S. 320.

42

NOVITATES ZOOLOGICAE.

VOL. XL, 1936–37.

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A Journal of Zoology

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EDITED BY

LORD ROTHSCHILD, F.R.S., PH.D.,

DR. ERNST HARTERT, AND DR. K. JORDAN, F.R.S.

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CONTENTS OF VOLUME XL (1936-37).

SIPHONAPTERA.

VERMES.

PLATES IN VOLUME XL.

ERRATA.

P. 2, line 11 from above read *Caprimima* instead of *Caprima*.

P. 5, line 2 from below read *Nosopsyllus* instead of *Nosopsylla*.

P. 45, line 17 from above read *Welwitschia* instead of *Welwitchia*.

P. 171, line 2 from above read *Peringia* for *Perygia*.

P. 289, line 28 from above read *Dasymys* instead of *Dasymus*.

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CONTENTS OF NO. I

NOVITATES ZOOLOGICAE

Vol. XL. AUGUST 1936. No. 1.

NEW SPECIES AND SUBSPECIES OF *CAPRIMIMA* (*LITHOSIINAE*, LEPIDOPTERA).

By LORD ROTHSCHILD, Ph.D., F.R.S.

1. **Caprimima shawmayeri** sp. nov.

♂. Nearest to *C. obliqua* Rothsch. 1901, but the outer $\frac{3}{5}$ of forewings deep shining blue instead of rufous chocolate. Legs, tibiae white, tarsi black with one white band; pectus black; head and thorax black, tegulae white, abdomen black, anal tuft greyish white. Forewing base black, basal $\frac{1}{3}$ white, obliquely dentate distally, outer $\frac{2}{3}$ deep shining blue. Hindwing apical $\frac{1}{3}$, abdominal margin and tornal margin black, rest of wing white.

Length of forewing: 12 mm. Expanse: 27 mm.

Hab. Zageheme, Cromwell Mts., 4,000 ft., East Finisterre Range, 20 June, 20 July 1931 (F. Shaw Mayer coll.), 2 ♂♂.

2. **Caprimima albicollis reducta** subsp. nov.

♂♀. Differs from *C. albicollis mendax* Rothsch. 1901 in the white patches on both wings being much reduced and in the ♂ having those on hindwings opaque, not semivitreous.

Hab. New Ireland, December 1923 (A. F. Eichhorn coll.), 1 ♂, 8 ♀♀.

3. **Caprimima coeruleomarginata insularis** subsp. nov.

♀. Differs from *C. c. coeruleomarginata* Rothsch. 1912 in having the outer black margin of the white band on the forewing much broader.

Hab. Goodenough Island, 2,500–4,000 ft., Aug. 1913 (A. S. Meek coll.), 4 ♀♀.

4. **Caprimima punctata** sp. nov.

♂♀. Pectus black; legs white, black bands on tarsi; head and thorax black, patagia partly golden yellow; abdomen black, anal tuft whitish grey. Forewing basal $\frac{3}{5}$ black with the greater part occupied by a large golden-yellow patch, outer $\frac{2}{5}$ brownish rufous, costa and termen black. Hindwing black, a golden-yellow spot in cell.

Length of forewing: ♂ 11 mm., ♀ 13–14 mm. Expanse: ♂ 24 mm., ♀ 28–30 mm.

Hab. Upper Setekwa River, Snow Mts., Dutch New Guinea, 2,000–3,000 ft., Aug. 1910 (A. S. Meek coll.), 1 ♂, 3 ♀♀ (♂ type); nr. Oetakwa R., Snow

Mts., Dutch N. Guinea, 3,500 ft., Oct.–Dec. 1910 (A. S. Meek coll.), 2 ♀♀; Mt. Goliath, Centr. Dutch N. Guinea, 5,000 ft., March 1911 (A. S. Meek coll.), 2 ♀♀.

5. **Caprimima simillima** sp. nov.

♂♀. Differs from *C. punctata* sp. nov. in its much smaller size, in the whole of the tegulae being golden yellow, and in the black outer area of hindwing having a purplish rufous chocolate apical patch.

Length of forewing: ♂ 9 mm., ♀ 10 mm. Expanse: ♂ 20 mm., ♀ 22 mm.

Hab. Upper Setekwa R., Snow Mts., Dutch N. Guinea, 2,000–3,000 ft., Sept. 1910 (A. S. Meek coll.), 2 ♂♂, 2 ♀♀; mts. inland from Huon Gulf, N.E. New Guinea (Ch. Keysser coll.).

6. **Caprima peculiaris** sp. nov.

♂. Pectus and underside of body black; palpi chocolate brown; legs brown, underside of tibiae and coxae white, tarsi white ringed with brown. Head black, tegulae golden-yellow, thorax and abdomen black, anal tuft greyish. Forewing above, basal $\frac{2}{3}$ black with very large golden-yellow patch, outer $\frac{1}{3}$ black with large rusty rufous-brown apical patch. Hindwing above golden-yellow, base and anal and tornal margins black, outer $\frac{1}{4}$ of wing black from vein 2 to apex. Underside of forewing has between the large golden patch and the apical brown patch a large area of paler yellow in which some of the scales are turned up, showing dark underneath.

♀ differs from ♂ in the restriction of the black on the forewing to outer margins and a black central band or line in the centre of the wing, and the brown apical patch is extended to tornus and is paler, while the golden-yellow is paler and more extended. Hindwing entirely black, with yellow median wedged patch from costa to vein 3.

Length of forewing: ♂ 14 mm., ♀ 15 mm. Expanse: ♂ 31 mm., ♀ 33 mm.

Hab. New Ireland, Jan. 1924 (A. F. Eichhorn coll.), 1 ♂, 5 ♀♀ (♂ type).

7. **Caprimima peculiaris flavidior** subsp. nov.

♀. Differs above from *C. peculiaris peculiaris* in the whole forewing being golden-yellow, the costal and terminal margins bordered with black, base and apex also black, a small reddish chocolate spot in the latter. The hindwing differs in the basal $\frac{2}{3}$ being golden-yellow, the abdominal margin and outer $\frac{1}{3}$ black, tapering from apex to tornus.

Hab. Talesea, New Britain, March–April 1925 (A. F. Eichhorn coll.), 2 ♀♀.

8. **Caprimima pseudaffinis** sp. nov.

♂♀. Differs from *C. peraffinis* Rothsch. 1912 in the much broader post-median black band and inner black margin of the forewing and the narrower white patch of the hindwing; and from *C. postexpansa* Rothsch. 1912 in the much broader black postmedian band of the forewing and in outer half of the inner margin of the forewing being margined with black.

Hab. Biagi, Mambare R., 5,000 ft., British New Guinea, March 1906 (A. S. Meek coll.), 2 ♀♀, type; Hydrographer Mts., British New Guinea, 2,500 ft., March 1918 (Eichhorn Bros. coll.), 1 ♀.

SIPHONAPTERA FROM WESTERN AUSTRALIA.

By MIRIAM ROTHSCHILD.

(With 19 text-figures.)

THIS interesting collection of Siphonaptera was sent to us by L. Glauert, in whose honour the new genus is named and to whom we tender our very best thanks. In addition to the new ideas described below, the collection contained some other species which we record here.

1. **Echidnophaga perilis** Jordan 1925.

5 ♂♂, 7 ♀♀, off *Thalacomys lagotis* Reid 1836, from Perth.

2. **Echidnophaga aranka** nov. spec. (text-figs. 1, 4, 5).

A pair was obtained off *Bettongia lesueuri* Quoi & Gaim. 1824, from Beverly, South-West Australia. This species is closely related to *E. macronychia* J. & R. 1906, with which it is compared in the following description.

♂♀. *Head.*—Angle of frons situated lower down, the proportional distance of the angle from the base of the antennal groove and the oral angle is 18 : 11, and in *E. macronychia* 14 : 17. Frontal marginal incrassation longer. Outline of frons from tubercle downwards straight or faintly concave. Genal process smaller, rounded off, and less curved backwards. Occiput, along dorsal line, about equal in length to the frons above the tubercle in ♂ and $\frac{1}{5}$ shorter in ♀. Longest bristle of second antennal segment reaches a fraction beyond posterior margin of head. Maxillary palp reaches to apex of forecoxa; proportional lengths of segments: ♂ 14–11–10–18; ♀ 15–13–12–18.

Thorax.—Lobe of pleura of prosternite shorter, not prolonged into a point. Metepimerum with 3 to 5 bristles in a row.

Abdomen.—As in *E. macronychia*. Sternite VII in ♂ with about seven slender hairs (each side).[1]

Legs.—Forecoxa broader, with hindmargin more strongly rounded. Proportional length and width (at widest) 39 : 20 (in *E. macronychia* 40 : 17). Hindcoxa with patch of 16 to 22 spines on inner surface. Lateral row of bristles on hindfemur with only 3 or 4 very weak bristles on inner surface. Foretibia with largest apical dorsal bristle only reaching apex of third tarsal segment. Two stout bristles at dorsal apical angle of the midtibia, the longest of which reaches to the middle of third tarsal segment; in *E. macronychia* it only reaches to apex of second. Hindtibia with fifth dorsal incision greatly reduced or absent; 8 or 9 strong bristles only, along the dorsal margin. Tarsi broader than in *E. macronychia*. Fifth segment of all tarsi with four pairs of lateral bristles, instead of five. First, second, and third segments of foretarsus of approximately equal lengths, the fourth a shade shorter. Second midtarsal segment only $\frac{1}{4}$ longer than first, instead of half as long again. Longest dorsal apical bristle of second hindtarsal segment does not quite reach to middle of 5th segment,

[1] Unless otherwise stated, all figures refer to both sides together.

while in *E. macronychia* it extends at least to apex of 5th segment. Basal projection of claw as large as in *E. macronychia*.

Modified Segments.—♂ (text-fig. 4): Stigma cavity $\frac{2}{3}$ length of antepygidial bristle. Sternite VIII bears three bristles in a row at right angles to ventral margin, situated some distance from distal margin; two upwardly curved bristles along ventral margin and 3 or 4 fine hairs situated irregularly on outer surface. Apical margin incurved above ventral apical angle. Manubrium of

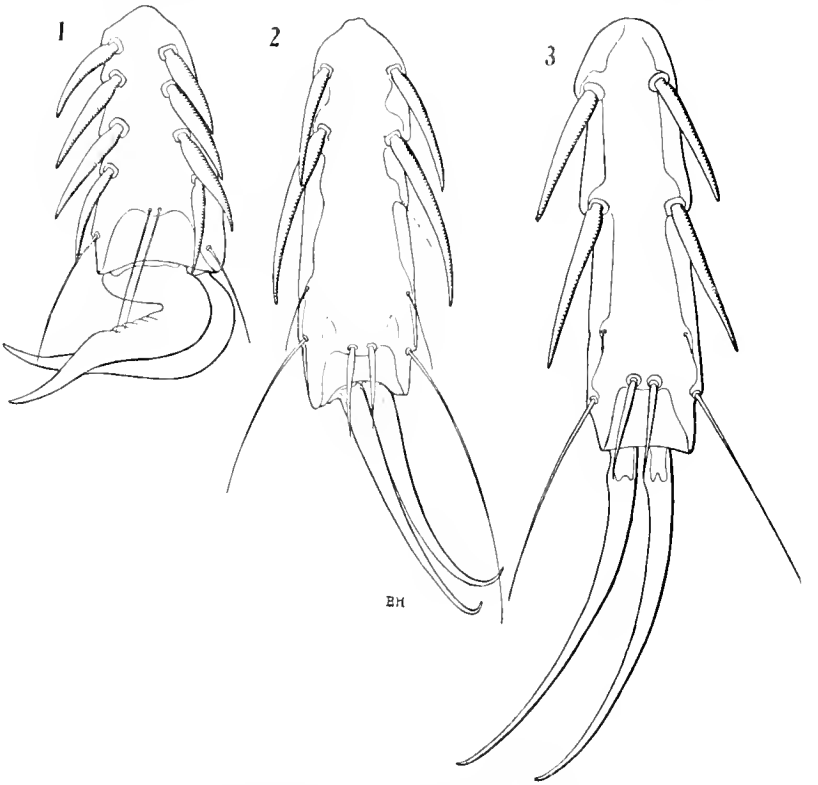

FIG. 1.—*Echidnophaga aranka*, midtarsal segment V, ♂.
FIG. 2.—*Echidnophaga ambulans ambulans*, hindtarsal segment V, ♂.
FIG. 3.—*Echidnophaga ambulans inepta*, hindtarsal segment V, ♀.

clasper slender, somewhat resembling that of *E. liopus* J. & R. 1906, except that terminal portion not turned upwards. Process P straighter than in *E. macronychia* with one thin longish bristle at ventral apical angle, and two more slender ones, equidistant from each other, on ventral surface, besides a number of apical and dorsal bristles. Process P^2 much shorter than in *E. macronychia*; its dorsal margin slightly convex, somewhat as in *E. liopus*. Finger F with ventral margin rather more strongly curved than in *E. macronychia*.

♀: Tergite VIII with fairly regularly rounded outline as in *E. macronychia*. Several bristles on outer surface near margin at apex, and one short, stout, very conspicuous spine-like bristle above these on inner surface. Stylet broader in

comparison with its length (ratio 7 : 5 compared with 7 : 4). In addition to the long terminal bristle, two bristles placed on ventral margin of stylet, of which the proximal one is considerably the longest. Receptaculum seminis very much larger (text-fig. 5) than in *E. marconychia* (text-fig. 6).

Length : ♂ 1·4 mm. ; ♀ 2 mm.

3. **Echidnophaga ambulans inepta** nov. subspec. (text-fig. 3).

2 ♀♀, off *Tachyglossus aculeatus ineptus* Thomas 1906, from Nolba near Geraldton. This is probably the West Australian subspecies of *E. ambulans*

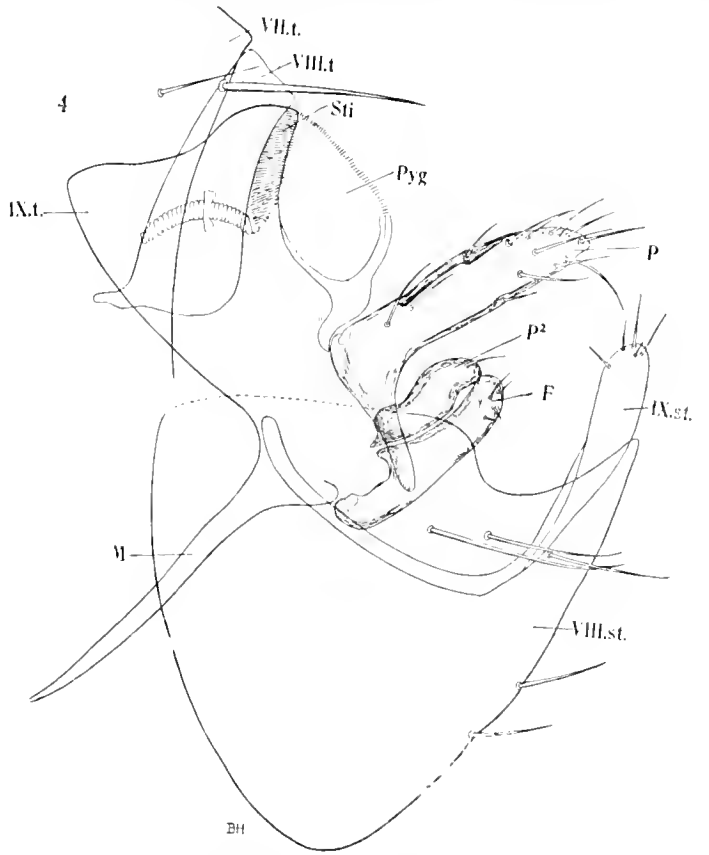

FIG. 4.—*Echidnophaga aranka*, end-segments of abdomen of ♂.

Olliff 1886. The main character for purposes of identification is the arrangement of the bristles of the fifth tarsal segments. The two pairs of stout lateral bristles are placed considerably farther apart (text-fig. 3), the second pair being situated slightly proximal to the middle of the fifth segment of the tarsus. In *E. ambulans* (text-fig. 2) the second pair is situated one-third from the base.

4. **Nosopsylla londiniensis** Rothschild 1903.

2 ♂♂, off *Tarsipes spenserae* Gray 1842, from King River, near Albany.

5. **Acanthopsylla woodwardi** Rothschild 1904 (text figs. 7, 8).

Ceratophyllus woodwardi Rothschild, *Nov. Zool.*, xi, p. 623, no. 16, tab. 10 fig. 41, tab. 11 fig. 42 (1904) (Perth).

Acanthopsylla woodwardi Jordan and Rothschild, *Ectoparasites*, i, p. 212 (1922).

1 ♂, off *Dasyurus geoffroyi* Gould 1870, from Cannington, near Perth.

Head.— Anterior row of frons with two spiniform bristles of which the lower

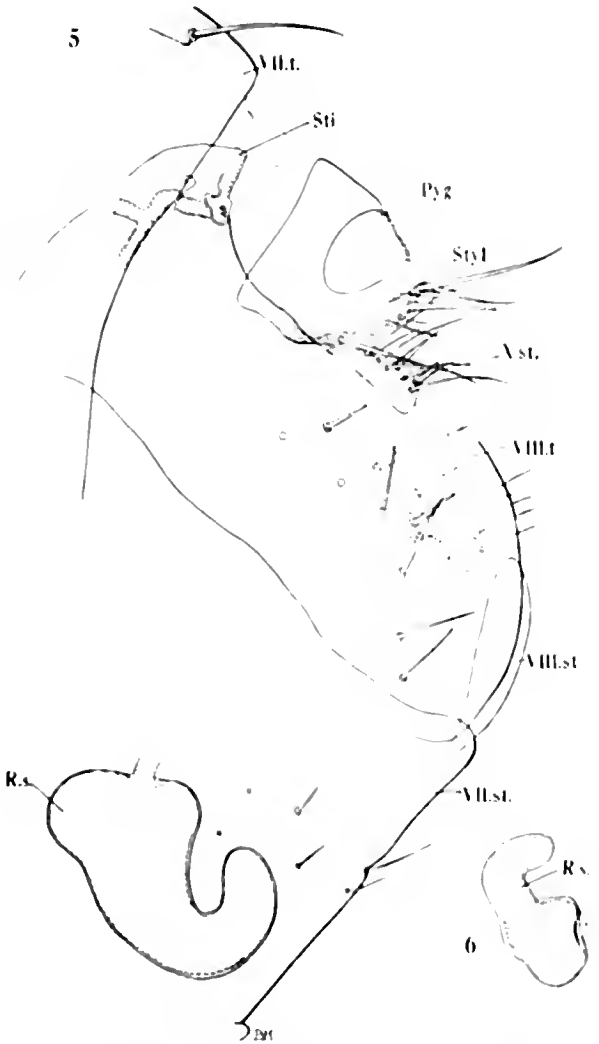

FIG. 5. *Echidnophaga aranka*, end segments of abdomen of ♂.
FIG. 6. *Echidnophaga macronychia*, receptaculum seminis.

is the longer, above them 1 stout bristle and below 3 medium sized bristles. In addition numerous fine bristles scattered over frons, and 7 stout ones, of which 3 are notably stronger than the rest and situated in following positions: (1) above eye close to antennal groove, (2) a short distance below first bristle in anterior

row, and (3) in front of the eye at the base of maxilla. Occiput with two oblique rows of bristles, each containing 10; submarginal row of 10 strong bristles; single large bristle above middle of antennal groove; 13–15 small bristles along antennal groove. Mouth parts as in the female. Antenna with 8 small bristles along margin of second segment, the longest of which does not reach beyond first segment of club.

Thorax.—Pronotal comb with 18 spines, 3 less than in female.

Abdomen.—All tergites bear 2 rows of bristles, with abbreviated third row in front. Tergites I to IV with vestigial combs of 1 spine each side. Tergite VII

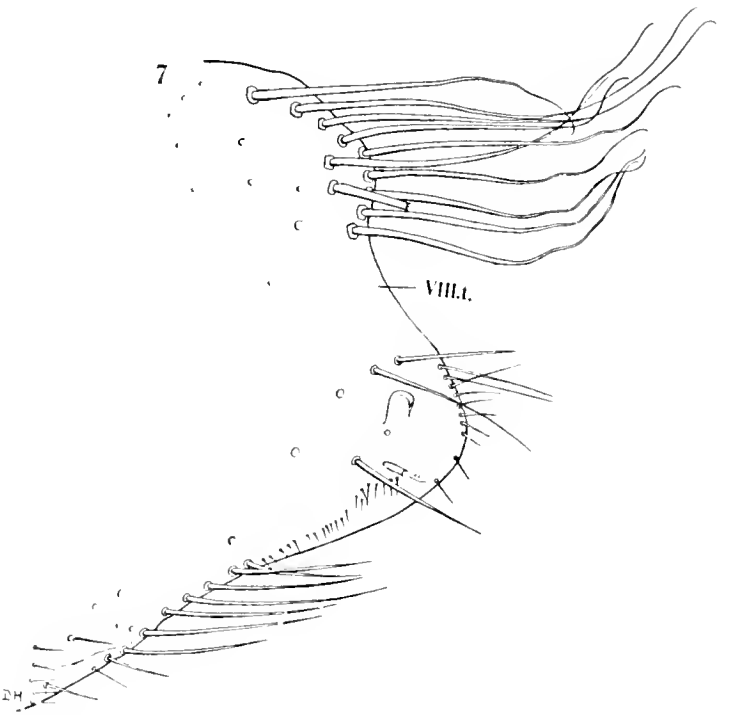

Fig. 7.—*Acanthopsylla woodwardi*, abdominal tergite VIII of ♂.

has complete row of posterior bristles, one of them placed below the stigma. Two antepygidial bristles, inner bristle shorter; ratio 5 : 7.

Legs as in ♀.

Modified Segments.—Upper portion of sternite VIII bears a submarginal row of 9 long whip-like bristles (text-fig. 7), close to it 3 more similar bristles and on lateral surface about 20 additional bristles scattered over the surface; lower portion somewhat resembles that of *A. rothschildi* Rainbow 1905, except that ventral margin is incurved from apex to half-way along its length. Margin in this region set with 9 very stout closely set bristles and several additional smaller submarginal bristles; apex of this ventral portion forms rounded lobe which is set with marginal row of 8 to 10 bristles which decrease in size from above downwards; just below this is an internal incrassation which marks the end of a

submarginal row of small bristles on the inner surface of the sternite. Clasper (text-fig. 8) large ; upper distal angle produced into strongly chitinised process P about twice as long as broad (at the base) ; ridge on inner surface studded with hairs, and a few fine bristles at the apex. Extreme posterior margin of clasper strongly convex. Finger F very large ; in general build it resembles that of *A. saphes* J. & R. 1922 ; apex broadly triangular in shape, projecting well beyond lower portion of clasper ; upper margin set with a submarginal row of small pale spines, while posterior margin bears a submarginal row of 14 stout bristles ; a few fine bristles sparsely scattered over outer surface. The general shape of vertical arm of sternite IX recalls that of *A. saphes* ; posterior margin forms

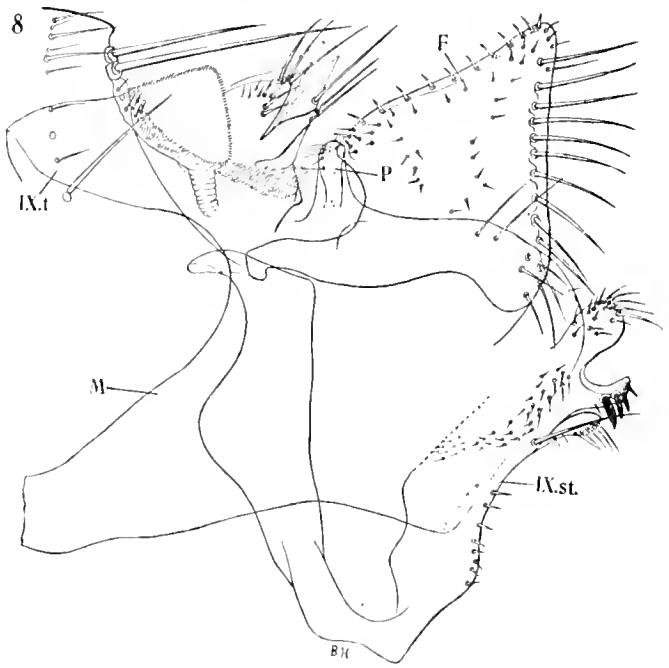

FIG. 8.—*Acanthopsylla woodwardi*, end-segments of abdomen of ♂.

nearly straight line, only slightly concave, reaching from posterior apical corner to elbow ; anterior apical angle prolonged into a long curved nose ; anterior margin deeply concave below nose and then slightly dilated before elbow, which is narrowest portion of sternite. Upper margin of horizontal arm membranous. Ventral margin almost straight, convex, a short distance beyond elbow, from which points extends a marginal row of short fine bristles. Terminal portion divided into 3 lobes (each side) ; most ventral lobe poorly chitinised and curved downwards, bearing 4 downwardly curved bristles at posterior extremity ; second lobe bears a rake of 4 spiniform bristles which decrease in size from below upwards ; a deep sinus separates this from third (uppermost) lobe, which is spatulate and covered with bristles, the heaviest of which are marginal in position. From the base of this lobe an irregular band of backwardly curved small bristles passes diagonally across outer surface of horizontal arm on to membranous portion of upper margin. Stylet-like lateral process of anal tergite bears 2 stout bristles

at apex. Paramere and lamina of penis generally resemble those of *A. rothschildi*; hood of paramere more rounded and lacks backwardly projecting hook-like process on upper margin; apex of ejaculatory duct exceptionally long, being seven times as long as it is broad at the base; in *A. rothschildi* it is approximately three times as long as broad.

Length: 3 mm.

Dr. Jordan suggests that this is the true male of *A. woodwardi*. The species described as such (1923, *Ectoparasites*, vol. i, p. 304) off *Conilurus albipes* Lichtenstein 1834, from Franklin Isle, I propose to rename **Acanthopsylla franklinensis** nom. nov.

Glauertia gen. nov.

This very interesting genus at first sight recalls *Leptopsylla* Rothschild 1911 on account of the shape of the head, but in all other respect agrees closely with the Australian genus *Acanthopsylla* J. & R. 1922. It is easily distinguished from *Leptopsylla* by the convex pygidium and the absence of the comb on the outer dorsal edge of the tibiae. It chiefly differs from *Acanthopsylla* in the shape of the head, the frons being angulated at $\frac{2}{3}$ from the ventral angle. The antennal groove extends to the vertex, nearly as in *Leptopsylla*, whereas in *Acanthopsylla* there is only a trace of the suture.

6. **Glauertia scintilla** spec. nov. (text-figs. 9–12).

A series of 1 ♂ and 5 ♀♀ off *Dromicia concinna* Gould 1845, from Tambellup.

♂♀. *Head.*—Frons angulated at $\frac{2}{3}$ from the ventral angle, lower portion inclining backwards. Frontal angle most forward portion of head; 4 bristles of anterior row, 2 above and 2 below angle, are spiniform; anterior row of bristles contains 5 strong bristles, 1 above and 4 below spiniforms; in addition numerous small fine bristles scattered over the frons, and there are long stout bristles in the following position: (1) on level with 4th spiniform about midway between anterior edge of antennal groove and edge of frons, (2) close to antennal groove a little distance above eye, (3) in front of eye, above maxilla, (4) immediately above maxillary palps. Eye well developed, but slightly reduced in size, placed low down in front of base of forecoxa. Occiput with 2 complete, almost horizontal, rows of bristles containing together about 10 bristles (each side of head); submarginal row of 12 strong and a few weak bristles; row along antennal groove containing 8 small and 2 long bristles. Antenna of ♂ $\frac{1}{6}$ as long again as that of ♀, which is

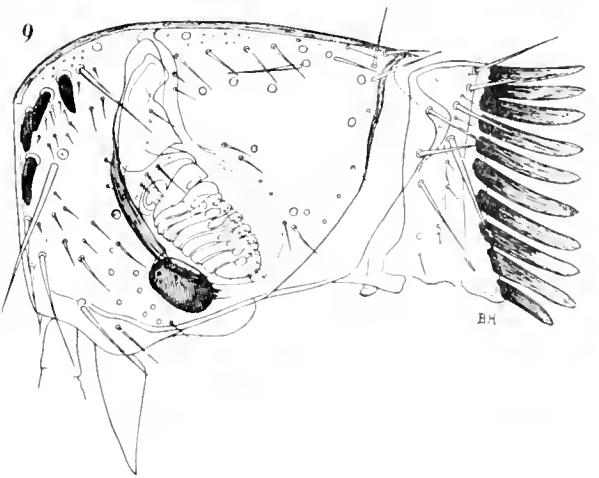

Fig. 9.—*Glauertia scintilla*, head of ♂.

subglobose; segment I bears 2 or 3 minute bristles; segment II bears 5 bristles along apical margin, reaching to second segment of club in ♂ and third in ♀. Maxillary palps reach to $\frac{1}{2}$ length of forecoxa in ♂, and $\frac{3}{4}$ in ♀, segment IV being longest; ratio of segments: 7, 7, 5, 9. Maxilla rather small, reaching to end of segment III of palp. Labial palps have 5 segments resembling those of *Acanthopsylla*, reaching to $\frac{1}{5}$ length of forecoxa.

Thorax.—Pronotum short, being only $\frac{3}{5}$ length of comb, and with comb about $\frac{1}{2}$ as long as mesonotum; comb with 20 teeth; two rows of bristles in

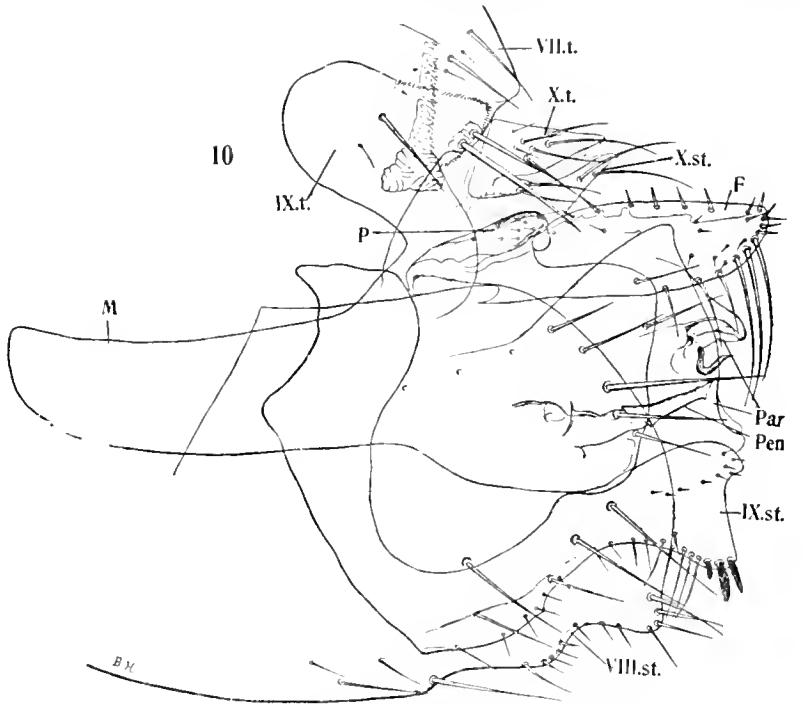

FIG. 10.—*Glauertia scintilla*, end-segments of abdomen of ♂.

front of comb, anterior row containing about 6, posterior row 10 bristles. Mesonotum with two rows of 10 bristles and 1 or 2 bristles in front of these representing an anterior row. Mesopleura with 6 strong and 1 fine bristle. Metanotum about $\frac{1}{3}$ shorter than mesonotum; two rows of bristles with vestigial third row of 1 or 2 bristles, first row with 10, second row with 11 bristles. Metepisternum with one long and one short bristle. Metasternum with one bristle. Metepimerum with 7 or 8 strong bristles and a few slender hairs.

Abdomen.—Tergites I to VII with two rows of bristles, anterior row containing 9, except segments VI and VII with respectively 6 and 12; a few bristles anteriorly represent a third row on anterior segments. One of the long bristles of posterior row placed below stigma. In ♀ stigma placed considerably farther anterior on tergites II to VI. Row of bristles on tergite VII incomplete, having only 4 strong bristles (each side) instead of 6. Thus there is no bristle below the stigma of this segment. Antepygidial bristles 2 each side, the inner being twice as long as the outer. Tergites II and III with vestigial comb. Basal sternite

with ventral pair of bristles and minute bristle in front in ♂ and 0 to 5 in ♀. Sternites III to VII with row of 6 to 8 strong bristles and in front 4 to 8 small bristles.

Legs.—Generally resemble those of *Acanthopsylla*. Forecoxa carries about 21 strong bristles on outer surface in addition to those of posterior margin. Midcoxa with 5 bristles forming a submarginal row on outer surface (apart from apical and marginal bristles). Hindcoxa with 6 or 7 bristles arranged in two rows on outer surface (apart from apical and marginal bristles). On inner side, close to apex, about 7 rather fine bristles. Forefemur with 6 to 8 fine bristles on outer surface and 2 on inner surface. No lateral bristles on mid- and hind-femora. Foretibia with bristles along hindmargin arranged in six incisions, 2 bristles each. Inner bristles of incision three and five, weak; additional fine bristles beside these incisions; a lateral row of 5 bristles; longest bristle of seventh incision in all tibiae about as long as first segment of tarsus. Midtibia with seven incisions; lateral row of 8 bristles. Hindtibia resembles midtibia; 10 lateral bristles. First three segments of foretarsus nearly equal in size, fourth smallest, fifth longest; two bristles longer than rest present on posterior margin of first segment; fifth segment bears 6 pairs of lateral bristles, first and third pairs being shifted slightly inwards, and fourth being subdorsal, sixth pair relatively weak. Four small apical spines in ♂ and two in ♀. Ratio of segments:

	Foretarsus	Midtarsus	Hindtarsus
♂	10 : 11 : 10 : 7 : 18	24 : 19 : 13 : 9 : 18	51 : 35 : 20 : 11 : 20
♀	12 : 13 : 11 : 8 : 18	26 : 21 : 14 : 10 : 18	59 : 38 : 21 : 12 : 22

Modified Segments.—♂ (text-fig. 10). Tergite VIII large. Cavity of stigma very long, reaching to dorsal edge of segment. Posterior margin marked by row of 4 strong bristles. Fourteen other strong bristles scattered somewhat irregularly over outer surface. Over 30 sensory pits on pygidium, which is strongly convex. Sternite VIII large, bearing about 16 bristles apart from the ventral marginal ones, 3 or 4 forming a submarginal row; ventral margin with two deep incurvings or shallow sinuses; a long strong bristle situated immediately before first sinus, which is the shallower of the two; 5 short bristles present between this and second sinus, in a row, the most anterior being the longest; apex is produced into rounded lobe set with 3 strong marginal bristles and a small one; a few fine bristles present along margin of second sinus. Manubrium broad and as in *Stivalius* resembles lamina of penis in shape. Clasper large; its dorsal angle produced into a strongly chitinised process P, with a few minute bristles on outer surface; lower angle round; a fairly stout bristle placed half-way along posterior margin and 2 slender bristles near dorsal angle, which is also rounded. Exopodite F rather slender; base narrow, the F suddenly broadens above P on dorsal side, being in this region a little more than ¼ as broad as long; dorsal apical margin set with row of small pale spiniforms; ventral (= posterior) margin at the apex bears 3 long stout bristles and several finer ones. Vertical arm of sternite IX resembles that of *Acanthopsylla rothschildi* Rainbow 1905, frontal angle of upper end being produced into a long pointed nose; portion adjoining horizontal arm is narrowest part of sternite. Horizontal arm slightly shorter than vertical arm; protrusion present on upper margin immediately before it broadens out to form apical portion, which is roughly triangular in

shape ; ventral apical angle more heavily chitinised and in addition to several slender hairs bears 3 spiniform bristles ; upper angle projects rather distad, is feebly chitinised and bears a number of minute bristles ; a few finer bristles are scattered sparsely over anterior portion of ventral arm, chiefly along ventral margin. Tergite X with fan-like arrangement of rather widely separated bristles on dorsal surface, with a lateral process as in *Stivalius* somewhat resembling

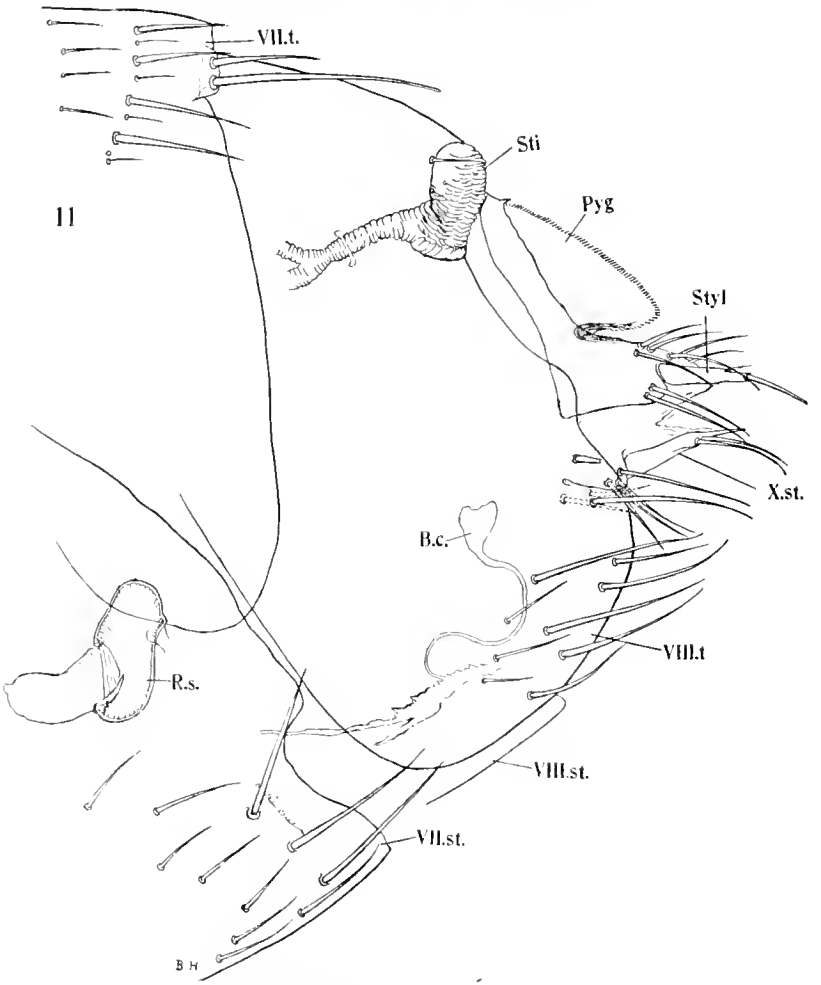

FIG. 11.—*Glauertia scintilla*, end-segments of abdomen of ♀.

stylet of female. Sternite X bears 2 strong bristles each side. Tendons of penis reach frontad beyond lamina of penis. Terminal portion of ejaculatory duct conical and strongly chitinised, with dorsal and ventral tooth. Lamina narrow posteriorly, but broadens out into paddle-shaped sclerite, the anterior end of which terminates in a pointed hook turned upwards, strongly recalling that of the allied genera *Stivalius* and *Pygiopsylla*. Paramere also resembles that of latter genus ; claw-like hook present at posterior extremity pointing downwards, and a tooth-like projection immediately below it, these forming together a pincer-

like structure. Membranal hood of paramere large and ventrally produced into an extensive flap.

♀. Sternite VII (text-figs. 11, 12) with 6 strong bristles in apical row. Before this between 14 to 23 bristles. Upper portion of apical margin slanting and about middle, somewhat convex. Sinus of medium depth somewhat variable in shape. Deepest above, strongly rounded, gradually becoming shallower ventrally. Lobe above sinus broadly rounded, projecting about as much as ventral lobe which is almost triangular in lateral aspect. A faint indefinite internal inerassation present on inner surface of segment situated at the sinus. Tergite VIII with ventral apical

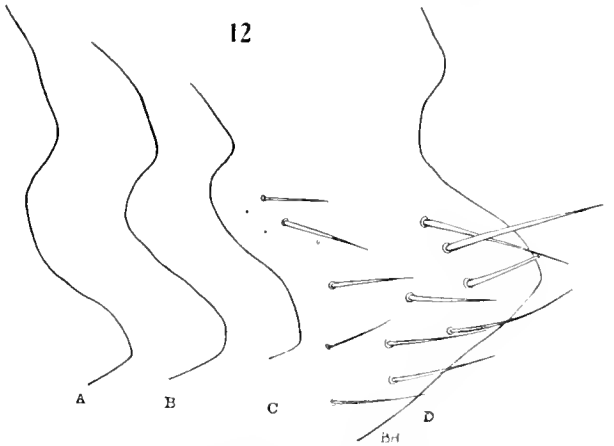

Fig. 12.—*Glauertia scintilla*, abdominal sternite VII of 4 ♀♀.

angle strongly rounded off. Apical margin slightly incurved below upper angle. Comparatively few bristles present. Outer surface bears 8 strong bristles and 4 to 6 smaller ones. Three strong bristles on inner surface near upper apical angle one behind the other, and a pale marginal bristle above ventral apical angle. Cavity of stigma only a little more than half as long as in ♂. Three minute bristles immediately in front of it. Upper margin of tergite X bears row of bristles and 2 bristles on the ventral surface below base of stylet. Anal segments greatly resemble those of *Acanthopsylla*. Sternite X bears a brush of 4 to 5 long bristles on proximal projection. Two curved bristles subapically each side. Stylet very slender, 4 times as long as broad at base. Stout bristle at extremity not quite double the length of stylet. Receptaculum seminis resembles that of *Acanthopsylla*. Tail deeply inserted in head and being $\frac{1}{3}$ shorter than the latter. Tail $\frac{1}{3}$ as wide as long, bearing small projection at anterior extremity. Head constricted and strongly ventricose near tail. Bursa copulatrix pear-shaped.

Length : ♂ 2·2 mm. ; ♀ 2·5 mm. to 3·2 mm.

7. **Leptopsylla segnis** Schönh. 1811.

1 ♀, off *Nyctinomus albidus* Leche 1884, from Dangin. A record of the mouse flea on the bat is interesting ; but its occurrence on this host is certainly accidental.

8. **Ischnopsyllus caminae** Rothschild 1903 (text-figs. 15, 18).

1 ♀, off *Chalinolobus morio* Gray 1841, from Irwin River, near Geraldton.

9. **Ischnopsyllus bathyllus** nov. spec. (text-figs. 13, 14, 17).

This species, of which 2 ♀♀ were obtained off *Nyctinomus australis* Gray 1838, is closely related to *Ischnopsyllus caminae* Rothschild 1903, with which it

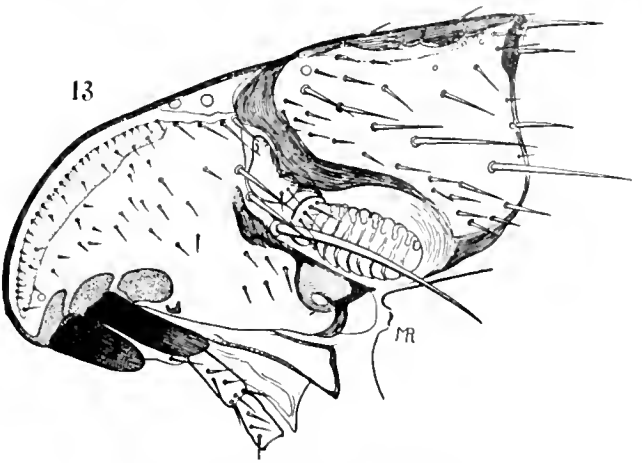

FIG. 13.—*Ischnopsyllus bathyllus*, head of ♀.

is compared throughout the following description. On the whole it is a more heavily chitinised species, with rather more numerous bristles.

Head.—Frons more rounded ; anteoral inerassation following contours of

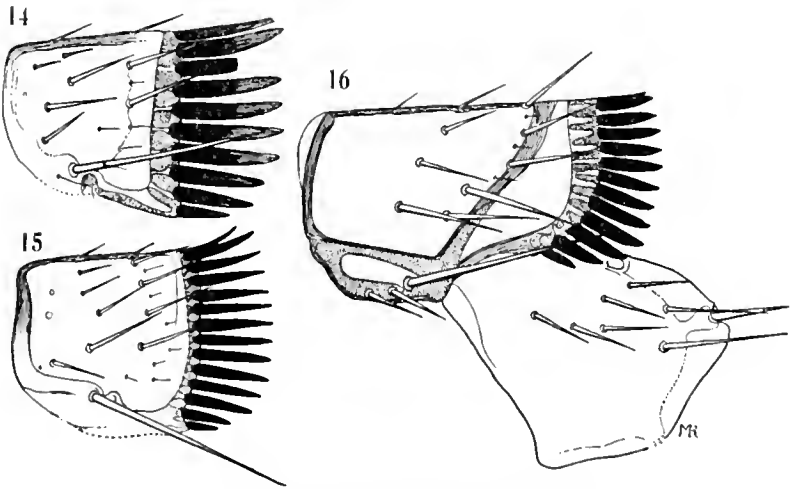

FIG. 14.—*Ischnopsyllus bathyllus*, metanotum.
FIG. 15.—*Ischnopsyllus caminae*, metanotum.
FIG. 16.—*Ischnopsyllus carinus*, metanotum and metepimerum.

frons broader. Small bristles on frons rather more numerous and stronger. Genal spines of stronger, blunter build, with ends more rounded ; anterior spine larger in comparison with posterior spine. Preoral tuber broader. Eye more distinct. Occiput with 12 bristles along posterior margin of antennal groove ;

in *Ischnopsyllus caminae* only 5 to 7. Shallow incrassation present on dorsal margin of occiput as well as pronotum half-way along its length.

Thorax.—Hindmargin of pronotum straight, whereas in *I. caminae* it is curved. Pronotal comb with 22 to 24 spines, the spines set in a straight row following the margin of the pronotum. Mesosternite bears more bristles, 12 to 16 (each side). Metanotal comb has only 18 to 20 spines, the comb stopping at ventral angle of tergite. Metepisternum slightly narrower (dorso-ventrally), bearing one strong bristle and one small fine one. Metepimerum with 12 bristles.

Abdomen.—Vestigial comb of first tergite missing. Number of teeth in other five combs are in the two specimens 14 (17), 13 (14), 11 (10), 11 (10), 11 (12); which is considerably less than in *I. caminae*. Sternites III–VI with 6 to 8 bristles, at least some of the sternites with 8, whereas in the examples of *I. caminae* in the N. C. Rothschild collection there are only six bristles on the sternites.

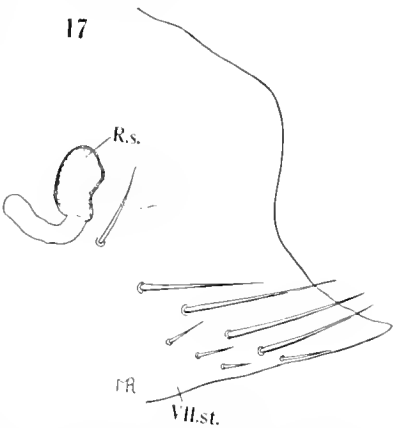

Fig. 17.—*Ischnopsyllus bathyllus*, abdominal sternite VII and receptaculum seminis.

Legs.—Chaetotaxy of legs resembles that of *I. caminae*, but proportion of tarsal segments different. Long bristle on hindmargin of forecoxa placed higher up. Proportion of foretarsal segments: 13, 15, 13, 10, 19; in *I. caminae* 10, 10, 8, 5, 11. First segment of mid- and hindtarsus less than twice the length of fifth segment; in *I. caminae* more than twice the length.

Modified Segments.—Number of bristles on sternite VII (text-fig. 17) very variable. Apical sinus deeper and broader. Outline of tergite VIII not very distinct. Apical margin marked by a row of six bristles. Fourteen bristles scattered irregularly over whole outer surface and six smaller bristles on inner surface near margin. Tergite X bears numerous short fine bristles scattered all over the surface, of which none are as long as terminal bristle of stylet. Sternite X bears several long stout marginal bristles and five lateral bristles (each side), of which one or two are longer than terminal bristle of stylet. Stylet approximately twice as long as wide at base. Receptaculum seminis with head and tail longer than in *I. caminae* (text-fig. 18); head being twice as long as broad.

Length: 2·2 mm. Locality: Carnamah, 150 miles N. of Perth.

10. **Ischnopsyllus earinus** nov. spec. (text-figs. 16, 19).

This species closely resembles the ♀ of *I. caminae*, but there are probably much more distinctive characters in the unknown male. The single specimen was obtained off *Eptesicus pumilus* Gray 1841 at Tambellup.

Head.—Tuber behind genal spines broader than *I. caminae*.

Thorax.—Pronotal comb with only 26 spines. Mesopleura with 12 to 14 bristles (each side). Metanotal comb curved as in *I. caminae*, with 27 spines. Metepisternum with two small bristles in addition to single large one. Metepimerum with 8 bristles.

Abdomen.—Vestigial comb of tergite I represented by one spine each side.

Number of teeth in following combs 23, 22, 21, 20, 20 (in the two sides together). Chaetotaxy of sternites resembles that of *I. bathyllus*.

Legs.—Chaetotaxy as in *I. caminae*, but proportion of segments of tarsi intermediate between *I. caminae* and *I. bathyllus*. Segment II of foretarsus longer than I, but midtarsal segment V half the length of I. Fifth hindtarsal segment V less than half length of I.

Modified Segments.—Sternite VII with two, somewhat irregularly arranged,

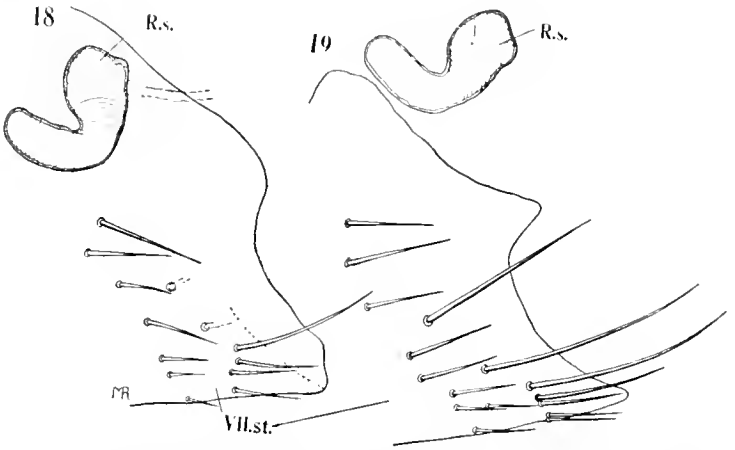

FIG. 18.—*Ischnopsyllus caminae*, abdominal sternite VII and receptaculum seminis.
FIG. 19.—*Ischnopsyllus carinus*, abdominal sternite VII and receptaculum seminis.

rows of bristles, anterior row containing 10, posterior row 7 bristles (each side). Lobe above sinus projects farther than in *I. caminae*, and its apex is pointed. Tergite VIII resembles that of *I. caminae* in outline, but the number of bristles is much larger, approximately 25 bristles being scattered irregularly over outer surface, 3 or 4 of these situated close together immediately below pygidium and placed in a vertical row (not horizontal, as in *I. caminae*); row of 12 closely set bristles near posterior margin.

Length : 2·3 mm.

Acknowledgments.—My very best thanks are due to Dr. K. Jordan, F.R.S., for help and advice, and to Miss B. Hopkins for executing the majority of the figures.

DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA.

NARRATIVE.

By DR. KARL JORDAN, F.R.S., F.R.E.S., F.Z.S.

(With 14 maps and photographs.)

SOME years ago certain continental biologists experimenting with insects cut off the heads of some species and replaced them by the heads of other species in order to ascertain whether this grafting would be as successful with insects as it is with plants. The experiments were a failure. I was reminded of this queer optimism when I gazed early in October 1933 for the first time on Walfish Bay and its hinterland. Here an experiment of a similar kind had been made about half a century ago by two statesmen who, in their wisdom, had decided to separate the head from the body, the one walking away with Walfish Bay in the sack, and the other, thankful to have managed to keep the rump, hoping that by the application of powerful stimuli another efficient head could be grown. The war has brought much unhappiness to the world, but here and there existing anomalies have been cleared away; South-West Africa has much benefited by the restoration of Walfish Bay to its hinterland. The connexion with the rump is still precariously loose, only a narrow-gauge railway connecting Walfish with the terminus of the main railway at Swakopmund, and this only when the Swakop R. is dry, the bridge built after the war having been swept away by the river in flood, as if Old Man river were dissatisfied with the mandatory system. Improvements are slow in a poor country on which nobody but the Union will spend money *à fond perdu* under present circumstances; but progress is certain, the excellent harbour being the natural outlet for the country.

I did not expect to find so many buildings behind the harbour, a township in infancy, most of them built in the sands of the Kuisep R., and backed by dunes as far as the eye can reach, with a good water-supply from inland and a busy life when a boat has come in, a fleet of whalers lying in the offing. A fellow-passenger, an engineer, had told me that he had planted an avenue of trees at Walfish (= Walvis); and as trees suggest caterpillars, I had my first disappointment on African soil: I could not find the trees until I realized that they were right in front of me, but had failed to catch my eye. When our boat was gone and the luggage been passed through the customs and handed over to the forwarding agent, all was quiet, and the embryo town fell asleep to dream of its future.

The object of my visit to South-West Africa was a double one: to see the country about which I had heard and read so much, and to make zoological collections. Neither the British Museum nor Lord Rothschild's Museum at Tring had much material from South-West, and I hoped to supply at least to some extent what was wanted. Moreover, a country with a hot, dry climate to the rigours of which animals and plants are adapted in many queer ways is of great interest to the biologist. A further inducement to choose South-West Africa for a visit was a more personal one: a near relation and her family lived

on a farm in the highlands near Windhoek, where I could leave the bulk of my equipment, taking only what was required on each of the excursions planned. My young and energetic cousin, Else Lütgens, met me at Walfish Bay the day after my arrival and took charge of myself and my belongings. She had come down to Swakopmund with a lorry, and we arranged with the forwarding agents, Messrs. Brasch & Winderstein, that the lorry be loaded up at Walfish and then return to Swakopmund to pick me up and to take us to our destination some 400 km. inland.

During the railway journey to Swakopmund, 33 km. from Walfish, I saw crowds of sea-birds, most of them cormorants, perched on platforms erected in the water close to the shore by enterprising merchants in fertilizers. There was hardly any vegetation until we crossed the bed of the Swakop R., where tamarisks and herbage covered the ground. My cousin had arranged for me to stay the night at the comfortable hostel attached to the German Hospital, whereas she returned to Walfish to supervise the transport of the luggage, which she hoped would be at Swakopmund next morning. In the garden of the hostel a pair of weaverbirds were busy building nests, for play rather than for the serious business of raising a new generation, the season being still too early. The lorry arrived when it was almost dark. The load being heavy and the sand not having set hard enough (there is no road from Walfish), the transport had been a very arduous task.

It was 7 p.m. when we were ready to start, my cousin, myself and a black driver. Windhoek has an altitude of 1,650 m., and the farm Hoffnung about 1,850 m., so it was uphill all the way. For the first 100 km. hardly anything but sand and stones was visible in the landscape so far as it was lit up by our headlights, then scattered vegetation appeared, a small hare (*Lepus capensis*), startled by the lights of the lorry, ran for a short distance along the road, bushes became more numerous, with stunted trees among them, and we had the driest part of the coastal desert belt, the Namib, behind us. The road was better than I expected, with few places in disrepair ; but for long stretches the surface was transversely rilled like corrugated iron, shaking the lorry considerably and keeping us awake. Towards midnight we were in the neighbourhood of Usakos ; my cousin produced sandwiches and thermos flask, and we stretched our legs for a little while. At 7 a.m. we saw in the distance the tall trees of Okahandja. After the twelve-hours' run (about 300 km.) from Swakopmund the Hotel Müller was a most inviting sight ; we were ready for a good breakfast. The distance from Okahandja to Windhoek is less than 100 km. by road (69 by rail), and we expected to reach Windhoek before luncheon. On our way from the coast we had had a little trouble with the engine and tyres, but that was nothing as compared with what unkind fate had in store for us ; one accident after another delayed progress, as if fate wished to impress upon my mind the picture of a dead landscape under a fierce sun. The ground under bush and tree was bare sand or stones, most trees looked dwarfed and crippled, only in flat places and depressions large Acacias gave a hint of what the country would be like in the rainy season. Notwithstanding the general barrenness there were some bushes in flower, recalling a white-flowering Cistus of the Mediterranean countries and thriving when everything else seemed deeply asleep. Half the afternoon had passed away when at last some houses of Windhoek appeared in view, and we could now hope to get there before the punctured front tyre gave way altogether.

First impressions are stored in one's memory. The town on a wide slope with a background of hills was a most pleasing sight after the long drive. We left the lorry to follow when it had been put in order and went on in my cousin's car to her home, Hoffnung, less than 20 km. farther east, where Hans Lütgens, the husband of my cousin, acted as bailiff.

Hoffnung is a fine property of 18,000 hectares, lying on the north side of the railway to Gobabis, comprising a plateau with the main buildings, gardens and large dam, and stretching away into the mountains and beyond: the view from the plateau southwards across a deep valley, with the Auas Mountains in front and Khomas Highlands to the right, is beautiful and very extensive. Trees, bushes, rocks, sand and loam, and herbage below the dam promised to provide fair hunting-grounds for my purpose. Thanks to the courtesy of Herr Piepmeyer, the representative of the owners of the farm, and the loving solicitude of my relatives, I was comfortably installed and could organize my expeditions into the country.

The question of transport and assistants was soon settled. I bought at Windhoek a Chevrolet lorry to carry a load of a ton and a half, and engaged two German gentlemen, agriculturists who had been in the country for some years and were disengaged at the time. Herr Walter Hoesch had been recommended to me by Professor E. Stresemann, Berlin, as an ornithologist who knew the birds of the South-West; and Herr Werner Bartsch, a friend of my relations, would drive the lorry and take care of the commissariat. Two servants of Herr Bartsch, a Hottentot and his stepson, a Herero, were likewise to accompany us. Neither Herr Bartsch nor Herr Hoesch had ever made a skin for museum's purposes, but they soon learnt to skin small mammals and assist in collecting insects, lizards, frogs and all else I required for the British Museum. We had a pleasant time together and amicably shared the troubles and pleasures which one meets with on expeditions into the wilds.

These preparations required several visits to Windhoek, where I also had to pay my respects to the Administrator of South-West, present my credentials to the Secretary and see other officials. The Foreign Office, through the High Commissioner of South Africa in London, had recommended that all facilities be given me which were in the power of the Administration to grant to a biological expedition. Everyone was most helpful, and I got permission to collect any mammal or bird I wanted, with certain restrictions as to big game, particularly in the game reserves. As I had no intention of molesting giraffe and elephant if I should come across them and had no desire for trophies of the usual kind, I could easily keep to the letter and spirit of the general permit. Our plans were made, but several weeks elapsed before all was ready for a start. The time of waiting I employed in making a miscellaneous collection on Hoffnung, where some rodents, carnivores and reptiles were obtained and moths caught at my acetylene lamp. The only butterflies on the wing at this time of the year were *Pyrameis cardui*, *Hypolimnas misippus* and a few common *Pieridae*. Under stones there were beetles; scorpions and spiders, occasionally a gecko. Some Tenebrionid beetles and weevils were crawling on the ground, keeping quiet when approached, and a large Carabid, *Anthia*, was not rare even at this season, being often seen close to the house; man and beast avoided it on account of the strong-smelling liquid it ejects from the tail-end and which has given it the name of vinegar-beetle. The water in the dam was reduced to a muddy pool; there was no insect life on

the mud except a few Hymenoptera which came to drink. The most conspicuous among them was a large blue-black fossorial wasp (*Hemipepsis rindex*) which sailed through the air with the noise of a miniature aeroplane, a common insect met

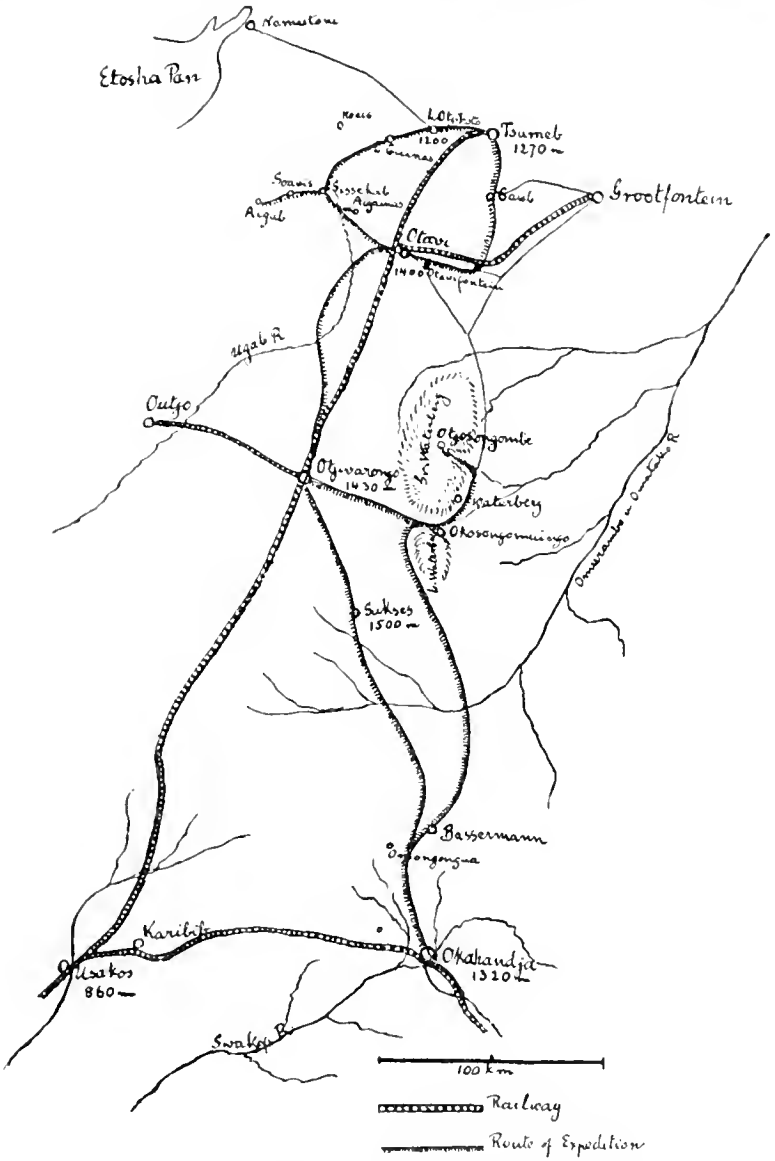

FIG. 20.—South-West Africa: northward route of expedition.

with again in many other localities in South-West. At an outpost of the farm, at Bellerode, natives brought me an aardwolf, *Proteles cristatus*, rare in these mountains. There were many burrows of the aardvark in the hill valleys, most of them old; baboons were frequently seen, and I was told that they sometimes came into the gardens. A colony of *Pedetes caffer* was observed near Bellerode,

these spring-hares coming out of the burrows at night, their eyes reflecting the light of the car ; the colony was later on wiped out by the flood. We tried in vain to trap a leopard which came to a water-hole in the hills ; he was too wary to be attracted by the bleating of a baby goat. A pair of ostriches sought safety in flight, the parents right and left and the two youngsters in between, the parents with a tumbling run as if pretending to be hit or trying to avoid a straight bullet ; we only looked at them. Hans Lütgens told me that the pair had had a large family, gradually reduced to the two we saw, probably due to decimation by leopards. Dassies (*Procavia*) were plentiful in the outcrops of rocks in the hill-sides ; they are easy to shoot, but difficult to obtain, as they slip down into the burrows and crevices if not killed instantaneously. The gizzard of a guinea-fowl I shot in the hills was crammed full of the spiky seeds of *Tribulus*. On a visit to Herr Blaschke's beautiful gardens at Klein Windhoek I inspected the tunnels driven into the hill-side for collecting the hot water for which this district is famous and found large colonies of four species of bats in them. One of the tunnels was occupied by *Rhinolophus aethiops* and *Rh. augur*, and the other by *Miniopterus smithianus* and *Nycteris damarensis*. I caught and examined many of these bats, but obtained only one specimen of a flea and a remnant of a dead *Cacodmus*, of the bed-bug tribe. The flea was a ♂ of a species described by Waterston from a single ♀ collected on a bat in a cave in the Transvaal. Although the water was little more than a trickle, the evaporation was strong and therefore the walls very damp and unfavourable for fleas to breed in.

South-West has sometimes a short rainy season in October–November, but this year no rain came. Though clouds formed occasionally when the wind was from the east, the much-needed rain remained an unfulfilled hope. For several years there had been too little rain ; the cattle suffered from lack of food and water, and in some districts a large percentage of them perished. Wild animal life cannot be expected to be abundant in such conditions, the struggle for life being too severe. I was aware of these circumstances when planning the expedition to South-West and deliberately chose to arrive during the dry season for a very definite object. The reports on the country mentioned the existence of permanent water in a number of places, deep small lakes like Lake Otjikoto, pools in river-beds, caves and fissures, and small brooks, in which fishes, frogs and crabs had been observed, but evidently never collected. For a visit of such places with the purpose of obtaining the fishes, etc., which were said to occur, the dry season, when the water was restricted, would be much more favourable than the wet season, when there might be too much water. I had written from England to Herr W. Hoesch, asking him to make a list of the places where we might expect to find fishes or where fishes were known to occur, and to ask the owners of the farms for permission to collect on their property for museum's purposes. Our excursions, therefore, were planned primarily in accordance with that object.

We started the last week in October, travelling via Okahandja northward across a flat sandy country, an open woodland with dry valleys and dry river-beds,[1] both little more than slight depressions, along which the trees were less stunted and the bush a little denser. Though on the whole rather monotonous, the landscape not showing much variety, the drive was not without its interest.

[1] A river-bed is called *rivier* in South-West. A road or a track is a *pad*. The natives address the white man as Mister ; not Baas, Herr or Master. "Willst Du diese Maus haben, Mister ?"

We were, of course, always on the look out for anything that flies, runs or crawls. Not far from Okahandja we found a female koodoo hanging in wire-fencing and vainly struggling to free itself. We managed to disentangle it by bending the wires, and the animal ambled away evidently uninjured. Later in the day we saw a male dead and decayed in the wires, having been similarly entrapped when jumping the fence. A few eland, hartebeest and jackal were seen, and now and again a bustard (*Otis afroides*) shot noisily into the air as if catapulted straight up to 30 ft. or more and slowly planed down, alighting not far from the place where it had been flushed by the noise of the lorry. Engine trouble prevented us from reaching our destination. Long after dark the lorry refused to go any farther. As we learned later on, the Chevrolet engine has the trick of stopping when on a dead point; by pushing the lorry forward and backward the engine can be started again. It was fortunate that we were close under the Little Waterberg and only a few minutes' walk from Okosongomuingo, where we were most hospitably received by Frau Elisabeth Schneider and put up for the night. The place fascinated me when I saw it next morning in bright sunshine. I knew it from Dinter's description, who, years before the war and before the present house was built, collected on the mountain-side along the swampy banks of a rill of water several dozen plants then new to science. The water is now harnessed for household purposes, and most of the plants have probably disappeared. Our hostess is a keen botanist, and has constructed in front of the house a large rock-garden containing many interesting succulents. A new species discovered by her on the Waterberg is named after Frau Schneider *Lithops elisabethae* Dinter. The house is built on the side of the mountain well above the plain and affords a fine view of the wide gap between the Little and Great Waterberg. It is the most attractive of all places I have seen since in South-West, and I left it with regret. We were bound for Otjosongombe on the other side of the Great Waterberg. The distance not being great, we started some time after luncheon, trusting to arrive well before nightfall. All went well until we were going up the valley leading to Otjosongombe, when the Chevrolet again struck and would not budge another inch. However, we were not far from the farm and soon had help. Herr and Frau von Flotho and their sons bade us a cordial welcome, and here we stayed as paying guests for over a week.

The valley of Otjosongombe gradually rises and narrows and at about 1,600 m. ends abruptly, the sides being nearly perpendicular, and on the more shady side densely covered with forest. The Waterberg is a table-mountain of sandstone, with flat top and "Kranz," the surface of the top being broken by fissures and ravines. At the head of the valley there is a clear spring, which originally formed first a peaty swamp and then a small brook, but the water is now led in pipes to the house and garden. The gutter carrying the water overhead from the mountain-side to the buildings leaked and splashed over, the flat piece of ground behind the house being well watered, and here various species of butterflies disported themselves, the place being gay with several species of plants in flower. On a sticky *Boerhavia* I found the green and blackish forms of caterpillar of *Hippotion eson*, a species widely distributed in Africa south of the Sahara. The butterflies were mostly *Teracolus*. I consider Otjosongombe to be a very good collecting ground in and after the wet season. Though there were no fish and crabs, we made a good general collection, including a rare bat caught with a butterfly-net over the pool in the garden where a number of common bats

(*Rhinolophus*) were flying round and round. In the valley we found some burrows of a mole-rat (*Cryptomys damarensis*, formerly included in *Georychus*) and trapped a series of specimens showing great variability in the number and size of the white markings. The flea on them was the common *Xenopsylla brasiliensis*. One evening I noticed one of the dogs, a puppy, in the lucerne behind the house busy chewing something, and on inspection found that he had stolen four or five of the skins which I had left on a shelf pinned down to dry; after that experience I kept the door shut. A hyaena (*H. brunnea*) caught in a trap provided a small series of a species of flea (*Echidnophaga larina*), the fleas being still fastened to the skin by the proboscis when the dead hyaena was brought down to the farm. It was too early in the season for moths, the numbers attracted being but small. One night, when out in the wood with the lamp, we saw on the ground an ant hanging on to a beetle, and on further search found two more; it was a species of *Paussus*, the ant having the flat antenna of the beetle firmly in its jaws. It looked much like a small boy leading a cow on a halter. We had accidentally placed the lamp on a clear piece of ground where there was an underground ants' nest, many ants coming up through small holes. It was not a fierce species, but we shifted the lamp. Another night Herr Hoesch nearly trod on a spitting cobra; the snake was lying across the path before the garden gate and Hoesch saw just in time that it was not a stick. The species is known to be attracted by human dwellings. To my regret the specimen, 5 ft. long, was summarily dealt with by a neighbouring farmer, who cut it in two with a hoe. Though we had as yet had no rain, the approaching wet season was heralded by toads (*Bufo regularis*), which lived in the pond and the irrigation ditches, concealed in daytime under stones and herbage, their deep, hoarse, guttural croak sounding like "poap-poap-poap," each croak separated from the next by an interval a little longer than the croak. Our host laughingly explained that these were the papists, the first in the field, and that the Lutherans, with their uninterrupted high-pitched "lutter-lutter-lutter," would appear after the first rain. In the fairly deep pond which I tried for water-insects I obtained some specimens of a glossy black toad with webbed feet (*Xenopus laevis*), which appears to be mute; at least, I never heard it make a sound wherever I found the species. It is a queer, slimy-looking creature, which Herr von Flotho told us was accidentally introduced from Outjo with the spawn of carp. A few lizards were obtained lower down the valley where the soil was more sandy. After a stay of nine days we had to leave according to our programme. I should like to visit the friendly place again at a season more favourable for insects.

It was a long run from Otjosongombe via Otjivarongo northward to Otavi. When we had the Waterberg district behind us, we traversed again an undulated plain with hills in the distance. Small limestone ridges made the old road from Otjivarongo northward tiresome for us and going was not too good. As was often the case on this and the next excursion, our calculations as to the time of arrival at our destination were upset by little mishaps which caused delay, and it was long after darkness had set in that we reached Otavi, dusty, hungry and thirsty. The circle on the map of South-West representing Otavi is bound to mislead the traveller fresh from Europe; he expects to find at this junction of the railways from Tsumeb and from Grootfontein a larger settlement than met my eye next morning. I made up my mind to regard in future the circle with a dot in it as indicating an embryo township, so that I should be agreeably surprised

if I found a settlement which had risen above this early stage. It would not take long to count the houses of Otavi, but, nevertheless, the place serves the present needs ; the traveller and the farmer find what they require in the stores, bakery, smithy and so on. The essentials of a township are there, and Otavi will grow to a larger community when the country becomes more populated, living on its own agricultural products rather than on imported goods paid for by the exportation of cattle. It lies at the foot of hills, with good arable land in the neighbourhood and mines in the hills, and has the prospect of becoming in time the busy centre of a prosperous district.

There had been some rain, but not sufficient to interfere with travelling by road. We were bound for Sissekab, a property situated, as the crow flies, about 40 km. north of Otavi. The owner, Baron von Maltzahn, had very kindly invited me to stay with him. The country between Otavi and Sissekab is mostly covered with bush and low sturdy trees, open ground of any extent being the exception. We were now north of the southern limit of distribution of the *Hyphaena* palm, groups of which were seen at intervals. The road was firm, but rough in places, the limestone cropping out now and again, and stones and boulders frequently covering the ground between the bushes. It was rather bold of me to inflict three Europeans on the hospitality of Sissekab, but our reception by the Baron and his family was so hearty and gracious that my qualms disappeared and we fitted outselves into the life at Sissekab without much ado. The property lies in bushland. On a large piece of open ground in front of the house there are several permanent open water-holes, which are small and not very deep and do not belong to any river system, but are fed by springs direct out of the ground, the water in the main pond being pleasantly cool for an afternoon dip. I did not find any animal population in the ponds except water-beetles and dragonfly larvae. We met here Herr Hoch, the owner of a neighbouring farm, Soavis, who at once took as great an interest in our pursuits as Herr von Maltzahn and his family, and it was from him that I received several species of reptiles not seen at Sissekab. Among them was a *Varanus*, apparently dead, which I put into a petrol tin filled with a 4 per cent. solution of formalin, alcohol being too precious for this large lizard. The hole of the tin, closed with a piece of wood wrapped in cotton-wool, was open the next morning and the *Varanus* gone. Shamming death, and my disposition to reserve the alcohol for smaller reptiles, had saved its life.

Some time before our arrival Sissekab had been honoured by royal visitors, a couple of lions, which had taken toll of Herr von Maltzahn's cattle, and probably were still in the neighbourhood. Our traps were put in likely places, and three guns went out next morning on the alert for great happenings. But it was not the hoped-for roar that greeted them, but a continued squeal ; one of the Baron's pigs was caught in a trap. However, there were other and more dangerous creatures in the woods around Sissekab. One morning Herr Hoesch, when walking along a path to inspect some nooses, heard a rustling noise, and in turning round saw that a snake was following him, a black mamba, $2\frac{1}{2}$ m. long, an unpleasant companion which he shot. I preserved head and neck for the purpose of identification (*Dendraspis angusticeps*). The small viper, widely distributed in South-West, also occurred at Sissekab. As a rule, this snake is sluggish and does not move if placed in a bag ; the small specimen, however, which Herr Hoesch had in a butterfly-net was very exeited and went

for the stick with which Herr H. touched it. When I held a bit of cotton-wool saturated with a weak solution of nicotine near its head, the snake quickly turned away and tried to escape. Injection of a drop of nicotine is the quickest way of killing a reptile, amphibian or mammal, death being instantaneous.

In this limestone region are a number of caves, of which some are well known to the farmers, while others are a secret of the bushmen, who live a roaming life in these extensive woods. To visit some of these caves was the main object of our stay at Sissekab. The first cave we explored was Aigamas, in the hills south-east of Sissekab and about one-third the way to Otavi, where fishes had been observed, but never caught. The cave is on an abandoned property in the woods, its entrance being situated on a hill-side. The former owner, I was informed, had built steps and ladders down to a platform above the water and here installed a pump; all this had more or less decayed or been removed, and note of this was taken in our preparations. We were quite a party: our host and his two daughters, Herr Hoch and we three, besides our two servants. Calling at a farm not far from the cave, we asked for a guide, and at the recommendation of the farmer also borrowed a ladder. There was no road to the foot of the hill with the cave, but under the direction of the guide the lorry found its way among the trees and boulders. A stumble over a stony hill and we saw the large dark mouth of Aigamas. The descent into the interior is steep; in places the rocks are perpendicular, in others wide crevices block the way; it would have been quite impossible to get anywhere near the water without a ladder and ropes. Baboons and probably other animals frequent the cave at times, I was told, sliding and jumping down to the water and polishing the rocks so much that they offered no safe hold for hand or foot. The floor of the cave was covered with rubble, dust and faeces of baboons full of insect remains; all was so dry that there were no beetles except some *Dermestes* and *Ptinus*. It was quite dark low down, and progress was only possible because we had an acetylene lamp and electric torches to light up the cave, which is much higher than broad. When von Maltzahn and Hoch—who were the most enterprising members of the party, and without whose help we should hardly have had success—arrived on the ledge where the pump had been and played the light downward, they did not see any water where it was known formerly to have been; fishes had been seen in it, so it could not have been much below the platform. However, a stone thrown down bounded off the rocks into a crevice deep down below the ledge and a splash was heard. So there was water. But how to get at it? As the crevice was too narrow for a round net, we fastened a strong butterfly-net on a wire bent the right shape, tied the net with four strings to an alpine rope, put a stone in as ballast, fastened a flashlight upside down on the rope and lowered the contraption into the crevice. When the net was pulled up after a little while, it was soaking wet, but with nothing in it but the stone. Herr Hoch tried again, giving more rope and waiting a little longer. When the net came up and was handed to me, a joyous shout resounded in the cave; there was in the net a rosy, transparent cat-fish about as long as my hand, with a tiny black eye. Where there was one, there were more, and when our efforts had been rewarded by a catch of a dozen and a half of various sizes, we stopped. The net never contained anything else alive. I had hoped that there might be some Crustaceans or water-insects along with the fishes, but my examination of the contents of the net each time it came up had only a negative result. Though Herr Hoch found a dead bat, there were

evidently none asleep in the cave, else the light and our calling to each other would have disturbed them, and we should have seen them fly about. The fishes subsist, I presume, mainly on the insect contents of the faeces of the baboons. The water-level was exceptionally low at the time of our visit, approximately 70 m. below the entrance to the cave and 10 m. below the ledge on which von Maltzahn and Hoch were standing. In the rainy season, when the water has risen to a high level, it will not be so difficult to get at the fishes ; but even then, considering the distance from Otavi and the outfit required for getting down to the ledge, an explorer must expect that each fish will cost him far more than its weight in gold. That I did not obtain any Crustaceans is no proof that there are none in Aigamas. A baited trap left for a day in the water during the rainy season might have positive results.

Another cave with water, Aigab, was known to exist some 25 km. west of Sissekab. Our friends had not yet been there and only had heard that it was somewhere off the old oxen-wagon track from the coast to Grootfontein, too vague a description to attempt a drive through the bush in search of the cave. Herr von Maltzahn, therefore, engaged a Bushman as guide, a tall and evidently intelligent fellow, probably a cross with Herero. We went via Soavis, where Herr and Frau Hoch joined the party, and then followed the old track, now so completely overgrown that we often went wrong, a halt being called until the Bushman found the track again and waved us on. It was an in and out between trees, over bushes and stones, regardless of the tyres and the pain the bumping might inflict on the merry party of three young ladies and five men, besides the two black servants and the Bushman. We got to the cave all right ; it was a deep hole on almost level ground, most probably a cave with the roof fallen in. After some climbing and sliding down, the very blue water could be seen, the light penetrating to the surface. We again used a butterfly-net on a rope, but to our regret found the water completely covered with a thin crust of gypsum, or another compound of lime, which excluded the air. There was no life at all in the water. In spite of this disappointment we enjoyed our alfresco meal. We had some discussion about another cave in the same region, but much farther away. After a confabulation of our host with the Bushman, it appeared fairly certain that there was no life in that cave either, and perhaps even no water at this time of the year. So we decided not to make another attempt at fishing in the woods.

Close to the house I found a few *Teracolus*, widely distributed species, and saw no other butterflies worth mentioning. The moths, however, and the beetles at the lamp were quite interesting and fairly numerous, particularly after some good showers of rain ; Sphingidae and Saturniidae were entirely absent. Though the collections made at Sissekab were not large, we had got what we chiefly came for, the fish of Aigamas, and now we could take leave of our kind hosts and wend our way farther northwards.

Our track through woods of the same kind as those around Sissekab was of no special interest, nor had we time for delay on the way, as we wished to visit that day two lakes, Guinas and Otjikoto, both reported in the literature on South-West as containing fishes in great numbers of individuals. Both are in the open country.

Lake Guinas is a very deep, almost circular hole with a diameter of about 100 m., the walls being quite sheer except in one place where the Bushmen we

met here managed to climb down to the water. On a platform high above the water a pump was installed, supplying a tank on the hill-side with water for cattle. No harm had been done to the fishes by the pump ; for we saw them in small shoals swimming close to the surface, probably hunting for insects that may occasionally drop down. They were at once attracted by a few crumbs of bread we threw to them, and it was therefore easy to catch a sufficient number by letting down a butterfly-net baited above the rim with a crust of bread and pulling it up when several fishes had assembled at the bait. Some specimens were nearly white, others piebald, and others again blackish without white markings. A species often seen by travellers, but unknown to science.

Lake Otjikoto lies east of Lake Guinas in the direction of Tsumeb. It is larger than Guinas, its dimensions being about 250 m. × 200 m., and surrounded with trees and bushes, *Ficus*, *Euphorbia*, etc., very interesting and beautiful. The water is inaccessible except at one side, where we could climb down and use a net with a long handle. A large pumping station which formerly supplied water to the copper mines at Tsumeb, 17 km. distant, was still in existence, but no longer in use, the mines being closed. According to descriptions we expected to find the fishes as numerous as in L. Guinas, which was not the case. We obtained only a few specimens, although we left a baited trap in the lake overnight. It is possible that the interference with the water by the mines has destroyed the fish or that the water got slightly poisoned from the cannons and ammunition thrown into it before the German force surrendered. However that may be, the fish was rare at the time of our visit. Dinter [1] speculated on the relationship of the Guinas and Otjikoto fishes and their origin. We now know that they belong to different genera, are normal in development of their eyes, and are no doubt relics from a former river system that have become modified during their long and absolute isolation. Both lakes give one the impression that they were originally caves, of which the roofs have fallen in ; that is also the explanation given by a tradition among the Bushmen. A species of lizard was common at one side of the lake, but very difficult to catch. At the lamp we got for the first time a Saturnian, *Usta wallengreni*, and when bedding down in the veranda of the caretaker's house some geckos I had not seen before found immortality (I hope) in an alcohol container.

The road to Tsumeb showed signs of the worst deterioration rain causes, the ground being so much softened in places that the wheels sink in and spin round and round without taking a grip. In such circumstances chains around the tyres are a necessity. The driver avoids the dark patches in the road, and it is generally wise to follow the ruts made by a previous vehicle which has found a safe passage among the bushes. On entering Tsumeb one gets the impression of a town, with gardens, trees, and houses like small European villas, a refreshing picture after a drive through bush and over bare ground. But the closing of the mines was the death-knell for the place. The huts on the hill-side for the 2,000 natives employed in the mines were empty, and the engineers had left, only the director and a skeleton crew remaining to prevent the machinery from deteriorating. Tourists who come so far north will miss the comfortable hotel where we put up for a couple of nights and which, we were told, would close down in the near future. The electric plant was still functioning, and crowds of the white Saturnian, *Usta wallengreni*, were attracted, the moths swarming about the lamps

[1] *Botanische Reisen in Deutsch Südwest Afrika*, p. 68 (1921).

and many tumbling to the ground. When I saw this spectacle, I understood that Mr. Pemberton had not exaggerated when he told me in sending 80 specimens of this moth collected at the lights at Benguela that he "could have caught hundreds more." Pemberton's catch contained only females, and all the other specimens at Tring were also females. Therefore I examined every one I could get hold of as to its sex, and thus obtained several males among the crowd of females, in this case the heavier sex being more partial to the lamps than the male. There is hardly any difference in the sexes of *U. wallengreni* apart from the antenna, forefoot and abdomen. I did not see anything else of special interest at the lamps. In eating soup at dinner a small bone stuck in my throat; my companions were startled by the colour of my face. I grabbed a forceps in my pocket to pull the bone out, when it came away by itself. What a relief! I wonder whether the moustache was originally developed as a filter, before it became a doubtful ornament.

My plan to pay a short visit to the game reserve at the Etosha Pan could not be carried out. The road was by now too bad for the lorry, and to wait for the regular carrier to take us to Namutoni would have meant spending another ten days in this district, which I could not well afford.

Our programme mentioned one more farm with permanent water in which there were fishes, Otavifontein, which we could visit on our way back to Windhoek. Instead of going along the railway to Otavi, we took the eastern route via Gaub, which is longer, but more interesting, leading gradually up through woodland. At the highest point we saw numerous specimens of that queer succulent *Cissus* which looks like a tree-stump and does not in the least resemble its near relatives, the Virginia creepers and grape vines. After the divide we came into a wide valley with flat bottom, flanked by wood-clad hills; teams of oxen before ploughs, grassy glens running up into the woods, a scene of European character. Beetles were more numerous on the road than before; the large Cicindelid *Mantichora*, the first of its kind observed by us, was fairly abundant, hunting on the road in the sunshine. But no butterflies played at the edge of the wood and the ditches. Far down the valley in a damp place, clusters of *Crinum* were in flower, their white blossom streaked with pink being very conspicuous on the still rather bare ground. Of course, we arrived at Otavifontein after dark; late arrival had almost become a habit with our lorry.

The large farm, belonging to the Otavi Mining Company, was under the management of Herr and Frau Böhme, two Holsteiner as fit, capable and industrious as they make them in that province of Germany. Herr Böhme and his daughter proved to us each evening before sunset that the hot climate, which is usually considered to have a deteriorating influence on body and mind, has the contrary effect on their energies. The performance of father and daughter in the garden at the horizontal bar took our breath away and made us feel slack and clumsy. This picture is still very vivid in my memory. Our hosts were great lovers of animals; dogs and cats galore about the premises. The cats bred freely, and evidently none were killed. It was all very friendly and homely, and the cats soon treated me as one of the family. For, on coming home one afternoon, I found a mother had made herself comfortable on my bed and presented me with five kittens; I put them in a corner on a rug, but when I returned that evening they were back on the bed with another cat as nursemaid. After various futile attempts to keep the bed for myself only, some chloroform and

naphthalene on the spot chosen for the nest offended the delicate senses of the cat so much that she definitely accepted the corner behind a wardrobe as a better place for the kittens.

A female eland and some other antelopes, which had been picked up when young and helpless, were in enclosures, the eland being free to walk away if it were so inclined; it had adopted a paddock as its home to which it always returned from a stroll in the wilds. One such excursion had resulted in the birth of a baby. According to Herr Böhme's experience, the eland is the most frugal antelope; it can subsist in barren places where other antelopes would perish, and it might really be turned into a domesticated animal most useful in a country like South-West.

On the evening of our arrival, before reaching the farm buildings, we had crossed a small brook by a bridge, the first road-bridge we had seen since leaving Windhoek. At this time of the year the brook was about a foot wide and ran merrily in its narrow bed from the slightly higher ground to the garden of the farm. It originated in a small swamp on flat ground near the Police Station, a short walk up the wide valley or plain, and in the pools of the swamp as well as in a pond in Böhme's garden a small fish abounded, a new subspecies of a species widely distributed in Africa. It has, like its relatives, the habit of taking its young into the mouth for protection; on slightly pressing the head sideways a dozen babies shot out of the mouth. Luxurious vegetation along part of the brook, accumulations of palm fronds and the leaves of banana trees looked promising for trapping mice and shrews; but when I saw the many cats, I became doubtful. In a competition between them and myself, they would have the advantage over me, as they knew where to go for their prey on their home territory. There was also another competitor, which I saw rolled up on the base of a banana leaf, a small Python, about the thickness of a child's arm and over 3 m. long, a beautiful sight in the bright sunshine. It glided slowly away when it felt our touch of the leaf. At night a species of gecko was plentiful on the outside walls of the house. Above the water swarmed several species of Odonata; but in the water I found only the common *Cybister*, ubiquitous in South-West. We did not see any frogs except a specimen of the bullfrog which had been thrown up by the plough, and which I rejected, because it would have filled a whole jar and required the sacrifice of more alcohol than I could spare.

Life on the farm was very active; agriculture was obviously much to the fore. The loamy soil looked as deep and fertile as if anything could be grown, contrasting greatly with the sandy or stony ground so usual in South-West. *Usta wallengreni* came to the lamp in company of beetles and a small number of other moths. Collecting with the lamp on flat ground is hardly ever very successful. In the garden around the house a *Mylothris* and other Pierids flitted about, and the roses were eaten by some large species of *Mylabris* (Meloidae), called the rose-beetles by Frau Böhme: local adaptation of a name. South-West would be a self-supporting country and could carry a much larger white population if the majority of farms were like Otavifontein.

The return journey to Windhoek was uneventful and very much like the outward journey. The new portion of the road from Otavi to Otjivarongo was now open to traffic. Its surface looked good, but was as yet innocent of tracks, a bad sign. We ventured on to it for a short distance and then turned across the bush to the old road, preferring to be shaken up by the stone ridges to sinking

in the sand, perhaps for hours. When we struck the railway, we stopped to collect what there was entrapped on the inside of the rails ; mostly Coleoptera, such as *Calosoma*, Tenebrionids and Cureulionids. The Waterberg appeared on our left and in good time for luncheon we arrived at Otjivarongo, the centre for the Waterberg and Outjo districts, a place with two good hotels and apparently a considerable traffic. We slept at Sukses (1,500 m.), a small settlement at the east side of the Omboroko Mts., which run up to nearly 1,900 m., being a little higher than the Waterberg. The highest point in this region is the peak of the Etjo Mts., which rises to 2,086 m. and looks inviting from the distance. None of the river-beds we crossed had any water, and the sand of the pad was still firm, permitting us to travel at a good speed (and in consequence to see everything more or less in a haze). From Otavi to north of Bassermann we were on the east side of the north-south divide, all the rivers belonging to the Omuramba system, a tributary (if it has any tribute to convey so far) of the Cubango, which flows into the Zambezi. The fish of Otavifontein, therefore, may be expected to occur also farther east, if there is any suitable permanent water. From north of Bassermann to Okahandja and Windhoek the rivers are part of the Swakop river system flowing into the Atlantic. The cordial welcome at Hotel Müller, Okahandja (1,320 m.), was mutual. Herr Hoesch introduced me to Herr F. Gaerdes, master at the German School, a man with a wide outlook on life and much devoted to nature and its history, and also to Dr. Sigwart, the veterinary surgeon, both of whom knew South-West well and could give me interesting information.

On our way up to Windhoek I noticed in the neighbourhood of Teufelsbach that Pierids had meanwhile become plentiful among the bushes between the large Acacias ; but we were in a hurry. Two months later I regretted that we had not stopped a couple of hours and taken what we could get. For when I went to the same place in the middle of January there was no abundance of specimens and most of them were in a battered condition. It is certainly wisest on such excursions to take what you see and not to leave anything to a future occasion.

At the end of November nature was much the same at Hoffnung as I had left it a month before. Rain had remained in the offing. Despatching the collections, repacking at Hoffnung and revictualling at Windhoek did not take long, and the first days of December saw us on our way southward. It is a stiff climb for car and railway over the Auas Mts., an imposing chain reaching above 2,400 m. at its highest point. The mountain-sides are covered with forest of the usual open type, denser in the ravines, with some tall Acacias in favourable places. It looked a good district for a bug-hunter's camp, but at this time of the year water and insects were equally scarce. In going down to Rehoboth we made a detour via Rehoboth station (100 km. south of Windhoek) which has the better pad. The hotel looked spacious and cool, and a drink did not come amiss this hot afternoon. From the station to Rehoboth itself (11 km.) the pad runs on and sometimes in deep sand, and is not everywhere easy to negotiate for a heavily laden lorry. I had read and heard much about Rehoboth, the centre of the Bastard's country, and had conceived a rather different idea from what I found. The house of the District Commissioner, the church with its tall steeple, the hotel where we stayed for the night and some other buildings came up to my preconception of a centre of a large region which has the reputation of having

the best grazing grounds in all South-West; but the rest of the dwellings were very modest, the population preferring, perhaps very wisely, the comforts of the simple life to the arduous toil and frequent disappointments of the white settlers. Rehoboth, built on flat ground which is covered with sand and loam

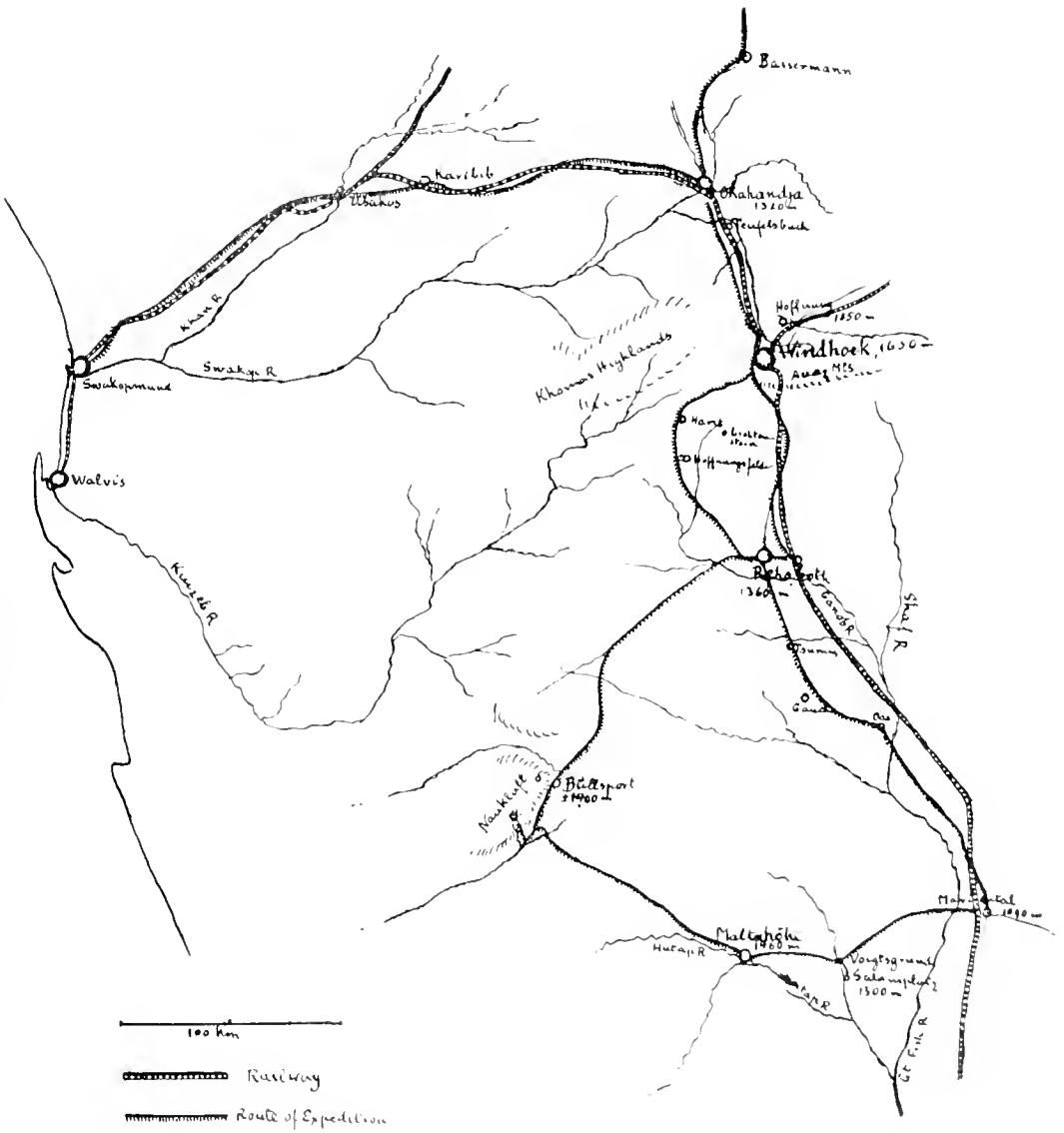

FIG. 21. — South West Africa: Walfish Bay to Windhoek, and southward route of the expedition.

and rises towards west, may appear to be a mean town judged by European standards, but viewed as a landscape it has great charm. The large and healthy Acacias which abound make you forget the human dwellings. Gold had been discovered in the plateau west of Rehoboth; many people had taken up claims,

some we saw washing for gold and others examining the outcropping stones, and there were diggings here and there, all the work being preliminary, and hope drawing a cheque on the future. The small man can hardly tackle the ground with success, there being no water available for his purpose, and the capital required for mining on a large scale will not easily be forthcoming for a risky undertaking. One would gladly wish the goldfields to bring in additional revenue to the exchequer of the Administration, the finances of the country being sadly reduced since the partial closing of the mines. The farms do not pay income-tax ; indeed, few of them would be able to bear the burden, the climate being so exacting and the rains so unreliable that the farmer has to accumulate reserves to keep himself out of the bankruptcy court when prolonged drought kills his cattle or excessive rain destroys his dam.

Our pad to the Naukluft Mts. led across the goldfields, an undulating plateau covered with stones. In the rainy season there will be many flowering plants, succulent, bulbous or creeping. Some of the dry rivers contained bushes and trees, but the hills we crossed or along which our pad ran were practically bare. The road frequently forked, and as fingerposts were mostly conspicuous by their absence, it was not always easy to find out from the map which was the right pad to the Naukluft, and once we got wrong, following a track which ended in a wooded ravine at the shack of a couple of Boers. After crossing a ridge, mountains loomed up in the distance with a dark belt at the base indicating a wooded rivier. Here we found Büllsport (= Buellesport), a farm belonging to Herr Rudolf Strey, who invited us to stay with him for a while. Herr Strey had first lived farther down the rivier in between the hills, but had found the present place on the border of the Büllsport plateau close to the Naukluft Mts. more suitable for farm buildings, there being good water in the ground, loam for a vegetable garden and wood in the rivier close by, the only drawback being occasional sand storms. The rivier runs west in between the Naukluft Mts. and the Rand Mts. and loses itself in the sands of the Namib. The Büllsport plateau is well known in Botany for the number of plants there discovered ; however, the Naukluft Mts., which consist of porphyry, do not seem to have been explored botanically. We spent several days at Büllsport, as grateful to our host for his assistance as for his hospitality. He conducted us to the only permanent open natural water-hole on the Büllsport side of the mountains. Under Herr Strey's guidance we went up the hill-side to a valley with flat bottom and shut in on three sides by steep mountains, and left the lorry in the shade of a tree close to the ruins of the German Police Station ; a peaceful spot and much to be recommended as a camping ground from which to observe and explore the fauna and flora. At the far side of the valley, a steep gorge requiring some climbing up the rocks was a watercourse in the wet season, but showed now only a little moisture here and there until we came to a corner shut in by high walls where there was a deep pool, for the greater part overgrown by reeds. There were neither fishes nor crabs in the cool water, but a species of frog, not quite the size of *Rana temporaria*, was quite abundant, some greener than others (*Rana fuscigula*). A leech was also plentiful, and we likewise netted water-beetles, Rhynchota and larvae of dragon-flies. The leeches were hungry and at once attacked Herr Hoesch, who ventured to walk into the pond with bare legs, and demonstrated *ad oculos* that our friend belonged to that branch of the Hoesch family which is not blue-blooded. In these mountains occur baboon, zebra, klippspringer, the

only antelope we saw. Near the Police Station among boulders, the Rock Rat (*Petromys*) occurred in some numbers, one of the most difficult rodents to skin on account of the softness of the tissues.

When eating our luncheon under the tree of the Police Station, fossorial Hymenoptera were attracted by our drinks. When I sprinkled some water on stones, these insects were so intent on imbibing the moisture that one could catch them with a forceps. More came along, evidently having noticed the presence of water from some distance.

At the farm we did some moth-collecting in the rivier, and then placed the lamp near the house, where two species of Noctuids came to the cage in very large numbers, to the astonishment of my companions, who had never seen such a sight. I myself was not surprised, as I had had the same experience at Bellerode ; the species are evidently partial to the kraals of cattle and to trampled-down herbage growing in farmyards. *Polydesma quenavadi* was the commonest species, but at Büllsport also a species of *Clytie* was abundant.

The pad from Büllsport to the true Naukluft valley runs in a southerly direction and, passing the farm of Herr Schwarz, turns south-west. It is no great distance from Büllsport. We made camp near the entrance to the narrow part of the valley under some trees where a placard informed the visitor that this was the best place for a camp. We walked up the valley to explore the lie of the land and were much pleased to find pools of clear water right up to the top of the valley, where it widens into a plateau surrounded by mountains. Here was the second German Police Station of the Naukluft Mts., now completely in ruins. There being plenty of water close by even in the driest season and therefore fodder for cattle, I wondered that nobody had settled in this place so ideal for a man who loved nature and his own company. The road leading up to the police station had become impossible for vehicles ; a new pad would have to be made, preferably along the mountain-side where it would be safe from the rush of water in a really wet season. All the water-pools had their inhabitants : frogs, tadpoles and crabs ; the tadpoles moved so fast on our approach that at first glance I mistook them for small fishes, of which there were none. The valley is narrow, a ravine, and, judging from the accumulation of sand and stones where it widens, there must at times be a brook running with considerable force. It joins a wider rivier that turns westward, ending in the Namib, being separated from the Fish river system (tributary of the Orange River) by the Büllsport plateau and the Tsaris Mts. According to information received there is, in the lower reaches of this rivier, a deep valley with permanent open water, which it might be worth while to visit. Crevices in the vertical rocky valley sides were the home of *Procavia capensis windhuki*, from which we obtained some specimens of *Procaviopsylla*, a genus of fleas confined to these rock dwellers. These fleas are closely related to rodent fleas, and we assume that a change in their morphology has taken place in consequence of the change of host. We know of several cases of this kind among fleas.

A few hundred metres from camp there were, at the bottom of the valley in damp or wet places, clumps of *Mentha longiflora* in flower, 4 ft. high, the inflorescences of which were visited by several Lepidoptera. Since Otjosongombe I had seen but few butterflies and here were several quite new to me. Of the three *Acraea* the commoner one was vivid red on the upperside and white beneath, a most attractive sight. It was *A. hypoleuca*, of which only two

specimens were known, one being in the Hope Department at Oxford and the other in the Zoological Museum of the University of Berlin. I took a series of both sexes, most specimens being quite fresh. Along with this species was *A. stenobea*, described from Bechuanaland and still rare in collections. Several Pierids and Lycaenids also visited the *Mentha*, some of the Pierids being strongly modified local forms, differing particularly in the reduction of the black markings. There was a single species of *Syntomis* on the mint, closely related to, or identical with, a species known only from South Africa, *S. johanna*. Under stones and herbage Carabids and Staphylinids were concealed ; a bombardier beetle occuring here behaved much like the European *Brachinus*. The frogs appeared to me the same species as those collected above Büllsport ; they were quiet, probably because the spawning season had been over for several weeks, the development of the tadpoles being well advanced. But it is also possible that this species does not give concerts, only grunting like the British Grass Frog. The wind coming from the east caught the wide entrance of the valley and blew upward ; collecting at the lamp, therefore, was less successful than it might have been in still weather. After our frugal meal the last evening in camp we had an unexpected visitor. Herr Bartsch suddenly jumped up and called out " A scorpion—no, a gecko ! " It was a slowly moving black-and-white gecko-like reptile, several inches long, which held the tail obliquely upward, rapidly moving its tip up and down as in imitation of a disturbed scorpion. The piebald colouring representing light and shade would render the specimen at rest almost invisible among the debris, whereas in the light of our lantern the crawling reptile was quite conspicuous. The tail is probably always raised as we saw it, a frightening attitude against any would-be aggressor. We searched the surroundings of the camp for more specimens, but found none.

On our way from the Naukluft eastwards we called at the house of Herr Schwarz for information about the best pad to Maltahöhe, drank coffee and exchanged news as is usual on such occasions. Politeness requires to refresh any caller with coffee or tea and to feed him at meal times, rain and cattle being the subject of conversation. A young Englishman who had dropped in that morning on his way to one of his farms gave me an impressive illustration of the all-importance of rain. He owned a hundred thousand acres, he said, and had ten thousand head of cattle, and neither he nor his animals had anything to eat or drink on his farms. His cattle were all away in the Rehoboth district as paying guests ; they cost him a great deal of money, and if this year did not bring sufficient rain, ruin would stare many of the farmers in the face.

This ardent wish for rain was on the point of being fulfilled. It had been raining that morning to the east from where we were, and heavy clouds were still piled up. We were going in that direction. The plateau we had to cross in a south-easterly direction was flat, with slight undulations and occasionally a hill with flat top and boulders at the base, such sandstone hills being quite a usual sight in South-West (cf. fig. 25). After a couple of hours we came to the area where the shower had come down, and passing a farm-house a woman hailed us and asked us to take a parcel to Maltahöhe. She had been to her dam and was very happy that there was water in it. " The first rain for four years," she said ; " my 800 cattle are on another farm where they cost me 6*d*. a head a month, and there is no income ; here on my 20,000 hectares there is hardly enough food for my 150 goats." The prospect of making a comfortable living on this plain

covered with sand and pebbles seemed to me as bleak as the landscape. The lady gave us some directions about the pad, which she thought would be quite all right in spite of the shower of rain. The going was indeed still good and we were at first much interested when we found farther east the thirsty landscape covered with puddles and saw the water running in all directions, collecting in small and large depressions. But our interest soon became very personal: the pad gradually became a brook too deep for the lorry. We tried the left side for firmer ground and stuck in a swampy ditch, and with difficulty crossed the pad to the other side, where we found conditions just as bad. Late in the afternoon we were confronted by a rushing stream with vertical banks, which effectively stopped any progress. As it would be dark in a couple of hours, we decided to camp near the river on a sandy piece of ground which was merely wet. A farm, or rather its windmill for pumping water, was visible in the distance, too far to get to us before nightfall some oxen for pulling the lorry on to dry ground. Fortunately there were trees along the river, some of them dry, and soon a fire was blazing and the kettle boiling. Under normal conditions we should have reached Maltahöhe at luncheon time, and here we were under a threatening sky trying to make merry with a cup of tea and the scanty provisions we had left. Groundsheets protected our bedding from getting wet on the soaked soil, but the air became so laden with mist in the night that the excessive absorption of water through the skin prevented us from dozing for long. Dawn was hailed with delight. The water had partly sunk into the ground and partly collected in the deeper pans so that the land could be explored for a possible passage out of this mess. While my companions worked hard to get the lorry over the water-logged ground, I sauntered about to look at and collect some of the insects, which were coming up from their underground nests. A daylight termite was the most interesting of them, running clumsily about, foraging, undisturbed by the rays of the forenoon sun. They were welcome soft fat morsels for the ants, which prowled about in numbers and pounced upon the helpless termite whenever they came near one, dragging it along to one of the entrances to their nest. We arrived at Maltahöhe twenty-four hours late and stayed for two nights to recuperate, instead of going straight on to Voigtsgrund. This proved to be fortunate inasmuch as we collected several frogs, lizards, mammals and beetles not seen by us before.

Maltahöhe, with two good hotels combined with stores, lies above the Hutap river on its north bank, an affluent of the Fish river, on a stony plateau, wind-swept and healthy, quite a fine dorp with school and police station, flourishing and declining with the fortune meeted out to the farmers of the district. Across the valley of the Hutap are high hills. The rocks consists of slate, quartzite and sandstone, varying in colour from reddish to grey and green. The Hutap was in flood, the river that had stopped us on the plateau probably being its upper reach. It is broad and in some places so shallow that we could walk across without removing boots and socks. Moth-collecting at night was out of the question, the wind being much too strong and there being no sheltered spot except behind a house. We had to concentrate in daytime on the heaped-up stones where lizards and a few small rodents could be obtained, and in the evening on the river with its frogs. The dry seed-pods of *Acacia hebeclada* contained a Longicorn beetle, two species of *Bruchus* in numbers, also a Hemipteron and a parasitic Hymenopteron. In the garden of the hotel earthworms were dug

up, and when dusk set in we were entertained by a frog-concert: "lutter-lutter-lutter . . . ," very loud and rapid. Here they were, the Lutherans of which Herr von Flotho had spoken at Otjosongombe. They were sitting in the water close to the bank or on the bank close to the water and were not difficult to catch, but it required walking barelegged in the water with a flashlight. The concert breaks off suddenly and after a short pause it starts again. There was one note rather higher than the rest and more metallic, which evidently was that of a second species,[1] and accordingly we paid special attention to this musician in order to procure at least one or two specimens of it. In the afternoon I went down to the muddy river with a net to have a try for fishes and beetles, of which I got none; but I caught a tiny frog, which at first puzzled me, as it could not be a young one of the Lutherans which were just spawning; then I remembered that very small species of frogs were known from South-West and other parts of Africa. A good find, I thought. In the evening we were attracted by a note sounding somewhat like castanets, which we attributed to a cricket concealed somewhere near the hotel. On following the note we found it to come from the valley and finally traced it to the river. It was the note of my tiny frog, of which about two dozen sounded their "nack-nack-nack," long pause, "nack-nack-nack" in the 200 yds. of the river we could explore. To catch them was a difficult proposition. Most of them were among herbage in fast-running shallows of the river, one calling here, another there; when one reached the spot the frog became mute, dived and called again a yard or two away. With perseverance we got half a dozen.

The stone-covered ground continued to Voigtsgrund (= Tsubgaris), a large farm famous in the country for its pedigree caracul breeding. The extensive buildings combine usefulness with comfort, and it did not take long to perceive that the establishment was managed on the lines of a well-ordered office, every member of the staff attending punctually to her or his duties; in England we should call it a model farm. We were hospitably received by Herr Middendorf, son-in-law of Herr Voigt sen., who was away at Swakopmund, and by Herr Voigt, jun., and two guest rooms were placed at our disposal. The buildings are above the rivier (fig. 24), palms and other trees giving shade to the main buildings. The rivier contained a series of permanent pools with a species of small fish, a crab and various insects. The dam which we visited one afternoon was some distance up the rivier, where there was a considerable area of land under the plough. On a large field of lucerne, the staple fodder for young animals and milk-cows, *Colias* swarmed in incredibly large numbers. We looked in vain for signs of the Striped Mouse (*Arvicanthis*) which we were assured occurred in the fields.

After a few days we moved to Satansplatz, farther down the rivier and recommended by Herr Middendorf as a place likely to be a good collecting ground. We found the name appropriate on account of the barrenness of the stone-covered ground and the exposure to the wind which sweeps the plateau. The empty dwelling-house was of the usual primitive kind, oblong, transversely divided into several rooms which open directly outside, one end-room serving as a kitchen. Very convenient for camping. No other buildings of the original establishment were left. In the wide and deep rivier below the house we found a chain of pools, some black from the dissolved droppings of cattle, others clear; there was even

[1] All the specimens we caught belonged to one species only; cf. H. W. Parker's account of the Herpetological collections, no. 82 (*Pyxicephalus delalandii*).—K. J.

some clear running water supplied by small springs in some shallow pools. A shower of rain had as yet no effect on the rivier. The right bank was steep and high, and here in crevices and on ledges Euphorbias and other succulents grew, emphasizing the dryness of the ground. The same little fish as at Voigtsgrund, only more abundant, the same crab and the same water-beetles. A large pool, however, partly covered with reeds, contained cat-fish too large for the small fish-hooks I had with me; the fish went for the bait all right, but broke the hooks or bent them straight in their struggle to get away. One of the small shallow pools filled with muddy rain-water was swarming with a small Crustacean, i.e. they were not rushing about, but lay quietly in the water on the muddy ground near the edge of the pool. The lizards here collected were mostly found concealed in heaps of stones. Here and in similar places of this region there was much evidence of the toll paid by cattle to the climate. Skeletons or cadavers of cattle, donkey or sheep were frequently encountered, and bleached bones among the stones were the rule rather than the exception. The domestic animals get so enfeebled in times of prolonged drought that they cannot travel to the water-holes, and if found before they are dead are frequently beyond feeding and drinking and simply lie down and die. There were trees, alive and dead, in the rivier, providing food for insects, and for that reason small numbers of moths and beetles come to the lamp in spite of the interfering wind. The lamp being placed one night behind a wall of loose stones for shelter, a gecko came out and helped himself to a meal.

The landscape from Maltahöhe via Voigtsgrund to near Mariental was very uniform in its geological composition. The vegetation of the plateau is poor as regards trees and shrubs. It is a country for springbuck, of which a herd crossed our pad.

On approaching Mariental (1,080 m.) from the west, the belt of large trees along the Fish river seen from the distance contrasts so agreeably with the monotonous plateau just traversed that, on reaching the rivier, one is rather taken aback by the sand dunes piled up the other side of the sandy dry river-bed and the sandy flatness of the ground on which Mariental is built. This station of the railway from the Cape Province to Windhoek is an important commercial centre, the region being by no means so poor as the sand suggests to the stranger. We stayed only one night, as I was anxious to get to a farm higher up the river where large pools were said to contain fishes. On the hotel bill was an item of over a pound for beer; however, I had entertained two guests after dinner. We soon found that a shower of rain had rendered the pad impossible for our lorry, for after we left the main road the ground became so soft that we stuck and had to give up the excursion, returning to the road and making for Rehoboth instead. On the way northward we halted several times to see what we could find under and among the stones; there was little besides swarms of the red migratory locust going north-westwards and resting in masses on bush and tree. On an outcrop of greyish sandstone and quartzite occurred a squat short-horned locust perfectly adapted in colour to the pebbles among which I observed it, and a small Tenebrionid beetle, a species of *Zophosis*, black, but so covered with dust that it became invisible when motionless. I have seen this beetle in numbers in many place in South-West. There were also some weevils and carabids with the colouring of the soil. This colour-adaptation to the background would afford an almost perfect protection if the insects would keep quiet; their movement destroys the

similarity. Nature has given protective resemblance with one hand and taken it away with the other, and the insects in question flourish nevertheless. Is there an explanation of this contradiction ? Perfect protection coupled with the great fertility of insects would lead to speedy overcrowding, disease and destruction ; the loss account in nature has to be enormous for the safety of the species. All that is needed is the preservation of an average number of individuals, imperfect protection meeting the case. Species adapted to the colouring of the soil generally have a second line of defence : sudden movement and fast running as in the case of the hare ; a sudden jump and then motionlessness as with a grasshopper ; or gregariousness and sudden bewildering dispersal in all directions ; all three lines startling the predator and thus giving the prey a chance to escape, while perseverance gives the predator his chance to get his share of the prey and thus to continue to live. Birds and lizards are much less successful in hunting than man with conscious knowledge, the preserver and the destroyer, the image of divine nature.

When we came to the Ganob, a tributary of the Shaap rivier, close to Rehoboth, we realized that we had been very wise not to stay another night at Mariental. For the rivier was in flood and rising, but still just shallow enough at the ford to make crossing possible. However, our plan to go on to Windhoek the next day was upset by the weather-god. More rain came down in the night, in fact it rained in sheets. When we got up in the morning, the road before the hotel was a rushing stream and remained a river all day. Shouting children splashing into the edge of the water, dogs running up and down barking at the waves as if to chase away these unknown animals. It meant another night at Rehoboth. The road was clear again next day, but between Rehoboth and the railway station there was a large lake blocking the pad we had taken early in the month on our way from Windhoek. So we took the usual pad running straight north from Rehoboth. After a few miles the ground dipped very slightly and became softer in places, water appeared in the ruts and far ahead we saw a car standing still at the side of the pad. Soon the glitter of puddles struck the eye, and when we were close behind the standing car we bumped into a hole. The occupants of the car, Bastards who had been to a wedding and one of whom was playing the guitar to while away the time, were waiting for the water to run off. They helped us to get the lorry going again ; unfortunately after a couple of hundred yards we sat in a deeper hole. After long, hard and unsuccessful labour on the part of my companions and Herr Dammermann of Klein Windhoek, to whom we had given a lift, it was decided to unload the lorry and carry the luggage to a slightly higher dry place near by. Meanwhile, another car had arrived and got stuck near us. Being light it could be lifted out of the pad and was soon on its way again. A small ditch cut across the pad led the water away into the bush ; the lorry was now lifted by a windlass, bushes and branches of hard wood were put under the wheels and in front of them, and at last the wheels took a grip and we were on firm ground. By 4 p.m. we had loaded up again and at 5 p.m. we were back at Rehoboth ; a day's hard work for my companions which deserved an extra drink. There was a third road to Windhoek, going first in a westerly direction and then north via Haris. This pad was on high firm ground, but we were informed that it was blocked by a large rivier in flood. We would risk it, and took this road next morning (the third " next morning ") in the hope that the rivier would have run dry by now.

We were right; the little water in it did not prevent us from getting across, the bottom being firm and the shovel removing the mud and sand piled up at either side.

The season was rapidly advancing; little dales in these highlands were covered with flowers, but no butterflies enlivened the scene; the landscape being exposed to the winds, they could only be expected to occur in sheltered localities. In passing we saw the Knurrhaan tumbling up into the air, and the amusing little meerkat, *Suricata*, which holds the tail straight up when running away. The descent from the highlands to Windhoek required careful driving. Being often very steep and having suffered from the rain, the road was in places far from good for our heavy load. We got safely back to Windhoek, arriving a few days before Christmas, and arranged to leave for another excursion early in January.

Christmas and New Year were spent with my relatives and their friends, merrily in accordance with this festive season. Herr Hoesch sent word that he would be unable to come with me on the next excursion, as he had to attend to business connected with his farm. Meanwhile the rain had come in abundance, and it was reported that all the riviers were in flood. We waited a fortnight for a break in the rains and then set out for the Kaokoveld, intending to travel via Okahandja and Outjo. The landscape below Windhoek was in spring dress, the ground covered with the yellow blossoms of creeping *Tribulus*; the high mountains rising on the other side of the valley, so dead and forbidding in October, shone yellow with blossoms as if they were covered with buttercup meadows. Lower down where the ground was sandy and loamy, progress became slow, bushes had to be cut for covering the black places in the road to prevent the lorry from sinking in too deeply, and we pulled up near the tents of party of men working on the road. The foreman of the party warned us that it would be dangerous to go any farther, the pad would not carry the lorry; and that we could not possibly get across the Swakop, which was in flood, had been so for days and would remain in flood for a considerable time. The black mud in front of us was convincing evidence that the man was right. We had to submit to the inevitable and turned back to Windhoek. While Herr Bartsch discussed matters with the foreman and got the lorry back on to firmer ground, I collected a *Mantichora*, which was common here, and observing the sexes realized that the mandibles of the male have a definite function in mating, the male keeping hold of the female by putting its enlarged mandibles round her waist.

As the rains continued intermittently, all the riviers turned into rushing rivers, carrying everything before them, breaking down dams and interrupting the railways. Cars and lorries which tried to cross a rivier remained in the water. Windhoek was isolated; provisions became scarce; letters arrived only by air mail; farmers who were at Windhoek or Swakopmund could not get back to their farms and whoever happened to be away in the country had to stay where he was. I hoped from day to day that the passage northward would become possible; but in vain. And so I remained at Hoffnung from Christmas to the second week in February.

The hills of which Hoffnung is part consist of dark-coloured gneiss and schist, with bands of quartzite, like all the highlands round about Windhoek. The hill-sides are covered with small flat stones, here and there rocks crop out, decayed into large and small slabs, where scorpions, beetles and lizards sought refuge from sun and rain, and where I collected many specimens either alone or, on

Sundays, in the company of my relatives. The flat stretches of ground were covered with sand, and here large shallow pools had formed, where I vainly fished for Crustaceans. In the small valleys there was deep dark soil washed down from the hill-sides, and here we found under stones, singly, a slate-coloured blind snake (*Typhlops*) as thin as a strong string, also a thicker pale species. At Voigtsgrund we had found only two specimens of lizard with a bright blue tail; here at Hoffnung the species was not at all rare (*Cordylosaurus*). It had the undulating motion of a slow-worm, but was much faster, and attracted everybody's attention by its colouring. As usual in lizards, the tail broke off easily if the specimen was not firmly taken by the head or body. If the Lamarckian principle in its rawest form held good in evolution, namely that offspring inherited characters acquired by parents in their individual life, I am afraid the lizards of Hoffnung would by now consist of races with stumpy tails. The meaning of the fragility of the tail becomes clear in this field-work: the broken-off tail wriggles about and draws your eye, or that of any other aggressor, away from the lizard, which thus finds time to escape safely into a hiding-place. The small viper was not rare in the hills; it simulated the colour of the stones so well that one of us nearly sat down on a specimen that was lying rolled up on a flat stone slab. In a valley just below the plateau on which stood the house of Lütgens were a number of old, brittle, dark-brown termite nests, and it was in one of them that I found a long thin snake, which wound itself round my arm when I took it by the neck; poisonous snakes, like the viper, if thus held, as a rule simply hang down like a piece of rope. On the rocks east of the railway bridge on the Hoffnung side of Klein Windhoek, a beautiful species of *Agama* had her home, the male with orange head and tail and blue body, and the female in a darkish dress with some orange splashes; I did not see the species at Hoffnung. The fig trees in the garden were laden with fruit and visited by some Cetonids in large numbers, mostly *Rhabdotis chalcea* and *Pachnobia cincta*, and by a Noctuid moth, a species of *Sphingomorpha*. A species of *Calosoma* was now very common, running about in daytime, but more often found under stones. In daytime I also collected some specimens of a white Saturnian, not the one observed in great numbers at Tsumeb, but *Usta bioculata*, which has no eye-spot on the hindwing. The specimens were resting in a thorn bush; others came to the lamp here and at Okahandja; *Usta wallengreni* evidently did not occur. The lamp now attracted many moths and beetles, some of the species in profusion; but there were no Sphingidae except the common *Herse convolvuli* and *Celerio lineata livornica*; the latter was on the wing also in daytime, starting about 10 a.m. visiting flowers, particularly those protected by Acacia bushes. The earliest moths to come to the lamp were *Cossidae*. One of the surprises was a brilliantly coloured Agaristid, *Paida pulchra*, which, from its coloration, I had considered to be a day-flier like most Agaristids. The species had preserved its true Noctuid habit, being active at night and concealed by day. I flushed it several times in full sunshine, and it always behaved like an ordinary Noctuid, flying low and fast for a short distance and settling again on the ground, concealing itself in the herbage under a thorn bush. The woolly species of cock-chafer (*Sparrmania*) which in October was attracted to the lamp in such numbers that it became a nuisance, injuring the delicate moths with its claws in climbing about the cage, did not now appear; this was evidently not the season for it. The specimens of this beetle which fell on to the ground or crawled away from the cage immediately began to dig themselves in and in a short time had disappeared.

There is, no doubt, some connexion between the woolliness of the body and this underground life.

Butterflies became more numerous in individuals after Christmas. The widely distributed *Pieris mesentina* was migrating, travelling in a north-westerly direction day after day on a front certainly many miles long; it did not fly in masses, there being on an average only about one specimen to five square yards, stopping to feed for a moment and then going on again, the males more numerous than the females. Among them were specimens of *Teracolus*, probably influenced by mass-suggestion, but most of them remained on the farm, causing some butterfly-nets to be badly torn. The best Pierid was *Teracolus subfasciatus*; it was by no means easy to net, as it was very much on the alert and the wind high. Two species of *Acraea* were on the wing; *A. neobule* occurred in a small wood below the dam where the vegetation was abundant, while *A. stenobea* was found in some numbers on the open, exposed, stony and sandy ground among small Acacia bushes (*Acacia horrida*). Acraeas have a knack of concealing themselves effectively on the ground when covered with a net; several times here and in Angola I was sure I had the specimen under the net, but searched for it in vain. Below the dam where in a wet place *Asclepias fruticosa* grew in profusion, *Danais chrysippus* was plentiful. As it was a very wet season I expected to find occasionally a specimen with white hindwing; whenever I saw one with some white on the hindwing I caught it and invariably had a female of *Hypolimnas misippus* in the net. This female has deceived me again and again on the wing; however, it gives itself away as a Nymphaline when it settles on a dry bare patch of the ground, as do our *Vanessa*, to which *Hypolimnas* is related. I never saw *D. chrysippus* resting that way. On the sandy or pebbly slopes a grey Asilid fly was not uncommon, a brave creature which attacked my legs when I went after it.

The large blue fossorial wasp (*Hemipepsis vindex*) was still much in evidence, and when one day I saw a blue insect of the same size with the hindlegs held backwards fly about an Acacia bush, I mistook it for that wasp; something strange in its flight, however, a certain clumsiness, falling rather than gliding when settling on the bush, made me look again. It was a Longicorn beetle, of the genus *Phyllocnema*, in which the hindtibia is broadened and therefore as distinctly visible in flight as the hindleg of the fossorial.

When the moon was up, the evenings were spent in collecting frogs. The "poap-poap" of the toad no longer attracted me—I had enough specimens, I thought—, nor did I take the bull-frog which I saw and heard in a pond near the dam. But there were four other notes: the "lutter-lutter-lutter" of two species [1] and the castanets as at Maltahöhe, and a note not heard before sounding like a deep guttural "ou-i"; we called this musician "the Student on a Sunday morning after a night of too much beer." The Lutherans were easily located in the pools which had formed below the dam (there were none in the dam itself, the frogs evidently preferring shallow pools), and here were also the castanet players in some numbers (*Cacosternum boettgeri*). But to locate and catch the sick Student was quite a different proposition. A single short "ou-i" and then a long interval; the frogs were somewhere in the herbage round about the ponds, not in the water. You went quietly to the spot from which the note came, and waited: it was in front of you, you played your flashlight and searched the ground; the note came from behind you or from your right or left. It was tantalizing. In order to

[1] Cf. footnote on p. 36.

ascertain whether it was a frog at all, we concentrated on one specimen, we four hunters: Else and Hans Lütgens, Herr Piepmeyer and myself. Tracing the note to a heap of small stones, we knelt down in a circle, flashlights in hand, and removed the stones one by one and finally pounced upon a frog as it tried to escape by a jump; it was a yellow-striped species very different from any I had seen before. Although the call-notes proved that there were quite a number of specimens, we caught only six in all the weeks, and then it turned out to be *Kassina senegalensis*, a widely distributed species of no particular interest to the specialist! The note of these frogs carries very far, being distinct for half a mile away on a still evening.

At Klein Windhoek, where I stayed a week with Herr and Frau Blaschke, drinking "most," eating grapes, and altogether enjoying the beautiful gardens and their products, as well as the pleasant company in the house, I added several species of moths to the collection. *Syntomis damarensis* (not represented in the British Museum or the Tring collection) fluttered about the blossoms of *Pelargonium* at the house and other flowers in the gardens. *Usta bioculata* came to the lamp and also a specimen of the large Saturnian *Gynanisa maia*. Although these moths belong to a family of Silk-spinners, their larvae do not spin cocoons, but go into the ground for pupation, as do most African Saturnians. It is an interesting fact that none of the closely related species of the Indo-Australian Region have lost the faculty of making a cocoon. Why has evolution taken this turn? Why does the pupa of the African *Bunaea* and other genera lie buried in the ground, whilst the pupa of their very near relative, the Indian *Antheraea*, is enclosed in a cocoon of the very best silk and hung up in bush or tree? The loss of the silk-spinning faculty in these larvae is definitely linked with Africa, and the cause of the loss must be due to some evolutionary factor present in Africa, but not in Indo-Australia. The loss cannot be accounted for by a difference in food or climate; for, in the aggregate, a very large number of different plants are eaten by these cocoon-less Saturnians, and cocoon-less species occur in the driest and in the wettest districts of Africa, at low and high levels, in open country and in the forest. But there is nevertheless an environmental factor peculiar to Africa. The influx of antelopes into Africa and their enormous development on that continent may have been so destructive for the free-hanging large cocoons that only those pupae which were close to the ground or covered by accumulations of dry leaves on the ground had a measure of protection, and this process of weeding out may have driven the mature larvae into the ground for pupation. That the habits of animals are affected by a change in the surroundings is well known. Take, for instance, the European sparrow, which originally constructed a large free-hanging nest with a side entrance and now builds under the roofs of houses, as now does also the Cape sparrow in South-West. Another illustration is the nesting habit of the small South African house swallow, *Hirundo cucullata*, which now prefers, for the construction of its long tunnel-like nest, the ceilings of rooms in houses to over-hanging rocks and caves.

I did not see any frogs, nor did I hear their notes, though several species have been recorded from Windhoek and Klein Windhoek. The railway above Klein Windhoek was a fairly good hunting-ground where I picked up numbers of weevils and Tenebrionids, also a few specimens of the Longicorn genus *Phantasis*. On the other side of Windhoek occurred *Tetracha*.

An excursion towards Teufelsbach, with the object of collecting the Pierids

I had seen there in passing at the end of November, did not add much to the collection; however, we found a specimen of *Gynanisa maia* on a rocky hill-side under a loose slab of stone, the colours of stone and moth blending fairly well.

After my return to Hoffnung I devoted a little time to the plants, many of which were now in full flower. The peculiar genus *Lithops* was represented by a very abundant species. Several species of *Tribulus* [1] with their yellow starry flowers covered large stretches of the ground, a pale pink *Oxalis* and two species of *Tradescantia*, one yellow, the other blue, were plentiful. *Indigofera* trailed in low bushes, and on a flat sandy piece of ground there were masses of a beautiful blue flower like a *Scilla*. The plants connected in some way with insects interested me most. On *Rumex nepalensis* I found two species of *Bruchus*; they were feeding, and quite common. I did not ascertain in the pods of which leguminous plant they had developed; I opened many *Acacia horrida* pods, but found the seeds intact; perhaps the beetle larva lives in the pod of *Indigofera*. A Melolonthid beetle similar to *Hoplia* occurred singly or in twos on the yellow flower-heads of a Composite (*Berkheya*) which closed up at night and in the rain, the marginal flowers forming a conical tent under which the beetle was well sheltered. Another Melolonthid occurred in numbers in the flowers of *Crinum*. One of the commonest flowers in the open ground was *Cleome diandra* (*Capillidaceae*), which grows somewhat like *Epilobium augustifolium*, but is an annual. The stamens and pistils project far beyond the corolla, and as they were somewhat curved up, as if to offer insects a support, I expected to see them visited by insects; however, all that came to crowds of this plant in various places were five specimens of bees of two species. A flower typical for districts like Hoffnung was another annual, *Sesamum capense*, with its larger form *grandiflorum*, lilac colour, the shape of the flower recalling a *Malva* or *Campanula*, which I saw again in Angola on limestone hills near the coast. As in a *Campanula*, I found in the flower occasionally small insects which had sought shelter from rain.

Dinter, in *Botan. Reis. D. Südwest Afr.*, 1921, p. 165, in speaking of succulent plants and the various devices to safeguard their water-contents, remarks that there are insects, especially among beetles and grasshoppers, which might also be called succulents, as they keep alive for months without food and water, their external skeleton preventing loss of water as does the epidermis of certain succulents. Dinter mentions the large weevil, *Brachypterus apterus*, as an example of extraordinary resistance. He had packed twenty specimens in a tin between layers of cotton-wool and added a bar of cyanide of potassium wrapped in a damp rag. The tin was forgotten and only opened a year after. All the beetles were alive, crawling over each other; they had eaten the cotton-wool and laid a number of eggs. I remembered this experience when I collected some specimens of this beetle, and therefore put them into a glass jar with a lump of cyanide. They were dead in two days. Perhaps Professor Dinter's tin was not quite airtight.

In the second week of February (1934) communication with Swakopmund by rail was restored, though the damage by the flood of the Swakop had not yet been entirely repaired, and I said good-bye to my dear friends at Hoffnung. The train was reported to leave Windhoek early in the morning, but we did not get off before the afternoon. Half-way to Okahandja we slowed up: a large party was working on the line, an engine was still lying in the rivier, wheels in the air. I went only as far as Okahandja, of which I wished to see more than had been

[1] The few plants collected have been identified by Cecil Norman, British Museum.

possible on the occasions when we passed through it or had stayed for a night. A little wood of tall trees was the remnant of Dinter's experimental plantation of forest trees. Neglect and natural causes had destroyed many of the trees planted by him. Herr F. Gaerdes generously added various welcome specimens to my collection and also drew my attention to an Australian Longicorn beetle which was rather plentiful here (*Phoracantha*), and explained its means of defence. When the beetle is caught, it throws its spiked antennae quickly backwards and presses them against the skin of the aggressor, moving the head up and down as if trying to drive the spikes into the skin. The beetle did not draw any blood, but the spikes gave me the sensation of a rather blunt pin being pressed against the finger-tip. Many Longicorns without spikes on the segments of the antennae have the same habit of trying to free themselves.

The railway journey from Okahandja to Swakopmund took nearly twelve hours. As we travelled at night, and the bed was quite comfortable, I hardly noticed how slow the train was. Swakopmund has been described and praised so often that I need say no more than that it is an oasis in a desert, where it was quite pleasant to wait for the arrival of the boat at Walfish Bay. It was certainly a great achievement of the German administration. The harbour, however, is silting up and has been abandoned since Walfish Bay has been restored to the country. I had my quarters again at the German Hospiz and was very pleased to meet here Frau Elisabeth Schneider, our kind hostess at Okosongomuingo, Waterberg, who was waiting for the railway to take her north to Otjivarongo. On my rambles along the shore I had an opportunity of seeing a little of the scanty fauna of this sandy district. There were a number of small hillocks about a foot or two high, formed by *Mesembryanthemum salicornioides* and sand, which harboured a comparatively rich insect fauna. A small *Mylabris* (Meloidae) and some Tenebrionids occurred in numbers ; also various Hymenoptera were much in evidence, being very lively, among them a *Mutilla* ; some Noctuids were sleeping under the *Mesembryanthemum*, and the fragile Geometrid (*Rhodemetra sacraria*) which was so common at Hoffnung fluttered about as if this was its home, but probably had been brought down from inland by the wind. *Pyrameis cardui* and *Hypolimnas misippus* were also abundant, both likewise wanderers from inland. In the hillocks lived a lizard, beautifully adapted in coloration to the sand, being grey with numerous inconspicuous dark dots (*Scapteira reticulata*). It was very fast and disappeared deep down in the sand of the hillocks. There was much jetsam lying about under which the lizard and various beetles concealed themselves, and here after much searching I caught two adult lizards which had buried head and body in the sand, but had forgotten to conceal the tail as well. A pretty mouse, *Gerbillus swalius*, slept in the hillocks, sand-colour above and white beneath ; it seemed to be more abundant away from the shore on higher ground as testified by the great number of burrows. On the wet sand occurred a species of Cicindelid, *Eurymorpha bohemani*, which fed on what the sea threw up. When a wave rolled back, the beetles ran to the line of small muck left behind and flew up when the wave came on again. I did not see any of them ten yards away from the sea. They were most common where the drain from the slaughter house opened on the shore.

The Swakop, to the south of the town, was in flood, deep one day and perhaps shallow the next, according to the rains inland. At Swakopmund they had had

but one shower. The river had brought down so much soil and wood that a large spit had been formed extending far into the sea. The shore north of Swakopmund was covered with trunks of trees large and small, and under the lamp of the café near the beach crawled many rhinoceros beetles (*Temnorhynchus*), which had probably come down in dead trees. The river had certainly played havoc with the houses and gardens in or close to the bed ; but optimism is a necessity for settlers in a new land, and we may be sure that this flood will be forgotten just as Noah's flood does not influence us sinners any more. However, not every owner of property along the Swakop complained. Dr. Boss, of the German High School at Swakopmund, a botanist who has discovered many new plants, kindly took me to Palmenhorst, a property situated a few hours' drive from the town in a valley flanked by surprisingly high rugged mountains (fig. 27), a sheltered, fertile place for fruit and vegetables. Though the river had torn furrows across the garden, it had more than recompensed the owner by depositing so much humus mixed with manure swept away from farms higher up the river that for years there would be no necessity to buy fertilizers. As at Hoffnung, Cetonids were eating the figs and attacking other soft fruit. There were a few *Welwitchia* left near Palmenhorst. On a hill-side I saw a longish black insect which I took for a Staphylinid. I picked it up and dropped it hastily, for it gave me a most painful sting in the tip of the finger. It was a Mutillid, not a harmless beetle. The specimen escaped among the rocks and thus proved that the sting of an insect can be a protection.

At last the news arrived that the boat would be at Walfish Bay on the third day, and we got orders to pack up and get across as long as the river was low. A large crowd of passengers, and friends to see them off, gathered on the river bank ; some got into hammocks to be carried to the other side, but the large majority went into the water with skirts or trousers tucked up and marched through the broad river, the water coming well above my knees at the deepest place. There we were now, sitting on the sand or portmanteaux, looking back at Swakopmund and smiling at the people still struggling with the water.

The Kuiseb had broken through the dunes and made an exit to the sea ; with the fall of the river the sea had come in through the gap, and many of the houses of Walvis were standing in the water, like the one in which the agent had reserved a room for me. In the water were some small fishes which had come in from the sea. Here we were, with nothing to do but to wait two days for our boat. I had net and killing bottle and some tubes with a little alcohol in my hand luggage and went out exploring the shore. Here the same Cicindelid occurred as at Swakopmund, only in much larger numbers, and behaved in just the same way. Nearly all were of the usual dull copper colour with a touch of green ; but a small percentage, perhaps 1 in 200, stood out by the glossy blue-green colouring. There were no *Mesembryanthemum* hillocks near the shore ; they were farther inland. It was very pleasant to walk barefoot on the wet sand and feel the splash of the little rollers, but when I tried to go home without shoes and socks, the dry sand was so hot that I could not stand it long.

At last the boat hove in sight ; all was bustle. My baggage was safely on board and South-West became a part of the past on which to ruminate. I had come to South-West in order to make zoological collections specializing on certain groups, to see the country and to learn a little about the life and well-being of the white and coloured populations. After an expedition one is always inclined to

regret that one has not done this or that; I might have made the collections more complete with expert assistance or if the roads had been reliable in the rainy season, the best time for insects. However, I got the fishes I came for, collected a good number of Amphibians and Reptiles, small mammals and their fleas, and thousands of insects, besides odds and ends of other classes; with which I had to be satisfied. A road from Walfish to Gobabis and another from the Orange river to Otavi, with reliable bridges over the riviers, built for the good of the country, would be a great blessing for South-West. But where to find the money?

One is accustomed at home to hear the Government of the day blamed for anything that is wrong, or that people believe is wrong, in the management of the country. Letting off steam gives relief. Criticisms of the administration of South-West must be taken with a large pinch of salt, be they uttered by Europeans, Boers or Natives. What astonished me most in travelling through the country was the fact that a large proportion of the white and coloured populations speak German, that the street-names are German and that, when in other colonies and in Europe the greedy game of grab was in full swing after the war, here in South-West no farm and no business had been confiscated. A noble monument to the leaders of South Africa. If Europe had had leaders of this fine type in 1919, we should not now be in the mess in which we find ourselves. On sailing from Walfish Bay I looked back to the country with gratitude to the Administration for the permits granted me and to all whose hospitality I had enjoyed and whose help had so materially contributed to the success of the expedition.

ANGOLA.

After I had seen a little of Angola, I was glad that I had gone first to South-West. Apart from the coast region, the south and the sandy far-interior, Angola with its large forests and surprisingly good roads contrasts so favourably with most districts of South-West that a traveller who had enjoyed Angola might easily feel depressed by the severer though healthier conditions of life in South-West. Lobito, where I landed, was a little gem. The voyage had taken three days, the weather keeping fine all the way.

The Colonial Office at Lisbon had accorded me special facilities of entry into the colony, and the Acting British Vice-Consul, Mr. Leo L. Davis, saw to all the formalities to which a visitor has to attend before he is free to travel in the country. Guns and ammunition present the only difficulty, as they have to be registered at the military office at Benguela, some 50 km. distant. As a rule, travellers are only allowed a monthly supply of 25 cartridges. However, after mine had been counted, I could take them all back to Lobito and had permission to use as many as I liked on the excursions inland. The British colony at Lobito was most helpful in revising my plans and giving me information about the conditions of travel, and about localities favourable for my purposes. Professor E. Stresemann (Berlin) had recommended to me as a suitable companion one of his correspondents, Herr Rudolf Braun, who had been in Angola for seven years, spoke Portuguese fluently and was much interested in bird-life. As he could drive a car and seemed above the average in intelligence, we soon came to an agreement, although I regretted that he had never attempted or been taught to make a mammal- or bird-skin. I hired a car and a small van from the Manica Trading Co., bought supplies and left in the hotel that portion of my baggage

Fig. 22. Rehoboth: houses of bastards.

Fig. 23. Rehoboth, west end: dwellings of natives.

FIG. 24. Voigtsgrund: the river in front and the flower garden at the back

FIG. 25. Table mountains between Mariental and Rehoboth

which was not required on the first excursion. It took nearly a week until a start could be made. The time passed pleasantly with invitations, rambles on the spit on which Lobito is built and a little collecting. The Hotel Terminus where I stayed is a first-class house. The gardens of Lobito, both private and public, have a luxuriant imported tropical vegetation, palms of various kinds, flowering shrubs and perennials. The wild fauna on this sand spit is not rich,

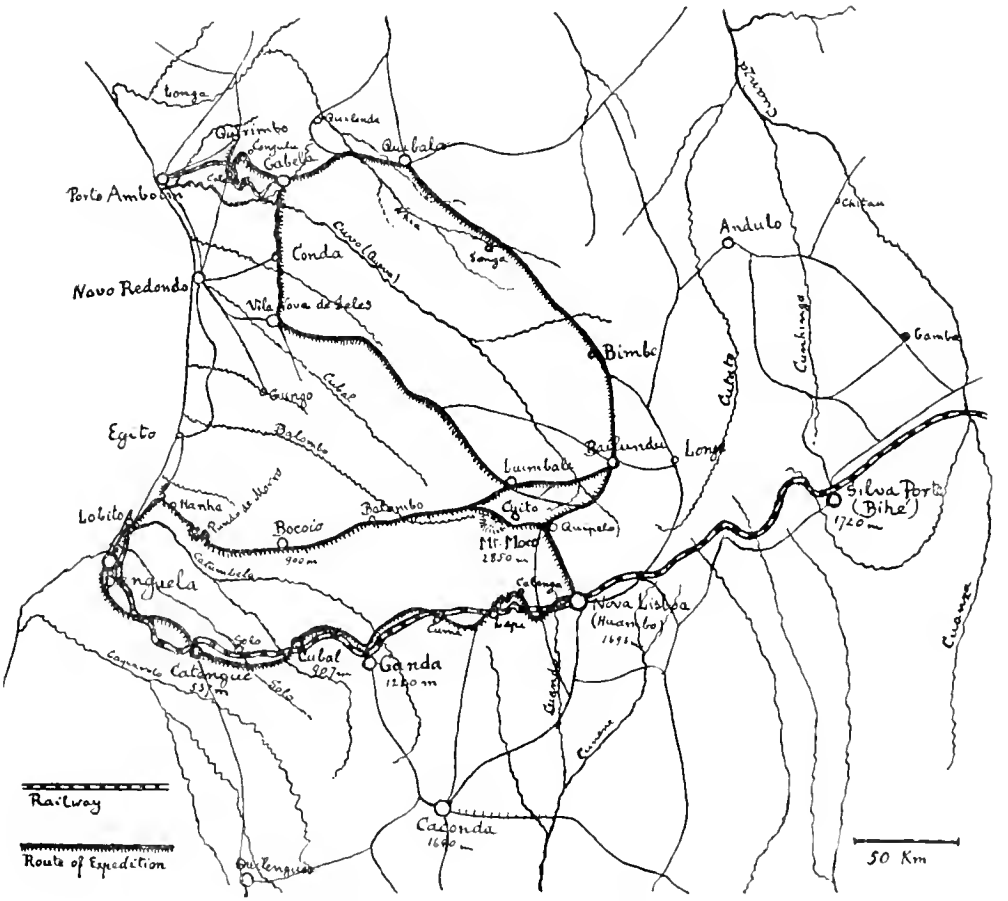

FIG. 28.—Route of expedition in Angola.

of course; but I collected at the lamps of the hotel quite a number of moths and beetles; the burrows of a rat (*Taterona schinzi*) were plentiful on the Benguela side of the town, and several lizards flitted about in numbers.

It was the beginning of March 1934 and the rainy season, when my party, which included two chauffeurs and a cook (so-called), set out for the interior. Our destination was Cuito, a large plantation of the Benguela Estates, Ltd., at the foot of Mt. Moco in the district of Luimbale. The road branched off northward before reaching the Catumbela river, skirted the lagoon at the head of Lobito Bay and sharply ascended to the first plateau, which was dry and mainly covered with coarse grass and Acacia bushes, and farther on some Candelabra

Aloes in flower. After having crossed a valley the road climbed in serpentines to the second plateau. The flora of the valley and the escarpment was very striking, Baobab in the valley, and in a gully of the escarpment an impenetrable picturesque bush with a multitude of high Euphorbias. As the van could not make the ascent, the luggage was left at a farm in the neighbourhood, and the chauffeur drove back to Lobito to exchange the van for another with a more powerful engine, while we went on to Bocoio, a settlement at 900 m. above the sea, with a good Portuguese hotel. Here we waited for the luggage and, as it only arrived late in the afternoon, stayed for the night. There is a little river at a short distance east of the hotel and a native village among bushes and trees, where we saw, on the trunks of trees, on large boulders of granite and on the walls of outhouses, various species of lizards in incredible numbers. From Bocoio the road led gradually upwards, there being a few places where it was steeper, but there was no sharp escarpment. Many little brooks were crossed on adequate bridges ; however, as we were travelling fast in order to arrive at Cuito in good time, we did no collecting.

Before going to Cuito we had to call at Luimbale on the district officer to leave our credentials, a formality to be observed by all travellers who wish to stay a while in a district, the control of strangers being strict in Angola. Luimbale consists, besides the establishment of the official, of a simple hotel plus store, and one or two additional buildings ; the country being open grassland and the forest some distance away, it is not a place for an entomologist. Such stores combined with hotel or inn are found all over the country and all act as filling stations for cars. We had to go back some distance the way we had come in order to get to the branch road leading to Cuito. The plantation was on an undulating plain surrounded by high wooded hills and traversed by a small river with a good supply of water. A row of very large trees was evidence that the place had been in the hands of Europeans for a considerable time. A comfortable dwelling-house surrounded by a flower border and a well-kept lawn, large outhouses, a row of huts for the native farm-hands, trees laden with fruit and a well-stocked kitchen garden gave Cuito a look of comfort and progress. There were European strawberries and apples, American guavas, Japanese loquats and other fruit in profusion. One could apparently grow anything at this height except purely tropical fruit like banana and pawpaw. The raw soil, however, is not particularly fertile ; it contains a good deal of iron, which gives it a reddish colour, and gets very hard in the sun, making a good surface for roads. The gardens and coffee plantations have to be specially improved by the addition of humus accumulated in the valleys and swamps. In the absence of the director of the estates we were cordially received by a young Portuguese assistant and the bailiff, who explained to us the the lie of the land and with whom we made arrangements for the building of a camp on a foothill of Mt. Moco, which towered up at no great distance. The few days we had to wait for the huts to be ready we employed in collecting what there was about the farm in our line. A species of toad (*Bufo regularis*) invited us to begin work the evening of our arrival ; it was in good numbers in the small irrigation ditches near the house, croaking all the evening. A row of a bushy *Amaryllid* along two sides of the square on which the house was built attracted the *convolvuli*-Hawk-moth in numbers ; the moths knew no shyness and could be observed at leisure. Several times I took the long tube of the flower between my fingers and,

pressing it when the proboscis was inserted, held the moth for a while, and when I let it go it dipped the proboscis into the next flower as if nothing untoward had happened. In daytime the toad was concealed under herbage in the shallow ditches and the flower border. I saw one close to the house creeping away, and I was just on the point of grabbing it when from under the herbage a snake appeared which was also after the Amphibian and now fell a prey to me ; I took it by the neck and killed it by putting a drop of nicotine in solution into its mouth. The snake was only the thickness of my small finger, but bulged in the middle ; before placing it into the jar, I gently pressed the stomach contents forward, and out came three toads, uninjured and still fresh. A large square of grass behind the house was a good place for collecting small Orthoptera, and a little farther afield numerous fresh hillocks indicated the presence of *Cryptomys*. It was a black species (*Cryptomys bocagei*), and the first specimen I caught provided me with some fleas peculiar to this rodent, *Rooseveltiella georychi*, described from Angola. Later on natives brought dead and alive *Cryptomys bocagei* in numbers, but I never found another flea on them. If a mammal is handled by a human being the fleas—at least the active ones, not those which are fastened by the proboscis to the skin of the host—jump away almost at once ; it may be an inherited trait protecting the flea from being swallowed by the Carnivore which has the flea's host in its jaws. It struck me as peculiar that we saw hardly any lizards, which may be due to the absence of rocks in the neighbourhood of the farm.

After a couple of days our equipment was transported on an oxen-wagon up the hill to our huts. We had chosen for our camp a clearing in the forest at an altitude of about 1,850 m., the Moco itself being stated to reach 2,850 m. The forest of evergreen trees which covers a large part of the highlands from Bocoio to Bailundu is neither high nor very dense, and wherever there is an opening grass takes the place of the undergrowth of bushes. The wood extended up the gullies of Mt. Moco, but did not nearly reach the top, which is a dome covered with grass and herbage, with bare rocks jutting out from the sides. The forest as such is neither impressive nor beautiful, being too uniform, but the monotony is relieved by a multitude of flowering shrubs and perennials along the roads and wherever the sun penetrates to the ground. Two shrubby *Combretum*, with long shoots studded with small scarlet or crimson flowers, and the Labiate *Leonotis leonurus*, 10 ft. high, many-branched, with numerous whorls of orange blossoms, were the most conspicuous. The valley below the camp was partly in cultivation by the natives, maize being here the chief crop, and partly had run wild again. The natives till a piece of ground as long as its fertility lasts, and then clear another plot of tree and bush, the abandoned fields and gardens being promptly occupied by a great variety of herbage.

Though the valley was full of flowers and close to the forest, there were hardly any butterflies, and on the wet sand and pebbles of a brook I saw only some Lycaenids and Skippers, no Papilios and Pierids. The brook had very clear water in spite of the rains, and was not only a great comfort to the camp, but also otherwise a treasure, there being a crab and several species of fishes in it. Small barbels played in pools under overhanging herbage and were easily scooped up with a strong net, one of them attracting our curiosity by a peculiar organ at the side of the head. A self-constructed trap placed mouth up-river on the clean pebbly bottom of the brook contained next morning two species of cat-fish, one slaty

black, the other (a new species) grey with numerous dark spots. When put into a deep muddy recess of the brook, the trap remained empty, and when we had removed it again to a clear bottom, we found it torn, possibly by crabs or an otter. The black cat-fish was obviously common, for the natives brought it into camp to sell; it was quite good to eat fried. The spotted species I did not see again. On the other side of the brook a maize-field was watched over by an old native sitting in a primitive shelter. He was probably younger than myself. His face wrinkled and his look stolid, he did not seem to be troubled by the deep thoughts of a Gandhi; he simply sat day in day out, protecting the maize from depredations.

The district was well populated, native villages being visible in the distance, and the smoke of fires curling up from the forest in many places. The men who had built our huts went home enriched by a few shillings, and soon natives trooped into camp bringing supplies of potatoes, chickens, cabbage, and rats and mice dead and alive, lizards with and without tails, frogs, dead caterpillars and anything they hoped the white men would buy. A large Flying Squirrel and a Lemurid were frequently offered and large and small *Cryptomys bocagei* and the large ochreous *Cryptomys mechowi* were daily arrivals, often in such numbers that we could skin only a few of them. The *C. mechowi* alive is a queer-looking, ferocious creature, its enormous incisors gleaming white, a tool and a formidable weapon. There were no Tree Squirrels, at least we saw none and the natives brought none. The catch of insects in daytime was very poor. For night work we built, above the valley, a platform for the lamp, and attracted large numbers of moths. As in South-West, Cossids were the first to arrive, together with such moths of various kind which were resting near by and were disturbed by the sudden glare of the lamp. Arctiids and Syntomids came after 8 p.m. and Hepialids at 10 p.m., the last being almost as punctual as clockwork. Sphingidae, of which we did not get many, appeared after 10 p.m. No Saturnians were obtained at Moco. I was astonished at the number of individuals of *Paussidae* that were attracted, together with some pale-brown species of *Staphylinidae* which evidently came from ants' nests. The peculiar Paussid beetles have, like a Bombardier Beetle, an apparatus for ejecting, with a faint explosion, a puff of smoke from the tail-end. Melolonthids and Copriids there were in quantities, wood-borers also were common, but Longicorns came in single specimens. We could not take all that arrived; on a good night the gauze cage with the lamp inside was simply covered with fluttering and crawling insects of many orders. Many large Noctuids and clumsy beetles had to be caught and killed simply to prevent them from doing too much damage among the more delicate species. Lasiocamps were difficult to catch on account of their tumbling flight, but frequently they settled for good, hypnotized by the glare of the lamp. A specimen of *Polyptychus* was saved just in time; it was so much like one of the abundant Noctuids in appearance that my companion was on the point of crushing it when I saw what it was. I expected to find at the brook some Trichoptera, but saw none. A species of frog was plentiful in the herbage, taking a long leap into the water when approached.

Life in camp was frugal and pleasant. The rain was sometimes very heavy, but the huts, thatched with grass, were nearly rain-proof, and we had, moreover, taken the precaution of putting a tarpaulin over the end of the hut where my bedding was on a bedstead of rough poles. A couple of chickens generally came into the hut in the evening to sleep in a corner, seeking protection from prowling

animals. The only unpleasantness in the hut was the dry mud with which a termite coated all the framework and everything that stood on the ground or leaned against the poles, the mud breaking away when touched, a shower of dust coming down when in turning round at night one inadvertently knocked against an upright. The termite, however, was not destructive; a boot might be covered with mud during the night, but the leather was not attacked. I might have protected the hut by painting the framework with carbolic; but it was hardly worth doing it for a stay of only two or three weeks.

When nothing new for us turned up, we broke camp and returned to Fazenda Cuito for a night, and had the pleasure of meeting, a few hours after our arrival, the director of the several large estates of the Company, an Australian by birth, who had seen much of the world and appeared eminently fit to keep a large concern in order.

As I did not wish to go back to Lobito the way we had come, we decided to drive to Nova Lisboa and take from there the main road to Benguela, which would give me an opportunity to see other districts of the high plateau and in passing to make the acquaintance of the towns which lie along the Benguela railway. We had sent a letter to the district commissioner of Luimbale notifying him that we should leave his district on a certain date and asking for the return of my papers. The documents, however, could not be entrusted to a messenger, we were informed, and had to be fetched by ourselves. Herr Braun, therefore, went via Luimbale, whereas I took the direct route to Nova Lisboa, where I arrived in the afternoon. I had to wait for Herr Braun nearly till nightfall because the commissioner had gone to Bailundu and Herr Braun had to follow him. Everybody seemed still to call Nova Lisboa by its old name Huambo. The Portuguese delight in changing geographical names, which is very disconcerting for the naturalist who finds the old names on labels in museums and does not know their equivalent on recent maps. Nova Lisboa is a spaciously built place in a rich district, the new capital of Angola, windy, cool and healthy, at an altitude of close on 1,700 m., with good water, electric light and the prospect of great expansion. It lies on the south side of the east-west divide, the rivers and brooks east and west of Nova Lisboa flowing south into the Cunene, whereas those somewhat farther east, at and beyond Silva Porto—the Bihé of museum labels—belong to the Cuanza river system, going north. The main road to Benguela runs more or less in the proximity of the railway. The plateau of Nova Lisboa is open country, with a view of dales, hills and forests; the landscape dotted with high pyramids of granite, naked or with a scanty vegetation in the crevices, remnants of decayed mountains. A small river west of Nova Lisboa called for a halt; it was about 10 ft. wide and 2 or 3 deep. By sweeping with a net under overhanging herbage we captured two species of small fishes, one of them since proved to be new. A native passing by on his way to Nova Lisboa said that it was the Cunene in which we were fishing, and added the information that there were crocodiles in it. However, according to the maps the upper reach of the Cunene is east of Nova Lisboa; our river, therefore, must have been a tributary of it, being most likely the Cuando, from which Nova Lisboa gets its water-supply. I may be wrong, for the smaller rivers of Angola run as yet more erratically on the maps than in nature. A young German on holiday, employed on a plantation in the Ganda district, and to whom we were giving a lift, assisted assiduously in the fishing and the search for insects. When

crossing the railway we collected the little there was between the rails, a few beetles hardly worth taking. The timber of old bridges was a refuge for lizards, which, in some places, swarmed about the old beams and supports, disappearing so quickly in the crevices and holes that we did not get a single specimen, there being no time for fitting nooses and setting traps.

Soon after Robert Williams, a station named after Sir Robert Williams, to whose efforts the railway owes its construction, the road ran up a high divide, attaining an altitude of nearly 1,900 m. and descending in wide sweeps to Lepi. Shortly before reaching Ganda we crossed the upper reach of the Catumbela or a branch of it, a swift-running clear brook, in a small pool of which, under an old discarded bridge, we obtained three species of fishes. From Ganda we had a fine view of the Caconda highlands to the south, where there are many large plantations, maize and seisal (both American) being the main products for export. As it was only mid-afternoon, we hurried on—this being the right word for travelling in a car through a country unknown to you, where there are all kinds of treasures the biologist would like to see and which, instead, he passes by in the maddening haste to get to a place where to eat and sleep. At the suggestion of the merry driver of the van who knew this country, we stopped at Cubal at a small inn. It might have been better (or at least more expensive) to have chosen the Station Hotel with its balcony and garden. However, a room was being cleared and cleaned and the inn had to do. I had hardly got into bed when a painful itching in the sole of my right foot required inspection with the electric torch, and Herr Braun at once recognized the cause of the pain as a jigger which had already bored deep enough to get me on the raw. A little operation got the flea out and a drop of iodine prevented any after-effects from arising. We wished to reach Lobito next day, a long drive. Getting up before it was quite light, to our surprise we splashed into water: the room was flooded. Fortunately our garments and hand-luggage were lying on chairs and table and no harm was done. A heavy shower had come down in the night, and as the boys had forgotten to open the drains in the evening, the water from the higher-lying backyard and garden had to run through the house. The atmosphere in the bedroom was rather damp and full of scents (or smells), but we got over it, and our appetite for breakfast was not impaired.

The road from Nova Lisboa to Cubal had been in fine order all the way, broad, with a hard even surface, and all the brooks spanned by good bridges, a delight to the driver who likes to go at 50 miles an hour rather than at 30. Our party of five increased to eight at Cubal: a Portuguese gentleman who wished to reach Catengue as early as possible asked for a lift, as there was no westward-bound train that day; and a couple of natives, husband and wife in charge of a beautiful native girl, wanted to save the fare to Benguela, so we allowed them to perch on top of the luggage. My driver of the car, a black mission boy from Cape Province, who had been down with malaria on and off, again sat huddled up in the back of the car, and Herr Braun had to continue acting as chauffeur. We travelled through woods on a road which became dirty and bumpy, deteriorating more and more, requiring careful and slow driving; at 11 a.m. we came to the small Solo river and found it in flood and without a bridge. The water was shallow, but a ripple in the middle indicated that there was a bank of sand or mud. "Slowly, slowly," I reminded the driver; but he was optimistic and drove with hurrah, so to speak, into the water, and there we stuck, the front

wheels boring deeper into the mud with each turn. The water entered the body of the car, which gradually began to lean dangerously up-stream. The van, fortunately, was behind us and could pull us back on to dry ground. The van might then have crossed, but it was too risky. There was a village up-river, and after a couple of hours we had a crowd of natives who, by pushing and pulling, got first the van and then the car on to the other side, each man being recompensed by a few pence and the headman by a shilling, quite a fortune. The time of waiting was pleasantly spent by my party in having an alfresco luncheon in the shade of a large tree, and a nap. Going for a stroll, I collected some dragonflies hovering over shallow pools in a field and disturbed a mouse, which led me to its nest under a decaying log, the nest containing many specimens of a small flea, the commonest rodent flea of Angola, *Xenopsylla brasiliensis*. The mouse was an *Otomys* ; I saw several other specimens close to the river under dead reeds. Our three native passengers had gone through the river and made themselves comfortable. After a while our Portuguese friend was seen talking to the man, arguing with him ; he came back to sit down by Herr Braun, quite angry that the native had refused to sell him the girl, whom he wanted there and then. Shocking for a European new to the country. We were in Africa, where bastards abound.

Our trouble with the little river was over, but the road did not improve. It was passable, but too narrow to be comfortable in the bush where you could not see far ahead, and we nearly bumped into a car coming from the opposite direction. It belonged to the official responsible for this road, and who was in it, our Portuguese passenger told us. Some time before we came out of the forest the road dipped into a valley which looked a good collecting ground ; at the rain puddles in the road were swarms of Lycaenids, Hesperids, Pierids and also a *Charaxes* which streaked away on the noisy approach of the car. As it was getting late, we could stop but a few minutes to wait for the van. We arrived before dusk at Catengue, just in time for our passenger to transact his business and catch the homeward train. The inn and store where we put up for the night was simple, but quite good enough to make it the headquarters for a longer stay. With the wooded hills almost before the door and the open calcareous country not far away to the west, a collector could expect good results. But I had other plans and had to return to Lobito.

After the woods were left behind, the road from Catengue traversed a park-like plateau, the vegetation becoming gradually poorer. This plateau has its beauty ; while in the forests the view is restricted and the eyes get tired by seeing the trees pass by in quick and monotonous succession, the eyes can now roam into the far distance where the trees stand still and where there might be antelopes and ostriches, much as in South-West. Nearing the dry coast belt we found on low herbage and on the bare ground a few specimens of a Buprestid, *Julodis*, which I had not seen before except in collections at home. Soon we got a first glimpse of the sea and went down the last hills on a steep road which needed repairing rather badly. Down in the coastal plain puddles, ruts and mud-holes made driving precarious ; the car had to pick its way. When some cows crossing the road obscured the view, we ran into a deep rut, where we stuck. After much churning in the mud, the car gave it up altogether, and the van had to tow us into Benguela, which was not far off. While the car was being roped to the van, I collected a species of *Cicindela* on the sands by the roadside, where

it was fairly abundant. We had luncheon at Benguela, and it interested me to see that our half-caste chauffeur was allowed to have his meal in the same room as the other guests, being treated as a white man, whereas the black chauffeur was asked to leave and to find a meal elsewhere. The van towed us into Lobito, where we created a little amusement among the natives who saw us come in at tandem.

Packing the collections and making arrangements for another excursion did not take long. As it was essential to spend the remaining time of my stay in Angola in an environment different from the high plateau where I had been, my friends at Lobito advised me to take the road along the coast via Egito to Novo Redondo and thence go inland to Vila Nova de Seles or another suitable place in that region, where I should find virgin rain-forest in the hills. The Cape boy, who had been of very little use on the excursion, was replaced by a half-caste chauffeur, and we left Lobito the first week in April by the road around the lagoon as before, and having climbed up the coastal escarpment, turned sharply northward into a deep valley with very steep sides. At the bottom, nearly at sea-level, there was a palm grove, very pleasant to look at, and behind it a small muddy river in flood with the bridge lying on the water and so badly damaged that only a pedestrian could cross it, but not a car. It was the only road northward ; so there was no way out of the difficulty but to go far inland and reach the Seles district from there. It was already dark when we arrived at Luimbale and halted to refill the petrol tank. We were informed by the hotel keeper that the only road to Seles was the one which turned off at Luimbale and that the Bailundu-Seles road was closed because the bridge over the Cuvo (= Queve) had been destroyed by the flooded river. Herr Braun did not believe the man, who, he thought, told us this story in order to keep us in his hotel for the night. However, at Bailundu (now Texeira da Silva for short !), another 60 km. farther east, the information was confirmed ; so we had to drive back to Luimbale next morning and there turn north-west.

The country down to Vila Nova de Seles is mostly grassland with copses and outcrops of rock. Seles is a largish place, not a plantation. We arrived here in the afternoon, and when, on enquiry, we heard that there was virgin forest farther north in the neighbourhood of Gabela, we went on to the " Posto " Conda where there was an inn plus stores. The road to Conda was in the open, very much up and down across narrow gullies, with wooded hills on our left, westward, which looked like a regular row of domed hillocks in the gathering darkness. We made the acquaintance of the Posto officer, who was at the inn (his property, I think), arranged for supper and accommodation and then waited in vain for our van to arrive. Herr Braun had to go back in the car to find out what happened. The explanation was simple and instructive. In one of the gullies the van had been so close on our heels that in taking the steep side with a rush it had to stop in order to avoid bumping into our more slowly moving car. Stopping the loaded van at such a steep place was fatal ; the engine was not powerful enough to climb up without the impetus received in coming down the other side. With the assistance of the car the difficulty was overcome. It was a dark night and I regretted that we were not in camp with the lamp put up. A few moths fluttered about the kerosene lamp of the room where our party, the Posto officer and the family of the inn keeper had supper.

We travelled now through wooded country and crossed the Cuvo R. on a high, well-constructed stone bridge, the Cuvo running in a deep gully with precipitous sides, the forest extending down to the water, which was clear and shallow. A party of women, with or without a child on the hip, were mending the steep road which the rains had slightly damaged, and soon after the forest came to an end. Gabela was before us, a small town built on a plateau above a small river. Good houses, hospital, two hotels, stores of various kinds, a large central place with the residence of the District Commissioner (" circunscrição ") and rows of trees, a well-ordered, permanent settlement of Europeans. The Commissioner, who could speak French, was very helpful and went out of his way to assist me. He introduced us to the owner of a large coffee plantation with primeval forest, who gave me permission to stay in the house of one of his bailiffs in the forest ; just what I wanted. The hotel Saude, where we remained till next afternoon, came up to its name, except for a certain convenience. However, as an innkeeper once said to us in Algeria, waving his arm : " voilà toute la nature ! "

The house of the bailiff of the Fazenda Congula was on top of a hill. It was divided by parallel walls into five rooms, of which three were placed at our disposal, with a kitchen on the other side of the little plateau, windswept and therefore comparatively cool in the shade. We were here on top of a steep escarpment, with a view over a plain with low hills and patches of woods and with a glimpse of the sea on the horizon. The escarpment, which runs more or less parallel with the coast, is covered with high forest, impenetrable where it is left untouched. Most of it was made suitable for growing native coffee by clearing away the undergrowth, and preserving a large number of the trees as shade-trees, which prevent the ground from drying up. The native workers of Congulu and their families were housed in a small village near our dwelling-house. The government looks well after the natives, who are a great asset for the colony. The houses provided for them have vertical walls of stone or mud ; that is one of the regulations. The natives are not only registered, but work is found for them when they are in arrears with the payment of the taxes, about 15*s*. a man. Drafts of them with their families are sent to the plantations to work off their debts, the planter having to provide, besides the hut and food, blankets and some clothing, which become the property of the worker. The natives of the plantation and all the neighbourhood took advantage of our presence to make some money by bringing live and dead specimens till we had more than enough of certain kinds. At a lower elevation, where bananas grew in profusion, the Puff-adder and the beautifully coloured Horned Viper (*Bitis nasicornis*) were not rare. The natives brought them in regularly, pricing them highly because these serpents are for them a good morsel for the pot. A Puff-adder I emptied contained a family of birds. A dead snake when pressed sideways, i.e. on the ribs, becomes quite lively, which may be the reason for the belief among natives that snakes do not die before the sun sets. The owner of the plantation most kindly kept us supplied with bananas, oranges and lemons ; the lemon was a small kind, not very sour and making a delicious drink. The weather was quite seasonal ; thunderstorms and heavy downpours, sometimes too much for our work, and then again brilliant sunshine. The house being exposed to the wind there were few blood-sucking flies. The soil was nearly black in the forest, but reddish clay below the layer of humus. In clearing away the undergrowth small masses of dry creepers, branches

and twigs had been left hanging among the trees; by beating this dry wood I obtained many small beetles, among them a single specimen of the smallest Longicorn I had ever seen, smaller than *Gracilia pygmaea*. On tree-trunks felled a short while ago *Sternotomis* and *Callichroma* (and allied genera) were seen in abundance, flying away or dropping quickly when approached. Apart from a few common species, there were hardly any butterflies along the roads and in the clearings. Being surrounded by forest and our lamp shining down the escarpment, moth-collecting was very good. At 10 p.m. a Saturnian appeared, flying round the lamp and dropping in the herbage, a form of *Drepanoptera* new to me; a *Brahmaea* also was not rare, but always came singly from 10 to after midnight, a very fast flier. The Sphingid *Polyptychus virescens* looked very pretty, but its lovely green colour did not keep; I ought to have set and artificially dried the specimens at once. When the rain was too heavy, or after the rain had driven us in and then abated or stopped altogether, I placed the lamp at the lee side of the house and here attracted other collectors of insects, toads and frogs. The toads came fearlessly to the lamp-cage and picked off the moths I did not want, thoroughly gorging themselves. To swallow a large moth sometimes involved a struggle on the part of the toad as well as the moth; the Convolvulus hawk and the Oleander hawk, though attacked by the toads, were let go after a little while, being too large and hard. Once late in the evening, after a severe shower of rain, large numbers of a winged termite came to the cage, slowly crawling up the sides, many of them falling a prey to the toads. Suddenly I noticed a large fly riding on the back of a termite, then another and another. For a minute this slow ride, the fly sitting quite still, was a puzzle. Then I saw the meaning of it. The rider waited for the right moment to turn its horse over and drive its proboscis into it. The fly (*Ochromyia spurca*) was evidently active at night and after the swarm of termites. There were at the cage some smaller but similar flies, possibly the males, all the large predaceous ones being females. The males did not move, did not attack the termites and did not approach the females while these were occupied with their meal.

In the forest below Congulu there were several specimens of *Caloncoba* in flower, somewhat resembling a *Magnolia* from afar. The trees were simply smothered in flowers, and I expected them to be as attractive to insects as they were to me. But there was nothing on them. The male inflorescence of the Oil Palm, on the other hand, a large brown bundle without any showy colouring, was full of small beetles; most of them were a Weevil, but there were also a few Staphylinids and Carabids. I shook an inflorescence over a bag and counted several hundred beetles and a few spiders. I never saw any beetle on the female inflorescences, which are on the same tree.

Two species of Tree Squirrels were common in the woods below the Fazenda, a brown species (*Heliosciurus rufibrachiatus brauni*, named after my companion) and a smaller striped one (*H. congicus*); on the latter we found a new species of flea. Natives brought me also some specimens of a large black Flying Squirrel (*Anomalurus*), with a beautiful long, dense, very soft fur. Under the roof of my room were the sleeping-quarters of a colony of a species of bat lousy with fleas (if I may use this contradiction in terms), both the bat and the flea being widely distributed common species.

A small woolly bee, black with tawny abdomen, like a miniature bumblebee, was a nuisance in my room, where we had our meals. It came in numbers,

foraging, and crawled into everything eatable, particularly anything sweet, tumbling into your spoon and cup and being very busy all day long robbing the larder.

As I wished to find a likely place for camping on the plain below us, we went for an excursion in the car, winding our way down the escarpment on a good road connecting Gabela with the two ports, Novo Redondo on the left and Porto Amboim on the right. At the bottom of the escarpment, where the road forked, there was a fazenda as railway station and inn, Calaongo. The left road, which passed into a wood, appeared the more attractive of the two, but after a short run we were effectively stopped by a broad belt of little runlets looking more like the overflow of a river than a river itself. While Herr Braun and the chauffeur tried to find a passage and finally had to turn the car and then tinker with it because it refused to run smoothly, I wandered about to see what I might bag. Standing close to a bush from which seemed to come a volume of shrill noise as if hundreds of cicadas were chirping, and wondering why none flew away—cicadas being generally very quick to get away when approached in hot sunshine—I knocked at the bush and nothing happened, the noise going on as before. It came from the ground, from a ditch behind the bush with a little water, and there I found the musicians: tiny frogs (*Arthroleptis parvulus*). They were spawning and could easily be caught with the net or the bare hand. I took several dozen, which did not seem to make any difference to the noise. It was the loudest continuous sound I have ever heard any creatures make. I had to shout to make myself understood by Herr Braun. The noise was less metallic than that of cicadas.

We now took the northward road and came to the Posto Quirimbo, where the road to Porto Amboim turned westwards at a right angle. The house was occupied by natives and goats. The surroundings were inviting: bush and grass on swampy ground, oil palms, patches of dense forest and bush on dry ground and the rain-forest not far away. We would make enquiries. As luck would have it, on our way back we overtook a young gentleman carried in a palanka, who was the officer of the Posto, knew all about us and was ready to help. He advised us to make our quarters in his old house, the one we had seen; he would clear the natives out, have the house cleaned and let us know when it was ready. A few days after we paid him a call at the new house he had built for himself on top of a foot-hill of the escarpment and were very hospitably entertained by him and his wife at an excellent luncheon. The life so far away from civilization is not an easy one for a gentle lady, though there may be every comfort in the house and many servants. It was plucky of the young wife to share the life with a husband whose duties of inspection often take him away from home. Both husband and wife were as pleasant and sympathetic as Portuguese generally are, and I left their house with my heart full of good wishes for a happy future.

Our new quarters were well built, the house consisting of a central room with a door at the front and another at the back, and a large room each side. The roof continued down to protect a veranda which ran round three sides of the house. The cars found shelter in a garage and the kitchen was opposite the house. The rooms in which the chauffeurs were supposed to sleep had been too long in occupation by goats; the van and the garage with fresh air were better quarters. The altitude was only 300 m., very low as compared with 850 m. of

Congulu, which we could dimly see above us. The end of the rainy season was near, and it was hot day and night. A very clear brook near by provided us with water and gave us an opportunity to take a cooling bath. The virgin forest was about ½ km. distant. The house stood in an oil-palm plantation, which was in the charge of a native, the plantation not being sufficiently remunerative to be under the direct management of a European. There was no bare ground except on the road and on the drive to the house. Insect-life was more abundant in daytime than at Congulu and Moko. On the shady road through the jungle a species of *Euphaedra* settled on the leaves of bushes or on the ground, and here also the bright-red *Euryphene coccinata* occurred. Along the sunny roadsides *Biblis*, *Precis* and other black-and-orange butterflies fluttered up and down, visiting flowers, and among them I often saw the Agaristid moth *Xanthospilopteryx pardalina*, likewise orange and black, looking on the wing very much like the butterflies, but giving itself away when settling on a flower or leaf with the wings held in roof-shape like a Noctuid. Several Pierids and Papilios congregated on wet patches of the roadside. *Papilio ridleyanus*, which is exactly like an *Acraea* when on the wing, could not possibly have been mistaken for anything else but a swallow-tail when on the mud drinking. The Pierids generally flew fast up and down the roadsides together with the peculiar *Charaxes ehmkei* and *Ch. eupale*, which both look as white in flight as a Pierid. The brown form of *Charaxes ehmkei* was also present, but less abundant; it is generally regarded as the dry-season form, which, in this case, was evidently not correct, for some of the specimens were quite fresh and appeared to have emerged from the chrysalis but a short time ago. As natives began to bring in specimens which required skinning or bottling, and as our catch of moths at night was generally abundant and had to be seen to next morning, there was not much time for butterfly-hunting, and a couple of hours with the net, usually from 11 to 1, were exhausting at this temperature. As I perspire very freely, the little breeze was cooling; but in spots sheltered by the wood or the reeds there was no breeze, only the quivering air of an oven; then I made for the shade of the forest, sitting down on a rock and embracing another, which, by contrast with the outside temperature, felt as cold as ice.

The first two nights we had the lamp on our veranda. Although some good species arrived, there was no crowd; we were too low, and decided to use for night-work the empty house standing higher up the plantation which had two stories with a veranda for the upper rooms. As the veranda, which is dimly visible in the photograph (fig. 31), ran along three sides of the building, we could always shift the lamp to the lee side, if the usual south-west wind should change. The light shone over the bushes and into the trees, and the white-washed walls of the house were an additional attraction for the insects. Here we sat every night until midnight and after. Below us in the bush a mongoose of some kind sent its weird cry into the night, probably eyeing us from a safe shelter. Bats were busy competing with us out of reach, and a small species of ant worked hard all the time to carry away the insects which got accidentally crushed when we tried to put the killing bottle or a pill-box over a large species which fluttered up and down the gauze cage among a crowd of small fry. It was enjoyable up there in the dark sweltering night, with new arrivals every second. As in other places, Cossids appeared soon after dark, an orange-spotted *Callocossus* being always hailed with satisfaction. Some common

Hawkmoths, like *Nephele*, *Hippotion*, *D. nerii* and *H. convolvuli*, were likewise early. The better Hawkmoths were late (and for that reason perhaps are rarer in collections), the most frequent being a species of *Praedora*, which generally flopped down and sat still, possibly because it is inconspicuous on the ground, whereas other Hawkmoths violently tumble about and are difficult to secure without a net. Some *Polyptychus* and a specimen of *Poliana buchholzi* arriving about midnight gave zest to the chase and made us forget that we were hot thirsty and sleepy. Beetles came likewise in numbers, often settling on our shoulders, crawling up and tickling our neck, when one involuntarily raised the hand to swipe them away or, as I generally did, to pick them off and have a look at them. A Bombardier Beetle was not rare, and the explosion of its shot sounded almost loud when I touched the beetle on my neck. Long-horned grasshoppers and mantids were always walking about on the cage in several species, the mantids looking at the light and not trying to catch any of the insects which crowded around them ; and a small long species of Cicadidae with the middle of the wings transparent and the apex dark (*Rhaphiophora zephyra*) looked in the transmitted light like a broken stick. In going back to our quarters we passed along a row of orange trees and saw sitting on leaf or fruit numbers of the large Yellow Underwing (*Ophideres*), showing up conspicuously in the light of the electric torch.

The nights were uncomfortably warm. If the windows and doors were left open in order to get a little draught, mosquitoes, and particularly swarms of midges, a real tormentor, came in, and if they were kept closed after the rooms had been " flitted," it got unbearably stuffy. Herr Braun suffered far more than I did. My mosquito-net was in order, and I protected myself against the Simuliums by a butterfly-net too fine for the fly to crawl through. With doors and windows open and the breeze just noticeable, it was not so bad on my bed of palm-leaves, my feet in the sleeping-bag. After we had been a week at Quirimbo, both of us got eczema of a yellowish colour on the neck and in the face. It spread over a large part of my companion's face, being especially irritating around the eyes, so that he could not stand it any longer and went to Gabela to see the doctor. A cooling unguent soon put us right. On our return to Lobito we heard that this eczema was of usual occurrence also at Lobito at that time of the year, and then I guessed its cause : some Meloid beetles allied to the " Spanish fly " came commonly to the lamp, often crawled up our necks and were picked off and thrown away, our hands smearing the cantharidine of these blister-beetles over neck and face. The veranda of our house was a meeting-place for lizards, which were also very numerous at the shed where a native was boiling the palm-nuts, making oil. Our jars, however, were nearly crammed full, as was also a petrol tin, and we had little alcohol left. Therefore we had to stop pickling, leaving room for a few specimens we might catch on the way to Lobito. The fauna of the brook was disappointing ; there were neither fishes nor crabs and hardly any insects. An Elmid beetle, however, was of some interest. It was accidentally discovered by Herr Braun when taking a bath in the brook. At one place the water plunged over a ledge of rock into a pool several feet deep ; the beetles were on the vertical side of the ledge under the rushing water. When disturbed by the net, they were carried away a few yards by the water, flew up, dived into the waterfall, and reached their feeding- or resting-place on the rock. I disturbed them several times, always with the same result. The live beetle was not wet, the dead and dried ones get wet when submerged. The coating of

fine hairs was evidently greasy in the live beetles and kept the water off. The beetle is 8 mm. long, narrow, tapering at both ends, convex above and flat and somewhat concave beneath. It was, no doubt, in consequence of this shape and the greasiness of the coat that the force of the falling water did not drive the diving beetle back but forward.

I am much interested in the tropical forms of the moth-family Zygaenidae and was always on the look out for them. One day, when after an Agaristid among the bushes, I noticed a Zygaenid high up on a flowering bush, raised the net, struck and let the net fall—for I had stepped into boiling water, or what felt like it! I tore away to the road, beat off the large black ants that ran up my legs and body, got the leather gaiters off in record time, and removed the ants which had buried their mandibles in my skin and dosed me with formic acid. The sting of bees, wasps and the bite of ants are said to be a remedy for rheumatism. Bear the pain in that heat? Too Spartan. I applied ammonia.

The district was known to be infested with various diseases, such as sleeping sickness, malaria and filariosis, and we had to keep our eyes open for the vectors of these delights of the wilderness. Tsetse settled now and again on my trousers. *Chrysops* also was there; it once took my nose as an object for exploration and was quickly removed into the killing bottle. These flies are very quiet; they do not announce themselves, and I did not notice their approach, especially in the case of the tsetse; they are suddenly there on your garments. The flowers of Papaya trees near our house attracted Sphingidae and some Noctuids at dusk, but only common species.

When a couple of days had passed without a shower of rain, and the heat increased and the Simuliums became fiercer than ever, we packed up and said good-bye to Quirimbo. During the time of our stay at Fazenda Congulu, there was a good deal of rough herbage among the coffee bushes in the forest; now in climbing the escarpment on our way to Gabela, we saw that all had been cleared away; the plantation looking spick-and-span. We collected our identification papers at the office of the Gabela circunscrição, had a civilized luncheon at the hotel Saude and left the hills and forests of the escarpment for good.

In order to avoid the rather uninteresting stretch from Vila Nova de Seles to Luimbale, we decided on a more northern route via Quibala. We were in open country, more grassland than bush, and between Gabela and Quibala some fires were already in progress, consuming grass and shrubs. Quibala is one of the older settlements, with an abandoned fort, now unnecessary, the natives being well in hand since the last disturbance. The hotelier presented to us next morning a copy of the rescript of the district commissioner of Quibala, according to which every stranger visiting the place has to report himself to the office within 24 hours. We certainly did not want to stay in Quibala all the morning. Interpreting the rescript as applying only to visitors who stay at least 24 hours, we paid our bill and went our way, the hotelier smiling and shrugging his shoulders. The commandante of the place, I was informed, had the reputation of being very strict and an excellent road-builder. We could do without the strictness of officialdom, but were very grateful for the good roads; they were indeed very good. Going along here at 40 miles an hour or more just after the rainy season conjured up the memory of the roads in South-West. A comparison, however, is particularly odious in this case. In Angola the roads are being kept in repair by the native population under the supervision of the officials of the

circumscrição. The state of the roads, therefore, depends on the administrative ability and zeal of the district commissioner, the number of natives that can be conscripted for the work and the suitability of the ground. The work is chiefly done by women and children, who carry the soil on pieces of bark placed on their heads. Trees with oblong pieces of the bark missing are a common sight all along the roads. Such pieces are also turned into cylinders and used as hives for wild bees, the hives being placed horizontally in forks of trees. Wherever there is plenty of water, the native population is large, and in consequence the roads good to excellent. The dry limestone belt near the coast has few inhabitants and therefore comparatively bad roads. The brooks and rivers I saw in Angola run in channels with definite banks, which facilitates bridge-building.

We very gradually ascended to a higher level. At 100 km. from Quibala we crossed a little river and halted to try our luck. We got several fish, representing a new species. According to the map, it was the Nhia, a tributary of the Longa, which reaches the Atlantic 40 or 50 miles north of Porto Amboim. Here, far away from forest, we also found *Charaxes nichetes*, apparently an inhabitant of the open grassy country with bushes along the water-courses and damp ditches. Soon the wooded Bimbe Mts. came in sight, where I intended to camp for a night. However, I did not see a suitable spot during our slow ascent on a winding road, and when we were on top it seemed hardly worth our while to drive to a plantation and make camp. So we went on along seisal plantations to Bailundu, which by now was a familiar dorp to me. As it was still early in the afternoon we went for a little excursion to the grassland near by with a definite purpose. The grass is burnt in the dry season, and when it begins to sprout again the young short-horned grass-hoppers that feed on the young shoots have been observed to vary from green to black, being an astonishingly good colour-adaptation to the black stubble and green shoots. I wanted to ascertain if possible whether the adult grasshoppers in the long dry grass showed an indication of the burnt-grass coloration. The Orthoptera were evidently rare at this season ; I got only a small number of specimens at Bailundu, and two days later on the chalk-ridge near the coast, and none suggested the colour of burnt grass and fresh shoots. When looking up from my labours with the sweeping-net in the long grass, what a shock ! My car was on fire and the chauffeur hard at work to beat the flames out with his cap, in which he miraculously succeeded. The usual carelessness, lighting a cigarette and dropping a match still burning. Before dinner, when it was getting dark, I saw some Hawkmoths at the row of Pelargoniums in front of the hotel and caught two, *Nephele aequivalens* and *Xanthopan morgani*, which I had not collected elsewhere.

Owing to engine trouble we had some delay in the morning, and as I still had a few days before it was necessary to be back at Lobito, we travelled more slowly and made camp during the afternoon at the roadside in the forest between Luimbale and Balombo. In strolling in the wood looking at flowers I saw on a tree a large number of caterpillars of the Saturnian *Cirina forda*. The moonlit night was beautiful, and looking up from my bed in the silent forest through the roof of trees into the starry sky gave me a feeling of great peace.

On the way down to Bocoio we nearly ran into a telegraph wire on turning a corner. The pole was broken, and the wire stretched across the road at the height of the windscreen ; Herr Braun just managed to pull up in time to avoid a nasty accident. At Bocoio we had the pleasure of meeting the German Vice-

Consul and his wife, whose acquaintance I had made at Lobito, and we heard to our surprise that it was Whit-Sunday. We did not stay long, as I wished to reach before dark the escarpment with its interesting dry-land flora, where I intended to camp, as there was a chance to find something we had not collected before. To our disappointment—or I should say, my disappointment—we found no place on the escarpment for parking the two vehicles and making a camp, however primitive. Therefore we crossed the valley and stopped for the night at the remnants of a house which a doctor had occupied when attending to an outbreak of some illness among the scanty population this side of the highlands. It was quite a good spot for camping and collecting, the only drawback being that the water had to be fetched from the valley, there being no well or brook near the house. We were on limestone, covered with grass, herbage, acacias, and creepers, with a few trees, one of them large and well grown in front of the house. The roof of the house was gone: inside we found geckos asleep on the walls and in holes in the walls. A shed snake-skin hanging down a wall frightened the cook, who had intended to sleep in one of the rooms. During the afternoon and next morning I collected various Pieridae, the best being a small series of both sexes of *Teracolus walkeri*. I slept very well under the tall tree, hands and head protected by butterfly-nets. When I woke up my companions told me that they had not been able to sleep and had passed the night with the moth-lamp burning. They had caught among other species a *Ludia* which we had not previously obtained. Water being scarce, we had to be content with a dry rub down.

The road from Morro de Pondo, as the place where we camped was called, to the coast was in indifferent repair. There was little in the dry grass, a few *Teracolus* and some succulents and other plants I had seen in South-West, for instance *Sesamum grandiflorum*, with large lilac flowers.

We arrived at Lobito in time for luncheon, and being too dirty for the dining-room and too hungry and thirsty to wait until we had had a thorough clean up, Herr Braun and I had a meal and several drinks in my room, a veritable bank holiday feast.

In order to get permission to leave the country, the guns and ammunition had to be taken for inspection to Benguela. The cartridges were counted, and I was presented with a bill for £7 for those we had used. I did not think they had cost me so much, but the traveller must contribute to the cost of administration. Travelling in Angola is safe and pleasant, which is worth a great deal in a tropical country.

Lobito looked its best; the vegetation as luxuriant as ever. Strolling in the hotel garden one evening I noticed some rills in the sand and, following them up, expected to find earthworms, but it was a black slug, which I found next morning to be quite abundant in the flower-beds.

I said good-bye to my friends at Lobito who had received me so kindly and helped me in many ways, and to whom I express here my sincere gratitude, in particular to Mr. Leo L. Davis and the Portuguese officials.

The specimens collected in South-West and Angola are the property of the British Museum with the exception of the Lepidoptera, which are in Lord Rothschild's Museum at Tring. Reports on some groups of the material will appear as and when the manuscripts are ready for publication. It is not to be expected that all the insects and other evertebrates will be worked out in the near future.

FIG. 29.—Coffee bushes and shade trees at Congulu, the undergrowth cleared away

FIG. 30.—Oil palm plantation at Quamuba

FIG. 31. Quirimbo: in the background the empty house on the veranda of which we collected insects at night.

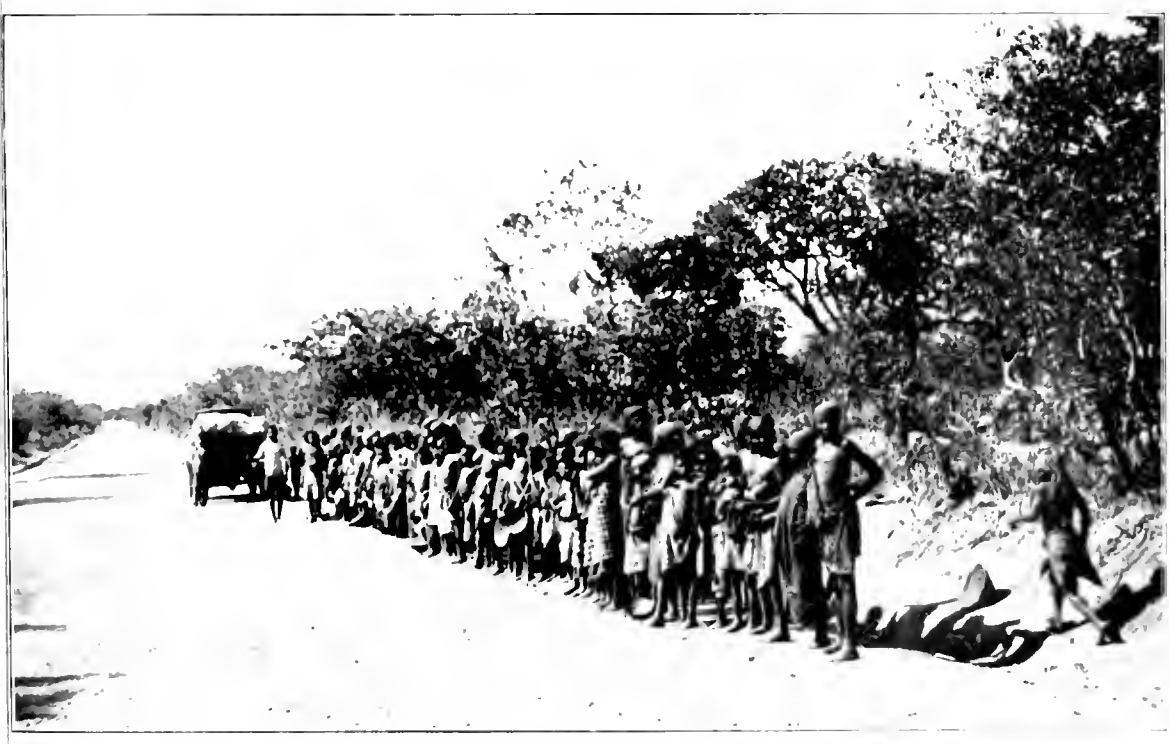

FIG. 32. Road between Lumbale and Boroco: a party of natives, mostly women and children, working at the road under an overseer.

Fig. 33.—In the public garden at Lobito.

DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA:

THE FRESH-WATER FISHES.

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(With Plates I and II.)

THE fishes collected by Dr. Karl Jordan on his expedition to Angola and South-west Africa are in the collection of the British Museum (Natural History), and have been entrusted to me for description, after preliminary determinations had been made by Mr. Norman. Seventeen species and subspecies are represented, eight of which are here described for the first time. A list of species grouped under localities will be found at the end of this paper.

Our knowledge of the fishes of Angola is due chiefly to the work of Steindachner [1] and Boulenger. Boulenger's descriptions up to 1916 are gathered together in his *Catalogue of African Fresh-water Fishes*,[2] and are based mainly on the collections of Welwitsch, Ansorge and Wellman. More recently Nichols and Boulton [3] have described a collection made on an expedition sent to Angola by the American Museum of Natural History, and led by Mr. A. S. Vernay. Angolan species have also been described by Pellegrin,[4] Fowler,[5] and Norman.[6]

Nichols and Boulton obtained their Angolan fishes from two localities, one in the Cuanza system, the other in the Cunene system. As none of their species was common to the two localities, they advanced tentatively the suggestion that Angola could be divided into two faunal areas, the northern centring round the Cuanza, related zoogeographically to the Congo region, the southern related to South and East Africa. Dr. Jordan's collection has so few species in common with the American one, and includes such a high percentage of hitherto undescribed species, that it emphasizes our ignorance of the ichthyology of this region at the same time that it diminishes it. The watershed from which the Cuanza, Cuvo, Luculla, and Catumbela flow northwards and westwards may have a minor importance as a zoogeographical barrier. There is no precise record of *Barbus kessleri* to the south of it, but *Haplochromis philander* is recorded from an affluent of the Cuanza as well as from South-West Africa and other south-tropical localities, *Tilapia sparrmani* is recorded from the Que River, as well as from farther south and east, and *Barbus paludinosus* is represented in Dr. Jordan's collection by a single specimen from the Cuvo system, as well as by numerous specimens from South-West Africa. Worthington [7] and Poll [8] have recently demonstrated the close relationship between the fish-faunas of the upper reaches

[1] Steindachner, *Verh. Zool.-Bot. Ges. Wien*, xvi, 1866, pp. 761–771, pls. xiii–xvii.
[2] Boulenger, *Cat. Fresh-W. Fish. Africa*, vols. i–iv, 1910–1916.
[3] Nichols and Boulton, *Am. Mus. Novit.*, no. 264, 1927.
[4] Pellegrin, *Bull. Soc. Zool. France*, xlvi, 1922, p. 118.
[5] Fowler, *Proc. Ac. Nat. Sci. Philad.*, lxxxii, 1930, pp. 27–83.
[6] Norman, *Ann. Mag. Nat. Hist.* (9), xii, 1923, p. 695.
[7] Worthington, *Ann. Mag. Nat. Hist.* (10), xii, 1933, p. 34.
[8] Max Poll, *Ann. Mus. Congo Belge* (1), iii, fasc. 3, p. 101.

of the Zambezi and of the southern affluents of the Congo, in Northern Rhodesia and Katanga; Angola, in its fauna, has much in common with this region, and this applies to the Cunene as well as to more northern rivers. More definite conclusions must await a far more complete exploration of the streams, rivers, and marshes of tropical Africa.

In the report which follows I have endeavoured to show the true relationships of new species, and to summarize the distribution of those already known, in such a way as to make them available for zoogeographical study.

Special interest attaches to certain fishes in the collection. Males and females of a new species (or subspecies) of *Xenopomatichthys* provide additional confirmation of Max Poll's discovery that this name was given to males of the genus *Kneria*, and should now be placed in the synonymy of that genus. In seeking the affinities of the new *Micralestes* it has been found that several species are wrongly placed in the genus *Petersius*, and the necessity for a revision of this group of Characins becomes apparent. An unpigmented, cave-dwelling *Clarias*, which, however, has not lost its eyes, is described. Before naming the *Cichlidae* I made a revision, soon to be published, of the species of *Haplochromis* found in the rivers and smaller lakes of Africa.

1. **Kneria polli** sp. n. (Pl. I, figs. 1, 2).

Depth of body $5\frac{1}{2}$ to 6 in the length, length of head $4\frac{3}{4}$ to $5\frac{1}{4}$. Width of head a little less than depth at occipital region, $1\frac{3}{4}$ to 2 in length of head. Snout 3 to $3\frac{1}{3}$ in length of head, diameter of eye $3\frac{1}{2}$ to $4\frac{1}{6}$, interorbital width $2\frac{3}{4}$ to 3. Eyes lateral. Mature males with a cupped outgrowth on the operculum and a series of oblique laminae behind the gill-opening; no spines on the head. Dorsal 2 or 3 + 7 + 0 or 1; origin equidistant from end of snout and base of caudal, above or immediately behind base of pelvic. Anal 3 + 7–8 + 0 or 1; base equidistant from origin of pelvic and root of caudal, or a little nearer caudal. Pectoral 1 + 11–13; $\frac{5}{6}$ or nearly as long as head. Pelvic 1 + 7 + 0 or 1; as long as or a little shorter than pectoral. 84 to 98 scales in a longitudinal series, 10 to 13 from origin of dorsal to lateral line, 8 to 10 from lateral line to pelvic. Caudal forked. Caudal peduncle twice as long as deep. Yellowish; a series of dark spots, united by a narrower band, along lateral line or its posterior $\frac{2}{3}$; a series of 3 to 5 round dark spots on either side of mid-dorsal line in front of dorsal fin; sometimes a spot at origin of dorsal; fainter dark markings along back and sides; upper part of head dark, lower parts of head and trunk pale; caudal spotted or clear, other fins clear.

Five males and nine females, 41 to 50 mm. to base of caudal; also two immature females and one immature male (without the opercular accessory organ); all from a brook at Mt. Moco, Angola (Cuvo River system).

I have pleasure in naming this species after Dr. Max Poll,[1] who first recognized the opercular apparatus of *Xenopomatichthys* to be a character of the mature male, and not generic. Dr. Poll, however, did not venture to abolish the name *Xenopomatichthys* without first knowing the sex of the described specimens of both *Kneria* and *Xenopomatichthys*. After examining the British Museum material, I have no hesitation in uniting the two genera. The types of *Xenopomatichthys ansorgei* are males. The type of *Kneria marmorata* and the three types of *K. spekei* are females. Two other specimens of *K. spekei*, 40 and 41 mm.

[1] *Ann. Mus. Congo Belge*, iii, 1933, p. 116.

to base of caudal, have immature gonads. Six specimens of *K. cameronensis* are spent fish, in four of which the gonads are empty, membranous sacs ; in the remaining two a few ova are retained. A specimen of *K. stappersi* and two of *K. angolensis* are small fish with immature gonads.

The possibility arises that *X. ansorgei* may be a synonym of *K. angolensis*, but on the material available it is difficult to decide this with certainty. They agree in scale-counts and in the position of the dorsal fin. Both species may have short spines on the head. Steindachner states of the types of *K. angolensis* that "der vordere Theil der Schnauze ist ringsum mit kleinen, dohrnähnlichen Auswüchsen besetzt," perhaps only in the male. The types of *X. ansorgei* have such spines, but situated below the eye, extending on to the lower jaw, and a few immediately in front of the eye. If Steindachner had a mature male he could hardly have overlooked the opercular apparatus, which is far more conspicuous than the spines. The spines may perhaps be common to both sexes. Poll evidently considers the two species to be distinct, for he refers a number of specimens of both sexes to *X. ansorgei* and also one to *K. angolensis*. The British Museum material of *K. angolensis*, being immature, is useless for comparison.

Max Poll (*l.c.*) refers all his Katangan specimens with the dorsal originating above the base of the pelvic to *Xenopomatichthys auricularis* Pellegrin, originally described from Mozambique. Of these, one large sample, from Lake Mweru, agrees with the types in scale-counts (60 to 70 in the lateral line), but a second, from Kansenia, has 75 to 80, and a third, from Elizabethville, has 85 to 90. These should probably be regarded at least as three subspecies, of which the first may be identical with the types and the last identical with or very near *K. polli*. In the absence of details of proportions and coloration, decision on this point must be postponed.

2. **Micralestes argyrotaenia** sp. n. (Pl. I, fig. 3).

Depth of body $3\frac{4}{5}$ to 4 in the length, length of head $3\frac{4}{5}$ to 4. Depth of head $1\frac{3}{5}$ to $1\frac{2}{5}$ in its length, width 2 to $2\frac{1}{4}$. Snout $\frac{3}{4}$ to $\frac{4}{5}$ as long as diameter of eye, which is $2\frac{4}{5}$ to nearly 3 in length of head, a little greater than interorbital width. Maxillary not quite reaching vertical from anterior edge of eye. 6 outer and 8 inner teeth in upper jaw, 8 outer and 2 inner in lower. 13 or 14 gill-rakers on lower part of anterior arch. Dorsal 2 + 8, originating above base of pelvic and slightly nearer to end of snout than to base of caudal, or at equal distance from both. Anal 3 + 16–18. Pectoral about $\frac{5}{6}$ head, not reaching pelvic. Caudal peduncle (measured from base of anal) $1\frac{1}{2}$ to $1\frac{3}{4}$ as long as deep. 30 to 32 scales in the lateral line, $4\frac{1}{2}$ from origin of dorsal to lateral line, 2 between lateral line and pelvic. A silvery lateral band with dark upper edge ; a narrow, dark, mid-dorsal streak.

Described from six specimens, the types, 48 to 72 mm. to base of caudal, from an upper reach of the Cunene River, Angola. Fourteen other specimens, 37 to 50 mm. long, from the same locality, also belong to this species.

As in some other species of *Micralestes* Boulenger 1899, and *Petersius* Hilgend. 1894, the anterior and middle rays of the anal fin are longer, stouter and more curved in the male than in the female ; there is no filamentous extension.

M. argyrotaenia is closely related to the two Congo species *M. woosnami*[1] (Boulenger 1907) and *M. humilis* Boulenger 1899, in both of which, however, the scales do not exceed 30 in number in the lateral line, and the caudal peduncle is shorter. *M. humilis* is recorded by Poll (*t.c.*, p. 120) also from Lake Mweru, L. Upemba and the rivers that flow into them. *M. luluae* Fowler 1930, of the Lulua River, has fewer anal rays (3 + 13–15) and fewer gill-rakers as well as fewer scales (26 to 29 in the lateral line). All these belong to a group of closely related species, which includes also the widespread *M. acutidens* (Peters 1852).

3. **Barbus paludinosus** Peters 1852.

Barbus paludinosus Boulenger, *Cat. Fresh-W. Fish. Afr.*, ii, p. 115, fig. 92 (1911), and iv, p. 251 (1916).

Sixty-four specimens, 38 to 75 mm. in length to base of caudal, from Satansplatz, S.W. Africa.

Eighteen specimens, 31 to 55 mm. in length to base of caudal, from Voigtsgrund, S.W. Africa.

One specimen, 50 mm. in length to base of caudal, from a brook at Mt. Moco, Angola (Cuvo River system).

This species, with a wide distribution in East and South Africa and known also from the Luapula and Lualaba river systems, has been recorded from the interior of Benguela (Boulenger) and from the Cunene river system (Nichols and Boulton).

4. **Barbus evansi** Fowler 1930.

Barbus evansi Fowler, *Proc. Ac. Nat. Sci. Philad.*, lxxxii, 1930, p. 34, fig. 5.

Dr. Jordan's collection contains two specimens, 31 and 33 mm. in length to base of caudal, from an affluent of the Catumbela River, Angola. In them the body is deeper than in the type (depth $3\frac{1}{4}$ times in the standard length), the eye, as may be expected in young fish, is relatively larger ($3\frac{2}{5}$ in length of head), and the anal fin is sheathed at the base by few large scales instead of by many small ones as in the type. The lateral line pierces only a few anterior scales of the longitudinal series. They agree with the type and differ from *B. kessleri*, which appears to be their nearest ally, in having only 22 or 23 scales in a longitudinal series, in the broad suborbital bones, and in the position of the dorsal fin, which is equidistant from the caudal and the posterior edge of the eye.

The species was formerly known only from the type, from the Cuanza River, Angola.

5. **Barbus kessleri** (Steindachner 1866).

Puntius kessleri Steindachner, *Verh. Zool.-bot. Ges. Wien*, xvi, 1866, p. 768, p. xiv, fig. 3.
Barbus kessleri, Boulenger, *Cat. Fresh-W. Fish. Afr.*, ii, p. 138, fig. 115 (1911), and iv, p. 258.

Nineteen specimens, 34 to 50 mm. to base of caudal, from a brook at Mount Moco, Luimbale district, agree very closely with Steindachner's description and figure, and with specimens in the British Museum (Natural History).

[1] I have examined the types of *Petersius woosnami*, *P. ansorgei*, *P. major* and *P. ubalo*, all of Boulenger, and a paratype of *P. nummifer* Boulenger, and find that they all possess a pair of inner mandibular teeth, and should therefore be transferred to the genus *Micralestes*. The remaining species represented in the British Museum (Natural History) are without these teeth, and are true *Petersius*, namely *P. conserialis* Hilgendorf, *P. tangensis* Lönnberg, *P. caudalis* Boulenger, *P. pulcher* Boulenger, *P. occidentalis* Günther, *P. septentrionalis* Boulenger, *P. xenurus* Boulenger and *P. spilopterus* Boulenger. It seems probable that *Petersius* is, even so, a polyphyletic genus. Myers has already made the peculiar *P. spilopterus* the type of a new genus, *Arnoldichthys* (*Rev. Zool. Afr.*, xiii, 1926, p. 174). Pellegrin's genera *Hemigrammalestes* (*Rev. Zool. Afr.*, xiii, 1926, p. 158) and *Hemigrammopetersius* (*t.c.*, p. 157) perhaps form together a more natural group.

The locality of the type is not given more precisely than "Angola." The specimens listed by Boulenger (1911 and 1916) are all from Angola (Cuanza system and "Benguella") and Nichols and Boulton (1927) also record specimens from the Cuanza system. The Angolan specimens in the British Museum agree very well with Steindachner's description, but there are also two from Katanga (see Boulenger, 1920, p. 17) which are not so close. They differ in coloration, the dark lateral band being very well-marked and extending forwards on to the snout, and in having a larger head ($3\frac{1}{3}$ to $3\frac{1}{2}$ in the standard length as against $3\frac{3}{4}$ to 4 in typical specimens);[1] also, in them the posterior barbel does not exceed in length the diameter of the eye. They agree with the Angolan specimens, however, in scale and fin-ray counts, and in having two rather conspicuous dark scales on each side of the base of the dorsal fin. These dark scales are well-marked in the figure of the type and in all the Angolan specimens, except the types of *B. caudimacula* Günther 1868, one of which is figured in Boulenger's *Catalogue*. Poll (*l.c.*, p. 128) also records this species from Katanga.

The scales of the lateral line (not counting one or two on the caudal fin) number 25 to 27 in the specimens from the Luculla River, 25 or 26 in the other Angolan specimens except three of Dr. Jordan's collection, which have only 24. The two Katanga specimens have 26 and 27.

6. **Barbus dorsolineatus** sp. n. (Pl. I, fig. 4).

Depth of body $3\frac{2}{5}$ to $3\frac{2}{3}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{2}{3}$. Snout shorter than diameter of eye, which is 3 to $3\frac{2}{3}$ in length of head. Interorbital width 3 to $3\frac{1}{3}$ in length of head, length of lower jaw $2\frac{1}{3}$ to $2\frac{1}{2}$. Lower jaw included; maxillary extending to below anterior edge or anterior $\frac{1}{4}$ of eye; two barbels at each side, the anterior $\frac{3}{4}$ to as long as diameter of eye, the posterior from as long to $1\frac{1}{2}$ as long. 25 to 28 scales in a longitudinal series, $4\frac{1}{2}$ from origin of dorsal to lateral line, $2\frac{1}{2}$ or 3 between lateral line and origin of pelvic, 11 or 12 round caudal peduncle. Scales radially striate. Dorsal 3 + 7; third simple ray bony, serrate, its rigid part $\frac{3}{5}$ to $\frac{2}{3}$ length of head; dorsal midway between base of caudal and some part of pupil (rarely anterior part of eye). Scales at base of dorsal not conspicuously enlarged or pigmented. Anal 3 + 5. Pelvics originating below origin of dorsal. Caudal crescentically forked. Caudal peduncle $1\frac{1}{2}$ to $1\frac{2}{3}$ as long as deep. Colour darker above; a dark stripe before dorsal fin; parietal region dark; a spot at base of caudal; a grey streak extending forwards from this towards head, sometimes bearing one or two dark spots; a larger spot below origin of dorsal; a spot at anterior end of lateral line and often another a little behind this.

Described from twenty-five specimens, 25 to 52 mm. in length to base of caudal, fourteen of which, the types, are from an affluent of the Catumbela River, the others from a locality 20 km. E. of Bocoio. Eight young fish, $13\frac{1}{2}$ to $20\frac{1}{2}$ mm. to base of caudal, also belong to this species. They are without dark spots except that at base of caudal.

This species is evidently related to *B. kessleri*, with which it agrees in the scale-counts, but from which it differs in having a larger head, and a slightly larger mouth, and in the coloration. In one or two of the smaller specimens the lateral line is incomplete.

[1] Boulenger gives $3\frac{1}{4}$ to 4, but among his specimens I find none in which the head is contained less than $3\frac{1}{4}$ times in the standard length.

7. **Barbus wellmani** Boulenger 1911.

Barbus wellmani Boulenger, *Cat. Fresh-W. Fish. Afr.* ii, p. 137, fig. 114 (1911).

Six specimens, 52 to 68 mm. to base of caudal, from a clear brook at Mt. Moco (Cuvo River system), agree very well with the types. In the types and the new specimens I measure the bony interorbital region as from a little more than 3 to $3\frac{1}{2}$ in length of head, thus differing from Boulenger, who probably included the flap of skin over the eye.

The species was hitherto known only from the types, from the interior of Benguela at an altitude of 4,000–5,000 ft.

8. **Barbus breviceps** sp. nov. (Pl. I, fig. 5).

Depth of body $3\frac{1}{6}$ in the length, length of head $4\frac{1}{5}$. Snout as long as diameter of eye, which is $\frac{1}{4}$ length of head. Interorbital width nearly 3 in length of head, lower jaw 3. Mouth subterminal; two barbels on each side, anterior $\frac{1}{2}$, posterior $1\frac{1}{4}$ diameter of eye. Dorsal 3 + 7, equidistant from caudal and nostril; third ray not enlarged, not serrate, a little shorter than head. Anal 3 + 5. Pectoral $\frac{3}{4}$ length of head, not reaching pelvic, the base of which is below anterior half of dorsal. Caudal peduncle $1\frac{3}{5}$ as long as deep. Scales with numerous, radiating striae, 33 $\frac{5\frac{1}{2}}{5\frac{1}{2}}$, $3\frac{1}{2}$ between lateral line and pelvic, 13 round caudal peduncle. Brown above, silvery beneath; a small dark spot at base of caudal and a grey streak from this nearly to head, parallel with line of vertebral centra. Lateral line almost straight, not pigmented.

Described from a single specimen, 50 mm. to base of caudal, from a brook, 100 km. S.E. of Quibala, Angola, Longa River system.

Five young fish from the same locality also belong to this species, which differs from *B. unitaeniatus* Günther 1866 in the smaller head and smaller eye, and in the fewer branched rays in the dorsal fin, and from *B. inermis* Peters 1852 in the deeper body and fewer dorsal rays. Of the species with 7 branched rays in the dorsal it is perhaps nearest to *B. motebensis* Steind. 1894 (from the Transvaal), which, however, has more scales below the lateral line and a larger head.

9. **Barbus mocoensis** n. sp. (Pl. II, fig. 6).

Depth of body 4 to $4\frac{1}{3}$ in the length, length of head $3\frac{3}{4}$ to 4. Snout as long as or a little longer than diameter of eye, which is $3\frac{2}{3}$ to $4\frac{1}{3}$ in length of head; interorbital width 3 to $3\frac{1}{2}$ in length of head. Mouth terminal, its width about $3\frac{1}{2}$ to 4 times in length of head. Two barbels on each side, anterior about $\frac{1}{2}$, posterior $\frac{3}{4}$ to as long as diameter of eye. Dorsal 3 + 7, equidistant from root of caudal and from anterior part of eye or nostril; last simple ray not enlarged, $\frac{2}{3}$ to $\frac{3}{4}$ length of head. Anal 3 + 5. Pectoral shorter than head, not reaching pelvic, the base of which is below anterior half of dorsal. Caudal peduncle $1\frac{3}{4}$ to twice as long as deep. Scales with radial striae, 32 or 33 $\frac{5–5\frac{1}{2}}{4\frac{1}{2}–5\frac{1}{2}}$, 3 or $3\frac{1}{2}$ between lateral line and pelvic fin, 12 or 13 round caudal peduncle. Brown above, silvery beneath; a dark spot at base of caudal, from which a dark streak extends forwards nearly to head, following the line of the vertebral centra; four or five fainter pigment streaks along the longitudinal series of scales.

Thirty-six specimens, 35 to 52 mm. in length to base of caudal; from a clear brook belonging to the Cuvo River system, at Mt. Moco, Angola.

This species is quite distinct from *B. unitaeniatus*, which has a larger eye, 8 branched rays in the dorsal fin, and the longest dorsal ray from a little shorter than the head to a little longer. The barbels are also shorter than in most specimens of *B. unitaeniatus*. In coloration and in the shortness of the barbels it resembles *B. burgi* Boulenger 1911 of Cape Colony, but in *B. burgi* the mouth is inferior and the scales above the lateral line are larger (4 or $4\frac{1}{2}$ from origin of dorsal to lateral line).

10. **Barbus lineomaculatus** Boulenger 1911.

Barbus lineomaculatus Boulenger, *Cat. Fresh-W. Fish. Afr.* ii, p. 159, fig. 136 (1911), and iv, p. 266 (1916).

The types are from the neighbourhood of Kilimanjaro, and further specimens are recorded from Tanganyika territory, Katanga and Northern Rhodesia (Solwezi River).

Dr. Jordan's collection contains six specimens, 26 to 40 mm. in length to base of caudal, from an upper reach[1] of the Cunene River, Angola. They agree very well with the Katanga specimens of *B. lineomaculatus*, and are placed with this species on the length of the barbel and the rather slender form (depth $3\frac{1}{2}$ to 4 in the length). The scales number 27 to 29 in the lateral line, $4\frac{1}{2}$ or $5\frac{1}{2}$ from origin of dorsal to lateral line, $2\frac{1}{2}$ or 3 between lateral line and pelvic. The anterior barbel is about as long as the diameter of the eye, the posterior $1\frac{1}{3}$ to $1\frac{1}{2}$ times as long. The diameter of the eye is contained $2\frac{2}{3}$ to 3 times in the head. The caudal peduncle is twice or nearly twice as long as deep. There are four to six, usually four, dark spots along the middle of the side, a fainter one at the anterior end of the lateral line, a dark spot at the origin of the dorsal fin and a larger one at the base of the anal. The upper scales and sometimes also those of the lateral line are pigmented basally. The dorsal fin formula is 3 + 8, the anal 3 + 5.

The relationship between the specimens assigned to *B. unitaeniatus* and *B. lineomaculatus* is probably not correctly expressed by dividing them between the two specific names. The species were distinguished in Boulenger's *Catalogue* (1911) by the coloration and by the length of the barbel, which was stated to be 1 to $1\frac{1}{4}$ times the diameter of the eye in *B. unitaeniatus*, $1\frac{1}{2}$ to twice in *B. lineomaculatus*. The scales of the lateral line were given as 30 to 33 in *B. unitaeniatus*, 30 to 32 in *B. lineomaculatus*.

Subsequently Worthington (1933, p. 44) recorded thirty-two specimens of *B. unitaeniatus* from the Luapula River system having 29 or 30 scales in the lateral line, and I find that, of the specimens recorded by Boulenger in vol. iv of his *Catalogue* (1916), two from the Luculla River, and four from Banga Ngola, Angola, as well as two from Zululand, have 27 to 29. Also the specimens of *B. lineomaculatus* from Katanga and Rhodesia have 27 to 30 scales. The range of variation in scale-counts for both species is thus 27 to 32 or 33. The length of the barbels does not seem to be correlated with scale-counts; in the Angolan specimens of *B. unitaeniatus*, from the Bengo and Luculla Rivers, with 30 to 32 scales, the posterior barbel is not longer than the diameter of the eye, in a Zululand specimen with 31 scales it is a little longer; in the Angolan specimens with 27 to 30 scales it is about $1\frac{1}{4}$ the diameter of the eye, in the Zululand specimens

[1] Probably the Cumulo R., cf. p. 51.

with 27 to 29 scales it is as long as the diameter of the eye or a little longer; in the Luapula River-system specimens it is once to $1\frac{1}{2}$ as long. The Luapula River specimens, however, differ from those of Dr. Jordan's collection here assigned to *B. lineomaculatus* in having a smaller eye (3 to $3\frac{3}{4}$ in length of head), and in this they differ also from most small specimens of *B. unitaeniatus*, but agree with them in having a rather deep, compressed body.

In considering the geographical distribution of these little fishes, their likenesses are perhaps more important than their differences, and they should be thought of as a single systematic unit liable to develop local peculiarities. Such close resemblances as are apparent between the Angolan and Zululand specimens of *B. unitaeniatus* and between the East African, Central African, and Angolan specimens of *B. lineomaculatus* make it impossible, in the present state of our knowledge, to define subspecies.

Farther afield, the relationships of this *B. unitaeniatus–lineomaculatus* group are with *B. trispilos* (Bleeker 1863) (Gold Coast and Niger Delta), *B. tetrastigma* Boulenger 1913 (Upper Congo), in which the caudal peduncle is both shorter and deeper, and *B. quadripunctatus* Pfeff. 1896 (East Africa), in which the barbels are much shorter.

B. inermoides Nichols and Boulton 1927, from the Cunene system, is evidently related to *B. unitaeniatus* and *B. lineomaculatus*, and may be identical with the latter. *B. tristigmaturus* Fowler 1934 from Natal is also very near *B. lineomaculatus*.

11. **Clarias dumerilii** Steindachner 1866.

C. dumerilii, Boulenger, *Cat. Fresh-W. Fish. Afr.* ii, p. 257, fig. 213 (1911), and iv, p. 286 (1916).

Four specimens in Dr. Jordan's collection, 137 to 250 mm. in length to base of caudal, from Mt. Moco (Cuvo River system), Angola.[1]

One of these is larger than the specimens recorded by Boulenger, and differs from them in certain proportions, as follows: Length of head $4\frac{7}{8}$ in the standard length, diameter of eye 8 times in interorbital width.

The type (in Vienna) is from Angola, and Boulenger's specimens are from Old Calabar, Lower Congo, and Angola.

12. **Clarias cavernicola** sp. n. (Pl. II, figs. 7, 8, 9).

Depth of body $6\frac{1}{2}$ to $8\frac{1}{3}$ in the length, length of head $4\frac{1}{5}$ to $4\frac{3}{8}$. Head $1\frac{1}{3}$ to $1\frac{2}{5}$ times as long as broad, smooth. Occipital process acutely pointed, but a little broader than long. Frontal fontanelle of variable size and shape, more or less sole-shaped, its length $3\frac{1}{2}$ to $4\frac{1}{2}$ in length of head; occipital fontanelle sometimes extending on occipital process. Eyes variously developed, their diameter 6 to 10 times in interorbital width; often sunk in the socket, with the surface skin more or less opaque; upper rim of orbit usually distinct but lower often vague. Interorbital width $2\frac{1}{3}$ to $2\frac{2}{5}$ in length of head, width of mouth from a little more than 2 to $2\frac{2}{5}$. Nasal barbel $\frac{3}{4}$ to nearly as long as head, maxillary $1\frac{1}{4}$ to $1\frac{1}{2}$ as long, outer mandibular about $1\frac{1}{6}$, inner $\frac{5}{6}$ to nearly as long. Praemaxillary band of teeth about $4\frac{1}{2}$ times as long as broad. Vomerine teeth forming a curved band with a median posterior process, or (young) in two groups. 12 to 15 gill-rakers on anterior arch. Clavicles concealed. Dorsal 72–76, its distance from occipital process $\frac{1}{4}$ to $\frac{2}{7}$ length of head, ending at root of caudal. Anal

[1] Common in the neighbourhood of Mt. Moco; the natives brought specimens for us to eat; quite good fried. The specimens sent to the B.M. were caught by myself in a trap.—K. J.

60 to 73, in contact with caudal. Pectoral $\frac{1}{8}$ to nearly $\frac{1}{2}$ length of head, the spine feebly serrated on the outer side, strongly on the inner, $\frac{3}{4}$ to $\frac{5}{6}$ length of fin. Distance of pelvic from caudal $1\frac{1}{2}$ to $1\frac{2}{3}$ that from tip of snout. No pigment, except in the eyes.

Described from six specimens, 106 to 130 mm. to base of caudal. There are twelve other specimens from the same locality, Aigamas Cave, north of Otavi.

The abdomens of all these are swollen and the dark contents of stomach and intestine show through the colourless skin. In three specimens examined the stomach was full of fragments of fairly uniform size, most of which are parts of the dark-brown exoskeletons of insects. These are contained in the excrements of the baboons frequenting the cave. None of the fragments suggested that the prey had been taken whole and alive except a complete insect in a pupal case, a curved white grub, and a flatworm. The debris included several white egg-shells measuring about 2 × 1 mm.

In numerical characters and in the positions of the fins *C. cavernicola* agrees with *C. alluaudi* Boulenger 1906 of Lake Victoria, but this has longer barbels, a more acute occipital process and a more strongly serrated pectoral spine. In *C. submarginatus* Peters 1882 (Cameroon) the interorbital region is wider, and the dorsal fin is more distant from both head and caudal. *C. dumerilii* Steindachner (Angola) differs in the same ways and also has fewer fin-rays. From all these species, *C. cavernicola* is further distinguished by having no pigment and by the degeneration of the eyes. The blind Clariid fish *Uegitglanis zammaranoi* Gianferrari (1923), of Italian Somaliland, appears to be related to *Gymnallabes* Günther 1867.

13. **Amphilius lentiginosus** sp. n. (Pl. II, figs. 10, 11).

Depth of body $6\frac{1}{5}$ to $6\frac{1}{2}$ in the length, length of head $3\frac{2}{3}$ to 4. Head very slightly longer than broad. Snout broadly rounded, $\frac{1}{2}$ length of head. Diameter of eye $8\frac{2}{3}$ to $9\frac{1}{2}$ in length of head, $2\frac{1}{3}$ to $2\frac{1}{2}$ in interocular width, which is $3\frac{3}{4}$ to $3\frac{4}{5}$ in length of head; posterior nostril nearer to eye than to end of snout. Maxillary barbel a little more than $\frac{1}{2}$ length of head, outer mandibular $\frac{1}{2}$, inner $\frac{1}{3}$. Dorsal 1 + 7, its distance from root of caudal $1\frac{2}{5}$ to $1\frac{1}{2}$ that from tip of snout. Adipose dorsal $1\frac{1}{3}$ length of rayed dorsal, twice or $2\frac{2}{5}$ its own length distant from latter. Anal 3 + 6. Pectoral $\frac{3}{4}$ length of head, longer than pelvic, which begins at a distance behind dorsal equal to $\frac{1}{3}$ length of latter. Caudal emarginate, with rounded lobes. Caudal peduncle, measured from end of base of anal, twice as long as deep. A row of papilla-like folds of skin at base of caudal. Throat, belly and undersides of pectoral and pelvic fins pale; rest of body, head and fins covered with small dark spots, over a fainter piebald pattern (which is the same in both specimens).

Two specimens, 115 and 118 mm. in length to base of caudal, from a brook at Mt. Moco (Cuvo River system).[1]

Perhaps nearest to *A. natalensis* Boulenger, but differing from this especially in the more slender caudal peduncle and the shorter adipose fin. The papillae at the base of the caudal fin are absent in *A. natalensis*, *A. platychir* Günther 1864 and *A. grandis* Boulenger 1905, but are present, and more elongate, in *A. grammatophorus* Pellegrin 1913 and *A. longirostris* Boulenger 1901, and are weakly developed in *A. opisthophthalmus* Boulenger 1919.

[1] Obtained together with *Clarias dumerilii* in a trap placed in the clear brook, the bottom of which is covered with pebbles and stones. — K. J.

14. **Tilapia guinasana** sp. n.

Depth of body $2\frac{1}{3}$ to $2\frac{3}{5}$ in the length, length of head from a little less than 3 to $3\frac{1}{6}$. Snout from a little longer than diameter of eye to $1\frac{3}{4}$ as long. Diameter of eye 4 to 5 in length of head, depth of preorbital $4\frac{1}{4}$ to $4\frac{1}{5}$, interorbital width $2\frac{3}{4}$ to $3\frac{1}{3}$, length of lower jaw $2\frac{2}{3}$ to nearly 3. Jaws equal anteriorly; maxillary not extending to below eye. Teeth in 4 to 7 series, outer bicuspid, inner tricuspid, 52 to 58 in outer series of upper jaw. 1 or 2 series of scales on cheek. 8 to 11 very short gill-rakers on lower part of anterior arch. Lower pharyngeal teeth small, close-set. 27 or 28 scales in a longitudinal series, 3 from origin of dorsal to lateral line. Dorsal XII–XIV 10–11; last spine less than $\frac{1}{2}$ length of head. Anal III 8–10; third spine less than $\frac{2}{5}$ length of head. Pectoral not reaching anal. Caudal truncate or rounded-subtruncate. Caudal peduncle $\frac{1}{5}$ to as long as deep. Uniformly blackish or particoloured; or, occasionally, with faint traces of a black band from operculum to caudal and another on upper lateral line.

Thirty-two specimens, 60 to 137 mm. in total length, from Lake Guinas, South-West Africa (W. of L. Otjikoto and Tsumeb, altitude 1,270 m.).

Fishes of less than 85 mm. are included for numerical characters only. They have a relatively larger eye (diameter $3\frac{1}{2}$ in length of head in a 60-mm. fish), and fewer teeth (in the same fish, 32 in the outermost of 3 series in the upper jaw). Otherwise they agree with older fishes.

The low numbers of gill-rakers, of dorsal spines and of scales on the cheek show the relationship of *T. guinasana* to *T. sparrmani* A. Smith 1840, the type of which came from Namaqualand. In *T. sparrmani* of the same size [1] the head is smaller ($3\frac{1}{6}$ to $3\frac{1}{2}$ in the length), the snout shorter (from less than diameter of eye to $1\frac{1}{4}$ as long), the eye larger ($3\frac{3}{5}$ to $4\frac{1}{3}$ in length of head), the preorbital narrower ($4\frac{2}{3}$ to 6 in length of head), and the teeth in 3 or 4, rarely 5, series. On the cheek there are always 2, occasionally 3, series of scales. There is also a notable difference in numbers of dorsal fin-rays, as the following table shows.

Dorsal fin-rays.		*Tilapia guinasana* (32 specimens).	*T. sparrmani* (40 specimens).	*T. sparrmani* (57 specimens), recorded by Poll.[2]
Total	22	4	0	—
	23	5	1	—
	24	23	6	—
	25	0	25	—
	26	0	8	—
Spines	XII	9	0	0
	XIII	21	1	1
	XIV	2	29	47
	XV	0	10	9

The number of dorsal rays in the type of *T. sparrmani* was given as XIII 9.

The intestine in *T. guinasana* is long, coiled and thin-walled, and is found

[1] These measurements were made on 16 specimens of *T. sparrmani*, 96 to 140 mm. long, from L. Bangweulu, Upper Zambezi, Katanga, Angola, Namaqualand, Rhodesia and Transvaal. *Tilapia deschauensei* Fowler 1930, from Bechuanaland, is very near, and probably identical with *T. sparrmani*.

[2] Poll, *l.c.*, p. 141.

to contain the fine remains of vegetable matter, including numerous diatoms. In a specimen of 107 mm. the intestine is over 5 times the total length of the fish.

15. **Haplochromis philander dispersus** subsp. n.

Paratilapia moffati (not Castelnau)[1] Boulenger, *Proc. Zool. Soc. Lond.* 1898, p. 140; Pellegrin, *Mém. Soc. Zool. France*, xvi, 1904, p. 259.

Tilapia philander (part.) Boulenger, *Proc. Zool. Soc. Lond.* 1899, p. 136; Pellegrin, *t.c.*, p. 340.

Tilapia ovalis (not Steindachner)[2] Boulenger, *Poiss. Bass. Congo*, p. 461 (1901); *Cat. Fresh-W. Fish. Afr.* iii, p. 208, fig. 133 (1915); Pellegrin, *t.c.*, p. 319; Gilchrist and Thompson, *Ann. S. Afr. Mus.*, xi, 1917, p. 505, fig. 131.

Haplochromis moffati (part.) Boulenger, *Tr. Zool. Soc. Lond.*, xviii, 1911, p. 415; *Cat. Fresh-W. Fish. Afr.* iii, p. 300 (1915); Gilchrist and Thompson, *t.c.*, p. 514; Regan, *Ann. Mag. Nat. Hist.* (9), x, 1922, p. 257.

Haplochromis moffati Schreitmüller, *Bl. Aqu. Terr. K.*, xxiii, 1912, p. 724, fig.

Dr. Jordan's collection contains five specimens, two full-grown (89 and 91 mm.) and three young (24 to 40 mm.), from Lake Otjikoto, South-West Africa.[3]

This subspecies is known from the rivers and lakes of Transvaal, Beehuanaland, Rhodesia, Katanga and Angola. It differs from *H. philander philander* (Weber 1897), from Natal and Mozambique, but slightly, in having a smaller mouth, with shorter premaxillary pedicels (nearly $3\frac{1}{2}$ to 4 in length of head as against 3 to nearly $3\frac{1}{2}$ in *H. philander philander*).

16. **Haplochromis philander luebberti** (Hilgendorf 1902).

Parotilapia luebberti Hilgendorf, *Sitz. Ber. Ges. naturf. Fr. Berlin*, 1902, p. 141; Boulenger, *Cat. Fresh-W. Fish. Afr.* iii, p. 350 (1915).

Haplochromis moffati (part.), Regan, *Ann. Mag. Nat. Hist.* (9), x, 1922, p. 257.

Dr. Jordan's collection contains about forty specimens, 33 to 80 mm. in total length, from Otavifontein, South-West Africa.[4]

This subspecies, hitherto unrepresented in the British Museum (Nat. Hist.), is known only from the neighbourhood of Otavi. From *H. philander dispersus* it differs mainly in the higher numbers of dorsal spines (XV or XVI as against XIII to XV in *H. p. dispersus*).

LIST OF THE FISHES COLLECTED

South-West Africa

Barbus paludinosus Peters 1852, Voigtsgrund and Satansplatz, Fish R. system, affluent of Orange River.

Clarias cavernicola sp. nov., Aigamas Cave, north of Otavi.

Tilapia guinasana sp. nov., Lake Guinas, west of Tsumeb.

Haplochromis philander dispersus subsp. nov., Lake Otjikoto.

Haplochromis philander luebberti (Hilgendorf 1902), Otavifontein.

[1] *Chromys moffati* Castelnau (*Poiss. Afr. Austr.*, p. 16, 1861) was insufficiently described, but it is improbable that it is this small species of *Haplochromis*, for Castelnau's specimen was 140 mm. long, and he states that the Cape Museum has one of twice that length. No specimen of *H. philander* is known to exceed 112 mm. total length. *C. moffati* is probably a *Tilapia*.

[2] *Chromis ovalis* Steindachner 1866 is a synonym of *Tilapia sparrmani* A. Smith 1840.

[3] Reported to be plentiful in L. Otjikoto, but we saw very few. The pumping station installed at the Lake may have destroyed the fish, or the water may have been poisoned by the cannon, etc., thrown into the lake by the German contingent before surrendering.—K. J.

[4] In numbers in the little pool near the police station, none in the swift-running brook from this pool to the farm, but again in numbers in the bathing pool at the farm; evidently prefers quiet water. Many with young in the mouth.—K. J.

ANGOLA.

A brook at Cuito, Mt. Moco, Luimbale, Cuvo River system.

Kneria polli sp. nov.
Barbus paludinosus Peters 1852.
Barbus kessleri (Steindachner 1866).
Barbus wellmani Boulenger 1910.
Barbus mocoensis, sp. nov.
Clarias dumerilii Steindachner 1866.
Amphilius lentiginosus, sp. nov.

A brook south-east of Quibala, Longa River system, probably Nhia River, affluent of Longa River.

Barbus breviceps, sp. nov.

A brook between Lepi and Ganda, Catumbela River system.

Barbus dorsolineatus, sp. nov.
Barbus evansi Fowler 1930.

A brook 20 km. east of Bocoio, probably Balombo River system.

Barbus dorsolineatus sp. nov.

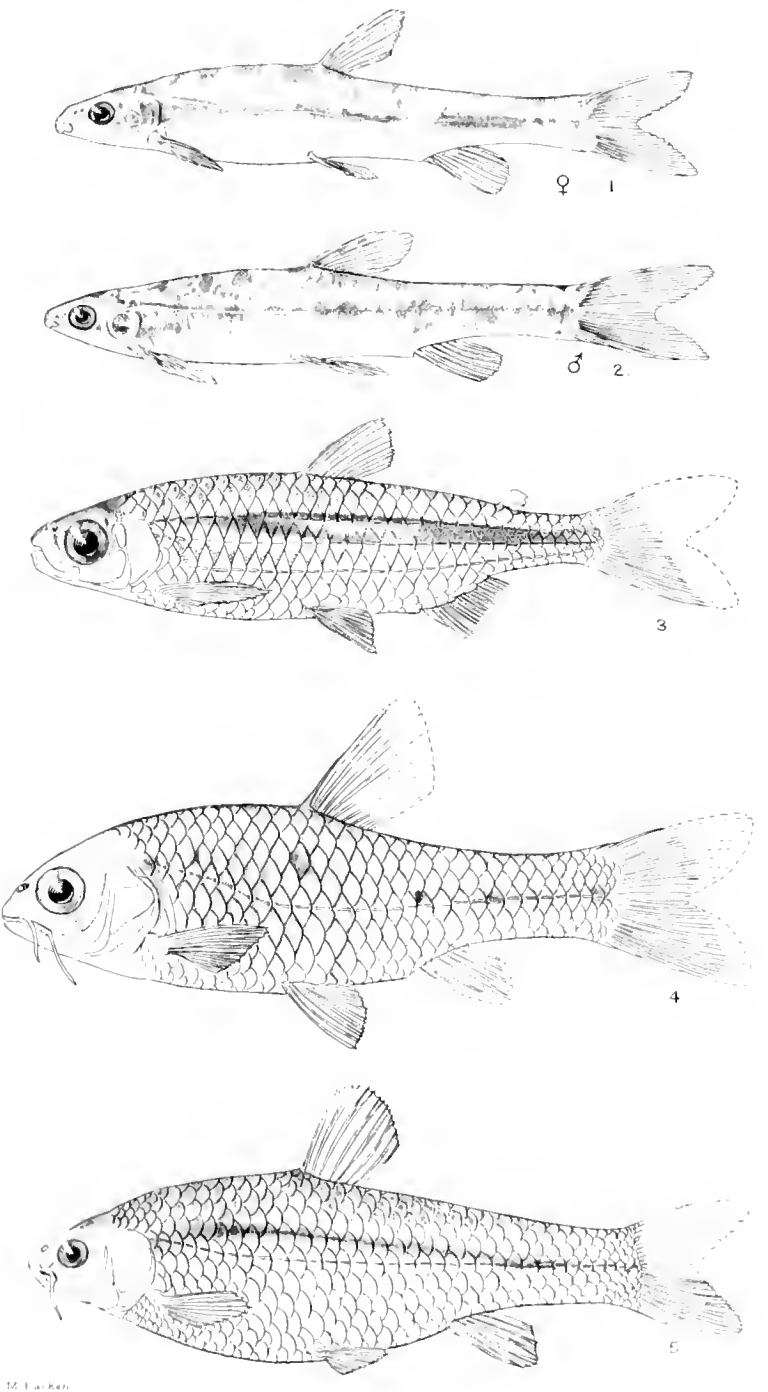
A small river west of Nova Lisboa, affluent of Cunene River.

Micralestes argyrotaenia sp. nov.
Barbus lineomaculatus Boulenger 1903.

EXPLANATION OF PLATES I AND II

Pl. I. Fig. 1. *Kneria polli* sp. nov., female, 54 mm.
2. *Kneria polli* sp. nov., male, 58 mm.
3. *Micralestes argyrotaenia* sp. nov., female, 91 mm.
4. *Barbus dorsolineatus* sp. nov., 64 mm.
5. *Barbus breviceps* sp. nov., 60 mm.

Pl. II. Fig. 6. *Barbus mocoensis* sp. nov., 65 mm.
7. *Clarias cavernicola* sp. nov., 147 mm.
8. *Clarias cavernicola*, dorsal view of head of another specimen.
9. *Clarias cavernicola*, premaxillary (*a*) and vomerine (*b*) teeth of a specimen 122 + 15 mm.
10. *Amphilius lentiginosus* sp. nov., 142 mm.
11. *Amphilius lentiginosus*, dorsal view of head.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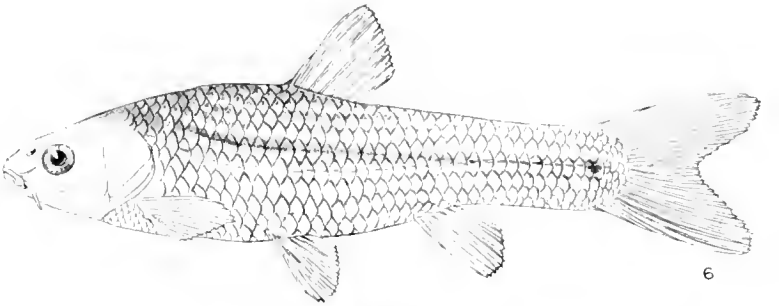
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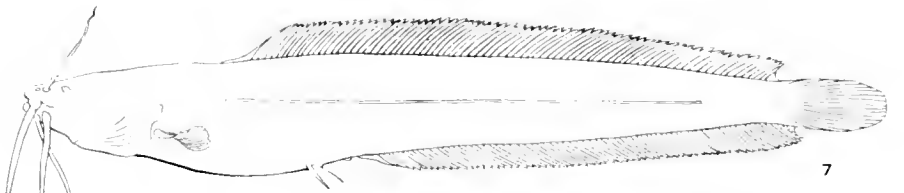
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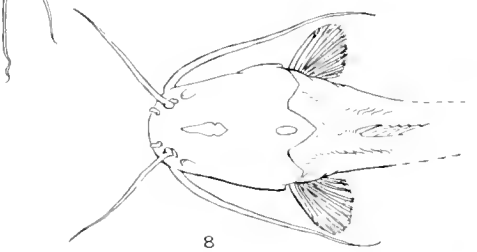
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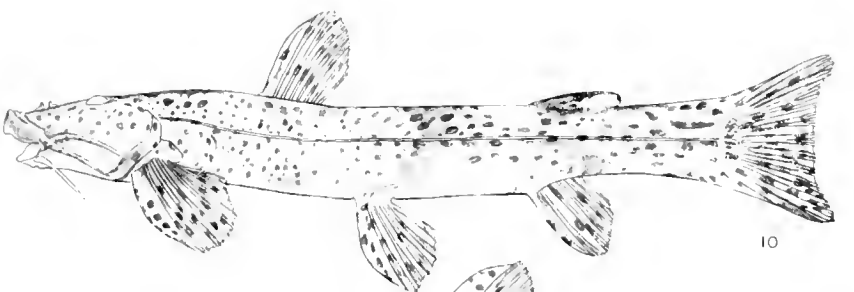
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M. Lasker

DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA: MAMMALS.

By JANE ST. LEGER, F.Z.S.

Department of Zoology, British Museum (Natural History).

THE series of Mammals collected for the British Museum on the Expedition contains several species of particular interest. The specimens of two squirrels belonging to the genera *Anomalurus* and *Heliosciurus* represent new subspecies recently described by me from this material. Until Dr. Jordan obtained *Anomalurus* in Western Angola, the Flying Squirrel was not known to occur west of the Congo basin. The capture of *Platymops haagneri* at the Waterberg, *Nasilio brachyurus* at Mt. Moco, *Taterona schinzi* at Lobito, and *Leggada bella induta* at Büllsport has also considerably extended the known range of these mammals.

I. SOUTH-WEST AFRICA.

Localities: Büllsport (or Buellesport), at the foot of the Naukluft Mts.
Hoffnung, a large farm, east of Windhoek, 1,800–2,000 m.
Klein Windhoek, east of Windhoek, ± 1,700 m.
Maltahöhe, 280 km. south of Windhoek.
Naukluft Mts., about 240 km. south-west of Windhoek.
Otjosongombe, Waterberg, ± 1,600 m.
Otavifontein, east of Otavi, 1,400 m.
Satansplatz, south of Voigtsgrund.
Sissekab, north-west of Otavi.
Swakopmund, at mouth af Swakop R.
Windhoek, ± 1,650 m.
Voigtsgrund, 40 km. east of Maltahöhe.

1. **Hipposideros commersoni** Geoff. 1813.

Sissekab; one specimen in alcohol.——On the wall of the veranda, in daytime. Another specimen in Aigamas cave, dead. K. J.

2. **Hipposideros caffer caffer** Sundev. 1846.

Otjosongombe; a male, no. 30.——Flying over a pond in company of the two following species. K. J.

3. **Rhinolophus aethiops** Peters 1868.

Otjosongombe and Klein Windhoek; 2 specimens.——The bats collected at Klein Windhoek were found in the water tunnels in Herr Blaschke's garden. K. J.

4. **Rhinolophus geoffroyi augur** Anderson 1904.

Otjosongombe and Klein Windhoek; 2 specimens.

5. **Nycteris damarensis** Peters 1870.

Klein Windhoek; 3 specimens.

6. **Miniopterus natalensis smitianus** Thomas 1927.

Klein Windhoek ; 8 specimens.——The *Miniopterus* and *Nycteris* were in one tunnel and the two *Rhinolophus* in the other, all four species in numbers.

7. **Platymops (Sauromys) haagneri** Roberts 1917.

Otjosongombe ; one female, no. 39.

This bat, I believe, has only been recorded previously from the typical locality, Keetmanshoop, and from the Great Brukaros Mts., both places in the south of the country, where they were collected by Captain G. C. Shortridge. Otjosongombe lies more than 800 km. farther north.

Austin Roberts has formed the subgenus *Sauromys* for the two South African bats *haagneri* and *petrophilus*, which he differentiates from *Platymops macmillani* (*Ann. Transv. Mus.*, vol. 6, p. 5, 1917) on account, among other characters, of the presence of the small premolar (pm^3) in the upper jaw. In *Platymops macmillani* Thomas 1906, which is the genotype of *Platymops* Thomas 1906, a minute pm^3 is present, although only perceptible with a strong lens, and apparently not discovered by Thomas when he described *P. macmillani*. This premolar is mentioned by Miller ("Families and Genera of Bats," in *Bull. 57, U.S. Nat. Mus.*, p. 254, 1907), who describes it as "a minute (sometimes deciduous) spicule considerably smaller than cingulum of canine." In the subgenus *Sauromys* this premolar is well formed and visible without a lens.—— Flying over the pond in the garden. K. J.

8. **Aethechinus frontalis** Smith 1830.

Hoffnung ; 1 specimen.——Found in a small nest made of dry grass under a slab of stone. There was a single flea on it, which jumped away and was lost. K. J.

9. **Crocidura hirta** Peters 1852.

Otjosongombe and Otavifontein ; 3 specimens.

The specimens seem to be indistinguishable from the grey phase of this widely distributed shrew, of which the typical locality is Tette, Port. E. Afr.

10. **Panthera pardus shortridgei** Pocock 1932.

Hoffnung ; skull of a female.

11. **Proteles cristatus** Sparrm. 1785.

Skull of female.——In the hills towards Bellerode. K. J.

12. **Ictonyx striata** Shaw 1800.

Voigtsgrund ; one female, no. 58.——Baited with an egg. K. J.

13. **Cynictis penicillata bradfieldi** Roberts 1924.

Hoffnung ; one male, no. 44.

14. **Myonax cauii bradfieldi** Roberts 1932.

Otjosongombe ; 1 specimen. Almost topotypical, the subspecies being described from an animal killed on Quickborn Farm.—— Baited with an egg. K. J.

15. **Paraxerus cepapi sindi** Thomas & Wroughton 1908.

Sissekab and Otavifontein ; 3 specimens.

16. **Desmodillus auricularis** Smith 1834.

Hoffnung ; one male, no. 17.

17. **Gerbillus swalius oralis** Thomas & Hint. 1925.

Swakopmund ; one female, no. 74.——In the hillocks formed by *Mesembryanthemum salicornioides* near the shore ; many burrows on higher and firmer ground. K. J.

18. **Thallomys demarensis** De Winton 1897.

Otjosongombe, Naukluft Mts., and Satansplatz ; 4 specimens.

19. **Aethomys namaquensis namaquensis** Smith 1835.

Otavifontein, Maltahöhe, and Hoffnung ; 3 specimens.

20. **Aethomys namaquensis siccatus** Thomas 1926.

Satansplatz ; 6 specimens.——Under heaped-up stones. K. J.

21. **Mastomys coucha bradfieldi** Roberts 1926.

Otjosongombe ; 6 specimens.——In the reeds around the pond in the garden. K. J.

22. **Leggada bella induta** Thomas 1910.

Büllsport ; one female, no. 50.——Shortridge gives Gobabis district and Karibib as the southern (known) limit of distribution. Büllsport is 240 km. farther south than Karibib. K. J.

23. **Mus musculus** L. 1758.

Voigtsgrund ; one female, no. 57.

24. **Saccostomus andersoni** De Winton 1898.

Okahandja ; one female, no. 73.

25. **Cryptomys damarensis lugardi** De Winton 1898.

Otjosongombe ; 8 specimens.——Variable in the amount of white. All the specimens trapped in one spot of the valley. K. J.

26. **Petromys typicus tropicalis** Thomas & Hint. 1925.

Büllsport ; 3 skins and 5 skulls.——Also seen and collected near Windhoek in rocky places. K. J.

27. **Lepus capensis damarensis** Roberts 1926.

Hoffnung ; one male, no. 18.

Hoffnung Farm is about 100 km. distant from, but in the same mountain range as, Quickborn Farm, from which locality Austin Roberts described this hare as *L. zuluensis damarensis*. I refer it, however, to the *capensis*-group, on

account of the red colouring of the legs and feet, which is absent from the *zuluensis*-group. The specimen from Hoffnung Farm is less red on the legs and sides than *L. c. mandatus* Thomas 1926 from Berseba, but shows more red colouring than *L. z. herero* Thomas 1926, which subspecies it resembles in the presence of white patches in front of and behind the eyes.

28. **Procavia capensis windhuki** Brauer 1914.

Hoffnung and Naukluft ; 6 specimens.

II. ANGOLA.

Localities : Congulu, Coffee plantation on escarpment about 85 km. from Porto Amboim, rain forest, 700–800 m.
Lobito, harbour.
Mt. Moco (Moko), Cuito, district of Luimbale, 1,800–1,900 m.
Quirimbo, 75 km. from Porto Amboim, ± 300 m., Oil Palm plantation, edge of rain forest.

1. **Galago crassicaudatus monteiri** Gray 1863.

Mt. Moco ; 2 males, nos. 26a and 43, and 3 flat skins.
Quirimbo ; one female, no. 127.

The series from Mt. Moco shows considerable variability in the amount of brown colouring on head and dorsal surface. In no. 43 there is scarcely a trace of brown colour on the head, and the fur of the shoulders and back is pale grey, whilst in one of the three unnumbered skins from the same locality there is a well-marked patch of chocolate brown between the ears, and the whole dorsal surface and limbs are distinctly washed with the brown colour. These three skins were purchased from natives who came into camp at Mt. Moco, but who may have travelled some distance ; the original locality of these skins, therefore, is doubtful.

2. **Galago moholi** Smith 1939.

Congulu ; one male, no. 122.

3. **Rousettus angolensis** Bocage 1898.

Congulu ; 4 specimens.

4. **Hipposideros gigas** Wagner 1845.

Congulu ; one male, no. 96.

5. **Hipposideros caffer angolensis** Bocage 1897.

Congulu ; one male, no. 94.

6. **Nycteris hispida** Schreber 1775.

Mt. Moco.

7. **Pipistrellus anchietae** Sebra 1900.

Congulu ; 10 skins and 6 juv. in spirit.

8. **Eptesicus bicolor** Bocage 1889.

Mt. Moco ; one female, no. 26.

9. **Chaerephon limbatum** Peters 1852.

Congulu ; a series.——In great numbers under the roof of the house. K. J.

10. **Lophomops cristatus** Allen 1917.

Congulu ; 9 specimens.

11. **Crocidura ansorgei** Dollman 1915.

Congulu ; 4 specimens.

Dr. Jordan is to be congratulated on obtaining specimens of this little-known shrew.

12. **Nasilio brachyurus** Bocage 1882.

Mt. Moco ; 2 specimens.

The typical locality of *N. brachyurus* is Caconda, which lies towards the southern extremity of the highlands of which Mt. Moco is the highest point north of the railway line.

13. **Felis ochreata caffra** Desm. 1822.

Mt. Moco ; one skin (juv.).

14. **Genetta tigrina angolensis** Bocage 1882.

Congulu ; one female, no. 97.

15. **Anomalurus jacksoni jordani** St. Leger 1935.

Congulu and Quirimbo ; 4 specimens.

Described from this material in Nov. Zool., xxxix, p. 251 (1935), type (♀) from Congulu.——The specimens all came from the rain forest of the escarpment and were brought in by natives. K. J.

16. **Heliosciurus rufobrachiatus brauni** St. Leger 1935.

Congulu ; 6 specimens.

Described l.c. p. 252.——Fairly plentiful in the trees of the escarpment below the house. K. J.

17. **Funisciurus congicus congicus** Kuhl 1820.

Congulu ; 7 specimens.

In the dull colour of the side-stripe and in the dark coloration of the tail this series matches exactly the type of *congicus*, and differs entirely from *F. c. olivellus* Thomas from Cunga, Angola.——Together with *H. r. brauni*, abundant. K. J.

18. **Taterona schinzi** Noack 1889.

Lobito ; one male.

This species has not been previously recorded, I believe, north of the Cunene R., where Captain Shortridge obtained a long series. — Evidently abundant near Lobito, judging from the large number of burrows. K. J.

19. **Taterona valida** Bocage 1890.

Mt. Moco ; 2 specimens.

20. **Cricetomys ansorgei** Thomas 1904.

Congulu and Mt. Moco ; 2 specimens.

21. **Aethomys bocagei** Thomas 1904.

Congulu ; 4 specimens.
Quirimbo ; one female, no. 129.

22. **Praomys tullbergi** Thomas 1892.

Congulu ; 3 specimens.

23. **Myomys colonus angolensis** Bocage 1890.

Mt. Moco ; skin and skull, no. 38.

24. **Mastomys coucha coucha** Smith 1836.

Mt. Moco ; 22 specimens.
Quirimbo ; one male, no. 134 ; this skin is unusually dark in colour.

25. **Rattus rattus** f. **rattus** L. 1758.

Mt. Moco ; one male, no. 18.
Congulu ; 10 specimens.

26. **Rattus rattus** f. **alexandrinus** Geoffr. 1812.

Quirimbo ; one female, no. 130.
This seems to be an example of the imported black rat on the way to resume the wild tone of colour.——Rats were frequently seen on the road at Quirimbo ; they looked black in the bright sunshine and were evidently searching for grass-seeds. K. J.

27. **Pelomys campanae** Huet 1888.

Mt. Moco ; one female, no. 35.
Congulu ; one male, no. 87.
Quirimbo, 8 specimens.

28. **Dasymys nudipes** Peters 1870.

Congulu ; 4 specimens.

29. **Leggada bella sybilla** Thomas 1918.

Congulu ; one female.

30. **Cryptomys mechowi** Peters 1881.

Mt. Moco ; 9 specimens.
The adults of this series equal in size of body and skull *C. blainei* Hint. from the Loanda R., Angola. The cheek teeth, however, are not larger than those of *C. mechowi*, under which species I place this series, pending the time when the genus can be carefully revised.

31. **Cryptomys bocagei** De Winton 1897.

Mt. Moco ; 11 specimens.

Quirimbo ; 2 specimens.

The species was very common in the clearings and the native fields at the base of Mt. Moco. At Congulu I saw only a few burrows. K. J.

32. **Philantomba monticola anchietae** Bocage 1878.

Quirimbo ; one male.

33. **Procavia bocagei** Gray 1869.

Quirimbo ; 2 specimens.——The flea found on these specimens is a species quite distinct from the flea we have off *Procavia bocagei* collected in the province of Benguela. K. J.

DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA: SIPHONAPTERA.

BY DR. KARL JORDAN, F.R.S., F.R.E.S., F.Z.S.

(With 8 text-figures.)

THE mammals obtained on the Expedition were mainly collected for the sake of their Ectoparasites, particularly fleas. As I found little time for trapping, especially in Angola, we did not get large numbers of fleas, there being hardly ever anything on the mammals brought in dead or alive by the natives. Since my return to Europe, Herr W. Hoesch, one of my companions in South-West, has sent me from that country two consignments of fleas which add materially to the collection. Some of the species we obtained are new, the most interesting new flea being a subspecies combining characters of *Ctenocephalides felis felis* and *Ct. connatus*.

In order to make the report on the fleas more useful, I have included in it all the species known to me from South-West and Angola.

1. SOUTH-WEST AFRICA.

1. **Echidnophaga gallinaceus** Westw. 1875.

Sarcopsyllus gallinaceus Westwood, *Ent. Mo. Mag.*, xi, p. 246 (1875) (Ceylon).

Abundant in the warm districts of the Eastern Hemisphere and in the Southern States of U.S.A. We have no records of it from Central and South America. A pest on fowl and other birds, but also common on mammals.

Maltahöhe, xii., on *Aethomys namaquensis namaquensis*.——Hoffnung, x., xi. 1933, on *Geosciurus capensis* and *Cynictis penicillata bradfieldi*.——Omongongua, N.W. of Okahandja, iv. 1934, on *Mungos mungo*.——Otjosongombe, Waterberg, xi. 1933, and Ombijomatemba, near Otjivarongo, on *Cynictis penicillata*, *Geosciurus capensis* and *Lepus capensis*.——Otavifontein, xi. 1933, on *Aethomys namaquensis namaquensis*.

2. **Echidnophaga larina**, J. & R. 1906.

Echidnophaga larina Jordan & Rothschild, *Thomps. Yates & Johnst. Lab. Rep.*, vii, i, p. 49, no. 3, pl. 1, fig. 12; pl. 2, fig. 18; pl. 3, fig. 25 (1906) (So. Afr., Abyss., Somalild.).

The species was only known from the eastern side of the continent. Its true host appears to be the Aardvark (*Orycteropus*), but the flea is also found on Carnivora (which prey on the Aardvark or make use of its burrows).

Otjosongombe, xi. 1933, on *Hyaena brunnea*, a small series, the proboscis embedded in the skin of the host.

3. **Echidnophaga aethiops** J. & R. 1906.

Echidnophaga aethiops Jordan & Rothschild, *Thomps. Yates & Johnst. Lab. Rep.*, vii, i, p. 51, no. 4 (1906) (Namaqua).

Spitzkopje, on "*Nycteris grandis*," vii. 1912 (O. Püschel), 1 ♀.——Klipfontein, on *Nycteris capensis*, vi. 1903 (Capt. C. H. B. Grant), 1 ♀.——Occurs also on the east side of the continent.

4. **Procaviopsylla angolensis** Jord. 1925 (text-fig. 34).

Procaviopsylla angolensis Jordan, *Nov. Zool.*, xxxii, p. 102, no. 15, text-figs. 12–14 (1925) (Benguela)

Naukluft Mts. 1,300–1,500 m., xii.1933, on *Procavia capensis windhuki*, 2 ♂♂, 3 ♀♀. The specimens agree very well with the Angolan ones, except that in these ♀♀ the head of the spermatheca is slightly larger and that there are fewer bristles on abdominal segment VII, 8 or 9 instead of 13. As we have only one Angolan ♀, the range of variability in that country is not known.

5. **Xenopsylla erilli** Roths. 1904.

Pulex erilli Rothschild, *Nov. Zool.*, xi, p. 610, no. 5, pl. 8, figs. 16, 17; pl. 9, fig. 22 (1922) (Deelfontein, Cape Prov.).

Omongongua, iv.1934, on *Crossarchus fasciatus*, 1 ♀.—A flea of the Ground Squirrel, but frequently found on Carnivora.

6. **Xenopsylla brasiliensis** Baker 1904.

Pulex brasiliensis Baker, *Proc. U.S. Nat. Mus.*, xxvii, pp. 378, 379 (1904) (S. Paulo).

Okahandja and Waterberg, iii.–iv.1934, on *Thallomys damarensis*, a series. ——Omongongua, on *Procavia*, one ♀.——Otavifontein, xi.1933, on *Aethomys namaquensis namaquensis*, *Mastomys coucha* and (1 ♀) *Crocidura hirta*, a series.—— Ombijomatemba, on *Aethomys chrysophilus imago*, 1 ♀.

7. **Xenopsylla scopulifer** Roths. 1905.

Pulex scopulifer Rothschild, *Nov. Zool.*, xii, p. 480, no. 2, pl. 13, fig. 5 (1905) (Zululand).

Ombijomatemba, on *Aethomys chrysophilus imago*, 1 ♀.——The species was hitherto known only from Zululand and Portuguese East Africa.

8. **Xenopsylla nubicus** Roths. 1903.

Pulex nubicus Rothschild, *Ent. Mo. Mag.* (2), xiv, p. 82, no. 2, pl. 2, figs. 10, 16 (1903) (Shendi).

Ombijomatemba, on *Aethomys chrysophilus imago*, 1 ♀.——The first record from a locality so far south, Nyasaland being the most southern country from which we have specimens of this species.

9. **Xenopsylla eridos** Roths. 1904 (text-fig. 35).

Pulex eridos Rothschild, *Nov. Zool.*, xi, p. 611, no. 6, pl. 8, fig. 21; pl. 9, fig. 23 (1904) (Deelfontein).

Ombijomatemba, on *Aethomys chrysophilus imago*.——Otjosongombe, ix.1933, on *Mastomys coucha bradfieldi* and *Cryptomys damarensis hahni*, a series.

In the N. C. Rothschild collection only from various places in Cape Province. The record from Zululand in *Verh. III. Intern. Ent. Kongress*, p. 616 (1926) is erroneous; the specimen belongs to the next species.

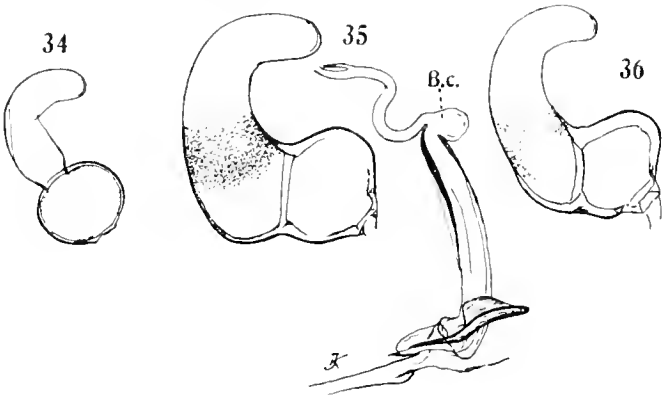
10. **Xenopsylla pirici** Ingram 1928 (text-fig. 36).

Xenopsylla pirici Ingram, *Bull. Ent. Res.*, 18, p. 371, text figs. 1, 2 (1928) (Transvaal; Cape Prov.).

Hoffnung, x.1933, on *Desmodillus auricularis*, a small series.

The ♂♂ of this species and *X. eridos* are easily distinguished from one another by the difference in the tendons of the penis; in *X. eridos* the tendons make only half a convolution, whilst in *X. pirici* they make one and a half convolutions, as pointed out by Dr. Ingram. In the ♀♀ there is no such conspicuous

difference, but the specimens of the two species from South-West can be separated by the spermatheca, the duct of the bursa copulatrix and the sclerite at the base of this duct. As illustrated by text-figs. 35 and 36, taken from South-Western



specimens, the base of the tail of the spermatheca is somewhat broader in *X. eridos* than in *X. piriei*. Moreover, the duct of the bursa copulatrix is shorter in *X. eridos* and the sclerite placed at its base also slightly shorter. However, these distinctions are less precise in the long series of ♀♀ we have from South Africa.

11. **Ctenocephalides connatus** Jord. 1925.

Ctenocephalus connatus Jordan, *Nov. Zool.*, xxxii, p. 98, no. 6, text-fig. 5 (1925) (So. Afr.; Tang. Terr.).

Ombijomatemba, on *Geosciurus capensis*, a series.

Like the preceding species, *Ct. connatus* was only known from the eastern side of the continent. In all the South-Western specimens of both sexes the head is very strongly rounded, contrasting very much in shape with the head of the subspecies of *Ct. felis* here following.

12. **Ctenocephalides felis damarensis** subsp. nov.

♂♀. Frons as strongly slanting forward and its oral angle as sharp as in *Ct. felis felis* Bouché 1935. In ♂ foretarsal segment V with 5 or 6 stout short ventral bristles at and near apex as in *Ct. connatus* ♂. In ♀ abdominal sternites III to VI with 2 bristles each side, VII with 2 or 3. Frons in some ♂♂ slightly shorter than in others.

Omongongua, near Okahandja, iii. 1934, on *Procavia capensis windhuki*.——Otjosongombe, xi. 1933, on *Myonax cauii bradfieldi*.——Waterberg, v. 1934, on *Lepus crassicaudatus* and *Ictonyx striata*.——Ombijomatemba, near Otjivarongo, on *Cynictis penicillata* and *Lepus capensis*.——Gobabis, on *Genetta felina pulchra*.

Evidently common. Nearly all the specimens were received from Herr W. Hoesch, who remarks on the abundance of this flea on the veranda of his house at Omongongua. He says that the flea probably was brought in by the dog and was breeding so profusely that one's legs got covered with fleas in crossing the veranda.

The specimens look so much like European cat-fleas that I determined them as such before any had been cleared and mounted. The introduced European

cat which one finds on the farms, sometimes in numbers, would have explained the occurrence of the European cat-flea. The ♀♀ of *Ct. felis damarensis* do not present any differences from that sex of *Ct. felis felis* and from extreme narrow-headed *Ct. felis strongylus* Jord. 1925; whilst all the ♂♂, some 70, possess on protarsal segment V a cluster of spiniforms at apex as in *Ct. connatus*. In both sexes the proboscis is as short as in *Ct. felis felis*, i.e. shorter than in *Ct. connatus*. As *Ct. connatus* occurs in South-West, whereas *Ct. felis strongylus* was not obtained, we conclude that the flea in question is the South-West African representative of *Ct. felis*.

The presence of ventral spiniforms on the end-segment of the foretarsus of the ♂ is of some interest. The fifth segment generally bears in fleas some minute hairs on the ventral surface, in many cases from near the base to the apex, and occasionally these hairs develop into short spiniforms, as for instance in *Dasypsyllus lasius* Roths. 1909, from Argentina. One, two or three apical ones are always a little enlarged, one being usually longish and more like a stiff hair, and the others shorter and spiniform. In *Ct. f. damarensis* ♂ segment V of mid- and hindtarsus bears 2 such spiniforms, very occasionally 3 in one tarsus, whilst in the foretarsus, in addition to these, 3 or 4 others have become spiniform. If there are only 5 spiniforms on the foretarsus, there is in front of the cluster one small hair larger than the small hairs, and it is this hair which has developed in other specimens into a slender and short spiniform. It is, further, interesting to note that the cluster of spiniforms of *Ct. connatus* and *Ct. f. damarensis* occurs again in *Ct. arabicus* Jord. 1925, from Arabia, but not in the species of *Ctenocephalides* found only in Kenya, nor in any of the related genera. There must be some reason for the acquisition of the cluster of spiniforms—it can hardly be retention—in the two widely separated districts. The cause of the development of the cluster may lie concealed in the similarity of environment in these dry countries. I do not wish to imply, however, that a dry climate directly produces spines in animals as it produces thorns and spines in plants. The cluster is confined to the ♂, and ♂-characters mostly have the function of bringing the sexes together or facilitating mating. We may, therefore, conclude that the cluster comes into play when the ♂ is underneath the ♀; but I cannot guess at its special function.

A further point of interest is the difference in the shape of the head obtaining in the various species and subspecies of *Ctenocephalides*. The short head with the strongly rounded frons may be taken as ancestral, from which the long-fronted head of *Ct. felis* is derived. The 4 geographical races of *Ct. felis* show all the gradations from a strongly rounded primitive frons to a strongly elongated younger frons

(*a*) In Tropical Africa, *Ct. felis strongylus*, the frons varies from being as round and short as in *Ct. connatus* to being nearly as long and pointed as in *Ct. felis felis*.

(*b*) In South-West Africa, *Ct. felis damarensis*, the frons is strongly pointed, sometimes in the ♂ with a very slight inclination towards round headedness.

(*c*) In the Nile countries and the Palaearctic Region, *Ct. felis felis*, the frons is always long and pointed.

(*d*) In the Oriental Region, *Ct. felis orientis* Jord. 1925, the frons is nearly as much rounded as in *Ct. canis* Curtis 1826.

13. **Listropsylla prominens** Jord. 1930.

Listropsylla prominens Jordan. *Nov. Zool.*, xxxvi, p. 133, no. 4, text-figs. 3, 4 (1930) (Zululand).

Gobabis, on *Aethomys chrysophilus*, x.1925 (Dr. Ingram), 1 ♀.——The genus is known from South and East Africa, Uganda and the Ruwenzori. Gobabis is so far the most western locality of its range.

Oxyparius gen. nov.

Similar to *Ischnopsyllus* Westw. 1840 and *Araeopsylla* Jord. & Roths. 1921, differing from both in the following combination of characters:

The dorsal incrassations so conspicuous in *Araeopsylla* on the thoracic and abdominal tergites absent or at most feebly indicated. Bristles of the *Ischnopsyllus*-type, not spiniform as many are in *Araeopsylla*. Genal process as strongly chitinized as in *Araeopsylla*, but gradually narrowed to a point, its upper margin straight or nearly and the tip sharp. Metepimerum not extending so far dorsad as in *Araeopsylla*, the abdominal tergite I being broader than in that genus, agreeing with *Ischnopsyllus* in width. Basal abdominal sternite with one or more lateral bristles anteriorly above middle, such bristles not occurring in any other bat-flea (apart from very minute hairs at the extreme basal margin). Segment V of all tarsi with four lateral pairs of plantar bristles and one ventral pair, the latter placed nearly in between the second pair, which is unusual.—— Genotype: a species here identified as *Ischnopsyllus isomalus* Waterst. 1915.

14. **Oxyparius isomalus** Waterst. 1915 (text-fig. 37).

Ischnopsyllus isomalus Waterston. *Rec. Albany Mus.*, III, 2, p. 109, text-figs. 4, 5 (1915) (Pretoria, possibly off *Miniopterus*, one ♀).

Araeopsylla isomalus Waterst., Jord. & Roths., *Ectoparasites*, I, p. 146 (1921).

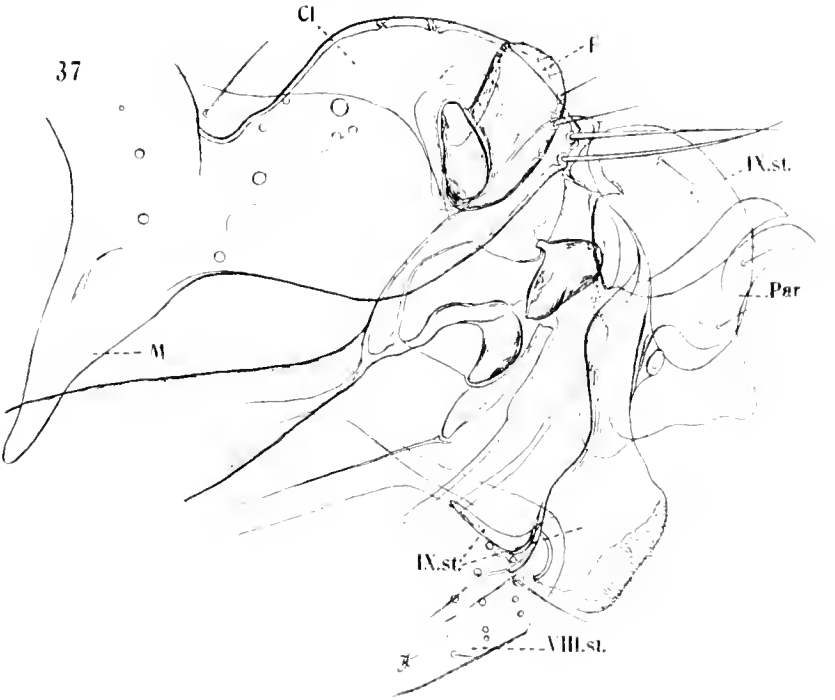
Klein Windhoek, x.1933, on *Miniopteris natalensis smithianus*, 1 ♂.

Described from a single Pretoria ♀ in the Albany Museum at Grahamstown. We have a ♂ from the same cave where the ♀ was obtained, the bat being determined as *Miniopteris natalensis*. The ♂ from South-West agrees with the Pretoria ♂ apart from some differences in details, which I consider to be distinctions obtaining between individuals. Both ♂♂ evidently belong to the same species as the ♀ described by Waterston, although they do not quite agree with the description. Waterston says of tarsal segment V that it bears 4 stout marginal bristles, the first two longer than the second pair, 1 stout ventral bristle and 7–8 dorsal. According to this description the ventral pair of our 2 ♂♂ is represented in the ♀ by a single bristle.

Spines in the combs of the South-West ♂: 23, 19, 15, 17, 12, 8.

Modified Segments.—Tergite VIII large, rounded posteriorly, with 9 or 10 bristles on upper half of side, the largest of them close to margin; sternite VIII triangular (in lateral aspect), with the apex rounded and membranous, before apex 11 or 12 slender bristles. Clasper irregularly elliptical, dorsally somewhat more strongly rounded than ventrally, at apex 2 long bristles, above them the margin of clasper straight and oblique to angle of F, where there is a minute marginal projection and a minute hair; manubrium M very strongly oblique, the bay between it and tergite IX being very shallow. Sclerite F twice as long as broad in middle, ventrally and apically strongly rounded, anterior (=dorsal) margin straight, angle formed with apical margin distinct but obtuse, 2 slender

subapical bristles above middle of posterior side (=ventral), about as long as F is broad, and a few minute bristles. Vertical arm of IX st. a short and narrow process; ventral arm in three sections: basal section subrectangular, about one-fourth longer than broad, ventrally covered with minute hairs; middle section



much narrower, ventrally about as long as proximal section; apical section elongate reniform, incurved on proximal side and evenly rounded on posterior side, bearing a few slender bristles, some of them in a row in upper half and 2 each side submarginal in lower half; the apical section measured vertically about half the length of the total ventral arm. Apical armature of penis with a long hook each side (Par.).

II. ANGOLA.

1. **Tunga penetrans** L. 1758.

Pulex penetrans Linnaeus, *Syst. Nat.*, ed. X, p. 614, no. 2 (1758).

Common at the coast as well as in the interior.

2. **Echidnophaga gallinaceus** Westw. 1875.

Cf. *antea*, p. 82.

Nova Lisboa (Huambo), i. 1926, on a hawk (H. F. Varian), 1 ♂, 1

3. **Pariodontis riggenbachi** Roths. 1904

Pulex riggenbachi Rothschild, *Nov. Zool.*, xi, p. 611, no. 7, pl. 8, figs. 19, 20; pl. 9, fig. 24 (1904) (Morocco and Cape Province, type Deelfontein, C.P.).

Mongona R., Bihé, xii. 1904, on *Hystrix* (Dr. W. J. Ansorge), a small series.

4. **Procaviopsylla angolensis** Jord. 1925.

Cf. *antea*, p. 83.

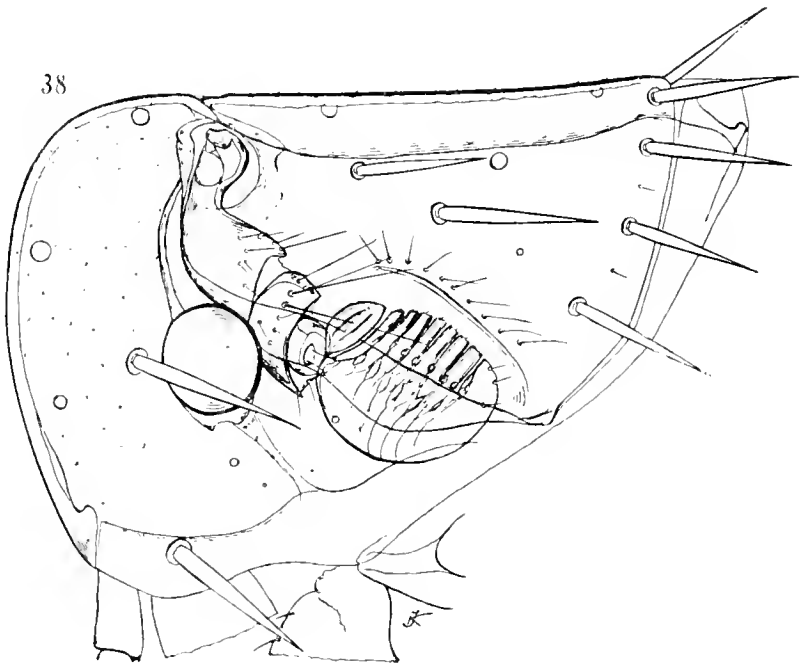
Benguela, on *Procavia bocagei*.——Besides the original 4 ♂♂, 1 ♀ received from Messrs. O. E. Janson & Sons, no further material has come to hand.

In the Key given in 1926 (*Verh. III. Intern. Entom.-Kongress*, p. 605) there is a penslip: line 9 from above, which refers to *P. divergens*, should read "proboscis reaching well beyond apex of palpus."

5. **Procaviopsylla spinifex** sp. nov. (text-fig. 38).

In 1926, *l.c.* p. 604, I gave an amplified diagnosis of *Procaviopsylla* in which I stated that the bristle in front of the eye was small or absent. The present new species refutes that statement, which has to be deleted.

♂♀. Very close to the preceding *P. angolensis*, but differs from that species and all the others of the genus in the bristle in front of the eye being very stout,



as are also the larger kind of bristles on head and thorax. Abdominal tergites II to VI with a row of 8 bristles in *P. angolensis* (on the two sides together) and a row of 10 in *P. spinifex*. On inner surface of hindfemur a lateral row of 5 or 6 bristles in *P. angolensis* and 3 or 4 in *P. spinifex*. Mid- and hindtibiae as in *P. angolensis* with 8 dorsal notches. Stigma of segment VIII somewhat broader, particularly in ♀. Processes P^1 and P^2 of clasper longer than in *P. angolensis*.

Quirimbo, v. 1934, on *Procavia bocagei*, a small series.

6. Xenopsylla brasiliensis Baker 1904.

Cf. *antea*, p. 83.

Mt. Moco, iii.1934, on *Rattus rattus*, a series.——Solo R., east of Catengue, iii.1934, in nest of *Otomys*, a series.——The commonest species of *Xenopsylla* in Angola and the Congo. An African species now of wide distribution, accidentally described first from Brazil.

7. Xenopsylla versuta Jord. 1925.

Xenopsylla versuta Jordan, *Nov. Zool.*, xxxii, p. 100, no. 10, text-fig. 8 (1925) (Benguela).

Benguela, i. 1906 (Ansorge), on *Funisciurus*, a small series of both sexes.—— Occurs also in Tanganyika Territory and Kenya.

The ♂ is easily recognized by the genitalia, the end-tube of the penis-sheath bearing a long tooth directed frontad, the lamina of the penis being apically rounded, not turned up into a point, and sternite IX dorsally membranous (transparent) and gradually curved upwards at the end. The ♀, however, closely resembles that sex of *X. cheopis* and requires close scrutiny; it bears fewer bristles on the side of tergite VIII, the spermatheca is a little smaller, and the duct of the bursa copulatrix less chitinized.

8. Xenopsylla cheopis Roths. 1903.

Pulex cheopis Rothschild, *Ent. Mo. Mag.* (2), xiv, p. 85, no. 5, pl. i, figs. 3, 9; pl. ii, figs. 12, 19 (1903) (Shendi, Sudan).

Benguela, v.1904, on *Rattus rattus* (Ansorge), 1 ♀.——An Indo-African species now occurring in most warm countries, occasionally in European harbours.

9. Rooseveltiella georychi Fox 1914.

Rooseveltiella georychi Fox, *Hygienic Labor. Bull.* 97, p. 7, pl. i, figs. 1–6 (1904) (300 miles inland from Benguela).

Cuito Estate and Mt. Moco, iii.1934, on *Cryptomys bocagei* and accidentally on *Rattus rattus*, a small series.

10. Ctenocephalides felis strongylus Jord. 1925.

Ctenocephalus felis strongylus Jordan, *Nov. Zool.*, xxxii, p. 98, no. 7 (1925) (West, East and South Africa).

Congulu, iv.1934, on *Homo*, 1 ♀. Bihé, x.1904 (Ansorge), on *Canis adustus*, 1 ♀. Without a ♂ it is not possible to say whether the ♀♀ belong to *Ct. f. strongylus* or a race of *Ct. conradus*. Cf. *antea*, p. 84.

Libyastus gen. nov.

The squirrel fleas from tropical Africa described as species of *Ceratophyllus* are all nearly related to each other and form a special group well separated morphologically from the Palaearctic, Oriental and American squirrel fleas. The new genus I propose for their reception is best placed near *Tarsopsylla* Wagner 1927.

♀♂. On outer side of forefemur 0–3 lateral bristles, on inner side 0 or 1, hindcoxa on inner side with marginal bristles only. On frons an anterior row of 1–3 bristles and a posterior row of 3. On occiput 1 median bristle not accom-

panied by a small one, the median bristle often reduced or absent, very rarely a bristle near base of antennal groove. Bristles of segment II of antenna all short in ♂, one reaching to middle of club in ♀; club of ♀ exceptionally long, twice as long as broad, not rounded in middle. Hindtibia with 8 dorsal notches. First pair of plantar bristles of tarsal segment V lateral, but distinctly bent ventrad-apicad.

♂. With 1 or 2 antepygidial bristles, the upper one the shorter. Tergite VIII without dorsal spiculose area on inside. Sternite VII reduced to a membrane. Posterior portion of tergite IX nearly completely separated from IX, forming an intercalar sclerite (as in many other fleas). Clasper partially separated from manubrium and dorsal portion of IX; no prominent process P.

♀. With 3 antepygidial bristles. Stylet with 1 lateral bristle. Basa, abdominal sternite, at least on one side, with 1 or more lateral bristles (often present also in ♂). Anal sternite with numerous lateral and ventral bristles none of which are curved and spiniform, 2 each side very long, one apical, the other subapical. Anal tergite each side with one very long bristle, which is longer and thicker than the apical one of stylet. Orifice of spermatheca on a prominent cone, which is curved downward in some species; tail without appendix.——Genotype: *L. infestus* Roths. 1908 (as *Ceratophyllus*).

KEY TO THE SPECIES

A. Median bristle of occiput much smaller than ventral posterior one. Clasper of ♂ on posterior side with sinus, process P above sinus somewhat curved distad. In ♀ snout of spermatheca not directed downwards.

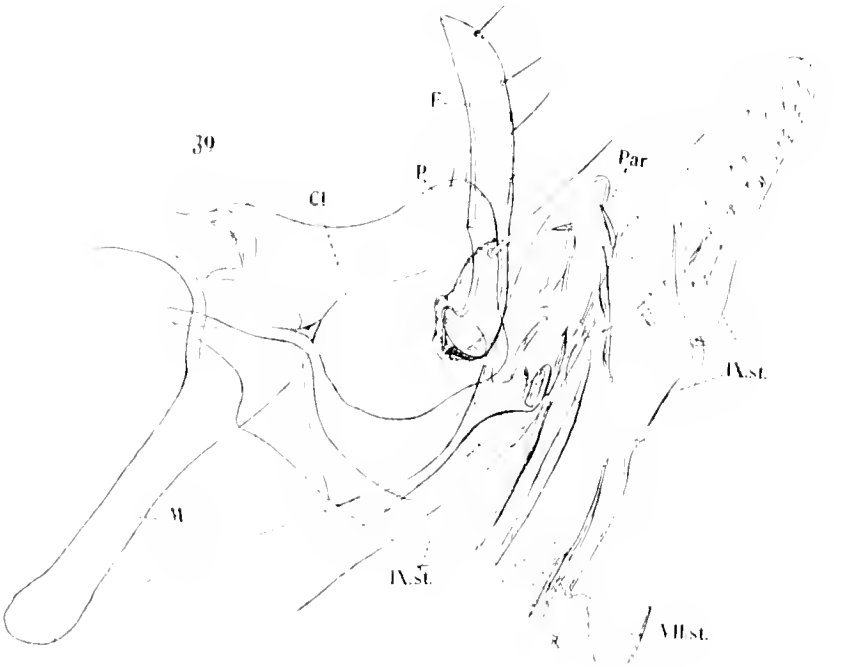
1. *L. infestus* Roths. 1908.——Basal abdominal sternite with numerous lateral bristles. Sclerite F of ♂ broadish, curved frontad at apex, rounded on posterior side. Sternite VII of ♀ with more than 30 bristles on the two sides together. *L. infestus infestus* from Kenya and *L. infestus duratus* Jord. 1931 from Tanganyika Territory.
2. *L. piger* Jord. 1925.——Basal abdominal sternite with few lateral bristles. Sclerite F of ♂ narrow, straight. Sternite VII of ♀ with 14 bristles. Uganda.

B. Median occipital bristle about as thick as posterior ventral one, but usually shorter. Clasper of ♂ without sinus on posterior side. In ♀ snout of spermatheca directed obliquely downwards.

3. *L. consobrinus* Jord. 1925.——Only the ♀ known. Sternite VII with small narrow sinus and about 20 to 22 bristles on the two sides together. Gaboon and Nigeria.
4. *L. stratiotes* Roths. 1905.——Only the ♂ known; possibly the ♂ of the preceding or the following species. Dorsal side of clasper very feebly incurved and distally very slightly convex, with 2 long bristles on posterior side. Spanish Gaboon.
5. *L. notabilis* Jord. 1925.——Only the ♀ known. Sternite VII strongly narrowed, apex obliquely truncate, very feebly incurved, upper angle strongly rounded, projecting farther distad then ventral angle; with 35 bristles. Gaboon.
6. Sp. nov.—— ♂: dorsal side of clasper incurved and distally rather strongly convex; one acetabular bristle. ♀: sternite VII, distally much broader than in *L. notabilis*, truncate, with 25 or fewer bristles. Angola.

11. **Libyastus vates** sp. nov. (text-figs. 39, 40).

♂♀. Frons with a row of 3 long bristles some distance from eye, middle one smaller than the others, farther forward 2 to 4 much smaller bristles and farther up another bristle close to antennal groove. On occiput a long strong bristle above middle of antennal groove, and another at posterior ventral angle; besides this latter one, the subapical row contains each side only 3 rather short and slender bristles, the interspace between the long bristle and the nearest short one being large. Eye somewhat larger in ♀ than in ♂, longer than broad, the longer diameter



equalling in ♂ the distance from the upper large eye bristle. Genal process broad, apex rounded.

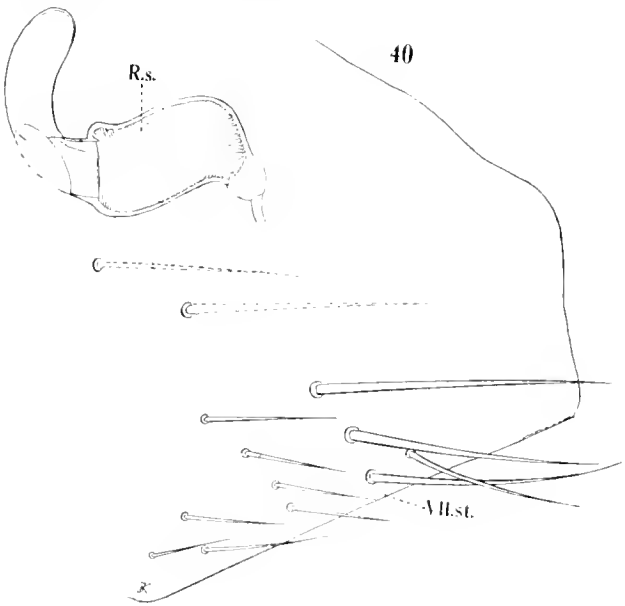
Pronotum dorsally in ♂ as long as comb, in ♀ a trifle longer; a row of 12 bristles and a comb of 20 spines. On mesonotum a row of 10 or 11 bristles, in front of this row another of small bristles, besides some additional dorsal bristles, there being a large bare lateral area. On metanotum the same number of bristles. Mesopleura with 10 bristles in ♂, 7 to 9 in ♀; metepimerum with 6 or 7.

Spines on abdominal tergites: in ♂ I 2, II 4, III 2, IV 2, V 1; in ♀ I 2, II 4, III 2, IV 2, V 0, the 2 on each side of II close together. Bristles on tergites: ♂ III 9, 11, IV 6, 12, VII 6, 8; in ♀ III 14 to 16, 12, IV 12 to 14, 12 or 13, VII 8 or 9, 6 or 7. Bristles on sternites: in ♂ III 3, 6, IV 2, 6, V 3, 6, VI 2, 6, VII 7, 5; in ♀ III 5 or 6, 6, IV 4, 6 or 7, V 5, 8 or 9, VI 9 to 11, 8. On basal abdominal sterite of one ♀ a lateral bristle on one side, none on the other, in second ♀ (Dala Tando) 2 or 3 each side; in ♂ none.

Posteriorly near apex of hindcoxa 2 bristles. Hindfemur with one lateral

bristle on outside and 1 or 2 on inside. On outside of hindtibia a row of 7 or 8 dorso-lateral bristles. Measurements of tarsi: midtarsus, in ♂ 20, 18, 12, 8, 16; in ♀ 21, 19, 13, 8, 16 (Dala Tando specimen) and 23, 19, 13, 9, 17.—— Hindtarsus, in ♂ 54, 32, 20, 11, 17; in ♀ 55, 33, 21, 11, 18 (Dala Tando) and 58, 34, 22, 12, 19. Longest bristle of hindtarsal segment II reaching to two-thirds of III.

Modified Segments.—♂: VIII t. large as in the other species of the genus, with 6 lateral bristles, of which 1 is subventral, and 5 long and 8 smaller marginal and submarginal ones; apical margin angulate and projecting below last bristle. Clasper (text-fig. 39 Cl.) dorsally evenly incurved and then strongly convex, this



portion corresponding to process P of other fleas; ventrally the clasper somewhat unevenly convex; one acetabular bristle, placed above middle. Manubrium M somewhat shorter than in *L. stratiotes*, apically distinctly rounded-widened. Sclerite F long and narrow, of nearly even width, but apically gradually narrowing to an obtuse point, upper half feebly concave on frontal side and convex on posterior side, 4 bristles at posterior margin. Apex of vertical arm of IX st. on frontal side with a round projection which is on a level with lower margin of manubrium M, posterior side also convex at the same level, apical nose long and narrow. Apical lobe of ventral arm of IX st. long, conical, with the tip rounded. Ventral sclerite of paramere, covered by the apical lobe of IX. st., rounded dorsally, its ventral apical angle pointed and produced downward.

♀. VII st. truncate (text-fig. 40), nearly as in *L. notabilis*, but the apex broader and the rounded upper angle not projecting beyond the ventral angle; with 20 to 25 bristles, in *L. notabilis* more than 30. On VIII t., from stigma down, 9 bristles in Dala Tando ♀ and 16 in the other, on inner surface 2 in the former and 4 in the latter. Bristles of anal sternite much more numerous than in *L. notabilis*, more than 30 each side, some of the ventral ones thicker in the

Congulu specimen then in the one from Dala Tando. Stylet $2\frac{1}{2}$ times as long as broad, that of *L. notabilis* being one-third longer than in the new species. Spermatheca as in *L. notabilis*.

Length (specimens somewhat extended): ♂ 3·1 mm., ♀ 3·3 mm.; hindfemur: ♂ 0·53 mm., ♀ 0·56 mm.

Congulu, Amboim district, on *Funisciurus congicus congicus*, v. 1934, one pair.——Dala Tando, ix. 1908 (Ansorge), on *Funisciurus*, 1 ♀.

The two specimens from Congulu were found on the same individual of the host.

12. **Stivalius afer** Roths. 1908.

Pygiopsylla afer Rothschild, *Proc. Zool. Soc. Lond.*, p. 618, no. 1, pl. 29, figs. 7, 8 (1908) (Benguela).

Benguela, 200 miles inland (Dr. F. C. Wellman), 1 ♀, no host mentioned.—— Dala Tando, xii. 1901 (Ansorge), on *Arricanthis rufinus*, 2 pairs.

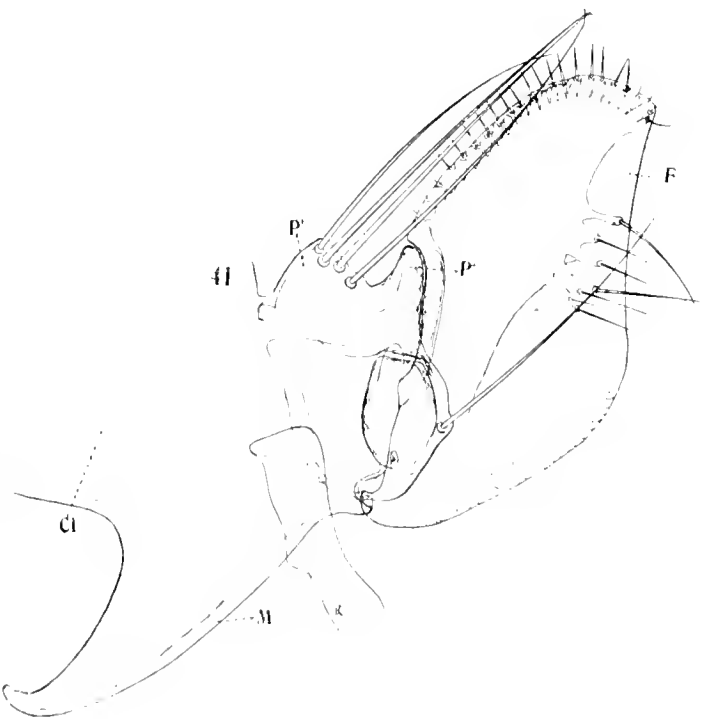
No further Angolan material has come to hand.

13. **Ctenophthalmus ansorgei ansorgei** Roths. 1907 (text-fig. 41).

Ctenophthalmus ansorgei Rothschild, *Nov. Zool.*, xiv, p. 330, no. 2, text-fig. 4 (1907) (Bihé).

Bihé (= Silva Porto), on *Cryptomys bocagei*, xi. 1904 (Ansorge), 1 ♂, 4 ♀♀.—— Also Dilolo, Congo Belge (Dr. Richard).

Although the ♂ has several times been mentioned in comparison with other



species and with *Ct. a. catanganus* Jord. 1936, the genital armature has not yet been figured. We give here a sketch of the clasper and its appendages.

14. **Ctenophthalmus atomus** J. & R. 1913.

Ctenophthalmus atomus Jordan & Rothschild, *Nov. Zool.*, xx, p. 551, no. 25, text-fig. 22 (1913) (Ndala Tando); Jord., ibid. xxxviii, p. 295, text-fig. 53 (1936) (Congo Belge).

Dala Tando (= Ndala Tando), on *Arricanthis rufinus*, xii. 1908 (Ansorge), 1 ♀.——No further specimens from Angola have come to hand; but Dr. Richard collected 2 ♂♂, 1 ♀ off *Pelomys frater* at Dilolo, Congo Belge, close to the Angolan frontier.

15. **Dinopsyllus horridus** J. & R. 1913.

Dinopsyllus horridus Jordan & Rothschild, *Nov. Zool.*, xx, p. 576, no. 39, text-fig. 41 (1913) (Pedreira).

Pedreira, Bihé, on *Pelomys campanae*, xi. 1904 (Ansorge), 4 ♂♂, 1 ♀.——We have received no other Angolan specimens.

16. **Dinopsyllus lypusus** J. & R. 1913.

Dinopsyllus lypusus Jordan & Rothschild, l.c., p. 570, no. 34, text-figs. 36, 37 (1913) (Kenya and Uganda).

Mt. Moco, Luimbale, iii. 1934, on *Myomys colonus angolensis*, 1 ♀.

I obtained only this single ♀. It is a small specimen, length (somewhat extended in mounting) 2·4 mm., hindfemur 0·48 mm.; on abdominal tergites II to V altogether 15 marginal teeth. There is a possibility that the specimen is a ♀ of *D. apistus* J. & R. 1913. *L. lypusus* is common in East Africa and extends northward to Darfur; it appears also to be abundant in the Katanga district of the Congo Belge.

The distinctness of *D. lypusus* from *D. ellobius* Roths. 1904 is open to doubt. Extreme specimens are easily distinguished by the difference in the length of the pronotum, in *D. ellobius* the pronotum being but little longer from the comb forward than the dorsal spines of the comb, whereas in *D. lypusus* the pronotum is twice the length of the comb or nearly; in the ♂ of *D. ellobius*, the frons is shorter and the last two long ventral bristles of VIII st. are close together. However, many South African specimens take an intermediate position.

17. **Lagaropsylla incerta** Roths. 1909.

Ceratopsylla incerta Rothschild, *Entom. Rec.*, xii, p. 37, pl. 2, figs. 2, 5, 6 (1909) (Madagascar and Sierra Leone).

Congulu, on *Chaerephon limbatum*, iv. 34, a long series.——The bat was very plentiful under the roof of the house in which we had our quarters; we caught them with a butterfly-net, and almost every specimen had some fleas. I found nothing on the specimens of this bat and the others brought in by the natives.

DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA: LASIOCAMPIDAE.

BY W. H. T. TAMS.

(With 9 plates.)

SO little material comes to this country from the regions of South-West Africa north of the Cape of Good Hope, that one is very grateful for the opportunity of examining the *Lasiocampidae* collected by Dr. Jordan during the winter of 1933-1934, when he went to South-West Africa and Angola.

The African fauna is so rich in *Lasiocampidae* that we are only just beginning to gather some idea of the large number of species belonging to this family to be found in that region, and our knowledge of their distribution is still extremely scanty, owing to the small numbers of specimens which come to us from any one locality. It is possible that more could be achieved if care were taken to utilise freshly caught or bred females for the purpose of attracting males. We are not nearly so anxious to have a single perfect female as we are to have both sexes in whatever condition they come to us, and damage to one female is worth risking if there is any possibility of getting her to attract males.

No attempt is made in this paper to do more than display facts, as it would be impossible to paint any sort of picture of the geographical distribution of the African *Lasiocampidae* on the basis of the material dealt with or on existing records. It becomes more and more evident that many records are worse than useless, because they are so misleading, some being accurate, but many being based on misidentifications. The many different kinds of environment existing in the African Continent, each with its own type of flora and fauna, make it imperative that every record shall be based on the most critical examination of each specimen. A glance at the four species of *Nadiasa* figured on Plate VII will give some idea of the difficulties involved.

In the main the subfamily arrangement given by Aurivillius in Seitz is retained, with the exception that for convenience I have placed the *Gastropachinae* at the end after the *Gonometinae*. Aurivillius's generic arrangement is also followed, except in the case of *Craspia ignicotincta* Aurivillius, which I believe to be a *Trichopisthia*; and the genus *Lechriolepis*, which I believe to be more closely related to *Chrysopsyche* than Aurivillius seems to have thought.

MALACOSOMATINAE.

1. **Chrysopsyche mirifica leptophyes** subsp. n. (Plate iii, fig. 1, ♂; fig. 2, ♀).

♂. More delicate in colouring and less robust in build than the typical subspecies, *C. m. mirifica* Butler (*Ann. Mag. Nat. Hist.* (5), v, p. 386, 1880); underside lacking the vinaceous-purple suffusion.

♀. More delicate in colouring and less robust than the typical subspecies.

Holotype ♂ and paratype ♂. N. Angola, N'Dalla Tando (= Dala Tando), 2,700 feet, 19.xi.1908 (W. J. Ansorge).

Allotype ♀. Angola, Quirimbo, 75 km. E. of P. Amboim, 300 m., 7-12.v. 1934 (K. Jordan).

2. **Chrysopsyche radei** Dewitz (Plate iii, fig. 5, holotype ♂).

Lasiocampa radei Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 77, pl. ii, fig. 16 (1881).

Recorded by Dewitz from Chinchoxo (Dr. Falkenstein). I am able to give a figure of the type through the courtesy of Dr. Martin Hering of the Zoologisches Museum der Universität, Berlin. This is the only specimen I have ever seen.

3. **Lechriolepis dewitzi** Aurivillius (Plate iii, fig. 3, ♂; fig. 4, ♀).

Lechriolepis anomala Butler, Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 78, pl. ii, fig. 9 (1881), *non* Butler.
Lechriolepis dewitzi Aurivillius, in Seitz, *Grossschmett. der Erde*, xiv, p. 220, pl. 30a, *dewitzi* ♀ (1927).
Lechriolepis flaveola Bethune-Baker, *Ann. Mag. Nat. Hist.* (8), vii, p. 563 (1911), ♂.

Angola, Amboim district, Fazenda Congulu, 700–800 m., 12–16.iv.1934, 2 ♂♂.

Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v.1934, 1 ♀.

LASIOCAMPINAE.

4. **Laeliopsis gemmatus** Wichgraf (Plate iv, fig. 1, holotype ♂; fig. 2, ♂).

Phasicnecus gemmatus Wichgraf, *Int. Ent. Zeitschr.*, xv, p. 19 (1921).
Laeliopsis erythrura ab. *marginata* Aurivillius, in Seitz, *Grossschmett. der Erde*, xiv, p. 217 (1927).

The type, which was presented to the British Museum by the late J. J. Joicey, is labelled: Angola, Bailundo. Thirteen ♂♂ collected by the late T. Alexander Barns in Angola (South Bihé district, Benguela Plateau, 5,000 feet, xi. 1928) apparently belong here, and these agree with the description of *L. erythrura* ab. *marginata* Aurivillius. The type of *L. erythrura* Aurivillius (*Ark. Zool.*, ix (11), p. 5, 1915) is a specimen from the Belgian Congo. All the Angola specimens I have seen, including one in the Tring Museum labelled: Angola, Bihé, 10.ix.1901 (Pemberton), belong to *L. gemmatus*, which may be only a subspecies of *L. erythrura*.

5. **Trabala burchardii** Dewitz.

Amydona burchardii Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 74, pl. ii, fig. 5 (1881).

A species based on Falkenstein's Chinchoxo material, and not represented in the collection under review.

6. **Beralade jordani** sp. n. (Plate iii, fig. 12, holotype ♂; fig. 13, allotype ♀).

♂ and ♀. White, the pattern of the forewings picked out in drab (cf. figures). Palpus warm buff, basally fuscous. Antenna honey yellow, shaft cartridge buff. Head cartridge buff with long black hair-scales around eyes. Forefemur streaked distally with black. Forewing white with the costa cartridge buff, pattern drab.

Expanse: ♂, 28 mm., ♀, 34–40 mm.
Forewing length: ♂, 12 mm., ♀, 15–18 mm.
Holotype ♂. S.W. Africa, Sissekab, N.W. of Otavi, 1,300 m., 14.xi.1933.
Allotype ♀. S.W. Africa, Lake Otjikoto, W. of Tsumeb, 17.xi.1933.
Paratypes. 2 ♂♂, Sissekab, 11.xi.1933.
All these specimens were taken by Dr. K. Jordan.

7. **Beralade quirimbo** sp. n. (Plate iii, fig. 8, ♂; fig. 6, enlarged view of right wings, ♂).

♂. Palpus fuscous inclined to sepia, mixed with warm buff. Antenna honey yellow, shaft cartridge buff. Head and thorax fuscous, avellaneous and white mixed, cartridge buff behind. Abdomen tergally cartridge buff. Pectus, legs and venter cartridge buff to warm buff streaked with fuscous. Forewing cartridge buff strongly shaded with a mixture of warm buff and fuscous proximally, distally irrorate with fuscous; a short fuscous longitudinal streak at base of cell; a prominent oblique white dash at end of cell, concave distad; an oblique fuscous antemedial fascia from base of vein Cu1 to inner margin at one-fourth; a prominent oblique fuscous postmedial fascia from costa before apex to inner margin before middle; a fine fuscous subterminal fascia from termen at end of vein R3 to inner margin at end of vein A2, accentuated by a decrease in the fuscous irroration before it; fringe white, with a fuscous line running through it. Hindwing cartridge buff; fringe with a fuscous line.

Underside: forewing cartridge buff, the fore half strongly suffused with fuscous; hindwing cartridge buff, with fuscous suffusion from costa to vein Sc.

Expanse: 30 mm. Forewing length: 13 mm.

This represents the typical subspecies, *B. quirimbo quirimbo* subsp. n.

Holotype ♂. Angola, Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v. 1934 (K. Jordan).

Paratypes. 2 ♂♂, with data similar to those of the holotype. 1 ♂, Morro de Pundo, 60 km. N.E. of Lobito, 21.v.1934 (K. Jordan).

8. **Beralade quirimbo exocyrta** subsp. n. (Plate iii, fig. 9, ♂; fig. 7, enlarged view of right wing).

♂. Almost indistinguishable from the preceding subspecies, but generally lighter in colour. Differs therefrom in the following features: smaller size; the white discocellular dash convex distad; hindwings have always more or less fuscous shading.

Expanse: 24–30 mm. Forewing length: 10·5–13 mm.

Holotype ♂. S.W. Africa, Otavifontein, near Otavi, 19.xi.1933.

Paratypes. Otavifontein, 19.xi.1933, 2 ♂♂, and 21.xi.1933, 1 ♂. Sissekab, N.W. of Otavi, 1,300 m., 11.xi.1933, 1 ♂. All the specimens were taken by Dr. Jordan.

9. **Beralade parva** Aurivillius (Plate iii, fig. 10, ♂; fig. 11, ♀).

Beralade parva Aurivillius, *Ann. S. Afr. Mus.*, xviii, p. 236 (1924).

S.W. Africa. Windhoek, 1,650 m., 20.i.1934, 1 ♀.
Hoffnung, E. of Windhoek, 1,850 m., 10.i.1934, 1 ♂, 1 ♀.
Okahandja, 1,320 m., 1–4.i.1934, 1 ♂, 2 ♀♀.
Voigtsgrund, 1,300 m., 15.xii.1933, 1 ♂.
Satansplatz, near Voigtsgrund, 1,300 m., 17.xii.1933, 1 ♂, 1 ♀.
Naukluft Mts., 1,300–1,500 m., 7–10.xii.1933, 2 ♀♀.
Buellesport (= Büllsport), foot of Naukluft Mts., 1,400 m., 6.xii.1933, 6 ♂♂, 1 ♀.

All the above specimens were taken by Dr. Jordan.

10. **Odontocheilopteryx triodonta** sp. n. (Plate iv, fig. 3, holotype ♂; figs. 4, 6, 8, 10, ♂ genitalia).

♂. Palpus cartridge buff shaded with light to warm buff and chestnut to warm sepia. Antenna honey yellow. Head cartridge buff with some warm buff shading. Thorax cartridge buff, shaded with warm buff, patagium with a few blackish-brown scales proximally, tegula with strong shading of warm sepia. Abdomen maize yellow, streaked terminally and ventrally with warm sepia. Pectus and legs chestnut to warm sepia streaked with light buff. Forewing light buff shaded with warm sepia and fuscous black (for pattern cf. figure). Hindwing maize yellow. Underside of forewing light buff lightly shaded with warm sepia, of hindwing maize yellow.

Expanse: 30–34 mm. Forewing length: 13–15 mm.

Holotype ♂ (30 mm.) and paratype ♂ (34 mm.).

Angola, Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v.1934 (K. Jordan).

Paratype ♂. Amboim district, Fazenda Congulu, 700–800 m., 12–16.iv. 1934 (K. Jordan).

Plate iv, figs. 5, 7 and 9 show corresponding structures of the ♂ genitalia of *O. myxa* Wallengren (*Wien. ent. Mon.*, iv, p. 165, 1860), for comparison with the figures of the genitalia of the new species. In these moths as in many other *Lasiocampidae*, the valves or claspers are much reduced, the function of clasping being carried out largely with the aid of the greatly developed and hinged extension of the 9th ventrite (fig. 8, *O. triodonta*; fig. 9, *O. myxa*), here shown broken off from the main part of segment 9 (cf. figs. 4 and 5 respectively). In the case of the new species the aedeagus possesses much larger cornuti (cf. figs. 7, *O. myxa*, and 10, *O. triodonta*).

11. **Philotherma tandoensis** Bethune-Baker (Plate v, fig. 1, holotype ♂).

Philotherma tandoensis Bethune-Baker, *Ann. Mag. Nat. Hist.* (9), xx, p. 333 (1927).

Bethune-Baker had two males, labelled N. Angola, N'Dalla Tando, 2,700 feet, 26.x.1908 (Dr. W. J. Ansorge).

In the Zoological Museum, Tring, are three specimens apparently belonging to the same species, with the following data:

♂, Angola, Canhoca (Dr. Ansorge)—(Plate v, fig. 2).

♀, Benguella [1] (Dr. Ansorge)—(Plate v, fig. 3).

♀, Angola, Bihé.

12. **Philotherma melambela** sp. n. (Plate v, fig. 4, holotype ♀).

♀. Warm buff, the head, thorax and abdomen, dorsally and ventrally, suffused with antimony yellow. Forewing with a black-edged white discocellular spot, and an indistinct black postmedial fascia bowed (concavity basad) from costa at three-fifths to vein M2, thence straight and oblique to middle of inner margin; a subterminal series of ill-defined sagittate marks roughly parallel with termen. Hindwing with a prominent subterminal series of black sagittate marks roughly parallel with termen. Underside similar, forewing lacking the discocellular spot.

Expanse: 93 mm. Forewing length: 43 mm.

Holotype ♀. Angola, Bihé, Salumkinga-Angulo, ix.1934 (R. Braun).

In the Zoological Museum, Tring, is another ♀, slightly crippled, labelled: Angola, Bange Ngola, 2.x.1903 (Dr. Ansorge).

[1] The Portuguese spelling is Benguela.

13. **Olyra sublineata** Walker (Plate xi, fig. 4, ♂; fig. 5, ♀; fig. 6, larva).

Poecilocampa sublineata Walker, *Proc. Nat. Hist. Soc. Glasgow*, i, p. 342 (1869).

Walker's type is a ♀, labelled simply: Congo.

The following Angolan (♂) and Congo (♀) specimens are figured:

♂. N. Angola, N'Dalla Tando, 2,700 feet, 10.xii.1908 (W. J. Ansorge).

Agrees with the description and figure of *Lasiocampa distantii* Dewitz (*Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 79, pl. ii, fig. 14, 1881). There is another ♂ in the British Museum from the same source, dated 20.xi.1908.

♀. Congo Belge, Congo R., Kinchasa, v.1920 (T. A. Barns).

Matches Walker's type of *Olyra sublineata*. Plate xi, fig. 6 shows a larva preserved by Monsieur Ch. Seydel, to whom I am indebted for the opportunity of making the photograph. The specimen was labelled:

Elisabethville, iv.1925 (Ch. Seydel). No. L 8174.

14. **Bombycopsis indecora** Walker.

Lasiocampa indecora Walker, *List Lep. Ins. B. M.*, xxxii, p. 561 (1865).

Walker's type is a South African specimen. Aurivillius (in Seitz) says: "South and West Africa at least as far as the Cameroon (Bamenda)." The species is not represented in any material I have seen from Angola.

15. **Catalebeda producta** Walker (Plate vi, fig. 1, ♂).

Lebeda producta Walker, *List Lep. Ins. B. M.*, vi, p. 1465 (1855).

Angola, Amboim district, Fazenda Congulu, 700–800 m., 12–16.iv.1934, 1 ♂ (K. Jordan).

The place of origin of Walker's type is unknown.

16. **Catalebeda elegans meridionalis** subsp. n. (Plate vi, fig. 2, holotype ♂).

♂. Differs from ♂ of *C. elegans elegans* Aurivillius (*Ergebn. Zweit. Deutsch. Zentr. Afrika Exp.*, i, p. 1293, Plate L, fig. 14, 1925: S. Cameroon, N'Gola, 28.iv.1911), in the structure of the 8th ventrite, which in the British Museum example of the typical subspecies (from the Cameroons, Efulen, H. L. Weber) has the lateral arms long, curved and sharply pointed, and the inner process apparently blunt, its point being directed dorsad, whereas the subspecies here described has the lateral arm short, and the inner process with its point directed mediad (cf. Plate vi, fig. 4, *C. e. elegans*; fig. 5, *C. e. meridionalis*).

Holotype ♂. Angola, Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v.1934.

Nadiasa Walker.

Nadiasa Walker, *List. Lep. Ins. B. M.*, v, p. 1014 (1855).

This genus has long been known under Moore's name *Taragama*, owing to the fact that the generic position of the type species, *N. concolor* Walker (*List. Lep. Ins. B. M.*, v, p. 1015, 1885), had not been satisfactorily determined, although Aurivillius long ago suggested that Walker's name might be revived if *N. concolor* proved to be a *Taragama*. The citation of *N. concolor* as the type of the genus rests on Kirby's statement in his *Synonymic Catalogue of Lepidoptera Heterocera*, 1892, though Kirby did not recognize the relationship of Walker's type specimen, associating with it two other Walker species belonging to a very different genus, viz. *Anadiasa* Aurivillius. The acquisition of Cape Colony specimens which I

am satisfied are *N. concolor* now establishes with certainty the identity of both the species and the genus, and *Taragama* Moore (*Cat. Lep. Mus. E. I. House*, ii, p. 427, 1859) falls as a synonym. The true *N. concolor* Walker is figured for the first time on Plate vi, fig. 7, ♂, fig. 8, ♀, and this is also the first time, so far as I am aware, that the ♂ has been received in this country. To the typical section of the genus belong *N. jordani* and *N. pancala*, described below, and amongst others *N. carinata* Wallengren (figured on Plate vi, fig. 6) and *N. jansei* (Plate vi, fig. 5), a species which has sometimes been confused with *N. carinata*.

N. basale Walker (*List Lep. Ins. B. M.*, vi, p. 1448, 1855: *Megasoma basale*) represents another section of the genus, of which there are many African species. Some idea of the difficulties involved in determining the value of variations in these insects may be gathered from a perusal of the photographs here reproduced. The moths are so similar that one finds it no easy matter to decide, even after a study of the genitalia, whether one is dealing with individual varieties or different species. In a series of Nigerian ♀♀ which I believe to belong to *N. amblycalymma*, the shape of the *lamella antevaginalis* is so constant that I have definitely taken the view that the Angolan ♀♀ before me are different species, more especially as, in spite of great similarity between them, each possesses a different facies. I hope that the photographs here reproduced will be the means of encouraging anyone collecting in Africa to obtain as many specimens as possible of each species, and I also hope that anyone with the time and opportunity will try to rear to maturity any larvae of the sort figured.

17. **Nadiasa jordani** sp. n. (Plate vi, fig. 9, holotype ♂).

♂. Palpus chestnut irrorate with ochraceous orange ventrally, dorsally light buff mixed with white. Antenna honey yellow. Head light buff mixed with white, sparsely streaked with chestnut. Thorax and abdomen dorsally and ventrally light to warm buff streaked with chestnut, tegula chestnut, legs shaded with chestnut. Forewing chestnut to chocolate densely irrorate with light to warm buff except for a distally white-edged English red patch at base between cell and inner margin, a similar patch proximally edged with chestnut beyond and adjoining the end of the cell, the latter forming part of a chestnut patch between the white antemedial and postmedial fasciae from costa to vein Cu1; a white spot at base of cell; subterminal almost obsolete, consisting of a series of interneural English red dashes; fringe light buff. Hindwing chocolate, irrorate distally with light buff, with light to warm buff on inner margin towards anal angle, and cartridge buff fringe, chocolate near anal angle. Underside chocolate, forewing light buff along inner margin.

Expanse: 42 mm. Forewing length: 19 mm.

Holotype ♂. South Central Angola, Upper Cubango-Cunene Watershed, 5,500 feet, x.1928 (T. A. Barns).

Richer in colour, smaller than, but similar in pattern and structure to *N. repanda* Hübner (*Europ. Schmett. Bomb.*, ff. 274, 275: 1818–1822; 346: 1834–1841), of which it may ultimately prove to be a subspecies.

18. **Nadiasa pancala** sp. n. (Plate vi, fig. 10, holotype ♀).

♀. Palpus light to warm buff mixed with fuscous, orange laterally and ventrally. Antenna honey yellow, shaft warm buff, irrorate with fuscous. Head light buff mixed with vinaceous brown and fuscous. Thorax light to warm

buff, patagium streaked with white, vinaceous brown and fuscous, tegula wax yellow to olive ochre (faded ?). Abdomen tergally light to warm buff. Pectus warm buff, vinaceous russet to Hay's russet in front. Venter warm buff, irrorate with vinaceous russet. Legs warm buff with vinaceous russet and fuscous shading. Forewing with the proximal two-thirds vinaceous russet suffused with Hay's russet, dark vinaceous brown to fuscous at the postmedial fascia, and traces of white at middle of costa ; distal third warm buff with white along the postmedial fascia, irrorate with vinaceous brown. Hindwing cartridge buff to light buff, the proximal two-thirds suffused with vinaceous brown, the latter edged with diffused white. Underside light to warm buff, the proximal two-thirds of each wing suffused with vinaceous brown.

Expanse : 60 mm. Forewing length : 27·5 mm.

Holotype ♀. S.W. Africa, Swakopmund, 6.xi.1933 (K. Jordan).

The ♀ of the previously described species must be very similar to this in appearance (cf. Plate vi, fig. 9, *N. jordani*, ♂).

19. **Nadiasa jansei** sp. n. (Plate vi, fig. 5, holotype ♂).

♂. Palpus light buff dorsally, yellow ochre to ochraceous orange ventrally. Antenna honey yellow, shaft light buff. Thorax anteriorly light buff mixed with russet, tegula yellow ochre to ochraceous orange, edged with light buff, mesothorax and metathorax warm buff to ochraceous buff. Abdomen tergally warm buff to ochraceous buff, distally tinged with russet. Pectus, legs and venter light to warm buff, the scales surrounding the genital opening, and the terminal tuft, russet to chocolate. Forewing russet, the fasciae cartridge buff (for pattern cf. figure) ; a cartridge buff spot at base of cell ; costa warm buff ; an ochraceous orange patch bounded by lower margin of cell, anal vein and antemedial fascia ; discocellular streak chocolate, succeeded by a patch of ochraceous orange ; a warm buff area between lower margin of cell and inner margin and the antemedial and postmedial fasciae ; chocolate edging at tornus. Hindwing russet, inner margin light to warm buff, wing apex and anal angle edged with chocolate ; postmedial fascia cartridge buff. Underside russet to vinaceous tawny, fore- and hindwings with costa warm buff, inner margin light buff, cartridge buff postmedial fascia.

Expanse : 37 mm. Forewing length : 16·5 mm.

Holotype ♂. Transvaal, Pretoria, 6.xi.1906 (A. J. T. Janse).

Smaller than *N. carinata* Wallengren (*Wien. ent. Mon.*, iv, p. 165, 1860), the fasciae more prominent, the colour less rich (cf. Plate vi, fig. 5—*N. jansei*, fig. 6—*N. carinata*).

20. **Nadiasa quirimbo** sp. n. (Plate vi, fig. 11, holotype ♀).

♀. Palpus chestnut, streaked with warm buff and ochraceous orange. Antenna honey yellow, the shaft chestnut streaked with warm buff. Head and thorax warm buff mixed with avellaneous to vinaceous fawn. Abdomen tergally warm buff suffused with vinaceous fawn, tegula ochraceous orange. Pectus vinaceous russet to walnut brown, sparsely streaked with warm buff. Legs walnut brown to chestnut, streaked with warm buff. Venter walnut brown, streaked with warm buff, segments edged distally with light buff. Forewing vinaceous russet, patchily relieved with ochraceous orange ; a broad tuft of chestnut brown and fuscous scales at end of cell ; antemedial and postmedial

fasciae fuscous, white-edged; subterminal fascia ill-defined, indicated by vandyke brown scaling; on the inner margin a lanceolate patch, light buff irrorate with vinaceous russet, white-edged except on inner margin, its point extending just beyond the postmedial fascia; fringe vinaceous brown. Hindwing warm buff with a vinaceous russet suffusion increasing towards the subterminal area; a fine fuscous terminal edging; fringe light buff, edged with fuscous. Underside of both wings almost uniform vinaceous russet irrorate with light to warm buff.

Expanse: 74 mm. Forewing length: 34 mm.

Holotype ♀. Angola, Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v. 1934 (K. Jordan).

21. **Nadiasa oinopa** sp. n. (Plate vi, fig. 12, ♂; fig. 13, ♀).

♂ and ♀. Pattern as in figures. Ground colour of forewing vinaceous brown, enriched basad by chocolate, fringe fuscous. Hindwing warm buff suffused with vinaceous russet, fringe fuscous.

Expanse: ♂, 44–46 mm., ♀, 60–63 mm.

Forewing length: ♂, 19–20 mm., ♀, 26–28 mm.

♂ genitalia with the 9th ventrite similar to that of *N. cuneata* Distant (Plate vii, figs. 10, 11), but with the terminal crown of spines narrow, the spines small and more or less uniform in size.

♀ genitalia. Armature of *ostium bursae* broad, with a long, narrow, blunt process, somewhat irregular in outline (cf. Plate vi, fig. 14).

Larva (Plate viii, fig. 7). I am indebted to Monsieur Ch. Seydel for the opportunity of photographing this beautifully preserved larva (M. Seydel's No. L 8172).

Holotype ♂ and allotype ♀. Belgian Congo, Elisabethville, xii. 1926 (Ch. Seydel).

Paratypes from the same source, dated xi. 1926, 1 ♂, 1 ♀.

22. **Nadiasa directa** Mabille (Plate vii, fig. 1, holotype ♀).

Pachypasa directa Mabille, *Ann. Soc. ent. Belge*, xxxvii, p. 58 (1893).

Mabille gives Gabun as the locality. Plate vii, figs. 2, 3 show two views of the ♀ genital armature. It will be noticed that in the forewing the oblique fuscous dashes in the subterminal fascia are unusually long and extend basad almost to the postmedial fascia. Mabille's type ♀ is in the British Museum.

Expanse: 82 mm. Forewing length: 38 mm.

23. **Nadiasa pamphenges** sp. n. (Plate vii, fig. 5, holotype ♀).

♀. Ground colour vinaceous tawny to vinaceous rufous, shaded with chestnut, which is richest at the forewing base and tegula. Pattern as seen in the figure, fasciae fuscous edged with vinaceous fawn, discocellular spot prominent. *Ostium bursae* with a simple armature, the *lamella antevaginalis* with a moderately long, fairly stout, parallel-sided process (cf. Plate vii, fig. 15).

Expanse: 60 mm. Forewing length: 28 mm.

Holotype ♀. N. Angola, N'Dalla Tando, 2,700 feet, 15.xi.1908 (W. J. Ansorge).

24. **Nadiasa amphilecta** sp. n. (Plate vii, fig. 4, holotype ♀).

♀. Ground colour warm buff tinged with vinaceous tawny, shaded with auburn on forewing proximally, and most of tegula. Pattern as seen in figure. *Ostium bursae* with a strong armature, the *lamella antevaginalis* broad, with a moderately long, somewhat irregularly shaped blunt process (cf. Plate vii, fig. 7).

Expanse: 78 mm. Forewing length: 35 mm.

Holotype ♀. ? Angola (Monteiro). The specimen is labelled: Angola or Delagoa Bay.

25. **Nadiasa torynecteta** sp. n. (Plate vii, fig. 13, holotype ♀; fig. 14, ♀ genital armature).

♀. Coloration intermediate between that of *N. directa* Mabille and *N. amphilecta* Tams. Light edging of tegula very fine. Forewing more rounded, termen less oblique than in the two species just mentioned. *Ostium bursae* strongly chitinized, the *lamella antevaginalis* with a long curved spatulate process.

Expanse: 62 mm. Forewing length: 28 mm.

Holotype ♀. Angola, Pungo Andongo (A. v. Homeyer).

26. **Nadiasa amblycalymma** sp. n. (Plate vii, fig. 6, ♀ genital armature).

♀. General coloration tawny to vinaceous tawny and vinaceous russet; pattern sharply defined. Forewing more richly coloured at base, there inclined to chestnut; a prominent chestnut brown discocellular dot; fasciae sepia, antemedial proximally and postmedial distally edged with light buff; area between postmedial and subterminal tawny, proximally shaded with vinaceous russet; a light buff terminal line, fringe sepia. Hindwing tawny, distally suffused with vinaceous tawny; a light buff terminal line; fringe sepia. Underside vinaceous tawny, forewing with faint traces of fasciae similar to those on upper side, hindwing with a bowed postmedial almost exactly through the middle. ♀ genital armature with the *ostium bursae* strong, the process arising from the *lamella antevaginalis* shaped like a broad chisel blade.

Expanse: 64 mm. Forewing length: 30 mm.

Holotype ♀. Côte d'Ivoire.

Very similar to *N. torynecteta*, but with a much smoother appearance, lighter in colour, with the fasciae very sharply defined. In *N. torynecteta* the postmedial fascia on underside of hindwing is more prominent, and set distinctly farther distad.

27. **Nadiasa pachyla** sp. n. (Plate viii, fig. 1, holotype ♂; fig. 2, allotype ♀).

♂. Palpus chocolate sparsely irrorate with warm buff. Antenna honey yellow, shaft vinaceous brown densely irrorate with warm buff. Thorax vinaceous brown to chocolate sparsely irrorate with warm buff, tegula chocolate, velvety, finely edged with light buff. Abdomen tergally vinaceous brown sparsely irrorate with warm buff. Pectus, legs and venter chocolate, sparsely irrorate with light to warm buff. Forewing chocolate, rich and velvety from base to postmedial fascia; antemedial and postmedial fasciae fuscous; a light buff and chocolate pale patch from wingbase extending along inner margin to just beyond postmedial fascia; for pattern see figure. Hindwing vinaceous brown irrorate with warm buff, suffused with chocolate distally. Underside vinaceous brown, costa and fringe in both fore- and hindwings edged with chocolate.

♀. Similar, colder in tone of colour, warm sepia instead of chocolate, olive brown instead of vinaceous brown.

Expanse: ♂, 50–52 mm.; ♀, 72–76 mm.

Forewing length: ♂, 21–23 mm.; ♀, 32–34 mm.

Holotype ♂. Belgian Congo, Elisabethville, xii. 1926 (Ch. Seydel).

Allotype ♀. Belgian Congo, Elisabethville, iv. 1926 (Ch. Seydel).

Paratypes from the same source, 2 ♂♂, 1 ♀, xii. 1926.

The ♀♀ are hardly distinguishable from the Angolan ♀ described as *N. sminthocara* below, but they have a rougher facies, with somewhat narrower and lighter hindwings, as may be seen by comparing the figures. The *lamella antevaginalis* in *N. sminthocara* is broader than that of *N. pachyla*. *N. pachyla* is more robust and of a more rugged aspect than *N. coilotoma* Bethune-Baker. The larva (cf. Plate viii, fig. 6) was found at Elisabethville by Monsieur Ch. Seydel, to whom I am indebted for the opportunity of photographing it, and also for all the specimens listed above. The specimen of the larva bore a number (L 8248). The ♀♀ were reared from larvae to which M. Seydel assigned a different number (L 8225), and apparently I overlooked this larva when I had the opportunity of photographing the specimens. Plate viii, fig. 9 shows two larvae of *N. distinguenda* Aurivillius (*Trans. Ent. Soc. Lond.* 1905, p. 315, Plate xvi, fig. 13), figured here for comparison with the figures of the larvae of *N. pachyla* and *N. oinopa* (Plate viii, figs. 6 and 7 respectively).

28. **Nadiasa coilotoma** Bethune-Baker (Plate viii, fig. 8, holotype ♂).

Metanastria coilotoma Bethune-Baker, *Ann. Mag. Nat. Hist.* (8), vii, p. 564 (1911).

The type bears a label: Angola, N'Dalla Tando, 2,700 feet, 5.xi.1908 (Dr. W. J. Ansorge).

29. **Nadiasa graberii** Dewitz (Plate viii, fig. 3, holotype ♀).

Pachypasa graberii Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 72, pl. ii, fig. 3 (1881).

I have included, with a photograph of Dewitz's type, one of the only specimen we have in the British Museum collection providing a fair match for the type, a ♀ from the Oberthür collection labelled: Afriq. Occid., Kamerun, Johann-Albrechts Höhe Station (L. Conradt)—(cf. Plate viii, fig. 4).

30. **Nadiasa sminthocara** sp. n. (Plate viii, fig. 5, holotype ♀).

♀. Palpus and antenna Natal brown streaked with vinaceous buff. Head and thorax vinaceous buff degraded with Natal brown, tegula chestnut brown inwardly edged with vinaceous buff. Abdomen tergally vinaceous buff degraded with avellaneous. Pectus and legs Natal brown streaked with vinaceous buff. Venter vinaceous buff shaded with Natal brown. Forewing warm sepia, enriched basad to chestnut brown, with a degraded patch of vinaceous buff on the inner margin, edged, except along inner margin itself, with cartridge buff; a fuscous spot at end of cell; a deeply bowed fuscous antemedial fascia, almost semicircular; a straight, oblique, fuscous postmedial fascia from costa just before apex towards inner margin at two-thirds, but not crossing the marginal vinaceous buff patch. Hindwing vinaceous buff lightly suffused with warm sepia except along inner margin. Underside vinaceous buff slightly degraded with warm sepia.

Expanse: 68 mm. Forewing length: 32 mm.

Holotype ♀. Angola, Amboim district, Fazenda Congulu, 700–800 m., 7–12.iv.1934 (K. Jordan).

Evidently closely related to *N. distinguenda* Aurivillius (*Trans. Ent. Soc. Lond.* 1905, p. 315, Plate xvi, fig. 13), from which it differs chiefly in the richer colouring; the hindwing in *N. distinguenda* is always uniformly lighter. I have seen similar specimens, not necessarily belonging to this species, labelled "*graberii* Dewitz," but the colour tone of *N. graberii* is much colder, matching best the clove brown of Ridgway's *Color Standards and Nomenclature*, 1912.

31. **Pachypasa subfascia** Walker (Plate ix, fig. 1, ♀; fig. 2, ♂).

Pachypasa ? subfascia Walker, *List. Lep. Ins. B. M.*, vi, p. 1426 (1855).
Pachypasa subfascia Walker, Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 72, pl. ii, fig. 12 (1881)

Dewitz figures a ♀ from Chinchoxo, the only specimen in Dr. Falkenstein's collection. There are no specimens in the material under review, but a ♂ and a ♀ from the Cameroons are figured.

32. **Pachypasa imitans** Aurivillius (Plate ix, fig. 4, ♂).

Taragama imitans Aurivillius, *Ent. Tidskr.*, xiv, p. 213 (1893).
Pachypasa imitans Aurivillius, in Seitz, *Grossschmett. der Erde*, xiv, p. 242, pl. 33d, *imitans* (1927).

Angola, Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v.1934 (K. Jordan), 1 ♂.

33. **Pachypasa mesoleuca mesoleuca** Strand.

Pachypasa mesoleuca Strand, *Ent. Rundschau*, xxviii, p. 150 (1911).
Pachypasa mesoleuca Strand, *Lep. Niepeltiana*, i, p. 22, pl. iv, fig. 3 (1914).

Dr. Jordan found a larva at Fazenda Congulu, Amboim district, 700–800 m., in April (7–11), 1934, from which he reared a specimen which I feel sure must belong to this species. It is a ♀, resembling the figure in Seitz (*Grossschmett. der Erde*, xiv, pl. 32f, *mesoleuca*) in pattern, but the colour is tawny.

In the British Museum (Natural History) there are three ♀♀ from Nyasaland with the same tawny coloration. These I believe constitute an eastern geographical race, and I propose to call it *Pachypasa mesoleuca* **pyrsocoma** subsp. n. (Plate ix, fig. 5).

Holotype ♀. Nyasaland, Mt. Mlanje, 8.v.1913 (S. A. Neave).
Paratype ♀. Nyasaland, Mt. Mlanje, 23.iv.1913 (S. A. Neave).
Paratype ♀. Nyasaland, Zomba, Lingangala River, xii. 1920 (H. Barlow).

34. **Pachypasa honrathii** Dewitz (Plate ix, fig. 7, ♀).

Pachypasa honrathii Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 73, pl. ii, fig. 11 (1881).

Angola, Pungo Andongo (A. v. Homeyer), 1 ♀.

35. **Pachypasa pyrsocorsa** sp. n. (Plate ix, fig. 6, holotype ♀).

♀. Palpus chestnut, sparsely streaked with ochraceous orange. Antenna honey yellow, the shaft clothed with chestnut scales irrorate with ochraceous orange. Head with frons chestnut streaked with ochraceous orange, vertex light greyish vinaceous. Abdomen tergally light orange yellow, the segments tinged distally with ochraceous tawny. Pectus and venter buff pink suffused with chestnut. Legs chestnut irrorate with ochraceous orange. Forewing vinaceous tawny to cinnamon rufous, buff pink before the antemedial fascia and

after the postmedial fascia, these fasciae being fuscous; pattern as in figure. Hindwing buff pink, proximally tinged with light orange yellow, distally suffused with vinaceous tawny. Underside of forewing and hindwing proximally light orange yellow, distally vinaceous tawny.

Expanse: 90 mm. Forewing length: 42 mm.

Holotype ♀. Angola, Pungo Andongo (A. v. Homeyer).

36. **Pachypasa papyroides** sp. n. (Plate xi, fig. 14, holotype ♀).

♀. Palpus ochraceous orange mixed with chestnut. Antenna honey yellow, the shaft warm buff shaded distally with chestnut. Head with frons ochraceous orange, vertex light buff. Thorax light buff with a hoary appearance, with a narrow chestnut medial longitudinal stripe. Abdomen tergally ochraceous orange to orange. Pectus, legs and venter chestnut streaked with ochraceous orange, the tarsal segments edged distally with orange. Forewing vinaceous tawny, proximal third of costa cartridge buff to warm buff; antemedial fascia cartridge buff, edged proximally and distally with diffuse fuscous, slightly wavy, from middle of costa oblique to inner margin at one-third; postmedial fascia similar, parallel with termen to vein Cu2, then to inner margin at two-thirds; a broad strip of cartridge buff suffusion beyond the postmedial extending from vein Cu2 to inner margin; subterminal fascia only slightly indicated by fuscous shading; fringe tawny olive with some light buff edging near the tornus. Hindwing vinaceous tawny, paler in proximal third; a very faint indication of a bowed postmedial fascia; termen edged with tawny olive; fringe warm buff. Underside of both wings vinaceous tawny, with indications of the two fuscous edges of the postmedial fascia on the forewing.

Expanse: 94 mm. Forewing length: 44 mm.

Holotype ♀. Angola, Amboim district, Fazenda Congulu, 700–800 m., 17–22.iv.1934 (K. Jordan).

This moth resembles very closely *Pachypasa papyri* Tams (*Ann. Mag. Nat. Hist.* (10), viii, p. 36, Plate i, fig. 2, 1931), of which I was able to describe both sexes from a bred series, and from which it differs chiefly in colour. It may be the Angolan representative of that species, but this cannot be definitely established without more material, particularly males.

37. **Pachypasa dallana** Bethune-Baker (Plate ix, fig. 3, holotype ♀).

Pachypasa dallana Bethune-Baker, *Ann. Mag. Nat. Hist.* (9), xx. p. 331 (1927).

N. Angola, N'Dalla Tando, 14.i.1909 (W. J. Ansorge).

If not actually identical with *Pachypasa rohdei* Aurivillius (*Ark. Zool.*, v (5), p. 18, 1909), *P. dallana* is certainly very closely related to that species.

38. **Pachypasa wellmanni** Weymer.

Pachypasa wellmanni Weymer, *Deutsch. ent. Zeit.*, 1908, p. 510, ♀; p. 733, ♂ (1908).

Pachypasa wellmanni Weymer, Aurivillius, in Seitz, *Grossschmett. der Erde*, xiv, p. 245, pl. 34a, ♂ (1927).

Benguela.

From the figure one would judge this species to belong to the genus *Craspia*. I have seen no specimens from Angola.

39. **Leipoxais peraffinis** Holland (Plate x, fig. 1, ♂).

Leipoxais peraffinis Holland, *Psyche*, vi, p. 520 (1893).

Ogové River. There is a paratype ♂ in the collection of the British Museum (Natural History).

Ogové River, Lambarené, i.1908 (W. J. Ansorge), 1 ♂.

N. Angola, N'Dalla Tando, 2,700 feet, 5, 23.xi.1908 (W. J. Ansorge), 2 ♂♂.

S.W. Congo, Kuila River, Udamba (J. S. Bousfield), 1 ♀.

40. **Leipoxais fuscofasciata** Aurivillius.

Leipoxais fuscofasciata Aurivillius, *Ark. Zool.*, v (5), p. 12 (1909).

♂. Mouth of Congo River, Banana.

I know only the figure in Seitz, *Grossschmett. der Erde*, xiv, p. 248, pl. 34b, *fuscofasciata*, but have included the reference as the moth may occur in Angola.

41. **Leipoxais haematidea** Snellen.

Gastropacha haematidea Snellen, *Tijdschr. v. Ent.*, xv, p. 44, pl. iii, figs. 13, 14 (1872).

This is another species occurring at the mouth of the Congo River.

42. **Leipoxais crenulata** Bethune-Baker (Plate x, fig. 2, holotype ♂).

Leipaxais [*sic*] *crenulata* Bethune-Baker, *Ann. Mag. Nat. Hist.* (8), vii, p. 565 (1911).

N. Angola, N'Dalla Tando, 2,700 feet, 3.xi.1908 (W. J. Ansorge).

43. **Leipoxais marginepunctata** Holland (Plate x, fig. 3, ♂).

Leipoxais marginepunctata Holland, *Psyche*, vi, p. 531 (1893).

Aurivillius gives the distribution of this species as Sierra Leone to the Congo. Some form of the species may occur in Angola, and for this reason I have included a figure of a specimen with the following data:

♂. Congo, Luteto, 16.xi.1903 (C. Christy).

44. **Eucraera köllikerii** Dewitz (Plate x, fig. 4, ♂).

Lasiocampa köllikerii Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 78, pl. ii, fig. 15 (1881).

Cabinda, Chinchoxo (Dr. Falkenstein), paratype ♂ in the British Museum (Natural History).

Angola, Amboim district, Fazenda Congulu, 700–800 m., 12–16.iv.1934 (K. Jordan), 2 ♂♂.

Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v.1934 (K. Jordan), 2 ♂♂.

45. **Eucraera gemmata asaphes** subsp. n.

♂. The pointed process arising from the proximal half of the valve in the genitalia longer than that in the typical subspecies from the Transvaal, *E. gemmata gemmata* Distant (*Ann. Mag. Nat. Hist.* (6), xx, p. 207, 1897, *Dendrolimus gemmata*).

Holotype ♂. N. Angola, N'Dalla Tando, 2,700 feet, 27.x.1908 (W. J. Ansorge).

Allotype ♀. Angola, S. Bihé district, Benguela Plateau, 5,000 feet, xi.1928 (T. A. Barns)—(cf. Pl. x, fig. 5).

Paratype ♀. Angola, Cubal River, ii.1899 (Penrice)—(Pl. x, fig. 7).

46. **Eucraera aphrasta** sp. n. (Plate x, fig. 6, holotype ♂).

♂. White, pattern in degraded Isabella colour. Abdomen tergally ochraceous orange, the segments proximally shaded with fuscous black. Fuscous black discocellular dots on forewing and hindwing above, on hindwing only beneath. White antemedial and postmedial fasciae narrow, serrate, the former with two sharp angles. Genitalia: Valve with the proximal pointed process moderately long.

Holotype ♂. Angola, Morro de Pundo, 60 km. N.E. of Lobito, 21.v.1934 (K. Jordan).

This species is not easily distinguished from *E. gemmata asaphes* described above, which, however, has the proximal half of the forewing chamois. The pointed process arising from base of valve is intermediate between the long process in the subspecies of *E. gemmata* and the very short process found in *kōllikerii*.

47. **Mimopacha jordani** sp. n. (Plate x, fig. 8, holotype ♂; fig. 9, allotype ♀).

♂. Chestnut brown. Antennal pectinations infuscate, the shaft chestnut brown, with light buff at base. Forewing shape and pattern as in figure, the fasciae indicated by fine light buff scaling; area between postmedial and subterminal fasciae vinaceous drab shaded proximally and distally with dusky brown; a prominent rounded discoecllular spot with three light buff dots, the chestnut brown ground colour surrounding it somewhat richer; fringe edged with light buff. Hindwing with a hyaline spot at end of cell, similarly surrounded by enriched chestnut brown, of which there is an almost velvety patch between the subterminal fascia and the termen from apex to vein Cu1. Underside similar, the forewing lacking the discoecllular spot and dots.

Expanse: 50–58 mm. Forewing length: 24–26 mm.

♀. Similar, larger, less rich in colour.

Expanse: 65 mm. Forewing length: 31 mm.

Holotype ♂. Angola, Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v. 1934 (K. Jordan).

Allotype ♀, and 3 paratype ♂♂. Angola, Amboim district, Fazenda Congulu, 700–800 m., 7–11.iv.1934 (K. Jordan).

48. **Mimopacha gerstaeckerii** Dewitz (Plate x, fig. 10, paratype ♂).

Gastropacha gerstaeckerii Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 74, pl. ii, fig. 6 (1881).

Not represented in Dr. Jordan's material. The figure shows a paratype ♂ from the original locality, Chinchoxo (Dr. Falkenstein).

49. **Mimopacha knoblauchii** Dewitz (Plate x, fig. 11, paratype ♂).

Gastropacha knoblauchii Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 75, pl. ii, fig. 2, ♂; fig. 4, ♀ (1881).

Not represented in Dr. Jordan's material. The figure shows a paratype ♂ from the original locality, Chinchoxo (Dr. Falkenstein).

50. **Mimopacha excavata** Hering (Plate x, fig. 12, paratype ♂).

Mimopacha excavata Hering, *Deutsch. ent. Zeitschr.* 1935, p. 176.

The paratype figured is a Belgian Congo specimen now in the British Museum (Natural History).

51. **Odontopacha spissa** Tams (Plate v, fig. 5, ♂; fig. 6, ♀).

Odontopacha spissa Tams, *Ann. Mag. Nat. Hist.* (10), iii, p. 154 (1929).

Angola, Amboim district, Fazenda Congulu, 700–800 m., 12–16.iv.1934 (K. Jordan), 5 ♂♂.

Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v.1934 (K. Jordan), 2 ♂♂, 2 ♀♀.

52. **Trichopisthia igneotincta** Aurivillius (Plate v, fig. 7, ♂; figs. 10, 11, ♂ genitalia).

Craspia igneotincta Aurivillius, *Ark. Zool.* (5), v, p. 21 (1909).

Angola, Amboim district, Fazenda Congulu, 700–800 m., 12–16.iv.1934 (K. Jordan), 1 ♂.

Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v.1934 (K. Jordan), 19 ♂♂.

Bihé, Gamba, i.1935 (R. Braun), 1 ♂.

A variable series, the specimen figured showing the maximum degree of orange rufous streaking, which some specimens entirely lack. The latter have the forewings vandyke brown. One specimen approaches in appearance that figured by Grünberg as *Lasiocampa poecilosticta* (*Denkschr. med.-nat. Ges. Jena*, xvi, p. 136, pl. iii, fig. 14 (1910)). Dr. Jordan obtained many more ♂♂ than those recorded above, but no ♀♀.

It remains to be discovered how far *T. poecilosticta* Grünberg, treated by Aurivillius (in Seitz, *Grossschmett. der Erde*, xiv, p. 223, pl. 30c, 1927) as a local race (Damaraland) of *T. igneotincta*, differs from the typical subspecies, but a specimen from Tanganyika exhibits differences in the genitalia as shown on Plate v, figs. 8 and 9. In this subspecies the valve has a distinctly broader, shorter neck and the vesica of the aedeagus has an armature of much more delicate spines. I propose to name this subspecies *Trichopisthia igneotincta* **eothina** subsp. n. Holotype ♂: Tanganyika Territory, Kilosa, at light, 5.iii.1926 (N. C. E. Miller).

GONOMETINAE.

53. **Gonometa bicolor** Dewitz (Plate xi, fig. 12, a copy of Dewitz's figure).

Gonometa bicolor Dewitz, *Verh. Leop.-Carol. Akad. Nat.*, xlii, p. 73, pl. ii, fig. 1 (1881).

Recorded only from Chinchoxo (Dr. Falkenstein). This species may be related to *Pachymeta lamborni* Aurivillius (*Ark. Zool.*, ix (11), p. 6 (1915), the only species known to me bearing any resemblance to the figure, which, however, represents a ♀ much smaller than the only ♀ of that species I have seen. I certainly do not know a true *Gonometa* like it.

54. **Anadiasa punctifascia** Walker (Plate xi, figs. 17, 18, ♂♂).

Eriogaster punctifascia Walker, *List. Lep. Ins. B. M.*, vi, p. 1472 (1855).

S.W. Africa, Sissekab, N.W. of Otavi, 1,300 m., 14.xi.1933 (K. Jordan), 4 ♂♂.

55. **Pseudometa jordani** sp. n. (Plate xi, fig. 16, holotype ♂).

♂. Antenna honey yellow, the shaft sepia. General coloration warm sepia, with light buff scaling on pectus and femora. Forewing with a light buff lunule at end of cell, and a series of subterminal fuscous-black dots. Hindwing with the

inner-marginal area extended to form a short, blunt tail. Fringes finely edged with light buff.

Expanse: 33 mm. Forewing length: 15 mm.

Holotype ♂. Angola, Quirimbo, 75 km. E. of P. Amboim, 300 m., 7–12.v.1934 (K. Jordan).

56. **Pseudometa plinthochroa** sp. n. (Plate xi, fig. 15, holotype ♂).

♂. Palpus, antennal shaft, head, thorax, pectus and venter madder brown finely irrorate with light buff. Antennal pectinations honey yellow. Abdomen tergally warm buff suffused with madder brown. Legs light buff strongly suffused with madder brown, the foretibia outwardly edged with strong fuscous shading, irrorate with light buff. Forewing madder brown, with a white-centred fuscous-black spot at end of cell, and a subterminal series of fuscous black dots. Hindwing light buff suffused with madder brown.

Expanse: 36 mm. Forewing length: 33 mm.

Holotype ♂. Angola, Mt. Moco, Luimbale, 1,800–1,900 m., 13.iii.1934 (K. Jordan).

57. **Pseudolyra caiala** sp. n. (Plate xi, fig. 9, holotype ♂).

♂. Warm buff shaded with fuscous, hindwings warm buff only, the fasciae fuscous; subterminal fascia interrupted at the veins.

Expanse: 40 mm. Forewing length: 18 mm.

Holotype ♂. Angola, Bihé, Caiala, 12.x.1904 (W. J. Ansorge).

58. **Pseudolyra miona** sp. n. (Plate xi, fig. 11, holotype ♀; fig. 10, paratype ♀).

♀. Palpus warm buff. Antenna warm buff irrorate with drab. Head warm buff mixed with fuscous, the scales white-tipped. Thorax light buff mixed with fuscous, the scales white-tipped. Abdomen tergally light buff streaked with drab. Pectus, legs and venter warm buff irrorate with drab. Forewing hoary, fuscous or russet vinaceous and white mixed, the white slightly predominating, warm buff along costa and veins; a fine, bowed (concavity basad) fuscous antemedial fascia; a trace of fuscous on the discocellulars; a fine fuscous postmedial fascia, bowed beyond and round end of cell; a fuscous subterminal fascia of fine, oblique dashes, roughly parallel with termen; fringe russet vinaceous mixed with white. Hindwing russet vinaceous (predominant) and white mixed, the appearance less hoary than that of forewing. Underside of both fore- and hindwings light buff tinged with vinaceous russet.

Expanse: 34 mm. Forewing length: 15·5 mm.

Holotype ♀ and paratype ♀. Angola, Mt. Moco, Luimbale, 1,800–1,900 m., 13.iii.1934 (K. Jordan).

59. **Pseudolyra lineadentata** Bethune-Baker (Plate xi, fig. 7, holotype ♂; fig. 8, ♀).

Pseudolyra lineadentata Bethune-Baker, *Ann. Mag. Nat. Hist.* (8), vii, p. 561 (1911).

Bethune-Baker's type is labelled:

N. Angola, N'Dalla Tando, 2,700 feet, 21.xii.1908 (W. J. Ansorge).

A specimen (♂) in the Zoological Museum, Tring, bears the data Angola, Fort Don Carlos, 21.ix.1903 (Dr. Ansorge).

The ♀ figured is in the Tring Museum, and is labelled: Pungo Andongo (A. v. Homeyer).

60. **Mallocampa zopheropa** Bethune-Baker (Plate xi, fig. 13, holotype ♂).

Metanastria zopheropa Bethune-Baker, *Ann. Mag. Nat. Hist.* (8), vii, p. 565 (1911).

The type is labelled: West Africa, Gunnal.

GASTROPACHINAE.

61. **Opisthodontia jordani** sp. n. (Plate xi, fig. 2, holotype ♂).

♂. Palpus brownish vinaceous to russet vinaceous, first segment ventrally light buff, remainder irrorate with light buff. Antenna honey yellow, the shaft vinaceous tawny irrorate with light buff. Head and thorax brownish vinaceous to russet vinaceous and vinaceous tawny. Abdomen tergally light to warm buff. Pectus warm buff, brownish vinaceous in front. Venter warm buff shaded with brownish vinaceous. Legs russet vinaceous to vinaceous tawny streaked with light to warm buff. Forewing brownish vinaceous to purplish vinaceous, russet vinaceous along costa and veins, the darker colours masked by a fine, dense streaking of light buff; antemedial fascia and postmedial fascia fuscous, fine; subterminal fascia indistinct, fuscous; a fine preterminal edging of sepia; fringe light buff. Hindwing similar, the light buff streaking more uniform and producing a greyish effect; the preterminal edging more pronounced. Underside colouring similar; forewing with postmedial fascia not crenate; hindwing with area surrounding accessory cell and veinlets dark vinaceous brown, long warm buff hair-scales from base along inner margin; postmedial fascia more or less evenly bowed (concavity basad).

Expanse: 40 mm. Forewing length: 19 mm.

Holotype ♂. Angola, Amboim district, Fazenda Congulu, 700–800 m., 12–16.iv.1934 (K. Jordan).

62. **Opisthodontia rothschildi** sp. n. (Plate xi, fig. holotype ♂).

♂. Palpus chocolate, with some fuscous shading, inner side light buff. Antenna honey yellow, the shaft chocolate. Head and thorax chocolate. Abdomen tergally vinaceous russet. Pectus and venter vinaceous russet strongly suffused with chocolate. Legs chocolate with some light buff irroration. Forewing chocolate sparsely irrorate with light buff, the medial and preterminal areas degraded with livid brown, fasciae indistinct, veins irrorate with light buff; fringe interneurally finely edged with white. Hindwing similarly coloured, with less livid brown. Underside forewing lighter (cameo brown) than that of hindwing, which is more like upperside, but has the bilineate fascia more distinct.

Expanse: 38 mm. Forewing length: 17·5 mm.

Holotype ♂ and paratype ♂. Angola, Bihé, Gamba, xii.1934 (R. Braun).

63. **Opisthodontia dentata** Aurivillius (Plate xi, fig. 1, ♂)

Opisthodontia dentata Aurivillius, *Ent. Tidskr.*, xx, p. 245 (1899).

The specimen figured is a ♂ with the following data: Ogové River, Lambarené, v.1907 (Dr. Ansorge).

PLATE III.

Fig. 1. *Chrysopsyche mirifica leptophyes* Tams, subsp. n. ♂.
„ 2. „ „ „ „ „ ♀.
„ 3. *Lechriolepis dewitzi* Aurivillius, ♂.
„ 4. „ „ „ ♀.
„ 5. *Chrysopsyche radei* Dewitz, holotype ♂.
„ 6. *Beralade quirimbo* Tams, sp. n. ♂, enlarged view.
„ 7. „ „ *exocyrta* Tams, subsp. n. ♂, enlarged.
„ 8. „ „ Tams, sp. n. ♂.
„ 9. „ „ *exocyrta* Tams, subsp. n. ♂.
„ 10. „ *parva* Aurivillius, ♂.
„ 11. „ „ „ ♀.
„ 12. „ *jordani* Tams, sp. n., holotype ♂.
„ 13. „ „ „ „ allotype ♀.

PLATE IV.

Fig. 1. *Laeliopsis gemmata* Wichgraf, holotype ♂.
„ 2. „ „ „ ♂.
„ 3. *Odontocheilopteryx triodonta* Tams, sp. n., holotype ♂.
„ 4. „ „ „ dorsal half of 9th segment.
„ 5. „ *myxa* Wallengren, dorsal half of 9th segment.
„ 6. „ *triodonta* Tams, lateral view of genitalia *in situ*.
„ 7. „ *myxa* Wallengren, aedeagus.
„ 8. „ *triodonta* Tams, ventral half of 9th segment.
„ 9. „ *myxa* Wallengren, ventral half of 9th segment.
„ 10. „ „ „ aedeagus.

PLATE V.

Fig. 1. *Philotherma tandoensis* Bethune-Baker, holotype ♂.
„ 2. „ „ „ „ „ ♂.
„ 3. „ „ „ „ „ ♀.
„ 4. „ *melambela* Tams, sp. n., holotype ♀.
„ 5. *Odontopacha spissa* Tams, ♂.
„ 6. „ „ „ ♀.
„ 7. *Trichopisthia igneotincta* Aurivillius, ♂.
„ 8. „ „ *eothina* Tams, subsp. n., valves of ♂ genitalia.
„ 9. „ „ „ „ aedeagus.
„ 10. „ „ valves of ♂ genitalia.
„ 11. „ „ aedeagus.

PLATE VI.

Fig. 1. *Catalebeda producta* Walker, ♂.
„ 2. „ *elegans meridionalis* Tams, subsp. n., holotype ♂.
„ 3. „ „ „ „ 8th ventrite.
„ 4. „ „ *elegans* Aurivillius, 8th ventrite.
„ 5. *Nadiasa jansei* Tams, sp. n., holotype ♂.
„ 6. „ *carinata* Wallengren, ♂.

Fig. 7. *Nadiasa concolor* Walker, ♂.
,, 8. ,, ,, ,, ♀.
,, 9. ,, *jordani* Tams, sp. n., holotype ♂.
,, 10. ,, *pancala* Tams, sp. n., holotype ♀.
,, 11. ,, *quirimbo* Tams, sp. n., holotype ♀.
,, 12. ,, *oinopa* Tams, sp. n., holotype ♂.
,, 13. ,, ,, ,, ,, allotype ♀.
,, 14. ,, ,, ,, armature of *ostium bursae*, showing the long process of the *lamella antevaginalis*.

PLATE VII.

Fig. 1. *Nadiasa directa* Mabille, holotype ♀.
,, 2. ,, ,, ,, ,, ♀, lateral view of armature of *ostium bursae*, showing process of *lamella antevaginalis*.
,, 3. *Nadiasa directa* Mabille, holotype ♀, the same, ventral view.
,, 4. ,, *amphilecta* Tams, sp. n., holotype ♀.
,, 5. ,, *pamphoxys* ,, ,, ,, ♀.
,, 6. ,, *amblycalymma* Tams, sp. n., ♀, armature of *ostium bursae*.
,, 7. ,, *amphilecta* Tams, sp. n., armature of *ostium bursae*.
,, 8. ,, *basale* Walker, ♂, 9th segment and genitalia.
,, 9. ,, ,, ,, ♀, armature of *ostium bursae*.
,, 10. ,, *cuneata* Distant, ♂, 9th segment and genitalia.
,, 11. ,, ,, ,, ♂, ventral half of 9th segment.
,, 12. ,, ,, ,, ♀, armature of *ostium bursae*.
,, 13. ,, *torynecteta* Tams, sp. n., holotype ♀.
,, 14. ,, ,, ,, armature of *ostium bursae*.
,, 15. ,, *pamphenges* Tams, sp. n., ♀, armature of *ostium bursae*.

PLATE VIII.

Fig. 1. *Nadiasa pachyla* Tams, sp. n., holotype ♂.
,, 2. ,, ,, ,, ,, allotype ♀.
,, 3. ,, *graberii* Dewitz, holotype ♀.
,, 4. ,, ,, ,, Cameroons.
,, 5. ,, *sminthocara* Tams, sp. n., holotype ♀.
,, 6. ,, *pachyla* Tams, larva.
,, 7. ,, *oinopa* Tams, larva.
,, 8. ,, *coilotoma* Bethune-Baker, holotype ♂.
,, 9. ,, *distinguenda* Aurivillius, larvae.

PLATE IX.

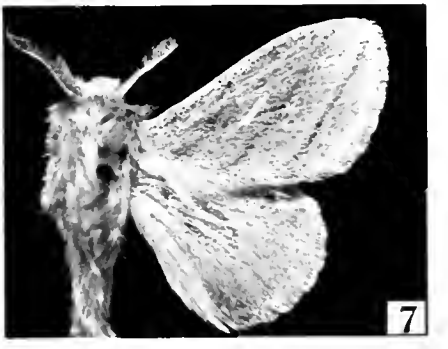
Fig. 1. *Pachypasa subfascia* Walker, ♀.
,, 2. ,, ,, ,, ♂.
,, 3. ,, *dallana* Bethune-Baker, holotype ♀.
,, 4. ,, *imitans* Aurivillius, ♂.
,, 5. ,, *mesoleuca pyrsocoma* Tams, subsp. n., holotype
,, 6. ,, *pyrsocorsa* Tams, sp. n., holotype ♀.
,, 7. ,, *honrathii* Dewitz, ♀.

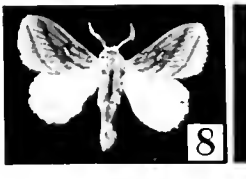
PLATE X.

Fig. 1. *Leipoxais peraffinis* Holland, ♂.
,, 2. ,, *crenulata* Bethune-Baker, holotype ♂.
,, 3. ,, *marginepunctata* Holland, ♂.
,, 4. *Eucraera köllikerii* Dewitz, ♂.
,, 5. ,, *gemmata asaphes* Tams, subsp. n., allotype ♀.
,, 6. ,, *aphrasta* Tams, sp. n., holotype ♂.
,, 7. ,, *gemmata asaphes* Tams, subsp. n., paratype ♀.
,, 8. *Mimopacha jordani* Tams, sp. n., holotype ♂.
,, 9. ,, ,, ,, ,, allotype ♀.
,, 10. ,, *gerstaeckerii* Dewitz, paratype ♂.
,, 11. ,, *knoblauchii* Dewitz, paratype ♂.
,, 12. ,, *excavata* Hering, paratype, ♂.

PLATE XI.

Fig. 1. *Opisthodontia dentata* Aurivillius, ♂.
,, 2. ,, *jordani* Tams, sp. n., holotype ♂.
,, 3. ,, *rothschildi* Tams, sp. n., holotype ♂.
,, 4. *Olyra sublineata* Walker, ♂.
,, 5. ,, ,, ,, ♀.
,, 6. ,, ,, ,, larva.
,, 7. *Pseudolyra lineadentata* Bethune-Baker, holotype ♂.
,, 8. ,, ,, ,, ♀.
,, 9. ,, *caiala* Tams, sp. n., holotype ♂.
,, 10. ,, *miona* Tams, paratype ♀.
,, 11. ,, ,, ,, holotype ♀.
,, 12. *Gonometa bicolor* Dewitz, copy of original figure.
,, 13. *Mallocampa zopheropa* Bethune-Baker, holotype ♂.
,, 14. *Pachypasa papyroides* Tams, sp. n., holotype ♀.
,, 15. *Pseudometa plinthochroa* Tams, sp. n., holotype ♂.
,, 16. ,, *jordani* Tams, sp. n., holotype ♂.
,, 17. *Anadiasa punctifascia* Walker, ♂.
,, 18. ,, ,, ,, ♂.





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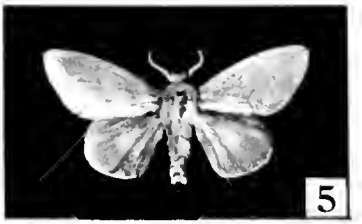

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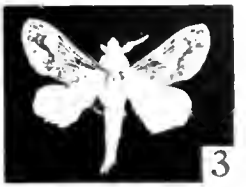

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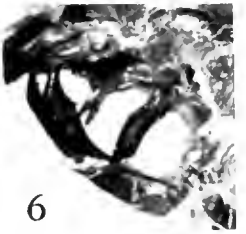

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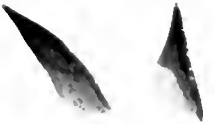

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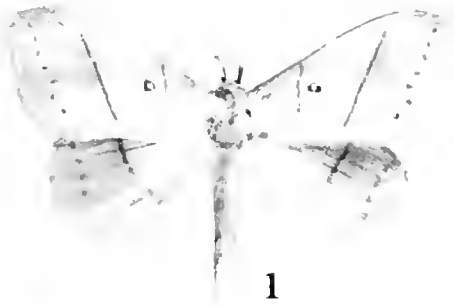

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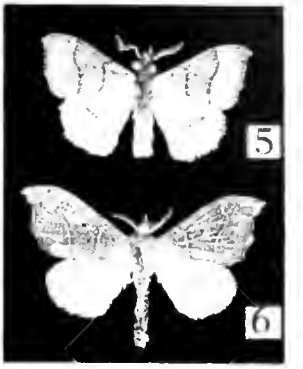

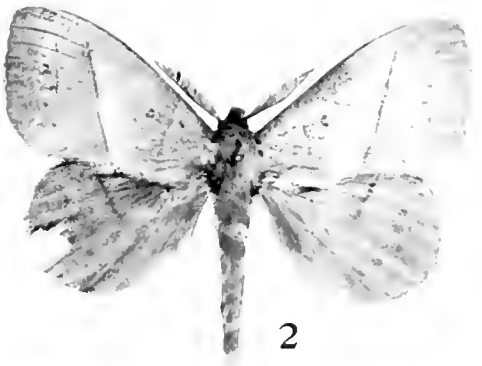

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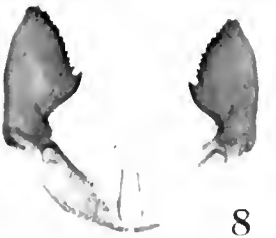

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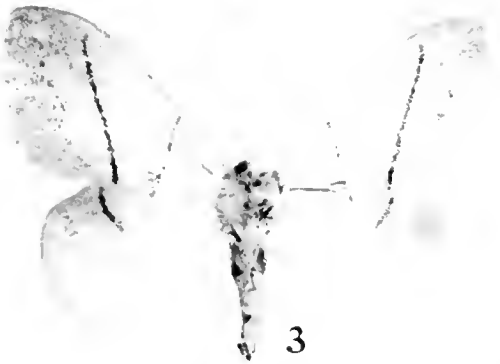

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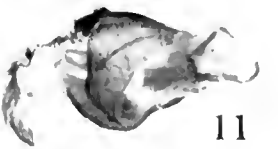

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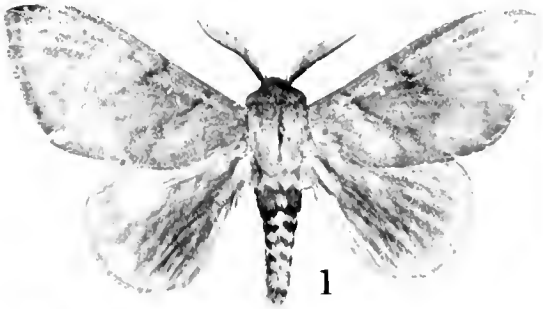
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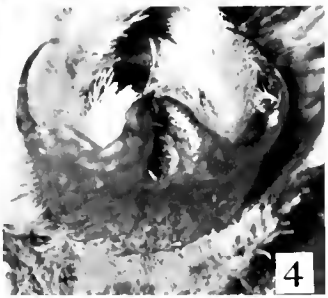
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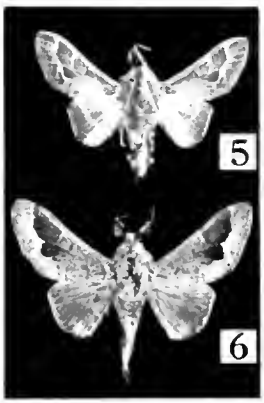
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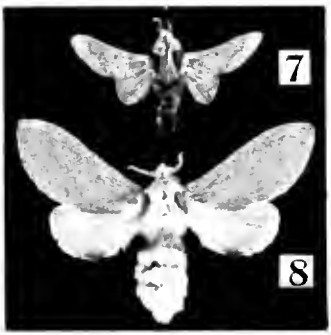
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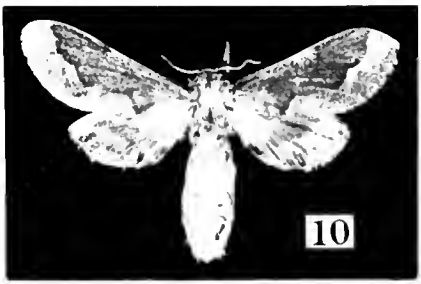
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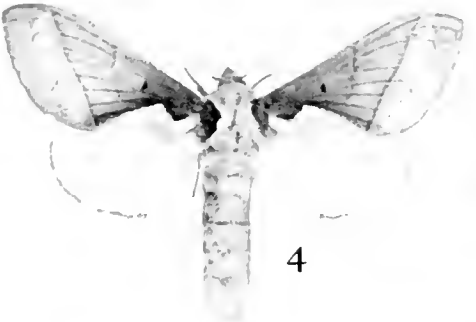

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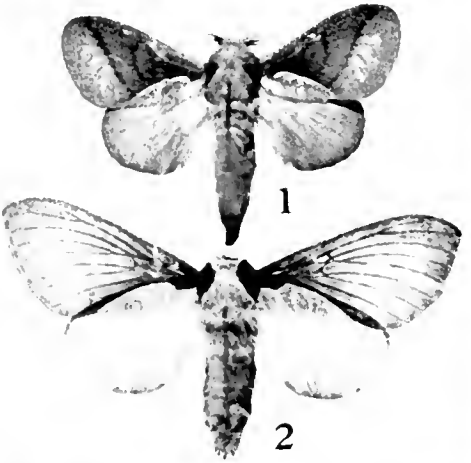
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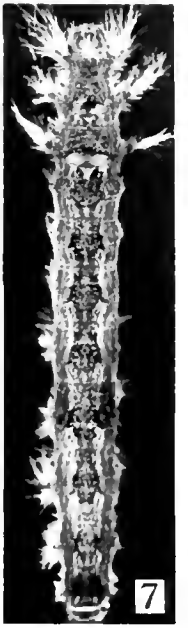
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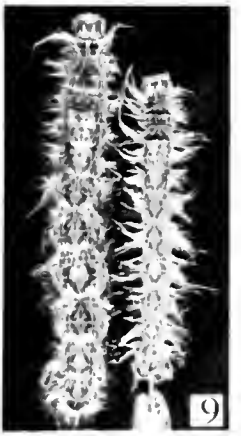
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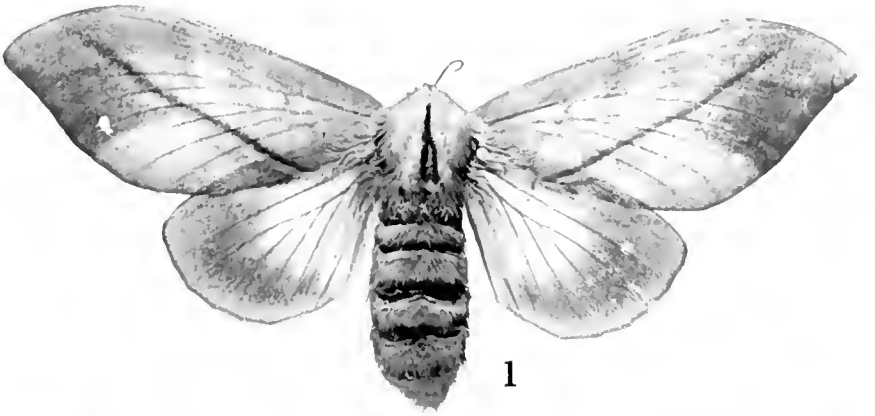

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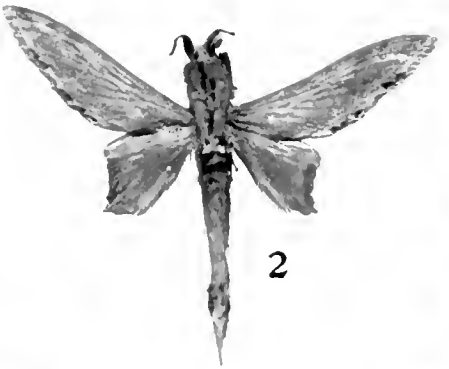

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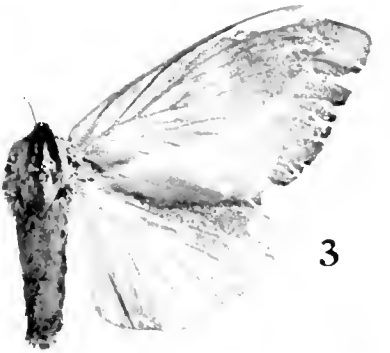

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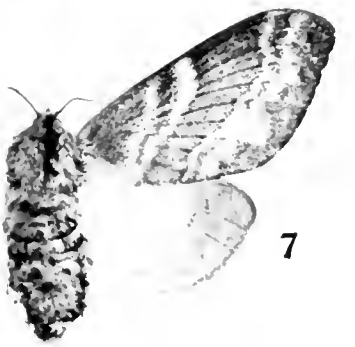

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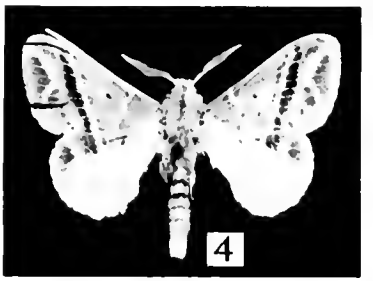
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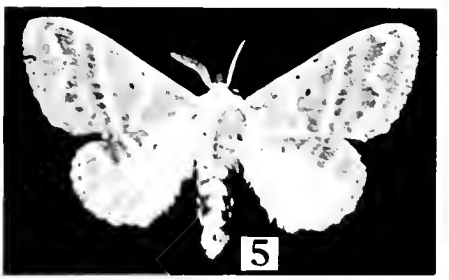
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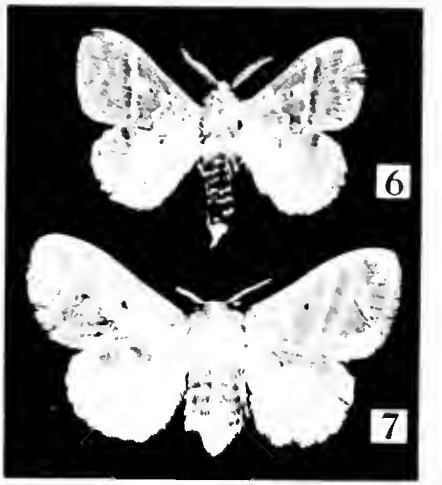
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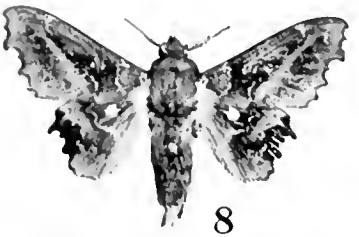
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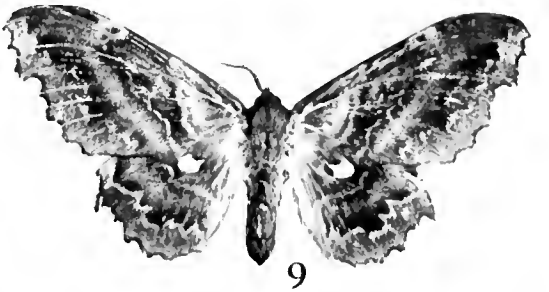
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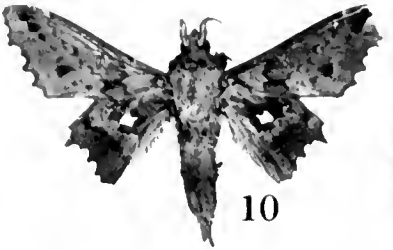
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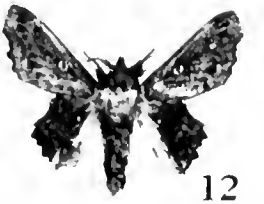
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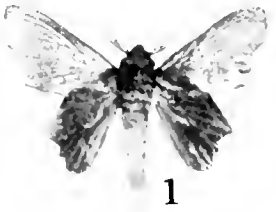
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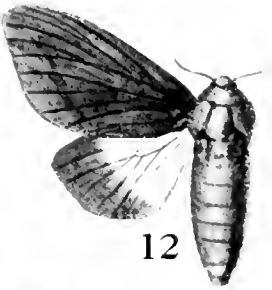
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DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA: HERPETOLOGICAL COLLECTIONS.

By H. W. PARKER, B.A.

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(With two text-figures.)

NO large area of the African continent now remains completely unexplored, and in many regions the herpetological fauna is remarkably well known. But during recent years there has been a tendency towards an intensive study of some of the more easily accessible regions, so that the growth of our knowledge has not been uniform. For this reason alone the present collections would have been of considerable value, but they have an additional and greater value owing to the fact that the areas selected for field-work were chosen to include as many different types of terrain as possible; full details of these localities, together with details of their topography, climate and flora, will be found in Dr. Jordan's introductory article. The author wishes to express his indebtedness to Dr. Jordan, not only for the privilege of studying the collections, but for much valuable assistance and information concerning habitats and habits; acknowledgments are also due, and made with gratitude, to Mr. A. Loveridge for much enlightening correspondence and to M. Gaston de Witte, who very generously placed the magnificent collection of the Congo Museum at the author's disposal.

Dr. Jordan's collections contain over 700 specimens, representing 95 species and subspecies, of which six are believed to be new to science. Their study has resulted in the discovery of numerous points of systematic interest which are embodied in the following notes, but some matters of more general interest concerning distribution and zoogeography may conveniently be discussed first. The bulk of the collections were made in strongly contrasting regions. In Angola most of the material (40 species) was collected in the heavily forested areas about Congulu and Quirimbo, whereas in S.W. Africa, though not geographically far distant, most of the species were taken in dry regions of granite, gneiss and sand. But, in addition, collections were made in open forest country both in Angola and in Damaraland, as well as in dry granitic and sandy areas in Angola analogous with those in S.W. Africa. Analysis of the lists of species taken in these different climatic and vegetational zones emphasizes the enormous effect which these environmental factors play in determining the composition of the fauna, and the facts may be summarized for each zone as follows:

A. Forest and Swamp in Angola (Congulu and Quirimbo).

Of the 40 species collected in these localities only 4 were collected in the dry zone of Damaraland; three of these are widespread, tolerant species: *Boaedon lineatus*, *Gerrhosaurus flavigularis* and *Bufo regularis*, and the fourth, *Agama planiceps* (q.v. infra), shows a distinct tendency towards subspecific differentiation under the different conditions. The facies of the remainder of the fauna is distinctly that of the equatorial Rain Forests, for 64 per cent. of the species are strictly confined to that area or to the outlying forest islands. Many of these forms are to be found widely distributed through the whole of this zone,

but a considerable proportion are essentially species of the Congo Basin and are not known to occur in the Cameroon-Gaboon area or the western forest province. The remaining species are either apparently indigenous in Angola (17 per cent.), widespread species such as *Causus rhombeatus*, which was not actually taken in Damaraland but undoubtedly occurs there, or species widely distributed in the Savannah countries bordering the Rain Forest and sometimes encroaching upon it (17 per cent.). Some of the indigenous species, such as *Rana albolabris acutirostris* and *Leptopelis jordani*, are obviously closely allied to, and are probably derived from, true Rain Forest species. It is thus apparent that, as might be expected, the forests of western Angola are essentially similar faunistically to the forests of the Congo basin, but that some slight degree of differentiation has taken place, giving rise to new, indigenous species ; and further, their position on the edge of the main forest-zone has exposed them to penetration by the more virile forms from the surrounding savannahs.

B. Open Forest in Angola (Mt. Moco to Catengue).

The collections made in the more open type of forest are, unfortunately, not sufficiently large to permit of any very extensive generalizations. But it seems probable that this vegetational zone has very little in common with the true Rain Forest. Of the 12 species collected, 55 per cent. are either widespread species (*Causus rhombeatus*, *Rana oxyrhynchus* and *Bufo regularis*) or are savannah species found in the countries bordering the forest. The only two which might be regarded as Rain Forest forms are *Chamaeleo dilepis* subsp. and *Ichnotropis bivittata* (?) (q.v.), and it may be significant that both of these differ from the normal. Their presence, however, does suggest that this open forest may be a derivative of the primeval Rain Forest, which has been subjected to penetration from the savannahs, and in which conditions have changed to such an extent that the components of its original fauna have either been exterminated or become modified to meet the changing environmental conditions.

C. Open Forest in Damaraland (Sissekab).

Only 9 species were collected in this zone, but these suffice to indicate that it has little in common with the Angolan forests. Two of the species occur also in the damp forests of Angola, but both are tolerant forms, *Bufo regularis* and *Gerrhosaurus flavigularis*, whilst the only one which also occurs in the open forests of Mt. Moco is probably racially distinct (*Chamaeleo dilepis*, q.v.). The remainder are either species indigenous in the Damaraland region, or forms which inhabit the zone bordering the equatorial rain forests on the south and east.

D. Dry, Granitic or Sandy Localities in Angola (Bocoio and Lobito) *or Limestone* (Morro de Pundo).

Three species only were collected, the cosmopolitan *Hemidactylus mabouia* and two species indigenous in the dry country of S.W. Africa and southern Angola, *Mabuia acutilabris* and *Rhoptropus boultoni*.

E. Dry Granite, Gneiss, Limestone or Sand in S.W. Africa (Lake Otjikoto, Waterberg Mts., Omongongua, Okahandja, Swakopmund, Windhoek, Hoffnung, Rehoboth, Naukluft Mts., Maltahöhe, Voigtsgrund and Satansplatz).

Of the 46 species collected in these localities, only 4 are found in the damp Angolan forests and these have been discussed above. The remainder consists of one or two tolerant species which range over almost the whole of the continent, irrespective of vegetational or climatic conditions, of a more numerous class of species which extend over a greater or less extent of the belt surrounding the Rain Forest and of species indigenous in the dry region from southern Angola to Little Namaqualand. These latter constitute the largest element of the fauna (46 per cent.), but it is quite impossible to distinguish clearly between them and those species which range across the southern border of the Rain Forest, and these, in turn, grade insensibly into others with a more extended range around the Rain Forest. Thus 21 species may be classed as strictly indigenous in the dry zone and are not known to extend eastwards beyond the Kalahari; but another group of 6 species extends eastwards into the Transvaal and S. Rhodesia; 7 others range still farther eastwards into Mozambique and Southern Tanganyika Territory; 8 have a similar range, but extend northwards into the Kenya, Sudan or Somaliland areas; and only one, *Kassina senegalensis*, ranges completely round the whole Rain Forest. This offers a decided contrast with the conditions obtaining in the Angolan forests, where, of the 7 invading species, 5 range completely round the forest belt and the other two have an extensive range on both the south and east of this area.

If, as seems probable, a process of desiccation is in progress in the south-west of Africa similar to that which is occurring in the north and north-east, the natural sequence of changes in the herpetological fauna consequent on the destruction of the primeval forest and its replacement by arid steppe and desert conditions may well be exemplified by the fauna of the different types of country considered above. First of all, with the approach of the dry zone to the original dense, wet, forest there is an infiltration of new species which are widely distributed round the margin of the dying forests (A). As the true Rain Forest is replaced by a more open type of savannah forest (B and C) the original species are, for the most part, exterminated and replaced by other species with a wide distribution in similar zones. As desiccation proceeds, greater and greater specialization becomes necessary to the fauna, and new forms make their appearance, which, since the area of maximum desiccation in the south-west is still relatively small, have a more and more restricted range. The intermediate stages of open forest have a fauna which, to judge from the present collections, is much more limited in the number of its component species. This may, of course, be a purely fictitious conclusion and be merely the expression of the length of time spent by the collector in each zone. But it may have a deeper significance, for Sanderson (1936, p. 178) has recently shown that, in the Cameroons, the artificial clearing of primeval forest produces a similar result, and that in the various intermediate stages before the land is allowed to revert to its natural, permanent, secondary condition, the number of species in the frog fauna is very much smaller than in either the original or final stages. A possible explanation of this phenomenon may lie in the fixity, or otherwise, of the different zones. Both the primeval forest and the final condition of steppe and desert after its desiccation may not be large and their actual sizes are changing; but their conditions are relatively permanent and they have fixed geographical centres. The intermediate zones, on the other hand, may be large in extent, though strip-like, but they are fluctuating and have no permanent positions. Consequently species which can survive in them must not only be adapted to the physical and biological environment, but must be possessed of

the requisite mobility to maintain their positions in this shifting medium. Too great a dependence on external factors and too close a linkage with the environment must tend to render a species immobile, for it can only persist when its exact requirements are fulfilled; the more complex these are, the less is the probability of exactly the same conditions arising again within migrational range when the original combination is destroyed. But in areas of fixed position and with relatively permanent physical conditions, nicety of adjustment to the environment is no handicap.

The following lists, in which the species are grouped roughly according to their geographical distribution, shows also their distribution in the different climatic and vegetational zones, as determined by the present expedition. It shows the changes mentioned above and also emphasizes the great differences in the composition of the forest and desert faunae. In the former snakes abound, whilst geckos and lacertid lizards are almost non-existent, whereas, in the dry zones, the number of snakes is greatly reduced, and the dominant elements in the lacertilian fauna are geckos and lacertids, with, also, an increase in the number of skinks of the genus *Mabuya*. In the Somaliland Peninsula, another recently desiccated area (Parker, 1932), the fauna is essentially similar in its general composition, with numerous geckos (the genus *Hemidactylus* taking the place of the S.W. African *Pachydactylus*), lacertids and skinks.

I. WIDESPREAD SPECIES VERY TOLERANT OF DIFFERENT CLIMATIC AND VEGETATIONAL CONDITIONS.

	A.	B.	C.	D.	E.
Boaedon lineatus	+				+
Causus rhombeatus	+	+			
Hemidactylus mabouia				+	
Gerrhosaurus flavigularis	+		+		+
Chamaeleo dilepis[1]		+	+		+
Rana (Ptychadaena) oxyrhynchus	+	+			
Bufo regularis	+	+	+		+

[1] A species with many local races. As noted below, the form in zone B is very different from that in zones C and E.

II. SPECIES CONFINED TO THE RAIN FOREST AND ITS OUTLIERS.

	A.	B.	C.	D.	E.
Typhlops punctatus intermedius	+				
Lycophidion ornatum sp. n.	+				
Oophilositum parkeri	+				
Hormonotus modestus	+				
Chlorophis heterodermus	+				
Boiga pulverulenta	+				
Boiga blandingi	+				
Thelotornis kirtlandii	+				
Naja goldii	+				
Naja melanoleuca	+				
Dendraspis jamesoni	+				
Bitis nasicornis	+				
Hemidactylus longicephalus	+				
Ichnotropis bivittata		+			
Mabuya maculilabris	+				
Lygosoma breviceps	+				
Lygosoma dewittei	+				
Ablepharus cabindae	+				
Feylinia currori	+				
Chamaeleo etiennei	+				
Arthroleptis parvulus	+				

III. SPECIES INDIGENOUS IN THE ANGOLAN FORESTED REGION.

	A.	B.	C.	D.	E.
Agama planiceps [1]	+			+	+
Eremias benguelensis		+			
Mabuya bocagii	+				
Rana albolabris acutirostris subsp. n.	+				
Rana (Ptychadaena) ansorgii	+	+			
Pyxicephalus tuberculosus	+	+			
Hyperolius bocagii	+				
Hyperolius cinnamomeoventris	+				
? *Hyperolius* sp.		+			
Leptopelis jordani sp. n.	+				

[1] Distribution uncertain; Angolan specimens differ appreciably from those from Damaraland (see p. 132).

IV. SPECIES DISTRIBUTED ROUND THE PERIPHERY OF THE WHOLE RAIN FOREST, BUT ENCROACHING UPON IT.

	A.	B.	C.	D.	E.
Chlorophis irregularis	+	+			
Dasypeltis scaber	+				
Crotaphopeltis hotamboeia	+				
Mabuya raddoni	+				
Phrynobatrachus natalensis	+				
Kassina senegalensis					+

V. SPECIES BORDERING THE RAIN FOREST ON THE EAST AND SOUTH (FROM THE SUDAN-SOMALILAND-KENYA REGION SOUTHWARDS).

	A.	B.	C.	D.	E.
Typhlops schlegeli mucroso					+
Turbophis semiannulatus					+
Dendraspis angusticeps			+		
Causus resimus	+				
Agama atricollis		+			
Mabuya striata					+
Mabuya varia		+			
Riopa sundevallii					+
Rana fuscigula angolensis	+	+			
Pyxicephalus delalandii					+
Pyxicephalus adspersus					+
Cacosternum boettgeri					+

VI. SPECIES BORDERING THE RAIN FOREST ON THE SOUTH, FROM TANGANYIKA TERRITORY OR MOZAMBIQUE WESTWARDS.

	A.	B.	C.	D.	E.
Leptotyphlops distanti					+
Aspidelaps scutatus					+
Pachydactylus bibroni turneri					+
Pachydactylus punctatus					+
Acontias meleagris					+
Amphisbaena quadrifrons					+
Xenopus laevis laevis					+

VII. SPECIES CONFINED TO COUNTRIES TO THE SOUTH OF THE FOREST, BUT NOT EXTENDING INTO TANGANYIKA TERRITORY OR MOZAMBIQUE.

	A.	B.	C.	D.	E.
Psammophis notostictus					+
Psammophis bocagei					+
Bitis caudalis			+		+
Ptenopus garrulus					+
Agama hispida aculeata					+
Eremias lineo-ocellata					+
Eremias lugubris					+
Rana fuscigula fuscigula					+

VIII. SPECIES CONFINED TO THE DRY AREAS IN ANGOLA, DAMARALAND, BECHUANALAND AND NAMAQUALAND.

	A.	B.	C.	D.	E.
Typhlops boylei					+
Rhoptropus barnardi			+		
Rhoptropus boultoni				+	
Pachydactylus bibroni pulitzerae				+	
Pachydactylus laevigatus					+
Pachydactylus weberi					+
Pachydactylus rugosus					+
Pachydactylus purcelli					+
Narudasia festiva					+
Chondrodactylus angulifer					+
Agama anchietae anchietae					+
Cordylosaurus trivittatus					+
Zonurus jordani sp. n.					+
Eremias namaquensis					+
Eremias undata					+
Scapteira reticulata					+
Nucras intertexta damarana subsp. n.			+		
Mabuya sulcata					+
Mabuya damarana					+
Mabuya acutilabris				+	+
Mabuya binotata			+		
Monopeltis capensis					+
Phrynomerus annectens				+	
Bufo jordani sp. n.					+

REPTILIA SERPENTES.

1. **Typhlops punctatus intermedius**, Jan. 1861.

3	Congulu	April
1	Quirimbo	May

These specimens are of the lineate form with the central zone of the belly immaculate; the pigmentation does, however, invade the sides of the belly more than in normal *intermedius*, so that in this respect they approach typical *punctatus*.

2. **Typhlops schlegeli mucroso** (Peters, 1854).

1	Omongongua	Jan.

Scales 318; ratio of diameter to length, 27.

3. **Typhlops boylei** Fitzsimons, 1932.

1	Hoffnung	Dec.

This example differs from the original description of the species as follows: The rostral extends backwards to the level of the eyes, the nasal suture proceeds

from the first upper labial, instead of from the suture between the first and second, the portion of the rostral visible from below is once and a half, instead of "slightly," broader than long, and there are 28 instead of 26 mid-body scale-rows.

But in a series of 5 specimens from Ghanzi, near the type locality of *boylei*, there is some variation in all these characters. The rostral may not extend quite to the level of the eyes; the length of the first upper labial is not absolutely constant, so that the nasal suture may or may not touch the labial suture, and there are from 26 to 28 scale-rows. The number of scale-rows and high diameter/length ratio suggest close affinity with *T. lalandii*, and it may be that some S.W. African records of this may be in reality based on *boylei*; the two are readily distinguishable by the much more prominent snout and cutting rostral edge of the latter.

4. **Leptotyphlops distanti** (Boul., 1892).

Stenostoma scutifrons (*non* Peters, 1854) Peters, 1865, *Mon. Ak.*, Berlin, p. 261, fig. 5; *idem*, 1882, Reise Mossambique, iii, p. 104 (part) pl. xv, fig. 4.

Glauconia scutifrons Boulenger, 1890, *Ann. Mag. N.H.* (6), vi, p. 92; *idem*, 1893, *Cat. Snakes Brit. Mus.*, i, p. 68.

Glauconia boettgeri Werner, 1899, *Zool. Anz.*, xxii, 581, p. 116.

Glauconia latifrons Sternfeld, 1908, *Sitzber. Ver. Nat. Fr.*, Berlin, p. 94.

Glauconia okahandjana Ahl, 1924, *Archiv Naturg.*, xc, 4, 5, p. 247.

1	Hoffnung	Nov.
3	,,	Dec.
2	,,	Feb.
1	Windhoek	Jan.
2	?	
1	Okahandja	Dec.

Fitzsimons and Loveridge (Loveridge, 1933, p. 225) have given reasons for considering *distanti* Boulenger to be a synonym of *scutifrons* Peters. But in doing so they have not given any further consideration to the problem of whether *scutifrons* Peters 1854, is conspecific with the *scutifrons* of Peters 1865, and of Boulenger 1893 (p. 68). The specimen described and figured by Peters in 1865 was that recorded by Boulenger, but this point seems to have been missed by Sternfeld and Werner, who have both discussed the matter. Sternfeld (1908, p. 94) considered that the true *scutifrons* of Peters (1854) was distinct from the *scutifrons* of Boulenger (which is also the *scutifrons* of Peters, 1865 *nec* 1854), the former lacking the anterior upper labial; he accordingly proposed a new name, *latifrons*, for the latter. Werner (1909, p. 210) is unconvinced that the two really are distinct, preferring to believe that a labial so small as that of *latifrons* might easily be lost (presumably as an individual anomaly), giving rise to the condition found in the type of *scutifrons*. Sternfeld (1910, p. 13) maintains his original views without further comments, and Werner (1910, p. 354), with more material before him, is still dubious, but speaks of a "*scutifrons* group" with 4 members, distinguished thus:

First Supralabial	*Supraoculars*	
Present	Present	*latifrons* Sternfeld.
Present	Absent	*boettgeri* Werner.
Absent	Present	*scutifrons* Peters.
Absent	Absent	*labialis* Sternfeld.

There can be little doubt that Loveridge and Fitzsimons are correct in considering *scutifrons, sensu* Peters 1865, and Boulenger 1893, i.e. *latifrons* Sternfeld, to be synonymous with *distanti* Boulenger. But the position of true *scutifrons* is by no means established, and it may, perhaps, be significant that all the examples of *scutifrons* and *labialis* which have been recorded are symmetrical; if their labial condition was merely anomalous, some asymmetry might have been expected. Accordingly, until some proof is forthcoming that the absence of the anterior labial is an individual abnormality, *L. scutifrons* must be considered as a species distinct from *L. latifrons*; the latter is conspecific with *distanti*, which is the older name and must be be used. *L. labialis* and *L. boettgeri*, both known from one or two specimens only, are probably based on individual aberrations of *scutifrons* and *distanti* respectively, whilst yet another name, *G. okahandjana* Ahl (1924), ought, probably, to be added to the synonymy of the latter. The topotype in the present collection agrees well with the original description except that the ratio of length to diameter is 69 instead of about 53; but Werner (1910, p. 354) records a variation in "*scutifrons*" of from 55 to 105.

5. **Boaedon lineatus** Dum. & Bibr., 1854.

♀	Okahandja	Dec.–Feb.
2 ♂♂, ♀, 2 juvs.	Congulu	April

6. **Lycophidion ornatum** sp. n.

Among the collections from Congulu are two specimens of a species of *Lycophidion* closely allied to *L. capense*. They differ constantly from a large series of the latter, including 5 others from Angola, in having a broad light band bordering the snout (as in *L. capense uzungwense*), in a frontal as broad as, or broader than long, and in having the posterior nasal separated from the first upper labial. Each one of these differences appears trivial in itself, but they are correlated, for exactly the same differences were found in four other examples from Uganda, and in 10 specimens from the Belgian Congo. This suggests that they represent a distinct species, almost intermediate between *L. capense* and *L. laterale*.

The holotype is a female in the British Museum, from Congulu, Angola; collected in April 1934 by Dr. Karl Jordan.

Diameter of the eye greater than its distance from the lip. Rostral more than twice as broad as deep; internasals about as large as the nasals; prefrontals longer than broad; frontal little broader than long, a little shorter than its distance from the rostral, $\frac{3}{4}$ the length of the parietals; loreal twice as long as deep; one preocular, as large as the supraocular and making a broad suture with the frontal; two postoculars, both in contact with the parietal; temporals 1 + 2; eight upper labials, the first separated from the posterior nasal, and the third, fourth and fifth entering the eye. Two pairs of small chin-shields, the posterior the smaller; five labials in contact with the anterior. Scales smooth, with single apical pits in 17–17–17 rows; ventrals 199; anal entire; subcaudals 42 + 1.

Grey-brown above, each scale faintly mottled with lighter; a broad, light band round the snout, extending backwards on to the temple, where it becomes indistinct; lower surfaces grey, the chin and the posterior edge of each scute lighter.

Length from snout to vent 299 mm. ; tail 45 mm.

The paratypes are :

B.M.
Congulu. ♀. Sc. 17–17–17. V. 199. C. 46 + 1.

Mus. Congo 5174
Nyonga, Katanga. ♂. Sc. 17–17–17. V. 196. C. 48 + 1.

Mus. Congo 4952
Nyonga, Katanga. juv. ♂. Sc. 17–17–17. V. 205. C. 43 + 1.

Mus. Congo 1925
Karemi, L. Tanganyika. ♀. Sc. 17–17–17. V. 194. C. 40 + 1.

Mus. Congo 4000
Usumbura, L. Tanganyika. ♀. Sc. 17–17–17. V. 200. C. 41 + 1.

Mus. Congo 3823
Kissenyi, Kivu. juv. ♂. Sc. 17–17–17. V. 187. C. 44 + 1.

Mus. Congo 3797
Lulenga, Kivu. juv. ♂. Sc. 17–17–17. V. 174. C. 46 + 1.

Mus. Congo 3793
Lulenga, Kivu. ♀. Sc. 17–17–17. V. 190. C. 39 + 1.

Mus. Congo 3781
Lulenga, Kivu. ♀. Sc. 17–17–17. V. 194. C. 39 + 1.

Mus. Congo 1144
Beni, Ituri. ♀. Sc. 17–17–17. V. 198. C. 41 + 1.

Mus. Congo 1688
Moera, Ituri. ♂. Sc. 17–17–17. V. 196. C. 53 + 1.

B.M. 1934.12.15.555–556
Muko, 7,000 ft., Kigezi, Uganda. ♀♀. Sc. 17–17–17. V. 202, 204. C. 38 + 1, 37 + 1.

B.M. 1934.12.15.557
Kayonsa Forest, 7,000 ft., Kigezi. ♀. Sc. 17–17–17. V. 200. C. 39 + 1.

B.M. 98.12.27.17
Mau Ravine, 7,500 ft., Uganda. ♂. Sc. 17–17–17. V. 198. C. 46 + 1.

Total variation in pholidosis : Sc. 17–17–17. V. ♂♂ 174–205. ♀♀ 190–204. C. ♂♂ 43–53 + 1. ♀♀ 37–42 + 1.

The series shows singularly little variation in colour or in the proportions of the head-shields. With respect to the latter and to the number of ventrals and subcaudals it is very similar to *L. laterale*, but may be at once distinguished by the single apical pits.

7. **Oophilositum parkeri** Angel, 1934.

2 ♂♂, 4 ♀♀ Congulu April

These six specimens are referred to this species with an element of doubt. The species was originally described as differing from *O. fasciatum* in having fewer teeth, longer parietals and only six upper labials, of which two entered the eye. Another difference was found in the size of the maxillary foramen, but this, quite correctly, was considered of doubtful importance. Examination of a much larger series of *O. fasciatum* than was available when the genus *Oophilositum* was described (Parker, 1933, p. 515) reveals that the maxillary foramen is of no importance whatever from a taxonomic standpoint, that the length of the

parietals of *O. fasciatum* varies sufficiently to include the condition of *O. parkeri* and that there is a greater variation in the number of teeth than was previously believed. The size of the maxillary foramen is, to some extent, correlated with age; no very young specimens have been found in which it is not very large, but, on the other hand, it has been found to exist in specimens considerably larger than others which lack it. Possibly if large series from different localities were available its absence might prove to be an age character, but the age at which it closes varies in different areas. The number of posterior maxillary and mandibular teeth is extremely variable, and it is rather remarkable that the number in one jaw appears to be quite unrelated to that in the other. The only remaining characters whereby the species *parkeri* might be recognized are the lower number of upper labials and the fact that only two, instead of three, enter the eye. The present series is quite uniform in this respect and agrees with another example from the Ituri, which is in the same general area as the type locality of *parkeri*. If these really are conspecific the variation in the development of the maxillary foramen and the number of teeth is quite comparable to that found in *O. fasciatum*. The variation in these characters in the two species is:

A. *O. fasciatum*.

Locality.	Sex.	Length.	Post. Max. Teeth.	Post. Mand. Teeth.	Max. Foramen.
W. Africa (Type)	♀	198 mm.	7	11	Large
Ituri	♂	162 ,,	7	5	,,
Sierra Leone	♂	202 ,,	7	11	,,
Efulen, Cameroons	♂	260 ,,	7	5	,,
Musolo, Fernando P.	♂	288 ,,	5	4	Moderate
Oil River	♂	264 ,,	8	11	,,
,, ,,	♂	265 ,,	8	7	Small
,, ,,	♂	335 ,,	8	10	Large
Ja River, Cameroons	♂	325 ,,	7	5	,,
Gaboon	♂	360 ,,	5	7	,,
Bityé, Cameroons	♂	363 ,,	8	8	Absent
,, ,,	♂	370 ,,	12	10	V. Small
,, ,,	♂	380 ,,	9	12	Moderate
,, ,,	♀	390 ,,	11	12	Absent
			5–12	4–12	

B. *O. parkeri*.

Locality.	Sex.	Length.	Post. Max. Teeth.	Post. Mand. Teeth.	Max. Foramen.
Kabulire (Type)	?	?	3	4	Large
Ituri	♀	317 mm.	11	11	,,
Congulu	♂	270 ,,	6	5	Small
,,	♂	290 ,,	6	5	Absent
,,	♂	305 ,,	6	5	,,
,,	♂	320 ,,	6	7	,,
,,	♂	332 ,,	8	5	,,
,,	♀	352 ,,	6	7	,,
			3–11	4–11	

Scales about the body are 17–17–15 or 17–17–17; Ventrals ♀♀ 171, 172, 173, 174, ♂♂ 176, 180; Subcaudals ♀♀ 40, 36, 39 and 37 + 1, ♂♂ 43, 43 + 1.

8. **Hormonotus modestus** (Dum. & Bibr., 1854).

♀ Congulu April

This example appears to be the first recorded from Angola, but is quite typical of this widespread Rain Forest species.

9. **Chlorophis heterodermus** Hallowell, 1857.

2 ♀♀, 5 juvs. Congulu April

10. **Chlorophis irregularis** (Leach, 1819).

♀ Mt. Moco March
2 juvs. Congulu April

Schmidt (1923, p. 76) has already drawn attention to the fact that this species of the Savannahs does occasionally invade the forest area in the Cameroons and the Ituri district ; its occurrence in the forested Congulu area and on Mt. Moco indicates a similar encroachment in the south.

11. **Dasypeltis scaber** (Linn. 1758).

3 juvs. Congulu April

12. **Tarbophis semiannulatus** (Smith, 1849).

juv. Okahandja Feb.

13. **Boiga pulverulenta** (Fischer, 1856).

♂ Congulu April

14. **Boiga blandingi** (Hallowell, 1844).

♂, ♀ Quirimbo May

15. **Crotaphopeltis hotamboeia** (Laurenti, 1768).

♂, juv. Quirimbo May

16. **Thelotornis kirtlandii** (Hallowell, 1844).

2 ♀♀ Quirimbo May

Both examples lack the head-markings so frequently found in southern and eastern specimens and thus conform to the typical forest race.

17. **Psammophis notostictus** Peters, 1867.

♂ Maltahöhe Dec.
♀ Hoffnung Jan.

The male is aberrant in having 9 upper labials, of which the fourth, fifth and sixth enter the orbit.

18. **Psammophis bocagii** Boul., 1895.

♀ Otjosongombe Nov.

This appears to be the most southerly record for the species, which ranges into Angola and eastwards through Beehuanaland to S. Rhodesia.

19. **Naja goldii** Boul., 1895.

2 ♀♀ Quirimbo May

The discovery of this Rain Forest species in Angola extends its known range considerably; it has not previously been recorded south of the lower Kasai River and Lower Congo. Both specimens are, however, quite typical with 15 scale-rows, 194–198 ventrals and 78–80 + 1 subcaudals; the larger measures 1,770 mm.

20. **Naja melanoleuca** Hallowell, 1857.

♀	Quirimbo	May
juv.	Congulu	April

21. **Dendraspis angusticeps** (Smith, 1849).

Head Sissekab Nov.

22. **Dendraspis jamesoni** (Traill, 1843).

♀	Quirimbo	May
juv.	Congulu	April

23. **Aspidelaps scutatus** (Smith, 1849).

♀, juv.	Okahandja	Feb.
♀	Omongongua	Jan.

Fitzsimons (1935, p. 326) has drawn attention to the uniformly dark heads of western (Kalahari and S.W. Africa) examples of this species, as contrasted with the white-blotched heads of eastern specimens. The two adults in the present collection agree with this generalization, but the juvenile has white blotches disposed exactly as in a cotype from Natal.

24. **Bitis caudalis** (Smith, 1849).

♂, ♀, juv.	Hoffnung	Jan.
♂	Büllsport	Dec.
juv.	Sissekab	Nov.

25. **Bitis nasicornis** (Shaw, 1802).

♂, 2 ♀♀ Quirimbo May

This constitutes yet another first Angolan record of a typical species of the Rain Forest. Previously it has not been reported south of the Lower Congo.

26. **Causus rhombeatus** (Licht., 1823).

2 ♀♀	Mt. Moco	March
juv.	Quirimbo	May

27. **Causus resimus** (Peters, 1862).

2 ♂♂, juv.	Quirimbo	May
juv.	Congulu	April

The distribution of this species is rather puzzling. It is certainly not a forest species, but is common in the eastern savannahs from the Anglo-Egyptian Sudan, Ethiopia and Somaliland southwards to Tanganyika Territory. But it does not appear to have been recorded between the latter and Angola. Boulenger's record of the species from Rhodesia (1907, p. 12), quoted by Pitman (1934, p. 300), is erroneous and based on examples of *C. defilippii*. In addition to this apparent discontinuity of range is the fact that in Angola the snake appears to be confined to the low-lying, swampy and forested littoral zone (Bocage, 1895, p. 146).

SAURIA.

28. **Rhoptropus barnardi** Hewitt, 1926.

♀	Sissekab	Nov.
3 ♂♂, 4 ♀♀	Lake Otjikoto	Nov.

This series agrees with other examples in the British Museum from the Messum River and from Mossamedes ; they have the acute snout so characteristic of *barnardi*, none have any transversely enlarged plates beneath the tail and the total number of lamellae beneath the fourth toe varies from 15 to 17.

29. ? **Rhoptropus boultoni** Schmidt, 1933.

♂	Bocoio, Benguela	March

This single specimen differs from the preceding series in having a broader, more rounded snout, a series of transverse plates beneath the tail on all except the first three segments, rather more subdigital lamellae (20) and smaller chin-shields. It agrees well with the description of *bradfieldi* Hewitt, except that the scales on the snout are faintly keeled in the canthal region, and in having the second pair of lower labials distinctly elongate. But, at the same time, it is obviously conspecific with 5 other specimens from Benguela, which are now in the British Museum, and these show more deviations from the description of *bradfieldi* in having chin-shields, 4 to 6 of the anterior caudal segments without transverse plates and fewer (17–20) lamellae beneath the fourth toe. If these northern specimens really are conspecific with *bradfieldi*, the species exhibits a range of variation which would include the described condition of *boultoni* Schmidt, and if these two are synonymous then the described species of the genus (excluding *bracconnieri* of uncertain status) may be distinguished thus :

I. Median gular scales larger than those on the belly ; anterior nasals separated by two or three granules ; digits very long and slender ; no preanal pores. *R. afer* Peters.
(C and S. Damaraland.)

II. Median gulars much smaller than the ventral scales ; anterior nasals separated by a single scale ; digits shorter and stouter ; preanal pores usually present.

A. Tail without transversely enlarged plates below; snout pointed; subdigital lamellae beneath the fourth toe 14–17.
R. barnardi Hewitt.
(N. Damaraland to Mossamedes.)

B. Tail with transversely enlarged plates below, at least posteriorly; snout rounded; subdigital lamellae beneath the fourth toe 17–23.
R. boultoni Schmidt.
(N. Damaraland and Benguela.)

30. **Hemidactylus longicephalus** Bocage, 1873.

7 ♂♂, 9 ♀♀	Congulu	April
♂, 2 ♀♀	Quirimbo	May

31. **Hemidactylus mabouia** (Mor. de Jonnés, 1818).

♂	Lobito	April

Pachydactylus bibroni (Smith, 1849).

The various species and races forming the *bibroni* complex are at present very little understood. Boulenger (1910), in his survey of the South African forms, recognized two species, *bibroni* and *laevigatus*; *stellatus* Werner was not considered and Gray's *turneri* had long been considered a synonym of *bibroni*. Werner, in the same year, recognized *bibroni*, *laevigatus*, *stellatus* and *boulengeri* (of Tanganyika Territory) as distinct species. Hewitt considered both *laevigatus* and *stellatus* to be merely subspecies of *bibroni*, giving the ranges of the three respectively as S.W. Africa, Great Nama(qua)land and the Cape Province. But Schmidt (1933), finding *laevigatus* in the same localities as specimens of *bibroni*, confessed his inability to understand the distribution of the two, and of *stellatus*, on the hypothesis of their all being subspecies, and so accorded them all full specific rank, but described the Angolan *bibroni* as a new subspecies, *pulitzerae*.

It is evident, from a survey of the material in the British Museum, that one probable cause of confusion is misidentification owing to the fact that the degree of stellation of the dorsal tubercles, usually regarded as diagnostic of *stellatus*, is largely an age-character, and also occurs in typical *bibroni* and, to some extent, in *laevigatus*. A tentative arrangement, which seems to overcome the distributional difficulties, is to regard *stellatus* and *pulitzerae* as races of *bibroni*, and *laevigatus* as a distinct species. Unfortunately the name "*stellatus*" has to give way to the much older *turneri*, since the subspecies with the stellate tubercle is found to range from Damaraland to Mozambique. The various forms are not readily separable, but the following key may be of assistance:

I. Dorsal tubercles on the middle of the back smooth, or very obtusely keeled; stellate tubercles confined to the region behind the ear. Nostrils directed almost vertically upwards. Gular scales flat, half the size of the ventrals. Damaraland. *P. laevigatus* Fischer.

II. Dorsal tubercles always strongly keeled and trihedral. Nostrils lateral. Gular scales almost granular.

A. Stellate tubercles confined to the back of the head and flanks; dorsal tubercles sometimes with additional radiating keels on their posterior facets. Distance from snout to anterior border of orbit no longer than the distance from the eye to the posterior border of the ear in the adult. Cape Province and Namaqualand.
P. bibroni bibroni (Smith).

B. Mid-dorsal zone with stellate tubercles, the radiating keels being present on the lateral as well as the posterior facets of many of them. Snout as in A.
Damaraland, Orange Free State, Transvaal, Rhodesia, Portuguese East Africa, Nyasaland and Tanganyika Territory.
P. bibroni turneri (Gray).

C. Tubercles as in A. Distance from the tip of the snout to the anterior border of the orbit much longer than the distance from eye to ear. Angola. *P. bibroni pulitzerae* Schmidt.

32. **Pachydactylus bibroni turneri** (Gray, 1864).

Homodactylus turneri Gray, 1864, *Proc. Zool. Soc. London*, p. 59, pl. ix, fig. 2.
Pachydactylus bibroni var. *stellatus* Werner, 1910, *Jena Denkschrift*, xvi, p. 309.

♀	Otjosongombe, 1,600 m.	Nov.
4 ♂♂, 2 ♀♀	Otavifontein	Nov.
2 juvs.	Lake Otjikoto	Nov.
6 ♂♂, 6 ♀♀, 4 juvs.	Maltahöhe, 1,460 m.	Dec.

This series has been compared with the cotypes of *turneri* and cannot be distinguished by any characters which might be of specific importance. Both have the stellate tubercles which characterize the rather ill-distinguished northern race of *P. bibroni*, but there is a considerable amount of individual variation in this respect. In juveniles the stellate tubercles are confined to the region behind the ear and the posterior part of the flanks, in which areas they are present in the typical form; but with increasing age they are developed more and more over the middle of the back. Specimens have been examined from Tanganyika Territory, Nyasaland, Portuguese East Africa, Rhodesia (North and South) and the Transvaal. Other examples from the Orange Free State and Bechuanaland cannot be referred with confidence either to *turneri* or the typical form.

33. **Pachydactylus bibroni pulitzerae** Schmidt, 1933.

3 ♂♂, 1 ♀, 4 juvs.	Morro de Pundo, Angola	May

These 8 specimens, together with 4 others from the province of Benguela, resemble typical *bibroni* (cotypes examined) in the degree of development of their dorsal tubercles, but differ from that form and from *turneri* in a longer, more pointed snout, a somewhat narrower interorbital space and more pronounced frontal concavity. These differences seem to indicate the existence of a distinct Angolan race for which the name *pulitzerae* is available.

34. **Pachydactylus laevigatus** Fischer, 1888.

♂	Windhoek	Jan.
♂, 2 juvs.	Hoffnung, near Windhoek	Feb.
2 ♂♂, 2 ♀♀, 2 juvs.	,, ,,	Dec.
♂	,, ,,	Jan.
♂, ♀	Büllsport, Naukluft Mts., 1,450 m.	Dec.
2 juvs.	Rehoboth, 1,450 m.	Dec.
3 ♂♂, 2 juvs.	Satansplatz, 1,300 m.	Dec.

35. ? **Pachydactylus weberi** Roux, 1907.

♂	Windhoek	Jan.
♂	Hoffnung	Dec.

Recently Hewitt (1932, p. 124, and 1935, p. 315) has east doubts on the validity of this species and on the accuracy of nearly all records of the species except the original one. He considers true *weberi* (from Klipfontein, Namaqualand) to be a subspecies of *P. capensis*; specimens from Garies and nearby localities in the south of Little Namaqualand are referred to another subspecies, *P. capensis griesensis*, whilst specimens from the Khan River, Karibib and Keetmanshoop (i.e. from Damaraland and Great Namaqualand) are determined as yet a third subspecies, *P. c. werneri*. The present specimens must almost certainly belong to the same race as those from Karibib and also those from Windhoek recorded as *weberi* by Sternfeld (1911, p. 387, and 1911a, p. 14), yet they do not agree in detail with the descriptions of any of the so-called races. This strongly suggests that some of the latter will prove to be untenable and geographical considerations suggest that *werneri* = *weberi*; since proof of intergradation with *capensis* is still lacking, it is preferred to use the name specifically.

36. **Pachydactylus rugosus** Smith, 1849.

♂	Naukluft Mts., 1,300 m.	Dec.

This specimen has the colour pattern and mental shield ascribed to *P. rugosus frater* Hewitt. But none of the other characters used to define that race are at all apparent. The gular scales are conical and the ventrals pyramidal, as in the type.

37. **Pachydactylus purcelli** Boul., 1910.

2 ♂♂, 2 ♀♀	Maltahöhe, 1,460 m.	Dec.

38. **Pachydactylus punctatus** Peters.

♂, ♀	Hoffnung, near Windhoek, 1,850 m.	Feb.

It seems very probable that none of the so-called subspecies of *punctatus* are recognizable. Fitzsimons (1935, p. 339) has already expressed the opinion that *brunnthaleri* Werner, described from S. Rhodesia and also reported from Angola (Schmidt, 1933, p. 5), is untenable. The present two examples only differ from others from Rhodesia and Angola in having the first labial entering, or very narrowly separated from, the nostril, in which character they approach *langi* Fitzsimons and *amoenoides* Hewitt.

Although the two were collected on the same farm they are very different in colour, suggesting that colour differences, such as are said to characterize *langi* and *bicolor* Hewitt, are of little consequence.

39. **Narudasia festiva** Meth. & Hewitt, 1913.

♀ Satansplatz, 1,300 m. Dec.

This example has been compared with a paratype of the species and found to agree well. The status of the genus, however, is open to question. The original describers compared it with *Homonota* and *Stenodactylus*, but in reality it appears to be almost indistinguishable from *Gymnodactylus*. It differs from the majority of the species of that genus in the absence of chin-shields, but that is by no means a constant character and is insufficient to warrant the retention of a separate genus. But *Gymnodactylus* is a cumbersome, and possibly not a monophyletic, assemblage which may ultimately be broken up; any revision of the genus should certainly consider the status of *Narudasia*.

40. **Ptenopus garrulus** (Smith, 1849).

♂ Mariental to Rehoboth Dec.

41. **Chondrodactylus angulifer** Peters, 1870.

♂ Büllsport, Naukluft Mts., 1,450 m. Dec.

42. **Agama anchietae anchietae** Bocage, 1896.

♂	Voigtsgrund	Dec.
2 ♂♂, ♀	Satansplatz	Dec.
2 ♂♂, 2 ♀♀	Maltahöhe	Dec.
3 ♂♂, 6 ♀♀	Windhoek	Jan.
2 ♀♀	Hoffnung, near Windhoek	Dec.

In this series, especially amongst those collected at Windhoek, there is every gradation between examples with a distinct dorsal crest and specimens without a trace of it; at the same time the number of enlarged scales on the dorsum varies enormously, and in a few instances they are almost completely absent. Leg-length also varies and there is thus every stage of intergradation between *A. anchietae anchietae*, typically found in Angola, and *A. anchietae methueni* of Namaqualand; Boulenger and Power (1921, p. 269) record the typical form from Maltahöhe (misspelt "Matahöle").

43. **Agama hispida aculeata** Merrem, 1820.

♀	Omongongua	Nov.
2 ♂♂, 5 ♀♀	Windhoek, 1,650 m.	Jan.
2 ♀♀, 1 juv.	Hoffnung, Windhoek, 1,850 m.	Oct.
♀	,, ,, 1,850 m.	Jan.
♂, ♀	,, ,, 1,850 m.	Dec.
♀	W. of Mariental	Dec.

44. **Agama planiceps** Peters, 1862.

7 ♂♂, 6 ♀♀	Windhoek	Jan.
4 juvs.	Morro de Pundo	May
8 ♂♂, 5 ♀♀, 13 juvs.	Congulu	April
♂, 5 ♀♀	Quirimbo	April

Comparison of the Windhoek series with those from Angola shows that the former has, on the average, larger scales. This is most noticeable on the upper arm and femur, but is most easily described in terms of the number round the body. The Damaraland specimens available to the author (15) have a minimum mid-body count of 63 and a maximum of 74, the average being 69·5. The types, from Neu Barmen, in Damaraland, had from 73 to 76. But in Angola the number is much higher. In 55 specimens collected between 13° S. and 8° 30′ S., the minima and maxima respectively are 71 and 99, with an average of 87·5. There is thus an overlap, and tabulation of the figures suggests that further material from southern Angola and northern Damaraland will show a continuous gradation, rendering it impossible to recognize any clearly defined races. The following localities are arranged in order from south to north.

Locality.	Specs.	Min.	Max.	Average.
Windhoek	13	63	74	69
"Damaraland"	2	68	72	70
Neu Barmen (Types)	?	73	76	74·5
Caconda	4	76	90	81·5
Bihé	1	82	82	82
Morro de Pundo	4	76	83	79
Congulu	26	71	94	87
Quirimbo	6	85	99	89·6
Pungo Andongo	11	79	94	88
Ambaca	2	93	96	94·5
Duque de Braganza	1	89	89	89

45. **Agama atricollis** Smith, 1849.

♀ Mt. Moco, 15–1,900 m. March

Sehmidt (1919, p. 477) has pointed out how this species, which is essentially a lizard of the savannahs of East and South Africa, enters the Rain Forest in the eastern Belgian Congo. Consequently its occurrence in the forest islands of Angola is to be expected. It should be pointed out that Sehmidt's scale counts (loc. cit.) have been accidentally diminished by a hundred. In the present example the scales from chin to anus number 157.

46. **Cordylosaurus trivittatus** (Peters, 1862).

5 ♂♂, 4 ♀♀, 3 juvs.	Hoffnung	Dec.–Feb.
2 ♀♀	Voigtsgrund, 1,300 m.	Dec.

Dr. Jordan reports that this lizard runs with lateral undulations, recalling a slow-worm or a snake, and emphasizes the very fragile nature of the tail.

The series makes it very doubtful whether the subspecies *australis* Hewitt, from Namaqualand, can be maintained. This race was based on two examples only, with but a single other example for comparison, a series which was quite inadequate for the purpose. The present longer series, from the area in which the species was originally discovered, are obviously all conspecific, but show

variations which cover almost every feature said to distinguish *australis* and the other examples mentioned by Hewitt (1932, p. 115) which he considered might be specifically distinct. Thus, the light dorso-lateral lines never occupy more than two scale-rows on the body, though the light colour usually extends on to the posterior upper temporal. The parieto-occipital shield is completely undivided in 4 adults, has more or less distinct traces of incomplete sutures in 7 and is completely divided into parietals, interparietal and frontoparietals in the 3 juveniles. Femoral pores vary from 7 to 9, of which the proximal 3–5 are well developed and the distals rudimentary in females, but all, except sometimes the end pore, are well developed in males. The tympanic shield is always broader than the posterior upper temporal. The only difference which is not covered by the present series is the keeling of the scales ; in the lumbar region the median keel is always the most prominent. The largest example, a female, measures only 143 mm. from snout to vent.

47. **Gerrhosaurus flavigularis nigrolineatus** Hollowell, 1857.

juv.	Windhoek	Jan.
2 ads.	Sisseksab	Nov.
5 juvs.	Congulu	April
6 ads.	Quirimbo	May

The three examples from the dry country of Damaraland approach the typical form of East Africa in several respects, notably in their longer, narrower frontals. Those from the forested parts of Angola appear to be typical of the West African subspecies.

48. **Zonurus jordani** sp. n.

Z. polyzonus (*non* Smith) Boettger, 1894, *Ber. Senck. Natf. Ges.*, p. 89 ; Werner, 1910, *Jena Denkschrift*, xvi, p. 325.

Holotype a ♀ from Hoffnung, near Windhoek, collected by Dr. K. Jordan in December 1933.[1]

Boettger, in recording a *Zonurus* from Rehoboth, under the name *polyzonus*, notes that it has only 7 femoral pores, and Werner records two others from Hereroland with pores varying from 5 to 7. The latter author calls particular attention to the fact that this low number is unusual, and that specimens of *polyzonus* from Namaqualand have from 12 to 17. Power, too, must have been suspicious of these records with a low number of pores, for in his revision of the genus (1930) he neglects them completely. The single specimen collected by the present expedition apparently belongs to the same form, for it "keys" into *polyzonus*, but has the lower number of femoral pores, and certain other differences, which seem to indicate that it is specifically distinct. The species does not appear to have received a name, and the type may be described thus :

Fronto-nasal separated from the rostral by the supra-nasals which form a long suture ; lower eyelid with a transparent disc composed of two much-enlarged scales ; head scales rugose and disposed as in *polyzonus*, but the scales of the temporal region distinctly larger. Dorsal scales feebly keeled ; laterals similar in size but strongly keeled and mucronate ; 36 transverse rows of scales between occiput and base of tail, a single row at the middle of the body containing 34. Ventrals smooth, in 22 longitudinal series, separated from the dorsals by 1 to 2 rows of granules lying in a distinct fold. Gular scales flat. Caudal scales very

[1] Paratypes a ♀ and a juv. from Otjosongombe, Feb. 1936 (W. Hoesch) ; pholidosis and counts as in holotype.

large and spinose, a single transverse series in each whorl. Scales on the limbs above strongly keeled and mucronate.

Pale brown above, with small, obscure, darker spots. Lower surfaces uniform, pale, straw-colour.

Length from snout to vent 111 mm.; tail incomplete; fore-limb 42 mm.; hind-limb 56 mm.

The species is closely allied to *polyzonus*, with a large series of which (including the types) it has been compared, but also has some features in common with *cordylus*. From the latter it is readily distinguished by the presence of a supranasal and by its smaller scales, and from *polyzonus* as follows:

jordani	*polyzonus*
(1) Femoral pores 5–7.	(1) Femoral pores 12–17.
(2) Temporals larger.	(2) Temporals smaller.
(3) Caudal whorls composed of a single row of scales.	(3) Caudal whorls at the middle of the tail composed of 2 rows of scales.
(4) Posterior upper femoral scales much enlarged and strongly spinose.	(4) Posterior upper femorals scarcely larger or more spinose than the anterior.
(5) Transverse dorsal scales in 32–37 series.	(5) Transverse dorsal scales in 38–46 series.

49. **Eremias namaquensis** Dum. & Bibr., 1839.

♂, 5 ♀♀	Hoffnung, 1,850 m.	Nov.–Feb.
2 ♂♂, ♀	Rehoboth, 1,450 m.	Dec.

The females collected at Hoffnung in November, December and January are pregnant, but the single specimen taken in February has the oviducts still enlarged but empty, and the gonad itself is shrunken.

50. **Eremias undata** (Smith, 1838).

♂	Lake Guinas	Nov.
♂, ♀	Sissekab	Nov.
3 ♂♂, 3 ♀♀	Otjosongombe	Nov.
3 ♂♂	Hoffnung	Dec.
2 ♂♂, ♀	Rehoboth	Dec.
♂, ♀	Kobui, S. of Rehoboth	Dec.
♂	Büllsport, Naukluft Mts.	Dec.
♀	Voigtsgrund	Dec.
♂	Satansplatz	Dec.

51. **Eremias benguelensis** Bocage, 1867.

juv.	Catengue, Angola	March

52. **Eremias lineo-ocellata** Dum. & Bibr., 1839.

♂	Hoffnung	Jan.
4 ♂♂, 4 ♀♀	Maltahöhe	Dec.
♀	Satansplatz	Dec.
♂	Voigtsgrund	Dec.

53. **Eremias lugubris** (Smith, 1838).

3 ♂♂, ♀ Hoffnung Jan.

54. **Scapteira reticulata** Bocage, 1867.

2 ♂♂, 2 juvs. Swakopmund (Sea Shore) Feb.

55. **Nucras intertexta damarana** subsp. n.

3 ♂♂, 5 ♀♀ Sissekab Nov.

There is still a great deal of confusion regarding the species and subspecies of *N. intertexta* and *N. tessellata*, but the above specimens appear to differ constantly from any of the races previously described, in their smaller size, the reduction of the occipital scale and the shortening of the interparietal, so that the parietals always form a suture behind it. In 35 out of 37 specimens of *intertexta* subspp. the interparietal separates the parietals completely and is truncate behind, where it forms a suture with the occipital or its rudiments. The Sissekab specimens probably represent a race with a very limited distribution, for Sissekab is one of the few localities in S.W. Africa where open forest country persists. This race may be described as follows, the description being drawn up from the 8 cotypes.

Head small, broader than deep (1·1–1·3), once and a half to once and two-thirds as long as broad; its length contained 4 to 4·9 times in the length from snout to vent. Limbs moderate, the hind-limb reaching the wrist or the elbow; foot as long as the head. Tail once and a half to twice as long as the head and body.

Head-shields as in *N. intertexta* except that the frontal may be slightly shorter than its distance from the tip of the snout; the parietals are only once and a half (vice $1\frac{2}{3}$) as long as broad; the occipital is rudimentary or, usually, quite absent; the interparietal is shorter, forming an acute angle posteriorly (instead of being truncate) and the parietals form a suture behind the interparietal. A parietal foramen and pterygoid teeth are present; 25 to 31 gular scales in a median series between chin-shields and collar; latter composed of 8 or 9 scales of which the median is usually much the largest. Dorsal scales smooth, in 35 to 41 rows at the middle of the body; ventrals in 8 longitudinal and 28–34 transverse series. Femoral pores 10–13. Subdigital lamellae beneath the fourth toe 20–24.

Dark brown above, with three narrow white stripes; flanks with two narrow white lines of which the upper, commencing at the middle of the ear, is complete. Limbs with circular white spots above; a white line along the back of the thighs and the inner borders of the tibiae. Uniform pinkish white beneath.

The largest specimens, two females, measure 54 mm. from snout to vent; another female of 52 mm. is gravid. The largest male is 52 mm. from snout to vent.

56. **Ichnotropis bivittata** Bocage, 1866.

1 juv. Mt. Moco, Angola, 1,500–1,900 m. March

This identification is questionable. The specimen has smaller scales than normal (45–56 at mid-body), but is too young to afford any reliable evidence as to whether racial differentiation has taken place outside the true Rain Forest.

7. **Mabuya bocagii** Boul., 1887.

4	Congulu	April

In all these four examples the scales about the body number 40 instead of 36–38 and the dorsals are, for the most part, feebly tricarinate. Five keels do appear, however, in some places, and in other characters there is nothing whereby they may be distinguished from typical *bocagii*, so that the differences must be regarded as within the range of variation of the species.

58. **Mabuya striata** (Peters, 1844).

2	Otjosongombe	Nov.
2	Windhoek	Jan.
1	Hoffnung	Jan.
1	Voigtsgrund	Dec.
1	Mariental to Rehoboth	Dec.
2	Büllsport	Dec.

Fitzsimons (1935, p. 371) has recently drawn attention to the high proportion of specimens of this lizard which, in Bechuanaland, have the subocular reaching the edge of the lip. The same condition occurs in 20 out of the 21 specimens from Angola and Damaraland which have been examined. In the Transvaal and Rhodesia the proportion falls, somewhat, to 77 per cent. (49 examined), and in Mozambique and Natal there is a sharp decline to 6 per cent. (17 examined). To the north, however, the decline is less rapid, specimens from Nyasaland, Tanganyika Territory and southern Kenya Colony showing about equal numbers of those with the subocular reaching and cut off from the lip. In Uganda, Ethiopia, Somaliland and the Sudan, however, the proportions are similar to those in Mozambique and Natal, only 7 per cent. (32 examined) having the subocular bordering the mouth.

59. **Mabuya sulcata** (Peters, 1867).

M. sulcata var. *sexstriata* Werner, 1910, *Jena Denkschrift*, xvi, p. 345, pl. viii, fig. 10.

3 ♂♂, 2 ♀♀	Windhoek	Jan.
4 ♂♂, 4 ♀♀	Hoffnung	Dec.
1 juv.	,,	Feb.
♂	Rehoboth	Dec.
2 ♂♂, ♀	Maltahöhe	Dec.
♂, ♀	Voigtsgrund	Dec.
4 ♂♂, 2 ♀♀	Satansplatz	Dec.

The scale-rows in this series vary from 36 to 42. The majority have 38, but one male from Rehoboth has 40 and a female from Windhoek 42. This extends the range of variation to a sufficient extent to include *Mabuya ansorgii* Boul. of Benguela ; but it is possible that the latter may be a tenable subspecies, for adults retain the six-lined colour pattern, which is the juvenile livery in Damaraland. Werner (1910), in discussing a series from Damaraland, refers to a var. *sexstriata* which he ascribes to Bocage. The latter author described the coloration of the six-lined variety, but applied no varietal name ; consequently, the name *sexstriata* must date from Werner 1910, but it does not appear to be a valid subspecies and must be placed in the synonomy. In the same paper the author mentions another

example which he says is "really *octstriata*"; the word is placed in inverted commas and is obviously being used descriptively and not nomenclatorially.

60 ? **Mabuya damarana** (Peters, 1869) (text-fig. 43).

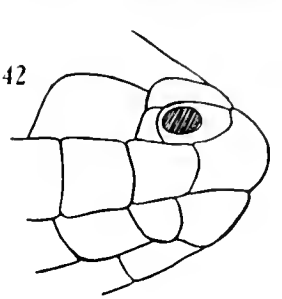
Euprepes damaranus Peters, 1869, *Oefvers. Vet.-Ak. Forhandl.*, p. 660.

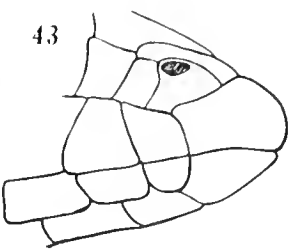
Mabuia hildebrandti (*non* Peters) Werner, 1910, *Jena Denk.*, xvi, p. 347; Boulenger, 1910, *Ann. S. Afr. Mus.*, v, p. 485; Sternfeld, 1911, *Mitt. Zool. Mus. Berlin*, v, 3, p. 408; *idem*, 1911, *Fauna Deutsch. Kolon.*, iv, 2, p. 40.

Mabuia varia var. longiloba, Methuen and Hewitt, 1914, *Ann. Transvaal Mus.*, iv, p. 142.

4	Hoffnung	Dec.–Jan.
3	Windhoek	Jan.
2	Maltahöhe	Dec.
2	Voigtsgrund	Dec.

Werner, in first recording the north-east African *M. hildebrandti* from Damaraland and S. Africa (1910, p. 347), suggested that his specimens might not be correctly identified, but might represent a distinct species. Methuen and Hewitt realized that specimens from this region, which were probably identical with the so-called *hildebrandti* of Werner, Boulenger and Sternfeld, were more closely allied to *varia* and proposed a new subspecific name for them. The material in the present collection confirms the opinion that this S.W. African skink is not related to *hildebrandti*, from which it may be distinguished by the





smaller scales on the soles of the feet and much shorter digits and claws. It certainly seems closely akin to *varia*, but, in addition to the length of the ear lobules, which was the only constant character discovered by Methuen and Hewitt to distinguish the two, there is also a constant difference in the position of the nostril which, in all the material examined, affords a clear-cut differentiation between the two, without any sign of intergradation. Consequently it is proposed to accord full specific status to the south-western form, for which, on geographical grounds, the name *damarana* appears to be available in preference to the much later *longiloba* of Methuen and Hewitt.

M. varia and *M. damarana* may be distinguished thus

A. Nostril lateral, separated from the first upper labial by a distance much less than its own diameter (text-fig. 42), its centre behind the rostro-labial suture. Subocular not, as a rule, very much narrowed inferiorly, its labial margin half, or more than half, the length of its upper border; ear lobules short and broad. *M. varia*.

B. Nostril directed vertically upwards, separated from the first upper labial

by a distance about as great as its own diameter (text-fig. 43), its centre vertically above the rostro-labial suture. Subocular usually more narrowed inferiorly, its labial margin not half the length of its upper border; ear lobules long and lanceolate.—*M. damarana*.

The character of the subocular is by no means definitive and the position of the centre of the nostril relative to the rostro-labial suture also shows some variation. *M. varia* has been examined from the Cape Province, Transvaal, Natal, Angola, N. Bechuanaland, S. Rhodesia, N. Rhodesia, Nyasaland, Mozambique, Tanganyika Territory, Kenya Colony, Uganda and Somaliland. *M. damarana* appears to be confined to the south-western districts, material having been seen from Damaraland, Namaqualand (Narudas Süd) and the Cape Province (Deelfontein and Port Elizabeth); Methuen and Hewitt record it from Great Namaqualand and various localities in the Karoo (Steytherville, Victoria West, Middleburg, Klerksdale, Cradock and Steinkop). To prevent future confusion it must be pointed out that Fitzsimon's (1935, p. 369) inclusion of Methuen and Hewitt's Great Namaqualand records under *M. varia varia* is erroneous; these examples were the cotypes of *longiloba*.

61. **Mabuya varia** (Peters, 1867) (text-fig. 42).

1	Mt. Moco	March

In specimens of this species from Angola and the Lower Congo, the supranasals tend to be separated. In 9 out of the 10 specimens examined the frontonasal just touches the rostral. This condition seems to be rare, though not unknown, in specimens from other areas, and its frequent occurrence in this western area may indicate the beginnings of subspecific differentiation.

62. **Mabuya acutilabris** (Peters, 1862).

1	Swakopmund	Feb.
1	Voigtsgrund	Dec.
4	Lobito, Angola	March

The example from Voigtsgrund has 34 scale-rows at the middle of the body and exhibits an anomalous fusion of the praefrontals and frontonasal.

63. **Mabuya binotata** (Bocage, 1867).

2	near Sissekab	Nov.

This appears to be the first record of this Angolan species from Damaraland, but as has already been pointed out (*Nucras intertexta damarana*, q.v.), Sissekab, with open forest country, is very different from most of the rest of Damaraland.

64. **Mabuya raddoni** (Gray, 1845).

11	Congulu	April

65. **Mabuya maculilabris** (Gray, 1845).

6	Congulu	April
2	Quirimbo	May

66. **Lygosoma dewittei** (Loveridge, 1934).

1 ad. Congulu April

This single specimen appears to agree with the species described by de Witte and subsequently renamed by Loveridge. One of the characteristic features which was believed to distinguish the species was a laterally compressed tail with a series of transversely enlarged subcaudals; unfortunately the tail of the Congulu specimen is incomplete, but compressed tails have been noted in many other skinks and enlarged subcaudals appear frequently on regenerated tails. The species was originally referred to *Siaphos*, but this is now included by Smith (1935, p. 279) in *Lygosoma*.

67. **Ablepharus cabindae** Boeage, 1866.

4 Congulu April

Smith (1935, p. 309) has recently drawn attention to the fact that the genus *Ablepharus* is not a natural one, but a polyphyletic assemblage, and has also pointed out that the lower eyelid is not always fused to the upper completely. The present species illustrates both of these facts. The lower eyelid is not fused with the upper except at the corners. In this character, in the presence of supranasals, and the occasional presence of four supraoculars, it differs from all the other African species grouped with it, and there seems to be every probability that it is closely allied to the West African species grouped under *Riopa* (i.e. *breviceps*, *togoense*, *kitsoni* and *dahomeyense*). These species have probably nothing whatever to do with true *Riopa* and, if they be grouped with *cabindae*, as seems logical, the name *Panaspis* Cope (Type species *P. aeneus* = *cabindae*) becomes available for them.

The species is variable in other characters. Thus, of four specimens here recorded, one has four supraoculars, whereas in the other three the first and second are fused, and one of the latter has the frontoparietals and interparietal fused to form a single large shield; scales about the middle of the body vary from 24 to 26.

68. **Lygosoma (Panaspis) breviceps** (Peters, 1873).

5 Congulu April

The discovery of this skink in Angola is a considerable extension of its known range. The specimens do not appear to differ from those found in the Cameroon-Gaboon area, though the number of scales about the body may be somewhat lower. They vary from 30 to 34, the known range of *breviceps* (including *batesi* Boul.) is from 32 to 38 (Müller, 1910, p. 588).

69. **Riopa sundevallii** (Smith, 1849).

2 Okahandja Dec.

70. **Acontias meleagris** (Linn., 1758).

5 Okahandja Dec.–Feb.

71. **Feylinia currori** Gray, 1845.

1 juv. Congulu April

72. **Amphisbaena quadrifrons** Peters, 1862.

6	Hoffnung	Dec.–Feb.
1	Okahandja	Feb.

Cott (1933, p. 160) records 7 examples of this species from Mozambique, and at the same time points out that they differ from typical examples from Damaraland in having fewer segments in an annulus, fewer annuli on the body, 6 instead of 4 preanal segments and certain differences in the head-shields. The comparative material available at that time was very small, but with the new material in the present collection, the records of Fitzsimons (1935, p. 353) and the material in the Congo Museum recorded by de Witte (1933, p. 72) it becomes apparent that the variation is continuous across the continent. The number of preanal segments and the variation in the head-shields appear to have no significance, and the numerical variations may be tabulated thus:

Locality.	Specs. Examined.	Segments in an Annulus.	Annuli on Body.
Damaraland	8	18–22 16–22	221–238
Kalahari (Fitzsimons)	15	18 16 (Av.)	231 (Av.)
Lower Congo	1	18 15	198
Katanga	15	14–16 13–15	200–216
Rhodesia (Fitzsimons)	8	16 14 (Av.)	217·6 (Av.)
Mozambique (Cott)	7	15–18 14–16	211–221

73. **Monopeltis capensis** Smith, 1849.

1	Rehoboth	Dec.
2	?	

These three specimens show some variation beyond that previously recorded for the species. There are constantly only two maxillary teeth; the number of segments in an annulus is variable, even in closely adjacent annuli, but the limits appear to be between 51 and 56. The annuli on the body are 203, 209 and 211, and the caudals constantly 11; preanal pores are only feebly indicated. Without a larger series for purposes of comparison the significance of the smaller segments and reduced number of maxillary teeth cannot be ascertained.

74. **Chamaeleo etiennei** Schmidt, 1919.

5 ♀♀, 1 juv.	Congulu	April

Schmidt (1919, p. 574) drew attention to the fact that the so-called *Ch. gracilis* of the Lower Congo had a differently shaped casque from typical W. African examples, and that, in addition, the male lacked a tarsal spur; he further suggested that the Angolan specimens generally referred to *gracilis* would prove to belong to the Lower Congo form, and this suggestion is well founded. But the material examined shows that this species has an even wider range, as may be seen from the following lists:

C. etiennei. 94 specimens examined from Angola (Congulu, Pungo Andongo, Duque de Bragança, Condo, Canhoca, Marimba) and the southern half of the

Belgian Congo (Lower Congo, Banana, Zambi, Leopoldville, Vista, Congo da Lemba, Moanda, Boma, Kisontu, Kwango, Luabo, Mwanza Kulu and Albertville) from the coast to Lake Tanganyika.

C. gracilis. 84 specimens examined from Gambia, Liberia, Sierra Leone, Gold Coast, Ashanti, Nigeria, Northern Belgian Congo (Uele, Ituri and Lake Albert areas), Anglo-Egyptian Sudan, Ethiopia, Uganda, Kenya and Italian Somaliland.

75. **Chamaeleo dilepis** Leach, 1819.

♂	Hoffnung	Feb.
♂	Windhoek	Jan.
juv.	Sissekab	Nov.
2 ♂♂, 5 ♀♀, 3 juvs.	Mt. Moco	March

This series contains representatives of two distinct forms of this very variable species. Those from the forested Mt. Moco are very much smaller (♂♂ 84–102, ♀♀ 94–104 mm. from snout to vent) with a flatter head, less concave interorbit, less marked parietal crest and slightly larger occipital lobes. But until a survey of all the local races can be undertaken the use of trinomials seems inadvisable.

AMPHIBIA SALIENTIA.

76. **Rana albolabris acutirostris** subsp. n.

♀	Congulu	Holotype.
4 ♂♂, ♀	Quirimbo	Paratypes.

These, the most southerly recorded examples of *Rana albolabris*, differ from a large series ranging from Liberia eastwards to Uganda and south to the mouth of the River Congo, in their much more acutely pointed and prominent snouts. This probably indicates the existence of a southern race, rather than a distinct species, but this is so clearly marked as to justify the use of a trinomial. A detailed description is not necessary, for in almost all respects, except the shape of the snout, these 6 specimens agree with typical *albolabris*. The snout is, however, acutely pointed and very strongly prominent, with a more obtuse canthus rostralis and more oblique loreal region. The distance between the nostril and the tip of the snout is contained not more than once and a quarter in the internarial distance, whereas in the typical form the same ratio is 1·5 to 1·7. The holotype, a mature female, measures 82 mm. from snout to vent, and has greatly distended ovaries and enlarged oviducts; it was captured in April. Another female caught in May is in the same condition, and males caught in the same months have nuptial pads. The largest of the latter sex measures 74 mm. from snout to vent.

77. **Rana fuscigula angolensis** Bocage, 1866.

6 ♂♂, 5 ♀♀, 1 juv.	Quirimbo	May
5 ♂♂, 5 ♀♀, 2 juvs.	Congulu	April
12 ♂♂, 3 ♀♀, 13 juvs.	Mt. Moco	March

78. **Rana fuscigula fuscigula** Dum. and Bibr., 1841.

6 ♂♂, 5 ♀♀	Büllsport, Naukluft Mts.	Dec.

79. **Rana (Ptychadaena) ansorgii** Boulenger, 1905.

2 ♂♂, ♀	Mt. Moco	March
♂	Congulu	April

It will probably be found that all records of "*ansorgii*" from Tanganyika Territory, Portuguese East Africa, Nyasaland, Rhodesia and Zululand really refer to a distinct species, which is similar in its digital webbing, but has a broader head and less prominent snout, characters in which it resembles *R. mascareniensis*. The name available for this eastern form appears to be *mossambica* Peters, 1854.

80. **Rana (Ptychadaena) oxyrhynchus** Smith, 1849.

♀, juv.	Congulu	April
1 juv.	Mt. Moco	March

81. **Pyxicephalus tuberculosus** (Boul., 1882).

13 ♂♂	Mt. Moco	March
♂	Quirimbo	May

82. **Pyxicephalus delalandii** Dum. and Bibr., 1841.

♀	Windhoek	Jan.
8 ♂♂, 12 ♀♀	Farm Hoffnung, near Windhoek	Oct.–Jan.
2 juvs.	Omongongua	Jan.
2 juvs.	Okahandja	Feb.
19 ♂♂, 2 ♀♀	Maltahöhe	Dec.

This species was found breeding in December and January. Dr. Jordan reports that the voice of the males is loud but melodious, sounding at a distance like "lutter, lutter, lutter——" (the u sound being long); it is accordingly known locally as the "Lutheran."

83. **Pyxicephalus adspersus** Tschudi, 1840.

1 juv.	Omongongua	January

84. **Phrynobatrachus natalensis** (Smith, 1849).

7 ♂♂, 7 ♀♀	Congulu	April

85. **Arthroleptis parvulus** Boul., 1905.

34 ♂♂, 4 ♀♀	Calaongo, below Congulu	April

This series shows two features which have not previously been recorded for the species. First of all, males have a large, flat, oval gland on the hinder side of the thighs as in *A. cornutus*, and *A. ogoensis* (Parker, 1935, p. 403). Hitherto *parvulus* has not been suspected of relationship with these species, but has been grouped with *A. dispar* and *A. feae* (Noble, 1924, p. 201); examination of the latter two species shows that these femoral glands are present in the males of *dispar*, but not, apparently, of *feae*.

Secondly there appears to be a considerable amount of variation in the degree of webbing of the toes. The majority of individuals have the toes about a quarter webbed, as in the cotypes, but two others in the present collection, and two

others in the British Museum from Mossamedes, have them nearly half webbed, as in *ogoensis*; they differ from this species, however, in their much smaller digital discs. It seems very improbable that these four specimens represent a distinct species, for they differ in no other characters and even in more normal specimens there is no absolute constancy in the webbing. The resemblance of this species to *dispar* is very marked, but the latter has larger digital discs as in *ogoensis*; nevertheless it seems very probable that the two may have been confused and that the Angolan records of "*dispar*" (Peters, 1888, p. 618) really refer to *parvulus*.

86. **Cacosternum boettgeri** (Boul., 1882).

14 ♂♂	Hoffnung, near Windhoek	Dec.
♂	,, ,, ,,	Feb.
6 ♂♂	Maltahöhe	Dec.
♂	Voigtsgrund	Dec.

This species was breeding at Hoffnung in December; the voice of the male resembles castanets.

87. **Phrynomerus annectens** (Werner, 1910).

Phrynomantis nasutus Methuen and Hewitt, 1914, *Ann. Transvaal Mus.*, iv, p. 122, pl. xiv, fig. 2.
Hoplophryne marmorata Ahl, 1934, *Zool. Anz.*, cvii, p. 334, fig. 1.

2 juvs. Morro de Pundo May

These two specimens both have a somewhat longer leg than has been described previously, and as all the previous records appear to have been from S. Africa and the Cape Province, this might suggest the existence of a distinct northern race in which the tarso-metatarsal articulation nearly reaches the eye (instead of the shoulder). But the difference is sexual, for out of a series of 8 specimens from Benguela the 4 males have the tarso-metatarsal articulation reaching the posterior corner of the eye, whilst in the four females it only reaches the axilla or shoulder.

88. **Kassina senegalensis** (Dum. & Bibr., 1841).

Kassina deserticola Ahl, 1930, *Zool. Anz.*, lxxxviii, p. 280; *idem*, 1931, *Das Tierreich*, *Anura*, iii, p. 449.

3 ♂♂	Hoffnung	Dec.
3 ♂♂	,,	Jan.

This series, which is almost topotypical of *K. deserticola*, shows a considerable variation in the degree of folding and wartiness of the anterior part of the belly; other specimens in the British Museum from other localities also show considerable variation, and since this is the principal feature said to distinguish *deserticola* from *senegalensis* it seems very doubtful whether the former can be retained, even subspecifically.

The species was breeding in December. Males do not call from the water, but from beneath stones or herbage not far from it. The call is a short guttural "ou-i" (not unlike the sound of vomiting) and is not given continuously, but at long and irregular intervals. Power has described the mating call as resembling the withdrawal of a cork from a bottle or the bursting of a large bubble (1925).

89. **Hyperolius bocagei** Steindachner, 1869.

♂, ♀ Congulu April

90. **Hyperolius cinnamomeoventris** Bocage, 1866.

1 ♀, 1 juv. Congulu April

These two specimens agree well in morphological characters with representative specimens of the species. In the female, however, the characteristic black lateral markings are only very faintly indicated, whilst in the juvenile they are completely absent.

91. **Hyperolius** sp.

♀ Mt. Moco March

This single specimen belongs to a very short-webbed, uniformly-coloured species which may well be undescribed.

92. **Leptopelis jordani** sp. n.

Holotype a female from Congulu, 700–800 m.; collected in April 1934 by Dr. Karl Jordan.

Vomerine teeth in two groups between the choanae. Head broad, very much broader than long, with a blunt snout once and a quarter as long as the eye; canthus rostralis obtusely angular, strongly curved; loreal region oblique, very slightly concave. Tympanum distinct, slightly more than half the diameter of the eye and separated from the latter by a distance greater than half its own diameter. Digits with well-developed discs and strong subarticular tubercles. Fingers with a rudiment of web; first shorter than the second, which is shorter than the fourth. Toes not quite half webbed. A very large compressed, inner metatarsal tubercle as long as its distance from the disc of the inner toe. Limbs short, the tibio-tarsal articulation reaching the shoulder and the metatarsal shovel the anterior corner of the eye; tibia not three times as long as wide, its length equal to the maximum width of the head and contained 2·5 times in the length from snout to vent. Skin smooth above; a few granules below the ear. Lower surfaces, including the thighs, strongly granular.

Purplish brown above; a black line from the tip of the snout, through the nostril and eye, along the upper margin of the tympanum to the flanks. An obscure, dark, interorbital triangle connected by its apex to a dark chevron on the middle of the back; posterior part of the back dark-stippled. A series of white streaks forms lines along the outer edge of the forearm, the outer edges of the tarsus and metatarsus and above the vent. Lower surfaces yellowish white, a few spots of this colour invading the flanks. Chin faintly brown-mottled.

Length from snout to vent 62 mm.; width of head 24 mm.; hind-limb 85 mm.

This species is undoubtedly the representative in the Congulu Forest-zone of the widespread *L. aubryi* of the Rain Forest proper. It differs from the latter in its shorter leg, broader head, larger size and the greater distance intervening between tympanum and eye. In a series of 27 examples of *L. aubryi* from French Guinea to the Ituri and south to Gaboon the tibio-tarsal articulation always reaches the eye and the metatarsal tubercle past the tip of the snout; the tibial length is always appreciably greater than the width of the head and contained only 2–2·25 times in the length from snout to vent; the greatest length is 54 mm. and the distance between eye and tympanum less than half the diameter of the latter, though subject to some variation.

93. **Bufo jordani** sp. n.

Holotype a ♂, from Satansplatz, *circa* 1,300 m.; collected Dec. 1934 by Dr. Karl Jordan.

Crown without bony ridges; snout bluntly rounded, once and a quarter as long as the eye; canthus rostralis rounded but distinct; loreal region nearly vertical; tympanum and eustachian tubes absent; interorbital space flat and broader than the upper eyelid. Fingers short, the first shorter than the second, which is shorter than the fourth; third finger, measured along its mesial side, as long as the snout; two large, flat, metacarpal tubercles. Toes nearly one-third webbed, with double subarticular tubercles; sole with conical tubercles; two metatarsal tubercles; no tarsal fold; tarso-metatarsal articulation reaching the eye and the length of the tibia contained 2·8 times in the length from snout to vent.

Paratoid glands absent. Dorsal surfaces closely beset with small conical warts each of which is tipped with a minute, blunt spine (♂). Lower surfaces wrinkled, but not granular.

Uniform purplish brown above; immaculate white beneath.

Length from snout to vent 28 mm.

Nuptial asperities are developed on the inner two fingers; vocal sacs absent.

This species is allied to *B. anotis* Boulenger and *B. katangaanus* Loveridge, both of which it resembles in its reduced auditory apparatus; it is distinguished from both by the absence of paratoid glands and by its ungranulated lower surfaces. These species, and also *B. taitanus* Peters, *B. rosii* Hewitt, *B. lönnbergi* Andersson, *B. mocquardi* Angel, *B. preussi* Matschie, *B. surdus* Boul., *B. fissipes* Boul., *B. variegatus* (Günther) and *B. ockendeni* Boul., have the tympanum not merely hidden but absent; there is no *cavum tympani*, *annulus tympanicus*, *columella auris* or Eustachian tubes as in the many genera previously recorded by the author (1934, p. 4). The same condition probably obtains in *B. micranotis* Loveridge, *B. ushoranus* Loveridge and *B. osgoodi* Loveridge.

94. **Bufo regularis** Reuss, 1834.

11 ♂♂, 2 ♀♀	Otjosongombe	Nov.
juv.	Sissekab	„
3 ♂♂, 6 juvs.	Cuito, Mt. Moco	March
♀	Congulu	April

95. **Xenopus laevis laevis** (Daud., 1803).

12 ♂♂, ♀♀	Otjosongombe	Nov.
2 ♀♀ and late larva	Hoffnung	28 31 Dec.
♀	Okahandja	Oct.
11 larvae and recently metamorphosed exs.	Voigtsgrund	14 Dec.

Most of these specimens are quite typical, with immaculate lower surfaces, though generally small. The single female from Okahandja, however, is very much larger (92 mm.), but has the mottled abdomen more commonly found in the Angolan *petersi* (Parker, 1936).

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DR. KARL JORDAN'S EXPEDITION TO SOUTH-WEST AFRICA AND ANGOLA: NEW LYMANTRIIDAE FROM ANGOLA.

By C. L. COLLENETTE, F.R.E.S.

(With Plate XII.)

THE insects from Mt. Moco (March), Congulu (April), Quirimbo (May) and Morro de Pundo (May) were obtained on Dr. Jordan's Expedition in 1934 and those from Gamba (December 1934) and Andulo (January 1935) by R. Braun, who had been Dr. Jordan's companion in Angola.

An account of the localities visited by Dr. Jordan is given in the Narrative of the Expedition; cf. pp. 46–62.

All types are in the Tring Museum.

1. **Olapa brachycerca** sp. nov. (Pl. XII, fig. 2).

♂. Palpus, head, body and legs ochraceous buff to light ochraceous buff; a streak of fuscous down the inner side of femur and tibia of foreleg. Antennal shaft whitish; pectinations tawny olive, shading to fuscous basally. Wings and fringes, above and beneath, whitish.

♀. Resembles the ♂, but the pectinations of the antenna entirely fuscous. The streak of fuscous on the inner side of foreleg less extensive. Anal tuft hair brown, the hair-scales smooth and compact. Abdomen varies in length, but averages the same length as inner margin of hindwing.

Expanse: ♂♂ 34–39 mm., ♀♀ 47–50 mm.

1 ♂ (holotype) and 3 ♂♂ (paratypes), Quirimbo, 7–12 May 1934; 2 ♂♂ (paratypes), Morro de Pundo, 21 May 1934; 1 ♀ (allotype) and 2 ♀♀ (paratypes), Fazenda Congulu, 7–11 April 1934.

2. **Olapa macrocerca** sp. nov. (Pl. XII, fig. 3).

♀. Resembling the last species (*O. brachycerca*), but with wings and fringes light buff. Antennal shaft light buff, pectinations tawny olive. Abdomen distinctly longer than inner margin of hindwing; anal tuft cinnamon buff, large and rather bushy. The expanse is also greater than in *O. brachycerca*, and the genitalia present differences.

Expanse: ♀♀ 45–56 mm.

1 ♀ (holotype) and 19 ♀♀ (paratypes), Quirimbo, May 1934; 1 ♀ (paratype), Fazenda Congulu, 17–22 April 1934.

3. **Leucoma hololeuca** Hampson, 1910.

28 ♀♀, Quirimbo, 7–20 May 1934; 6 ♀♀, Fazenda Congulu, 7–16 April 1934.

This species is superficially very similar to *L. albissima* B.-Baker, 1911, which was also taken plentifully at Quirimbo and Fazenda Congulu. In the ♀ it may be distinguished by the absence of the black spot on the discocellulars, a rather less shiny surface on the forewing, and the fact that the veins M^3 and Cu^1 in both wings rise well apart at their point of origin, whereas in *L. albissima* they arise close together or even from a point.

4. **Cropera celaenogyia** sp. nov. (Pl. XII, fig. 14).

♂. Palpus fuscous black, on the lower side at the base orange buff. Antennal shaft fuscous black, pectinations drab. Head and thorax warm buff, mixed on the patagium with fuscous black. Abdomen above and beneath, pectus and legs warm buff to light buff, the legs strongly marked on the inner side with fuscous black, the tarsi almost completely fuscous black. Wings semi-hyaline. Forewing pinkish buff, the veins and termen defined with fuscous ; fringe pinkish buff. Hindwing and fringe light buff. *Underside* of both wings and fringes as on upperside.

Expanse : ♂ 39 mm.

1 ♂ (holotype), Gamba, December 1934.

This species is closely allied to *Cropera stilpnaroma* Hering, 1926, and to *Olapa furva* Hampson, 1905. It will probably be necessary to transfer these three species to a new genus, but the material at my disposal is not at present sufficient for the investigation.

5. **Cadurca moco** sp. nov. (Pl. XII, fig. 30).

♂. Palpus fuscous, on the inner side pale pinkish buff. Antenna fuscous, the shaft streaked with pale pinkish buff. Head, body and legs fuscous mixed with pale pinkish buff, and with patches of warm buff on head, patagium, pectus and venter. Wings whitish, mixed to a slight extent with fuscous, giving a greyish effect ; all veins, and the termen in both wings, defined with fuscous ; fringes pinkish buff. *Underside* of both wings, and fringes, as on upperside.

♀. Palpus and frons warm buff, thorax and abdomen light buff, a patch of fuscous black on each side of the patagium behind the antenna. Pectus, venter and legs warm buff mixed with light buff, the legs heavily striped with fuscous black. Antenna fuscous black. Wings semi-hyaline, light buff ; all veins, and the termen in both wings, defined with Dresden brown ; fringes light buff. *Underside* of both wings, and fringes, as on upperside.

Expanse : ♂♂ 33–38 mm., ♀♀ 45–54 mm.

1 ♂ (holotype), 1 ♀ (allotype), 2 ♂♂ and 1 ♀ (paratypes), Mt. Moco, 13–18 March 1934 ; 1 ♀ (paratype), Gamba, December 1934.

The ♂ resembles *Cadurca venata* Swinhoe, 1906, and *Cadurca dianeura* Hering, 1928, in both of which the apex of the hindwing is rather pointed and projects well beyond the termen of the forewing. In the present species the apex is more rounded and the projection slight. The ground colour of the wings in the present species is paler than in those named above.

The ♀ is superficially rather similar to the ♀ of *Cropera phaeophlebia* Hampson, 1910, but has black antennae, as compared with light brown in the other species.

6. **Laeliophila seydeli** Hering, 1932 (Pl. XII, fig. 23).

♀. Wings longer and narrower than in the ♂. Forewing drab grey, the veins darker, and the lower margin of the cell edged with fuscous scales ; fringe tilleul buff. Hindwing and fringe tilleul buff. *Underside* of both wings, and fringes, tilleul buff ; costa of both wings edged narrowly with fuscous.

Expanse : ♀ 37 mm., ♂♂ 33–36 mm.

1 ♀ (neallotype) and 4 ♂♂, Mt. Moco, 15–18 March 1934.

7. **Crorema jordani** sp. nov. (Pl. XII, fig. 25).

♂. Palpus light buff mixed with fuscous. Antennal shaft warm buff, the pectinations somewhat darker. Head and thorax orange buff. Abdomen above and beneath, pectus and legs warm buff to light buff, the legs striped on the inner side with fuscous. Forewing pale orange yellow, mixed towards the base of the costa with orange buff; a series of eight rounded benzo-brown spots placed interneurally; the first, which is faint, above vein R^5; the second larger and slightly more basad, above vein M^1; the third, still larger and slightly more basad, above vein M^2; the fourth, slightly more proximad, above vein M^3; the fifth and sixth, large, above veins Cu^1 and Cu^2; the seventh, not in line with the fifth and sixth, below vein Cu^2; the eighth, rather indistinct, in a line between the seventh and the inner margin; fringe maize yellow. Hindwing cream colour; fringe maize yellow. *Underside* of both wings, and fringes, maize yellow, the spots on the forewing faintly visible

♀. Resembles the ♂; the spots on the forewing indistinct and apparently oval in form.

Expanse: ♂♂ 31–38 mm., ♀ 48 mm.

1 ♂ (holotype) and 6 ♂♂ (paratypes), Mt. Moco, March 1934. 1 ♀ (allotype) and 22 ♂♂ (paratypes), Gamba, December 1934.

Near to *Crorema evanescens* Hampson, 1910, but with larger and rounded spots on the forewing. In well-marked specimens there are two spots below vein Cu^2, whereas in *C. evanescens* there appears to be only one. The three spots below veins M^3, Cu^1 and Cu^2 are in line with each other in *C. evanescens*, but not in the present species, and the genitalia show considerable differences.

8. **Stracena promelaena** Holland, 1893.

3 ♂♂, Fazenda Congulu, 7–16 April 1934.

These insects are considerably larger (expanse 51–52 mm.) than males from the Cameroons and Gold Coast. All have a broad snuff-brown terminal band running from vein Cu^2 to the anal angle. I can, however, find no difference in the genitalia.

9. **Pirgula stictogonia** sp. nov. (Pl. XII, fig. 10).

♂. Palpus whitish, shaded with fuscous on the outer side. Antenna cartridge buff, tinged with cream buff at the base of the shaft. Head, body and legs cartridge buff to whitish, mixed lightly with cream buff on head and thorax; a streak of fuscous down the whole of the inner side of foreleg, and a few fuscous hair-scales on the inner side of tibia and tarsus of middle leg. Wings hyaline, whitish; the base of the costa in the forewing, for a distance of about three millimetres, edged narrowly with fuscous black; a fuscous-black apical spot in the angle between veins R^3 and R^4, and a second spot subterminally between veins R^5 and M^1; a further spot just above the anal vein, almost touching the meeting-place of vein and tornus; fringe whitish; on the hindwing a fuscous-black spot just above the 2nd anal vein, almost touching the meeting-place of vein and anal angle; fringe whitish. *Underside* of both wings, and fringes, whitish; the fuscous-black spots reproduced as on the upperside.

♀. Resembles the ♂, but with no fuscous on the palpus, the head and thorax more strongly tinged with cream buff, and with a further small fuscous-black subterminal spot on the forewing, below vein M^1.

Expanse: ♂ 41 mm., ♀ 44 mm.

1 ♂ (holotype) and 1 ♀ (allotype), Quirimbo, 7–12 May 1934.

May be easily distinguished by the position of the spots near the tornus of the forewing and the anal angle of the hindwing.

10. **Euproctis conionipha** sp. nov. (Pl. XII, fig. 22).

♂. Palpus pinkish buff, the tip lighter. Antennal shaft whitish, pectinations pinkish buff. Head, body and legs cartridge buff to whitish. Forewing cartridge buff irrorated with fuscous, the irroration absent in the basal, costal and terminal areas; the costal area and at the lower margin of the cell lightly tinged with warm buff; fringe cartridge buff. Hindwing, underside of both wings, and fringes, whitish.

♀. Resembles the ♂; anal tuft tawny olive.

Expanse: ♂♂ 28–30 mm., ♀ 36 mm.

1 ♂ (holotype), 1 ♀ (allotype), 2 ♂♂ (paratypes), Fazenda Congulu, April 1934.

May be placed near to *Euproctis palla* Holland, 1893.

11. **Aroa leonensis** Hampson, 1910.

17 ♂♂, Gamba, December 1934 and January 1935; 1 ♂, Mt. Moco, 20 March, 1934.

These insects have the whitish streak on the hindwing long and narrow; it varies in extent, but in nearly every case is more conspicuous than in Sierra Leone specimens. The ground colour of the forewing is richer, and approximates more nearly to that of *Aroa pampoecila* Collenette, 1930.

12. **Laelia basibrunnea** Holland, 1893 (?).

1 ♀, Mt. Moco, 17 March 1934.

I have seen no ♀♀ of this species from the type locality. The present insect has an almost straight postmedial fascia, without crenations, on the forewing, and a dark hindwing. I have placed it under this name with hesitation, but the question must await the arrival of further material.

13. **Dasychira andulo** sp. nov. (Pl. XII, fig. 21).

♂. Palpus snuff brown, lighter on the inner side. Antenna Saccardo's umber. Head, thorax and abdomen snuff brown to Saccardo's umber, dorsal tufts on the basal segments of the abdomen somewhat darker. Pectus, venter and legs pinkish buff, the foreleg heavily marked, the other legs lightly marked, with snuff brown. Forewing snuff brown; a sepia subbasal fascia; antemedial fascia obsolete; discocellulars indistinctly bordered with sepia; a sepia postmedial fascia, crenate, bowed (convexity terminad) from the costa to a point below the discocellulars, thence to the inner margin which it meets at right-angles; a broad sepia subterminal shade, which from vein Cu^1 to the inner margin is the most conspicuous marking on the wing; a sepia preterminal fascia, broken at the veins; fringe snuff brown mixed with sepia. Hindwing and fringe drab. *Underside* of both wings pale pinkish buff, faintly mixed and irrorated with snuff brown; traces on both wings of a darker mark on the discocellulars and a postmedial fascia; fringes of forewing snuff brown mixed with sepia, fringe of hindwing pinkish buff mixed with snuff brown.

Expanse: ♂♂ 33–35 mm.

1 ♂ (holotype), Andulo, December 1934; 2 ♂♂ (paratypes), Gamba, December 1934 and January 1935; 1 ♂, Mt. Moco, 17 March 1934.

May be placed near to *Dasychira basileus* Hering, 1932.

14. **Dasychira dasymalla** sp. nov. (Pl. XII, fig. 38).

♀. Palpus tawny olive mixed with fuscous. Antenna sayal brown, darker at the base of the pectinations. Head and thorax tawny olive mixed with cinnamon buff. Abdomen, pectus and venter pinkish buff mixed with tawny olive, dorsal tufts on the basal segments of the abdomen Saccardo's umber. Legs tawny olive, the foreleg heavily marked, the other legs lightly marked, with Saccardo's umber. Forewing pinkish buff, irrorated over the whole wing with Saccardo's umber, giving a drab effect; a streak of sayal brown at the base of the cell; a prominent Saccardo's umber antemedial fascia, running oblique inwardly from costa to inner margin, almost straight, but turning further oblique inwardly between anal vein and inner margin; medial area slightly darker than the remainder of the wing; discocellulars bordered, excepting towards the costa, with Saccardo's umber, the border touching the postmedial fascia at the lower angle of the cell; a rather prominent sayal-brown postmedial fascia, crenate from costa to lower angle of cell, oblique outwardly from anal vein to inner margin; a faint sayal-brown subterminal fascia; a narrow Saccardo's umber preterminal fascia, parallel with the termen; fringe tawny olive. Hindwing and fringe tawny olive, somewhat lighter towards the base of the wing. *Underside* of both wings, and fringes, tawny olive mixed with Saccardo's umber; a Saccardo's umber postmedial fascia, almost straight in the forewing, parallel with the termen in the hindwing.

Expanse: ♀♀ 37–38 mm.

1 ♀ (holotype), December 1934, and 1 ♀ (paratype), Gamba, January 1935.

Resembling *Dasychira aeana* Collenette, 1931, in which the antemedial fascia is strongly bowed with concavity basad.

These insects may possibly prove to be the ♀♀ of *Dasychira andulo* described above.

15. **Dasychira hyphasma** sp. nov. (Pl. XII, fig. 37).

♂. Antennal shaft hair brown, pectinations tawny olive. Palpus, head and thorax hair brown mixed with chaetura drab. Abdomen drab, with chaetura-drab dorsal tufts on the basal segments. Pectus, venter and legs drab mixed with whitish, the tarsi heavily shaded with chaetura drab. Forewing drab, the wing crossed by several poorly defined fasciae of chaetura drab; a patch of cinnamon buff on the discocellulars, edged with chaetura drab; a small admixture of white on the proximal side of the postmedial fascia; fringe drab, pinkish buff at the vein-ends. Hindwing pale pinkish buff; fringe whitish, mixed interneurally with drab, the latter colour extending to the terminal area. *Underside* of forewing, and fringe, drab, the fringe darker interneurally. *Underside* of hindwing, and fringe, pale pinkish buff, mixed in the costal area with drab.

Expanse: ♂ 33 mm.

1 ♂ (holotype), Gamba, January 1935.

16. **Lomadonta erythrina** Holland, 1893.

2 ♂♂, 1 ♀, Quirimbo, 7–20 May 1934.

The ♀ is of the extreme yellow form described as *L. johnstoni* Swinhoe, 1903, while one of the ♂♂ is of the reddish form and the other slaty grey.

17. **Lomadonta obscura** Swinhoe, 1904.

12 ♂♂, 1 ♀, Quirimbo, 1–20 May 1934.

All the ♂♂ are considerably darker than specimens from the Gold Coast and Cameroons.

18. **Aclonophlebia xuthomene** sp. nov. (Pl. XII, fig. 13).

♀. Palpus and antenna fuscous. Frons fuscous, remainder of head pale pinkish buff. Thorax and base of abdomen pale pinkish buff mixed with fuscous, remainder of abdomen fuscous mixed with antimony yellow. Pectus, venter and legs fuscous, the legs marked at the joints with pinkish buff. Forewing pale pinkish buff; five almost square patches of fuscous along the costa, approximately equidistant, and forming the starting-point of basal, subbasal, antemedial, postmedial and subterminal fasciae of the same colour; the antemedial and postmedial fasciae join below the lower margin of the cell; the subterminal fascia roughly parallel to the termen, crenate, points on the veins, concavities terminad; a crescent-shaped patch of orange buff on the discocellulars, edged narrowly with fuscous; a series of terminal interneural fuscous spots, extending through the fringe, which is otherwise pale pinkish buff. Hindwing pale pinkish buff; a hair-brown subterminal fascia, narrow from costa to vein Cu^1, thence broadening considerably and running oblique outwardly to the anal angle, where it invades the fringe; fringe pale pinkish buff, fuscous interneurally. *Underside* of both wings, and fringes, pale pinkish buff, the markings reproduced as on upperside.

Expanse: ♀ 37 mm.

1 ♀ (holotype), Gamba, January 1935, R. Braun.

May be placed near to *Aclonophlebia rhodalipha* Felder, 1874.

19. **Aclonophlebia atectonipha** sp. nov. (Pl. XII, fig. 40).

♀. Palpus, head and thorax fuscous, with a narrow collar of orange buff between head and thorax. Antenna fuscous black. Abdomen ochraceous buff. Pectus, venter and legs fuscous, mixed with ochraceous buff on the hindtarsus. Forewing whitish mottled with fuscous, the latter colour predominating in the medial third of the wing and in the apical area; a small patch of mars yellow on the discocellulars; fringe whitish, fuscous interneurally. Hindwing pale yellow orange; a broad patch of fuscous occupying the apical area, down to a point just below vein Cu^1; fringe pale yellow orange, fuscous interneurally from apex to vein Cu^1. *Underside* of both wings, and fringes, as on upperside.

Expanse: ♀ 36 mm.

1 ♀ (holotype), Fazenda Congulu, 7–11 April 1934.

20. **Palasea albimacula** Wallengren, 1865.

1 ♂, 11 ♀♀, Quirimbo, 7–12 May 1934.

All the ♀♀ are distinctly darker on the forewing than average specimens from Natal and Rhodesia. The ♂ cannot be separated from Natal examples.

NEW LYMANTRIIDAE FROM MADAGASCAR.

BY C. L. COLLENETTE, F.R.E.S.

(With Plate XII.)

THE insects dealt with in this paper were collected by Monsieur and Madame d'Olsoufieff, at Périnet, 149 kilometres east of Tananarivo, eastern Madagascar.

With a single exception, all types are in the Tring Museum. In the case of *Marblepsis chionoptera* Collnt., British Museum material was employed for the description.

1. **Marblepsis chionoptera** sp. nov. (Pl. XII, fig. 1).

♂. Palpus and head warm buff. Antennal shaft sayal brown, pectinations fuscous. Thorax and abdomen, above and beneath, whitish. Legs warm buff. Wings semi-hyaline, whitish; costa of forewing at the base narrowly edged with warm buff for a distance of about 3 mm.

♀. Resembles the ♂.

Expanse: ♂♂ 42–46 mm., ♀ 48 mm.

1 ♂ (holotype), 1 ♀ (allotype) and 21 ♂♂ (paratypes), April–June 1892, Fianarantsoa; 4 ♂♂, April–June 1890 and 1893, Antsianaka; all collected by Perrot Frères; in British Museum collection. 1 ♂, January 1933, Périnet, Mme N. d'Olsoufieff.

The single ♂ in the d'Olsoufieff collection has made it necessary to describe the large series of this species in the British Museum (Natural History).

I take this opportunity to transfer to the genus *Marblepsis* the following species, all of which have been wrongly placed in the past:

Leucoma macrocera Sharpe, 1890. (*Redoa kibwezi* Collenette, 1932.)

Phalaena (Olapa) flabellaria Fabricius, 1787. (*P. b. eleutheria* Stoll, 1790.)

Crorema quadristrigata Talbot, 1929.

Redoa melanocraspis Hampson, 1905.

Redoa mayotta Collenette, 1931.

Redoa xanthoma Collenette, 1931.

Redoa kenya Collenette, 1931.

M. chionoptera, described above, may be readily separated from the somewhat similar *M. xanthoma* Collnt., in which the antennal shaft is white and somewhat shorter.

Lymantica genus nov.

♀. Proboscis absent. Palpus upturned, three-segmented, rather short. Eye round, about the width of frons. Antenna just under one-third the length of costa, bipectinate, the branches at middle about one-fifth the length of shaft. Abdomen slightly longer than inner margin of hindwing. Midtibia with one pair, and hindtibia with two pairs of rather stout spurs of medium length. Forewing with costa and apex well rounded, termen, tornus and inner margin moderately rounded. Vein *Sc* parallel with the costa; R^1 from the cell at four-fifths, anastomozing with *Sc* for a short distance, thence approaching rather closely to R^2 and on to costa; veins R^2 to R^5 stalked, R^2 originating at about one-sixth

the total length of R^4, R^5 at about one-fourth of R^4, and R^3 at two-thirds of R^4 ; M^1 from well below the angle ; M^2 and M^3 almost from a point ; Cu^1 about four times as far from M^3 as M^3 is from M^2 ; Cu^2 from three-fifths lower margin of cell ; anal vein roughly parallel with inner margin. Hindwing with apex and termen well rounded, anal angle slightly rounded, costa and inner margin almost straight ; vein *Sc* touching the cell shortly at about one-fourth the length of cell ; *Rs* and M^1 from a point ; M^2 and M^3 well separated, Cu^1 slightly farther from M^3 than M^3 is from M^2 ; Cu^2 from three-fourths lower margin of cell ; A^2 and A^3 almost straight ; frenulum present.

Type : *Lymantica epelytes* Collenette.

2. **Lymantica epelytes** sp. nov. (Pl. XII, fig. 24).

♀. Palpus warm buff, tipped with fuscous. Antennal shaft fuscous, pectinations drab. Head, thorax and abdomen warm buff, the tegula and base of patagium somewhat darker. Pectus, venter and legs warm buff to light buff, the tarsi fuscous black, and an admixture of the same colour on the tibiae. Forewing pale yellow orange ; a buckthorn brown antemedial fascia, well marked, running obliquely outwards from costa to the origin of veing Cu^2, thence sinuate and less well defined to the inner margin ; a broad buckthorn brown stripe from costa to upper angle of cell ; the costa, discocellulars, veins R^3 to Cu^2 and the distal half of lower margin to cell, narrowly defined with fuscous to fuscous black ; a series of interneural terminal fuscous spots, extending to the fringe, which is incomplete in the type but apparently cinnamon buff. Hindwing light buff ; a faint fuscous mark on the discocellulars ; a series of small interneural terminal fuscous spots ; fringe cinnamon buff. *Underside* of forewing cream colour, faintly mixed with orange pink over the medial area ; a fuscous streak on the discocellulars and traces of a postmedial fascia ; interneural terminal spots, and fringe, as on upper side. *Underside* of hindwing cream colour ; a fuscous streak on the discocellulars ; interneural terminal spots, and fringe, as on upper side.

Expanse : ♀ 49 mm.

1 ♀ (holotype), December 1932.

The unusual shape of vein R^1 (vein 11 of Hampson system) serves to distinguish this genus.

3. **Pirgula melanoma** sp. nov. (Pl. XII, fig. 11).

♂. Palpus whitish, with some fuscous black hair-scales on the outer side. Antennal shaft fuscous black, lighter towards the base ; pectinations pale pinkish buff. Head, patagium and base of tegula orange buff. Remainder of thorax, abdomen and legs pale pinkish buff ; some fuscous black hair-scales on the inner side of tibia and tarsus of foreleg. Wings hyaline, whitish, iridescent in certain lights ; at the base of costa of forewing a fuscous black streak, about one millimetre in length, narrowing towards its distal end ; fringes whitish.

♀. Resembles the ♂, but antennal shaft, head and patagium pale pinkish buff, the orange buff present only at the base of tegula.

Expanse : ♂♂ 36 mm., ♀ 40 mm.

1 ♂ (holotype) and 1 ♂ (paratype), March 1935 ; 1 ♀ (allotype), October–November 1930.

In the ♀, vein R^1 originates from just beyond the centre of the areole, while in the two ♂♂ it originates from the cell not far from the base of the areole.

4. **Euproctis oxyptera** sp. nov. (Pl. XII, fig. 12).

♂. Palpus light buff, on the outer side of the second segment light orange yellow. Antennal shaft whitish, pectinations light ochraceous buff. Head, patagium and base of tegula whitish, remainder of thorax and base of abdomen light ochraceous buff; distal half of abdomen and anal tuft orange buff. Pectus, venter and legs light buff to whitish, the inner side of foretibia light orange yellow. Forewing light ochraceous buff; some indefinite whitish markings near the base of the wing; a whitish antemedial fascia, almost straight, meeting the inner margin at right-angles; a whitish postmedial fascia, running roughly parallel with the termen; the costal area between the two fasciae mainly whitish; fringe whitish. Hindwing whitish, mixed with light ochraceous buff in the terminal area; fringe whitish. *Underside* of both wings, and fringes, white; costa of forewing narrowly edged with light orange yellow.

Expanse: ♂♂ 22–28 mm.

1 ♂ (holotype) and 1 ♂ (paratype). February 1935; 7 ♂♂ (paratypes), March 1935; 2 ♂♂ (paratypes), December 1932; 1 ♂ (paratype), January 1933.

In structure very similar to *Euproctis* (*Porthesia*) *producta* Walker, 1863, but with the apex and termen of the forewing less rounded.

5. **Noliproctis parvula** Kenrick, 1914.

♂. Resembles the ♀, but the forewing rather more heavily marked.

Expanse: ♂♂ 21–23 mm., ♀♀ 28–29 mm.

1 ♂ (neallotype), 5 ♂♂, 1 ♀, January 1933; 3 ♂♂, October–November 1930; 1 ♀, December 1932.

6. **Noliproctis lithoides** sp. nov. (Pl. XII, fig. 19).

♂. Palpus fuscous. Antennal shaft white, pectinations tawny olive. Head white, the frons fuscous black. Thorax mottled with white and fuscous black, patagium entirely white. Abdomen pale pinkish buff, mixed with Saccardo's umber. Pectus and venter whitish; legs white, banded and spotted with fuscous black. Forewing white, spotted and mottled with fuscous black, the white area predominating beyond the cell, the dark area predominating above the discocellulars and in the centre of the apical area; fringe white, fuscous black interneurally. Hindwing pale pinkish buff, irrorated in the terminal half with Saccardo's umber; fringe pale pinkish buff, Saccardo's umber interneurally. *Underside* of forewing sepia, lighter along the inner margin; fringe white, marked interneurally with sepia, giving a chequered effect, which is continued round the apex as far as the cell. *Underside* of hindwing, and fringe, pale pinkish buff; some sepia markings on the discocellulars and at intervals along the costa.

♀. Resembles the ♂, but rather less distinctly marked; anal tuft sepia.

Expanse: ♂♂ 25–28 mm., ♀♀ 32–35 mm.

1 ♂ (holotype), 2 ♀♀ (paratypes), December 1932; 1 ♀ (allotype), 9 ♂♂, 4 ♀♀ (paratypes), October–November 1930; 7 ♂♂ (paratypes), January 1933; 9 ♂♂ (paratypes), March 1935.

A very distinctly marked species, with vein M^2 absent in the hindwing.

7. **Laelia polia** sp. nov. (Pl. XII, fig. 27).

♀. Palpus pinkish buff. Antenna, head, body and legs pale pinkish buff, mixed on thorax and legs with sayal brown. Forewing whitish, shaded in and above the cell with sayal brown, the sayal brown appearing also to some extent over the whole wing; an indistinct sayal-brown antemedial fascia, meeting the inner margin at right angles; discocellulars indistinctly bordered with sayal brown; a sayal-brown postmedial fascia, crenate, running inwardly oblique from costa to vein Cu^2, thence at right angles to the inner margin; a series of subterminal interneural sayal-brown spots; fringe whitish, marked interneurally with sayal brown. Hindwing drab, the fringe somewhat lighter. *Underside* of both wings whitish, suffused to some extent with drab; on the forewing an almost straight postmedial fascia, and on the hindwing a faint drab spot on the discocellulars, with traces of a postmedial and a subterminal fascia; fringes whitish, marked interneurally with drab.

♂. Resembles the ♀, but the markings rather darker.

Expanse: ♀♀ 39–40 mm., ♂ 31 mm.

1 ♀ (holotype), October–November 1930; 1 ♂ (allotype), January 1933; 1 ♀ (paratype), December 1932.

May be placed near to *Laelia janeschi* Hering, 1926.

8. **Laelia conioptera** sp. nov. (Pl. XII, fig. 20).

♂. Palpus pale pinkish buff, on the outer side and at the tip bistre. Antennal shaft whitish, pectinations drab. Head pale pinkish buff. Thorax and abdomen pale pinkish buff, mixed with drab, anal tuft pinkish buff. Pectus, venter and legs pale pinkish buff, mixed on the legs with bistre. Forewing ecru drab; a patch of whitish mixed with tiber green along the medial third of the costal area and the distal half of the cell; some scattered markings of fuscous mixed with tiber green over the remainder of the wing; a bowed (concavity basad) fuscous antemedial fascia; discocellulars faintly edged with fuscous; an indistinct fuscous postmedial fascia; fringe Saccardo's umber, lighter at the vein-ends. Hindwing and fringe whitish, the veins faintly indicated with pinkish buff. *Underside* of forewing, and fringe, drab, mixed with whitish in the apical and terminal areas and at the base of the fringe. *Underside* of hindwing and fringe whitish; a drab spot on the discocellulars.

♀. Resembles the ♂, but with the pattern on the forewing much less distinct.

Expanse: ♂ 30 mm., ♀♀ 33–36 mm.

1 ♂ (holotype) and 1 ♀ (paratype), October–November 1930; 1 ♀ (allotype), February 1932.

9. **Dasychira iodnephes** sp. nov. (Pl. XII, fig. 9).

♂. Palpus, antennal shaft, head and body mummy brown, the pectinations of antenna darker. Pectus, venter and legs mummy brown mixed with pinkish buff. Forewing Prout's brown, with a faint violet sheen over the medial third of the wing; traces of a lighter patch at the base of the wing; a faintly indicated sinuate antemedial fascia; a conspicuous pinkish-buff patch at the apex, containing some spots of Prout's brown, and stretching from the apex to midway between the apex and the end of the areole, its proximal margin crenate; a faintly indicated lighter patch beyond the end of the discocellulars; a conspicuous pale

pinkish-buff postmedial streak, stretching from vein Cu^2 to the anal vein, edged proximally with a patch of mummy brown ; a series of subterminal interneural mummy-brown streaks ; termen narrowly edged with mummy brown ; fringe mummy brown, lighter at the vein-ends. Hindwing and fringe Saccardo's umber ; termen narrowly edged with a darker line. *Underside* of both wings Saccardo's umber ; a darker postmedial fascia on the forewing, parallel with the termen ; traces of a double postmedial fascia on the hindwing ; fringes mummy brown, lighter at the vein-ends.

♀. Resembles the ♂.

Expanse : ♂ 32 mm., ♀♀ 33–36 mm.

1 ♂ (holotype), March 1935 ; 1 ♀ (allotype), 1 ♀ (paratype), February 1935.

Not closely resembling any other species, but may be placed near to *Dasychira orygioides* Aurivillius, 1925.

10. **Dasychira miselioides** Kenrick, 1914.

♀. Wings on the upperside strongly resembling those of the ♂, the hindwing somewhat darker. *Underside* of both wings pinkish buff dusted with snuff brown, much darker than those of the ♂.

1 ♀ (neallotype), December 1932 ; 1 ♀, October–November 1930 ; 1 ♂, January 1933 ; 1 ♂, March 1935.

Kenrick's holotype of this species was taken either at Périnet or at Nalamagaotna in the same district.

11. **Dasychira prasina** Butler, 1882.

♀. Resembles the ♂, but the forewing somewhat less heavily marked. The fuscous-black spot at the tornus is present in two and absent in three specimens. The large fuscous-black oval spot towards the centre of the hindmargin of the forewing, present in the holotype ♂, is not visible in the ♀♀ of this series.

Expanse : ♀♀ 34–42 mm., ♂♂ 31–32 mm.

1 ♀ (neallotype) and 2 ♂♂, March 1935 ; 1 ♀, December 1932 ; 1 ♀, January 1933 ; 2 ♀♀, February 1935.

12. **Dasychira chalcoptera** sp. nov. (Pl. XII, fig. 31).

♂. Strongly resembling in facies *Dasychira* (*Orgyia*) *malgassica* Kenrick, 1914, from Nalamagaotna, at 2,500 feet. *D. malgassica* varies very little in appearance, whereas the present species is rather strongly variable. The forewing of *D. malgassica* is dark green, and in the new species from dull citrine to old gold. The patch on the discocellulars is greenish and rather inconspicuous in *D. malgassica*, while in the present species it is conspicuously white with a central streak of sudan brown. The postmedial fascia in *D. malgassica* joins the inner margin rather closer to the tornus than in the present species. The *upperside* of the hindwing in *D. malgassica* is dark, whereas in the present species it is light buff, with a subbasal fascia of mummy brown which is absent in some specimens and usually much stronger towards the anal angle. In *D. malgassica* the *undersides* of both wings are rather dark, while in the present species they are light buff, with some subterminal spots of mummy brown on both wings and a discocellular spot on the hindwing.

♀. Resembles the ♂, but with the markings less conspicuous.

Expanse : ♂♂ 30–34 mm., ♀♀ 38–44 mm.

1 ♂ (holotype) and 11 ♂♂ (paratypes), March 1935 ; 1 ♀ (allotype) and 2 ♂♂ (paratypes), January 1933 ; and the following paratypes : 3 ♂♂ and 1 ♀, October–November 1930 ; 4 ♂♂, December 1932 ; 9 ♂♂, February 1935.

13. **Dasychira maligna** Butler, 1882.

♀. Strongly resembles the ♂.

Expanse : ♀ 40 mm., ♂♂ 29–34 mm.

1 ♀ (neallotype) and 7 ♂♂, December 1932 ; 4 ♂♂, January 1933 ; 6 ♂♂, February 1934 and 1935 ; 1 ♂, March 1935.

14. **Dasychira zonobathra** sp. nov. (Pl. XII, fig. 29).

♂. Palpus tawny olive, the outer side bistre. Antennal shaft rainette green, pectinations tawny olive. Head and thorax rainette green mixed sparsely with bistre. Abdomen pinkish buff mixed with tawny olive, and with bistre dorsal tufts on the basal segments. Pectus and venter pinkish buff, mixed on the pectus with rainette green. Fore and middle legs with femur and tibia rainette green mixed and banded with bistre, the tarsi bistre banded with pinkish buff ; hindleg pinkish buff mixed with bistre. Forewing rainette green ; a broad subbasal band of argus brown mixed with a few scales of fuscous black, its distal edge at right angles to the costa and almost straight ; a crenulate antemedial fascia, roughly parallel to the subbasal fascia ; a postmedial fascia, crenulate, bowed (convexity tornad) from costa to vein Cu^2, thence running at right angles to inner margin ; a large rounded argus-brown patch between veins R^4 and R^5, midway between discocellulars and apex, a smaller patch between veins Cu^1 and M^3, and an elongated irregular patch between vein Cu^2 and the inner margin ; a series of faint interneural subterminal argus-brown streaks ; fringe pinkish buff, marked interneurally with argus brown. Hindwing pinkish buff dusted heavily with Saccardo's umber ; fringe pinkish buff, marked interneurally with Saccardo's umber. *Underside* of both wings pinkish buff ; cell of forewing shaded with Saccardo's umber and a faint spot of the same colour on the discocellulars of hindwing ; an almost straight postmedial fascia and a faint subterminal fascia across both wings, roughly parallel with the termen ; fringe pinkish buff, marked interneurally with Saccardo's umber.

♀. Resembles the ♂.

Expanse : ♂♂ 31–36 mm., ♀ 46 mm.

1 ♂ (holotype) and 2 ♂♂ (paratypes), March 1935 ; 1 ♀ (allotype), October–November 1930 ; 2 ♂♂ (paratypes), December 1932 ; 1 ♂ (paratype), January 1933.

This species is very distinct, but may be placed near to *Dasychira phasiana* Butler, 1882. A well-marked male has been chosen as holotype. Four of the males are much less distinctly marked, and were not at first recognized as belonging to the same species.

15. **Dasychira phasiana** Butler, 1882.

♀. Resembles the ♂, but the underside of both wings more heavily dusted with Prout's brown.

1 ♀ (neallotype), February 1934 ; 2 ♂♂, December 1932 ; 1 ♂, January 1933.

16. **Dasychira olsoufieffae** sp. nov. (Pl. XII, fig. 16).

♂. Palpus pinkish buff, on the outer side and at the tip snuff brown. Antennal shaft whitish, shading to fuscous distally; pectinations sayal brown. Head and thorax pale pinkish buff, the frons snuff brown. Abdomen pale pinkish buff, mixed sparsely with sayal brown, dorsal tufts sayal brown. Pectus and abdomen pale pinkish buff. Legs pale pinkish buff, the tibiae and tarsi banded with sayal brown and snuff brown. Forewing with basal third velvety lincoln green, medial third vinaceous lavender, the two separated by a well-defined white antemedial fascia, almost straight, but slightly bowed (convexity basad) between the cell and the anal vein, and with a streak of Prout's brown in the fascia at costa and inner margin; a patch of lincoln green on the discocellulars, bordered distally with fuscous black; distal third of wing citrine drab, separated from the medial third of the wing by a white postmedial fascia, which curves round the distal side of the discocellulars to vein Cu^2, thence outwardly oblique to the inner margin; a streak of Prout's brown at the junction of the postmedial fascia with the costa, and a conspicuous almost square patch of Prout's brown and fuscous black on the costa beyond the postmedial fascia, reaching vein R^5; fringe citrine drab, at the ends of the veins white. Hindwing tawny olive; fringe tawny olive, at the ends of the veins white. *Underside* of forewing tawny olive, somewhat lighter in the inner marginal area; discocellulars and postmedial fascia faintly indicated in snuff brown; fringe snuff brown, at the ends of the veins white. *Underside* of hindwing pale pinkish buff, a snuff-brown spot on the discocellulars and traces of a double postmedial fascia; fringe snuff brown, at the ends of the veins white.

♀. Resembles the ♂, but less brightly coloured, and with the antemedial and postmedial fasciae on the forewing hardly visible.

Expanse: ♂♂ 41–47 mm., ♀♀ 53–59 mm.

1 ♂ (holotype) and 1 ♂ (paratype), March 1935; 1 ♀ (allotype) and 2 ♀♀ (paratypes), December 1932; 11 ♂♂ (paratypes), January 1933.

This fine species may be recognized by the conspicuous and almost square dark patch near the apex of the forewing, the almost straight antemedial fascia, and the vinaceous-lavender area occupying the medial third of the wing.

The present species and the nine new species which follow, together with *D. butleri* Swinhoe, 1923, *D. pastor* Butler, 1882, *D. zena* Hering, 1926, *D. viola* Butler, 1879, and *D. abbreviata* Kenrick, 1914, all of which are from Madagascar, show so many points of similarity that it has been necessary to examine the genitalia to establish the fact that they are distinct species. The most noticeable characteristics in the pattern of the forewing, where they are of consequence, are mentioned at the ends of the descriptions, and, together with the present illustrations and those already published, should suffice to distinguish the different species.

17. **Dasychira disjunctifascia** sp. nov. (Pl. XII, fig. 26).

♂. Palpus tawny olive, on the outer side darker. Antennal shaft bistre, pectinations snuff brown. Head, thorax and abdomen sayal brown to snuff brown, a line of white across the patagium posteriorly and some white hair-scales in the tegula. Pectus, venter and legs tawny olive, mixed on the legs with bistre and whitish. Forewing with basal area rainette green; a broad band of sepia and Saccardo's umber running across the wing, and reaching from the subbasal

to the antemedial area, the same colour extending narrowly along the costa to the base ; medial area greyish lavender, mixed with Saccardo's umber towards the costa, bounded by an antemedial and a postmedial fascia of Saccardo's umber both narrowly edged with white and rainette green ; discocellulars edged narrowly with sepia ; a broad band of Saccardo's umber running parallel to the postmedial fascia on its distal side from costa to inner margin, this band crossed by a single lighter streak just above vein M^1 ; terminal area Saccardo's umber mixed sparsely with rainette green ; fringe Saccardo's umber. Hindwing and fringe pinkish buff. *Underside* of both wings, and fringes, pinkish buff to pale pinkish buff ; a darker shading over the cell of the forewing, a faint patch of Saccardo's umber on the discocellulars and a straight postmedial fascia of the same colour on both wings.

♀. Resembles the ♂, the hindwing rather darker.

Expanse : ♂♂ 36–41 mm., ♀♀ 48–50 mm.

1 ♂ (holotype), 1 ♀ (allotype), 5 ♂♂ and 1 ♀ (paratypes), December 1932 ; 4 ♂♂ (paratypes), October–November 1930, January 1933, February and March 1935.

May be recognized by the distinct and well-marked antemedial and postmedial fasciae in the forewing, which are well separated from each other where they meet the inner margin.

18. **Dasychira junctifascia** sp. nov. (Pl. XII, fig. 7).

♂. Very similar to *D. disjunctifascia* described above, but with the antemedial and postmedial fasciae almost touching where they meet the inner margin. Furthermore, there is a light streak along vein M^2 from the subterminal to the postmedial area, and a distinct and rather broad subterminal fascia of rainette green.

♀. Resembles the ♂.

Expanse : ♂♂ 38–42 mm., ♀ 54 mm.

1 ♂ (holotype) and 2 ♂♂ (paratypes), October–November 1930 ; 1 ♀ (allotype) and 6 ♂♂ (paratypes), December 1932 ; 2 ♂♂ (paratypes), January 1933 and March 1935.

19. **Dasychira leucopicta** sp. nov. (Pl. XII, fig. 6).

♂. Palpus sayal brown, on the outer side and at the tip bistre. Antennal shaft bistre, pectinations somewhat lighter. Head, thorax and abdomen sayal brown to snuff brown, mixed on thorax and abdomen with whitish. Pectus, venter and legs tawny olive, banded on the legs with bistre and whitish. Forewing with basal area grape green ; a broad band of fuscous black and snuff brown running across the wing and reaching from the subbasal to the antemedial area, its distal margin almost straight, the snuff brown extending narrowly along the costa to the base ; medial area white, round the discocellulars and upwards to the costa snuff brown ; discocellulars defined with fuscous black mixed with grape green ; the medial area bounded by an antemedial and a postmedial fascia of fuscous black, both narrowly edged with grape green and white ; the postmedial joins the costa at an outwardly oblique angle ; distal third of wing snuff brown mixed sparsely with grape green ; a subterminal patch of fuscous black with vein R^5 passing through its centre ; a preterminal fascia of fuscous black, broken at the veins, the portions between veins M^1, M^2 and M^3 more basad than the

remainder ; fringe snuff brown, lighter at the vein-ends. Hindwing and fringe tawny olive. *Underside* of both wings pinkish buff ; costal and apical areas of forewing shaded with sayal brown ; a fuscous patch on the discocellulars of both wings ; faint postmedial fasciae, single on the forewing and double on the hindwing ; fringes sayal brown, lighter at the vein-ends.

♀. Resembles the ♂, but with body, hindwing and underside of both wings darker.

Expanse : ♂♂ 39–43 mm., ♀ 51 mm.

1 ♂ (holotype) and 4 ♂♂ (paratypes), January 1933 ; 1 ♀ (allotype), February 1935 ; 7 ♂♂ (paratypes), March 1935.

Characterized by the conspicuous white patch in the medial area of the forewing.

20. **Dasychira cyrtozona** sp. nov. (Pl. XII, fig. 5).

♂. Resembles *D. leucopicta* described above, but the antemedial fascia and the distal edge of the dark area in the basal third of the forewing are evenly bowed, with concavity basad. In the medial third of the wing the admixture of white is small. The postmedial fascia joins the costa at an inwardly oblique angle.

Expanse : ♂♂ 39–43 mm., ♀♀ 49–52 mm.

1 ♂ (holotype), 1 ♀ (allotype) and 8 ♂♂ (paratypes), March 1935 ; 5 ♂♂, 2 ♀♀ (paratypes), October–November 1930 ; 11 ♂♂, 1 ♀ (paratypes), December 1932 ; 2 ♂♂ (paratypes), January 1933 ; 10 ♂♂, 1 ♀ (paratypes), February 1935.

21. **Dasychira albilunula** sp. nov. (Pl. XII, fig. 17).

♂. Palpus tawny olive, above and on the outer side bistre. Antennal shaft tawny olive, pectinations Saccardo's umber. Head, thorax and abdomen tawny olive to Saccardo's umber, the patagium edged distally with pale pinkish buff, the dorsal tufts on the abdomen dark. Pectus and venter pale pinkish buff, legs pale pinkish buff to pinkish buff, banded with bistre. Forewing from base to postmedial fascia mainly fluorite green ; a patch of tawny olive mixed with bistre on the proximal side of the antemedial fascia and reaching from the cell to the inner margin ; a patch of tawny olive on the discocellulars, edged with bistre ; an antemedial fascia and a postmedial fascia of bistre, not well defined ; a fuscous black subterminal fascia, with a broad shade of fuscous on its proximal side, the fuscous black produced interneurally between veins R^5, M^1 and M^2 to the termen ; a whitish streak between the anal vein and Cu^2, on the proximal side of the postmedial fascia ; a fuscous-black preterminal fascia, broken at the veins ; fringe fuscous, lighter at the ends of the veins. Hindwing and fringe pinkish buff ; a narrow fuscous preterminal fascia, broken at the veins. *Underside* of both wings pinkish buff ; costal area of forewing cinnamon buff, the discocellulars and postmedial fascia faintly indicated in fuscous ; fringe of forewing fuscous, at the ends of the veins lighter ; fringe of hindwing pinkish buff.

♀. Less boldly marked than the ♂, the hindwing and underside of both wings darker.

Expanse : ♂♂ 36–40 mm., ♀ 44 mm.

1 ♂ (holotype), 1 ♀ (allotype) and 6 ♂♂ (paratypes), February 1935 ; 6 ♂♂ (paratypes), December 1932 ; 1 ♂ (paratype), January 1935 ; 4 ♂♂ (paratypes), March 1935.

Characteristic points in this species are the broad fuscous subterminal shade on the forewing and the whitish streak near the anal angle.

22. **Dasychira mniara** sp. nov. (Pl. XII, fig. 35).

♂. Palpus bistre, the second segment distally sayal brown. Antennal shaft citrine drab, pectinations bistre. Head, thorax and abdomen pinkish buff mixed with bistre, the bistre predominating on the thorax. Pectus, venter and legs pinkish buff, the legs banded with bistre. Forewing Saccardo's umber; basal area mignonette green, excepting along the costa; a clove-brown antemedial fascia, bordered distally with mignonette green; discocellulars edged with clove brown; a clove-brown postmedial fascia, bordered proximally with mignonette green; an irregular subterminal clove-brown shade, bordered distally with mignonette green; a clove-brown preterminal fascia, broken at the veins, bordered distally with mignonette green; fringe Saccardo's umber, lighter at the vein-ends. Hindwing tawny olive, fringe cinnamon buff. *Underside* of forewing pinkish buff; the area in and beyond the cell shaded with Saccardo's umber; a band of clay colour along the costa; an almost straight Saccardo's umber postmedial fascia; fringe Saccardo's umber, at the vein-ends lighter. *Underside* of hindwing pinkish buff; a spot of Saccardo's umber on the discocellulars, with postmedial and subterminal fasciae of the same colour; fringe pinkish buff.

♀. Colours on the forewing rather less bright than in the ♂, the underside of both wings darker.

Expanse: ♂♂ 32–38 mm., ♀♀ 37–41 mm.

1 ♂ (holotype), 8 ♂♂ and 3 ♀♀ (paratypes), January 1933; 1 ♀ (allotype), 2 ♂♂ and 1 ♀ (paratypes), December 1932; 1 ♀ (paratype), October–November 1930; 1 ♂ (paratype), February 1935; 5 ♂♂ (paratypes), March 1935.

Antennae rather longer than half the length of costa.

23. **Dasychira lichenodes** sp. nov. (Pl. XII, fig. 36).

♂. Rather similar to *Dasychira mniara* described above, but smaller, and with the antennae less than half the length of costa; the mignonette green entirely replaced on the forewing by deep olive buff; the postmedial fascia joining the costa at a more oblique angle; the dark subterminal shade entirely absent and replaced by a series of interneural wedge-shaped spots, the points directed basad.

♀. Resembles the ♂, but with the pattern on the forewing less distinctly marked.

Expanse: ♂♂ 31–35 mm., ♀♀ 39–40 mm.

1 ♂ (holotype), 6 ♂♂ (paratypes), March 1935; 1 ♀ (allotype), 2 ♂♂, 1 ♀ (paratypes), December 1932; 4 ♂♂, 1 ♀ (paratypes), January 1933.

24. **Dasychira phloeodes** sp. nov. (Pl. XII, fig. 39).

♂. Strongly resembles *Dasychira lichenodes* (described above) in facies, but with the antennal shaft and pectinations rather longer and heavier. The deep olive buff on the forewing in *D. lichenodes* is entirely replaced by Saccardo's umber, giving the impression of a brownish and not a greenish insect. The genitalia are abundantly distinct.

Expanse: ♂♂ 33–37 mm.

1 ♂ (holotype), 4 ♂♂ (paratypes), February 1935; 7 ♂♂ (paratypes), March 1935.

25. **Dasychira uteles** sp. nov. (Pl. XII, fig. 18).

♂. Palpus Saccardo's umber, somewhat lighter distally. Antenna, head, thorax and abdomen snuff brown. Pectus, venter and legs pinkish buff, mixed on the legs with snuff brown. Forewing snuff brown; some indistinct fuscous markings subbasally; a fuscous antemedial fascia directed at right angles to the inner margin, bordered narrowly on the proximal side and broadly on the distal side with light grape green; discocellulars faintly marked with fuscous; a fuscous postmedial fascia, bordered broadly on the proximal side with light grape green; a faintly indicated fuscous subterminal fascia, broadening towards the inner margin; fringe snuff brown. Hindwing and fringe pinkish buff mixed with tawny olive. *Underside* of forewing Saccardo's umber, inner marginal and terminal areas pinkish buff; a streak of clay colour along the costa; a dark postmedial fascia faintly indicated; fringe Saccardo's umber, pinkish buff at the vein-ends. *Underside* of hindwing, and fringe, pinkish buff; a dark spot on the discocellulars, and faint indications of a postmedial and a subterminal fascia.

♀. The markings on the forewing much less distinct than in the ♂; hindwing and underside of both wings darker.

Expanse: ♂♂ 28–33 mm.

1 ♂ (holotype), 3 ♂♂ (paratypes), March 1935; 1 ♀ (allotype), October–November 1930; and the following paratypes: 3 ♂♂, December 1932; 2 ♂♂, January 1933; 3 ♂♂, February 1935.

26. **Dasychira melissograpta** sp. nov. (Pl. XII, fig. 15).

♂. Palpus bistre, towards the tip lighter. Antennal shaft honey yellow mixed with bistre, pectinations bistre. Head, thorax and abdomen honey yellow mixed with bistre, the latter colour predominating on the tegulae. Pectus, venter and legs pinkish buff, mixed on the legs with bistre. Forewing honey yellow; the area from costa to lower margin of cell, and extending from the base of the wing almost to the postmedial, shaded with bistre; an indistinct light patch below the cell on the proximal side of the antemedial fascia; faintly indicated fuscous antemedial and postmedial fasciae; a whitish subterminal streak reaching from vein M^3 to the inner margin, slightly bowed (concavity terminad) and bordered proximally and distally with bistre; a series of conspicuous interneural preterminal fuscous spots; fringe pinkish buff, fuscous interneurally. Hindwing pinkish buff mixed with Saccardo's umber; fringe pinkish buff. *Underside* of forewing pinkish buff, shaded in and above the cell with fuscous; fringe fuscous, lighter at the vein-ends. *Underside* of hindwing pinkish buff; a fuscous spot on the discocellulars and traces of a postmedial and a subterminal fascia; fringe pinkish buff.

Expanse: ♂♂ 38–42 mm.

1 ♂ (holotype), January 1933; 1 ♂ (paratype), March 1935.

27. **Dasychira hexamitobalia** sp. nov. (Pl. XII, fig. 28).

♂. Palpus Saccardo's umber mixed with pinkish buff. Antennal shaft sepia, pectinations Saccardo's umber. Head, thorax and abdomen sepia, mixed on the head with tawny olive; patagium fringed distally with pale pinkish buff. Pectus, venter and legs pinkish buff, the foreleg heavily, mid and hindlegs less

heavily, marked with Saccardo's umber. Forewing with basal third fuscous black, mixed to some slight extent with Saccardo's umber and tea green ; antemedial fascia fuscous black, rather inconspicuous, double, slightly bowed (concavity basad) from costa to inner margin ; fuscous-black postmedial and subterminal fasciae ; area from antemedial to subterminal largely pale purple drab, with a slight admixture of tea green ; discocellulars rather heavily banded with fuscous black ; a fuscous-black patch above vein R^5, midway between the postmedial and subterminal fasciae ; a fuscous-black preterminal fascia, broken at the veins, on a ground of tea green ; fringe fuscous, lighter at the vein-ends. Hindwing tawny olive ; fringe fuscous, lighter at the vein-ends. *Underside* of both wings pale pinkish buff ; in and beyond the cell of forewing shaded with Saccardo's umber ; on both wings a patch of Saccardo's umber on the discocellulars, with postmedial and subterminal fasciae of the same colour ; fringes Saccardo's umber, lighter at the vein-ends.

♀. Resembles the ♂.

Expanse : ♂♂ 30–35 mm., ♀ 41 mm.

1 ♂ (holotype), 1 ♂ (paratype), January 1933 ; 1 ♀ (allotype), 1 ♂ (paratype), October–November 1930 ; 1 ♂ (paratype), December 1932.

28. **Dasychira belessichares** sp. nov. (Pl. XII, fig. 42).

♂. Very similar in facies to *Dasychira lignea* Butler, 1879, from Fianarantsoa, Madagascar. In the latter species is a pale pinkish-buff triangular patch, just below vein Cu^2 at the tornus ; in the present species this patch appears as a narrow wedge-shaped streak, bordering the lower side of vein Cu^2, and with its point at just over half the distance from tornus to cell ; the whole of the cell of forewing and the costal area above the cell light buff, this area being lighter than in *D. lignea*. Hindwing light buff, with a faint tawny-olive spot on the discocellulars and traces of a postmedial fascia of the same colour ; the hindwing of *D. lignea* is considerably darker. The termen of the forewing in the present species is moderately rounded, while in *D. lignea* it is slightly concave between veins Cu^1 and Cu^2.

Expanse : ♂♂ 31–35 mm., expanse of *D. lignea* (holotype), 36 mm.

1 ♂ (holotype) and 19 ♂♂ (paratypes), December 1932 ; 1 ♂ (paratype), October–November 1930 ; 3 ♂♂ (paratypes), February 1935.

29. **Dasychira hedilacea** sp. nov. (Pl. XII, fig. 32).

♂. Palpus sayal brown, beneath and at the tip whitish. Antennal shaft whitish, pectinations sayal brown. Head whitish, at the base of the frons and between the antennae sayal brown. Thorax and abdomen light buff, shaded on tegula, patagium and basal tufts of the abdomen with buff yellow. Pectus, venter and legs whitish, the inner side of femur and tibia on the foreleg sayal brown. Forewing sayal brown ; some indefinite darker markings at the base of the wing ; all veins, excepting in the costal area, outlined with bistre ; costal area light brownish olive, mixed with whitish ; a whitish streak between veins R^4 and R^5, stretching from the postmedial area to the termen ; fringe sayal brown, at the ends of the veins whitish. Hindwing whitish, irrorated with sayal brown, the irroration rather heavier towards the termen ; the veins faintly out-

lined in a darker colour ; fringe whitish, with a slight admixture of sayal brown interneurally. *Underside* of both wings, and fringes, whitish ; the costal half of the forewing shaded with sayal brown, and the same colour interneurally on the fringe.

♀. Resembles the ♂, but with a somewhat lighter hindwing.

Expanse : ♂♂ 29–31 mm., ♀♀ 36–38 mm.

1 ♂ (holotype) and 3 ♂♂ (paratypes), March 1935 ; 1 ♀ (allotype) and 1 ♀ (paratype), December 1932 ; 3 ♂♂ (paratypes), January 1933.

May be placed near to *Dasychira clavis* Saalmuller, 1884. The present species bears a curious resemblance in facies to *Thagona hedila* Druce, 1906, but this is not borne out in structure.

30. **Psalis punctuligera** Mabille, 1880.

1 ♂, January 1933.

Expanse : 35 mm.

This species, which was previously known only from the type in the British Museum, has been formerly placed as a synonym of *Psalis pennatula* Fabricius, 1793. The present specimen strongly resembles the type, and they can be separated with ease from African and Asiatic specimens of *P. pennatula*. In *D. punctuligera* the termen is less oblique ; two snuff-brown lines run from base to termen in the forewing, the one through the cell and along vein M^2, the other between the anal vein and Cu^2 ; in *P. pennatula* the lower of these two lines is not visible, while the upper curves upwards towards vein R^5. The genitalia show marked differences from those of Natal specimens.

Perinetia gen. nov.

♂. Proboscis small and aborted. Palpus porrect, three-segmented, the second segment heavily fringed with hair, the third segment short. Eye round, about the width of frons. Antenna about half the length of costa, bipectinate, the branches at middle about one-fourth the length of shaft. Abdomen slightly shorter than inner margin of hindwing. Process on foretibia straight and rather longer than the tibia ; midtibia with one pair and hindtibia with two pairs of well-developed and rather long spurs. Forewing with costa, termen and inner margin slightly rounded, apex and tornus only slightly rounded ; vein *Sc* parallel with the costa ; R^1 from the cell at two-thirds, curving up until close to *Sc* and running parallel with it to the costa ; R^2 to R^5 on a stalk which eventually curves up towards R^1, almost forming an areole, R^3 and R^4 branching off near the apex, R^2 about 2·5 mm. from the apex, R^5 from well above the upper angle of the cell, running parallel with M^1 ; M^1 from just below the upper angle ; M^2 and Cu^1 from points equidistant from M^3, and from fairly close to the lower angle ; Cu^2 from about two-thirds lower margin of cell ; anal vein parallel with inner margin. Hindwing with costa and inner margin slightly rounded, apex, termen and anal angle moderately rounded ; vein *Sc* touching the cell shortly at about one-third the length of cell ; *Rs* and M^1 shortly stalked from the upper angle ; M^2 from well above lower angle ; M^3 and Cu^1 almost from a point ; Cu^2 from about two-thirds lower margin of cell ; A^2 and A^3 almost straight ; frenulum present.

Type : *Perinetia leucocloca* Collenette.

31. **Perinetia leucocloea** sp. nov. (Pl. XII, fig. 8).

♂. Palpus coral red mixed with mustard yellow. Antennal shaft coral red, lighter towards the tip ; pectinations deep olive buff. Head, thorax and abdomen dragon's-blood red, the patagium white and conspicuous. Pectus and venter light buff. Foreleg dragon's-blood red to coral red. Middle and hindlegs light buff, mixed on tibia and tarsus of middle leg with coral red. Forewing dragon's-blood red ; a broad medial band of mustard yellow, bordered narrowly on each side with spectrum red ; indistinct subbasal and postmedial fasciae of spectrum red ; costa narrowly edged with mustard yellow, and a narrow band of the same colour along the termen ; fringe mustard yellow. Hindwing cream colour ; a small area at the base of the cell, the anal margin, and broadly in the terminal area, light coral red ; fringe cream colour. *Underside* of forewing coral red, the mustard-yellow markings of the upperside reproduced in cream colour ; fringe cream colour. *Underside* of hindwing, and fringe, light buff.

♀. The white patch on the patagium absent. Forewing salmon orange, without trace of the light medial band.

Expanse : ♂♂ 26–29 mm., ♀ 36 mm.

1 ♂ (holotype), December 1932 ; 1 ♀ (allotype), October–November 1930 ; 1 ♂ (paratype), March 1935. Also, in the British Museum collection, 1 ♂, Tananarive, (R. P. Camboué), 1889, and 1 ♂, Tamatave.

The extent of variation, as shown even in this small series, is very great. In two of the males the broad medial band of mustard yellow on the forewing is almost or entirely absent. However, the conspicuous white patch on the patagium is present in all the males. The most marked characteristic of the venation is the wide interval between vein R^1 and the stalk of R^2 to R^5, which approach later and almost form an areole.

32. **Lymantria canariensis** Kenriek, 1914.

♂. Resembles the ♀. The medial band on the forewing is considerably broader than in the type ♀, and this probably represents an individual variation.

Expanse : ♂ 36 mm.

1 ♂ (neallotype), March 1935.

33. **Lymantria dulcinea** Butler, 1882.

There are three well-defined forms in this species, all of which are represented in the Olsoufieff collection. In the parent form of *L. dulcinea*, the ground colour of the wings is cream colour to light buff, and the markings on the forewing diffuse. In the second form, which has received the name of *L. didymata* Kenriek, 1914, the ground colour of the forewing is light buff, the markings diffuse and the ground colour of the hindwing vinaceous pink. In the third form the ground colour of the forewing is whitish, the markings more clear-cut, and the ground colour of the hindwing vinaceous pink.

Although the three forms can be easily separated, no difference can be seen in the genitalia, and it does not seem advisable to recognize them by giving a name to the third form.

Of the first form I have seen the holotype, allotype and two further ♀♀ in the British Museum collection, also two ♂♂ from Périnet, taken in February.

Of the second form, Kenrick's ♂ type in the British Museum, and a ♂ from Périnet taken in February. Of the third form, a ♀ in the British Museum, 3 ♂♂ and a ♀ from Périnet taken in February and a single ♂ taken in March.

34. **Lymantria (Imaus) malgassica** Kenrick, 1914.

♀. Resembles the ♂, but with a tinge of flesh pink in the cell and inner marginal area of the hindwing, and with considerable light coral red on the outer side of the palpus, the pectus and femora.

Expanse: ♂♂ 38–41 mm., ♀♀ 53 mm.

1 ♀ (neallotype) and 1 ♀, December 1932; 8 ♂♂, January 1933; 2 ♂♂, March 1935.

35. **Lymantria polycyma** sp. nov. (Pl. XII, fig. 41).

♂. Strongly similar to *Lymantria malgassica* Kenrick, 1914, but smaller, with relatively shorter antennae, no trace of pink in wings, body or legs, the fasciae in the forewing broader and more strongly marked, and the termen of the hindwing more rounded. The genitalia are very distinct—in the present species the valve terminating in a point, without teeth, while in *L. malgassica* the end of the valve is well rounded, with several small teeth present.

♀. Resembles the ♂.

Expanse: ♂♂ 31–36 mm., ♀♀ 39–47 mm.

1 ♂ (holotype), 5 ♂♂ (paratypes), March 1935; 1 ♀ (allotype), 2 ♂♂ (paratypes), February 1935; 1 ♂, 2 ♀♀ (paratypes), December 1932; 2 ♂♂ (paratypes), January 1933.

36. **Lymantria lamda** sp. nov. (Pl. XII, fig. 33).

♂. Palpus pale pinkish buff, on the outer side and at the tip bistre. Antennal shaft pale pinkish buff, pectinations cinnamon buff. Head, body above and beneath, and legs pale pinkish buff, the legs banded with bistre and sayal brown. Forewing whitish; six rather prominent patches of sayal brown along the costa at approximately equal intervals, coinciding with the fasciae; three rather weakly marked fasciae of sayal brown—basal, subbasal and antemedial—the last mentioned ending in a prominent patch of the same colour on the inner margin; a spot of sayal brown in the middle of the cell; a prominent angled streak of sayal brown along the discocellulars; a postmedial fascia composed of double lines of sayal brown, crenate, ending in a prominent patch of the same colour on the inner margin, where it almost joins the antemedial fascia; a subterminal fascia of sayal brown, crenate and well defined; a series of terminal interneural spots of sayal brown; fringe whitish. Hindwing and fringe whitish, the wing very slightly shaded with sayal brown in the terminal area. *Underside* of both wings, and fringes, pinkish buff, the inner marginal area of the forewing lighter; discocellulars of both wings faintly marked with sayal brown.

Expanse: 43 mm.

1 ♂ (holotype), January 1933.

There is a second male in the British Museum collection, from the Antsianaka Forests, collected by L. Humbolt in 1888.

37. **Lymantria leucophaes** sp. nov. (Pl. XII, fig. 34).

♂. Palpus whitish, on the outer side and above russet. Antennal shaft whitish, shading to russet distally; pectinations cinnamon buff. Head whitish, with a band of russet medially through the vertex and frons. Thorax and abdomen above and beneath, and legs, russet mixed with whitish. Forewing white; six rather prominent patches of russet along the costa at approximately equal intervals, coinciding with the fasciae; traces of three fasciae of russet—basal, subbasal and antemedial; the area between antemedial and postmedial fasciae filled in with russet irroration; a prominent russet streak on the discocellulars; a crenate russet postmedial fascia; a russet subterminal fascia, obsolete on both sides of vein M^2 and between veins Cu^1 and Cu^2, ending in a prominent streak which runs oblique outwardly from vein Cu^2 to the tornus; a series of interneural terminal russet spots, which extend on to the base of the fringe; fringe white. Hindwing russet, mixed with whitish towards the base of the wing and along the basal half of the costa; fringe white mixed with russet. *Underside* of forewing whitish, with some russet markings along the costa, a streak of the same colour on the discocellulars and a postmedial streak from costa to vein M^3; fringe whitish, with a series of russet spots interneurally at the base. *Underside* of hindwing and fringe whitish; a small russet spot on the discocellulars and a faint patch of russet near the anal angle on each side of the 2nd anal vein.

Expanse: 38 mm.

1 ♂ (holotype), January 1933.

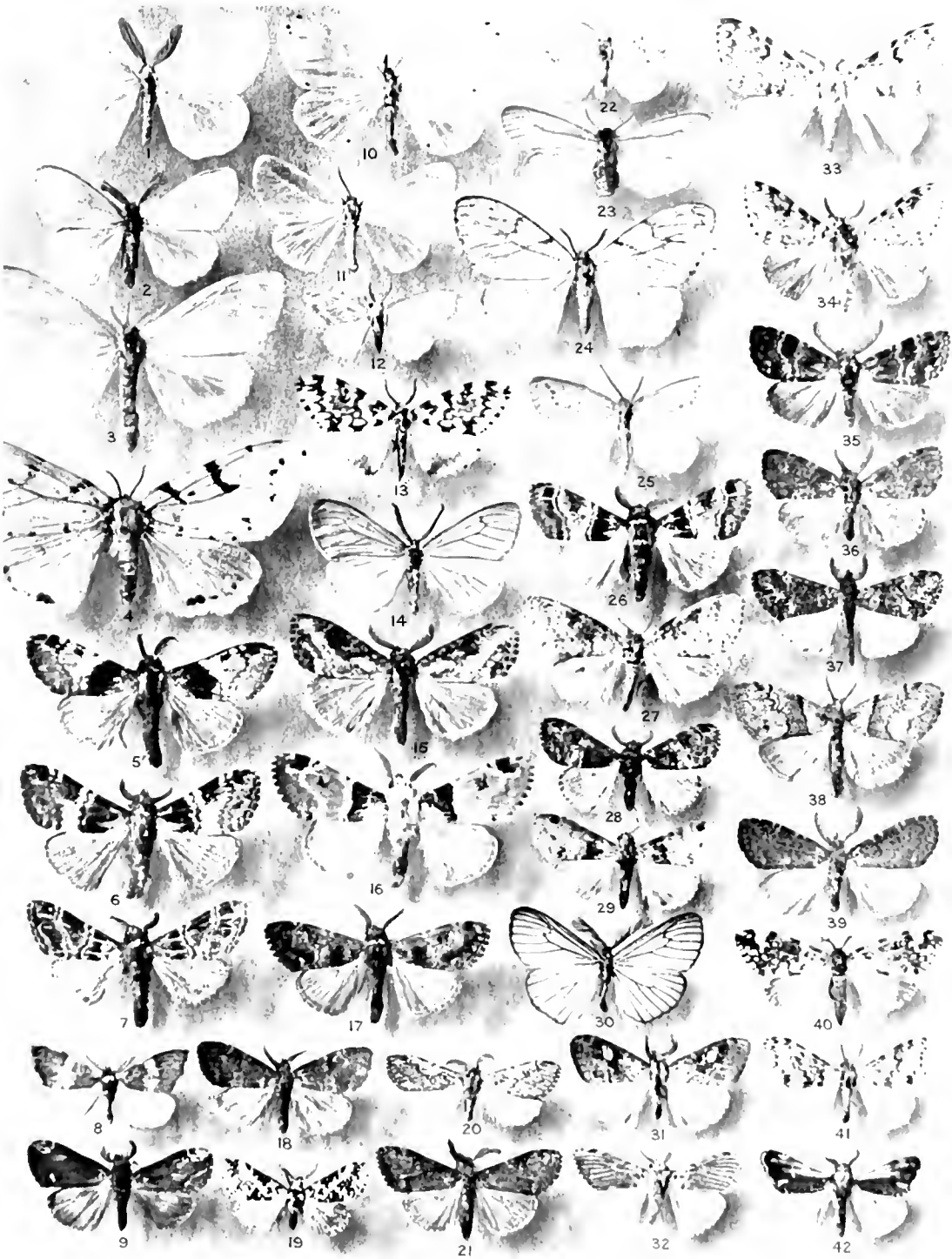
38. **Lymantria velutina** Mabille, 1878 (Pl. XII, fig. 4).

♀. Palpus, body and legs pale orange yellow, mixed on palpus and legs with fuscous black. Antennal shaft fuscous black, the pectinations somewhat lighter. Forewing pale orange yellow, without the "watered silk" effect shown in the ♂; two broad fuscous-black stripes running from the costa to the lower margin of the cell, the one across the centre of the cell, the other across the discocellulars; a spot of the same colour situated in the cell between these two stripes; an irregular series of fuscous-black interneural subterminal spots, continued along the inner margin; fringe pale orange yellow, with a single fuscous-black spot between veins R^4 and R^5. Hindwing and fringe pale orange yellow; a faint fuscous-black spot on the discocellulars, and a series of fuscous-black interneural subterminal spots, largest towards the anal angle. *Underside* of both wings, and fringes, pale orange yellow, with the markings of the upperside reproduced somewhat more faintly.

Expanse: ♂♂ 68–78 mm., ♀ 64 mm.

1 ♀ (neallotype), February 1934; 5 ♂♂, December 1932; 3 ♂♂, January 1933, February and March 1935.

This species has been represented in collections for many years by a series of males, but the female has remained unknown. The present specimen differs considerably from the male in colour and general appearance, and was not at first recognized. It is smaller than might be expected, and is perhaps a dwarfed specimen.



New LYMANTRIIDAE from Africa in the U. S. National Museum

EXPLANATION OF PLATE XII

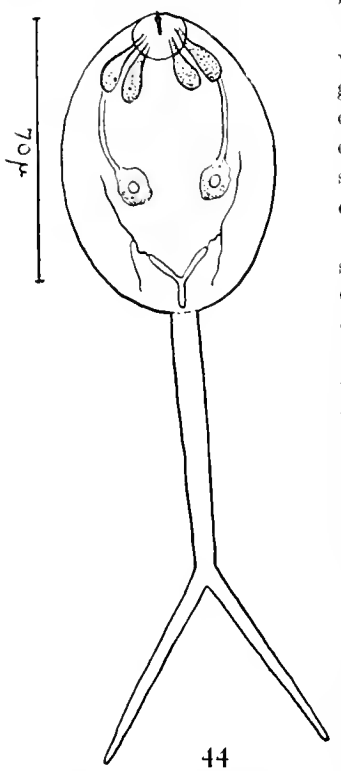
1. *Marblepsis chionoptera* sp. nov., holotype ♂ (p. 153). Madagascar.
2. *Olapa brachycerca* sp. nov., holotype ♂ (p. 147). Angola.
3. *Olapa macrocerca* sp. nov., holotype ♀ (p. 147). Angola.
4. *Lymantria velutina* Mabille, neallotype ♀ (p. 168). Madagascar.
5. *Dasychira cyrtozona* sp. nov., holotype ♂ (p. 161). Madagascar.
6. *Dasychira leucopicta* sp. nov., holotype ♂ (p. 160). Madagascar.
7. *Dasychira junctifascia* sp. nov., holotype ♂ (p. 160). Madagascar.
8. *Perinctia leucocloca* gen. and sp. nov., holotype ♂ (p. 166). Madagascar.
9. *Dasychira iodnephes* sp. nov., holotype ♂ (p. 156). Madagascar.
10. *Pirgula stictogonia* sp. nov., allotype ♀ (p. 149). Angola.
11. *Pirgula melanoma* sp. nov., holotype ♂ (p. 154). Madagascar.
12. *Euproctis oxyptera* sp. nov., holotype ♂ (p. 155). Madagascar.
13. *Aclonophlebia xuthomene* sp. nov., holotype ♀ (p. 152). Angola.
14. *Cropera celaenogyia* sp. nov., holotype ♂ (p. 148). Angola.
15. *Dasychira melissograpta* sp. nov. holotype ♂ (p. 163). Madagascar.
16. *Dasychira olsoufieffae* sp. nov., holotype ♂ (p. 159). Madagascar.
17. *Dasychira albilunula* sp. nov., holotype ♂ (p. 161). Madagascar.
18. *Dasychira nteles* sp. nov., holotype ♂ (p. 163). Madagascar.
19. *Noliproctis lithoides* sp. nov., holotype ♂ (p. 155). Madagascar.
20. *Laelia conioptera* sp. nov., holotype ♂ (p. 156). Madagascar.
21. *Dasychira andulo* sp. nov., holotype ♂ (p. 150). Angola.
22. *Euproctis conionipha* sp. nov., holotype ♂ (p. 150). Angola.
23. *Laeliophila seydeli* Hering, neallotype ♀ (p. 148). Angola.
24. *Lymantica epelytes* gen. and sp. nov., holotype ♀ (p. 154). Madagascar.
25. *Crorema jordani* sp. nov., holotype ♂ (p. 149). Angola.
26. *Dasychira disjunctifascia* sp. nov., holotype ♂ (p. 159). Madagascar.
27. *Laelia polia* sp. nov., holotype ♀ (p. 156). Madagascar.
28. *Dasychira hexamitobalia* sp. nov., holotype ♂ (p. 163). Madagascar.
29. *Dasychira zonobathra* sp. nov., holotype ♂ (p. 158). Madagascar.
30. *Cadurca moco* sp. nov., holotype ♂ (p. 148). Angola.
31. *Dasychira chalcoptera* sp. nov., holotype ♂ (p. 157). Madagascar.
32. *Dasychira hedilacea* sp. nov., holotype ♂ (p. 164). Madagascar.
33. *Lymantria lamda* sp. nov., holotype ♂ (p. 167). Madagascar.
34. *Lymantria leucophaes* sp. nov., holotype ♂ (p. 168). Madagascar.
35. *Dasychira muiara* sp. nov., holotype ♂ (p. 162). Madagascar.
36. *Dasychira lichenodes* sp. nov., holotype ♂ (p. 162). Madagascar.
37. *Dasychira hyphasma* sp. nov., holotype ♂ (p. 151). Angola.
38. *Dasychira dasymalla* sp. nov., holotype ♀ (p. 151). Angola.
39. *Dasychira phlocodes* sp. nov., holotype ♂ (p. 162). Madagascar.
40. *Aclonophlebia atectonipha* sp. nov., holotype ♀ (p. 152). Angola.
41. *Lymantria polycyma* sp. nov., holotype ♂ (p. 167). Madagascar.
42. *Dasychira belessichares* sp. nov., holotype ♂ (p. 164). Madagascar.

A NOTE ON THE VARIATION OF CERTAIN CERCARIAE (TREMATODA).

BY MIRIAM ROTHSCHILD.

(With 7 text-figs.)

IN view of the very large numbers of Cercariae which are examined from single infections it is perhaps surprising and a little disappointing that individual variations are not noticed more frequently. When the method of reproduction is considered, " monsters " might be expected to occur quite commonly, but records of these are very scanty (Mathias, 1930).



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Types of variation of greatest interest are those which may throw light on the evolution of the group. Most frequently recorded is the precocious development of certain characters of the Metacercaria or adult Fluke, such as the presence of a ventral sucker in Heterophyid Cercariae or additional flame cells in certain branches of the excretory system.

Fork-tailed Cercariae are found normally in several unrelated groups such as the Bucephalus Cercariae, " Dichotoma " Group, " Discursata " Group, the somewhat isolated species from *Nucula nucleus* (Jones and Rothschild, 1932), apart from the numerous freshwater species generally grouped together as the Furcocercous Cercariae. The early development of the excretory system of Cercariae (as two parallel canals which later fuse in the caudal region) gives considerable weight to the theory that they probably evolved from a primitive type possessing a bifid tail.

I have searched very carefully, but only found one example of a perfectly symmetrical forked tail (Fig. 44) in a species normally possessing a simple tail. This occurred in an infection of the " Ubiquita " Group from *Peringia ulvae* Pennant, 1777, from Millport. This type of variation is also probably much less rare than the records indicate.

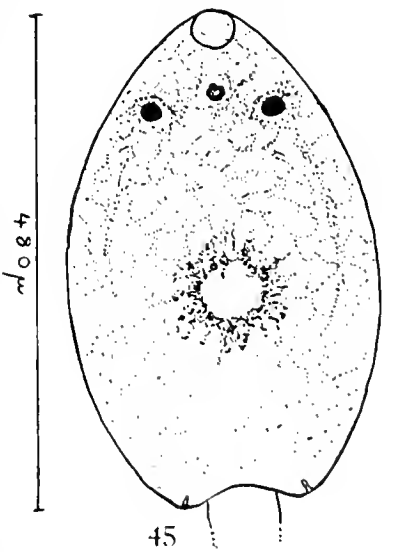
As already noted (Rothschild, 1935), an infection of *Cercaria doricha* Rothschild 1935, was found in which most of the larvae possessed pink pigment in the tail. Four of the other species belonging to the " Rhodometopa " Group have pink pigment in the anterior region, and it was therefore of interest to find this tendency present in the related species, although the location in the tail was rather surprising. It is perhaps worth noting that the colour of the sporocysts of this group differs greatly according to the sex of the host. The pigmentation of the sporocysts appears to be directly influenced by the pigmentation of the gonads which they attack.

An interesting type of variation was encountered in *C. ephemera* Lebour, 1907 (nec Nietsch), also from *Peryngia ulvae*, of which I think it may be worth giving a more detailed account. In this single abnormal infection the variation in pigmentation [1] covers most of the range met with in the allied species of the whole group.

Normal Pigmentation of *C. ephemera* Lebour and the Allied Species of Cercariae.

Cercaria ephemera Lebour is a very typical representative of the group, the adults of which belong to the monostome family **Notocotylidae.** When the Cercaria emerges from the snail host the colour, by both strong transmitted light and direct illumination, appears brown. Examination under the microscope reveals that the brown colour is due to scattered pigment granules, arranged in small aggregations forming an irregular network, distributed over the whole dorsal and ventral surfaces of the body. It is slightly denser anteriorly. Three eyespots, arranged in a triangle, are present in the oesophageal region. The two lateral eyespots appear black owing to the density of the pigment. Under pressure of a coverslip this pigment is distinctly brown. Faust (1917) has shown that they are true eyes with lenses, in contrast to the median eye, situated immediately over the central nervous mass, which is only a dense aggregation of pigment in the form of a ring. This median eye, in which the pigment is not so concentrated, appears brown.

The development of the pigment follows certain well-defined stages. While still within the Redia the Cercaria is white and transparent. The pigment is first seen in the lateral eyes, which appear as two faint brown spots. These rapidly darken while aggregations of pigment begin to form around them in two dendritic patches, giving the very characteristic appearance of "dark spectacles." The pigment in this area increases in density and at this stage seems darker than at any other, owing to the larger aggregations. It now begins to spread posteriorly, along the course of the main ventral and dorsal nerves, and gradually from there, over the whole surface of the body. The median or third eyespot forms while this process of general dissemination is in progress.



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Considerable variation is found in the pigmentation of the allied species of the group. The colour varies according to the density of the pigment. Thus *Cercaria zostera* Sinitzin, 1911, is "almost black," and *Cercaria pellucida* Faust, 1917, "whitish grey." The undescribed *Cercaria G* (Rothschild, 1936) is very much darker than *C. ephemera* Lebour, possessing the "leaden grey" colour during development described by various

[1] Variation in pigmentation is most commonly met with in species which encyst in the open, such as the Cercaria of *Diplodiscus temperatus* Staff (Krull & Price, 1932).

authors for allied species. In the fully grown *Cercaria ephemera* Lebour the course of the main nerves is only very faintly indicated by the presence of pigment aggregation, but in some species it is quite strongly marked. In some cases the dorsal and ventral, but not the lateral, lines are marked out. Wesenberg-Lund (1934) finds this the main character for the separation of *C. monostomi* v. Linst., 1896, from *C. ephemera* Nietsch, 1807.

In *Cercaria pellucida*, *C. fulvoculata* Cawston, 1918, and *C. osafuni* Faust, 1924, the median eyespot is missing. In the Cercaria of *Notocotylus attenuatus* Joyeux, 1922 (nec Rudolphi, 1809), which invariably encysts within the first host, the eyespots are absent altogether. In *Cercaria fulvoculata* (Fig. 49) the pigment remains concentrated round the lateral eyespots. In *C. imbricata* Looss, 1896, Wesenberg-Lund has described an aggregation of pigment in the posterior region of the body, which gradually extends laterally, forming a somewhat lyre-shaped figure (Fig. 46).

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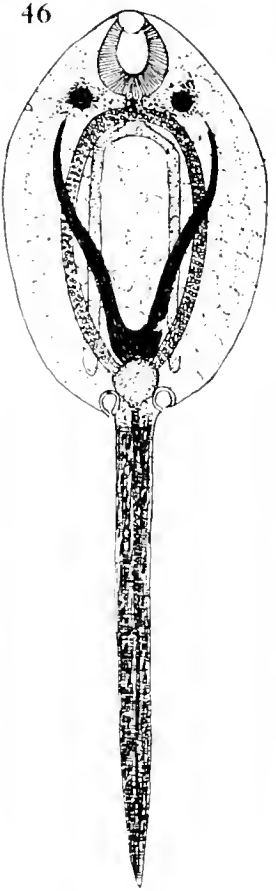


The presence of brown pigment granules scattered over the surface of the body of Cercariae is generally associated with the absence of penetration glands and encystment in the open—although the latter habit is sometimes lost and encystment then takes place in the first host. Wunder (1924) suggests that the pigment has a protective function against the light. In the "Ephemera" group of Cercariae the pigment is not extruded with the cystogenous material as in some forms. The cyst wall is white and partially transparent. The characteristic colour and appearance of a "black pearl" is due to the pigmented Metacercaria showing through the cyst wall. The eyespots of the Cercariae remain visible for several days after the cyst is formed, but gradually disappear. The small aggregations of pigment are also lost, and the Metacercaria assumes a uniform fulvous-brown colour in which the granular nature of the pigment can no longer be made out.

PIGMENTATION IN THE ABNORMAL INFECTION OF *CERCARIA EPHEMERA* LEBOUR.

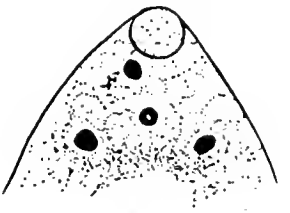
The Cercariae.—A rapid examination of the first few specimens which emerged from the snail gave the erroneous impression that this Cercaria and *C. ephemera* Lebour were not identical. A very careful and prolonged comparison of living material, however, convinced me that they were undoubtedly the same species.

The snail was isolated in a tube and kept alive for six months. During this period several hundred Cercariae emerged. A certain number were allowed to encyst naturally, and were consequently only examined under a hand lens.

The variation in pigmentation met with in this infection was so great that, unless the origin of the Cercariae had been known, several different species would

have appeared to be under review. However, the underlying cause was always the same, and can be defined as a failure in the normal distribution of the pigment. Examination of the developing Cercariae revealed that pigment formation proceeded as usual until the "spectacle" stage was reached.

The most common type of variation, found in the majority of the naturally emerged Cercariae, was a more or less complete absence of pigment in the posterior third of the body, with unusually dense scattered aggregations in the region of the bifurcation of the oesophagus.



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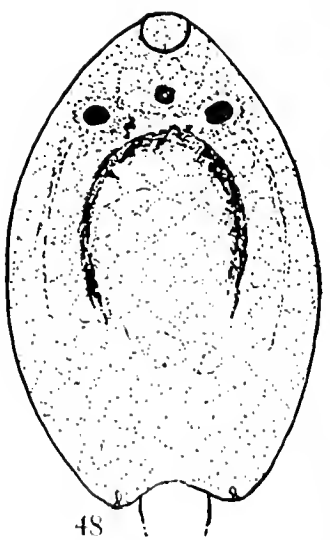
A second common variation was the type in which the body below the oesophagus was unpigmented except for the paths of the nerves, which were clearly outlined by aggregations of pigment. This represents a slightly earlier stage in development.

The third or median eyespot was frequently missing altogether, whereas in others it was more strongly marked than usual. Harper (1929) records that in *C. monostomi* the median eyespot does not always develop properly—being represented by a few granules of pigment, and I have noticed that in almost all infections of *C. ephemera* Lebour it varies in density.

Occasionally a fourth "eyespot" was present above the median eye, generally slightly to one side of it (Fig. 47). This spot varied in shape and was sometimes round and sometimes oval.



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In a few examples (Fig. 48) the aggregations of pigment in the oesophagal region had fused, forming a more or less continuous band, recalling the type of pigmentation met with in *C. imbricata*.

In two or three examples, which emerged on the same day, the pigment formed a fairly large ring in the middle of the body, giving a superficial impression of a ventral sucker (Fig. 45).

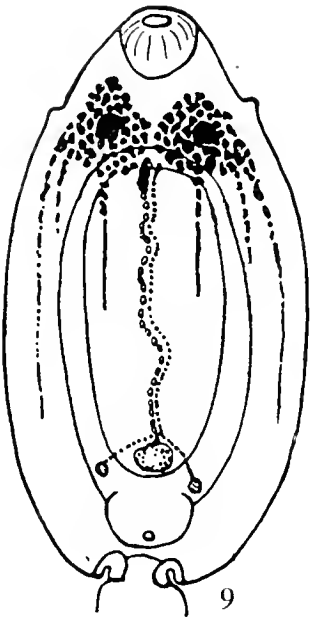
By far the most striking variation (Fig. 50), which was also only rarely met with, was an almost exact replica of the pigmentation of the fully developed *C. fulvoculata*. The body of the Cercaria was white, and the pigment entirely concentrated around the lateral eyespots. The median eyespot was missing. This also represents an early stage in development of *C. ephemera* Lebour, only the pigment appeared to be present in larger quantities and considerably denser.

Apart from the pigmentation, the Cercariae resembled the fully developed normal *C. ephemera* Lebour. The measurements, condition of the intestine, cystogenous glands and other organs showed that the Cercariae were not emerging "prematurely."

The Rediae.—There was absolutely no discernible departure from the norm in the Rediae giving rise to the abnormal Cercariae. On the whole, I have found

the full-grown Rediae of Notocotylid Cercariae very constant in colour for each species. These were the normal faint primrose yellow with a dark-brown intestine, fleeked with black.

The Cyst.—The Cercariae encysted normally, but the diffusion of the pig-



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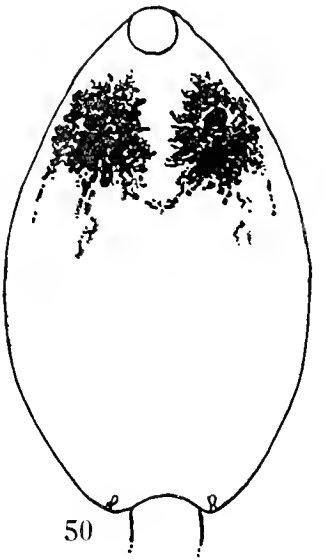

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ment took much longer than usual. In a few cases the eyespots did not disappear at all and the posterior portion of the body remained unpigmented.

ACKNOWLEDGMENTS.

My very best thanks are due to the Editors of *The Journal of Parasitology* (*Urbana*) and *Mémoires de l'Académie Royale des Sciences et des Lettres de Danemark, Copenhague* (Section des Sciences), for permission to reproduce Figs. 46 and 49.

I would also like to express my gratitude to Professor Arthur Woodhead, who kindly sent me two copies of the translation of D. T. Sinitzin's paper, one of which is deposited in the Library of the British Museum of Natural History, Cromwell Road, and is therefore now available to English readers.

EXPLANATIONS OF FIGURES.

Fig. 44 : A fork-tailed variety of a Cercaria of the " Ubiquita " Group.
Figs. 45, 47, 48 and 50 : Pigment variation in *Cercaria ephemera* Lebour.
Fig. 46 : *Cercaria imbricata* (drawing by C. Wesenberg-Lund).
Fig. 49 : *Cercaria fulvoculata* (drawing by E. C. Faust).

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LORD ROTHSCHILD and KARL JORDAN.

CONTENTS OF NO. II

THE RIGHT HONOURABLE

LORD ROTHSCHILD

PH.D., F.R.S.

BORN 8th FEBRUARY, 1868

DIED 27th AUGUST, 1937

NOVITATES ZOOLOGICAE

Vol. XL. SEPTEMBER 1937. No. 2.

NEW AND LITTLE-KNOWN BALI GEOMETRIDAE IN THE TRING MUSEUM.

By LOUIS B. PROUT.

FOLLOWING up his very successful Javan collecting, some of the fruits of which have already been made known (see Nov. Zool., xxxix, 221), Mr. J. P. A. Kalis in 1934–35 made further extensive collections on Bali. The Geometridae of this island have never received any special attention, although many new species, chiefly from Doherty's collecting, were described by Warren, with some additions from Swinhoe and myself, and scattered faunistic records will be found in vol. xii of Seitz's *Macrolepidoptera* and in a few revisions of individual groups. It is not surprising, however, that this additional material has added greatly to our knowledge and it is only to be regretted that few important zoogeographical deductions are yet possible, on account of the comparative paucity of corresponding material from the islands to the eastward.

In order to avoid repetition in the body of this paper, the data, as furnished by Mr. Kalis, are given here.

Mondoktoempang, W. Bali, 2,500 feet, October and November 1934.

Prapetagoeng, W. Bali, 1,500 feet, May 1935.

Batoeriti, E. Bali, 3,500 feet, June 1935.

Subfam. OENOCHROMINAE.

1. Eumelea biflavata Warr.

Eumelea ludovicata biflavata Warr., *Nov. Zool.*, iii, 357 (1896) (Pulo Laut, type; Nias)

Somewhat unaccountably, only one specimen was obtained, a ♂ from Mondoktoempang, November, in very good condition. I expect it will prove to be a subspecies; rather small, the median line of both wings exceptionally slender and sharply defined, rather straighter than usual, yellow spot at apex of forewing small but distinct, yellow discal patches rather ill-defined. Probably *biflavata* has here reached its south-eastern limit; even on Java it seems to be scarce. The previously recorded distribution is Nias, Sumatra, Java, Penang, Borneo, Sulu, with races—not very sharply differentiated—in N.E. India, Tonkin, Hainan, Formosa and the Liu-kiu Islands.

SUBFAM. **HEMITHEINAE.**

2. **Epipristis storthophora** sp. n.

♂, 26–27 mm. Size of a rather small *minimaria* (Guen., 1858), but with the green colour and heavy black cell-marks of *nelearia* (Guen.). Both wings with some black maculation close to base; forewing with antemedian line thick, irregularly zigzag, the tooth outward in cell stronger than in *nelearia*, the one behind it longer, but scarcely so acutely pointed as in most *nelearia*; both wings with postmedian line much more deeply dentate than in the species named, the spots outside it more blackish, the terminal dots more triangular. Underside with the cell-spots intense, the black borders strong, that of the forewing proximally less curved than in the allies, distally reaching (or almost reaching) the termen except at apex, that of the hindwing proximally less wavy, distally reaching nearer to the termen than in most *nelearia*, but not so nearly as in most *minimaria*.

Prapetagoeng, 4 ♂♂. A worn ♂ was also taken with the following in November.

3. **Epipristis nelearia accessa** subsp. n.

♂, 32–34 mm.; ♀, 36–44 mm. On an average larger than *n. nelearia* (Guen. 1858, Borneo), forewing with the cell-mark elongate, the shades between postmedian and subterminal greyish, usually weaker anteriorly than posteriorly, subterminal rather broad and distinct; underside, especially in the ♂, with the blackest (the proximal) part of the outer band narrowed, the distal only weakly suffused, or sometimes wanting.

Mondoktoempang, 2 ♂♂, 2 ♀♀.

I formerly overlooked the racial characters, which at best are not very strong, in 3 ♂♂ from E. Java (Nongkodjadjar and Singolangoe), which I unite with *n. accessa*.

4. **Agathia affluens** sp. n.

♂, 46 mm. In markings almost exactly like *discisticta* Prout (1912), which is now almost certainly known to be the ♂ of *gigantea* Butl. (1889); differs, apart from its larger size, in the following particulars.

Forewing with the tooth in the termen at R^3 rather stronger, hindwing with the corresponding tooth weaker, in both respects intermediate towards the shape of *diversiformis* Warr. (1894); almost all the markings somewhat more ample, mostly rather paler and more violaceous; basal patch of forewing elongate as in *diversiformis*, projection of green ground-colour outward (at and behind R^3) more acute and elongate.

Mondoktoempang, November, the type only.

The coloration recalls that of *exquisita* Warr. (1899).

5. **Agathia laqueifera** Prout.

Agathia laqueifera Prout, *Gen. Ins.*, 129, p. 60 (1912) (Upper Assam).

Mondoktoempang, an unusually large ♂ (fully 40 mm.) of the recurrent aberration which I have named ab. *vernifera* (Seitz, *Macrolep.*, xii, 72).

This slightly extends the range of the species, which is chiefly Malaysian and of which I included one old ♂ from "Java" (East India Company) in my original description, also approximately of this form.

6. **Uliocnemis castalaria lepturges** subsp. n.

Differs from *c. castalaria* (Oberth., 1916, Khasia Hills) in having the violet-grey terminal patches reduced, that of the hindwing ending in a definitely smaller red-brown mark.

Mondoktoempang, 4 ♂♂, including the type; Prapetagoeng, 2 ♂♂.

Besides Assam, the species has been recorded from the Malay Peninsula, Tonkin and W. China.

7. **Rhomborista megaspilaria purgata** subsp. n.

♂, 23–28 mm. In addition to its small size distinguishable from *m. megaspilaria* (Guen., 1858, Borneo) by the extreme narrowing of the purple terminal markings of the hindwing; in the type, which is the smallest specimen, the tornal and hindmarginal marks of the forewing are also wanting, so that at first glance the specimen does not even look like a *Rhomborista*; but the two paratypes have a blackish-purple patch from tornus to M^1, thus resembling an aberration which is well known in *m. lyra* (Swinh., 1892, N.E. India).

Prapetagoeng, 3 ♂♂.

Probably very variable. At the higher altitude (Mondoktoempang), to judge from a single ♂, *megaspilaria* seems to revert towards the more normal Malaysian forms and it is possible that further material will show that we have to do with a local aberration rather than a stabilized subspecies.

8. **Thalassodes griseifimbria** sp. n.

♂, 35–37 mm. Face green. Palpus with terminal joint short (well under ½ second joint). Hindtibia slender.

Wings shaped nearly as in the *verraria* (Guen.) group, the termen of the forewing a little straighter; angle of hindwing weak. Deeper green than in the allies (near Russian green of Ridgway, or rather of R. Oberthür, pl. 229, 2–3).

Forewing with the costal edge only extremely slenderly pale buff; antemedian line obsolete; postmedian excessively slender, almost as proximally placed as in *grammonota* Prout (1916), not traceable quite to the costa; terminal line slightly darkened but without black dots; fringe green in proximal half, grey in distal.——*Hindwing* with the line normally formed, slender, weakening behind its angle; fringe as on forewing.

Underside only a little less deep green than upperside.

Batoeriti, 2 ♂♂, in good condition. Also a ♂ from Nongkodjadjar, E. Java, 4,000 feet, which I had put aside for further study.

From *furvifimbria* Prout (1917, Ceylon) quite distinct in its shorter palpus and less bent distal margins.

9. **Oenospila strix gemmans** Prout.

Oenospila strix gemmans Prout, *Nov. Zool.*, xxxix, 224 (1935) (E. Java).

Batoeriti, 1 ♀, referable to this recently described race or possibly a closely similar new one, the postmedian dots in their central part only 2·5 mm. from termen instead of 3 mm., the abdominal marginal patch of hindwing slightly more red-brown and a trifle further reduced in size.

10. **Hemithea undifera** (Walk.)

Thalera undifera Walk., *List Lep. Ins.*, xxii, 601 (1861) (Sarawak).

Mondoktoempang, 2 ♂♂; Batoeriti, 1 ♀. Also a ♂ from Trettes, E. Java, and one from Nongkodjadjar.

Very likely a new subspecies of this elusive species, but with only Walker's extremely faded type and a scarcely less faded series from S. Celebes (Doherty) not yet differentiated it is impossible to begin any serviceable analysis.

11. **Hemithea antigrapha** Prout.

Hemithea antigrapha Prout, *Ann. Mag. Nat. Hist.* (8), xx, 122, t. vii, f. 11 (1917) (Khasis).

A ♂ from Mondoktoempang and a ♀ from Prapetagoeng seem to agree accurately with this species except that the abdomen does not show the dark dorsal spots. Perhaps a new subspecies. More typical *antigrapha* have been received from the Malay Peninsula.

12. **Hemithea tranquilla** Prout.

Hemithea tranquilla Prout, *Nov. Zool.*, xxxix, 224 (1935) (E. Java).

A ♂ from Batoeriti and probably a ♀ from Mondoktoempang, both in fair condition, are pretty safely referable to this recently described species, though the ♀ (hitherto unknown in *tranquilla*) shows a reddish dorsal patch which brings it nearer to *simplex*.

13. **Hemithea vesta** Prout.

Hemithea vesta Prout, *Nov. Zool.*, xxxix, 224 (1935) (E. Java).

Prapetagoeng, 1 ♂, rather small and in very poor condition but well recognizable, without dissection, by the antenna, abdomen, wing-shape and course of the lines.

The genus has also other representatives on the island, belonging to *tritonaria* (Walk. [1863]) sens. lat., probably embracing two or three species, but mostly faded and requiring close anatomical investigation; I consider it better to hold these over until fresher specimens are available or until the whole genus is more thoroughly revised.

14. **Diplodesma androcmes** sp. n.

♂, 16–18 mm.; ♀, 18–19 mm. Closely similar to *D. subtusumbrata* (A. Fuchs, 1902, E. Sumatra), especially in the ♀, which has all the spurs present and is superficially scarcely distinguishable except that the lines are somewhat finer and straighter. Referable, however, to section C (Prout in Seitz, *Macrolep.*, xii, 117), "forewing with SC^2 wanting"[1]—♂ with the dark subterminal band of the underside much reduced, in the type confined to a small posterior part of the forewing, in the Javan ♂ showing also at the costal margin of the hindwing, in the ♀♀ nearly or quite complete on the hindwing and approaching the costa on the forewing.

Prapetagoeng, May, the ♂ type; Mondoktoempang, October, a much-damaged ♂ and a good ♀. Also from Kangean (J. P. A. Kalis), April 1932: Karuaru, 2 ♀♀, Aerkohkep, 1 ♀; and E. Java: Trettes, May 1932, 1 ♂.

[1] In the ♀ from Aerkohkep this vein is conserved, running into the costal; i.e. a throw-back to section B.

Easily distinguishable from the species with the same venation: from *contracta* (Warr., 1896, Assam) by its less narrow wings, the hindwing less produced to a tail; from *caudularia* (Guen., 1858, India) by its banded underside.

15. **Iodis subtractata accumulata** subsp. n.

♂, 24 mm. More heavily irrorated with green than *s. subtractata* (Walk. [1863]), excepting perhaps the ab. *spumifera* Warr., the cloudy shading about, and proximal to, the cell-marks more complete and band-like, sinuous postmedian also broadened, sharply defined distally (being succeeded by more or less definite traces of a white subterminal line), perhaps a little nearer to the termen than in the name-typical race.

Mondoktoempang, October, 4 ♂♂.

16. **Pyrrhorachis pyrrhogona succornuta** subsp. n.

Border of forewing with a very small and narrow red extension from tornus, pointing obliquely inward across SM^2.

Mondoktoempang, 2 ♂♂. Tring Museum has a similar ♀ from N. Borneo.

An interesting link between the typical *p. pyrrhogona* (Walk., 1866, S. India) and the Papuan *p. cornuta* (Warr., 1896) series, which was once sunk as synonymous, then again raised to the potential status of a species.

SUBFAM. **STERRHINAE.**

17. **Organopoda orbata perorbata** subsp. n.

Cell-spots (both wings) still larger than in *o. orbata* Warr. (1907, New Guinea). Will pretty certainly prove to be a separate race, though confirmatory material from both sources is desirable.

Mondoktoempang, October, 1 ♂.

18. **Calothysanis punctinervis rigida** subsp. n.

More reddish in tone than the two Javan races (*p. punctinervis* Prout, 1916, and *p. piperata* Prout, 1935), the irroration only moderate, the line of the hindwing very straight.

Batoeriti, 3 ♂♂, 1 ♀.

19. **Anisodes argentosa** Prout.

Anisodes argentosa Prout, *Nov. Zool.*, xxvii, 278 (1920) (Borneo).

A single ♀, from Mondoktoempang, adds materially to the known range of this species (*Lep. Cat.* 61, p. 123) and, as it is rather large, dull and dark, may present a new subspecies.

SUBFAM. **LARENTIINAE.**

20. **Xanthorhoë sordidata inimica** subsp. n.

♂, 36–37 mm. Smaller than *s. sordidata* (Moore, 1888, N. India), darker, much less brown, well marked above, rather weakly beneath, but with large cell-dots; antemedian line of forewing less sharply angled than in some of the forms.

Mondoktoempang, the type ♂. From Nongkodjadjar, E. Java, similar 2 ♂♂ were received, less fresh.

21. **Ecliptopera rectilinea impingens** subsp. n.

The brown parts of *r. rectilinea* (Warr., 1894) are here blackish fuscous, thus much darker than in any other known subspecies.——*Forewing* with the second white line (boundary of dark basal area) bent close to costa so as to reach costal margin about perpendicularly, not obliquely inward ; the large triangular costal patch encroached upon distally by a continuation inward of the very slender white line of SC^5 ; both the slender pale lines immediately outside the postmedian continued forward at least to SC^4 ; the white streak from apex more oblique, thus coalescing with, or at least touching, the subterminal between the radials, thence continuing a little less close to termen, so that the terminal spots enclosed in cellules 2 and 1*b* are less small.

Mondoktoempang, November, 3 ♂♂.

Possibly a separate species ; the worn Sambawa ♀ mentioned in *Rés. Sci. Voy. Ind. Or. Néerl. Prince Leopold*, iv, 68, is either synonymous or a closely similar race.

22. **Loxofidonia obfuscata pallidistriga** subsp. n.

Xanthorhoë pallidistriga Warr. M.S. in Mus. Tring.

After repeated comparisons of a variable series from Bali and Java with the still more variable "*Coremia*" *obfuscata* Warr. (1893) = "*Cidaria*" *bareconia* Swinh. (1894), besides its aberration "*Perizoma*" *rubridisca* Warr. (1896), I have come to the conclusion that the undoubtedly different impression which it makes is attributable to the cumulative effect of the following factors or tendencies.

Forewing with median band better defined, generally with a stronger central projection distally, perhaps also with more sinuous proximal edge, the pale areas which bound it often clearer, the basal patch never (as in some *obfuscata*) confluent with the median band ; apical patch never so outstandingly darkened as in the majority of *obfuscata* ; the ♂ (also sometimes even the ♀) has the subapical dark patches (costal and terminal) divided by an often broad pale-grey or whitish oblique streak, the rest of the terminal area either predominantly dark (♀) or predominantly pale (♂).——*Hindwing* often in the ♂, occasionally even in the ♀, with a more noticeable pale postmedian band than in *obfuscata*.

Batocriti, 4 ♂♂, 1 ♀ (loc. typ.). Also 3 ♂♂ and 11 ♀♀ from E. Java, which were studied too late for inclusion in my previous paper, 2 ♀♀ from W. Java and one from Korintji, W. Sumatra.

The median band is often blackish, occasionally rather dark brown ; the ♀♀, notwithstanding their darkness, commonly show on this band a pronounced slaty-blue admixture, recalling *Xanthorhoë griseiviridis* Hmpsn. (1895).

23. **Collix astathes** sp. n.

♂♀, 40 mm. On the upperside extremely similar to *hypospilata* Guen. (1858), though somewhat more heavily marked ; the irregularly lunulate subterminal line continuous, not (as in *hypospilata*) inclined to break up into isolated dots and dashes. Underside showing the closer relationship to be with the group *basicristata* Prout (1923), *practenta* Prout (1929), *mesopora* Prout (1932) ; possibly a subspecies of *praetenta*. Larger and darker than the last-named ; underside with scarcely any indication of longitudinal dark markings, only a very faint suffusion about the median vein and along the proximal part of the costal region

(forewing); cell-spots large (as in *praetenta*), postmedian narrower than in *praetenta*, on the hindwing bandlike and almost uninterrupted, though intensified and slightly broadened about cellules 6, 3 and 1*b*, on the forewing a little more interrupted and macular, though still essentially bandlike, somewhat inbent between costa and 1st radial; subterminal of forewing very feeble, except as paired spots between the radials and single detached ones between the medians and at fold, the costal end almost or quite obsolete; subterminal of hindwing slightly better developed than that of the forewing, but with corresponding spots prominent.

Batoeriti, 1 ♂, 1 ♀. Also, perhaps in a slightly less brownish form, from E. Java: Singolangoe, 2 ♂♂; Kletak, 1 ♂.

24. **Chloroclystis inaequata scotosema** subsp. n.

♂. Rather larger than *i. inaequata* (Warr., 1896, as *Sesquiptera*), hindwing with the patch of specialized scaling dark fuscous instead of brown, its two lines beneath as a rule more approximated.

Batoeriti, 11 ♂♂, 11 ♀♀.

The ♀ (unknown in the name-typical race) is, as was expected, extremely similar to those of *olivata* Warr. (1901) and *conversa* Warr. (1897), though with the postmedian of the forewing more strongly angled than in the latter; or like that of *coronata* (Hb. [1809–13])[1] except that the hindwing is paler and with a more distinct, less angled line on the upperside.

25. **Hybridoneura abnormis** Warr.

♂. *Hybridoneura abnormis* Warr., *Nov. Zool.*, v, 25 (1898) (Khasis).
♀. (?) *Neoscelis metachlora* Hmpsn., *Journ. Bomb. Nat. Hist. Soc.*, xviii, 47, t. E, f. 9 (1907) (Ceylon).
Hybridoneura abnormis Prout, *Ins. Samoa*, iii. (3) 145 (1928).

Mondoktoempang, 1 ♂, 2 ♀♀.

The ♂ is closely like Warren's type, while the ♀♀ match Hampson's *metachlora* very well. I doubt whether there is more than one species in the genus, whilst the extreme inadequacy of material prevents any separation into subspecies.

26. **Ziridava xylinaria** Walk.

Ziridava xylinaria Walk., *List Lep. Ins.*, xxvi, 1550 [1863] [Sarawak].
Ziridava xylinaria ab. *subrubida* Warr., *Nov. Zool.*, iv, 71 (1897) (Bonthain, S. Celebes).
Ziridava xylinaria subrubida Prout, *Rés. Sci. Voy. Ind. Or. Prince Leopold*, iv (6) 69 (1932) (Celebes).

Mondoktoempang, 1 ♂, 1 ♀; Batoeriti, 5 ♂♂.

The ♂♂, especially those from E. Bali, seem to agree essentially with the type of *subrubida* Warr., which, on the strength of a second ♂ (Tondano-Menado) as well as the geographical probabilities, I registered as a separate subspecies. In any case it is, however, very close to the forms which are considered typical and the one ♀ shows nothing distinctive. The ♂♂ are more clouded, especially in the distal area beneath; of the Celebes examples I wrote that the "large size and a difference of tone and relative strength of some of the markings on the

[1] The date is taken from Hemming's *Hubner*, vol. 1, p. 275 (February 1937). This work has brought together or made known for the first time an enormous amount of important information on Hubner's voluminous writings.

upperside seem to me as characteristic as the reddish and heavily dark-marked underside on which Warren based the form." Here again, as with so many of the smaller Indo-Australian Geometridae, the material is still insufficient for any systematic revision, but as extensive collections of moths are now being received at Tring from Celebes, it will perhaps be possible to return to the species in dealing with them ; my first attempt at an analysis of the subspecies (*Ins. Samoa*, iii, 146, 1928) was somewhat premature, but gives a general indication of our knowledge up to that date. With augmented material and more concentrated study I am now preparing a further revision. Known localities are Ceylon, India, Formosa, Luzon, Borneo, Sumatra, Java, Bali, Flores, Celebes, Ceram, New Guinea and its islands and N. Queensland.

27. **Sauris interruptata** (Moore).

Remodes triseriata part., Moore, *Lep. Ceyl.*, iii, 485 (1887) (Ceylon) (err. det., ♀ nec ♂).
Remodes interruptata Moore, *Lep. Coll., Atk.*, p. 270 (1888) (N. India).

Batoeriti, 1 ♂, 1 ♀.

Large, the ♂ extremely so. Perhaps a subspecies, but a pair received from E. Java help to link it up with those of the Malay Peninsula and India.

28. **Polynesia curtitibia** Prout.

Polynesia curtitibia Prout, *Nov. Zool.*, xxix, 345 (1922) (Khasis).

Mondoktoempang, 5 ♀♀, in October.

Rather large, very heavily marked, the colour more as in the ♂ than in the ♀ of *curtitibia*. Probably at least a valid race ; the discovery of the ♂ may well show it to be a distinct species. Until we have both sexes for study I have elected to leave it unnamed ; there is already one close ally (potential race) from Ceylon awaiting further elucidation.

29. **Eois lunulosa** (Moore).

Pseudasthena lunulosa Moore, *Lep. Ceyl.*, iii, 450, t. 200, ff. 5, 5a (1887) (Ceylon).
Psilocambogia lunulosa Hmpsn., *Ill. Het.*, ix, 40 (1893) (Ceylon).
Anthyria lunulosa Swinh., *Tr. Ent. Soc. Lond.*, 1894, p. 191 (1894) (Khasia Hills) ; Meyr., *ibid.*, 1897, p. 70 (1897) (Pulo Laut).
Cambogia lunulosa Hmpsn., *Faun. Ind., Moths*, iii, 421 (1895) (Khasis ; Ceylon).
Pseudosthena ochracea Warr., *Nov. Zool.*, i, 395 (1894) (Khasia Hills ; Sikkim) (ab.).

Batoeriti, 1 ♂.

By the clear yellow postmedian band, the somewhat enlarged cell-mark of the hindwing and other details this specimen is certainly referable here rather than to *grataria* (Walk., 1861), of which Doherty brought one from Bali. Whether the two so-called species, however, are nearly parallel series of one extraordinarily variable species remains somewhat uncertain. Both have a wide distribution, *grataria* exceptionally so, extending from W. Africa and Natal to the Admiralty Islands and New Hanover. *E. lunulosa* was already known from India, Malaya, Borneo, Hainan and Formosa ; "*Chrysocraspeda*" *duplicilinea* Wileman (1911), from the last-mentioned country, has been registered as a separate subspecies (see *Ent. Mitt. Deutsch. Ent. Mus.*, iii, 247), but I now doubt its validity as such.

30. **Eois sordida** (Warr.).

Pseudasthena sordida Warr., *Nov. Zool.*, iv, 223 (1897) (Oinanissa [Dutch Timor]).

Batoeriti, 2 ♂♂.

These agree essentially with the hitherto unique type (also a ♂), but nothing very definite can yet be said about them. Considerably smaller than *plumbacea* (Warr., 1894), on which see Nov. Zool., xxxvii, 9 and *Journ. F.M.S. Mus.*, xvii, 56, and without the yellowish outer spot.

Subfam. **GEOMETRINAE.**

31. **Buzura praeparva** sp. n.

♂, 47 mm. Essential structure of *recursaria* (Walk., 1860), the ♂ antenna being unipectinate, with long branches, SC^{1-2} short-stalked, fovea well developed (section *Amraica*). Much smaller than any previously known species in the section.——*Forewing* with the termen almost regular in shape, not noticeably sinuous and only very faintly waved; coloration and scheme of markings as in *recursaria*; cell-spot smaller, even when allowance has been made for the greatly reduced wing-expanse; antemedian line more regular, almost evenly curved, thickened not only by a costal spot but also by small teeth on M and SM^2, the former followed and the latter preceded by very slight indentation; postmedian with the inward subcostal bend deeper than in most *recursaria*, the projection at R^1 less acute, as there is no recession of the line until behind R^2; brown subapical blotch and terminal dots much as in *recursaria*.——*Hindwing* and underside with similarly reduced cell-spots.

Prapetagoeng, 1 ♂, somewhat worn.

32. **Buzura insularis illucescens** Prout.

Buzura insularis illucescens Prout, *Bull. Hill Mus.*, ii, 146 (1928) (W. Sumatra).

Mondoktoempang, 1 ♂.

The specimen is very badly rubbed, especially on the forewing. I suspect that it may represent a separable race, though the few Javan which I have seen are almost typical; but I cannot form a definite judgment without more and better-conditioned specimens. The forewing apparently lacks the lines and almost certainly the costal spots, but these can be either present or absent in *i. insularis* (Warr., 1894, Nias); basal maculation apparently reduced, that of the subterminal and of the termen normal. Hindwing with the diffuse median shade and incomplete postmedian line heavily blackened.

33. **Catoria olivescens maturata.**

Mondoktoempang, October (♂ type) and November (allotype).

Upperside deeper olive-grey than in *o. olivescens* Moore (1888), cell-ring of the hindwing, especially in the ♀, approaching the elongate form which characterizes *o. longistigma* Prout (1929). Underside of ♂ suffused with grey, of ♀ similar to that of *o. longistigma*.

The same race has been received from Java, 2 ♂♂ from Nongkodjadjar, 1 ♀ from Mount Malang.

For a revision of this genus see Nov. Zool., xxxv, 132–141 (1929).

34. **Catoria kalisi** sp. n.

♂, 42 mm. Nearest to *tamsi* Prout (1929), but materially paler. Lower part of face white, upper partly fuscous.

Forewing with the long stalk of SC^{1-2} connected by an extremely short bar, or anastomosing at a point (or hardly more) with C ; whitish with a tinge of olive, the markings on the whole slightly smaller than in *tamsi*, notably the outer postmedian and its costal spot.——*Hindwing* with the cell-mark slightly less elongate than in *tamsi* and not filled in with black (more like that of *hemiprosopa*, Turn., 1904) ; the double postmedian (but especially its proximal element) thickened between SC^2 and R^3, sharply bent at the radial fold.

Underside very different from that of *tamsi* ; white, the black cell-mark developed on the forewing only, the costal spots not very strong, a dark distal band also developed on forewing only, not quite reaching termen and nowhere as wide as the space which separates it from the cell-spot, the usual white apical and midterminal spots present.

Batoeriti, 1 ♂. A second, 2 mm. larger, from Nongkodjadjar, E. Java, 4,000 feet.

Cleora Curt.

Abundant and very interesting material in the *alienaria* group (see *Bull. Hill Mus.*, iii, 179 seq.). A great part of it is referable to the *decisaria* subgroup, which I am making the subject of a separate article. *C. repetita* (Butl., 1882), received from both the W. Bali stations, shows much less extreme variability than in Celebes, the Moluccas and eastward ; the specimens are mostly rather dark, or with dark median area or thick black median line. *C. alienaria* (Walk.), from all three localities, though not in large numbers, is very variable in size, as well as in coloration, perhaps on the whole rather large ; in my revision (l.c.) I should presumably have referred them to *C. a. gelidaria* (Walk. [1863]), together with those from E. Java, but I still doubt (or increasingly doubt) whether the racial differentiation is valid. *C. hermaea* Prout (1929), also new for Bali, was taken only at Batoeriti ; one ♂ has the forewing predominantly bright ochreous and another has an ochreous streak along its hindmargin—both apparently rare aberrations, though represented in a marvellous series of *hermaea* sent from E. Java. Of *C. concentraria* (Snell., 1877), a few were collected at Mondoktoempang, an extremely fine and variable series at Batoeriti ; these are the first records for Bali, but by no means unexpected, as the Tring Museum has one specimen from Lombok. *C. injectaria* (Walk., 1860) will almost certainly have to be added, as two rather grey or dark ♀♀ of the puzzling *processaria* form (*Bull. Hill Mus.*, iii, 213) were obtained, one at Prapetagoeng, one at Batoeriti.

35. **Racotis monognampta** sp. n.

♂, 43–48 mm. Antenna nearly as in *inconclusa* (Walk., 1860), but with the teeth continuing triangular almost to the base.——*Forewing* above difficult to distinguish except by its tone, ground-colour a little paler, some of the markings somewhat blacker, notably the circumscription of the cell-mark ; the (red-brown, black-mixed) median spot at hindmargin large and strong ; dark suffusions of distal area relatively strong, the pale (but not sharply defined) midterminal spot larger than in the Bali form of *inconclusa*.——*Hindwing* also strongly marked and with somewhat enlarged midterminal spot ; at once distinguishable by the post-

median line, which, after its (weak or moderate) bend at R^1, is much more direct right to the abdominal margin, even the inward curve at fold very weak or wanting; the usual black dashes developed on the outer side of this line.——*Underside* nearly as in the cleanest, darkest-marked *inconclusa*; cell-marks strong, lines very slight, showing chiefly as short punctiform extensions from the costal spots of forewing; borders on the whole not quite so broad as in *inconclusa*, sharply defined proximally, the whitish apical and midterminal spots generally stronger.

Mondoktoempang, October and November, 8, ♂♂; also 1 ♂ from Prapetagoeng.

Bali seems well provided with *Racotis*. Besides a series of the widely distributed *inconclusa*, Kalis obtained 2 ♂♂ (Batoeriti) and 1 ♀ (Mondoktoempang) of *anaglyptica* Prout (1935) and 2 ♂♂ (Batoeriti) of *neoncphria* Prout (1935).

36. **Hyposidra salebrata** sp. n.

♂, 32–34 mm. In the relatively short forewing and the character of the markings nearest to the well-known *janiaria* Guen. (1858). Abundantly distinct in the dark-grey tone (browner on the underside) and in a number of other characters.——*Forewing* with the sinus between the apex and midtermen rather more pronounced than in *janiaria* ♂; median and postmedian lines much more outbent in the middle; fringe much more strongly spotted.——*Hindwing* with termen more crenulate and with a more pronounced tooth at R^3; fringe more strongly spotted.

Prapetagoeng, 4 ♂♂.

37. **Hypochrosis spodographa** sp. n.

♀, 34 mm. In structure and scheme of maculation very near *festivaria* (Fabr., 1794). Head and body concolorous with wings; the palpus and parts of the front of pectus and of legs more reddish (as also in some brightly coloured *festivaria*).

Wings (especially hindwing) with termen appreciably more rounded than in *festivaria* ♀; ground-colour as in *festivaria*, the grey strigulation rather strong and slightly more bluish.——*Forewing* with costal edge more broadly ochreous, with the blackish irroration and strigulae copious; basal area also somewhat mixed with ochreous, its boundary oblique inward from costa at 4 mm. to hindmargin at 3 mm.; median area whitish instead of dark green (and with no white edgings), very extensive, its distal boundary anteriorly only 2 mm. from termen (slightly more from SC^5 forward, on account of an inward curvature), about R^3 making an inward sweep almost to cell, then nearly vertical to M^2 and after a further turn inward running to hindmargin at about 4 mm. from tornus; an elongate ochreous cell-mark, connected with costal shade by a dark-mixed patch in front of DC^1; scattered blackish dots and short dashes on the pale area, accumulating in places so as to suggest two very incomplete and irregular lines, both traceable from M hindward and curving round so as to meet close to hindmargin: the antemedian curved outward at fold, inbent before and behind the curve, the postmedian perpendicular from base of M^1, directed basad immediately after crossing M^2, sharply angled at fold, thence forming a strong outward curve.——*Hindwing* with the costal area broadly and abdominal margin narrowly fleshy-ochreous, the rest coloured as the forewing; the whitish, dark-dotted patch

nearly semicircular, based on SM^2, its curved side reaching cell-fold, its distal end very near tornus.——Underside ochreous, the forewing slightly more reddish-tinged than the hindwing; much like some of the least reddish undersides of *festivaria* but with the dark suffusion about the base of the medians of the forewing very slight.

Mondoktoempang in November, 1 ♀.

38. **Hypephyra sterrhoticha** sp. n.

♂, 30–32 mm. Closely related to *subangulata* Warr. (1896), from the N.E. Himalayas, agreeing in having the antenna dentate-fasciculate, the hindtibia very strongly swollen. Apex of forewing somewhat less acute, angle of hindwing much weakened; median area of forewing variably clouded with grey (as proves to be also the case with *subangulata*), the clouding chiefly developed in posterior part; distal areas above and beneath, except at apex of forewing, as a rule solidly dark, especially beneath, where even the ochreous apical suffusion is only weak and restricted.

Mondoktoempang, 5 ♂♂.

39. **Chiasmia hypomesta** sp. n.

♂, 20 mm. Scarcely larger than *Ch. minuta* Warr. (1905), from North Borneo; antenna ciliated in long fascicles, as in that species. Head pale, the face with two blackish dots at upper edge and sometimes very small dots across the middle. Thorax and abdomen above more heavily dark-clouded than in *minuta*.

Forewing with termen very slightly more oblique than in *minuta*; very pale buff, scarcely so yellow as in that species, cell-spot nearly as large; markings rather less brown, heavier; spots of proximal area sometimes in part confluent; lines of median area arising from enlarged costal spots, the postmedian with its distal edge oblique outward anteriorly; posterior part of this area (from M and base of M^2) forming a still more solid blotch than in *minuta*, median line from costa to R^1 thickened into a broad shade, more or less confluent with cell-spot; distal markings nearly as in *minuta*, the proximal subterminal shade less interrupted in the middle.——*Hindwing* with median shade thicker and proximal subterminal less interrupted than in *minuta*.

Batoeriti, 2 ♂♂.

The only similarly banded Indian species of the group, *radiata* Warr. (1897), is generally much larger and has the subterminal line farther from the termen and more sinuous, the median band of the hindwing dark throughout and other differences from *hypomesta*.

40. **Lomographa frixa** sp. n.

♂, 22–24 mm. Face smooth. Palpus about 1, moderately rough-scaled. Antenna with pectinations about as long as in *trimaculata* (Vill., 1789), a longer distal part non-pectinate.

Wings much more thinly scaled than in typical *Lomographa*, in all but the freshest specimens subdiaphanous.——*Forewing* much less broad, costa almost straight to near apex, termen oblique, little curved till behind M^1; cell $\frac{1}{2}$; SC^{1-2} coincident; fovea present; grey; costal margin and to a less extent some of

the veins more normally scaled, whitish, with blackish spots or longitudinal streaks; cell-dot minute; very faint traces of lines arising from the three principal costal spots, curved at first, then approximately parallel with termen; a fine dark terminal line; fringe chequered, dark grey and whitish.— *Hindwing* with termen slightly sinuate between the radials, otherwise nearly smooth; concolorous with forewing or slightly paler; a small cell-dot and indication of two lines; termen and fringe nearly as on forewing.

Forewing beneath nearly as above; hindwing rather paler and less weakly marked.

Batoeriti, 5 ♂♂, only the type in really good condition; Mondoktoempang, 2 ♂♂, fair, October and November. Also from E. Java, 2 ♂♂, darker, Nongkodjadjar and Singolangoe. A worn ♀ from Medan, Sumatra, has stood for many years in my collection; antenna simple.

Systematic position very doubtful; perhaps a new genus will be required.

A REVISION OF THE *DECISARIA* GROUP OF *CLEORA*.

BY LOUIS B. PROUT.

(With Plate XIII.)

SINCE I published my revision of the "*alienaria* group" of *Cleora* Curt. (*Bull. Hill Mus.*, iii, 179–224, pls. v–vii, 1929), Janse has erected (*Moths S. Afr.*, i, 119 [gen. caelebs] and 266, 1932) a new genus *Neoclora*, which he based negatively on the presence of "only one pair of pectinations on each joint" of the ♂ antenna (not two pairs as in *Cleora* sens. str.) and positively on the "very characteristic genitalia, the typical feature of which is the two well-pronounced cornuti at the end of a tubular, wrinkled vesica." By the former criterion, my section B (l.c., pp. 182, 185, 203–220) would have to be transferred to *Neoclora*, and it is probable that this would give a better approximation to an accurate taxonomy. But as Janse definitely states that "all species" placed by him in his new genus have the remarkable cornuti, and this is not the case with their Indo-Australian relatives, I have decided not to make the change at present; to transfer them by cutting out the genitalic section of the diagnosis, without some alternative method of delimitation, would be almost tantamount to making the very "natural" new genus into a receptacle for numerous so-called *Cleora* which have not yet been critically considered from the standpoint of systematics.

In any case the purpose of the present contribution is not classificatory. It owes its inception to the discovery that the subsection of my section B which may appropriately be called the *decisaria* group embraces several previously unknown or undetected species; and that consequently my treatment of it was not only inadequate but in some details inaccurate. The general unity of structure, coupled with the extreme variability in the wing markings—at least in the few localities from which at that time sufficient material was accessible—blinded my eyes to the existence of two or three well-distributed species, although I did recognize the independence of some Pacific Island forms (*hemiopa* Prout and *psychastis* Meyr.) and of the interesting *rhadia* Prout of Luzon. The recent acquisition by the Tring Museum of splendid collections from Bali and Java, made by Mr. J. P. A. Kalis, directed my attention to some deviations which did not seem explicable on geographical grounds, and necessitated fresh investigations into the structure, particularly of the ♂ genitalia. With the patient help of Mr. W. H. T. Tams and Mr. A. H. Stringer at the British Museum, I have at last brought the group into sufficiently good order to justify a further revision, although there will certainly be many fresh discoveries made when some of the other islands have received the attention which has now been given to Bali.

By the *decisaria* group I understand all the species which have the special fovea which I used in my key (l.c., p. 185)—"fovea above with a rosette of black scales"—and described more fully under *displicata* (p. 204) and especially *decisaria* (p. 205); that is to say, species 21 to 24 of my revision. My first intention was to use the group name in a still narrower sense, ignoring *displicata* (Walk.), with its non-dilated ♂ hindtibia and lack of raised scale-tufts on the hindwing; but I found that there was work to be done in this direction also and

that the relations were probably closer than I had supposed. In my introductory characterization of the genus I pointed out (p. 181, footnote) the taxonomic unimportance of the tibial character, and if I were rewriting my key I should transpose the divisions 3 and 4, so that all the subjects of the present survey would be brought under the one heading (3 to 6, inclusive).

Mr. Stringer, in testing the question of the transference of the group to *Neocleora* Janse (see above), noted that none of those examined had the *two long spines* at the end of the vesica, but generally 3–4 (sometimes 5 or a larger number) *smaller* "cornuti"; at the same time he called my attention to the more proximally placed spine or spines of the aedoeagus, which may prove to have taxonomic significance: in spp. 1–3 (*displicata* auctt. olim) there are 5 or 6 spines proximally (or perhaps in *pheucta* one composite spine) and a considerable number of cornuti distally; in the central section (spp. 4–11) there are 1 proximal spine (sometimes also in *frigescens* a second but very small one) and nearly always 3 or 4 cornuti distally; in two New Hebrides outliers (*psychastis* Meyr. and *immemorata* Walk.) there are 2 strong spines proximally; *psychastis* has 1 at the tip of the vesica, *immemorata* (new for the New Hebrides, Miss L. E. Cheesman) 2 in this position.

In dealing with already known species below, I omit a few bibliographical references which can be supplied from my former revision and cite the latter under a highly abbreviated title.

1. **Cleora displicata** (Walk. 1860).

Prout, *Revision*, p. 204, pl. vi, fig. 19 (1929).

From the last letter which I received from Mr. G. M. Goldfinch before his much-to-be-regretted retirement from active entomological work, I learned that he had noticed the existence of two or three distinct Queensland species which were passing under the above name. Hoping, however, that he would follow the matter up, I had taken no steps to deal with it until recently, when a new Bali species with non-dilated hindtibia (No. 4, *infra*) and a renewed examination of the "? Java" ♂ (No. 2, *infra*) forced it upon my notice.

Fortunately Walker's type, a ♂ from Moreton Bay, belongs to the same species as the "Queensland" one (not exactly localized) from which Mr. Bennett made his preparation and drawing and there is little to modify in my account. The genitalia, however, are scarcely so "remarkably" distinct from some others as they then seemed to me, but the figure, in spite of some imperfections, will give a very good impression of the valve. The "occasional ab." (in markings) belongs to No. 3. Walker's original ♀, said to come from Sydney, probably belongs here; for his ♂ "b," see No. 3.

2. **Cleora pheucta** sp. n.

Smaller than *displicata* (32 mm.). Palpus approaching twice the length of diameter of eye.——*Forewing* with fovea formed much as in *displicata*; median area rather narrow, postmedian after the curve at the radials running inward a good deal, its inward curve between M^2 and the vicinity of the hindmargin rather pronounced and nearly smooth (with only a very slight tooth about the fold to break its course).——Underside also much as in *displicata*, the dark border on the

forewing reaching the postmedian line at costa, but on the hindwing rather narrow compared with that of most of the group.

In the genitalia distinguishable from *displicata* by the absence of the scobinate patch and by the dilated sacculus arm ; instead of a group of spines on the aedoeagus, which characterizes both the preceding and the following, there appears to be a serrated single spine, or perhaps a cluster so compact that it has not been found possible to separate them.

Java : Mount Gedeh, a ♂ in the Tring Museum so similar to an undersized *displicata* that I formerly referred it there and suspected a possible error of locality. Notwithstanding the differences in the genitalia, it may yet come to be regarded as a subspecies of that species.

3. **Cleora goldfinchi** sp. n.

Hindtibia not dilated. Generally smaller than *displicata* (34 to 36 mm.). The darker irroration, thicker lines and in general heavy dark markings give it a distinctive appearance ; in particular the well-developed longitudinal shading in front of R^3, on the forewing appearing to continue the (often well-developed) median shade (compare *injectaria vittata* Warr.).——*Forewing* with antemedian not so oblique outward anteriorly as in most *displicata* ; cell-mark rather evenly edged with blackish.——*Hindwing* with somewhat better traces of the long scales proximally to the cell-mark and to the postmedian than in *displicata*, though still much smoother-looking than in most of the *decisaria* group ; dark median line contrasting sharply against the whitish proximal area.——Both wings beneath with the dark border generally tapering regularly from M^1.

Queensland : Moreton Bay (type in Mus. Brit.), Taylor Range, Townsville, Burdekin River, Toowoomba. West Australia : Geraldton (E. H. Saunders), a ♂ in Mus. Brit. ; Roebourne, a few in Mus. Tring.

Valve with the scobinate patch present, differently placed from that of *displicata* ; both the arms of the sacculus shortened.

4. **Cleora diphasia** sp. n. (pl. XIII, fig. 16).

♂, 27–32 mm. ; ♀, 31–36 mm. This was easily picked out from an enormous series of *callicrossa* from the same locality by its smaller average size, more *displicata*-like underside and the general impression made by the upperside ; it was then noticed that the ♂ hindtibia was not or scarcely dilated, the hair-pencil wanting. Less variable than *callicrossa* (only the roughly typical forms and those with the median area shaded with black-grey in the posterior half of the forewing or the posterior *and proximal* parts yet known).——Median shade of *forewing* passing close to (generally " hugging ") the distal side of the cell-mark, never forming the wide loop which is so frequent in *callicrossa* ; dark shading on postmedian about (and in front of) R^3 on the whole more developed.——*Hindwing* a trifle less ample in proportion than in *callicrossa*, its termen on the whole less crenulate.——Underside with the borders more soberly darkened than in *callicrossa* (especially in the ♂), with little or no shading off to brown proximally ; postmedian of forewing generally touching the dark border in parts of its anterior half (in *callicrossa* generally well separate).

W. Bali : Prapetagoeng, 1,500 feet, May 1935 (J. P. A. Kalis), 28 ♂♂, 12 ♀♀, in the Tring Museum. A ♀ from Sumba (W. Doherty), in the same

collection, which has hitherto been a puzzle, belongs here, possibly separable racially.

The shape and armature of the ♂ valve (pl. xiii, fig. 1) confirm the distinctions, and the genitalia of the race about to be described (fig. 2) conform entirely; complex process of the sacculus modified, less irregular than in the *decisaria-callicrossa* assemblage, proximally evenly toothed, margin of valve only slightly hairy. Uncus slight. The aedoeagus agrees with the *decisaria* rather than with the *displicata* subsection.

C. d. refota subsp. n. Browner than the Bali race and smaller still than the great majority; the brown shade outside the postmedian rather bright, as also on the forewing that which precedes (proximally) the antemedian.

Tenimber, the type ♂ ex coll. Joicey, together with 1 ♀; Portuguese Timor: Suai, 2 ♂♂, 3 ♀♀ (E. Wahr) in the Tring Museum, one of each sex showing the aberration in which the posterior half of the median area is darkened with black-grey.

5. **Cleora rhadia** Prout 1929.

Prout, *Revision*, p. 204, pl. vi, fig. 20 (1929).

This and the following forms, as far as *lacteata*, are associated by the two-pronged processes of the valve (fig. 3) and seem to be all closely related. Mr. Stringer, indeed, was inclined to regard all as races of a single species; but taking into account all the characters, as well as the inferences deducible from their distribution, I consider them as two, if not three, species. Concerning typical *rhadia*, from Luzon, I have nothing fresh to record.

C. r. frigescens subsp. n. (pl. xiii, fig. 17), ♂, 31–35 mm.; ♀, 38 mm. Upperside of a dead white, with some brown-grey irroration.——*Forewing* perhaps on an average slightly narrower than in *rh. rhadia*, proximal markings scarcely so oblique, median area generally narrower at posterior end, median line more strongly expressed.——Underside distinctive, decidedly whiter than *rh. rhadia*, the subterminal shades and on the hindwing the cell-spot still further reduced, sometimes almost obsolete on the hindwing (closely similar to *hemiopa ecdecs* Prout 1929). Valve (fig. 4) narrower at apex than in *rh. rhadia*, with the pronged processes of the sacculus longer and slenderer.

W. Bali: Prapetagoeng, 1,500 feet, May 1935, 8 ♂♂, 1 ♀, showing little variation.

From W. Java I have only seen 3 ♂♂, which I cannot separate superficially from *rh. frigescens*, unless the brown shade outside the postmedian is a little less ill-developed, but which may represent a different race, as the genitalia of the one examined in the British Museum (Mount Gedeh, 5,000 feet, Overdijkink) shows the pronged processes less developed; the other two (Mount Gedeh, 2,000 feet; Mount Malang, 3,000 feet) were received by Lord Rothschild from Mr. Kalis. A worn ♂ from Celebes looks as if it belonged about here, but has not been critically studied.

6. **Cleora perbona** sp. n. (pl. XIII, fig. 18).

Cleora decisaria part., Prout, *Revision*, pp. 205, 206, pl. vi, fig. 21 (valve) 1929) (err. det.).

♂, 33–40 mm. (one dwarf 30 mm.); ♀, 40–42 mm. Conceivably a remarkably differentiated race of *rhadia*, as no significant difference has yet been found in the genitalia; but so dissimilar that I suspect structural distinctions will yet be

discovered. More likely a less white subspecies of the species which I assume to be *lacteata* Warr. (see below). Abdomen relatively more elongate than in *rhadia*, with irregular dorsal spots (in some examples almost crest-like) of elongate white scales.

Forewing somewhat less narrow than in *rhadia* and its races, apex somewhat rounded, about as in *callicrossa*; in the ♂ well tinged with brown, especially beneath, in the ♀ whiter, but more or less copiously irrorated and with the brown bands which accompany the lines bright; lines more strongly dentate than in *rhadia*, the ante- and the postmedian line widely—generally very widely—separated at costa, the former slightly oblique inward from costa to SC, then making a strong curve outward, as in most *callicrossa*; median variable, at times making a wide outward loop beyond the cell-spot; cell-spot commonly with black or blackish circumscription; postmedian with the sinuosities not strong; subterminal well developed, with fairly strong dark-grey shading or maculation on each side.——*Hindwing* with termen rather strongly convex and appreciably more crenulate than in *rhadia*; the patches of raised white scales well developed, the area between median and postmedian generally whitish; coloration and markings otherwise conforming to those of forewing.

Underside at first sight remarkably like that of *callicrossa*, with similar brownish suffusions outside the postmedian, strong blackish cell-spots, strong median line and dark distal bands; cell-spots on the whole not quite so large, especially that of the hindwing; median line even thicker, its central bend on the hindwing generally rather more angular, its entire course on that wing inclined to be faintly crenulate; distal band less broad on both wings, but especially on the hindwing, showing the tendencies to posterior narrowing, or even obsolescence, which indicate its affinity with *rhadia*.

Goodenough Island, 2,500–4,000 feet, April and May 1913 (A. S. Meek), a good number, the type series in the Tring Museum. Probably also on parts of the New Guinea coast; in the Tring Museum there are no less than 11 ♀♀ from Astrolabe Bay and district which I feel confident should be referred to *perbona*, but not a single ♂ was taken with them.

An aberration, known in one of each sex, shows much black-grey suffusion proximally to the median line (not, as in similar aberrations of *callicrossa* and *diphasia*, extending to the postmedian posteriorly).

The processes of the valve (fig. 5) are slightly less long than in *rhadia frigescens*, but otherwise similar. Unfortunately, not having a Ceram ♂ available and not suspecting any confusion of closely similar species, I had the valve of a *perbona* figured (*Revision*, pl. vi, fig. 21) as *decisaria*.

7. **Cleora lacteata** (Warr. 1897) (pl. XIII, fig. 20).

Chogada lacteata Warr., *Nov. Zool.*, iv, 247 (1897) (Kinnigunang [Kinigunang], New Britain).

I think this name, which has been sunk in the synonymy of *decisaria* (Walk.), will have to be resuscitated for the Bismarck and Solomon Islands representative of the preceding. Very unfortunately the type, a ♀, is the only Gazelle Peninsula specimen of the group yet known and is not quite typical, the marginal (or on the hindwing chiefly *submarginal*) shades beneath being less broad than usual [1] and

[1] Warren's brief diagnosis, giving "thick postmedian and broad submarginal shade," is therefore more appropriate to the present species than it would have been if he had compared this particular specimen with the norm of the group.

—on account of its not very fresh condition—the brownish shading between postmedian and subterminal band is little in evidence; but a quite normal ♂ of the Solomons species, taken on Feni Island (E. of New Ireland), proves its occurrence in the Bismarck Archipelago, while a side-by-side comparison with a short series of both sexes of *nigristigma* (see below) shows how difficult it would be to conceive of it as an aberration of this latter. For the valve of a Guadalcanar ♂, see fig. 6.

Generally speaking, *lacteata* differs chiefly from *perbona* in its whiter colour (though with strongly developed markings, the brown bands which accompany the lines rather bright) and especially on the underside, which has the postmedian still thicker and the borders broader, though on the hindwing still sufficiently narrowed in its posterior half to leave room for an almost continuous white terminal band from radial fold to tornus.

Solomon Islands: Guadalcanar (type ♂ in Mus. Tring), Bougainville, Treasury, Choiseul, Ysabel, Tulagi. Also a ♂ from Feni Island (see above) and the original ♀ from New Britain.

8. **Cleora decisaria** (Walk. 1866) (pl. XIII, figs. 21, 22).

Boarmia decisaria Walk., *List. Lep. Ins.*, xxxv, 1589 (1866) (Ceram).
Prout, *Revision*, p. 205 (1929) (part.).

The troublesome fact that Walker founded this species on a ♀ is made all the more troublesome by the further fact that it still remains the only specimen of its group which I have seen from Ceram, so that there has been no opportunity to become acquainted with the range of forms which occur there or to examine the genitalia of any topotypical ♂. A fresh study of the type, however, has given me a certain amount of assurance as to the determination; the white underside, without the brownish suffusions of *callicrossa* and with the median line very ill-developed posteriorly, point pretty definitely to the other widely distributed species of the group, so that I feel justified in employing the old name in this sense.

Expanse 34–42 mm., in W. Bali on the whole a trifle larger than *callicrossa* and perhaps with the termen of the forewing slightly more oblique, just sufficiently to give it in general a slightly less stumpy appearance. In the palpus, antenna, hindleg and fovea, as well as in the scaling, not yet found to diverge from the characterization which I gave of the composite "*decisaria*" of my earlier revision. Even the ♂ genitalia deviate so little that one would hesitate to make this a basis for a reclassification if there were any other way of understanding (and demonstrating) the interrelations of the distribution, both horizonal and vertical, of the two forms. The distal margin of the valve (figs. 7, 8) is appreciably broader and the whole has a squarer appearance, the patch of hairs at its apex is reduced in extent and the hairs themselves are shorter; the proximal part of the complex "sacculus" is certainly more highly developed than in some of the group, but I am not sure that it can be distinguished from every form that can occur in *callicrossa*, some allowance having to be made for individual variation.

Walker's type ♀, which has lost its abdomen but is otherwise in passably good condition, has been very successfully photographed by Mr. Tams and its inclusion on our plate will materially add to the utility thereof. It is by no means

a striking form, but its underside shows close similarity to that of a Mount Kebea ♀ with which I carefully compared it ; this, is its turn, is quite obviously the ♀ to a ♂ (from the same locality) which has furnished one of our figures of the valve (fig. 8). The principal distinctions from *callicrossa* underside are that the postmedian line of the underside is slender, only well developed on the anterior part of the forewing, weak or obsolete behind (in *callicrossa* thick throughout, see fig. 21) ; the space between this line and the terminal band whiter (in *callicrossa* suffused with brown), on an average broader, the terminal band being on the whole less broad and less heavy, the contained white terminal spots not quite so sharply defined ; the cell-spots, though often large (as in Walker's type) are less constantly so than in *callicrossa*, and on the upperside show (that of the hindwing particularly) a tendency to reduce the black element. Notwithstanding the variability of both, the following further details may also be often found serviceable : postmedian line of both wings, above and beneath, commonly less strongly sinuous than in *callicrossa*, at times also the proximal edge of the terminal band of the forewing ; underside almost throughout with a whiter tone, particularly in the ♀♀.

? E. Java: Waterfall Baoeng, 1,200 feet, a pair; W. Bali: Mondoktoempang, 2,500 feet ; E. Bali : Batoeriti, 2,500 feet, 2 ♂♂ ; Buru : Kayeli, 2 ♂♂ ; Ceram, 1 ♀ (the type) ; New Guinea : Mount Kebea, 6,000 feet, 1 ♂, 1 ♀.

9. **Cleora amphidoxa** sp. n. (pl. XIII, fig. 23).

♂, 33–36 mm. ; ♀, 36–37 mm. Face, palpus, antenna and hindleg as in *decisaria* and *callicrossa* ; tibial pencil of ♂, as in them, including a patch of fuscous or dark-grey hair. Wings in all the known examples with a slightly brownish tone, the bright brown shades fairly well expressed.——*Forewing* with the markings much as in well-marked *decisaria*, postmedian line not (as in *callicrossa*) deeply incurved at fold, thus never touching the median line, in the ♀♀ not even approaching it ; cell-mark with the dark circumscription brown rather than blackish, not very strong.—*Hindwing* with corresponding modification of the cell-mark ; postmedian line often rather markedly sinuous.——Underside with some brown suffusion recalling that of *callicrossa* ; the markings brown, less mixed with black than in *callicrossa*, the postmedian weakened, more approaching that of *decisaria*, the cell-spot of the hindwing also small and weak.

Genitalia : ♂ valve (fig. 9) not so square as that of *decisaria* nor with its apex so lightly clothed ; seems hardly distinguishable from that of some *callicrossa* forms in which the proximal part of the sacculus armature is highly developed.

N. Borneo : Tenom (E. Wahr), 6 ♂♂, 2 ♀♀, type ♂ in the Tring Museum ; Labuan (A. Everett), 1 ♀.

In most respects, including the wing-shape, strictly intermediate between the preceding and the following species, so that I do not care to attach it to either as a subspecies, though perhaps the genitalia suggest that it has the more recently branched off from *callicrossa*. The only noteworthy aberration yet known is one of the ♂♂ ; in it the bright brown shades are extended, running longitudinally from near base to near termen on the posterior part of the fore- and the anterior part of the hindwing.

10. **Cleora callicrossa** (Meyr. 1889) (pl. XIII, fig. 19).

Boarmia callicrossa ♂ Meyr., *Tr. Ent. Soc. Lond.*, 1889, p. 498 (1889) [1] (Port Moresby).
Chogada callicrossa Warr., *Nov. Zool.*, v, 423, 430 (1898) (Key Islands).
Cleora decisaria part. Prout, *Revision*, p. 205 (1929).

Meyrick's holotype, a ♂, is a pretty and rare aberration with strong dark blue-grey (almost blackish) shades on the upperside proximally and distally to the subterminal. The species is extremely variable on the upperside, but the splendid series which have been received from the Key Islands and from Prapetagoeng, W. Bali, besides good material from Townsville, Queensland, have shown how little the underside varies and how good a criterion it furnishes in differentiating the allied forms. It is not necessary to repeat here what has been given under *decisaria* and *amphidoxa*.

The valve has been figured from a Key Island ♂ in *Ins. Samoa*, iii, 161, text-fig. 2A, after a drawing by Mr. Tams; it has, however, been considered desirable to use some of his photographs here (figs. 10–13), in order not only to secure uniformity with the other illustrations, but also to show the apical patch of hair and the possibility of geographical variation.

The distribution of *callicrossa* is certainly very wide, although by no means so wide as I thought when I gave the list of known localities for "*decisaria*" on p. 206 of my first *Revision*. Leaving out a few which it has not yet been possible to confirm, I can give the following list: Bali, Sumba, Timor, Dammer, Tenimber, Key, Queensland, New Guinea (near the coast) and almost certainly St. Aignan (2 ♀♀ only before me).

One or two extremely interesting aberrations, previously unknown in the group, occur in the Prapetagoeng series; perhaps the most striking (represented by 3 ♂♂ and 1 ♀) has a large dark (brown, largely suffused with black) patch on the hindwing from R^1 almost to abdominal margin, proximally crossing the median line and distally reaching considerably beyond the postmedian.

11. **Cleora nigristigma** (Warr. 1905) (pl. XIII, fig. 24).

Chogada decisaria ab. *nigristigma* Warr., *Nov. Zool.*, xii, 432 (1905) (Choiseul I.).

I am inclined to think the "*decisaria*" of the Solomon Islands a separate species rather than merely a subspecies of either of the foregoing. The apex of the valve (fig. 14) is narrower than in any of the cognate forms, the tufts of hairs on the margin considerably more developed, the complex process of the sacculus smaller. In any case it needs a separate name.

Generally rather small, the ♂♂ and to some extent the ♀♀ suffused with a dirty brownish, the markings above generally more or less blurred, even the lines fine and not intense; cell-spots, on the other hand, often (perhaps in 20 per cent. of the known examples) strongly black even on the upperside. Underside, especially in the ♂♂, with the dark border rather broad and considerably reducing the white terminal spots, the postmedian of the hindwing gently curved rather than bent or angled.

As regards the nomenclature, I think I am justified in here raising the "ab." name to the rank of a species, as it was not actually erected as a "nomen collectivum," is not preoccupied in the genus and happens to represent a phase

[1] "1899" in my *Revision* is of course a misprint, unfortunate but not likely to have caused any misunderstanding.

which, though by no means the commonest, occurs throughout the range of this species while extremely rare elsewhere in the group.

Bougainville, Choiseul (type), Ysabel, Florida, Guadalcanar, Kulambangza and San Christoval.

C. n. talaseënsis subsp. n. Not so small (♂, 35–38 mm. ; ♀, 37–40 mm.), above with the markings less blurred than in *n. nigristigma*, otherwise essentially similar.

New Britain : Talasea, January and February 1928 (A. F. Eichhorn), 6 ♂♂, 2 ♀♀ in Mus. Tring ; for the sake of uniformity, I have selected as holotype the one example (♂) of the black-spotted form.

12. **Cleora ictuibasis** sp. n. (pl. XIII, fig. 25).

♂, 34–38 mm. ; ♀, 40 mm.

Divergent from all the preceding in the entire absence of dark terminal bands beneath ; also in some details of the fovea, which, however, is sufficiently similar to justify its inclusion in the group. Easily picked out among the innumerable *concentraria* (Snell.) forms of the district in which it occurs by its more uniform, greyish tone (caused by the rather profuse distribution of dark irroration and comparative obsolescence of the reddish-brown bands of shading), much less bulged postmedian of the forewing, black mark at base of abdominal margin of hindwing (a trifle larger than in most of the *decisaria* group) and essentially different underside, which, though much less deeply than above, is also uniformly irrorated and shows (rather weakly) the principal markings of the upperside ; cell-spot, especially of hindwing, generally narrowed. Hindtibia of ♂ with strong hair-pencil, tarsus slightly shorter than in *decisaria*.

Forewing slightly narrower than in *decisaria* ; the large, composite fovea characteristic, occupying almost the whole proximal area between M and SM^2, its principal part bisected by the fold but in its totality somewhat lyre-shaped, scaled above much as in *decisaria*, but without the differentiated " rosette."—— *Hindwing* above in both sexes with the patches of long white or white-grey scales as in *decisaria*.

The ♂ valve (fig. 15), figured from a photograph kindly prepared by Mr. Tams, shows a stronger tooth near the base of the costa than in any of the *decisaria* group (sens. str.) and very noticeable differences in the armature (" sacculus " and " harpe ").

E. Java (J. P. A. Kalis) : Djoenggoe, Ardjoeno, 4,500 feet, 8 ♂♂, including the type; Tengger : Singolangoe, 5,000 feet, 2 ♂♂ and 1 ♀; Kletak, 6,000 feet, 1 ♂.

SOME OLD-WORLD ANTHRIBIDAE.

By DR. KARL JORDAN, F.R.S.

THE species described under Nos. 1–16 are from the Oriental Region, those under Nos. 17–20 from Africa.

1. **Xenocerus anthriboides continens** subsp. nov.

♂♀. Sutural line joining the angulate transverse line; dorsal line from middle to base and lateral one from middle to near base, these lines not interrupted as in *X. a. anthriboides* Montr. 1856; subapical transverse linear spot long.

Solomon Islands: Bougainville, 2 ♀♀; in Brit. Mus. a ♂ with broken antennae from the same island; type ♀.

2. **Xenocerus charis** sp. nov.

♂. Antenna compressed, segment III short.

Black, densely covered with a clayish buff pubescence. Rostrum with narrow black median vitta, which widens into a triangle on occiput. Antenna one-fourth longer than body, black, segment VIII, apex of VII and base of IX white, II and VI to VIII strongly compressed. On pronotum two black vittae, broader than buff median vitta and narrower than luteous lateral area. Scutellum buff. On elytra the following black markings: an oblique shoulder-patch, an elliptical spot on subbasal swelling, extending to base, two spots side by side before middle, the upper one from interstice II to IV, a little longer than broad, the lateral one close to it, somewhat oblique, reaching to margin, broader than long, with a short spur anteriorly from upper angle, before apical declivity a transverse band from side to side, evenly curved, convex anteriorly, narrow at side, dorsally about as broad as interstices I and II, its posterior margin diffuse. Pygidium with narrow black median vitta. Underside somewhat paler than upper, without markings; apices of tibiae and of tarsal segments black.

Length 9 mm.

Tenimber: Larat (F. Muir), 1 ♂.

The pubescence may possibly be white in other specimens.

Eczesaris Pascoe 1859.

Syn.: Idiopus Lacordaire, *Gen. Coléopt.*, vii, p. 511 (1866) (type: *I. striga* Lacord. 1866).

The genotype of *Idiopus* is a black species with a white basimarginal band on the elytra. I have before me three specimens from Ceram and Gilolo which conform with Lacordaire's generic and specific descriptions and agree so well with *Eczesaris atomaria* Pascoe 1859 that I have some doubt about their being really specifically distinct from *E. atomaria*. Assuming that my identification is correct—the type of *I. striga* is not available for comparison; the locality of the specimen was said to be Celebes—*Idiopus* is a synonym of *Eczesaris*. In Lacordaire's classification *Idiopus* is placed in group VI and *Eczesaris* in group VIII. In the descriptions of these groups of genera it is stated that the antennal scrobe is sulciform in *Idiopus* and allies and foveiform in *Eczesaris* and allies. However,

on p. 521 Lacordaire himself states that the groove of *Eczesaris* forms a deep furrow. This statement, which contradicts the diagnosis of group VIII, is hardly correct, the groove being ovate with a narrow forward projection for the insertion of the antenna and with a glossy shallow depression back- and downwards, which might be called a furrow, but not a deep one.

3. **Eczesaris bolana** sp. nov.

♂. Like *E. penicillus* Jord. 1898, but elytrum with only two tubercles, which are high, and the end-segment of antenna short.

Evidently an immature specimen, for the derm of rostrum, underside and legs is orange-ochraceous and that of lateral half of elytrum green (as it sometimes is in *E. penicillus*). Rostrum with low median carina disappearing apically and basally, dorsolateral carina barely vestigial; between antenna and eye two thin ridges, the upper one dorsal, commencing above margin of antennal groove, the other lateral, a continuation of the margin of this groove. Frons somewhat broader than in *E. penicillus*; pubescence on crown of head somewhat prolonged, but not forming a tuft. Eye a little longer than in *E. penicillus*. Segment IX of antenna somewhat longer than broad, X nearly as broad as long, XI as long as broad, truncate at base.

Median swelling of pronotum slight, pubescence of central area more or less orange-ochraceous; dorsal carina rather strongly concave, towards side more convex than in the allied species and then again concave, laterally lower in middle than at end, the thorax appearing, in dorsal view, somewhat constricted before angle of carina.

Underside with numerous pale buffish dots and dispersed blackish pubescence, which is the same colour on tibiae and tarsi. Anal sternum truncate-rotundate, as long medianly as sternum II.

Length 7, width 4 mm.

Mandated New Guinea: Bolan Mts., 1 ♂.

4. **Phaulimia caena** sp. nov.

♂♀. Very near *Ph. priva* Jord. 1895, but narrower, frons wider, club of antenna shorter, segment X transverse, luteous spots of pronotum larger, particularly those occupying the central area, which are confluent, angle of pronotal carina more broadly rounded, horns of hypopygidium of ♂ slightly longer. Taking the width of rostrum as 1, the width of frons is in *Ph. caena* ♂ 0·32, ♀ 0·40–0·42, in *Ph. priva* ♂ 0·20–0·25, ♀ 0·27–0·31.

Ceylon: Mawagankanda, Ratnapura, 500 ft., ii. 1935, ex *Dipterocarpus ceylanicus*, 1 ♂ (type); Ohiya, Uva, 5,850 ft., vi. 1935, ex. *Gordonia ceylanica*, 1 ♂, 3 ♀♀, and iv. 1935, ex *Calophyllum walkeri*, 1 small ♀; all collected by Gauri Dutt.

5. **Rhaphitropis cosmia** sp. nov.

♂♀. Similar to *Rh. stevensi* Jord. 1925; but frons narrower, being only one-third the width of rostrum; antenna pitchy brown, paler at base, club darkest, almost black; eye slightly incurved on side towards antenna; grey streaks of pronotum more sharply defined; streak in interstice III of elytrum interrupted on subbasal swelling, thence complete to apex and here turning laterad to join streak in IX, streak of X from base to apical declivity, the one in VII a little

shorter and slightly interrupted behind shoulder, streaks IX and X more or less widely interrupted twice. Tarsi blackish.

Rh. indicus Jord. 1925, which is streaked and spotted nearly like *Rh. stevensi*, has the pronotal dorsal carina much more forward and more distinctly incurved in middle, almost angulate.

Bengal: Dahura, Bagdogra, Kurseong, viii. 1935 (N. C. Chatterjee), ex *Michelia champaca*, a small series.

6. **Uncifer myodes** sp. nov.

♂♀. Similar to *U. stigmosus* Jord. 1936; smaller, frons much broader, lateral angle of pronotal carina less projecting backwards, pronotum with two broad black stripes, etc.

Brownish black, pubescence of upperside mouse-grey with a slight yellowish tint. Head uniformly pubescent; frons and eye more convex than in *U. stigmosus*; frons a little over half the width of rostrum. Antenna pale buff, club darker, III very little longer than IX, club a trifle longer than in *U. stigmosus*. On pronotum a mouse-grey median stripe interrupted in middle, at side of this stripe a black one about twice the width, not sharply defined, narrowest at apex, widened in middle and less so in front of carina; lateral angle of carina almost as in some species of *Rhaphitropis*, not obviously projecting backward, the carina flexed forward a very short distance. Scutellum nearly white, its colour contrasting with that of pronotum and elytra. The latter marked with black: a median patch on suture twice as long as broad, on each elytrum about 23 dots, most of which placed in interspaces III and alternate ones, two or three of them joined to the sutural patch, an elongate spot on shoulder angle.

Legs pale buff, tarsi and upperside of femora and tibiae, especially in hindleg, blackish. Abdomen of ♂ medianly flattened, the depression not flanked by a carina as in *U. stigmosus*.

Length 2·5–2·8 mm.

Bengal: Duhura, Bagdogra, Kurseong, viii. 1935 (N. C. Chatterjee), ex *Michelia champaca*, 1 ♂, 3 ♀♀.

7. **Zygaenodes semnus** sp. nov.

♂. Eye entire, short-elliptical, eye-stalk with tuft above eye.

Upperside rufescent buff. Rostrum and anterior portion of frons flat with sides straight from apex to eye-stalk and parallel, the flat area nearly a square; apical margin straight, a large diffuse blackish patch occupying the whole apical margin, narrowing upward and disappearing towards base, in between antennae a minute median tubercle. Eye-stalk subcylindrical, very little compressed, eye larger than usual, placed below end of stalk which bears on upperside a crest of black-tipped ochraceous hairs. Occiput convex, no tubercle between eye-stalks; the following markings white: a lateral stripe from eye to antennal groove and a second parallel with the first farther back, a diffuse apical patch on frontal side of eye-stalk and a transverse band between the eye-stalks. Antenna inserted on straight side of rostrum at two-fifths from eye-stalk to mandible, proximally rufescent buff, gradually becoming blackish distally, segment III nearly as long as IV + V, IV to VII nearly alike, VIII shorter and apically broader, IX two and one-half times as long as VIII, one-third

longer than III, X as long as III, XI a little longer than III, one-sixth shorter than IX.

Pronotum with narrow, interrupted, white median band, a sublateral, irregular, pale stripe within a broad blackish area connected halfway between carina and apical margin with a pale lateral patch; above this stripe a small white dot at carina; dorsal carina angulate in centre; no tubercles; scutellum white.

Elytra one-fifth longer than broad, flattened dorsally, strongly convex-declivous posteriorly, subbasal swelling distinct, but not tuberculiform; this swelling, the shoulder, a area from shoulder gradually widening, reaching in middle to interspace III, and the whole apical area to above the declivity brownish black, before apical area a transverse white band from side to side, wider at suture than in interstices IV–VI, extending forward between VII and margin to base, and connected with scutellum by an oblique branch which runs across antemedian depression along the posterior and sutural sides of subbasal swelling; in white transverse band two brown dots in interspace III, in interspace VII six blackish spots from apical black area to shoulder and in IX three such spots, a large triangular antemedian lateral patch free of white pubescence, the dorsal area from black apex to base rufescent buff, enclosing blackish subbasal swelling; no tubercles. Pygidium black, a little broader than long, apex round.

Underside brownish black; on mesepimerum and anterior half of metepisternum a white elongate patch, from which extends a thin line along lower margin of metepisternum, tip of metepimerum also white; abdomen with thin silky white pubescence. Femora dark brown, their apices rufescent buff like tibiae and tarsi; all tibiae subcylindrical, foretibiae not compressed.

Length 4·5, width 2·3 mm.

Malay Peninsula: Retam Tenggalt R., xii.1932, in flight (F. G. Browne), 1 ♂.

8. **Basitropis truncalis** sp. nov.

♀. Like *B. peregrinus* Pasc. 1859, from Australia, perhaps a subspecies. Broader; apical sinus of rostrum wider, less anguliform, the apex of rostrum medianly more convex; pronotum broader and its sides more rounded, proportions of length and width in *B. peregrinus* ♀ from Queensland 22 : 23, in the new species 22 : 25. Abdomen with a row of dark-brown lateral spots as in *B. peregrinus*, all segments punctate, punctures laterally confined to base on II and III, ventrally the punctures very small and scattered except on I and V; prosternum with transverse fold in front of coxae as in *B. peregrinus*, but the fold more prominent.

Length 11·0, width 4·3 mm.

Solomon Islands: Lavoro, Guadalcanar, ii.1934 (H. T. Pagden), on tree trunk.

9. **Basitropis modica** sp. nov.

♀. The pubescence has much suffered; maculation similar to that of *B. hamata* Jord. 1903, but the spots more scattered. Proboscis with median carina as in that species, the punctures larger and more numerous, longitudinally confluent, as they are also on upperside of head (except neck). Antenna a little shorter than in ♀ of *B. hamata*. Pronotum as long as broad, less rounded and narrower than in *B. hamata* and other Indian species, puncturation denser,

especially at side, where the punctures form a net, with the interspaces much smaller than the punctures ; dorsal carina somewhat more concave and therefore the lateral angle more obtuse than in *B. hamata.*

Length 4·3–6·3 mm.

Bihar, Balaghat, C.P., vi. 1927 (Gauri-Dutt), 1 ♀ (6·3 mm.) ; Chota Nagpore, 1 ♀, type ; Motinala Road, S. Mandla, C.P., vi. 1927 (N. C. Chatterjee), 1 ♀.

10. **Protaedus salomonis** sp. nov.

♂. Pale rufescent buff, pubescence grey, with brown patches. Rostrum slightly impressed in middle, but with the margin of antennal groove strongly elevate, apical angle projecting, the sides being incurved at antennal grooves. Frons moderately convex, broader than rostrum between antennae. Eye strongly convex, with the sinus small and shallow. Antenna differs from that of other species of the genus in segment III being a little longer than IV ; IV to VIII about equal, IX to XI brown, IX a little shorter than VIII and a little longer than X, XI a trifle longer than X, with pale tip.

Pronotum one-third broader than long, coriaceous, slightly convex, somewhat flattened apically, at apex a double patch extending on to occiput brown, in posterior two-thirds of disc each side of middle a large brown patch, trapezoidal, the anterior outer angle of it produced forward, from this projection a stripe runs obliquely backward towards lateral carina and another obliquely forward to apex of lateral carina ; dorsal carina medianly nearly straight, quite evenly curved forward in a wide arc to apical third, sides strongly rounded in consequence, the pronotum being one-third broader at widest point than at apex.

Elytra strongly punctate-striate, with the interspaces convex ; grey, with diffuse brown patches and dots which are more or less connected, dorsally about six from base to apex and laterally about eight. Pygidium rounded, broader than long, almost smooth.

On underside the derm of thorax and abdomen brown. Legs pale, segment I of tarsi shorter than II to IV together, especially in fore- and midtarsi.

Length 2·4, width 1·0 mm.

Solomon Islands : Lakaru, Russell I., ii. 1934 (R. J. A. W. Lever), 1 ♂.

11. **Autotropis notalis** sp. nov.

♂♀. Close to *A. modesta* Jord. 1924 ; larger ; club of antenna somewhat broader ; pubescence of scutellum and basal half of elytra clayish grey instead of greyish white ; subbasal swelling of elytrum less prominent ; behind middle of elytrum an irregular blackish patch separated from the blackish lateral border.

Length : 4–5 mm.

Bengal : Samsingh, Kalimpong, iv. and v. 34 (Balwant Singh and M. Posford), type, ex *Acrocarpus fraxinifolius* ; Gazalduba, Jalpaiguri, x. 1933 (N. C. Chatterjee).

12. **Misthosima separ** sp. nov.

♂♀. Like *M. badia* Jord. 1931 from Java ; but rostrum somewhat shorter ; antenna of ♂ thicker ; pronotum more convex and its carina evenly rounded at side, without indication of an angle ; foretarsus of ♂ narrow and like foretibia without long hairs, segment I of all tarsi longer than II to IV together.

Ceylon: Kandy, vi.vii.1908 (G. E. Bryant), type; Colombo, a small series. Also from Kanekath, Nilambur, Madras, vi.1925 (S. N. Chatterjee), ex *Tectona grandis*.

13. **Melanopsacus nanellus** sp. nov.

♂♀. A small species. Very pale clay-colour (probably all the specimens not quite mature). Nearest to *M. ceylanicus* Jord. 1895, subglobose, less than twice as long as broad, sides rounded. On pronotum, in some specimens, indications of brown spots. Pubescence pale, evenly distributed, short, turned forward on pronotum and backward on elytra, the silky patches of *M. ceylanicus*, *M. lapillus* Jord. 1924 and *M. depexus* Jord. 1933 absent; in these three species the pubescence of the patches directed more or less right and left. Shaft of antenna brownish, club brown, segment II as long as III + IV, IX slightly asymmetrical, X and XI symmetrical, XI longer than X, nearly as long as II, elongate-elliptical, twice as long as broad. Eye black, smaller than usual, twice as long as broad. Frons broader than interspace between antennal scrobes. Lateral angle of pronotal carina smaller than 90°, angle of pronotum very little produced. Pygidium strongly rounded, about one-third broader than long.

Length 1·2–1·4 mm.

Bengal: Dalhura, Bagdogra, Kurseong, vii.viii.1935 (N. C. Chatterjee), a series ex *Michelia champaca*.

14. **Deropygus curvatus** sp. nov.

♂♀. In size like small specimens of *D. haemorrhoidalis* Jord. 1895; pronotal carina laterally rounded without indication of an angle; elytra, meso-metasternites and abdomen black, or (♀) also head and prothorax black.

♂. Head and prothorax pale buff, pubescence of pale areas grey. Frons one-seventh the width of head inclusive of eyes. Antenna testaceous. In front of scutellum a double spot black or the greater part of disc of pronotum blackish brown or black, apical area and sides and a sublateral basal triangular spot remaining pale, in the pale lateral area some brown spots, pubescence blackish except on some apical and lateral grey patches; puncturation as dense as in *D. haemorrhoidalis*, forming a net; carina flexed forward at side in an even curve, whereas in *D. haemorrhoidalis* there is a sharply marked angle of 95°.

Elytra black, rather coarsely punctate-striate, interstices granulate, the grey pubescence scattered, more concentrated at lateral margin and in two indistinct transverse bands, one behind middle and the other at beginning of apical declivity, an antemedian oval sutural spot conspicuous, almost confined to sutural interspace, no pale apical area. Pygidium broader than in *D. haemorrhoidalis*, one-half longer than broad, brownish black, with evenly distributed grey pubescence, median carina highest in apical half, higher than in *D. haemorrhoidalis*.

Metasternum convex each side of median furrow, not broadly flattened as in *D. haemorrhoidalis* ♂; abdomen compressed, but medianly transversely rounded, anal segment not abruptly projecting downwards, in lateral aspect the ventral outline from apex of end-segment forward gradually and nearly evenly curved, end-segment with small, shallow, transverse groove divided by a slight median carina and bearing a transverse double row of short bristles. Legs pale buff, more or less shaded with blackish brown.

♀. Black ; derm of occiput with a pale patch at eye. Base of antenna rufescent. In apical area of pronotum four diffuse grey spots. Elytra with antemedian grey sutural spot as in ♂. Pygidium a little longer than broad, convex in basal half, apically impressed, the rim being raised, but no subapical upturned flap. Apical margin of anal sternum medianly somewhat projecting like the spout of a jug. Legs coloured as in darkest ♂.

Length 3·5–3·8 mm.

Dehra Dun : Nakronda, vii.1936 (J. C. H. Gardner), in dead fallen tree.

15. **Stenorhis docis** sp. nov.

♂. Differs from *St. ampedus* Jord. 1928 (Ellice Is.) in the much longer club of the antenna and the rougher surface-structure of upper- and underside.

Twice as long as broad. Rufous brown ; pubescence luteous grey variegated with whitish grey, some places without pubescence. Markings diffuse : in front of pronotal carina on each side a small spot near angle, a comma-shaped one near middle and several indefinite markings near apex whitish ; in front of apical declivity of elytra a transverse luteous-grey zigzag band, another band near apex, basal half of elytra luteous grey variegated with brown and whitish grey.

Club of antenna longer than segments III to VIII together, III longer than IV, VIII about one-third longer than broad. Pronotum densely reticulate, basal angle obtuse and rounded off ; lateral carina extending a little beyond middle, continued by a slight longitudinal ridge. Elytra densely granulate, punctate-striate, the stripes not very conspicuous on account of the roughness of the interstices. Pygidium longer than in *St. ampedus*, prominently reticulate, apex truncate-rotundate, inerassate in anal aspect. Abdomen pitted with large punctures on all the segments. Tarsal segment III broader than long, but narrower than in *St. ampedus*.

Length 2 mm.

South Palavan, 1 ♂.

16. **Stenorhis promus** sp. nov.

Less cylindrical than the preceding species ; club of antenna as long as segments I to VII together.

Pale rufescent buff (immature ?), with lighter and darker patches, the former with grey, the latter with black dispersed pubescence. Segments I to VI of antenna pale rufous buff, VII to XI blackish, III shorter than II, VIII barely twice as long as broad, club very slender, not broader than segment I, its three segments about alike in length, XI pale at apex. Frons one-tenth narrower than the eye is broad transversely.

Pronotum one-fourth broader than long, nearly straight at side from base to beyond middle, then strongly narrowed-rounded, densely punctate-reticulate, evenly convex transversely and longitudinally, depressed along dorsal carina, indistinctly marbled with grey and black pubescence ; angle of carina very little larger than 90°, lateral carina extending to middle, blackish like dorsal carina.

Elytra strongly convex transversely, rounded-declivous longitudinally from near base, punctate-striate, interstices flat, punctures very much narrower than the interstices, row III containing about 26 punctures ; a short basal sutural stripe, another in interstice III and the shoulder grey, an antemedian transverse

band, an anteapical zigzag band, an apical band, the lateral margin and a sublateral median spot likewise grey, rest with dispersed black pubescence, the markings all diffuse and inconspicuous in the only specimen before me. Pygidium broader than long, rounded.

Length 1·8, width 0·9 mm.

Fiji: Taveuni, Waiyevo, x. 1924 (Dr. H. S. Evans), 1 ♀ (?).

17. **Tropiderinus nasutulus** Bohem. 1845.

Syn.: *Plintheria cinerea* Jord., *Nov. Zool.*, i, p. 628 (1894) (Sierra Leone).

♂♀. Rostrum in apical half with a median carina which reaches neither halfway to eye nor to apical margin. In ♂ segment III of antenna at most as long as II, usually distinctly shorter. Upperside grey, with black and brown patches and irrorations.

In our collection from Sierra Leone, Ukerewe (Victoria Nyanza), Usambara, Mozambique and Natal.

18. **Tropiderinus plintherioides** Karsch 1882.

Mecocerus plintherioides Karsch, *Berl. Ent. Zeits.*, p. 402 (1882) (Chinchoxo).

♂♀. Rostrum without carina. Pubescence white, concentrated in patches and, as a rule, along suture, contrasting with the glossy black derm, upperside more extended black than white. In ♂ segment III of antenna longer than II, club longer than in *T. nasutulus*, especially segments IX and XI.

In our collection from Cameroons, Fernando Po, Gaboon, Belgian Congo. Evidently replacing the previous species in the forest region of West Africa.

19. **Tropiderinus celatus** sp. nov.

♂♀. Rostrum with a longer carina than in *T. nasutulus*, extending from base to between antennae. White scale-hairs of upperside longer and narrower than in the two previous species, scattered, more numerous in front of scutellum, at base of suture, in antemedian depression of elytra and in front of apical declivity. Antenna of ♂ reaching to near middle of elytra (with the head directed forward-downward), segment III one-half longer than II, being longer than in the other species, VIII as long as II, IX one-half longer than broad, one-fifth longer than VIII and one-fifth shorter than III, X one-fourth broader than long; in ♀ II one-sixth longer than III, VIII half as long as II, IX one-fifth longer than III, a little longer than broad, X one-half broader than long. White scale-hairs of underside and legs longer and less close together than in the previous insects.

Length 3·3–3·5, width 1·5–1·6 mm.

Capetown: 1 ♂, type; Durban: 1 ♀.

20. **Anaulodes eumeces** sp. nov.

♀. Distinguished especially by the elliptical eye not being sinuate and the pronotum being one-fourth longer than broad.

Narrower than the other known species; rufescent brown, pubescent grey mottled with brown; median area of pronotum for the greater part brown, in two specimens with an interrupted grey median stripe and some grey spots, in the third specimen more diffusely spotted with grey and an antemedian spot

each side of middle fairly conspicuous; elytra spotted with brown, sutural interspace almost tessellated, in two specimens sutural area more brown than grey, before apical declivity a large brown patch on each elytrum isolated or more or less connected across suture. Pygidium strongly rounded, about one-third broader than long, apical margin slightly elevate in centre.

Eye much less convex than in the other species of the genus. Prothorax a little broader than elytra; these two and one-half times as long as broad.

Apical margin of hindtibia, on ventral side, with a small pale hump and a short tooth-like projection.

Length 3·5–4·3, width 1·0–1·3 mm.

Tanganyika Territory: Ukerewe, viii. xii. 1935 (P. A. Conrads), three ♀♀.

Anaulodes cylindricus Kolbe 1894 is the same as *Anthribidus caffer* Fåhrs. 1871. We have specimens from Sierra Leone, the Congo and Natal. In the ♀ the anal sternum bears a small median carina at apex.

Anthribidus Fåhrs. 1871.

Syn.: *Anthotribidus* Gemm. and Har., *Cat. Col.*, ix, p. 2743 (1892) (emendatio).

Fåhraeus placed two new species into his new genus, but did not follow Schönherr's exeellent custom of designating the genotype. The two species, *A. natalensis* and *A. caffer*, are generically distinct, and the second has indirectly been made by Kolbe the genotype of *Anaulodes* Kolbe, *Stett. Ent. Zeit.* lv, p. 396 (1895, vol. lv for 1894 issued 1895), Kolbe's *cylindricus* being the same as *caffer*. In order to forestall any possible nomenclatorial complication I designate *Anthribidus natalensis* Fåhrs., *Ofv. Vet.-Ak. Förh.* 1871, p. 441, as genotype of *Anthribidus*.

In Schenkling, *Cat. Col.*, Pars 102: Wolfrum, Anthribidae, a third species is placed under *Anthribidus: sellatus* Roelofs 1879, from Japan. But this is closely related to the European Anthribid generally known as *Anthribus albinus* L. 1758, Sharp's *A. daimio* 1891 being a synonym of *sellatus*. The unfortunate mania to emendate names carried out in the *Munich Cat. Col.* by Dr. Gemminger, sometimes with ludicrous results, evidently misled Roelofs to describe the species as "*Anthotribidus* (*Anthribidus* Fåhrs.) *sellatus*"; he states that this new species has the characteristics attributed to "*Anthribidus*" by Lacordaire, *Gen.*, vii, 574, which volume appeared five years before the birth of the name *Anthribidus*. Roelofs meant, of course, *Anthribus* of Lacordaire's work (= *Anthotribus* of the *Cat. Col.* by Gemm. and Har. 1872). Roelofs compares it with "*Phloeobius longipennis* F. and *P. gibbosus* R.," the former name being a slip of the pen, instead of *P. longicornis* F. 1798.

Anthribidus natalensis is very close to certain small *Phloeobius* Schönh. 1826, and it appears to me as yet uncertain whether there is a sharp line of generic distinction. The chief characteristics of *A. natalensis* are the broad frons, the slender and non-prolonged ♂ antenna and the broad apex of the pronotum. The side of the pronotum, from the end of the lateral carina to the apical margin, is cariniform, this ridge projecting a little forward behind the eye, the apex of the prothorax being broader than the head inclusive of the eyes. It is perhaps advisable to place into *Anthribidus* all the species now in *Phloeobius* which have a similar prothorax. That, however, would also involve *Phloeobiopsis* Kolbe 1895, the genotype of which I have not yet examined.

ANTHRIBIDAE FROM SOUTH AND CENTRAL AMERICA.

By DR. KARL JORDAN, F.R.S.

A RICH collection of South American Anthribidae entrusted to me for study by Dr. A. Avinoff, director of the Carnegie Museum, Pittsburg, Penn., was the primary incentive to overhaul, in conjunction with this collection, our own Nearctic material which had accumulated during the last thirty years. The number of species unknown to me was found to be large in both collections. As the majority of species described from South and Central America are represented either at Tring or at the British Museum by the types or by paratypes, the determination of the material was much facilitated. There remained, however, instances of species so closely resembling each other that the original descriptions of a hundred years ago applied equally well to one or the other of them and of which the types are at Stockholm. Professor O. Lundblad very generously lent me the types which it was necessary to compare, and I express here my gratitude to him for having thus assisted me in determining correctly some hitherto doubtful species.

The new species of Anthribidae which await description are numerous, one might almost say endless. For various reasons I publish here the descriptions of only a portion of the new species actually seen and compared. Another instalment may follow, if time permits.

Mr. F. Nevermann, of S. José, Costa Rica, has also submitted to me for determination several interesting species, among which were three new ones represented by small series of specimens; the descriptions of these are incorporated in this paper, as are likewise the descriptions of two new species received from the Riksmuseum at Stockholm.

The types of the new species are at Tring, if not otherwise stated, and I have retained one or more paratypes of the new species, the types of which are in the Carnegie Museum, in coll. Nevermann or in the Riksmuseum. I cordially thank the donors, and particularly Dr. A. Avinoff for his patience and generosity.

Most of the species here described belong to the genera *Gymnognathus* and *Phaenithon*. It is interesting to note that there is a resemblance in colour and pattern between several species of the two genera, and even such a peculiar ♂-character as the deep groove on the head of certain species of *Gymnognathus* is found again in at least one species of *Phaenithon*.

1. **Tribotropis subvittatus** sp. nov.

♂. As in *T. vittatus* Kirsch 1888 the prosternum without transverse fossa and head and pronotum with median vitta.

Black; antenna, tibiae and tarsi rufous, apex of antenna and tarsi more or less black. Median stripe of rostrum, head and pronotum buff, a similarly coloured lateral stripe from eye to base of pronotum, not separate on pronotum from colouring of underside, less regular than median stripe and enclosing several irregular black spots; lateral carina longer than in *T. vittatus*. Elytra strongly depressed at suture, interspace III convex, at beginning of apical declivity

costate, V here likewise costate and higher than III, the whole surface with buff pubescence which encloses many black spots from III to X, these spots in V linear, sutural depression predominantly buff, sutural interspace tessellated with black, II almost entirely buff.

Below buff at side; intercoxal process of mesosternum not humped as in *T. vittatus*, but declivous, flat, subtriangular, with apex rounded; abdominal sternum I without sex-mark.

Length: 19, width 6 mm.

Ecuador: Rio Pastazza, 1 ♂.

2. **Ischnocerus malleri** sp. nov.

♂♀. Eye smaller than in *I. aeneus* Jord. 1895. Pronotum with a very slight depression each side of middle, centre very feebly convex, without tufted tubercle, sides strongly convex, more rounded than in *I. aeneus*; dorsal carina straight. Derm of elytra less metallic than in *I. aeneus*; subbasal tubercle high, not divided into two, not tufted; interspaces III, V and VII costate in posterior half, III highest, these ridges not divided into tubercles and not tufted. Foretibia strongly compressed, broader than in *I. aeneus*.

Pubescence of upper- and underside and legs grey, almost evenly distributed in small spots and patches, the underside and femora especially being irrorated or pencilled with grey, pubescence not condensed on rostrum, head and middle area of pronotum; suture and alternate interspaces not tessellated with black, interspace II and alternate ones not buff.

Brazil: Hansa Humboldt, Sta. Catarina (Anton Maller), one pair; named in honour of the collector, from whom I have received several new Anthribidae.

3. **Goniocloeus morulus** sp. nov.

♂♀. Black, pronotum almost impunctate, elytra with numerous tubercles; pubescence greyish white, condensed in dispersed small spots, which are numerous as a rule, a lateral row on abdomen definite; segment XI of antenna and III and IV of tarsi pale rufescent buff.

Rostrum a little more than half as broad again as long, with numerous shallow punctures, at base a median carina flanked by a depression; another depression, but shallower, behind apex on each side. Frons less than half the width of rostrum (♂ 1 : 3, ♀ 1 : 2½), punctate-subreticulate, with indication of median carina, occiput depressed each side, the depressions extending from behind eye obliquely forward, disappearing on frons, behind and above eye as well as in centre of occiput a diffuse white spot. Club of antenna almost compact, 2½ times as long as broad (17 : 7), all three segments broader than long, X transverse (14 : 9), XI round apart from truncate base; apices of IX and X often pale.

Pronotum one-third broader than long, the greyish white pubescence forming diffuse and partly confluent spots, 7 behind carina and 16 to 18 between carina and apical margin; in front of carina a median swelling, tuberculiform, rounded, on each side and in front of it a depression, the lateral depression extending sidewards, widening above lateral carina, the anterior depression extending obliquely forward and sideward, gradually becoming subapical; dorsal carina somewhat undulate, curved forward at side in a broad irregular arc to two-thirds

of length of prothorax, lateral angle faintly indicated and lateral carina somewhat incurved before angle. Scutellum white.

Elytra one-fourth longer than broad, with parallel sides; greyish white pubescence diffuse, tubercles more or less black, suture dotted with black, subbasal tubercle and median one of third interspace large, rounded, the former the larger, in apical half two smaller tubercles in III and a vestigial one near apical margin, in V four tubercles, smaller than the corresponding ones of III and placed more forward except the subbasal one, which is placed at the side of the large tubercle of III, at apex a depression, in VII four small tubercles and in front of apical depression a vestige of a fifth, IX with four feebly raised black spots and two or three white dots. Pygidium impunctate.

White pubescence of underside thin, metepimerum and a row of four lateral dots on abdomen white; prosternite and abdomen impunctate, punctures on side of metasternite small, shallow and scattered. Tibiae with antemedian white ring; basal half or third of tarsal segment I and base of II white above.

Length: 5·3–6·7, width 2·7–3·4 mm.

Amazonas: Pará (type) and Santarem, type in Carnegie Museum, Pittsburg; also from Costa Rica (F. Nevermann).

4. **Goniocloeus marilis** sp. nov.

♂. Like *G. morulus* (No. 3), smaller, with few buff and white conspicuous markings; base of rostrum without median carina; sides of pronotum from near dorsal carina to apex and depression around antebasal median tubercle punctate; tubercles in apical half of elytra and in interspaces V and VII much lower, mere pustules, no conspicuous white dots except one before middle in interspace V; tarsal segment I not white above. Lateral spot and median dot of occiput and lateral apical spots of pronotum buff.

Length: 3·7, width 1·9 mm.

Amazonas: Santarem, 3 ♂♂, type in Carnegie Museum.

5. **Monocloeus furvus** sp. nov.

♀. A small species similar to *M. or* Jord. 1904. Club of antenna not loose as in *M. or*, but compact, segments X and XI being broad at base and fitting into the apex of the preceding segment. Pronotum creamy buff at sides, the brown median area occupying anteriorly half the surface and posteriorly less than one-third, within it some creamy-buff speckles and a vestigial median vitta, in lateral area three small, ill-defined, black spots. Base of elytra not rufescent and not creamy buff, but dark-coloured like the rest of the elytra, subbasal swellings less prominent than in *M. or*, third interspace without median tubercle, no small tubercles elsewhere, in interspace III a creamy-buff spot behind antemedian depression followed by a short black line which is very slightly elevate and ends at a postmedian creamy-buff spot; each of these buffish spots, but farther back, accompanied by a small spot in V, a number of more or less indefinite creamy-buff spots and scattered pubescence of the same colour in apical half of elytra. Tibiae with grey antemedian ring, tarsal segment I grey above.

Length 4·0–4·5, width 2·0–2·3 mm.

Amazonas: Santarem, type in Carnegie Museum.

6. **Monocloeus inaequalis** sp. nov.

♂♀. Closely agreeing with *M. spiniger* Jord. 1904; subapical tubercle of interspace III of elytra not long, conical and pointed, but small, not larger than the corresponding tubercle of interspace VII.

"Brazil," type ex coll. Dejean with a label bearing above name; in Carnegie Museum from Rio de Janeiro and Santarem.

7. **Piezocorynus polimelas** sp. nov.

Like *P. brevis* Jord. 1904 somewhat out of place in this genus on account of the dorsal carina of the pronotum being subbasal, parallel with basal margin and ending abruptly at side or slightly curving forward.

♂♀. Ovate, strongly convex, subglobular. Pitchy black, antenna paler, pubescence of upper- and underside greyish white, sparse, evenly distributed, not concealing the colour of the derm, but somewhat denser on scutellum, metepimerum, a subbasal tibial ring and proximally on tarsal segments I and II.

Rostrum flat, broader than long (17 : 14), densely punctate-rugulate. Head punctate-granulate. Club of antenna very loose, X and XI (or only XI) pale buff.

Pronotum more than one-third broader than long, straight at sides from angle of carina, evenly convex, densely granulose-coriaceous, the granules arranged more or less in transverse ridges; distance of carina from basal margin about the length of antennal segment XI, practically the same from side to side, the lateral angle projecting sidewards, so that the basal longitudinal carinula forms a very acute angle with dorsal carina.

Elytra subglobular, strongly rising from basal margin, behind subbasal swellings transversely slightly depressed, from before middle regularly declivous-convex towards sides and apex, as in *P. tristis* Jekel 1855; punctate-striate, none of the interspaces convex. Pygidium longer than broad in both sexes.

Sides of thoracic sterna dispersedly punctate. Intercoxal process of mesosternum as in *P. tristis* truncate, nearly twice as broad as long. Anal sternum of ♀ triangular, the smooth tip visible from above.

Length 5·5, width 3·7 mm.

Amazonas: Santarem, two pairs, type in Carnegie Museum.

8. **Piezocorynus pullinus** sp. nov.

♂♀. Subcylindrical, black, spotted with grey or luteous; segments X and XI of antenna somewhat longer than broad; angle of pronotal carina about 90°, but very strongly rounded; subbasal callosity of elytrum prominent. Near *P. homoeus* Jord. 1904 in colouring. Derm sometimes rufescent; pubescence grey, not concealing the colour of the derm, two minute creamy spots at eye. Antenna thin, rufous or rufescent, VIII slightly widening towards apex, club of the narrow and loose type, IX triangular, nearly twice as long as broad in ♂, in ♀ about one-half longer than broad, X triangular, somewhat longer than broad, XI ovate-elliptical, pale creamy buff.

On pronotum a short apical median dash, a median basal spot and a lateral antemedian minute dot white, inconspicuous, centre distinctly raised, the disc

being somewhat depressed at the sides and behind this swelling ; carina subbasal, almost straight, slightly convex halfway to side, flexed forward at side nearly in a semicircle, running first forward and before reaching the vestigial meral suture turning upward-forward and disappearing at apical third ; between dorsal carina and carinate basal margin a complete transverse carinula, which is nearer the dorsal carina at sides than in middle ; behind dorsal carina at each side of middle the grey pubescence scarce, there being an indistinct blackish patch which extends more or less across the carina.

Scutellum creamy. Elytra coarsely punctate-striate, suture and convex alternate interspaces spotted with luteous or grey, the spots numerous and small at suture, few and somewhat longer elsewhere, III with short black postmedian elevate dash.

Legs and underside of body uniformly and rather sparsely pubescent grey, tibiae without spots or rings. Middle of abdomen not flattened in the specimens with long antennae, which I take to be ♂♂ (not dissected).

Length 4·4–5·5, width 2·1–2·6 mm.

Amazonas : Santarem, a series, type in Carnegie Museum.

Gymnognathus Schönh. 1826.

The name appears first in the TABULA SYNOPTICA on p. 4 of *Curcul. Disp. Meth.* (1826) as Subgenus H *Gymnognathus* nob. Typus : *Anthr.* (*Gymnogn.*) *signatus* nob.

Both the genus and species were new and without diagnosis. On pp. 37–38 the generic description is supplied and the statement added : *Typus* :—*Anthr. Ancora* Germ.—congenericus : *Anthr.* (*Gymnogn.*) *signatus* nob.

As the generic and specific names of p. 4 are *nomina nuda*, the designation of *signatus* as genotype on p. 4 is not valid. The genotype is *Anthribus ancora* Germar 1824, designated on p. 38.

The species are numerous ; 80-odd are now known, and I have seen many more. In the Key given after the descriptions of the new species I have divided the genus into two Sections in accordance with the surface structure of the pronotum. In Section I the derm is minutely coriaceous, rarely rugulose, and in Section II it is longitudinally plicate, the ridges being sometimes confined to a narrow median space in front of carina and concealed by the median vitta. To some extent the pattern of species belonging to Section I recurs in Section II. The antennae of some species of Section II are long as in *Analotes discoideus* Fåhrs. 1839, and as there are intermediates between the longicorn and the brevicorn species, I have as yet not found any reliable difference by which to separate *Analotes* inclusive of the longicorn *Gymnognathus* from the brevicorn *Gymnognathus*, and for that reason I have included *Analotes discoideus* in the Key of Section II. One might, of course, place all the species with plicate pronotum into *Analotes*, but I am not prepared to follow that course, since I am not yet sure that the division into the two Sections is more than a mere convenience.

The only described species I cannot place in the Key is *G. nebulosus* Motsch. 1874, from Brazil, the description containing no detail for recognizing the species.

SECTION 1.—PRONOTUM NOT LONGITUDINALLY PLICATE.—SPECIES 9–34.

9. **Gymnognathus bryanti** sp. nov.

♂♀. Similar to *G. ruficlava* Jord. 1906, but elytra without brown V-mark.

As in *G. ruficlava* head and anterior half of pronotum orange-red, contrasting with rostrum. Pronotum rather coarsely granulate, the transverse ridges distinct, carina somewhat abruptly flexed forward; basal half creamy, this colouring projecting forward in middle and enclosing two brown patches on each side in front of carina; fringe of apical margin creamy. Interspace II and alternate ones of elytra white, these stripes divided in apical half into two lines each. Pygidium in ♂ as long as broad, in ♀ very little longer, apical teeth distinct but short, white median line distinct. Occiput of ♂ with ovate groove, diameter of groove much longer than distance of groove from eye.

Brazil: Ilha Santo Antonio, near Santos, iii.1912 (G. E. Bryant), two pairs.

Of *G. ruficlava* only the ♀ is known; the posterior half of its pronotum ashy, with six blackish brown spots before carina and two behind it, besides vestiges of other brown spots, the area anteriorly straight, not produced forward in middle; white lines of elytra thin from near base, almost restricted to the punctate stripes; metasternite more extendedly pubescent luteous at side than in *G. bryanti*.

10. **Gymnognathus hetarus** sp. nov.

♂♀. Similar to *G. cincticollis* Jord. 1895; as in that species head and pronotum orange-red; on pronotum an apical marginal band and another before dorsal carina extending on to ventral surface, a short median vitta from carina forward, three patches behind carina ochreous, on elytra a dark-brown V from shoulder across suture, basal fourth with pale ochreous stripes and spots, on rest of elytra interspaces II and alternate ones grey or with thin grey lines on the rows of punctures. Underside spotted as in *G. cincticollis*. Differs from that species in the proboscis being longer, the antennal segments VI to VIII thinner (not compressed), the median basal spot of pronotum broader, the pygidium and anal sternum truncate-emarginate, with the angles distinct, but rounded off, and in the midtibia of ♂ being devoid of the apical tooth present in ♂ of *G. cincticollis*.

Length 7·0–9·0 mm.

Amazonas (Dr. Hahnel), type; also from French Guiana; in Carnegie Museum from Pará and Santarem.

11. **Gymnognathus helma** sp. nov.

♂. Likewise near *G. cincticollis*, broader, head (♂) with deep median groove, transverse band in front of carina of pronotum shortened, not reaching to median vitta, pygidium with large brown median area, truncate, with the angles somewhat acuminate.

Rostrum and frons dark rufescent, with broad pale ochreous stripe divided by the denuded median carina and covering the entire frons to the eyes, reaching just on to occiput, not continued along eye sidewards. Groove (♂) ovate, deep, bounded by the forked median carina except posteriorly, where the margin of the groove is slanting; occiput without any vittae. Antenna hardly reaching

to middle of prothorax, segment III as long as II, VI to VIII gradually broader, VIII less than one-half longer than broad. Pronotum red like occiput, except basal third, which is dark rufescent; median vitta complete, broad behind carina, widening at anterior side of carina and gradually and strongly narrowing to apex, where it is quite thin, but expands a little on fringe of margin; in front of lateral carina an oblique vitta extending down to coxa and upward to anterior margin behind upper half of eye, not being continued along margin to middle as it is in *G. cincticollis* and *G. hetarus*, a broad transverse patch before carina from angle dorsad representing the transverse band of allied species, but not attaining median vitta; lateral carina not quite twice as long as longitudinal basal carinula, its tip turned dorsad.

On elytra an indistinct stripe from above shoulder to subbasal swelling devoid of grey pubescence, not continued to suture, interspace I and II, and more or less also IV and VI covered with thin grey pubescence, the other interspaces rufous, the stripes of punctures grey, at margin a large spot below shoulder, a smaller one before middle and a triangular anteapical one longest at margin and posteriorly somewhat extending upward, dorsally in front of apical declivity an indication of an oblique spot from second to fourth line of punctures. Pygidium a little longer than broad (10 : 9), the creamy border of base and sides somewhat diffuse.

Pubescence of underside as in the allied species, the lateral stripe of abdomen consisting of three conspicuous spots; anal segment truncate-sinuate, its angles rounded, medianly it is about as long as segment IV laterally. Femora and base of tibiae rufescent like sterna, rest of tibiae and the tarsi black, apart from some sparse grey pubescence.

Length 6·6, width 3·0 mm.

Amazonas (Dr. Hahnel), 1 ♂.

12. **Gymnognathus lyrestes** sp. nov.

♀. Near *G. acutangulus* Jord. 1895, but head and thorax the same dark chestnut-colour as elytra. Pronotum before lateral carina with oblique vitta, which extends down to coxa, above angle a short vitta. Pygidium brown bordered with white, truncate like anal sternum, angles distinct, but not spiniform.

Rostrum about one-third broader than long, with broad ochre-yellow vitta divided by median carina; the vitta forking on frons, the two branches bordering eyes and joining oblique vittae of pronotum, no median vitta on head. Antenna short, blackish, segment II longer than III, VIII a little longer than broad, club nearly as long as IV to VIII together, X transverse, half as broad again as long (♀).

Pronotum minutely coriaceous, convex, slightly flattened in front of carina, markings greyish white or yellowish, median vitta complete, widest behind carina, a short vitta from lateral basal angle obliquely forward not nearly reaching middle, oblique dorso-lateral vitta in front of lateral carina broader than anterior half of median vitta; lateral angle of carina 90°, basal longitudinal carinula strongly oblique, forming equal angles with dorsal and lateral carinae. Scutellum white or yellowish.

Elytra very moderately depressed at suture, posteriorly evenly convex, third interspace not elevate; in depression between basal margin and feeble subbasal swelling a large spot, on suture behind scutellum a short vitta which

divides at one-fourth of length of suture into two stripes, one on each elytrum, occupying interspace II and posteriorly also III and curving sideward-forward at two-thirds of suture in the direction of antemedian lateral spot, which it does not reach in type, on apical declivity a strongly curved (anteriorly convex) narrow band from side to side, complete or interrupted, no spot at apex, at lateral margin a spot below shoulder, slightly extending upwards behind (probably sometimes reaching basal spot), a second spot above apex of metepimerum, separate from oblique transverse band or forming its marginal end. Pygidium as long as broad (propygidium not inclusive), creamy border interrupted at base, angles less distinct than those of anal sternum.

Underside silky grey, the pubescence condensed and creamy or buff in two stripes each side of prosternite (the lateral one being the lower end of the lateral oblique vitta of pronotum), on side of mesosternite, apex and base of side of metasternite and on side of abdominal segments I to IV. Femora and base of tibiae dark chestnut, rest of tibiae blackish like tarsi.

Length 6·2–6·8, width 2·2–2·6 mm.

Amazonas: Santarem, type in Carnegie Museum.

13. **Gymnognathus acastus** sp. nov.

♂♀. A robust species; pronotum minutely coriaceous, with a short vitta between dorsolateral and median vittae, pygidium completely rounded at apex, brown, bordered with grey, anal sternite strongly bispinose.

Rufous chestnut (type) or chestnut, markings of head and pronotum buffish, those of elytra buffish or grey. Rostrum with broad vitta divided by median carina, separating on frons into three stripes, median one thin, lateral ones broad and distinctly extending down to posterior side of eye. Antenna reaching beyond apex of prothorax, segment III longer than II, twice as long as IV, VIII little longer than broad, club as long as II + III, XI nearly as long as IX + X. Prothorax conical, widest at extreme base, one-sixth broader than long, medianly depressed before carina, the depression extending to apical margin as a shallow median channel occupied by median vitta, which latter strongly narrows apicad; dorsolateral vitta from upperside of lateral carina to lateral stripe of head broad, its upper margin at angle of carina, the angle itself not being filled in with buff pubescence, short laterodorsal vitta narrow, not nearly reaching to middle, parallel with dorsolateral vitta; angle of carina 90°, lateral carina reaching halfway to apical margin, basal longitudinal carinula oblique, forming a larger angle with lateral carina than with dorsal one. Scutellum buffish or white, longer than broad, narrowing anteriorly.

Elytra strongly flattened-depressed from base, interspaces III to IX somewhat convex in posterior half, especially V, before apical margin a depression, centre of declivous area of each elytrum with indication of a hump; a buffish or grey sutural area from base about to apical fourth, divided on suture anteriorly and posteriorly, the scutellum being placed in a brown triangle, in middle the area occupying interspaces I, II and III, anteriorly I and II and entering a little into III, posteriorly occupying also IV, in type an additional spot in V; from much before middle a thin stripe on fourth line of punctures runs forward to a basal patch placed in a depression above shoulder-angle, first and second line of punctures with some grey pubescence from sutural area to apex, similar lines indicated elsewhere, at side a spot below shoulder extending posteriorly obliquely

to seventh line of punctures, an antemedian mark composed of a marginal spot and a longer dash above it, and a line beginning above base of abdominal segment II and ending above IV, on apical area a few grey scale-hairs, but no definite spot. Pygidium as broad as long, very little narrowing apicad, but apex strongly and evenly rounded, a narrow grey border all round, interrupted by the basal median groove.

Pubescence of underside silky, not dense, more concentrated and therefore more creamy in a stripe from forecoxa obliquely forward-sideward, in another indefinite stripe behind meral suture of prosternite, on mesepimerum, at base and apex, laterally, of metasternite, and on abdomen exeept a diffuse sublateral stripe. Legs rufous chestnut, tip of tibiae and the tarsi blackish. In ♂ apex of anal sternum straight between the teeth, in ♀ rounded.

Length 8·0–8·7, width 3·1–3·5 mm.

French Guinea: St. Jean de Maroni, one pair; in Carnegie Museum also from Santarem.

14. **Gymnognathus iris** sp. nov.

♂♀. As in *G. ancora* Germ. 1824 pygidium longer than broad and bidentate, anal sternum in ♂ truncate and broadly impressed, the groove flanked by a straight carina, middle of prosternum and the abdomen with the exception of a creamy lateral stripe dark chestnut, upperside of rostrum and anal spot of elytrum often vermilion. Differs in the occiput being without a median vitta, in the laterodorsal vitta of pronotum being complete, the angle of carina less broadly filled in with grey; the spot on the subbasal callosity of the elytrum much larger and connected by a band across suture with the spot of the other elytrum, this transverse band usually with a short projection forward and a much longer one backward, both on suture, the brown design sometimes resembling a fleur-de-lis, in some specimens the sutural stripe joins the posterior brown area; brown median stripe of pygidium sharply defined.

French Guiana (type) and Amazonas; in Carnegie Museum from Pará.

In type-specimen the apical spot of elytra greyish white, narrow, oblique, anteriorly united with spot of other elytrum; in most other specimens the two spots larger and as a rule separate.

15. **Gymnognathus hedys** sp. nov.

♂ Cylindrical, elytra flattened above, but not depressed in sutural area; pygidium somewhat broader than long, bidentate, with rufous median stripe; dorsolateral vitta of pronotum anteriorly and posteriorly united with white underside, which extends upwards above lateral carina. Near *G. thecla* Jord. 1906.

Pale rufous. Rostrum one-third broader than long, with creamy vitta divided by median carina, forked on frons, bordering the eyes; no median vitta on head. Antenna short, segment III one-tenth longer than II, much longer than IV, V to VIII gradually shorter, VIII broader than VII, as broad as long, club twice as long as broad, XI broader than long.

Pronotum coriaceous, convex, feebly flattened dorsally before carina and along middle, median vitta complete, gradually narrowed, white area of underside extending well above lateral carina from base to apex, the carina entirely within the white area, dorsolateral vitta nearly interrupted before middle, separated

from white ventrolateral area by a long narrow rufous stripe from well before dorsal carina to beyond middle parallel with lateral carina ; this carina twice as long as slanting basal lateral carinula and its tip curved upwards. Scutellum white, broader than long.

Elytra cylindrical, feebly flattened above, not impressed in sutural area, a little over two-thirds longer than broad (58 : 34), a large grey area from base, expanding from shoulder to shoulder and dividing before middle of suture into two lobes, one on each elytrum, the lobe twice as long as broad and laterally at its apex with a tooth somewhat projecting in the direction of the antemedian limbal spot, outer margin of grey area gradually incurved from shoulder to fourth line of punctures and then curving gradually to sixth line ; on feebly indicated subbasal swelling a round rufous spot, before apex a thin transverse curved band from side to side and in sutural angle of each elytrum a triangular spot, at margin below shoulder and before middle a smallish spot. Pygidium with the brown median stripe sharply defined, narrow at base, gradually widened towards apex.

Underside densely pubescent white ; no brown spot on metepisternum, but abdominal segments with a rather large brown apical spot each at side ; anal sternum a little shorter than preceding one, rounded, faintly straightened in middle.

Length 5·5, width 2·3 mm.

Panama : Chiriqui, 1 ♂.

In *G. thecla* Jord. 1906, also from the Chiriqui, the brown median area of occiput extends to apex of rostrum, the vittae being narrow ; the anteapical band of elytra widened forward on suture.

16. **Gymnognathus mollis** sp. nov.

♀. Similar to *G. hedys*, longer, lateral carina of pronotum one-half longer than lateral basal carinula, abdomen without brown spots or bands, pygidium longer than broad.

Rostrum, head and antenna as in *G. hedys*, but segment III of antenna longer. On pronotum the dorsolateral rufous stripe separating dorsolateral vitta from white underside, longer, reaching close to fringe of apical margin ; basal lateral carinula horizontal, not slanting, lateral carina much shorter than in *G. hedys*, no distinct transverse carinula between dorsal carina and carinate basal margin.

Elytra nearly twice as long as broad (62 : 34), longer than in *G. hedys*, cylindrical, slightly flattened above, but not at all impressed in sutural area, none of the interspaces convex, a large area common to both elytra extends from basal margin to a little beyond middle of suture, here broadly truncate with an oblong projection on each elytrum, this lobe being nearly twice as long as broad and rounded behind, outer margin of creamy area running from above shoulder obliquely to fourth line of punctures and then curving gradually to fifth line which it reaches near end of lobe of creamy area, outline not sharply defined on account of the pubescence being somewhat longer than usual and not dense in creamy area, on vestigial subbasal swelling a narrow brown spot, if the spot were prolonged to suture it would form a V-mark with the spot of the other elytrum, no brown spot on suture in creamy area ; on apical declivous area a creamy A-shaped band from side to side, broadest at latero-apical margin and somewhat rounded at suture, apical margin with a very narrow diffuse creamy border, at

sides two spots, one below shoulder, the other before middle. Pygidium longer than broad (16 : 13), median stripe sharply defined, taken as a whole somewhat narrower than white border.

Underside pubescent white, pubescence not very dense, more concentrated in front of forecoxa, on mesepimerum, at apical margin of metasternite and dorsal margin of abdominal sterna I–III ; anal sternum longer than preceding segment, rounded at apex.

Length 6·2, width 2·3 mm.

Brazil : Jatahy, Prov. Goyaz, 1 ♀.

Near *G. vitticollis* Jord. 1895.

17. **Gymnognathus inca** sp. nov.

♀. Near *G. hilda* Jord. 1904 ; as in that species the pygidium entirely creamy white, broader than long, bidentate. Longer than *G. hilda*, dorso-lateral vitta of pronotum completely fused with white underside, basal lateral carinula rather strongly oblique.

Rostrum one-third broader than long, coarsely punctate-reticulate-rugate at brown sides, median carina thin, flattened near apical margin, a creamy-buff stripe occupies rather less than half the surface, forks on frons and curves down well behind eye, in centre of occiput a large brown triangular space extending on to frons, where it is diffuse, along middle of this triangular patch a few buffish scale-hairs. Antenna black, segment I rufous, III about as long as II, VIII as long as broad, club twice as long as broad.

Pronotum one-fifth broader than long, median vitta broad at base, strongly narrowing to apex, upper margin of white lateral area crossing dorsal carina at a distance longer than the basal lateral carinula, straight, slightly ascending, reaching apical margin a very little below the dorsal margin of the border of the eye, the brown stripe anteriorly a little narrower than behind middle, no trace of brown pubescence in the white lateral area ; lateral carina entirely in this area, angle of carina 90°, lateral carinula slanting, forming an obtuse angle with dorsal carina and an acute one with cariniform basal margin. Scutellum white.

Elytra cylindrical, somewhat flattened above, but not depressed, two-thirds longer than broad, rather strongly punctate-striate, interspace a little convex, a large greyish area from base to apical third, not divided at suture, extending at base to lateral margin, but brownish above shoulder (apart from denuded shoulder-angle), on subbasal swelling a round brown spot, grey area gradually narrowed from shoulder to line IV of punctures which its outer margin reaches at basal third, at middle the area widens to interspace VII and the anterior angle of this dilatation is produced forward-sideward to join the antemedian lateral spot, posteriorly the area rounded between punctate lines III and VII and on suture triangularly enlarged backwards, at apex a pale primrose patch across suture, round in front, reaching laterally to apical margin of abdominal segment IV, sutural angles narrowly brown. Pygidium also pale primrose.

Thoracic sternites without brown spots, almost uniformly pubescent white, at sides a little creamy, on abdomen pubescence less dense, sides more or less brown, upper lateral margins of II to IV narrowly white. Legs brown, pubescent grey, segment I of tarsi longer than claw-segment.

Length 6·2, width 2·2 mm.

Highlands of Peru, 1 ♀.

18. **Gymnognathus lusia** sp. nov.

♀. A narrow species with short beak, trivittate pronotum, depressed elytra, bidentate pygidium, which is white and longer than broad. Near *G. ritticollis* Jord. 1895, but narrower, elytra more depressed, dorsolateral vitta of pronotum from upperside of lateral carina, pygidium longer and without brown median stripe.

Rostrum one-seventh broader than long, with strong median carina which does not reach apex, but extends as a much thinner carina to occiput, near base of rostrum a thin carina branches off each side, running to occiput; broad creamy-white median vitta forks on frons, the branches bordering eye, but remaining straight posteriorly, not bending down behind eye; no median vitta on occiput. Antenna rufescent, short, segment II half as long again as III, VIII as long as broad, club twice as long as broad.

Pronotum nearly as long as broad (23 : 25), three narrow vittae, broader at base, median one narrowing to a point at apex, dorsolateral one from upperside of lateral carina, but the white pubescence extending to basal margin and a little along dorsal carina, a short spur projecting forward from this border of dorsal carina above lateral angle; this angle about 90°, but strongly rounded, basal lateral carinula horizontal, subbasal transverse carinula very distinct except in middle. Scutellum white.

Elytra three-fifths longer than broad, moderately narrowing to beyond middle, then rounded, dorsally flattened, somewhat depressed behind subbasal swellings, none of the interspaces distinctly convex; a greyish white area from base to apical third, at base expanding to lateral margin, but shoulder angle more or less brown, on subbasal swelling a large brown spot, somewhat oblique, isolated, from behind this spot the outer margin of white area in interspace V, turning into VI behind middle, the area terminating in a point, being deeply sinuate across suture, the sinus rounded and the brown colouring extending in sutural interspace to before middle, from two-thirds of suture a white triangular patch extends obliquely backward to side, to which is joined each side of suture a largish apical spot, an antemedian lateral spot drawn out into a long line in punctate stripe VIII and parallel with this line another nearer margin commencing a little farther back, both lines more or less joining the lateral arm of the anteapical patch. Pygidium one-sixth longer than broad, medianly suffused with brown (discoloured ?).

White pubescence of underside rather thin, condensed before anterior coxa, on mesepimerum, laterally at base and apex of metasternite and in a macular lateral stripe of abdomen. Femora and tibiae rufous, tarsi blackish.

Length 4·9, width 2·0 mm.

French Guiana: Pariacabo, ix. 1905, 1 ♀.

19. **Gymnognathus vanda** sp. nov.

♀. In markings near *G. lusia* (No. 18); but proboscis longer, dorsolateral vitta of pronotum across dorsal carina some distance above angle, pygidium brown, with triangular border at side, apex truncate, angles distinct but little produced, anal sternum also truncate, with the angles more produced; pattern of elytra nearly as in *G. dorsonotatus* Fahrs. 1835, in which the pygidium is brown with white median stripe.

Proboscis less than one-tenth broader than long, apical half punctate, rest rugate-plicate, upper edge of antennal groove continued to eye as a thin carina, median carina prominent, not reaching apical margin, continued to occiput, but thin on head, creamy buff vitta divided by carina, continued to occiput each side, not bent down behind eye, no median vitta on occiput, frons irregularly plicate-carinulate. Antenna dark brown, rufous at base, III one-half longer than IV, VIII in ♂ twice as long as broad, in ♀ a little longer than broad, club in ♂ nearly thrice, in ♀ two and one-half times as long as broad, XI in ♂ longer than broad.

Pronotum as long as broad, three sharply defined creamy-white vittae, median one broadest, about half as wide before carina as brown interspace, dorsolateral one oblique, more or less thin, starting from dorsal carina well away from angle, but continued to basal margin, the space above lateral carinula being creamy white, no such pubescence along upperside of lateral carina, brown dorsal interspace narrowing towards apex, the dorsolateral one widening accordingly ; angle of carina 90°, extreme tip rounded off, lateral carina less than double the length of basal lateral carinula, which is horizontal, subbasal transverse carinula distinct except in middle. Scutellum white, broader than long.

Elytra three- or four-fifths longer than broad, rather strongly narrowing posticad, flattened-depressed above, markings creamy white: three diffuse spots in depression above shoulder, more or less continuous with subsutural vitta, which commences at base at side of scutellum with diffuse pubescence, occupies interspaces I and part of II, widens behind brown subbasal swelling to punctate line IV, ending beyond middle in a point in interspace V, the dorsal margin of the patch starts from one-fourth (about) of suture and runs obliquely to meet its outer margin in interspace V, the patches of the two elytra, therefore, being separated from behind by a deep sinus, the edge of suture from apex of this bay to scutellum brown, from middle of suture to well before apical declivity an elongate-triangular spot posteriorly drawn out to interspace V or VI and either sinuate behind on suture (type) or straight, usually the edge of suture remaining brown within the spot, a spot on each elytrum close to suture a little longer than broad, before middle of side a small spot. Pygidium of ♂ as long as, in ♀ longer than broad, creamy-white lateral border narrow, ending in a point at middle of margin.

White pubescence of underside condensed into a conspicuous lateral creamy stripe on prosternite, a large patch occupying mesepimerum and base of metepisternum, a transverse lateral band at apex of metasternite, and a longitudinal lateral stripe on abdomen, these markings sharply contrasting with rest of underside, brown spot on metepisternum very large, extending down on to sternum. Legs thinly pubescent grey, femora and tibiae rufous, tarsi black.

Length 6·7–8·0, width 2·4–2·7 mm.

Amazonas: Pará, type (♀) in Carnegie Museum.

20. **Gymnognathus libussa** sp. nov.

♂. Near *G. vanda* (No. 19), but dorsolateral vitta of pronotum broader, the angle of carina within the creamy-white pubescence, pygidium more strongly bidentate, anal sternum with the angles completely rounded off.

Pale rufous, antenna except base and tarsi brownish black. Rostrum as long as broad, side in front of eye with a few flattened ridges forming a few meshes, upper margin of antennal groove continued by a carina directed towards under-

side of eye, which it does not reach, median carina broad, flanked by a depression, the carina disappearing on occiput, median vitta divided by naked carina, forked on frons and the two halves directed backwards, not being bent down behind eye, no median vitta on occiput, frons plicate. Antenna nearly as in *G. vanda* ♀, VIII broader and XI shorter, club thrice as long as broad.

Dorsolateral vitta of pronotum from angle, its upper margin crossing dorsal carina, and its lower margin lateral carina, the vitta being as broad before carina as median vitta.

Creamy-grey dorsal area of elytra extending basally from margin to margin, not interrupted at shoulder and suture (apart from the somewhat denuded shoulder-angle), nearly encircling the large round brown spot on subbasal swelling, suture not brown from base to near middle, the area here dividing into a lobe on each elytrum which is continued to beyond middle, curved laterad-forward at end and nearly reaching the antemedian lateral spot, which consists of a marginal and a submarginal portion, before apical declivity a Λ-spot extending from suture obliquely to punctate line IV and being connected by a thin incomplete line (in interspace III) with an apical spot placed about midway between suture and lateral margin. Pygidium a little longer than broad, white lateral border continued to apex, tooth at angle quite distinct.

Pubescence of prosternite denser than in *G. vanda*, therefore sides not contrasting with middle, sides of rest of body as in *G. vanda*, more or less; anal sternum rounded-truncate, angles rounded off.

Length 6·7, width 2·3 mm.

French Guiana: Gourdonville, xi. 1905, 1 ♂.

21. **Gymnognathus iphis** sp. nov.

♂♀. Similar to *G. vanda* (No. 19), but dorsolateral vitta anteriorly abbreviated, middle of prosternite sparsely pubescent, contrasting with sides.

Derm of upperside of head, anterior area of pronotum, base of antenna and femora more or less rufous. Base of rostrum at sides coarsely reticulate, no definite cariniform prolongation of upper edge of antennal groove. Rufous central area of occiput descending on to frons, large, occasionally with indication of a creamy-buff median spot, lateral vittae divergent, but not bent down to posterior margin of eye. Segment III of antenna at least half as long again as broad, club in ♀ nearly thrice, in ♂ narrower and thrice and one-half or nearly four times as long as broad, in ♂ XI longer than broad.

Dorsolateral vitta of pronotum from basal angle across angle of carina obliquely directed towards vitta of occiput, but somewhat curved and not reaching apical margin.

Creamy-white dorsal area of elytra reaching at base from shoulder to shoulder, the marginal spot below shoulder being separated from it, on subbasal swelling a large brown spot, completely enclosed, longer than broad, oblique, broadest anteriorly, incurved on side towards scutellum, the area reaching on each elytrum to two-thirds, ends of the two lobes rounded and more or less curved sideward to punctate line VI, in one specimen here connected with antemedian lateral spot by an oblique line, from behind subbasal swelling to posterior sideward curve the outer margin of the area on or at punctate line V, as in *G. vanda* a triangular creamy-white patch before apical declivity, broader, extending posteriorly to line VI of punctures, not connected with apical spot, in one speci-

men anteriorly a connection across interspace II with creamy-white area ; the brown Λ-band behind the creamy-white area anteriorly restricted to sutural interspace and here continued forward to basal third as a sharply defined line. Pygidium brown, in ♂ practically as long as broad, in ♀ one-fourth (approximately) longer than broad, angles produced as sharp teeth.

Underside much more densely pubescent white laterally than ventrally, brown spot of metepisternum sharply defined, not extended on to metasternum. Anal sternum shorter in ♂ than in ♀, a little flattened in ♂, apex truneate-rotundate, without indication of angles, white lateral stripe of abdomen conspicuous.

Length 6·6–9·7, width 2·4–3·7 mm.

Costa Rica, 28. vi. 05 (F. Nevermann), on dead wood, a series, type in coll. Nevermann.

22. **Gymnognathus moranus** sp. nov.

♂♀. Closely related to *G. daguanus* Jord. 1897, of which it probably is the Central American representative. As in that species with a notch at side of rostrum bearing a brush, which is vestigial in small specimens. Dorsolateral vitta of pronotum very narrow, incomplete, white lateral stripe of abdomen broad on anterior segments, narrowing behind.

Derm of upperside of head not brighter rufous than on rest of upperside, whereas in *G. daguanus* the colours contrast. Fringe of apical margin of pronotum entirely creamy white in *G. daguanus*, in *G. moranus* brown except in centre ; from lateral angle of carina a shallow, broadish, depression runs obliquely dorsad-apicad in *G. daguanus* filled in with sparse white pubescence forming a somewhat bent broad vitta, which, if it were prolonged, would reach middle vitta some distance from apex ; this depression absent in the new species, and the dorsolateral vitta is very thin and starts from or from before dorsal carina well above angle, the lateral carina being thinly bordered with white, the dorsolateral vitta strongly abbreviated, reaching beyond middle, its apex cut off as a spot ; if this vitta were prolonged it would reach apical margin some distance from median vitta.

Lateral stripe of prosternite more horizontal than in *G. daguanus* ; metepisternum brown, its ventral margin bordered with white, this border very broad in front, gradually being reduced, metepimerum also brown, metasternum with narrow white apical border laterally ; in *G. daguanus*, on the other hand, the metepisternum is densely pubescent (yellow in our specimens, discoloured ?), only the median third being brown, and the posterior patch extends broadly on to metasternum ; abdomen with conspicuous continuous lateral stripe in *G. moranus*, broad on segments I and II, narrower on III, on IV a small isolated spot, which is often absent. Femora and proximal half (more or less) of tibiae rufous, apex of tibiae and tarsi blackish ; foretibia of ♂ with carina on inner side.

Length 6·1–9·1, width 1·8–3·3 mm.

Costa Riea, ii, iii, iv, vi, vii, viii, xi (F. Nevermann), on dead wood, a series, type in coll. Nevermann.

23. **Gymnognathus nica** sp. nov.

♂. Head with deep ovate groove ; pygidium more than half as long again as broad, uniformly creamy white excepting denuded brown median line, apex

evenly rounded. A robust species near *G. molitor* Jord. 1895, but narrower. Rostrum as long as broad, the creamy-buff pubescence extending to near the sides, basal half longitudinally plicate; median carina divided on frons to form the margins of the deep ovate groove of head, sides of head creamy buff. Eye longer than broad. Antenna reaching to base of prothorax, slender, segment III more than twice as long as II, one-third longer than IV, V to VIII much shorter than III, but longer than usual, VIII somewhat widened, as long as II, club more than thrice as long as broad, as long as III, X a little broader than long.

Pronotum conical, a trifle shorter than broad, median vitta broad, in a rather deep depression, dorsolateral vitta likewise broad, somewhat irregular, starting from underside across lateral carina, which is entirely within the creamy-buff pubescence; this vitta extends to basal angle, but there is a small brown spot in the angle of the carina; from the base of this vitta projects a short broad intermediate vitta, which ends nearly on a level with lateral carina; dorsal carina incurved in median depression, laterally slightly convex, lateral carina a little slanting, nearly reaching halfway to apical margin, the angle completely rounded off, but not quite a half-circle, tip of lateral carina curved upwards; fringe of apical margin creamy buff from eye to eye.

Elytra narrowing towards apex, two-thirds longer than broad, flattened, with a depression in sutural area to interspace III, which is convex, the greater part of elytra occupied by creamy-buff pubescence, extending from base to apex on suture without interruption, but trisinuate laterally; it expands at base from side to side, enclosing a naked shoulder spot and on subbasal swelling a short irregularly oblong spot, 2 mm. from base the area almost suddenly narrows to fourth line of punctures, nearly 2 mm. farther back it expands to interspace VII; this expansion terminates irregularly, the brown colouring penetrating forward into the creamy-buff area as a narrow bay to second interspace (not to suture in the unique specimen), between this bay and apex the creamy-buff area expands twice, first in front of apical declivity to interspace IV, and then at apex to punctate line VII, in between, on the anteapical convex area, the brown colouring penetrating as a rounded bay to line II of punctures; at side an elongate median patch imperfectly separated in interspace VII from dorsal area, a smaller elongate spot above abdominal segment III and apex of II, brown area connected also with shoulder spot by a narrow streak.

Underside: pubescence thin anteriorly in middle of prosternum, laterally from meral suture to apex, on metasternum and in middle of metepisternum, as well as an abdomen excepting a densely pubescent lateral stripe; anal sternum longer than preceding segment, strongly narrowing apicad, but apex truncate-emarginate with the angles completely rounded off.

Length 12·0, width 4·3 mm.

Brazil: Bahia, 1 ♂.

24. **Gymnognathus signatus** Gyllenhal 1833.

Though we have no example which exactly matches the specimen on which this name was based, I have very little doubt that it belongs to the species which I described in 1904 as *G. blanca*. However, it is to some extent intermediate between *G. blanca* and *G. ada* Jord. 1904 and may represent a distinct species. It was obtained by Freyreiss, who also collected *Phaenithon moerosus* Bohem.

1833, a species of which I have likewise seen no other specimen than the type, a fact suggesting that no further material has come from that particular locality.

The specimen is a small ♂, somewhat broader than examples of *G. ada* and *G. blanca* of the same length. The two rather strong lateral carinae of frons of head converge forward, joining median carina at base of rostrum, as is often the case in the allied species ; broad creamy-white median stripe of rostrum and head apparently tripartite on occiput (which is retracted into pronotum). Pronotum with the following creamy-white vittae : a median one broad from base to near middle, then gradually narrowing, occupying at base more than one-fourth the post-carinal area and being at apical margin about one-third as broad as posteriorly, from apex of lateral carina forward a stripe more thinly pubescent white, the colour of the derm showing through, this stripe bounding a lateral vitta which posteriorly is united with the creamy underside, the lateral carina within this lateral vitta, lateral portion of post-carinal area creamy white, from this patch a narrow vitta runs oblique forward halfway to apex, continued to near apical margin by a less densely pubescent stripe ; on the brown interspaces some dispersed scale-hairs and along dorsal carina some pubescence likewise creamy white ; basal lateral longitudinal carinula more oblique than in the allied species.

Elytra for the greater part creamy white : base from shoulder to shoulder, the shoulder-angle remaining brown, the white area extending on suture to apex, narrow in front of antemedian depression on account of brown patch on subbasal swelling, then widening, extending farther laterad in middle and here running forward as a narrow irregular band to basal third of margin, before middle of suture an oblong brown spot, behind middle the sutural area restricted to interspace 1, widening before apical declivity into a somewhat sinuous transverse, narrow band which does not quite reach lateral margin, then again restricted to interspace 1 and at apical margin dilated sideward ; the brown spot on subbasal swelling laterally united with brown antemedian lateral area ; the posterior margin of creamy-white anterior half of each elytrum bisinuate. Pygidium creamy white, pubescence less dense in middle (worn off), without the white median line of *G. ada*, tooth long and sharp (that of left side missing).

Underside densely creamy white, a spot on metepisternum and a diffuse, partly denuded, sublateral stripe on abdomen brown, lateral creamy-white stripe of abdomen as in *G. blanca*, not divided into definite spots as it is in *G. ada*. Derm of legs rufescent, tip of tibiae and tarsi blackish brown.

Length 5·7, width 2·3 mm.

" Brasilia. Dom. Freyreiss " ; see *Phaenithon moerosus*, p. 255, No 58.

25. **Gymnognathus lotus** sp. nov.

♂♀. Like *G. dorsonotatus* Fahrs. 1839, but in that species—which we have from Eastern Brazil and the Lower Amazons—the white lateral stripe of the prosternite is medianly less densely pubescent, being longitudinally divided into two white stripes, of which one is entirely ventral and the other crosses the lateral carina, being dorsolateral, its upper margin crossing carina at angle. In the new species the white stripe is not divided and is wholly ventral, there being no white pubescence at the dorsal side of the lateral carina or only traces of it.

Upper Amazons (type), Bolivia and French Guiana.

26. Gymnognathus regalis sp. nov.

♂♀. Dorsolateral vitta of pronotum complete, but thin ; brown spot on subbasal swelling of elytrum large, connected aeross suture with that of other elytrum, the brown colouring extending on suture to apex ; pygidium bidentate, with white median vitta as in *G. lotus* and near allies.

Rostrum one-fifth longer than broad, median carina broad, not reaching apical margin and disappearing on occiput ; a white vitta divided by carina, continued as narrow border to eye, slightly bent down on occiput. Antenna dark brown, equalling in length the distance of apical margin of rostrum from hindmargin of eye in ♂, a little shorter in ♀, segment III somewhat longer than II and IV, V to VIII gradually shorter, VIII as long as broad, club somewhat longer than V to VIII together. Eye oblong.

Pronotum about one-tenth broader than long, with shallow depression along middle as usual, widened at carina, three white vittae, median one broadest, dorsolateral one thin, arising well above angle of carina, but continued to base and here widened to side, there remaining a brown spot in angle between dorsal carina and lateral carinula, a thin border of grey pubescence from vitta to angle and along lateral carina ; angle of carina a little over 90°, tip rounded off, lateral carina not reaching halfway to apex (measured from angle, not from base), lateral carinula the same direction as lateral carina in ♂, horizontal in ♀.

Elytra a little more than half as long again as broad, flattened-depressed above, narrowing posteriorly as in the allied species *G. dorsonotatus* Fahrs. 1839 and *G. decorus* Perroud 1853 ; the white decorations of the elytra appearing greyish, the colour of the derm showing through ; they consist of a sort of ribbon running from scutellum and suture behind it along basal margin to supra-humeral depression, curving round subbasal swelling obliquely to interspace II, occupying II and a little of III for a short distance and turning obliquely across III, IV and V to VI, ending here at apical fourth, the sutural interspace from behind base to apex without white pubescence, before apical declivity a Λ-mark from line III of punctures, interrupted at suture ; apex with a rather deep impression bearing a small spot ; no lateral spots. Pygidium as long as broad, bidentate, with narrow white median stripe angustate towards apex.

Mesosternal process not nearly reaching the level of the metasternum, truncate, broad, the metasternal intercoxal process bent down anteriorly ; metepisternum with large brown patch ; on abdomen a white lateral band, anal sternum truncate, somewhat longer than previous segment in both sexes. Derm rufous on femora, blackish on tibiae and tarsi.

Length 7·6–9·0, width 3·1–3·6 mm.

Brazil : São Paulo, 1 ♂, type ; French Guiana : Pariacabo, xii.1905, 1 ♀.

27. Gymnognathus pentilus sp. nov.

♂. Closely related to *G. regalis*, but differing in the markings of the elytra and in the mesosternal intercoxal process.

Head and proboscis as in *G. regalis*, but the groove at side of proboscis between antennal groove and eye deeper. Segments III and XI of antenna somewhat longer, club more than four times as long as broad, X a little broader than long, XI one-fourth longer than broad, its apex rounded.

Dorsolateral vitta of pronotum broader than in *G. regalis* and the area above

lateral carinula entirely pubescent white, without brown spot behind dorsal carina. Scutellum white.

Elytra as deeply depressed as in *G. regalis*, a white basal band from side to side across scutellum and extending from basal margin a little behind scutellum, the shoulder angle remaining brown, on suture the band not interrupted, but the white pubescence continued as a narrow sutural stripe to one-third the length of elytra, here the stripe divided into two, which turn nearly at a right angle to third line of punctures, run in interspaces III and IV and then obliquely across V (which is the highest point of elytrum) to line VI of punctures, terminating just beyond two-thirds from base, from two-thirds of suture a thin line runs obliquely to apical declivity terminating at line VI of punctures, the lines of the two elytra forming a long ∧-mark, apical area less swollen than in *G. regalis*, without impression and without white spot, at side an antemedian white stripe. Whereas in *G. regalis* the large subbasal brown spots of elytra are joined together across suture and separated from brown lateral area, they are, in the present species, broadly merged with the lateral area and separated from each other. Pygidium a trifle longer than in *G. regalis*.

Mesosternal intercoxal process reaching close to the level of the metasternum, narrower than in *G. regalis*, with the apex rounded, the intercoxal process of metasternum divided by a deep median furrow.

French Guiana: Nouvean Chanier, xi, 1 ♂.

29. **Gymnognathus ophiopsis** Dalman 1833.

Syn.: *G. femoralis* Jord., *Nov. Zool.*, iv, p. 175 (1897) (Colombia).

The type of *G. ophiopsis* is a large ♂, much larger than any of the four examples described by me as *G. femoralis* from the Rio Dagua in West Colombia. The specimen has all the characteristics of *G. femoralis*, but differs somewhat in the colour of the elytra. The sutural area is clay-colour instead of more or less greyish white shaded with clay-colour. The most characteristic feature of the species is the great length of the lateral pronotal carina. The dorsolateral vitta of the pronotum is represented by a few spots. Of the white spots of the elytra mentioned by Dalman, three are marginal and two dorsal, these latter being the tips of the projections of the sutural area, one before and the other behind the sinus which penetrates from the brown area obliquely forward into the grey or luteous sutural area.

There are several Remedios in South America, but the place well known a hundred years ago was Remedios in Colombia, at that time of importance on account of its goldfields, now exhausted.

30. **Gymnognathus procerus** sp. nov.

♂♀. Similar to *G. dorsonotatus* Fåhrs. 1839, which we have only from S.E. Brazil, whereas our series of *G. procerus* is from the Amazons and French Guiana. Differs especially in the pattern. End-segment of antenna somewhat longer. Rostrum and prothorax of large specimens likewise longer. None of the markings vermilion, all greyish white. Vitta of rostrum separated on head into two straight stripes which are narrower on occiput than the brown interspace. Median vitta of pronotum narrow. On elytra the sinus running obliquely forward into grey sutural area from brown lateral area usually reaching brown sutural spot, a grey

triangle being separated from anterior grey sutural area. In ♀ anal sternum shorter than in *G. dorsonotatus*.

Amazonas, type, and French Guiana, a series; in Carnegie Museum from Pará.

31. **Gymnognathus aulicus** sp. nov.

♂. Near *G. fahraei* Schönh. 1839; as in that species upperside white with black spots; narrower than *G. fahraei*, scutellum white, elytra without sutural spot in posterior half, abdomen with white lateral stripe from segment III instead of from or from near base, antenna longer, club narrower, puncturation of underside very sparse and the punctures smaller than in *G. fahraei*.

Antenna rufescent brown, segment III longer than II, VIII more than twice and club more than thrice as long as broad, IX as long as XI, twice longer than X, this shorter than VIII. Frons with a rather prominent carina midway between median carina and eye, extending on to base of rostrum, slightly curved sidewards at both ends, as in *G. leucomelas* Jord. 1904. Pronotum somewhat longer than in *G. fahraei*, less impressed before carina, which is less concave in middle, lateral angle of carina less broadly rounded, lateral carina almost horizontal, on disc each side of middle a tear-shaped black spot narrowing forward, not reaching apical margin, the two spots anteriorly nearly parallel, posteriorly divergent; behind carina a black spot each side of middle, not extending across carina, but continued along basal margin to lateral angle. Scutellum white.

Elytra more strongly punctate-striate than in *G. fahraei*, much less depressed at suture, interstice V not subcariniform; an elliptical spot in middle of suture and each elytrum with five additional spots black: one at shoulder, a circular one on subbasal swelling, a smaller round spot obliquely behind it between lines V and VII, a large postmedian patch widest at side, extending to line II, where it is rounded off, at sides broadly confluent with a subapical spot which extends dorsally to line II. Pygidium longer and narrower than in *G. fahraei*, with almost parallel sides, apex rounded-truncate.

Derm of underside and legs more or less rufescent; metasternite with transverse lateral band and abdomen from III to V with a lateral stripe, II of abdomen with a white dot. A patch on upperside of hindfemur and greater part of tibiae also white. Intercoxal process of mesosternum narrower than in *G. fahraei* and much less concave.

Length 6·6, width 3·1 mm.

Brazil, one ancient, damaged, ♂ from coll. Dejean via coll. Roelofs.

32. **Gymnognathus biloris** sp. nov.

♀. Upper- and underside white and buff-yellow, elytrum with postmedian lateral brown-black patch which is dorsally continued forward to the punctate line II as a thin stripe which widens at end, the mark not unlike a hen without legs. Nearest to *G. leucomelas* Jord. 1904.

Rostrum longer than broad, with white median stripe accompanied by a buff-yellow one, in front of eye an almost bare stripe and below eye a buff-yellow one; median carina prominent as in the allied species, on frons about halfway to eye a smaller one as in *G. leucomelas* and *G. aulicus*; vittae of rostrum continued over the frons; occiput without black spot. Antenna rufescent, III much longer

than II, VIII about as long as broad, club similar to that of *G. fahraei* in the length of the segments, but much narrower, IX twice X, XI shorter than IX, but longer than X.

Pronotum as in *G. leucomelas*, one-fourth broader than long, deeply depressed before carina, which is medianly as strongly concave as in *G. leucomelas* and laterally rather more convex than in that species, lateral angle less widely rounded, lateral carina reaching to middle, disc less densely pubescent than sides, without black spots, a dorsolateral stripe in white area and the borders of this area buff-yellow. Scutellum pale buff-yellow.

Elytra more than half as long again as broad, strongly depressed at suture, interstice III convex, punctate stripes distinct, declivous apex with swelling, stripe I and alternate ones buff-yellow, the others white, before apical rounding of margin a large brown-black patch, at side about as long as its distance from apical angle of suture, the patch more strongly narrowing in front than behind, turning forward in interspace III, running forward along line II for a short distance and then curving towards suture, abruptly ending at line I, the longitudinal diameter of the head of the line being about twice the diameter of interstice II; between suture and apical swelling a minute brown dash. Pygidium one-fifth longer than broad, buff-yellow, with white median stripe, apex round.

Prosternite silky, pubescence not very dense, the derm showing through, no puncturation. Intercoxal process of mesosternum gradually narrowed-rounded slightly convex in apical half; sides of thorax with yellowish clouds; abdomen almost bare ventrally, at side a stripe of five contiguous spots, each buff-yellow in front and to a smaller extent white behind. Femora and tibiae white, on upperside buff-yellow, tarsi and apex of tibae brownish black.

Length 8·0, width 3·7 mm.

Brazil: Bahia, 1 ♀.

33. **Gymnognathus doris** sp. nov.

♀. Near *G. tenuis* Jord. 1895, but pattern of elytra almost as in *G. lyrestes* sp. nov., No. 12.

Rostrum less depressed in middle, as in *G. tenuis* with a creamy median vitta, somewhat narrowing on occiput and continued to base of pronotum, no lateral vittae on occiput. Antenna pitchy black, short. On pronotum an oblique vitta from upperside of lateral carina, expanding from apex of carina to angle, no white pubescence in angle and very little at base above oblique lateral carinula; angle of carina 90°. Elytra with sutural depression; a grey basal marginal band, interrupted at shoulder, continued on suture to subbasal depression, turning a little sidewards and occupying at first interstice II, then II and III and at two-fifths turning sideward-forward and running as a narrow band to margin, which it reaches above apex of metepimerum; at apex parallel with suture but separate from it a straight stripe about as broad as two interstices and not quite three times as long as broad. Pygidium white, with brown median stripe which does not reach apex, apical margin rounded.

Underside thinly pubescent white; on prosternum a white stripe from coxa to below eye; mesepimerum, base and apex of metepisternum, apical margin and metepimerum, and a lateral stripe on segments I to IV of abdomen densely

pubescent white; derm of tibiae and tarsi blackish, of femora rufous; anal sternum strongly bidentate.

Length 4·5–6·0, width 1·8–2·3 mm.

Amazonas, 2 ♀♀, type (the larger specimen) in Riksmuseum, Stockholm.

34. **Gymnognathus pulchellus** sp. nov.

♀. Rostrum and lateral carina of pronotum as short as in *G. hilda* Jord. 1904, to which the species comes nearest, though the pattern of the elytra is very different. Pygidium bidentate, white, with brown tear-shaped median spot divided by a thin white median line.

Rufous to rufescent brown. Rostrum with creamy-white double vitta which separates on head, forming borders to the eyes and bounded by a thin carinula; sides of rostrum coarsely rugate-punctate. Antenna short, XI broader than long. Pronotum with three complete white vittae, median one broad at base and in front of carina, narrowing rather abruptly and then gradually, pointed, dorsolateral vitta about half the width of posterior portion of median one, remaining of the same width to apex, the rufescent-brown stripe separating it from white underside reaches close to dorsal carina, but does not touch it; lateral carinula horizontal (in *G. hilda* distinctly oblique), as long as lateral carina. Scutellum white.

Elytra cylindrical, not depressed at suture, subbasal swelling very faintly indicated, lines of punctures distinct, but feebly impressed, a basal marginal band interrupted at shoulder, nearly straight behind; suture narrowly brown from scutellum to apex; from behind subbasal swelling a white stripe along suture to beyond middle, curving sideward-forward and reaching lateral margin above apex of metepimerum, the anterior end of this curved band slightly widened, extending to line III or nearly IV of punctures and on the frontal side feebly emarginate, a straight rufescent-brown transverse band separating it from the white basal band, the transverse portion of the curved band a little wider than an interstice; at apex an elongate bandlike white spot from near outer margin above abdominal segment IV to near suture, curving upwards, not touching apical margin. Pygidium broader than long, apical teeth very distinct.

Underside white; on segments I and V of abdomen a rufous spot.

Length 4·0–4·3, width 1·9–2·0 mm.

Amazonas, 2 ♀♀, type in Riksmuseum, Stockholm.

SECTION II.—PRONOTUM LONGITUDINALLY PLICATE, AT LEAST IN MIDDLE BEFORE CARINA.—species 35–38.

35. **Gymnognathus phanerus** sp. nov.

♂♀. Near *G. flexuosus* Jord. 1895; antennae broader, in ♀ very strongly compressed from segment III; prothorax with white band from coxa to apical margin of pronotum behind eye; anguliform white line of elytrum not connected with basal white area.

Shaft of antenna not cylindrical, but as flat as club, in ♂ (where the antenna reaches to apical third of elytra or beyond) segment IV in long antenna thrice, in shorter antenna a little over twice as long as broad, club not much broader than shaft, particularly in ♀, in ♀ IV one-fourth longer than broad.

Pronotum longer than in *G. flexuosus*, lateral carina also longer and more slanting, the angle being larger, dorsolateral vitta not quite reaching apical margin. Basal margin of elytrum less strongly curved forward, no white sutural stripe connecting the anguliform arcs with each other and with basal area. Median areas of underside less densely pubescent ; abdominal segment I entirely brown at side, II to IV with white transverse basal band widest at side. Pygidium of ♀ longer and apically narrower than in ♀ of *G. flexuosus*.

Amazonas (Dr. Hahnel), 2 ♂♂ (type) ; Cayenne, 1 ♀ ; Cochabamba, Bolivia, 1 ♀ ; in Carnegie Museum from Chapada, Brazil, Pará, Santarem and S. Paulo de Olivença.

36. **Gymnognathus talis** sp. nov.

♀. Near *G. helena* Jord. 1904, but head and disc of pronotum coarsely reticulate ; white borders of pygidium narrow.

Rostrum half as broad again as long, with broad yellowish buff vitta which forks on frons, no median stripe or spot on occiput ; median carina of rostrum from apex, not extending across frons, which is entirely reticulate like occiput. Antenna short, III a little longer than II, I and II and club paler than III to VIII, XI broader than IX.

Pronotum convex, feebly depressed at carina, disc between dorsolateral vittae and from carina to apical fifths reticulate, the meshes more or less longitudinal, no straight isolated ridges ; median vitta narrowing to a point at apex, dorsolateral vitta broader, running from basal angle to border of eye ; angle of carina a little over 90°, with the tip rounded off, basal longitudinal carinula in the same direction and half the length of the lateral carina, forming an acute angle with dorsal carina.

Elytra half as long again as broad, strongly flattened-depressed, interspace V convex in posterior half, basal margin strongly curved forward ; a greyish white basal area from side to side, interrupted on shoulder, extending on suture to basal fourth, here forked, the lobe on each elytrum reaching to middle, indistinctly bounded by interspace V, rounded at end, the brown bay on suture rounded off, before apical declivity a triangular sutural patch, its apex on suture rounded, the lateral angle produced sidewards in the direction of the postmedian lateral spot, at apex an elongate creamy-buff spot separated from suture, at sides an antemedian greyish spot, a postmedian spot narrow, oblique, yellowish. Pygidium as long as broad, truncate-rotundate, the angles completely rounded, lateral border creamy buff, narrow, of even width, not sharply defined.

Pubescence of underside thin, silky, concentrated only on mesepimerum, apical margin of sides of metasternite, and at sides of abdominal segments II to IV, these segments with brown apical lateral spot, anal sternum truncate-rotundate, angles completely rounded.

Length 6·7, width 3·1 mm.

French Guiana : Gourdonville, xi.1905, 1 ♀.

37. **Gymnognathus elisa** sp. nov.

♂♀. Occiput with creamy pubescence in centre ; dorsolateral vitta of pronotum not separated from white area of underside, the pronotum being creamy white with two broad, sharply defined, brown stripes which widen a little at apical margin ; before apical declivity of elytra a triangular spot on suture,

connected on suture with creamy-white sutural area or isolated. Near *G. erna* Jord. 1904 and *G. abundans* Jord. 1906.

Rostrum as in the allied species; occiput without definite brown median area, but with more or less scattered creamy pubescence. Antenna of ♂ reaching to base of prothorax, rufous, club darker, shaft compressed, III slightly longer than II and IV, VIII not quite twice as long as broad; antenna of ♀ shorter, varying from rufous to black, shaft thicker than in the allied species, but much less compressed and narrower than in ♂.

Pronotum rugate-plicate, more regularly plicate in front of carina, only one-ninth broader than long; median vitta more or less narrowed towards apex, at carina about as broad as the brown stripes, these anteriorly slightly wider on account of the narrowing of the median vitta, lateral margin of brown stripe horizontal, the stripe, therefore, continuous with the post-ocular brown area of head; dorsolateral vitta completely fused with white underside from base to apex, but of a slightly buffish tint; angle of carina a little over 90°, tip rounded off, basal carinula horizontal, longer than half the lateral carina, transverse subbasal carinula barely vestigial.

Elytra more distinctly flattened above than in the nearest allies, longer, being five-eighths longer than broad, basal margin strongly curved forward, a large creamy-white dorsal area from base to apical third or fourth, reaching at base to lateral margin, the shoulder angle remaining brown and being isolated or connected with the brown lateral area, on subbasal swelling a round isolated spot, the white area narrowed gradually from shoulder to line IV of punctures before middle and then gradually widened to reach interspace V, posteriorly the area more or less rounded on each elytrum and more or less deeply excised upon suture, behind it a sutural spot of variable size, in type connected on suture with creamy-white area, at apex a largish spot on each elytrum more or less rounded, at lateral margin an antemedian spot, no postmedian one. Pygidium in ♂ as long as broad, in ♀ a little longer, truncate, with the angles strongly rounded.

Underside white, no definite brown lateral spots except on abdominal sternum 1, a lateral stripe on abdomen more densely pubescent than underside of abdomen, apex of anal sternum truneate-rotundate; femora and tibiae rufous, tarsi blaekish.

Length 5·2–5·6, width 2·1–2·2 mm.

Brazil: Espirito Santo, type; Santa Catharina; a short series.

38. **Gymnognathus pindonis** sp. nov.

♂♀. In the markings of the elytra similar to *G. vicinus* Jekel 1857, but pronotum coriaeeous, rugulose on dise, plicate in middle before carina, dorsolateral vitta well away from lateral carina, no short intermediate vitta. Nearest to *G. ampulla* Jord. 1906, which has no dorsolateral vitta on pronotum and no transverse band or triangular spot before apical declivity of elytra.

Rostrum as long as apically broad, median carina not reaching apex, creamy-buff stripe broadly divided along middle, the two halves narrower on frons, bordering eye and on occiput curved downward for a short distance; no buff median spot on occiput. Antenna black, in ♂ reaching to or beyond base of prothorax, in ♂ III more than twice II in length, not quite twice IV, III elongate-triangular, half the length of III, twice as long as apically broad, XI longer than

broad; in ♀ antenna III three-fourths longer than II and about one-fourth longer than IV, VIII as long as VII, but broader, not longer than broad, XI broader than long.

Pronotum at most one-eighth broader than long, coriaceous at sides, rugate-reticulate on disc, plicate medianly in front of carina, three well-defined vittae, median one occupying behind carina about one-fifth of the basal area, narrowing frontad, dorsolateral one crossing dorsal carina at some distance from angle, narrow, joining the dorsal border of eye, behind dorsal carina above lateral carinula a brown spot, angle of carina 90°, extreme apex rounded off, direction of lateral carinula the same as that of lateral carina, subbasal transverse carinula distinct at side. Scutellum white, broader than long.

Elytra twice as long as pronotum, narrowing posticad, flattened above, distinctly depressed transversely behind subbasal swelling, seriated punctures very distinct, interspaces flat, a basal band from side to side interrupted at shoulder, almost straight behind, subbasal swelling with large rounded brown spot broadly joined to lateral brown area, upon it follows (on each elytrum) an elongate trapeziform patch from suture to or beyond line IV of punctures, its lateral margin straight, very slightly slanting, the patch terminating in interspace V, its inner margin also straight, but slanting from suture to end, the pointed bay between the patches of the two elytra penetrating more forward on suture in some specimens than in others, sometimes the two patches practically separated, as a rule a thin sutural line connecting the double patch with the basal band, before apical declivity a triangle pointing forward, straight posteriorly, the lateral angles more or less drawn out as a transverse band, which sometimes reaches lateral margin, the triangle more or less divided by a thin brown line on suture, at apex, separate from suture, an elongate-ovate longitudinal spot, before middle of side a small spot. Pygidium truncate, angles not prominent, at each side a narrow creamy border tapering to a point, in ♂ length equalling basal width, in ♀ surpassing it.

Pubescence of underside thin, condensed at side, forming a large patch on mesepimerum and base of metasternite, a transverse lateral band at end of metasternite and a macular longitudinal band on abdomen; brown spot on metepisternum very large and continued on to sternum; anal sternum truncate, in ♂ the angles drawn out into a short tooth.

Length 6·1–7·3, width 2·4–2·8 mm.

French Guiana: Roches de Kourou and Pariacabo, 3 ♂♂, 1 ♀, received from M. E. Le Moult.

KEY TO THE SPECIES OF *GYMNOGNATHUS*.

Section I.—No longitudinal wrinkles on pronotum; disc minutely coriaceous or rugulose, the granules often united in minute transverse ridges.—Section II, p. 239.

An attempt to group the numerous species of this Section primarily according to the development of the apex of the pygidium and fifth abdominal sternum proved to be a failure, there being all intergradations between a bidentate and an entire apex. Considering that the number of undescribed and undiscovered species is evidently very large, the Key can only be provisional, more a help to the taxonomist in the determination of species than a classification. I have.

therefore, largely made use of the style of coloration which characterizes various assemblages of species.

Subsection A.—Derm of head or of apex of pronotum or of both rufous red, pronotum with one or two transverse grey, white or yellowish, usually abbreviated, bands, or with indications of such, no longitudinal dorsolateral vitta of that colour, or with five vittae, elytra usually striped with grey, or these stripes confined to basal area and rest of elytra brown, or elytra entirely brown.—Species 1–16.

Subsection B.—Occiput and sides of apex of pronotum with orange-red pubescence.—Species 17 and 18.

Subsection C.—Markings grey or white, sometimes pubescence red on rostrum, apex of elytra, pygidium and side of under surface; derm of occiput and pronotum rufous red, pronotum with greyish white oblique dorsolateral vitta.—Species 19–59.

Subsection A.

Group a.—Pygidium with white or creamy lateral border, which is sometimes strongly reduced, the pygidium then being almost completely brown.—Species 1–8.

1. Pronotum with five white vittae besides some lateral spots. Pygidium with yellowish lateral border and white median stripe; apex of pygidium and anal sternum bidentate . 1. *G. bohlsi* Jord. 1895.
   Pronotum not quinquevittate, some markings transverse . . 2.
2. Apex of both pygidium and anal sternum completely rounded 2. *G. cincticollis* Jord. 1895.
   One or the other, or both, truncate, with the angles distinct, or at least indicated . . . . . 3.
3. Anal sternum with two long sharp spiniform teeth; median vitta of pronotum reaching to apical margin . 3. *G. robustus* Jord. 1895.
   Angles of anal sternum not produced into long teeth . . . 4.
4. Pronotum with transverse band in front of dorsal carina not interrupted . . . . . 5.
   This band interrupted, not joining the median vitta . . . 7.
5. Abdomen with white isolated lateral spots; frons and rostrum tricarinate, median carina broad, lateral one narrow on frons, flattened on rostrum . . . . . 4. *G. hetarus* Jord., p. 213.
   Abdomen almost entirely white, at least the white pubescence of side not isolated as spots . . . . . 6.
6. Frons and rostrum with thin mesal carina, frons, besides, with a number of longitudinal wrinkles; basal longitudinal carinula of pronotum horizontal; white border of pygidium about as broad as brown median stripe. Head of ♂ with central ovate groove. On underside of prothorax a transverse band running obliquely backward and continuous with border of dorsal carina . 5. *G. emma* Jord. 1904.
   Basal longitudinal carinula oblique; white border of pygidium narrow; sutural area of elytra for the greater part diffusely grey from base to apical declivity, yellowish at base; no oblique transverse band on prosternite; before dorsal carina a dorsolateral triangular grey spot, median vitta nearly reaching apical margin 6. *G. calus* Jord. 1906.

7. Elytra with thin transverse line behind middle, curving backward at side, reappearing before apical margin and running forward at suture; grey basal lateral patch of pronotum enclosing before dorsal carina a brown spot . . . . . 7. *G. pulcher* Jord. 1906.

Elytra without that thin transverse line; no brown spot before carina in basal patch; on head a deep central groove (♂) 8. *G. helma* Jord., p. 213.

Group b.—Pygidium brown, with white or yellowish median stripe.—Species 9–16.

8. Anal sternum as well as pygidium bidentate . . . . . 9.

Anal sternum with the angles rounded; head of ♂ with central groove (probably in all the species, of some only ♀ known). . . . 12.

9. Basal longitudinal carinula almost horizontal, angle of carina very strongly rounded; median vitta of pronotum complete 9. *G. ornatus* Jord. 1895.

Basal longitudinal carinula strongly oblique, forming an obtuse angle with lateral carina as well as dorsal one, angle of carina 90° or less, not rounded . . . . . 10.

10. Elytra with hardly any white markings 10. *G. scolytinus* Jord. 1904.

Elytra striped with white or buff . . . . . 11.

11. Median vitta of pronotum extending to apex, not connected in middle with lateral abbreviated vitta . . 11. *G. comptus* Jord. 1904.

A transverse submedian band connects the abbreviated longitudinal stripes, none of which extend forward beyond this band. 12. *G. clathratus* Jord. 1895.

12. White lines of elytra continued to near apex; pygidium bidentate; head (♂) with cavity . . . . . 13.

Apical half of elytra without white lines; apex of pygidium rounded 13. *G. coronatus* Jord. 1904.

13. Median vitta of pronotum reaching a little beyond middle, remaining separate from transverse median band; no brown V-mark in basal half of elytra; pygidium distinctly bidentate 14. *G. bryanti* Jord., p. 213.

White lines of elytra very thin . . 15. *G. calus* Jord. 1906.

Pronotum with two large yellow, oblique, subapical spots, median vitta nearly reaching apex; angle of carina acute; white lines of elytra occupying alternate interspaces as in *G. bryanti* 16. *G. indagatus* Wolfr. 1931.

SUBSECTION B.

Only two species known, which form a group *c*.

Group c.—Characters of Subsection, p. 233.—Species 17 and 18.

14. Between median vitta of pronotum and lateral border three white longitudinal markings; elytra with a large blackish X, the two lines crossing at suture . . . . 17. *G. bella* Jord. 1904.

Between median vitta of pronotum and lateral border two longitudinal markings; the X of *G. bella* only indicated by an oblique line from shoulder to line IV of punctures . . 18. *G. clara* Jord. 1904.

Subsection C.

Group d.—Pygidium white, with or without brown median stripe, or with white border, sometimes the border confined to base.—Species 19–53.

15. Light-coloured median stripe of rostrum and frons continued on occiput as a median stripe ; no lateral stripe on occiput . . . . 16.
The light-coloured stripe (white, yellow or red) divided into two or three branches on occiput, or the whole occiput with light pubescence 17.

16. Lateral vitta of pronotum in front of apex of lateral carina ; before apical declivity of elytra an anguliform mark across suture, no apical spot . . . . . 19. *G. claudia* Jord. 1906.
Lateral vitta of pronotum from upperside of lateral carina ; no anguliform mark before apical declivity of elytra, apical spot present on each elytrum . . . . . 20. *G. tenuis* Jord. 1895.
Grey sutural area of elytra narrow, divided into a double stripe, each curved forward-sideward as a narrow band, apical spot of elytrum longitudinal . . . . . 21. *C. doris* Jord., p. 228.

17. On pronotum a vitta placed in front of apex of lateral carina and running from underside obliquely to apex where it joins lateral stripe of occiput . . . . . 18.
Markings of pronotum different . . . . . 19.

18. Elytra with dark V behind base ; basal longitudinal carinula of pronotum nearly horizontal ; angles of anal sternum not projecting 22. *G. acutangulus* Jord. 1904.
Elytra without dark V, with grey marking resembling the outline of a bell with handle ; basal longitudinal carinula strongly oblique ; angles of anal sternum more or less projecting 23. *G. lyrestes* Jord., p. 214.

19. On pronotum a dorsal vitta remote from lateral carina, on side of prosternum a broad horizontal vitta ; pygidium truncate, anal sternum bidentate, the teeth short in ♀ 24. *G. vanda* Jord., p. 219.
Markings of pronotum different or, if the same, pygidium bidentate and apex of anal sternum rotundate . . . . . 20.

20. Anal sternum strongly bidentate, the teeth projecting much beyond pygidium . . . . . 21.
Anal sternum not bidentate, in ♂ of some species sinuate, but the angles not drawn out as spiniform teeth . . . . . 24.

21. White border of brown pygidium restricted to base ; rostrum with notch behind antenna bearing in ♂ a short brush, which is rudimentary in ♀ . . . . . 22.
White border of pygidium more or less complete or the whole or nearly the whole pygidium white ; rostrum of ♂ without lateral brush 23.

22. On pronotum a broad stripe from upperside of lateral carina obliquely upward to beyond middle . . 25. *G. dag anus* Jord. 1897.
Between lateral carina and median vitta a thin, interrupted, abbreviated line . . . . . 26. *G. morannus* Jord., p. 222.

23. Lateral vitta of pronotum complete ; no small antemedian sutural spot in grey area ; apex of pygidium evenly rounded 27. *G. acastus* Jord., p. 215.

Lateral vitta interrupted ; a small brown antemedian spot on suture ; pygidium subtruncate, with the angles slightly turned up
28. *G. scalaris* Jord. 1906.

Lateral vitta represented by a few white speckles at lateral carina ; elytra with large triangular apical spot bisinuate on each elytrum, a small apical sutural dot remaining brown ; pygidium entirely white
29. *G. mexicanus* Jord. 1906.

24. Pygidium bidentate, the teeth more or less spiniform . . . 25.
Apex of pygidium rounded or truncate, angles effaced or at least not projecting as sharp teeth . . . . . 37.

25. Between lateral carina and median vitta a complete vitta from base to apex, at least dorsally sharply defined, median vitta with straight edges . . . . . 26.
Between dorsolateral vitta and median one some additional grey pubescence which forms spots or incomplete stripes, or dorsolateral vitta interrupted, or not extended to apex . . . . . 34.

26. Metepisternum without brown spot in middle ; abdomen without brown sublateral stripe . . . . . 27.
Metepisternum with large brown patch ; abdomen with brown sublateral stripe separating a creamy lateral stripe from creamy ventral area 31.

27. Pygidium much longer than broad . . 30. *G. mollis* Jord., p. 217.
Pygidium not longer than broad . . . . . 28.

28. White vittae of head united on rostrum, divided by the carina ; elytra with small apical spot and a very narrow, transverse, curved, subapical band . . . . . 31. *G. hedys* Jord., p. 216.
White vittae of rostrum and head narrow ; subapical transverse band of elytra broad, enlarged to a triangle on suture
32. *G. thecla* Jord. 1906.

Elytra without a narrow subapical band in addition to an apical spot 29.

29. Pygidium with brown median line ; basal lateral carinula of pronotum horizontal ; grey area of elytrum not drawn out into a narrow obliquely transverse band . . 33. *G. vitticollis* Jord. 1895.
Pygidium with brown elongate-pyriform spot divided by a thin white line ; elytrum with nearly semicircular band ending above apex of metepimerum . . . . . 34. *G. pulchellus* Jord., p. 229.
Pygidium entirely white ; basal lateral carinula strongly oblique . 30.

30. Lateral carina of pronotum twice as long as basal carinula ; dorsolateral white pubescence of pronotum not separated from pubescence of underside ; abdomen with brown diffuse lateral spots
35. *G. inca* Jord., p. 218.
Lateral carina much shorter ; a dorsal vitta partly separated from lateral and ventral white area by a rufous-brown stripe ; abdomen entirely white . . . . . 36. *G. hilda* Jord. 1904.

31. Occiput with median vitta broader than lateral ones
37. *G. extensus* Jord. 1904.
Median vitta of occiput absent or vestigial . . . . . 32.

32. The two brown rounded spots on subbasal swellings of elytra joined across suture . . . . . 38. *G. iris* Jord., p. 216.
The spots not connected with each other . . . . . 33.

33. Angle of pronotal carina 90° ; borders of pygidium sharply defined 39. *G. libussa* Jord., p. 220.
Angle of carina rounded ; borders of pygidium diffuse 40. *G. lusia* Jord., p. 219.
34. (Elytra with thin subapical curved transverse band, dorsolateral vitta of pronotum interrupted . . . 31. *G. hedys* Jord., p. 216.)
Elytra without thin subapical band . . . . . 35.
35. Dorsolateral vitta of pronotum interrupted, posteriorly broadly joined to white ventral area, lateral carina entirely within white area ; anal sternum of ♂ emarginate, impressed . 41. *G. ancora* Germ. 1824.
Dorsolateral vitta of pronotum starting from basal angle, curved, not reaching apical margin, lateral carina for the greater part within brown area . . . . . 42. *G. iphis* Jord., p. 221.
Between dorsolateral vitta and median one some additional markings 36.
36. Side of elytrum brown, with two thin grey or creamy lines ; pygidium creamy, with a thin white median line ; lateral stripe of abdomen more or less broken up into contiguous spots 43. *G. ada* Jord., 1904.
Side of elytra less extended brown, with larger grey markings ; underside more densely pubescent white, pygidium without thin white median line . . . . . 44. *G. signatus* Gyllh. 1833.
37. Pronotum with at least two brown stripes from base to apex . 38.
Pronotum white with or without a pair of black spots on dise, sometimes with indications of buff stripes on white ground . . . 42.
38. Lateral third or entire abdomen white or creamy . . . 39.
Abdomen with creamy lateral stripe ; pygidium and anal sternum long ; ♂ with large, ovate, hairy groove on head 45. *G. nica* Jord., p. 222.
39. Metepisternum with brown patch ; elytra with brown sutural spot before middle ; anal sternum of ♂ emarginate, with broad, hairy depression . . . . . 40.
Metepisternum without brown patch . . . . . 41.
40. Dorsolateral vitta of pronotum extending from upperside of lateral carina obliquely forward complete. . 46. *G. molitor* Jord. 1895
This vitta interrupted . . . . 47. *C. alma* Jord. 1904.
41. Side of pronotum diffusely pubescent, without sharply defined dorsolateral vitta ; angle of carina completely rounded (♀ only known) 48. *G. nubilus* Jord. 1904.
Pronotum with broad lateral vitta which is fairly well defined, at least dorsally ; angle of carina 90°, tip rounded off ; pubescence of head and rostrum, pronotum and pygidium with a pale vermilion shade ; ♂ with ovate groove on head . . 49. *G. clelia* Jord. 1904.
42. Pronotum with a pair of sharply defined black discal spots . . 43.
Without these spots . . . . . 44.
43. Elytra with triangular sutural black spot at beginning of apical declivity ; abdomen with white lateral stripe from segment I to V 50. *G. fahraei* Schönh. 1839.
Elytra without this sutural spot ; white lateral stripe restricted to segments III to IV, there being only an indication of white on II 51. *C. aulicus* Jord., p. 227.

44. Pro- and mesosternite black ; white lateral stripe of abdomen restricted to segments III to V . . . 52. *G. leucomelas* Jord. 1904.
Pro- and mesosternite not black ; abdomen with white and pale ochreous lateral stripe from base to apex . . 53. *G. biloris* Jord., p. 227.

Group e.—Pygidium brown or rufescent, with white, creamy or red median stripe.—Species 54–61.

45. Lateral carina measured from end of dorsal carina extending to apical third ; dorsolateral vitta of pronotum broken up into some obliquely placed spots ; pygidium and anal sternum with the angles more or less dentiform . . . . 54. *G. ophiopsis* Dalm. 1833.
Lateral carina extending at most a little beyond middle . . 46.

46. Elytra flattened at suture, but not depressed ; rostrum as long as broad ; pygidium rounded at apex ; anal sternum strongly bidentate ; underside almost uniformly white . 55. *G. polius* Jord. 1906.
Elytra depressed in sutural area ; abdomen with white or yellow lateral stripe ; anal sternum with the teeth short or absent . . 47.

47. No vitta between median one and lateral carina and no or very little white pubescence along upperside of the latter ; angles of pygidium almost effaced, those of anal sternum more or less distinct, but short 56. *G. lotus* Jord., p. 224.
In lateral aspect prothorax with a ventral vitta and a dorsolateral one, the latter extending from underside across lateral carina ; base without white pubescence above longitudinal carinula . . 48.
Dorsolateral vitta commencing at basal angle, therefore basal area adjacent to longitudinal carinula white ; pygidium rather strongly bidentate, apex of anal sternite rounded . . . . 49.

48. Brown median stripe of occiput narrower than white or yellow lateral stripe, often vestigial ; vitta of rostrum, apical spot of elytra, stripe of pygidium and lateral stripe of abdomen more or less vermilion, if not faded . . . . . 57. *G. dorsonotatus* Fährs. 1839.
Brown median stripe of occiput broader than white stripes ; no markings vermilion . . . . 58. *G. procerus* Jord., p. 226.

49. Pygidium longer than broad . . . . . 50.
Pygidium as long as broad, or broader . . . . . 51.

50. Antenna dark brown except base ; lateral carina of pronotum ending midway between dorsal carina and apical margin 59. *G. compar* Jord. 1895.
Antenna pale rufous ; lateral carina longer ; pygidium more strongly narrowed apicad, the teeth longer and nearer together 60. *G. decorus* Perroud 1853.

51. Dorsolateral vitta of pronotum narrow, crossing dorsal carina at some distance from angle and reaching apical margin behind eye ; lateral carina with thin white dorsal border which is continued along dorsal carina to dorsolateral vitta ; elytrum with impression on apical declivity . . . . . 61. *G. regalis* Jord., p. 225.
Dorsolateral vitta broader, no brown spot in angle between dorsal carina and lateral carinula ; apex of elytrum without impression ; brown patch on subbasal swelling united with brown lateral area, not across suture with corresponding spot of other elytrum 62. *G. pentilus* Jord., p. 225.

Section II.—Pronotum longitudinally carinulate; if coarsely rugate, the ridges more or less longitudinal, not transverse; sometimes the ridges restricted to the area in front of dorsal carina or even to the antecarinal portion of the median vitta. I include here the species known as *Analotes discoideus* Fahrs. 1839.

Some of the species agree closely with certain species of Section I in colour, pattern and build.

Subsection D.—Derm of frons and occiput red, this area sharply defined, and elytra with white double lines, as in *Subsection A.*—Species 63.

Group f.—One species; rostrum twice as broad as long; pronotum with five grey vittae, the two lateral ones connected with each other anteriorly by a transverse band; apex of pygidium and anal sternum rounded, on pygidium a straight black median stripe . . . . 63. *G. germaini* Jord. 1896.

Subsection E.—Derm of frons and occiput without sharply defined red area; rostrum not nearly double as broad as long; elytra without white double lines from base to apex.—Species 64–84.

Group g.—Pygidium brown, with white border, or white with sharply defined brown median stripe.—Species 64–71.

52. Occiput with undivided median vitta, sides brown, the vitta more or less vermilion; dorsolateral vitta of pronotum crossing dorsal carina a short distance from angle, more or less abbreviated; abdomen with lateral stripe of three large white spots
64. *G. marianna* Jord. 1904.

Occiput with vitta each side, or entirely white or yellow except a posterior median brown spot . . . . . 53.

53. Dorsolateral vitta of pronotum commencing at upperside of lateral carina; between rounded angle of carina and median vitta a short vitta starting from behind dorsal carina and not reaching halfway to apex; side of abdomen with four transverse white bands; apex of pygidium and anal sternum truncate-rotundate, angles not produced as spines; upperside of proboscis more or less vermilion
65. *G. vicinus* Jekel 1855.

Dorsolateral carina starting from base, its dorsal margin crossing dorsal carina at some distance from angle; no short vitta between dorsolateral and median vittae . . . . . 54.

54. Dorsolateral vitta some distance away from lateral carina, the space in and behind lateral angle of carina brown; brown median area of occiput large, continued to apex of rostrum; elytra with triangular sutural spot or a band before apical declivity; middle abdominal segments laterally with more or less distinct brown spots at apical margin; angles of anal sternum projecting; antenna of ♂ reaching to base of elytrum . . . 66. *G. pindonis* Jord., p. 231.

No band or triangular sutural spot in front of apical declivity of elytra
67. *G. ampulla* Jord. 1906.

Dorsolateral vitta commencing at basal angle, filling in the angle of carina and remaining contiguous with lateral carina for some distance, the separation from white underside being sometimes indistinct; pronotum at least one-third broader than long; angles of anal sternum rounded . . . . . 55.

55. Brown median area of occiput extending on to rostrum ; abdomen with lateral brown spot at apical margin of segments II to IV . 56.
Brown median area of occiput not extending to rostrum ; no brown spots on abdomen ; pygidium with brown median stripe . . 57.

56. Centre of head and disc of pronotum rugate-reticulate ; pygidium brown with narrow lateral white borders . . 68. *G. talis* Jord., p. 230.
Centre of head and disc of pronotum rugate-plicate, with distinct longitudinal ridges ; pygidium yellowish white, with brown median stripe 69. *G. helena* Jord. 1904.

57. Angle of pronotal carina 90°, its tip hardly at all rounded off ; brown median stripe of pygidium narrower than white border ; apical spot of elytrum triangular, broader than border of pygidium 70. *G. soror* Jord. 1907.
Angle of carina more than 90°, apex rounded off ; brown median stripe of pygidium broader than white border ; apical spot of elytrum about as broad as border of pygidium 71. *G. brevirostris* Jord. 1895.

Group h.—Pygidium white, with or without brown lateral spot or stripe, or brown with white median stripe.—Species 72–84.

58. In anterior half of pronotum a white stripe running from underside obliquely upward ; abdomen transversely banded at side ; antennae compressed, in ♂ longer than body ; derm of head rufous . 59.
Pronotum with three white vittae regular in shape, four brown or rufescent interspaces . . . . . 60.
Vittae irregular, brown interspaces therefore not straight stripes ; dorsolateral vitta short or more or less fused with white underside 62.

59. Elytrum with white basal halfring open behind and trapeziform antemedian patch from punctate line I to beyond IV, pointed behind ; white median stripe of pygidium broad 72. *G. variicornis* Jord. 1895.
Elytrum with nearly straight basal border, a straight white line from behind subbasal swelling to middle, here curving sideward-forward ; white stripe of pygidium narrow . 73. *G. phanerus* Jord., p. 229.

60. Elytrum with anguliform line as in *G. phanerus*, but the line meets that of other elytrum on suture and is continued to scutellum, this design somewhat resembling an anchor ; before apical declivity a nearly straight narrow band from side to side ; antenna of ♂ stout, not reaching apex of elytra, VIII longer than IX 74. *G. flexuosus* Jord. 1895.
Elytra with triangular spot on suture before apical declivity, the spot sometimes drawn out to lateral margin . . . . . 61.

61. Grey sutural area divided posteriorly, not joining the triangular sutural spot . . . . . 75. *G. affinis* Jord. 1895.
Grey sutural area joining the sutural spot ; club of antenna broader than in *G. affinis* . . . . 76. *G. editha* Jord. 1904.

62. Tarsal segment I shorter than claw-segment . . . . 63.
Tarsal segment I longer than claw-segment, especially in midtarsus 64.

63. Median vitta of pronotum abruptly narrowed, posterior half twice as broad as anterior ; apical spot of elytrum not sinuate ; antenna of ♂ reaching beyond base of elytra, with club narrow, shaft slender in ♂ ♀ ; hindtibia of ♂ with apical hook . 77. *G. hamatus* Jord. 1904.

Anterior half of median vitta represented by a few white hairs ; basal half of elytra suffused with white, apical spot of elytrum deeply sinuate anteriorly ; ♀ only known . . . 78. *G. martha* Jord. 1904.

64. Antenna reaching in ♂ beyond elytra, in ♀ beyond base of pronotum, shaft compressed in ♀, broad . 79. *G. discoideus* Fahrs. 1839.

Antenna shorter, shaft normal in ♀ . . . . . 65.

65. Brown area of pronotum irregular, laterally more or less ill-defined or bearing a short vitta . . . . . 66.

The two brown areas of pronotum well-defined . . . . 67.

66. Underside thinly pubescent, except on prosternite, mesosternal intercoxal process, and a lateral stripe on meso-metasternite and abdomen ; apical spot of elytrum smallish ; rostrum with brown side in ♂♀ ; in ♂ segment III of antenna longer than II 80. *G. irma* Jord. 1904.

Underside almost uniformly white or creamy ; apical patch of elytra occupying nearly the whole declivous area, anteriorly sinuate between punctate stripes V and VIII ; pygidium narrow and long ; rostrum entirely white in ♂, segment III of antenna of ♂ as long as II 81. *G. nanus* Jord. 1904.

67. White pubescence extending from underside very little above lateral carinula ; occiput brown at side, narrowly yellow in middle, frons entirely yellow ; apical patch of elytra large, not divided at suture, with small apical sutural brown spot ; underside uniformly white or creamy . . . . . 82. *G. abundans* Jord. 1906

White pubescence extending well above lateral carina and carinula 67.

68. Occiput with brown central area which extends on to frons or even rostrum ; apical patch of elytra divided by brown suture ; underside uniformly white . . . . . 83. *G. erna* Jord. 1904.

Occiput with diffuse brown median spot variable in size, sometimes obsolete ; apical spot of elytrum small, at beginning of apical declivity a transverse triangular spot on suture ; abdomen more densely pubescent at side than beneath ; shaft of antenna of ♂ stout 84. *G. elisa* Jord., p. 230.

39. **Phaenithon eximius** sp. nov.

♂♀. Upperside densely pubescent ochraceous buff and spotted with black. Pronotum with a broad median furrow from base to near apical margin. Intercoxal process of mesosternum strongly convex in middle, tuberculiform.

Black, upperside ochraceous buff, speckled with white hair-scales which are more or less condensed around the brown-black markings. Rostrum double as broad as long, entirely ochraceous buff, as is also the head, lateral angle a little nearer to base of mandible than to apex of eye-sinus, dorsal edge of eye continued on to rostrum as a carina which stops short halfway to apex, on frons three other carinae extending on to base of rostrum where they are united. Frons a little more than one-third the width of rostrum. Interspace between antennal groove and eye below sinus a little broader than segment II of antenna is long. Eye slightly longer than broad, anteriorly margined with white. Antenna short, club twice as long as broad in ♂, shorter in ♀.

Pronotum two-fifths broader than long, minutely coriaceous, a deep broad channel from base to near apical margin occupies at base about one-third,

behind apex one-sixth of the surface ; it is bounded each side by a high broad ridge ; half-way between middle and side a broad brown-black stripe from base on to the callosity, with two short transverse projections into the median ochraceous area and before middle a short projection forward, in middle the stripe expanding sideward for a short distance and then running to apical margin, which it reaches behind eye, behind apex an isolated brown-black spot each side of channel, sometimes also a short brown median line in channel, a brown spot above lateral carina and a grey postmedian dot in brown stripe ; dorsal carina slightly concave from side to side, almost gradually flexed forward, the arc rather flat, lateral carina continued upward by a vestigial line, subbasal transverse carinula distant from dorsal carina at angle, but soon approaching it very closely and disappearing before reaching median channel. Scutellum white, broader than long.

Elytra one-third longer than broad, depressed along suture, interstice III costate, V and VII slightly convex, IV impressed ; the following spots brown-black, all more or less edged with white : a round dot behind scutellum, a median sutural patch reaching to punctate stripe III and expanding shortly forward and backward on suture, a small anteapical sutural dot, in interstice III before apical declivity a linear spot, isolated or joined to a lateral patch, halfway to shoulder a basal and a subbasal spot, behind shoulder a submarginal isolated dot, well before middle a marginal patch extending upwards about to row VII of punctures, above it several small spots, sometimes confluent and forming an extension of the lateral patch, connecting it with the brown shoulder angle and nearly with the median sutural spot, well behind middle another marginal patch, more or less prolonged upwards as an abbreviated irregular band, before apical margin a small spot, all these markings variable. Pygidium a little broader than long, ochraceous buff, with some sprinkling of white, a diffuse spot in middle of base, the apical margin and a smear between middle and side white.

Underside white, a spot at side of metasternite and a row of lateral spots on abdomen brown-black ; prosternum in front of coxa about two-thirds as long as diameter of coxa ; metasternum and abdomen of ♂ broadly flattened, segment V nearly as long as III + IV, with deep apical groove ; in ♀ V as long as III + IV, emarginate in middle. Apices of tibiae and the tarsi brown-black, segment 1 of tarsi except apex and IV except base white, I in foretarsus of ♂♀ as long as II + III, shorter than claw-segment, foretarsus broader in ♂ than ♀, midtibiae of ♂ with apical spinulose hump.

Length 5·4–8·0, width 2·5–3·7 mm.

Brazil : Jatahy, Goyaz, 2 ♂♂ (type) ; Diamantino, 1 ♀ ; also from Cayenne.

40. **Phaenithon brevitarsus** sp. nov.

♂♀. In colouring exactly like *Ph. longicornis* Jord. 1904, but differs in the proboscis, antennae and tarsi.

Rostrum depressed in front of eye, feebly but noticeably convex in median area, not flat and slightly uneven as in *Ph. longicornis*, lateral angle more obtuse than in that species. Median carina of frons thin and short, no distinct lateral ridges. Antenna short in both sexes, VIII broader than long, shaft slender in ♂ as in ♀, whereas in *Ph. longicornis* the ♂ antenna is prolonged, VIII being at least twice as long as broad. In ♂ of *Ph. longicornis* abdomen medianly impressed,

with a pair of tufted tubercles on IV, in *Ph. brevitarsus* both I and IV with a pair of tufted tubercles. All tarsi deep brown in *Ph. longicornis* and the ♀ of *Ph. brevitarsus*, but in ♂ of *Ph. brevitarsus* fore- and midtarsi greyish white, moreover segment I of foretarsus of ♂ less than twice as long as broad, being about half the length of claw-segment, in midtarsus I not quite so short, but shorter than claw-segment, in hindtarsus I as long as II to IV together.

Largest specimens the size of the smallest we have of *Ph. longicornis*.

Length 5·3–7·3, width 2·2–2·9 mm.

French Guiana: Gourdonville and Pariacabo, viii.–xii. 1905, a series; we have also *Ph. longicornis* from the same localities. In Carnegie Museum *Ph. brevitarsus* from Pará.

41. **Phaenithon foveiceps** sp. nov.

♂♀. In both sexes a deep groove anteriorly on occiput.

Rufescent brown. Pubescence of rostrum and head diffuse, not concentrated into a stripe or stripes, denser in slightly convex centre of rostrum. Lateral angle of rostrum midway between bottom of sinus of eye and mandible, apical sinus rounded, lateral portions of apical margin nearly straight. Frons rugulose, faintly concave, with irregular thin median carina, pit in between posterior third of eyes ovate, its transverse diameter nearly half the distance of pit from eye (pit smaller in a dwarf ♀). Interspace between eye and antennal groove broader below sinus than segment II of antenna. Eye longer than broad. Antenna short, club as long as shaft, thrice as long as broad, X one-fourth broader than long, IX and XI longer than broad.

Pronotum two-sevenths broader than long, hardly at all depressed before carina, flattened in apical area, with the apical margin slightly incurved between the eyes, especially in ♂, disc evenly but not strongly convex, without median furrow, at each side of middle an irregular white vitta, broken up into dots in ♀, an incomplete median vitta likewise irregular, composed of spots, these vittae more or less connected at base and apex, before carina at outer side of submedian vitta an elongate spot, additional dots in central and lateral brown areas, variable in number; dorsal carina slightly undulate, concave from side to side, curved forward at side in a shallow arc, continued beyond middle as a thin vestigial line, basal longitudinal carinula nearly as distinct as subbasal transverse one. Scutellum white, transverse, triangular.

Elytra about one-fourth longer than broad, not depressed at suture, subbasal swelling vestigial; punctate-striate, interstices flat, no depression before apical margin, declivity very gradual, in ♂ rufescent-brown subbasal swelling encircled by white dots which on suture and behind swelling are more or less confluent, and on and before apical declivity a number of white dots, confluent or separate, a few additional in central and lateral areas, in ♀ the dots more numerous and most of them separate, only the subbasal swelling and a median sutural patch being devoid of them. Pygidium nearly alike in ♂ and ♀, a little longer than basally broad, strongly narrowing apicad, especially in ♂, with the apical margin evenly rounded, a median line composed of more or less confluent spots and a small number of lateral spots white.

Underside white; on metepisternum and abdominal segments II and III usually a brown spot each; intercoxal process of mesosternum convex, but not

tuberculiform, abdomen of ♂ medianly flattened, V transversely impressed. Legs rufous, tarsi and apices of tibiae blackish brown, segment I for the greater part white, foretibia of ♂ ventrally with a small apical tooth.

Length 6·2–6·5, width 2·5–3·1 mm.

French Guiana: Gourdonville and Pariacabo, xi. 1905, i. 1906, 2 ♂♂, 1 ♀, type ♂; in Carnegie Museum from the Amazons.

42. **Phaenithon hypocoelus** sp. nov.

♂♀. Near *Ph. figuratus* Gyllenhal 1833; differs as follows: shaft of antenna and tibiae dark brown; segment XI of antenna at most as long as broad; pronotum more coarsely coriaceous and more convex, between laterodorsal vitta and lateral carina a diffuse vitta indicated, lateral carina short, not nearly reaching to middle; apical spot of elytrum more rounded, pygidium white, at most with a brown smear each side of middle, strongly convex in ♀ and much less narrowed towards apex; abdomen of ♂ rather deeply impressed from I to V, the groove deepest on III and IV, at apical margin of these segments each side of groove a small notch, V a little longer than IV, without median tuft, in ♀ V shorter and apically broader than in *Ph. figuratus*; underside of abdomen dispersedly punctate in both sexes; tarsi and apices of tibiae brownish black, pubescence on underside of mid- and hindfemora shorter than in *Ph. figuratus*.

Brazil: Bahia, two pairs.

43. **Phaenithon phelus** sp. nov.

♂♀. Likewise close to *Ph. figuratus*; interspace between margin of antennal groove and eye below sinus only as wide as segment II of antenna is broad; antenna dark brown, club as in *Ph. figuratus*; pronotum medianly more strongly rugulose, vittae narrower, lateral carina continued forward by a thin vestigial line; sutural buff stripe reduced in length and width, not reaching to middle, rest of suture and the alternate interstices dotted with buff, four to seven dots in each row, apical spot separate from apical margin, at least laterally; pygidium of ♂ as in *Ph. figuratus*, with or without brown smear between middle and side; abdomen of ♂ with rather narrow depression from I to IV, V with deep groove entirely filled in with buff pubescence; tarsi and apical half or third of tibiae brown-black, tarsal segment I white above, foretarsus of ♂ as broad as in ♂ of *Ph. figuratus*, much broader than in *Ph. hypocoelus*.

Brazil, 3 ♂♂.

44. **Phaenithon stellans** sp. nov.

♀. Club of antenna consisting of two segments, X being absorbed.

Cylindrical, dark brown, upper surface rather densely dotted with creamy pubescence. Rostrum thrice as broad as long, being very short, depressed along apical margin, which is turned up, median sinus shallow, angle of lateral margin strongly rounded. Frons half as broad as rostrum, flat. Interspace between antennal groove and eye below sinus narrower than segment II of antenna. Eye slightly longer than broad. Antenna dark brown, club paler, elliptical, half as long again as broad, segment X absent (in the only specimen before me, a ♀), VIII much broader than VII, forming part of the club, of which it has the dull surface, III about one-fourth longer than IV.

Pronotum nearly two-thirds broader than long, convex, very feebly depressed along dorsal carina, densely granulate-coriaceous, the creamy dots laterally partly confluent ; lateral carina short, longitudinal carinula distinct, transverse carinula short. Scutellum slightly slanting, a little impressed along middle, broader than long.

Elytra cylindrical, not at all depressed above, somewhat swollen around scutellum, with slight indication of a depression behind this swelling, dots in the depression mostly confluent, apart from sutural one no impressed stripes, no seriated punctures, the whole surface very densely granulose. Pygidium dotted with white, as long as broad, moderately narrowed to apex, which is evenly rounded, basal half slightly convex, apical half flattened.

Underside thinly pubescent white ventrally, more densely laterally, but sides spotted and marmorated with brown. Prosternum short ; intercoxal process of mesosternum slanting, somewhat concave, almost gradually narrowing, lateral angle very obtuse, apex rounded and somewhat curved back ; anal sternite (♀) as long as III + IV, strongly narrowed to apex, which is as broad as IV is long in middle and sinuate, with the angles rounded off. Tibiae white except apex and extreme base, which are dark brown like the tarsi ; hindfemur reaching to apex of abdominal segment IV ; segment I of mid- and hindtarsi with white pubescence above, in all tarsi I shorter than twice the diameter of apex of tibia.

Length 6·8, width 3·3 mm.

Brazil : Espirito Santo, 1 ♀.

45. **Phaenithon ochrinus** sp. nov.

♀. Close to *Ph. stellans* (No. 44), but club of antenna with three segments, IX as long as X + XI, pubescence of pronotum and elytra for the greater part concentrated in patches, pale buff.

Frons more than half the width of rostrum. Segment III of antenna only a trifle longer than IV, club nearly twice as long as broad and nearly as long as II to VIII together, IX broader than long, X transverse, XI only as long as X.

Pronotum with median vitta interrupted in centre, continued on to occiput, broadened at and behind carina, at side of it a broad brown irregular stripe bearing a few buffish dots, lateral fourth dotted with pale buff, the dots united at some distance above angle into a small irregular rectangle with brown centre. Scutellum creamy white.

Spots on elytra less numerous than in *Ph. stellans* and most of them larger, at base near suture but well separated from it a squarish patch, an elongate one above shoulder, a squarish one in subbasal vestigial depression, dots on apical declivous area connected with one another, spots smaller and less numerous in lateral area than above. Apex of pygidium turned up. Underside as in *Ph. stellans*.

French Guiana : Cayenne, 2 ♀♀.

46. **Phaenithon romarus** sp. nov.

♂♀. As in *Ph. longitarsis* Jord. 1904, *Ph. curvipes* Germ. 1824 and *Ph. gravis* Fåhrs. 1839, the prosternite longer in front of coxa than the diameter of coxa.

Rostrum densely punctate, medianly slightly convex transversely, angle of lateral margin nearer mandible than apex of sinus of eye, very obtuse, apical

sinus subtriangular, a yellowish buff sharply defined median vitta divided at base, the two halves continued along eyes to base of pronotum. Antenna short, club thrice as long as broad in ♀, longer in ♂, as long in ♂ and ♀ as III to VIII together, IX longer than broad. Interspace between antennal groove and eye about twice as wide as segment II of antenna is long. Eye longer than broad. Frons with irregular median carina extending on to rostrum and longitudinally rugate-reticulate.

Pronotum very densely and finely coriaceous, one-eighth broader than long, gradually narrowed from before basal angle, moderately convex, somewhat depressed along dorsal carina, apical margin medianly incurved, especially in ♂; a short, narrow, median vitta at base, a broader, complete, laterodorsal vitta, somewhat curved, being convex dorsally, crossing dorsal carina about halfway between middle and side, the brown dorsolateral area broader in centre than brown median area, the three vittae joined together along carina, base behind carina creamy white from side to side, dorsal carina feebly concave, lateral carina very oblique, the arc, therefore, rather wide, this carina continued for a short distance as a vestigial horizontal line, basal longitudinal carinula distinct, not quite joining lateral carina, forming an angle of 90° with transverse carinula, this carinula close to dorsal carina except at lateral angle. Scutellum white.

Elytra about half as long again as broad, narrowing posticad, not depressed dorsally, finely punctate-striate, none of the interstices costate, apical declivity gradual, not humped, sutural area creamy white from base to two-thirds, extending at base to lateral margin, nearly interrupted at shoulder, widened above shoulder, again expanding laterad to line IV of punctures behind subbasal swelling, which remains brown and is broadly continuous with lateral brown area, the white area then narrows to lines III and II and behind middle expands to III and is joined (or nearly, type) to an elongate postmedian spot placed in interstice V, the suture remaining narrowly brown except at base, an antemedian, irregularly rounded, spot in interstices VII and VIII and a very small spot at margin a little farther forward, at apex an obliquely transverse spot, touching neither suture nor margins. Pygidium longer than broad, with the borders and a median vitta creamy white, the vitta broad at base, tapering apically and more or less interrupted, in ♂ pygidium rugulose, somewhat convex, first slanting and then gradually vertical, apical margin straight in middle, in ♀ granulose, gradually narrowed, with the apex evenly rounded.

Underside creamy white, pubescence thinner ventrally on metasternite and abdomen than laterally; prosternum about one-third longer in front of coxa than diameter of coxa; mesosternal intercoxal process somewhat narrower than coxa, the rounded apex curved back, lateral angle strongly rounded, not tuberculiform, middle slightly concave; in ♂ metasternum very moderately flattened, abdomen narrowly flattened on I to IV, hardly at all impressed, V shorter than IV, with deep round median groove, III and IV each with two small pale subapical tufts; in ♀ V as long as III + IV, apex rounded, with very small median sinus; in both ♂ and ♀ a spot anteriorly on mesepimerum, a large spot on metepisternum and a row of lateral marginal spots on abdomen brown. Tarsi and apices of tibiae brownish black, foretarsal segment I longer than claw-segment, midtibia of ♂ without mucro.

Length 7·3–7·9, width 3·1 mm.

Amazonas: Santarem, one pair, type (♂) in Carnegie Museum.

47. **Phaenithon mendis** sp. nov.

♂♀. Head and pronotum coarsely and very densely punctate-rugate. ♂ easily distinguished from that of similarly coloured species by the presence of a prominent median tubercle on abdominal sternum IV and by the upperside of the midtibia being flat and bearing along this area a carina from base to apex.

Black, with white pubescence. Rostrum more than twice as broad as long, white, slightly convex, but depressed behind elevate apical margin, angle of lateral cariniform margin nearer base of mandible than apex of sinus of eye, rounded, the margin continuous with apical margin, the two forming a wide arc, median apical sinus shallow. White pubescence of head not dense except at eyes, frons in ♂ less and in ♀ a little more than one-third as wide as rostrum (this measured from angle to angle, not from sinus of eye). Eye almost circular. Interspace between eye and antennal groove below sinus of eye as broad as antennal segment I. Antenna short, black, rufescent at base, club paler, as long as segments III to VIII, a little more than half as long again as broad.

Pronotum one-half broader than long, moderately convex, slightly flattened at apex, no subbasal depression, rather more than central half brown with a diffuse, interrupted white median stripe or some scattered white pubescence at base and apex, sides with a pair of irregular, partly confluent stripes and one or two spots, all rather indefinite ; dorsal carina somewhat concave, lateral carina quite short. Scutellum white.

Elytra cylindrical, one-third longer than broad, not depressed along suture, subbasal swelling vestigial, with a feeble depression behind it ; punctate-striate, interstices flat, markings white : from base to one-third (or beyond) of suture a broad stripe curving sidewards behind subbasal swelling and connected with basal margin by a line in interstice V and some dots in III, these interstices as well as VII and IX also elsewhere bearing some white dots, at apex an indefinite, variable, patch across suture. Pygidium longer than broad, a little narrower in ♂ than in ♀, gradually narrowing to apex, which is rounded, white pubescence more concentrated along middle and sides.

Underside white, without brown spots. Intercoxal process of mesosternum narrower than coxa, apex curved back, at side an indication of an angle. Abdomen of ♂ not depressed on I to IV, tubercle of IV subapical, small but rather high. Legs white, in ♂ inclusive of tarsi, only hindtarsus less densely pubescent (partly rubbed) ; in ♀ I of midtarsus and base of I in foretarsus white, the rest dark brown. The flat upper surface of midtibia of ♂ outwardly bounded by a carina is, on the inner side, bounded by a carina only proximally.

Length 4·3–4·8, width 2·0–2·2 mm.

Brazil : Hansa Humboldt, Sta. Catharina, i. and ii. 1936 (A. Maller), a series ; in Carnegie Museum from Chapada.

Phaenithon mediocris Jekel 1855.

The original description was evidently based on the ♀. The ♂ agrees with the ♀ in colouring ; the midfemur is enlarged on ventral side into a broad conical protuberance which is somewhat concave on frontal side and here, towards inner surface, studded with brown, erect, almost spiniform scale-hairs ; pygidium longer than broad, convex, i.e. apex curved slightly frontad, apical margin broad,

truncate-emarginate, angles rounded. Abdominal sterna I to IV flattened-depressed, lateral margin of depression elevate on II to IV, apical margin of IV also elevate, round, projecting a little over base of V, the depression with its raised margins somewhat resembling half a watchglass, V truncate-rotundate, short, broadly depressed. In both ♂ and ♀ interspace between antennal groove and eye below sinus rather wider than segment II of antenna is long.

A pair from the Amazons.

48. **Phaenithon aspersus** sp. nov.

♂. Rather broader than *Ph. mediocris* Jekel 1885, markings more indefinite, midfemur simple, midtibia with apical mucro, abdomen depressed from I to V, the depression not bounded by a ridge, apex of pygidium evenly rounded.

Head and rostrum white, buffish on occiput, lateral angle of rostrum nearer mandible than apex of eye-sinus, centre slightly convex, apical sinus broad. Frons two-fifths the width of rostrum, with central carina, sides rugate-plicate. Interspace between antennal groove and eye below sinus a little wider than segment II of antenna is long. Eye a very little ($1\frac{1}{12}$) longer than broad. Antenna short, club not quite twice as long as broad, apex of IX and X very oblique.

Pronotum rather coarsely rugate-coriaceous, medianly somewhat longitudinally plicate, markings buff at apex, white elsewhere, at apex and at base a short median stripe and a dorsolateral patch indicated, in between them the brown ground irrorated with white pubescence, all indefinite ; dorsal carina very slightly undulate, lateral carina continued for some distance obliquely upward by a vestigial raised line, basal longitudinal carinula very oblique, distinct, transverse subbasal carinula farther from basal margin than from dorsal carina except at point of juncture with lateral carinula. Scutellum white.

Elytra nearly as short as in *Ph. semigriseus* Germar 1824, strongly convex, not depressed at suture except very feebly behind vestigial subbasal swelling, seriated punctures distinct, the rows hardly at all impressed as stripes except sutural one ; as in *Ph. mediocris* a white basal sutural patch extending behind brown subbasal swelling to interspace IV and at basal margin to near shoulder with two interruptions, behind scutellum a small brown dot on suture, before middle a sutural area almost devoid of grey irrorations, farther back to near apical declivity interspaces I to III with white diffuse dots, interspaces V to IX dispersedly irrorated with ochraceous buff, at margin from base to beyond middle an interrupted, more or less grey line, at apex a largish triangular patch ochraceous buff, about as long at suture as at apical margin, somewhat indefinite. Pygidium longitudinally slightly convex, longer than broad, white, but pubescence less dense between middle and sides, the pygidium being nearly trivittate.

Underside white, a spot on metepisternum and a lateral row of spots on abdomen brown (partly denuded). Segment I of foretarsus a little shorter than II + III, hindtarsus blackish brown like apices of tibiae, segment I depressed, somewhat asymmetrical, with a white stripe in basal two-thirds of outer side. Intercoxal process of mesosternum as broad as coxa, slightly concave, apex turned backwards.

Length 5·7, width 3·0 mm.

Brazil : Jatahy, Goyaz, 1 ♂.

49. **Phaenithon apertus** sp. nov.

♂. Similar to *Ph. aspersus*. Pronotum very densely and evenly punctate-coriaceous, without longitudinal wrinkles, in middle a short apical stripe and a longer and broader basal one joined together by some white pubescence, halfway to side a subapical spot, and at one-fourth from centre another buff, rest of surface irrorated with white speckles; dorsal carina laterally less curved forward, lateral are more strongly curved, lateral carina short, continued by an indistinct horizontal line, basal longitudinal carinula obsolescent. Scutellum buff.

Elytra more strongly convex at base of suture, the larger patches of pubescence buff, most of the others white, especially on suture and at side, basal sutural patch less compact, being invaded by brown, on line VI of punctures a postmedian linear buff spot, apical declivity irrorated with buff, without condensed patch, rest of elytra dispersedly irrorated with white. Pygidium more convex than in *Ph. aspersus*, rugate-granulate-punctate, moderately narrowed to apex, with buff median stripe, ill-defined like all markings of upper surface, apex white, truncate-rotundate, with the angles strongly rounded, sides and base sparsely irrorated with white.

Underside white, side of prosternite rugulose, of metasternite densely punctate-coriaceous; intercoxal process of mesosternite somewhat narrower than coxa, longer than broad, apex curved backwards, lateral angles feebly marked, not swollen, the surface in between hardly at all concave; metasternum medianly broadly flattened, segments I and II of abdomen moderately flattened, not impressed, III and IV not flattened, V longer than IV, transverse, transversely slightly depressed, apex medianly truncate. Legs pubescent white, inclusive of upperside of tarsi, but this pubescence thin on tarsal segments II–IV, tibiae and mid- and hindtarsal segment I except blackish apices pale luteous, rest of tarsi blackish, foretarsal I not longer than II + III, IV longer than I to III, midtibia without muero, with a small hump instead, bearing a number of spines which are shorter than the normal spines of apical margin, hindtarsal I nearly as long as II to IV.

Length 4·3, width 2·3 mm.

Brazil: Jatahy, Goyaz, 1 ♂.

50. **Phaenithon perfectus** sp. nov.

♂♀. Similar to *Ph. jucundus* Jord. 1906, median vitta of pronotum complete, lateral carina short, intercoxal process of mesosternum vertical, but its apical triangular portion almost abruptly turned anad, being horizontal and its centre a little above the level of metasternum, abdominal segment IV of ♂ with two tubercles.

Rostrum more than twice as broad as long; frons about half as wide as rostrum, with a creamy-buff border to eye, on occiput a thin median line of variable length of the same pubescence. Median vitta of pronotum abruptly widened behind carina and just in front of it, not connected along carina with dorsolateral vitta, which tapers in front and does not reach apical margin, white pubescence of underside ascending to level of upper margin of eye, the apex of dorsolateral vitta being sometimes joined to this marginal upward extension, at base the white pubescence reaches behind and in front of carina

to dorsolateral vitta, lateral carina quite short, not continued forward by a thin raised line as in *Ph. jucundus*, fringe of apical margin entirely creamy buff.

Pattern of elytra not so definite as in *Ph. jucundus*, subbasal swelling encircled by white, this pubescence extending at base to outer margin, from this ring emanate backwards one or more stripes, usually diffuse and variable in length, or the dorsal area from irregular ring to apical third mottled with white, at side above metepimerum a spot, another much larger one at apex touching neither margin nor suture. Pygidium white, in ♀ with two diffuse brown smears, which are sometimes broken up into four indistinct spots.

Underside white ; abdomen of ♂ medianly depressed, segment IV at apical margin with two small tufted tubercles ; midtibia of ♂ with indication of a bump at apex.

Length 4·7–7·8, width 2·1–3·5 mm.

Costa Rica, vi. 1935 (F. Nevermann), on dead wood, a small series, type in coll. Nevermann.

51. **Phaenithon micula** sp. nov.

♂. A small and short cylindrical species, with large eyes, the pygidium truncate and the anal sternum sinuate.

Rufescent brown. Rostrum white, more than two and one-half times as broad as long (34 : 13), apical sinus shallow, angle of lateral margin very obtuse, rounded. Frons only as broad as rostrum is long, brown irrorated with creamy white, rugate, occiput brown with creamy pubescence in middle and at eye. Interspace between antennal groove and eye below sinus as broad as antennal segment II. Antenna short, club a little longer than II to VIII, IX and X short, XI longer than IX + X. Eye circular.

Pronotum half as broad again as long, coarsely punctate-coriaceous, slightly depressed along carina from side to side, moderately convex above, diffusely spotted with creamy white : at base a median spot widened behind carina, in centre a row of three more or less connected with each other, before them a rather larger median spot with a small spot at each side, lateral third of pronotum with about eight spots of which the anterior ones are joined together at apical margin ; dorsal carina very slightly and evenly concave, straight towards side, the lateral angle little larger than 90° with the tip rounded off, lateral carina bordered with white, flexed downward-forward and continued upward-forward by a thin line, subbasal transverse carinula distinct to near middle, nearly parallel with dorsal carina. Scutellum creamy white.

Elytra cylindrical, not depressed dorsally, not swollen behind scutellum, subbasal swelling vestigial, stripes of punctures distinct in basal half, obsolescent posteriorly, maculation irregular, the creamy-white spots small and few at side and in a median sutural area, more or less confluent in subbasal depression, a largish transverse spot behind middle from interstice II to V, on declivous apical area numerous small spots most of which are joined together. Pygidium white, longer than broad, rather strongly narrowed to apex, which is truncate, beyond middle a vestigial median hump.

Underside white. Intercoxal process of mesosternum short, subvertical, flat, apex truncate-rotundate. Abdomen convex, not depressed, anal sternum as long as III + IV, strongly narrowing apicad, apex sinuate, oblique dorso-

lateral margin incurved. Tibiae rufous; tarsi slender, brown segment I longer than IV, in hindtarsus I three-fourths the length of tibia.

Length 3·7, width 1·7 mm.

French Guiana: Roches de Kouron, 1 ♂.

52. **Phaenithon catharus** sp. nov.

♂. Near *Ph. semigriseus* Germar 1824, pronotum with three sharply defined, complete, deep creamy vittae.

Pubescence of rostrum deep creamy, divided posteriorly on frons into two stripes bordering the eyes and a short narrow median stripe; frons nearly two-fifths the width of rostrum. Pronotum minutely coriaceous, but rugulose on disc, with longitudinal wrinkles, median vitta narrowing forward, laterodorsal vitta broader, carina more strongly curved forward at side, basal longitudinal carinula obsolete, transverse subbasal carinula distinct, interrupted in middle. Scutellum broader than long, smaller than in *Ph. semigriseus*.

Elytra short and convex, seriated punctures distinct, but the rows hardly at all impressed, from base of suture to shoulder a white band continued at suture to one-fourth, here turning obliquely sidewards to line V of punctures, running in interstice V to two-thirds, turning abruptly towards suture as far as row I of punctures, this upward expansion trapezoidal, widest at row I, brown patch on subbasal swelling sinuous, broadly continuous with lateral brown area, at apex a transverse oblique spot from row I of punctures towards apicilateral margin, which it does not reach, the brown sutural area bounded by the white question-marks is almost rhombiform on each elytrum and extends forward to near scutellum as a thin sutural line. Pygidium longer than broad, white, much less narrowed to apex than in *Ph. semigriseus*, apical margin round.

Underside white, inclusive of legs, exclusive of hindtarsus. Intercoxal process of mesosternum slightly concave, angulate at side, apex rounded and turned backward; metasternum flattened; abdomen very feebly flattened, without groove, V very little longer than IV. Foretarsal segment I as long as II + III, shorter than IV in both fore- and midtarsus, midtibia with apical tooth, hindtarsal segments I and II apically compressed, not symmetrical, their dorsal surfaces (in our unique specimen) apically subcariniform.

Length 4·0, width 2·1 mm.

Amazonas, 1 ♂.

53. **Phaenithon praetersus** sp. nov.

♀. Near *Ph. figuratus* Fåhrs. 1839, but occiput with three vittae and the median one of pronotum complete, broader than dorsolateral vitta, of even width from before carina to apical margin. The four rufous-brown stripes of pronotum sharply defined, the lateral one a little wider than median vitta or the same width, posteriorly half as wide as sublateral rufous-brown stripe, dorsolateral vitta basally connected with white underside, angle of carina more abruptly rounded than in *Ph. figuratus*, denticulate lateral carina much shorter than in that species, but continued by a thin line; the whole pronotum minutely coriaceous, in *Ph. figuratus* the central area rather strongly rugulose.

Elytra subcylindrical; a basal marginal band greyish white, extended a short distance backward above shoulder and on suture to apical fourth, being

rather abruptly dilated behind subbasal swelling to line V of punctures and gradually and not so much posteriorly, before middle of side a patch or band running obliquely up- and backwards to line IV or V of punctures, at apex of each elytrum two spots connected (type) or separate, one apical, the other lateral, these spots slightly yellowish. Pygidium as in *Ph. figuratus* with three white lines, which are more or less abbreviated, especially the median one.

Underside white, abdomen ventrally less densely pubescent than at side. Tarsi and apices of tibiae pitchy black, the former slenderer than in *Ph. figuratus*, segment I of all tarsi longer than II to IV together. Mesosternal intercoxal process very feebly concave.

Length 5·0–6·2, width 2·0–2·7 mm.

Upper Amazons, 2 ♀♀.

54. **Phaenithon albipannis** sp. nov.

♂♀. Foretibia strongly dilated, a basilateral spot on pronotum and several at apex of elytra and on pygidium creamy white, very conspicuous on the dark ground.

Black, strongly convex. Cariniform dorsal edge of eye continued as broadish ridge to apical third of rostrum, the surface of the rostrum being thereby divided into three areas, median area very finely punctate, depressed, especially at base, with a white, irregular, median stripe to base of labrum, lateral area densely and rather strongly punctate. Head dotted with white, a median carina on frons widening forward and here divided by a median channel. Eye longer than in *Ph. leopardinus* Fåhrs. 1839 (which also has the foretibia dilated). Club of antenna slightly paler than shaft, asymmetrical, XI longer than IX, more strongly rounded on posterior side than anteriorly.

Pronotum half as broad again as long, moderately depressed in front of scutellum and very feebly so along middle, minutely and very densely granulate-coriaceous, dispersedly dotted with white, from basal angle across dorsal carina a creamy-white patch not touching lateral carina, anteriorly excised or longitudinally divided, longitudinal basal carinula distinct, transverse subbasal carinula quite short. Apex of scutellum drawn out into a longer pointed ridge than is usual.

Elytra almost as broad as long, being only about one-tenth longer than broad, strongly convex, not depressed above except very feebly before middle, subbasal swelling absent, rows of punctures I, II and III distinct, the others obsolete, the whole surface dispersedly dotted with white, a larger spot near suture at basal third, a small one in middle towards lateral margin, and a largish creamy-white spot of variable size at apex separate from suture. Pygidium broader than long in ♂, a very little longer in middle than broad in ♀ and in this sex granulate, apical margin round, in ♂ medianly straight for a short distance, at base a creamy-white band usually broken up into three spots.

Underside thinly pubescent white medianly, sides dotted with white, at side of abdomen a row of three creamy-white spots on II to IV, the last the smallest; intercoxal process of mesosternum vertical, much higher and broader than coxa, transversely strongly convex at highest point, anterior surface flat; abdomen in ♂ strongly depressed along middle, in ♀ somewhat flattened. Femora and mid- and hindtibiae dotted with white, foretibia strongly compressed, black, dilated,

inner side slightly concave, outer side convex, less than four times as long as broad, pubescence short, tarsi black, segment I white.

Length 7·0–10·3, width 3·9–5·6 mm.

French Guiana: Gourdonville, viii. x. 1905, two pairs; in Carnegie Museum also a ♂ from Santarem, Amazonas.

55. **Phaenithon baseopagus** sp. nov.

♂♀. Near *Ph. callosus* Fåhrs. 1839, but base of suture raised into a single rounded tubercle. Short and broad, of the size of large specimens of *Ph. leopardinus* Fåhrs. 1839, with the foretibia compressed and dilated as in that species, but proboscis quite different.

Black, densely dotted with creamy white above and below, laterally on pronotum and on underside the white dots more or less confluent, the black interspaces forming an irregular network. Rostrum more than twice as broad as long (in type 44 : 19), transversely depressed, irregularly creamy white except at base, middle rugulose, sides punctate-rugate, lateral margin dilated into an obtuse angle at one-fourth, from apex of angle the cariniform edge of antennal groove continued very obliquely to apical margin, antennal groove close to eye. Head dotted like pronotum, but frons more or less bare, a thin median carina on frons and numerous irregular ridges. Antenna reaching to base of prothorax, rufescent, paler at tip, segment X longer than broad in ♂, transverse in ♀, XI in ♂ twice as long as broad and in ♀ half as long again as broad.

Pronotum about one-half broader than long, strongly convex, feebly flattened before dorsal carina, which is straight, basal longitudinal carinula not well developed, transverse carinula vestigial except at side, where it is strongly developed. Scutellum slanting.

Elytra one-fourth longer than broad, not depressed at suture, but sutural area somewhat flattened posteriorly, punctate stripes fairly distinct, dorsal interstices feebly convex, sutural interspace swollen behind scutellum and at its sides a low but quite distinct callosity being formed, which is longer on suture than broad and gradually fades away posteriorly; the white spots more or less evenly distributed, very numerous and nearly all separate, except at side and behind callosity. Pygidium slightly raised in median line, spotted with white, in ♂ much broader than long, with apical margin straight in middle, in ♀ nearly as long in middle as broad, gradually and rather strongly narrowing apicad, apex somewhat turned up, evenly rounded, granulate.

Whole underside spotted with creamy white, the spots confluent (the pubescence rubbed away in middle of metasternum), intercoxal process of mesosternum subvertical, broader than coxa, apex curved back and rounded, at point of curvature angles swollen, tuberculiform, surface in between these tubercles slightly concave; abdomen depressed along middle in ♂, somewhat flattened-depressed in ♀. Forefemur and -tibia entirely brownish black, midfemur pubescent creamy white spotted with brown, midtibia uniformly pubescent creamy white with brown apex, hindfemur and -tibia spotted with creamy white and brown, tarsi more or less pale buff, segments I and II creamy white on upperside in all tarsi, if not rubbed bare, foretibia of ♂ with a small ventral tooth.

Length 6·3–9·2, width 3·3–5·3 mm.

Brazil: Espiritu Santo, 3 ♂♂, 2 ♀♀ (type ♂); in Carnegie Museum a series from Amazonas: Pará, Santarem, S. Paulo de Olivença.

56. **Phaenithon colonis** sp. nov.

♂♀. Similar to *Ph. baseopagus*, but proboscis very different, basal tubercle of elytra much higher, underside except abdomen dispersedly dotted with creamy white.

Proboscis twice as broad as long, white, depressed proximally in middle, with several longitudinal ridges at base, apical sinus smaller than in *Ph. baseopagus*, lateral margin from eye to above base of segment I of antenna straight, from here strongly slanting to apical margin, this oblique portion about half as long as the straight basal portion. Frons with longitudinal ridges, the two middle ones more regular than the others and united on occiput, the others branched and disappearing before reaching occiput, no single central carina. Distance of antennal groove from eye about equalling the length of segment II of antenna, the interspace being much wider than in *Ph. baseopagus*. Antenna reaching to about middle of prothorax, much shorter than in *Ph. baseopagus*, X transverse, XI slightly longer than IX and a little longer than broad.

Pronotum half as long again as broad, median depression before carina much broader and extending farther forward than in *Ph. baseopagus*, white spots in this depression more or less confluent, dorsal carina laterally slightly bent forward before turning apicad, the curve therefore more gradual than in *Ph. baseopagus*. Scutellum nearly perpendicular, larger, black, with a few minute dots at margins.

Elytra as in *Ph. baseopagus*, but basal tubercle much higher, interstice III subcostate, subapical convexity less regular, interstice III joining IX as a low ridge behind which there is a depression, at sides a large anterior area and a post-median one with fewer dots than in *Ph. baseopagus*. Pygidium flatter, not depressed laterally, therefore middle line not raised.

Thoracic sterna and sternum I of abdomen much less densely dotted than upperside, spots of abdomen pale yellow, more or less confluent; intercoxal process of mesosternum vertical, its apical portion horizontal, somewhat above the level of metasternum, tuberculiform angles much more elevate than in *Ph. baseophagus*. Femora and tibiae black, mid- and hindfemora sparsely dotted with white, mid- and hindtibiae with large pale-yellow median ring, all tarsi pale yellow, forefemur (♂) with small basal tubercle beneath, tip of foretibia with a tooth at apex of outer margin of underside, the underside with a deep groove to near base, inner side concave along cariniform dorsal margin, outer side somewhat convex. Abdomen depressed along middle.

Length 7·3–8·3, width 4·4 mm.

Brazil: Jatahy, Goyaz, 3 ♂♂.

57. **Phaenithon centralis** sp. nov.

♂♀. Close to *Ph. discifer* Jord. 1906, but pygidium and anal sternum longer (in ♀, the ♂ of *Ph. discifer* not known), apex of anal sternum less distinctly sinuate, sides of undersurface with large patches of creamy white pubescence.

Median area of proboscis somewhat depressed, covered by a creamy white stripe which is continued to base of pronotum, bare lateral area of rostrum wider than median area, coarsely rugate-plicate, angle of lateral margin nearer to eye than to base of mandible, interspace between antennal groove and eye below sinus narrower than antennal segment II. Brown or blackish patch at base of pronotum midway between middle and side variable in size.

Pygidium of ♂ broader than long, apical margin slightly straightened in middle. On side of prosternum two irregular creamy white stripes with dots in between, epimerum of mesothorax and episternum of metathorax creamy white for the greater part, on abdominal segments II and III a large, irregular, transverse patch. Mid- and hindtibiae dotted with white as in *Ph. discifer*; midtibia of ♂ with short sharp mucro. In ♂ abdomen medianly flattened-depressed.

Length 5·4–9·3, width 2·8–4·8 mm.

Amazonas (type) and French Guiana; in Carnegie Museum from Pará and Santarem.

58. **Phaenithon moerosus** Boheman 1833.

A short species with white underside. Vitta of rostrum and frons broad, narrowed on occiput. Pronotum with straight median vitta, white pubescence of underside extending dorsad well above lateral carina, appearing in dorsal aspect as a lateral vitta, two brown spots between end of lateral carina and apical margin, the posterior one small, some white pubescence along dorsal carina. The only species known to me in which the elytra bear on subapical declivity a white transverse band well separated from apical margin. The type is a ♂; the abdomen is medianly flattened and each sternum bears a transverse band of white, long, silky pubescence, bands of II to V occupy the ventral third of their segment and are laterally sharply rounded, the first band short (in the transverse sense).

Length 6, width 2·8 mm.

"Brasilia. Dom. Freyreiss."—The type is the only specimen I have seen. Freyreiss evidently was in a place whence no material has come into my hands; see also *Gymnognathus signatus*, No. 24.

59. **Phaenithon maculatus** Fabr. 1801.

Hylesinus maculatus Fabricius, *Syst. Eleuth.*, ii, p. 391, no. 8 (1801) (Amer. merid.).

The type is in the Museum at Copenhagen. I do not know into which family the species has been transferred by the Cataloguers. It is a *Phaenithon* very close to *Ph. similis* Jord. 1904, with three creamy-white vittae on pronotum, median one complete, in *Ph. similis* interrupted; markings of elytra almost exactly as in that species.

60. **Phaenithon guttulatus** Fährs. 1839.

The type is a small ♀ of *Ph. curvipes* Germ. 1824.

61. **Phaenithon implicatus** Fährs. 1839.

Dr. Lundblad informs me that the type is not at Stockholm. The description applies very well to *Ph. semigriseus* Germ. 1824, of which I consider *implicatus* to be a synonym. The species is common in South and Central America and varies a good deal in markings.

62. **Euparius placidus** n. n.

Euparius suturalis Jordan, in *Biol. Cent.-Amer., Coleopt.*, iv, p. 348, no. 8, pl. 13, fig. 4 (1906), *nec E. suturalis* Jordan, *Nov. Zool.*, xi, p. 308, no. 144 (1904).

63. **Euparius dipholis** sp. nov.

♀. Near *E. placidus*, in shape and colouring also resembling *Caccorhinus lateripictus* Jord. 1895 from New Guinea and Queensland. Pronotum with a conspicuous black spot each side before carina nearer side than middle.

Subcylindrical, a little more than two and one-half times as long as broad

(28 : 11) ; derm of upperside rufescent, of underside blackish brown, posteriorly rufescent. Pubescence of upperside creamy white clouded with pale cinnamon. Rostrum creamy white, with short median carina ; head pale cinnamon, white at side, frons more extended white than cinnamon. Antenna pale rufous buff, IX and X darker, IX as long as broad, X broader than long, XI ovate, one-fifth longer than broad.

Pronotum one-fifth broader than long, very densely punctate-coriaceous, almost reticulate at side, where the punctures are larger than on disc, conical, side hardly at all incurved before basal angle, slightly convex behind middle, disc convex transversely and longitudinally, without median channel, but there is a slight flattening in centre, with the scale-hairs parted right and left, the greater part of surface pale cinnamon, at each side of apex a white patch connected with a diffuse lateral stripe extending towards basal angle, black basal spot surrounded by white, especially on dorsal side, the white pubescence extending also along carina to a variable extent ; angle of carina 90°.

Elytra cylindrical, punctate-striate, none of the interstices raised, suture slightly flattened in basal half, subbasal swellings indicated, not tuberculiform, before apical margin a depression, but the swelling above it evenly convex, not at all tuberculiform, in front of subbasal swelling a patch shaded with pale cinnamon, similar shading in middle, before apical declivity and at side, in interspace III an antemedian black spot, linear, this colour extended diffusely and indistinctly to line V of punctures, the area between this spot and subbasal swelling pure creamy white. Pygidium creamy white, almost semicircular, half as broad again as long in middle.

Anterior half of side of prosternite punctate, metasternite impunctate. Tibiae grey, base and apex brown like tarsi.

Length 5·7, width 2·2 mm.

Amazonas : Santarem, 2 ♀♀, type in Carnegie Museum.

64. **Euparius nuchalis** sp. nov.

♀. Close to *E. dipholis*, No. 63, but pronotum with a large black basi-discal area nearly as in *E. thoracicus* Fåhrs. 1839.

End-segment of antenna pale, longer than in *E. dipholis*. Black area of pronotum occupying a little more than three-quarters of the base and extending forward across highest point of disc to five-sixths, gradually narrowing, apex of area incised medianly, behind its apex on highest point of disc a short transverse spur from grey lateral area projects into the black, before carina each side of middle an indication of a grey patch ; laterally at some distance from carina a short backward spur of grey area indicating black spot of *E. dipholis* ; there are also a few grey hairs indicating a median line ; median angle of carina a little less rounded than in *E. dipholis*. Scutellum black.

On elytrum an irregularly rounded patch on subbasal swelling extended to base, a shoulder patch, a minute spot in interstices III and V before middle, and a larger sublateral one behind middle black.

Intercoxal process of mesosternite broader than coxa, broader than in *E. dipholis*, slightly concave. Base and extreme tip of tibiae and tarsal segments II to IV brown-black, derm of I luteous, its pubescence white as on tibiae.

Length 6·7, width 2·8 mm.

Bolivia : Cochabamba (Germain), 1 ♀.

65. **Euparius bruchi** sp. nov.

♀. Lateral angle of pronotal carina somewhat smaller than in *E. dipholis* and *E. nuchalis*, about the same as in *E. figuratus* Bohem. 1845; intercoxal process of mesosternum distinctly convex, but not humped.

Rostrum and head white, slightly shaded with pale ochraceous, black behind eye. Segments I to VIII of antenna rufescent, club darker, XI elliptical, subtruncate at base, a little longer than in *E. dipholis* and shorter than in *E. nuchalis*, XI not pale. White area of head continued to beyond convex middle of pronotum, not sharply defined, basal area and sides below white area buffish ochraceous, lower part of side above lateral carina black like underside of prosternum, sides coarsely punctate-rugate; dorsal carina concave in middle, not angulate, lateral carina in dorsal view very distinctly incurved before angle; within the white area two brown dots each side of middle, the posterior pair almost merged into the buffish ochraceous basal area. Scutellum white.

Elytra as in *E. nuchalis* and *E. dipholis* without tubercles, derm rufous, sides blackish, pubescence buffish ochraceous shaded with white, in middle a white diffuse patch in which there are four black dots, one each in III and V and, a little farther back and smaller, in IV and VII, on subbasal swelling a blackish double dot in a white cloud, apical declivity diffusely white, especially strongly on convex portion. Pygidium almost semicircular, white pubescence not concealing rufous derm.

Underside and legs black, with sparse white pubescence, anal sternum rufous, pubescent white, segment IV also somewhat densely pubescent at side; prosternite coarsely rugate-punctate, metasternite laterally with largish shallow punctures; intercoxal process of mesosternum apically narrower than coxa, distinctly convex. Tibiae with pale-rufous median ring pubescent white, one-third of segment I in foretarsus, two-thirds in mid- and hindtarsus white.

Length 6·1, width 2·6 mm.

Argentina: Province of Cordoba (Dr. C. Bruch), 1 ♀.

66. **Euparius stratus** sp. nov.

♀. Basal angle of pronotum less than 60°; intercoxal process of mesosternum broad, emarginate, with broad subapical swelling; tarsi rufescent like tibiae. Nearest to *E. clitelliger* Fåhrs. 1839, but longer, proboscis not white, pronotum without median carina and with the basal angle more acute, subbasal tubercle of elytrum and subapical swelling much lower, punctures of line I much smaller, pygidium broader than long instead of longer than broad, etc.

Pubescence of upperside ochraceous buff mixed with white. On occiput an indication of a white median streak. End-segment of antenna pale creamy buff, half as long again as broad, ovate, shorter than IX + X.

Pronotum granulate-coriaceous, on disc almost smooth, less than one-half broader than long (7 : 5), depressed dorsally before carina, and along middle to near apex, disc swollen each side of middle, but not so much as in *E. clitelliger*, in the median channel a vestigial white stripe and on dorsal side of discal swelling a diffuse transverse white spot more or less connected with the white median pubescence, angle of carina nearly as acute as in *E. sellatus* Fåhrs. 1839, sides of pronotum gradually and very slightly incurved before angle, gently slanting to end of lateral carina, then more strongly slanting to apex. Scutellum white.

Elytra half as long again as broad, strongly punctate-striate, but the punctures on the whole smaller than in *E. clitelliger*, especially those of sutural line, which, in *E. clitelliger*, are partly confluent to form short grooves, subbasal tubercle quite distinct, but not so high as in *E. clitelliger*, behind it a transverse depression, sutural area flattened to apex bounded by interspace III, anteapical swelling much less prominent than in *E. clitelliger*, interstices III, V, VII and IX being much less convex, suture and alternate interstices more or less shaded with white and spotted with brown, from base of suture a white patch which extends sidewards behind subbasal tubercle to interspace V, excised on suture. Pygidium much broader than long.

Pubescence of underside and legs pale creamy buff, not dense, sides of thoracic sternites coarsely punctate, abdomen without the row of white lateral spots of *E. clitelliger*; legs irrorated with white, tarsal segment I somewhat shorter than in *E. clitelliger*.

Length 9·1–10·7, width 4·1–4·8 mm.

Bolivia: Sta. Cruz de la Sierra (J. Steinbach), 1 ♀; also in Carnegie Museum from the same source.

67. **Euparius mesculus** sp. nov.

♂. Very similar to *E. stratus* (No. 66), but mesosternal intercoxal process without median hump. Basal angle of pronotum less acute, median depression broader and less deep halfway to apex, with a slight median ridge. White sutural patch of elytra not continued to scutellum. Intercoxal process of mesosternum broader, emarginate, subapically convex, but not raised medianly into a rounded hump. Luteous velvety spot each side of median suture of metasternum sharply defined; side of metasternite without large punctures. Abdomen medianly flattened from base to apex, this area silky brown. Hindtarsus compressed, stout, first segment apically thicker than apex of hindtibia.

Length 8·3, width 4·0 mm.

Amazonas, 2 ♂♂.

68. **Euparius anceps** sp. nov.

♀. Likewise similar to *E. stratus*, but rostrum, head, apex of elytra and pygidium white; intercoxal process of mesosternum with low hump.

The white pubescence of head continued to middle of disc of pronotum, spreading a little sideward-backward and being medianly divided from behind for some distance, median depression very shallow before carina, hardly at all extended forward, the centre of disc being very feebly flattened, lateral angle of carina as in *E. stratus*. Scutellum white.

Elytra less strongly punctate-striate than in *E. stratus*, the interspaces flatter, subbasal swelling less high, gradually fading away laterally, interspace IV not strongly depressed at base, depression behind subbasal swelling very feeble in interspace III, from near scutellum to near middle a diffuse white area, extending laterally to interspace V, not sharply defined, behind it in interspace III a conspicuous black tuft, not a tubercle, a similar but smaller tuft a little farther back in VII with some white pubescence before it, suture with minute brown dots, alternate interspaces with traces of such dots and a slight white suffusion; white apical area from apical margin to above subapical hump, wider at sides and less well defined dorsally. Pygidium one-third broader than

long, middle of its apical margin slightly straightened (as is also the case with abdominal segment V).

Underside of body and the legs white, the body a little shaded with buff; sides of sterna with the punctures vestigial, just discernible on removing the pubescence; foretarsus and segments II to IV of mid- and hindtarsi brown, as are extreme tips of tibiae.

Length 7·7, width 4·3 mm.

Brazil: Ilha Santo Amaro, near Santos, iv.1912, 1 ♀ (G. E. Bryant).

69. **Euparius amictus** sp. nov.

♂♀. Near *E. albiceps* Jord. 1904, mesosternal, intercoxal process with tubercle, elytrum with subbasal and anteapical tubercles high, underside uniformly pubescent greyish white, not irrorated as in *E. albiceps*.

Head and rostrum greyish white, centre of occiput slightly olivaceous. Antenna rufescent brown, club about as long as IV to VIII, XI pale, elongate-elliptical, twice as long as broad, somewhat longer than IX.

Pronotum olivaceous buff, disc strongly swollen each side of middle into a broad tuberculiform elevation, from this swelling forward an ill-defined greyish white stripe, area before basal angle with a similar tint in certain lights, in front of scutellum a transverse, triangular area bounded in front by an anguliform depression extending halfway to side, ending at an oblong black spot in front of carina, the spot longer than broad, basal angle acute, strongly produced backward, side incurved in front of angle and then excurved, the apex of lateral carina on a sideward projection.

Elytra two-thirds longer than broad, strongly flattened-depressed from suture to interspace IV, subbasal swelling a high, broad, rounded tubercle, before apical declivity a less broad but higher tubercle directed backwards, depressed area greyish white, this colour extending a little sidewards before and behind middle and running across subapical tubercle, lateral area olivaceous buff, with some diffuse greyish white smears, in interspace IV an antemedian black tuft, another of the same colour in VII a little farther back in a greyish white stripe. Pygidium olivaceous buff, greyish white at base, apex and along middle, in ♂ one-sixth broader than long, in ♀ two-fifths.

Tubercle of mesosternal process projecting forward-downward; sides of abdomen shaded with olivaceous; the extreme bases and tips of tibiae and the tarsal segments II and III brown, underside of foretarsus long-hairy in ♂.

Length 12·7–13·7, width 5·7–6·1 mm.

Amazonas: Pará, 1 ♂, 2 ♀♀, type (♂) in Carnegie Museum.

70. **Euparius longiclava** sp. nov.

♂♀. Intercoxal process of mesosternum slanting, without central tubercle. End-segment of antenna linear, more than four times as long as broad, nearly twice as long as IX + X, as long as III to VIII together. Colouring of elytra nearly as in *E. albiceps* Jord. 1904 and *E. tarsalis* Jord. 1906, tarsi blackish as in the latter. An elongate species, nearly three times as long as broad.

Pubescence of head, rostrum and pronotum ochraceous buff mixed with greyish white. Rostrum depressed in middle, with a slightly raised median line. Antenna pitchy brown, IV to VIII paler, tip of XI pale buff, club loose, i.e. X

and XI with short basal stalk, this stalk inserted in apex of preceding segment near posterior angle, IX half as long again as broad, X very little longer than broad.

Pronotum one-half broader than long, very densely punctate-coriaceous, depressed before carina and also slightly along middle, disc somewhat swollen each side of middle, but the swelling not tuberculiform, basal angle acute, side gradually incurved before angle and then excurved, oblique from middle to apex.

Elytra twice as long as broad, distinctly punctate-striate, interspaces more or less convex, especially III, suture and interspace II flat, depressed, the depression deeper behind subbasal swelling and extended to interspace III, subbasal swelling distinct, but not very high, forming a low, rounded, tubercle, before apical margin an impression and above this the elytrum strongly convex, projecting backwards, not upwards, with interspaces III, V and VII almost costate, but raised as a tubercle, depressed sutural area greyish white, expanding before and behind middle to interspace V inclusive, suture and outer margin somewhat tessellated with brown, pubescence of sides of elytra as on pronotum, interspaces III and V in middle and before apical swelling brown. Pygidium ochraceous buff mixed with white, broader than long, apex rounded in ♂, slightly truncate in ♀.

Underside pubescent white, the pubescence not dense. Extreme bases and tips of tibiae and tarsi blackish brown, III and IV of tarsi paler.

Length 9·7–13·0, width 3·7–5·2 mm.

Brazil: Jatahy, Goyaz, type ♂; and in Carnegie Museum from Rio de Janeiro.

71. **Euparius medialis** sp. nov.

♂ In shape and colouring similar to *E. calcaratus* Jord. 1904, but basal angle of pronotum more acute, mesosternal process without tubercle, hindtibia (♂) without spur at apex.

Elongate, nearly thrice as long as broad. Pubescence of upperside ochraceous buff mixed with white. Proboscis with black median channel at base, the united edges of which form forward and backward (on frons) a very thin carina. Segment XI of antenna pale, nearly as long as IX + X, elongate-elliptical, twice as long as broad.

Pronotum one-fourth broader than long, very densely punctate-coriaceous, dorsally depressed before carina, disc less convex in middle than at each side of middle, but not impressed, white pubescence in evidence in middle and at sides, there being a diffuse white median stripe from base forward, interrupted in middle and vestigial at apex, at side from tip of lateral carina to apical margin a dark area as continuation of the colouring of prosternite, this area bounded above by more or less scattered white pubescence; basal angle about 80°, side of pronotum feebly incurved in front of angle and then slightly convex, the pronotum gradually narrowing from apex of lateral carina.

Elytra with parallel margins, depressed at suture, subbasal swellings very distinct, but not forming prominent tubercles, interspaces III, V and VII somewhat convex in posterior half, before apex an impression above which there is a prominent swelling, but no tubercle, sutural area white from base to apical declivity, on declivity restricted to sutural interstice, behind subbasal callosity widened to punctate line V and again behind middle for a shorter stretch, apical

half of suture minutely dotted with brown, III and alternate interspaces with brown and diffuse white spots, not regularly tessellated.

Pubescence of underside creamy white, not very dense, derm of thoracic sterna more or less blackish; mesosternal process slightly concave in basal half, obtusely angulate at side, more strongly slanting backwards from this point; anterior lateral area of prosternum as densely punctured as pronotum, side of metasternite with scattered punctures; abdomen (♂) medianly flattened; tarsal segments II to IV with little or no white pubescence on upperside.

Length 9·0, width 3·4 mm.

Bolivia: Sta. Cruz de la Sierra (J. Steinbach), 2 ♂♂, type in Carnegie Museum.

Euxuthus gen. nov.

Like *Euparius* Schönh. 1826, but eye sinuate, the sinus small, interrupting three or four lines of facets. Labiophore very short and broad, in middle only half as long as its base is broad between ends of buccal fissures. Prosternum in front of coxa less than half as wide (longitudinally) as forecoxa. Intercoxal process of mesosternum much broader than coxa, slanting, flat, truncate, feebly emarginate.——Genotype: sp. nov. here described.

72. **Euxuthus homochrous** sp. nov.

♂♀. Ovate, strongly and evenly convex. Entirely rufescent ochraceous, covered with a slightly paler pubescence which has golden and creamy reflections, only segments VII (or VI) to XI of antenna differ in colour, being pitchy black, and the apex of mandible, which is rufescent brown.

Rostrum with narrow median carina, which does not reach apex, traverses frons and disappears before reaching occiput, median sinus of apical margin small; lateral margin very obtusely angulate above antennal groove, the margin from this point forward rather strongly slanting. Antenna of the same type as in *Euparius*; club gradually widening to basal half of XI, this segment longer than IX, ovate, with the base subtruncate.

Pronotum one-third broader than long, finely coriaceous, dorsal carina concave medianly, convex towards sides, lateral angle 90°, with the tip rounded off, lateral carina ending before reaching meral suture, but continued across this suture by a thin line.

Elytra one-fourth longer than broad, punctate-striate, the stripes obsolescent behind, no dorsal depression, no distinct subbasal swelling. Pygidium half as long again as broad, evenly rounded. Segment I of tarsi less than one-third longer than II + III, claw-segment about as long as II. Abdomen medianly slightly flattened in ♂.

Length 5·0–5·2, width 2·6 mm.

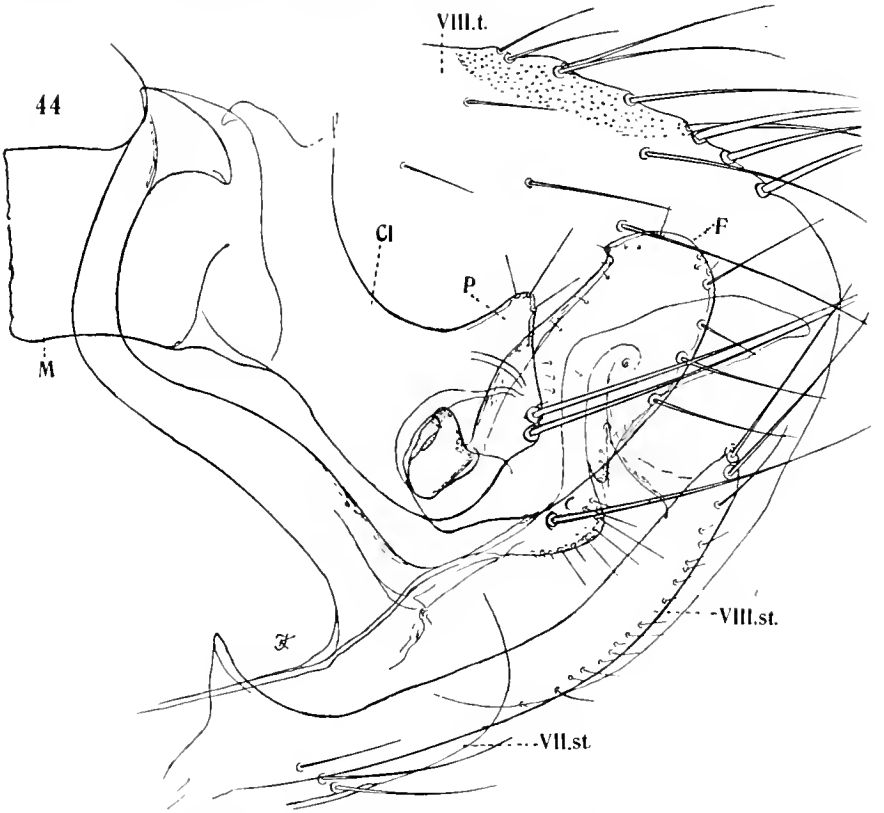
Colombia: Cacagualita; a small series; type in Carnegie Museum.

ON SOME NORTH AMERICAN SIPHONAPTERA

BY DR. KARL JORDAN, F.R.S.

(With 13 text-figures.)

THE Director of the Rocky Mountain Laboratory of the U.S. Public Health Service, Dr. R. R. Parker, and the Assistant Parasitologist of that Institute, Mr. Wm. L. Jellison, have submitted to me for identification and/or description a small number of fleas from Montana and neighbouring western states, among which are six I describe here as new. The types have been returned to Dr. Parker, but one or more paratypes, where available, have been retained. I take the opportunity to add to this paper notes on some other Nearctic fleas and to publish some figures which may prove useful.



1. **Ceratophyllus swansoni** Liu 1935 (text-fig. 44).

Ceratophyllus swansoni Liu, *Ann. Ent. Soc. Amer.* xxviii, p. 121, pl. I, figs. 1, 2, 3 (1935).

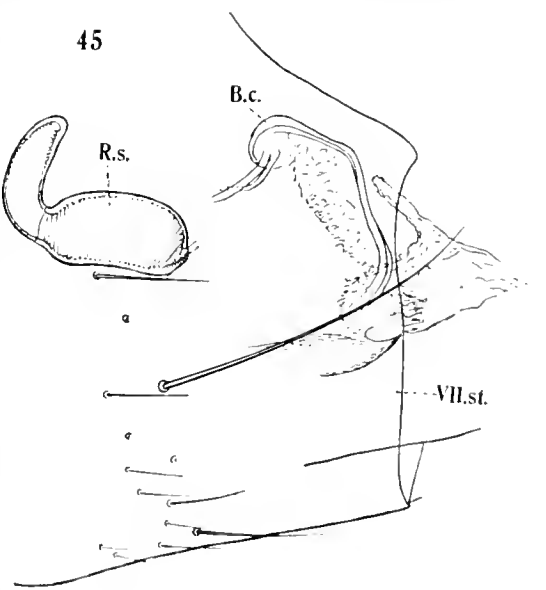
♂. Related to *C. vagabunda* Bohem. 1865, but differs not only in the genitalia, but also in the chaetotaxy, the bristles being more abundant, especially on the femora and tibiae. Our figure is drawn from the type, which Professor Riley has very kindly submitted to me for comparison with other bird fleas.

Proboscis short. On abdominal terga III to VI the row of small bristles placed in front of the posterior row of long ones extends down to near stigmata. On inner- and outersides of hindfemur a subbasal row of 6 or 7 bristles, on inside immediately above the row one or two additional ones; on outside of hindtibia 15 lateral bristles, not including the subventral and apical ones, on inside a row of 7. Tarsal segment V with minute hairs from apex to very near base.

Modified Segments.——Tergum VIII rounded, with 9 or 10 dorsomarginal bristles (text-fig. 44), 5 or 6 dorsolateral ones, and one long ventrolateral bristle, spiculose dorsal area of inner surface narrow. Sternum VIII (VIII. st.) without fringed apical flap, but with subapical, narrow, long, non-fringed vertical flap somewhat curved forward and then backward; at apex of VIII. st. two long bristles each side and along ventral margin from apex to near middle a row of short ones on outer side, some of them minute, and a few on inner surface. Process P of clasper short, conical, almost pointed, bay at its proximal side very wide; the two long acetabular bristles well above base of digitoid F. This finger F similar to that of *C. niger* Fox 1908, but broader. Apical lobe of sternum IX long and narrow.

Described by Professor Liu from a ♂ and ♀ found on *Asio wilsonianus* at Fertile, Minnesota, by Mr. Swanson.

Ceratophyllus rileyi Liu 1935, described in the same paper from both sexes, off *Bonasa umbellus*, is the same as *C. diffinis* Jord. 1925, a species of wide distribution, being in the N. C. Rothschild collection from British Columbia, New England and Long Island.



2. **Monopsyllus fornacis** sp. nov. (text-fig. 45).

♀. Closely related to *M. eumolpi* Roths. 1905, apparently differing only in the shape of sternum VII and in the bursa copulatrix. This sternum is truncate, with the upper angle rounded-projecting, the ventral margin of this short nose not forming an angle with the apical margin of the segment. The bursa copulatrix and its duct of *M. eumolpi* are very peculiar, being surrounded with glandular tissue and rolled up, making two convolutions in natural situation; in the new species the duct is much shorter, not rolled up, broadly margined with glandular tissue on the anterior side, the bursa itself rounded. Spermatheca (R.s.) as in *M. eumolpi*.

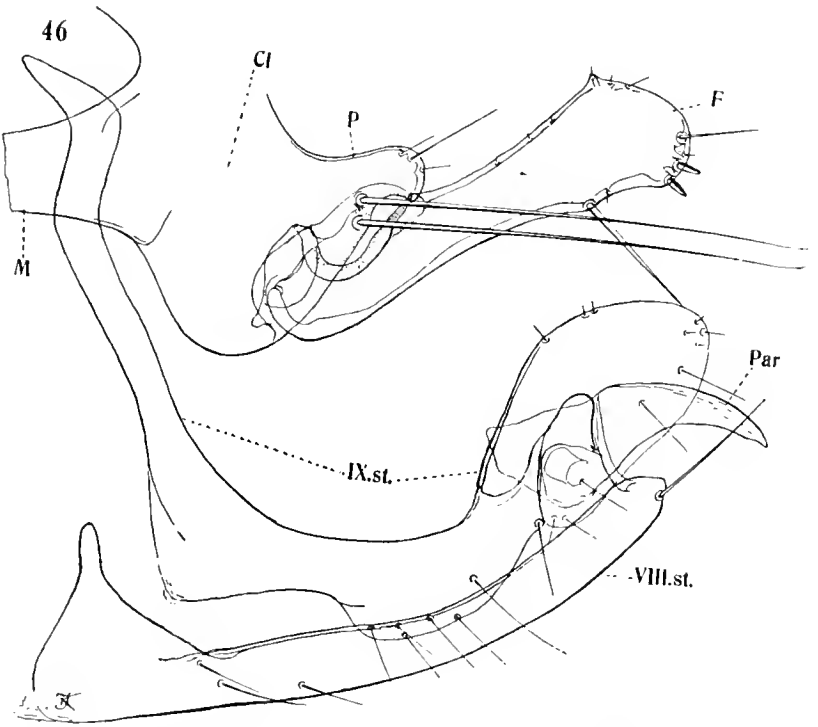
California: Sevenoaks, on *Sciurus griseus*, v.1936, 2 ♀♀ (Glen M. Kohls).

3. **Megabothris exilis** sp. nov. (text-fig. 46).

♂. Eye and stigma of abdominal segment VIII of this small species rather smaller than is usual in this genus. Similar to *M. acerbus* Jord. 1925, smaller, with fewer small bristles on abdomen, and different genitalia.

Bristles on abdominal terga : III 8 or 13, 14, IV 8 or 9, 13 or 14, V 6, 13 or 14, VI 5 or 7, 13, VII 3 or 5, 13, in the two specimens, both sides together ; on sterna : III 2 or 4, 5 or 6, IV 2 or 4, 6, V 3, 6, VI 2, 6 or 7, VII 1 or 4, 6.

On tergum VIII, on widened area below stigma, 5 marginal and 3 or 4 lateral bristles, 1 or 2 of the latter subventral. Sternum VIII (text-fig. 46) with 1



longish bristle each side close to apex, and 3 or 4 small ones in proximal half, in paratype also a small bristle on anterior side of long one, the basal upward projection more pointed in paratype than in type. Tergum IX more strongly projecting forward than in *M. acerbus*, the sinus above manubrium therefore smaller. Process P of clasper somewhat shorter than in *M. acerbus* ; the two acetabular bristles well above acetabulum (in type 3 such bristles on right side) ; ventral margin of clasper strongly rounded. Moveable digitoid F much longer than in *M. acerbus*, angle of anterior margin at one-third ; apex rounded-dilated on posterior side, more so in type (*see* fig.) than in paratype, two short apical spiniforms as in *M. acerbus*, above them a slender bristle ; at three-fourths of posterior margin a strong straight bristle, which is very little longer than the apex of F is broad. Vertical arm of sternum IX narrow, except ventrally, the nose of the apex long, the rounded posterior side of the apex more strongly

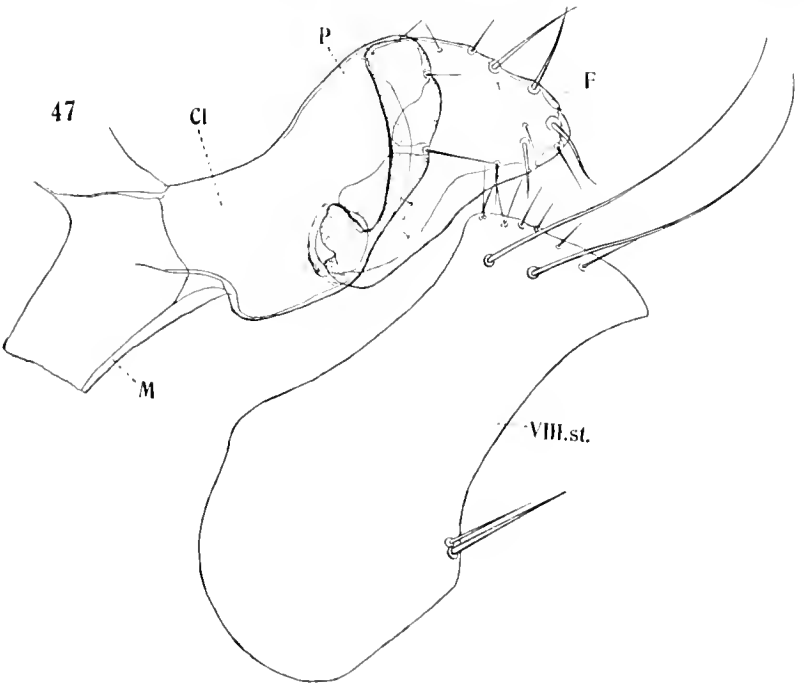
convex in paratype than in type figured ; ventral arm ventrally enlarged from one-fourth, the dilatation not very prominent and gradually receding, bearing about 6 thin bristles, more or less widely separated, not bunched on a narrow prominent lobe as in *M. acerbus* ; apical lobe broad, with very few slender bristles. Paramere pointed, claw-like.

Length : 2·3 mm., hindfemur 0·4 mm.

Montana : Powderville, Powder R. Co., off *Onychomys leucogaster*, 2 ♂♂ (Dr. R. R. Parker).

4. **Leptopsylla hamifer vigens** subsp. nov. (text-figs. 47, 48).

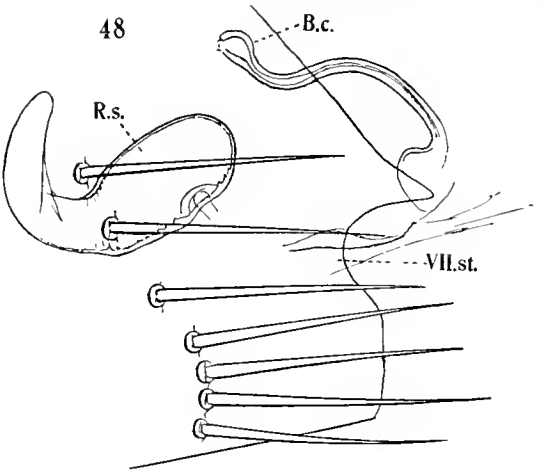
♂♀. Slightly larger than *L. h. hamifer* Roths. 1906 (Alberta) ; distinguished by some differences in the posterior abdominal segments of ♂. As only one ♂ of the new subspecies is known, we cannot be certain that the differences are constant. Sternum VIII (text-fig. 47, VIII. st.) ventrally in proximal half with two bristles on one side and three on the other, instead of one as in *L. h. hamifer* ;



at apical margin a row of four short bristles, of which the most ventral one is submarginal ; at rounded upper angle on inside two pairs ; on outer surface two very long bristles, nearly as long as the median antepygidial bristle, but very much slenderer. Ventral margin of clasper (Cl) rather abruptly rounded close to manubrium instead of gradually slanting ; finger (or dactyloid) F longer than apically broad, whereas in *L. h. hamifer* it is almost exactly as long as broad.

The spermatheca of *L. h. hamifer* is not known (having been destroyed in mounting the specimens—the firm of professional preparators to whom the

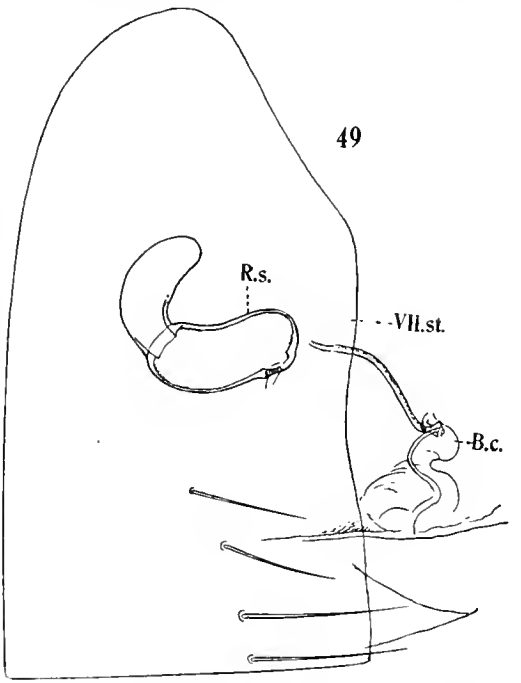
mounting was entrusted in the early days of N.C.R.'s entomological activities unfortunately spoiled many females by removing the spermatheca in clearing the abdomen right out). We figure here this organ of the new subspecies (text-fig. 48). The stylet usually bears two lateral bristles, both ventral, but in one of the two ♀♀ of *L. h. vigens* the proximal bristle is absent from the right side stylet. Below the stigma of VIII. t. there are usually two large lateral bristles in ♀, more rarely one.



Montana : Ravalli Co., 10.xii.1934, on *Microtus*, 1 ♂, 2 ♀♀ (Wm. L. Jellison).

5. **Callistopsyllus deuterus** sp. nov. (text-fig. 49).

♀. Agrees with the ♀ of *C. terinus* Roths. 1905, from British Columbia, with the exception of the spermatheca and the dark proximal portion of its duct. Sternum VII has a straighter, slightly incurved, posterior margin, and the upper apical angle of the dilated portion of tergum VIII is less strongly rounded ; but these differences may be due to the specimen of the new species being less pressed by the coverslip. Spermatheca : its head longer than tail, being a little over twice as long as broad (16 : 7) ; in our two specimens of *C. terinus* (the spermatheca of the third is lost) the head is very slightly shorter than tail, being much less than twice as long as broad (11 : 7). Bursa copulatrix very pale, not distinct in the specimens ; its upper end with a small sclerification, as shown in text-fig. 49 ; the duct of the spermatheca from bursa forward also sclerified, somewhat as in typical bird *Ceratophyllus*, this dark portion being in the new species as long as hindtarsal segment V (claw excluded), in *C. terinus* one-third shorter.



California : Big Bear Lake, on *Peromyscus*, v.1936, 1 ♀ (Glen M. Kohls).

Delotelis gen. nov.

♂♀. Like *Catallagia* Roths. 1915; but frons with three rows of bristles (2, 3, 7, or 1, 4, 7) and additional small bristles, some of which are placed below vestigial eye; stigma-cavity of tergum VIII narrow; hindtarsal segment V with one ventral bristle in between first lateral pair. In ♂ abdominal sternum VIII with dense apicimarginal row of bristles; process P of clasper much shorter than moveable digitoid F. In ♀ duct of bursa copulatrix short; orifice of body of spermatheca terminal, apex of tail of spermatheca obliquely truncate.—— Genotype: *Ceratophyllus telegoni* Roths. 1905, from British Columbia.

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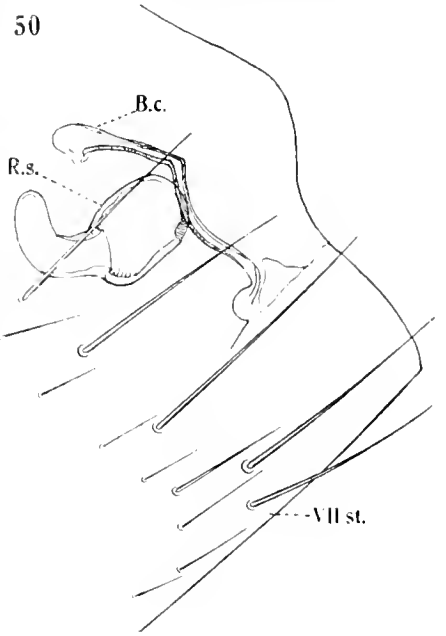
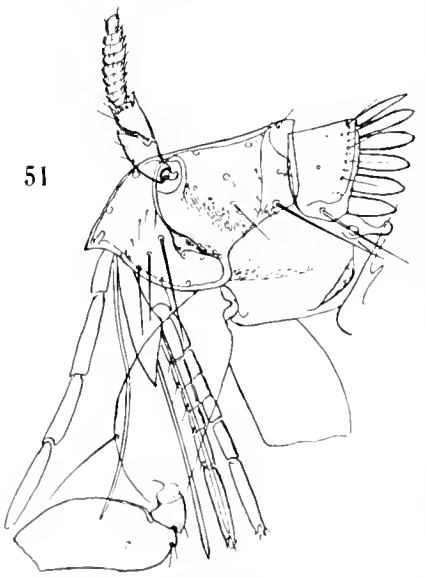


6. **Catallagia moneris** sp. nov. (text-fig. 50).

♀. Agrees in all details with *C. decipiens* Roths. 1915, from Alberta and British Columbia, except in the size and shape of the spermatheca. In *C. wymanni* Fox 1909, *C. charlottensis* Baker 1898 and *C. decipiens* Roths. 1915, the body of the spermatheca is broadened towards its tail and longer than the tail, as figured in *Ectoparasites* i., p. 44, text-figs. 46, 47 (1915). In the new species it is not widened towards the tail and is not longer than this appendage; moreover, the inner tube of the tail does not project so much into the lumen of the body as in the other species. Lower antepygidial bristle two-thirds the length of middle one, as in *C. decipiens*.

51

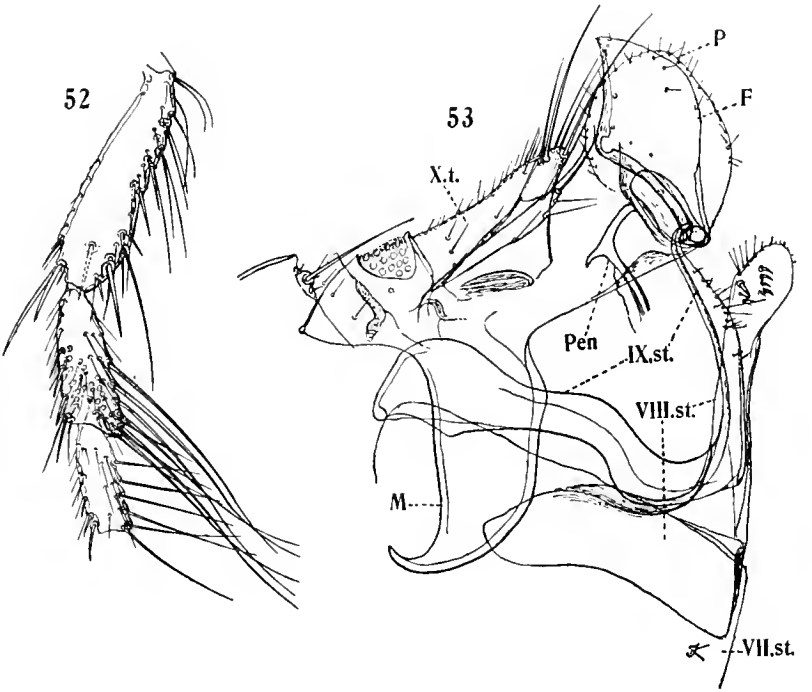


Montana: Ravalli Co., v.1932, on *Marmota flaviventris*, 1 ♀.

7. **Conorhinopsylla stanfordi** Stewart 1930 (text-figs. 51, 52, 53).

A most interesting flea. We have a single specimen, a ♂, from Highland Park, Illinois, collected by Mr. L. L. Pray in February 1926 on *Sciurus carolinensis*. I had drawn some figures before I noticed that Dr. Stewart had described the genus and species from both sexes in *Canad. Ent.* lxii, p. 178 (1930); his specimens were found at Ithaca, N.Y., on *Sciurus hudsonius*. As my

figures give some additional detail, I publish them here. In our specimen the labial palp (text-fig. 51) consists of 6 segments, not of 5 as stated by Stewart, and the posterior angle of the genal lobe is rounded. Segments I and II of hindtarsus are hairy and bear a number of long dorsal bristles (text-fig. 52).



Before apex of penis-tube (text-fig. 53, Pen) a dorsal hook. Sternum IX has a very narrow ventral arm which tapers to a point. The genus is closely related to *Callistopsyllus* J. & R. 1915 (= *Callistopsylla*, *Ectoparasites*, Index, p. 372, 1924).

Meringis gen. nov.

The species now contained in *Phalacropsylla* Roths. 1915 fall into two natural groups which I regard as generically distinct, the main differences being as follows : In *Phalacropsylla* the rostrum reaches to apex of forecoxa, in *Meringis* at most to three-fourths ; in the former the anterior abdominal terga bear apical spines, which are absent from *Meringis* ; the hindcoxa of *Phalacropsylla* has, on the inner surface, a patch of small bristles and small spiniforms, and in the new genus a row of short but rather stout spiniforms ; the hindtarsal segment III has only in *Meringis* a long apical bristle which reaches beyond middle of V. In the ♂ of *Meringis* sternite IX has a lateral process which is absent from *Phalacropsylla*, and in the ♀ the sensilium of tergum IX is posteriorly not convex and not sharply defined, as it is in *Phalacropsylla*.

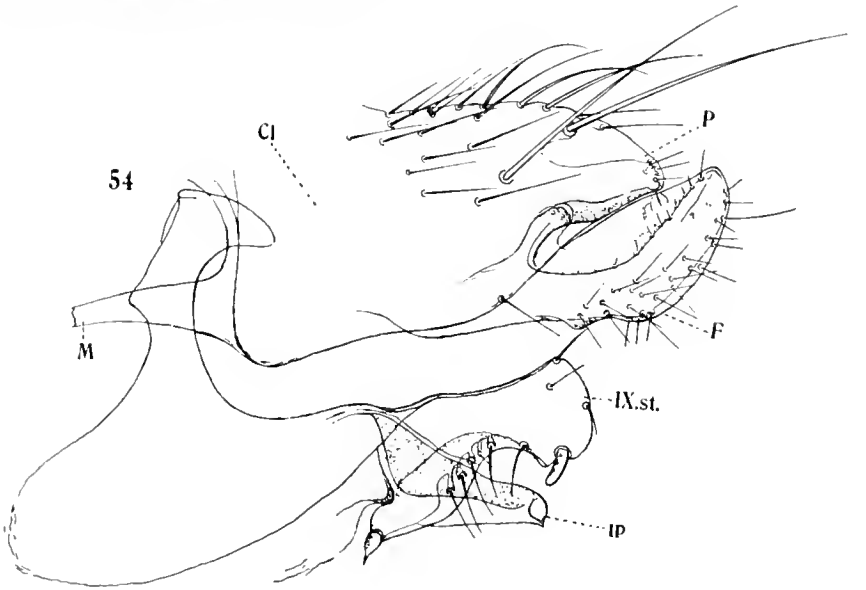
All the species of the two genera are Western Nearctic, preglacial relicts like so many Western insects. Two species are known of *Phalacropsylla* : *paradisca* Roths. 1915 from Arizona and *allos* Wagner 1936 from Utah.

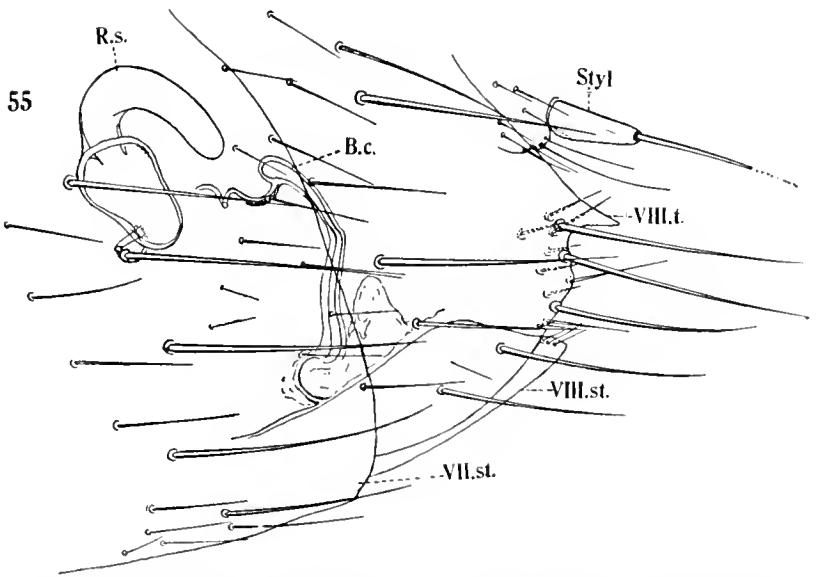
To *Meringis* belong four : *cummingi* Fox 1926 from California, *arachis*

Jordan 1929 from Arizona, *shannoni* Jordan 1929 from Washington and the new species here described.

8. **Meringis parkeri** sp. nov. (text-figs. 54, 55).

♂♀. Near *M. shannoni* Jord. 1929 from Ritzville and other places in Washington. Posterior segments different.





♂. Three antepygidial bristles as in *Phalacropsylla paradisea* Roths. 1915, there being only two in ♂♂ of *Ph. shannoni* and near allies, upper bristle less and lower one more than half the length of middle one. Process P of clasper

(text-fig. 54) and F somewhat broader, P more rounded dorsally at apex. Sternite IX nearly as in *M. shannoni*, but there are no bristles immediately behind the ventral apical spiniform ; a row of five bristles along ventral margin ; proximal ventral lobe as in *M. shannoni* with a bottle-shaped spiniform ; lateral lobe (lp) gradually narrowed, longer than in *M. shannoni* and not dilated at apex.

♀. Stylet longer than in *M. shannoni*. Apical angle of tergum VIII produced into a sharp point (text-fig. 55), not rounded as in *M. shannoni*, the margin below this projection incurved. Spermatheca (R.s.) as in *M. shannoni*.

Montana : Powderville, Powder River Co., off *Dipodomys* sp., 4 ♂♂, 2 ♀♀ (Dr. R. R. Parker). I have much pleasure in naming this interesting flea after its discoverer.

Micropsylla Dunn & Parker 1924.

Like *Rectofrontia* Wagner & Argyropulo 1934, genotype : *Rhadinopsylla pentacanthus* Roths. 1897, but metepisternum fused with metanotum.

Genotype : *Micropsylla peromyscus* Dunn & Parker 1924, which is synonymous with *Rhadinopsylla sectilis* Jord. & Roths. 1923. The types of both names have been compared.

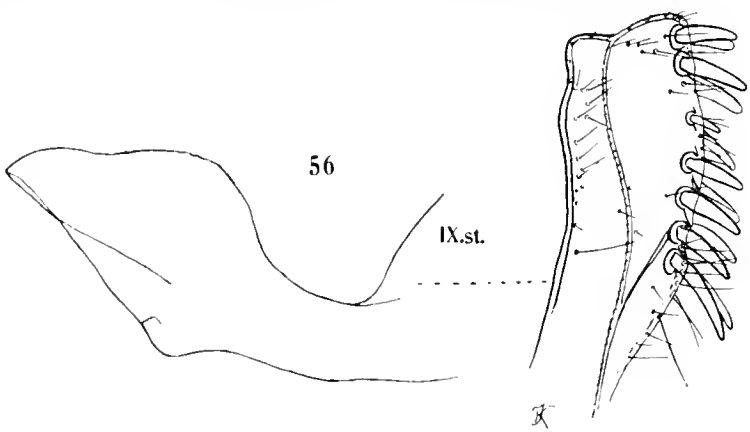
The present collection contains 2 ♂♂ from Montana : Ravalli Co., from rodent's nest, 1934 (William L. Jellison).

9. **Rectofrontia fraterna** Baker 1895.

Syn. : *Neopsylla hamiltoni* Dunn & Parker, *Public Health Reports, Treasury Department*, reprint No. 883, p. 10 (1924) (Bitterroot Valley, ♀ off Packrat).

Montana : Ravalli Co., off *Citellus columbianus*, vi.1932, 1 ♀ ; off *Neotoma cinerea*, x.1934, 1 ♂ ; Flathead Co., iii.1936, off *Mustela*, 1 ♀ ; Powderville, Powder R. Co., off *Mustela nigripes*, v.1916, 1 ♂, 1 ♀.

Baker's specimens from S. Dakota have been compared by me. We have the species from British Columbia and Alberta in some numbers ; I have also seen specimens from Saskatoon. The species varies individually in size and chaetotaxy ; the genal comb contains sometimes 6 spines instead of 5.



10. **Hystrichopsylla mammoth** Chapin 1921 (text-fig. 56).

The various Nearctic fleas decribed as distinct species of *Hystrichopsylla* Taschenb. 1880 are possibly all forms of one species, *H. gigas* Kirby 1837. But

the material we have in the collection, or I have examined in U.S.A., is insufficient for a thorough revision of the genus. I have made notes, but have to wait for more specimens, the usual complaint in systematics.

We figure here sternum IX of the type of *H. mammoth*, in U.S. Nat. Mus., Washington, D.C. The specimen is much larger than any of our specimens of *H. gigas dippiei* Roths. 1900.

Measurements of segments I and II of fore- and midtarsus :

Foretarsus in *H. g. dippiei*	♂ I 27, II 18	. . .	Midtarsus I 48, II 28
,, ,, ,, ,,	♀ I 34, II 22	. . .	,, I 60, II 33
,, ,, *H. mammoth*	♂ I 47, II 32	. . .	,, I 76, II 47
,, ,, ,, ,,	♀ I 50, II 32	. . .	,, I 82, II 48

The measurements of *H. g. dippiei* are those of our largest mounted specimens.

A FURTHER COLLECTION OF SIPHONAPTERA OBTAINED BY MR. F. SHAW MAYER IN EASTERN NEW GUINEA

BY DR. KARL JORDAN, F.R.S.

(With 13 text-figures.)

THE collection recorded in NOV. ZOOL. xxxiv, pp. 55–61 (1933), was made by Mr. F. Shaw Mayer in the Krätke Mts., towards the upper reaches of the Markham R., whereas the present collection was obtained in 1936 on the Bubu R., an affluent of the Waria R. in former British New Guinea, on the northern side of the Owen Stanley range of mountains, the mammals being procured at altitudes varying from 5,500 to 7,000 ft. Forty-four specimens of fleas were found, the difficulties of obtaining the hosts alive or not much handled by the native hunters employed being very great. I am much indebted to Mr. F. Shaw Mayer for all the trouble he has taken in collecting the fleas and for the careful labelling of the tubes. Four of the 10 species collected are new, one of them representing a new genus allied to *Stivalius*, and of a fifth Mr. Shaw Mayer found the hitherto unknown male together with a small series of females. Where both sexes of a new species are available, the type selected is a male.

1. **Pulex irritans** L. 1758.

Saiko, Bubu R., 5,500 to 7,000 ft., ix.x, on Bandicoot, *Pogonomys*, and *Dactylonax*, a small series; the fleas probably got on to the mammals while these were in the hands of the natives.

2. **Alaopsylla papuensis** Jord. 1933 (text-fig. 57).

Saiko, Bubu R., 5,500 to 6,000 ft., ix., on *Pogonomys* (prehensile-tailed rat), 1 ♂, 5 ♀♀.

Described from 2 ♀♀. The genitalia of the ♂ prove that the species is nearest to *Xenopsylla vexabilis* Jord. 1925 and allies, with the ventral arm of sternum IX ribbon-like. Dorsal longitudinal groove of occiput (♂) nearly as in *X. astia* Roths. 1911, its ventral outline upcurved at apical third. Vestige of eye a little more distinct in ♂ and some of the ♀♀ than in the other ♀♀. Process P^1 of genitalia of ♂ (text-fig. 57) with the anterior dorsal bristle nearly as long as the apical one; the ventral tooth of penis-tube a little shorter than in *X. vexabilis meseris* Jord. 1936; otherwise the genitalia as in that flea.

3. **Ctenocephalides felis orientis** Jord. 1925.

Saiko, Bubu R., 7,000 ft., xi., on *Echidna*, 1 ♂.

The natives obtain *Echidna* with the help of dogs, which explains the accidental occurrence of this flea on that animal.

4. **Acanthopsylla enderleini** Wagner 1933.

Saiko, Bubu R., 5,500 ft., xi., on *Distoechurus*, 1 ♂, 8 ♀♀.

5. **Stivalius novaeguineae** Roths. 1904.

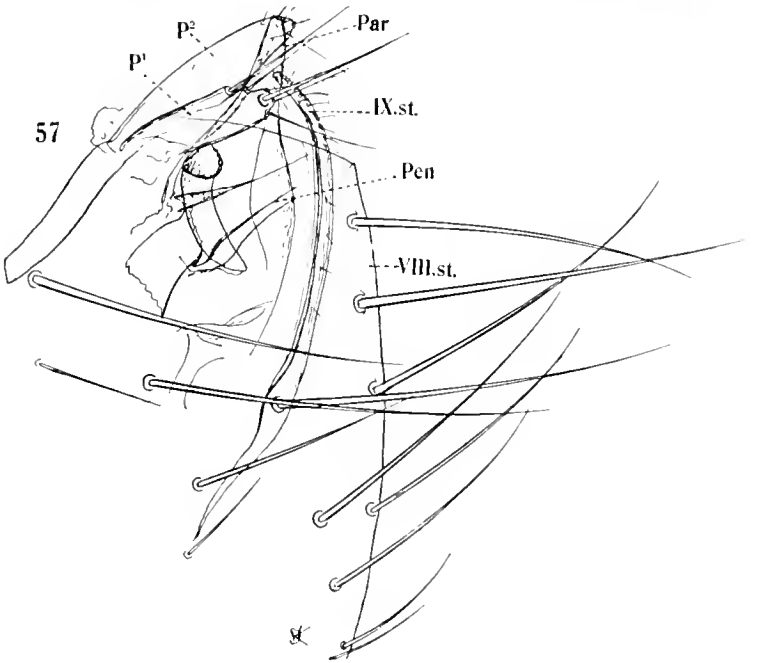
Bubu R., 6,000–7,000 ft., x., on Grey Phalanger, 1 ♀.

6. **Stivalius ancisus** sp. nov. (text-figs. 58, 59).

Saiko, Bubu R., 5,500 ft., x., on *Petaurus*, 1 ♀.

Not a typical *Stivalius*, but fits better into this genus than into *Pygiopsylla*. A small species, with the eye smaller than usual.

Head dorsally and frontally almost gradually rounded-slanting, without indication of an angle; on frons three rows of bristles and in front of eye a single bristle: 5, 4, 4, 1, besides several small bristles on side, upper bristle of second and third row large, second of third row small; on occiput (each side) three



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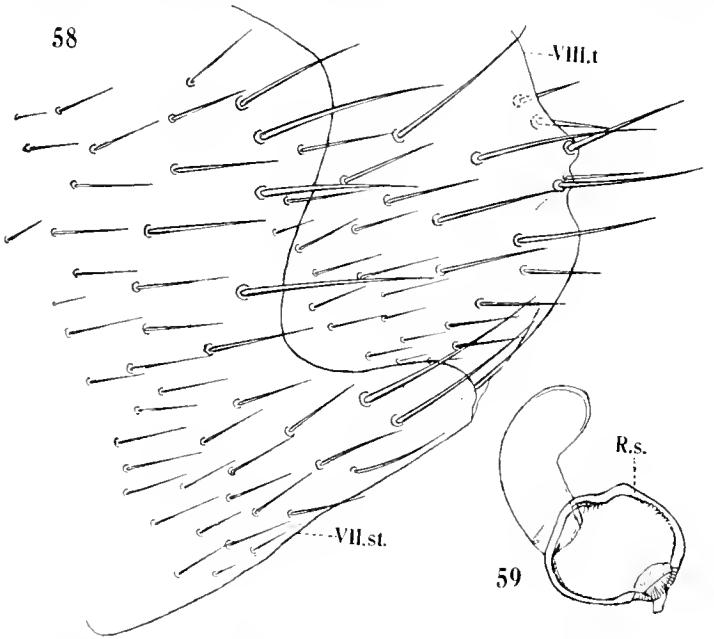
rows and a large bristle between second and third row: 5, 7, 1, 5 (not counting the small bristles of third row), above antennal groove from base of groove to apex about 12 small bristles. Segment I of maxillary palp as long as II. Proboscis not quite reaching to apex of forecoxa, with 5 segments to the palp, last one longer than III + IV. Eye almost circular, its horizontal diameter half the length of the transverse diameter of club of antenna, pale sinus very small. Club of antenna one-half longer than broad.

On pronotum a posterior row of 13 bristles and an anterior row of 8; a comb of 18 spines, most of which have a short sharp point, the spines longer than pronotum. Meso- and metanota with numerous small bristles and (on the two sides together) the former with a posterior row of 12, the latter 14. On mesopleura 10 bristles on one side of body and 12 on the other. The bristles on metepimerum 14 or 15.

Apical spines on abdominal terga: I 0, II 2, III 2, IV 1, V 0; bristles

I 48, 10, II 43, 14, III 54, 16, IV 56, 17, V 65, 16, VI 63, 18, VII 55, 8. Bristles on sterna: III 41, 13, IV 29 ?, 10, V 26, 12, VI 28, 12, VII 79, 12. In both terga and sterna the numbers of the anterior bristles may not be quite exact; they have been counted several times with slightly different results, which is of no importance, as the numbers will be found to vary individually to some extent.

On outer surface of hindtibia 12 dorso-lateral bristles, all slender, those placed close to the stout dorsal bristles not being stouter than the more lateral ones. First pair of plantar bristles of segment V lateral, but bent inwards in all



tarsi. Hindcoxa, on inner side, with a few bristles near anterior margin, none farther back.

Measurements of tarsi: midtarsus 19, 12, 8, 5½, 13; hindtarsus 42, 25, 12, 9, 15.

Modified Segments: Dorsal margin of tergum VII not projecting backwards; marginal lobe below antepygidial bristles short, broadly rounded. Sternum VII (text-fig. 58) deeply sinuate, the lobe above sinus broad, rounded, the ventral lobe longer, narrower, with two long strong bristles. Above stigma of tergum VIII, each side, about 6 bristles, stigma-cavity large, but not penetrating under the bristles; on widened ventral area 26 (or 28) bristles altogether on outer surface and 3 marginal ones on inner; 2 of the outer bristles at apical margin, which is gently incurved above the upper bristle and twice sinuate below it, the ventral apical angle effaced, not projecting. Anal sternite convex at base, but the projection not abrupt, bearing on the two sides together a dozen bristles, all rather long, and beyond this cluster on a slight prominence a pair of long ones; at apex two pairs. Stylet as long as hindtarsal segment IV. Head of spermatheca (text-fig. 59) more rounded than is usual in *Stivalius*, only

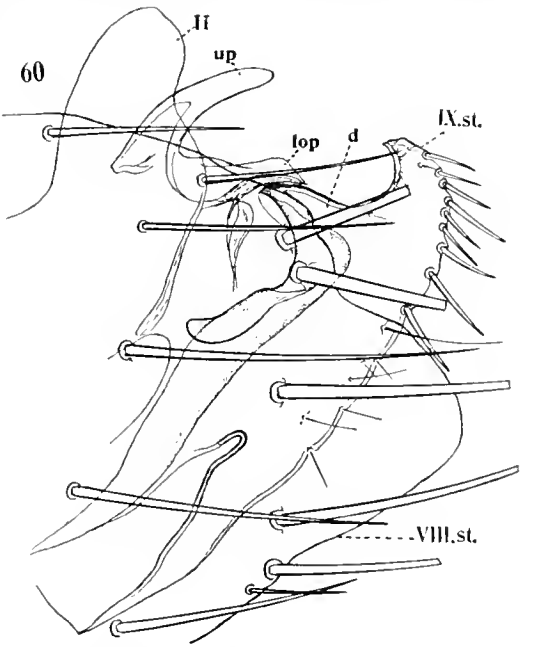
a little longer than broad, with a low, rounded, dorsal hump ; tail slightly longer than head.

Length 2·5 mm. ; hindfemur 0·43 mm.

7. **Stivalius alticola** sp. nov. (text-figs. 60, 61).

Saiko, Bubu R., 5,500–6,000 ft., ix. x., on black and white *Cuscus*, 4 ♂♂, 3 ♀♀ ; Bubu R., x., on *Mallomys*, 1 ♀.

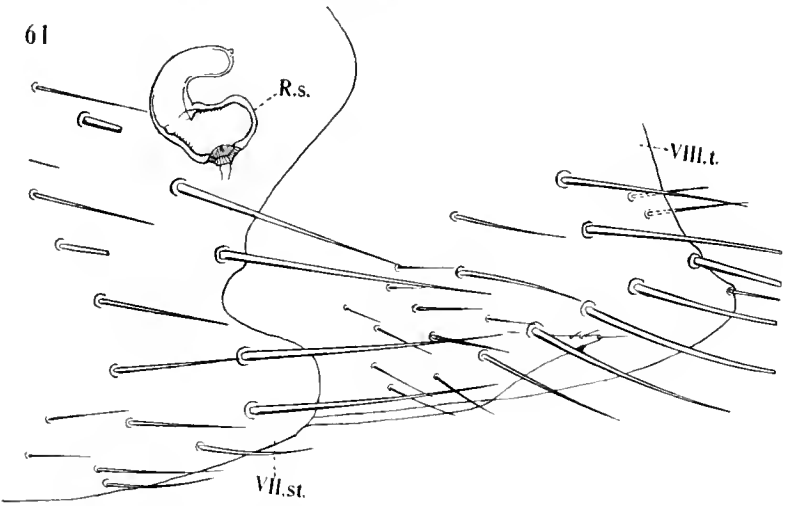
Nearly related to *St. corrugis* Jord. 1933, larger, the bristles somewhat stouter on the whole. The ♂ differs especially in the tail-end : sternum VIII (text-fig. 60) with 34 to 39 bristles, two of the large ones placed close together at or near apical margin ; this margin somewhat undulate, variable, ventral apical margin very broadly rounded. Digitoid F (not drawn) similar to that of *St. corrugis*, with the same dorsal corrugation in basal area ; with 4 to 6 long ventral bristles in outer half, usually 4, of which the proximal one is smallest ; the distal one nearer to apex than in *St. corrugis*. Ventral arm of sternum IX curved up at apex, the tip pointed, at a short distance from apex a large dorsal tooth (d), also pointed and somewhat curved frontad, the sinus between this tooth and apical hook round ; along ventral margin in apical fourth 7 to 9 short bristles, most of them rather stout for their length, the row preceded by some very thin bristles. Apical armature of phallosome also very different from that of *St. corrugis* : dorsal hood (H) broad and obtuse ; upper process (up) of paramere long, narrow, curved, finger-like ; lower one (lop) variable, more membranous, much shorter than upper process, obliquely truncate, with the lower angle pointed.



♀. This sex not known of *St. corrugis*. In the new species, apical margin of tergum VII as in *St. ancisus* (*see* above, No. 6) vertical dorsally, not projecting in between the two sets of antepygidial bristles (the original diagnosis of *Stivalius* has to be amended accordingly) ; below these bristles the margin strongly rounded-slanting. Sternum VII (text-fig. 61) with large sinus, which is strongly rounded at the lowest point, the margin from the bottom of the sinus upwards gradually slanting, sometimes with a small projection as in figure ; posterior row of bristles varying from 13 to 17 (two sides together), the bristles in front of row from 26 to 33, in one specimen the number being 40. Ventral apical angle of tergum VIII projecting but rounded off, on inner side of this lobe a slender marginal bristle, two, more rarely three, farther upward ; on outer side one or

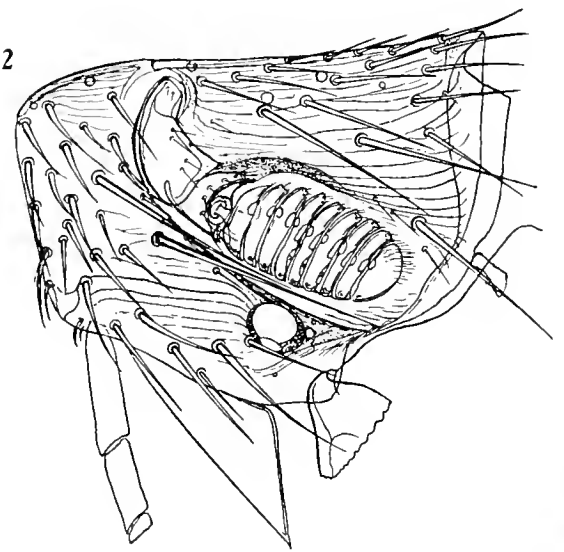
two large marginal bristles above the apical lobe, and from 30 to 45 on the side ; above the stigma from 6 to 13 each side. Anal sternum ventrally strongly humped, the hump bearing each side usually two pairs of bristles, sometimes more ; in the specimen off *Mallomys*, with most bristles on VII. st. and VIII. t.,

61



there is an isolated pair of bristles in middle on a small hump, one bristle each side. Spermatheca narrowing towards its tail, dorsally very strongly convex in posterior half, here about three times as wide as upper half of tail.

62



Length : ♂ 3·3–3·6, ♀ 4·0–4·7 mm. ; hind-femur : ♂ 0·49–0·56, ♀ 0·59–0·65 mm.

8. **Stivalius corrugis** Jord. 1933.

Saiko, Bubu R., 5,500 ft., ix., on *Rattus*, 1 ♂.

9. **Stivalius rugatus** sp. nov. (text-figs. 62, 63, 64).

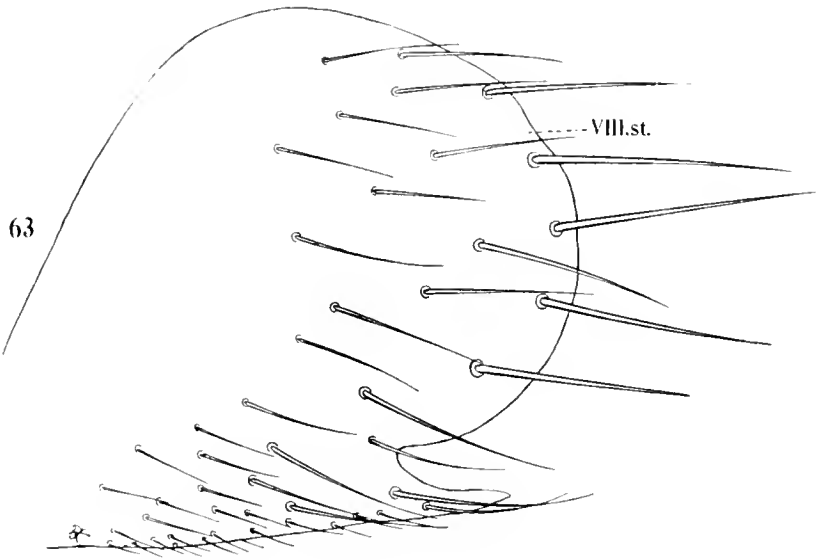
Saiko, Bubu R., 5,500 ft., ix., on Bandicoot, 2 ♂♂.

A very distinct species, with head almost angulate and bearing strongly marked horizontal lines, proboscis short, sternum VIII deeply sinuate, clasper bearing a long narrow process below base of digitoid, etc.

Greater part of frons vertical with a distinct backward slope, dorsal margin more strongly chitinized than anterior margin (text-fig. 62) ; 30 bristles on frons,

one of them close to eye. On occiput three rows and a large bristle between second and third rows. Segment I of maxillary palp one-half longer than II ; measurements : 18, 13, 9, 12. Proboscis reaching to middle of forecoxa, segments II to IV together being only five times as long as broad. Club of antenna nearly twice as long as broad (9 : 5).

On pronotum a posterior row of 11 or 12 bristles and an anterior row of 9 or 11 small ones ; comb containing 18 spines, the lateral ones one-half longer than pronotum measured from base of spines ; propleura strongly striated. Posterior



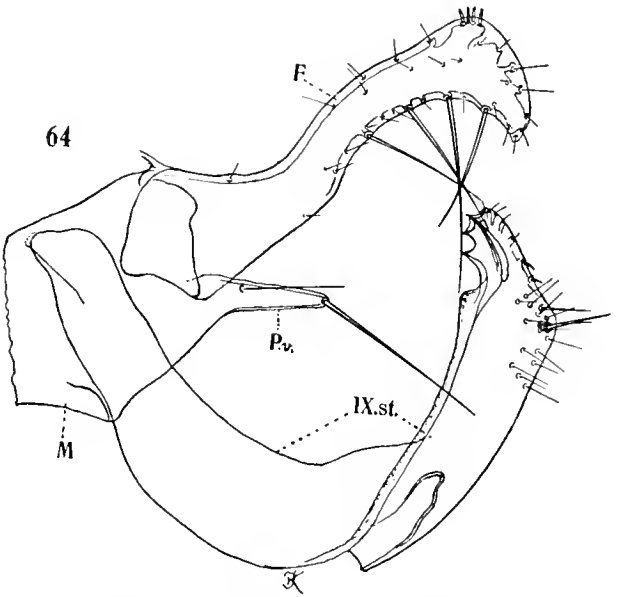
row on meso- and metanotum with 12 bristles ; mesopleura with 9 ; metepinerum with 10 or 11.

Apical spines on abdominal terga I 0, II 2, III 2, IV 2, V 2 ; bristles in type on III 24, 16, IV 26, 16, VII 16, 12, in paratype on III 17, 16, IV 17, 16, VII 12, 13. Bristles on sterna in type on III 13, 6, IV 16, 8, V 16, 7, VI 18, 6, VII 27, 7, in paratype on III 10 ?, 6, IV 15, 6, V 12, 6, VI 14, 6, VII 19, 6 ; *i.e.* type with more small bristles than paratype.

Hindcoxa on innerside with narrow patch of small bristles extending from apex upward-inward. Hindtibia on outer surface with 19 or 21 dorsolateral bristles of nearly equal size (apical ones not included), the bristles near the large dorsal ones not stouter than the other lateral ones. Length of tarsal segments in the two specimens : midtarsus 21 or 22, 16 and 17, 11, 8, 16 and 18 ; hindtarsus 43 and 48, 33, 17, 11, 20.

Modified Segments : stigma of tergum VIII narrow, not penetrating beneath the bristles ; sternum VIII (text-fig. 63) with more than 40 bristles, upper and distal margins strongly rounded together, the outline of the segment not exactly alike in the two specimens ; in both a deep subventral sinus, slightly larger in paratype than in type figured, ventral lobe narrow, pointed in lateral aspect. Digitoid F (text-fig. 64) with very few small bristles in proximal half, apical nose rather strongly curved down, four long bristles at ventral margin, distance of posterior one from tip of nose like diameter of middle of digitoid or a little shorter ; the

ventral process (P.v.) of clasper prolonged, subcylindrical, with a long apical bristle and a shorter and thinner antemedian one. Sternum IX obtusely elbowed beyond two-thirds of ventral margin, bearing at this point a fairly strong bristle which is shorter than the sternum is broad at the elbow, at the proximal and



distal sides of the elbow a number of small bristles : the portion beyond the elbow dorsally quadrisinuate, three small sharp teeth being formed and on the proximal side of the anterior sinus a small rounded hump.

Length : ♂ 2·6–2·8 mm. ; hindfemur 0·40–0·43 mm.

Idiochaetis gen. nov.

Close to *Stivalius* J. & R. 1922, differing in the head. Vertical portion of frons with a row of internal incrassations, of which at least the upper ones are battledore-shaped ; smaller incrassations dorsally, more distinct in ♀ than in ♂. A row of modified bristles along dorsal and frontal margins, bottle-shaped, very broad, on an average the enlarged portion of a bristle less than three times as long as broad, all ending with a thin projection (the tip of a normal bristle), which is broken off in some instances, lower bristles less modified than upper ones. Occiput measured horizontally from base of antenna very little longer than frons in ♂, shorter than frons in ♀. Prothorax short, notum with one row of bristles, spines of comb long.——Genotype : sp. nov. here described.

Idiochaetis illustris sp. nov. (text-figs. 65–69).

Saiko, Bubu R., 5,500–6,000 ft., ix., on Bandicoot, a small series of both sexes.

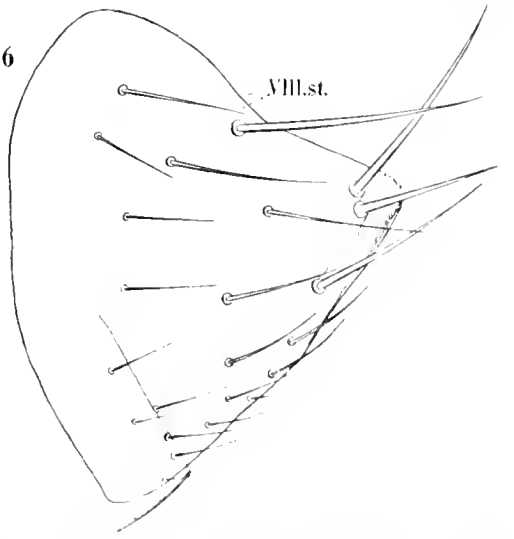
In the shape of the head, shortness of proboscis and in the ♂-genitalia resembling *Stivalius rugatus* sp. nov. (No. 9). Bristles numerous and stout on head, forecoxa, meso-metanota. Vertical diameter of head longer than horizontal

diameter, the difference being especially large in ♀. Fifteen to 17 spiniforms along frontal and dorsal margins; in some specimens nearly all the frontal incrassations

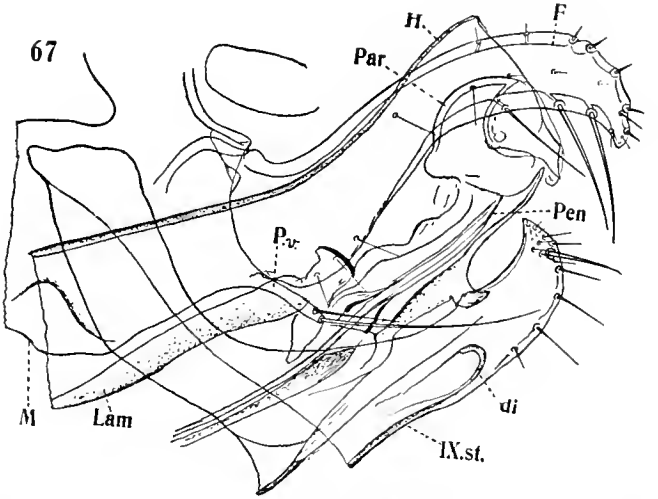
65

battledore-shaped; at antennal groove two long stout bristles, between them and ventral margin about 10 or more, of which those in front of and below the eye are more or less shaped like a hock-bottle (some accidentally curved in type, text-fig. 65); near the spiniforms a number of small thin bristles, and between these and the bristle at antennal groove a large space without bristles. Occiput with three rows and a large single bristle above middle of antennal groove, the numbers varying individually. Suture from antennal groove to vertex quite distinct in both sexes (in ♀♀ of *Stivalius* more or less feebly indicated). Proboscis short, not reaching to middle of forecoxa, the labial palpus consisting of five segments. Segment I of maxillary palpus longer than II, bristles of both stout. Antenna much shorter in ♀ than in ♂, club in ♂ one-half, in ♀ one-sixth, longer than broad.

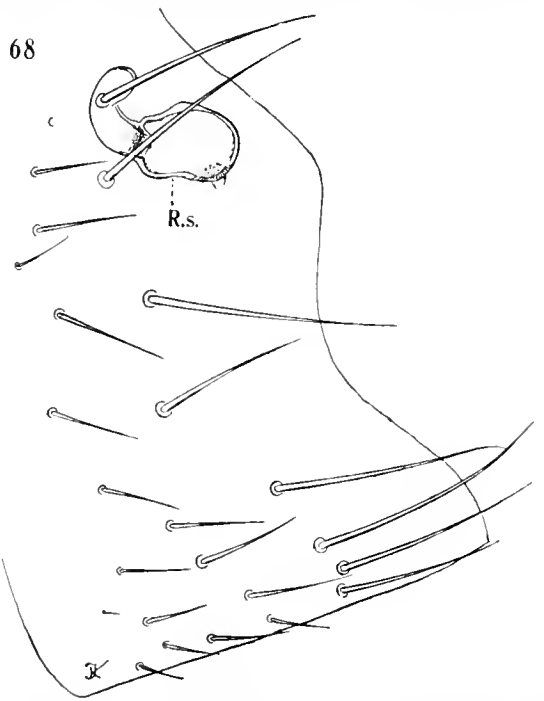
66



Pronotal comb with 18 spines, which are round at apex and more than twice as long as pronotum ; 11 or 12 large bristles, lower ones nearer to anterior



margin than to spines. Mesonotum covered with bristles from posterior row of 12 or 13 to basal margin ; on mesopleura ♂ 17 or 18, ♀ 15 to 25 bristles ; on metanotum from posterior row of 11 or 12 to near base over 40 bristles ; on metepimerum in ♂ 11 to 15, in ♀ 12 to 18.



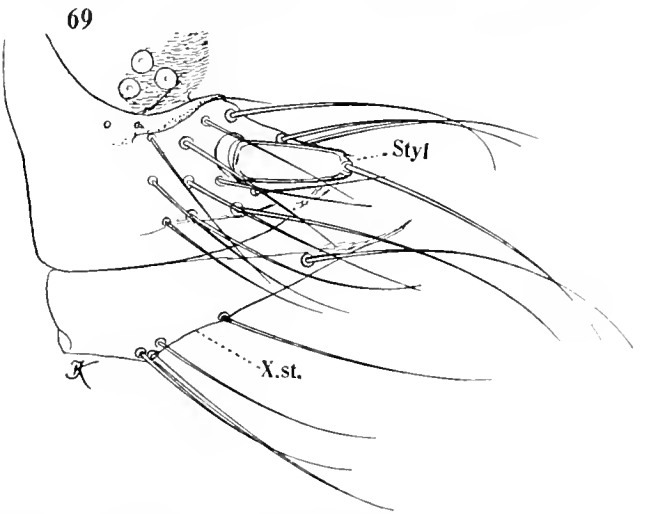
Abdomen : on terga II to IV (two sides together) two apical spines each, sometimes one missing on III or IV, rarely both on IV ; in front of posterior row of bristles in ♂ one row of small ones and at most a few additional dorsal bristles, in ♀ one or two rows of small ones and additional bristles ; in ♂ two bristles of posterior row below stigma on III to V, in ♀ three or four ; number of bristles on some terga : ♂ on III 15 to 17, 16, IV 13 to 16, 16, VI 10 to 13, 13 to 16, VII 10 to 13, 12 ; in ♀ on III 26 to 36, 18 to 21, IV 25 to 33, 18 to 21, VI 21 to 36, 17 or 18, VII 23 to 37, 9 to 11. On sterna : in ♂ on III 7 or 8, 7 or 8, IV 8 to 10 7 or 8, V 5 or 6, 8, VI 6 or 7, 6 to 8, VII 7 to 12, 8 ; in ♀ on III 13 to 15, 10 or 11, IV

11 to 15, 10 to 12, V 9 to 14, 9 to 11, VI 8 to 19, 10 to 12, VII 24 to 32, 14 or 15. Apical margin of tergum VII dorsally projecting in between the two sets of antepygidial bristles. Length of segments in

		I.	II.	III.	IV.	V.
Midtarsus	♂	17 or 18	12 or 13	9	6	17
,,	♀	19 to 21	13 to 15	9 or 10	7 or 8	18 to 20
Hindtarsus	♂	37 to 39	22 or 23	12	8 to 10	18 or 19
,,	♀	41 to 43	25 to 27	12 or 13	9 or 10	19 or 20
,,	large ♀	52	32	15	10	23 (midtarsus broken).

On outer surface of hindtibia 15 or 16 dorsolateral bristles, one or two of those near the dorsal pairs very slightly stouter than the others.

Modified Segments.——♂. Stigma-cavity of tergum VIII narrow, not extending underneath the row of short bristles. Sternum VIII (text-fig. 66) with 24 to 26 bristles each side, two near rounded apical angle close together. Clasper (text-fig. 67) with long ventral process (P.v.) as in *Stiralius rugatus*; digitoid F



gradually curved and distally gradually narrowed; at ventral margin three long bristles, distance of distal one from apex much shorter than width of F in middle, dorsally at highest point of curvature two small pale spiniforms, a third farther distal, these three corresponding to the cluster of three usually found in *Stiralius*; hardly any bristles in proximal half of F. Horizontal arm of sternum IX gradually turned up at apex, which is sharply pointed, along ventral margin about eight bristles, of which one a short distance from apex is the largest; division of right and left half of sternum halfway to apex as indicated by the line marked di. Hood of phallosome with almost straight distal (vertical) margin (H); upper portion of paramere (Par) claw-like; below orifice of penis-tube (Pen) a longish, sharp, triangular projection directed straight backwards.

♀. Margin of tergum VIII very slightly projecting immediately below antepygidial bristles, rounded, not forming a conspicuous lobe. Sternum VII (text-fig. 68) broadly and shallowly incurved, the ventral lobe more projecting than

the upper one, which is broad and short. Stigma of tergum VIII as in ♂; 7 to 14 dorsal bristles, one of them below stigma; on widened lower area of VIII. t. with 35 to 50 bristles on outside, and two strong submarginal bristles and a thinner marginal one on inside. Ventral margin of anal sternite (text-fig. 69) straight, slightly convex near base, with 6 to 8 bristles in proximal half (two sides together) and an apical pair. Stylet (Styl) cylindrical, thrice as long as broad, shorter than segment V of hindtarsus is broad in middle. Head of spermatheca (R.s.) longer than broad, almost symmetrical, with a low dorsal swelling in middle.

Length: ♂ 2·3–2·4, ♀ 2·5–3·3 mm.; hindfemur: ♂ 0·37–0·40, ♀ 0·40–0·53 mm.

RECORDS AND DESCRIPTIONS OF SIPHONAPTERA.

By DR. KARL JORDAN, F.R.S.

(With 10 text-figures.)

A COLLECTION of fleas sent to me for identification by Dr. J. Bequaert, Harvard Medical School, Boston, Mass., contains several new species from Africa and Asia, which are here described. Many of the other species are from places whence we have no record of fleas, or were obtained on hosts new for the species. A list of the collection, therefore, is of some value. The new bat-flea is a most interesting insect, upsetting our concept of a bat-flea by possessing three instead of two fully developed preoral spines, suggesting that the bat-fleas have originated from an ancestral form which had a row of spines along the ventral margin of the head. The vestigial third spine of *Chiropteropsylla broekmanni* Roths. 1915 points in the same direction. I am much indebted to Dr. J. Bequaert for allowing me to keep the types and other specimens for the N. C. Rothschild (British Museum) collection.

In order to facilitate the use of this article, I divide the list into two sections, the first dealing with American species only, and the second with the species from the Eastern Hemisphere.

I. AMERICAN SPECIES.

1. **Echidnophaga gallinaceus** Westw. 1875.

Florida: Sebastian, on *Spilogale ambarvalis*, 3 ♀♀.

2. **Pulex irritans** L. 1758.

Mexico: Monclova, on Indians, 2 ♀♀.——Proboscis short.

3. **Ctenocephalides felis felis** Bouché 1835.

Florida: Sebastian, on *Spilogale ambarvalis*, 1 ♀.

4. **Ctenocephalides canis** Curtis 1826.

Mexico: Monclova, on Indians, 2 ♀♀.

5. **Hoplopsyllus glacialis glacialis** Taschenb. 1880.

East Greenland: Franz Josef Fjord, on Polar Hare, 2 ♂♂, 3 ♀♀.

6. **Hoplopsyllus glacialis lynx** Baker 1904.

New Hampshire: on *Lynx canadensis*, 3 ♂♂, 7 ♀♀.

7. **Cediopsylla simplex** Baker 1895.

Massachusetts: on *Sylvilagus floridanus transitionalis*, 2 ♂♂, 4 ♀♀.

8. **Rhopalopsyllus cacicus saevus** J. & R. 1923.

Guatemala: Pulgera, North of El Paso, Peten, on *Dasypus novemcinctus mexicanus*, 1 ♀.

9. **Orchopeas nepos** Roths. 1905.

Oregon: Fort Klamath, on *Sciurus douglasi*, 1 ♀.

10. **Orchopeas caedens durus** Jord. 1929.

Massachusetts: Cambridge, on *Sciurus carolinensis leucotis*, 1 ♀.

11. **Orchopeas wickhami** Baker 1895.

Massachusetts: Harvard, on *Sciurus hudsonius loquax*, 1 ♂, 5 ♀♀; Boxboro, on *Sciurus carolinensis leucotis*, 1 ♂, 1 ♀.

12. **Orchopeas leucopus** Baker 1904.

Massachusetts: Barnstaple, on *Mus musculus*, 1 ♀.——Rhode Island: Kingston, on *Peromyscus leucopus noveboracensis*, 2 ♂♂.

13. **Diamunus montanus** Baker 1895.

California: San José, on *Otospermophilus beecheyi*, 1 ♀.

14. **Opisocrostis tuberculatus** Baker 1904.

North Dakota: Towner, on *Spermophilus franklini*, 5 ♂♂.

15. **Opisocrostis labis** J. & R. 1915.

Colorado: on *Marmota flaviventris*, 1 ♀.

16. **Oropsylla arctomys** Baker 1904.

Massachusetts: Wellesley, on *Marmota monax preblorum*, 1 ♂; Barnstaple, same host, 1 ♂, 1 ♀; Essex, same host, 1 ♂, 1 ♀.——Connecticut: Liberty Hill, on *Syrnium nebulosum*, 1 ♂, 1 ♀ (the owl had probably eaten a *Marmota*). ——New York: West Point, on *Urocyon cinereo-argenteus*, 1 ♀ (as before); Tupper Lake, on *Marmota monax rufescens*, 5 ♂♂, 3 ♀♀.

17. **Oropsylla rupestris** Jord. 1929.

Colorado: on *Marmota flaviventris*, 2 ♀♀.

18. **Foxella ignotus albertensis** J. & R. 1915.

North Dakota: Round Lake, McHeary Co., on *Mustela longicauda longicauda*, 1 ♂, 3 ♀♀.

19. **Megabothris acerbus** Jord. 1925.

Michigan: Douglas Lake, on *Tamias striatus listeri*, 1 ♀.——Massachusetts: Harvard, same host, 1 ♂.

20. **Megabothris quirini** Roths. 1905.

Minnesota: East Grand Forks, on *Zapus hudsonius campestris*, 1 ♂.

21. **Ceratophyllus idius** J. & R. 1920.

Massachusetts: Rock, from nest of *Sialis sialis*, 14 ♂♂, 10 ♀♀, and from nest of *Tachycineta bicolor*, 4 ♂♂, 5 ♀♀.

22. **Ceratophyllus gallinae** Schrank 1803.

Massachusetts: Robson Park, from nest of *Sialis sialis*, 3 ♂♂, 8 ♀♀.

23. **Nosopsyllus fasciatus** Bosc 1801.

Massachusetts: Barnstaple, on *Rattus rattus norwegicus*, 1 ♀.

24. **Leptopsylla segnis** Schönh. 1816.

Massachusetts: Cambridge, on mouse in laboratory, 1 ♂.

25. **Leptopsylla catatina** Jord. 1928.

Massachusetts: Ashburnham, Mt. Watatic, on ear of *Erotomys gapperi*, 1 ♂ (Francis Harper).

26. **Ctenophthalmus pseudagyrtes** Baker 1904.

Massachusetts: Natick, from mouse nest, 3 ♂♂, 2 ♀♀; Barnstaple, on *Microtus p. pensylvanicus*, 1 ♂.——New Hampshire: Hancock, on *Parascalops breweri*, 1 ♂, 2 ♀♀.

27. **Neopsylla wenmanni** Roths. 1904.

North Dakota: Round Lake, McHeary Co., on *Mustela longicauda longicauda*, 1 ♀.——Massachusetts: Barnstaple, on *Rattus rattus norwegicus*, 1 ♀, and on *Peromyscus leucopus noveboracensis*, 1 ♀.

28. **Neopsylla inopina** Roths. 1915.

North Dakota: Tower, on *Spermophilus franklini*, 1 ♀.——The head of the spermatheca is somewhat shorter than in our examples from Alberta and Washington.

29. **Neopsylla grandis** Roths. 1900.

Massachusetts: Petersham, on *Mustela n. noveboracensis*, 1 ♀.

30. **Stenoponia americana** Baker 1899.

Massachusetts: Wellfleet, on *Scalops aquaticus*, 1 ♂.——Rhode Island: Kingston, on *Peromyscus leucopus noveboracensis*, 1 ♀.

31. **Myodopsylla insignis** Roths. 1903.

Vermont: Mt. Aeolus, on *Myotis l. lucifugus*, 1 ♀; Chittenden near Rutland, same host, 1 ♂, 1 ♀.——Massachusetts: Hatchville, same host, 5 ♀♀; Mashpee, same host, 2 ♂♂; Centerville, same host, 1 ♂.——Indiana: Wyandotte Cave, same host, 1 ♀.

II. EASTERN HEMISPHERE.

Palaearctic: nos. 32, 39, 42, 43, 48. Oriental: nos. 41, 45, 46, 47, 49, 50, 51, 52. Aethiopian: nos. 33–38, 40, 44, 53.

32. **Pulex irritans** L. 1758.

Transjordania: Petra, on *Canis aureus*, 1 ♀.

33. **Synosternus somalicus** Roths. 1903.

Kenya: Neumann's Boma on the Guasa Nyiro, on *Xerus rutilus rufifrons*, 3 ♀♀.

34. **Procaviopsylla isidis** Roths. 1903.

Kenya: Elgonyi, Mt. Elgon, on *Procavia habessinica daemon*, 1 ♂, 1 ♀ (A. Loveridge); Guasa Nyiro, on *Heterohyrax syriacus hindei*, 1 ♀.

35. **Xenopsylla brasiliensis** Baker 1904.

Belgian Congo: Mulubula, Sankuru, on "domestic rat," 5 ♀♀.

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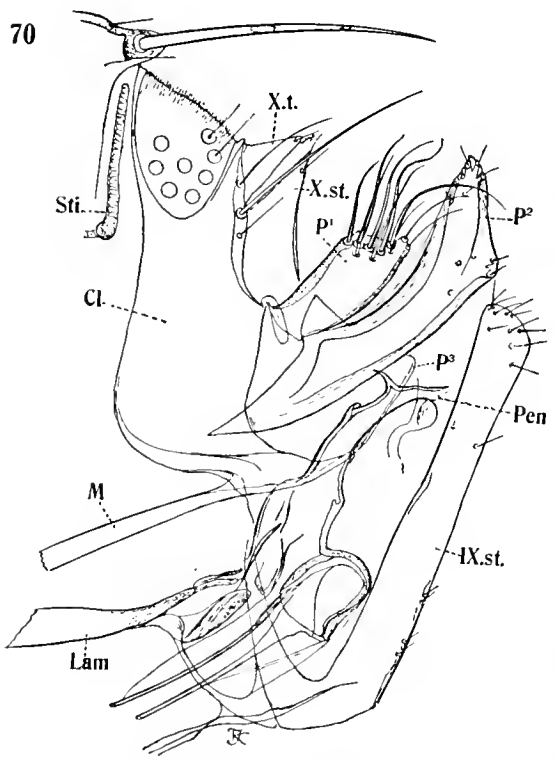


36. **Xenopsylla sarodes** sp. nov. (text-fig. 70).

Kenya: Guasa Nyiro, on *Saccostomus isiolae*, 1 ♂.

Near *X. tortus* J. & R. 1908 and *X. scopulifer* Roths. 1905; genitalia very distinctive.

Eye smaller than even in *X. tortus*. Dorsal groove of occiput much less deep than in both allied species. On mesopleura 5 bristles; on metepimerum 5, 7 and 6, 7. Apical cone of tergum VII nearly as prominent as in *X. scopulifer*. Hindcoxa with a row of 4 or 5 short spiniforms on inner side.

Modified Segments.—Posterior margin of tergite IX with one long and two short bristles (text-fig. 70). Process P^1 of clasper as broad as in *X. scopulifer*, but longer, bearing 7 rather strong and several thin bristles; process P^2 much broader than in the allied species, elbowed at three-fourths of ventral margin, broader at the elbow than proximally of it, the apical portion almost gradually narrowing to a point.

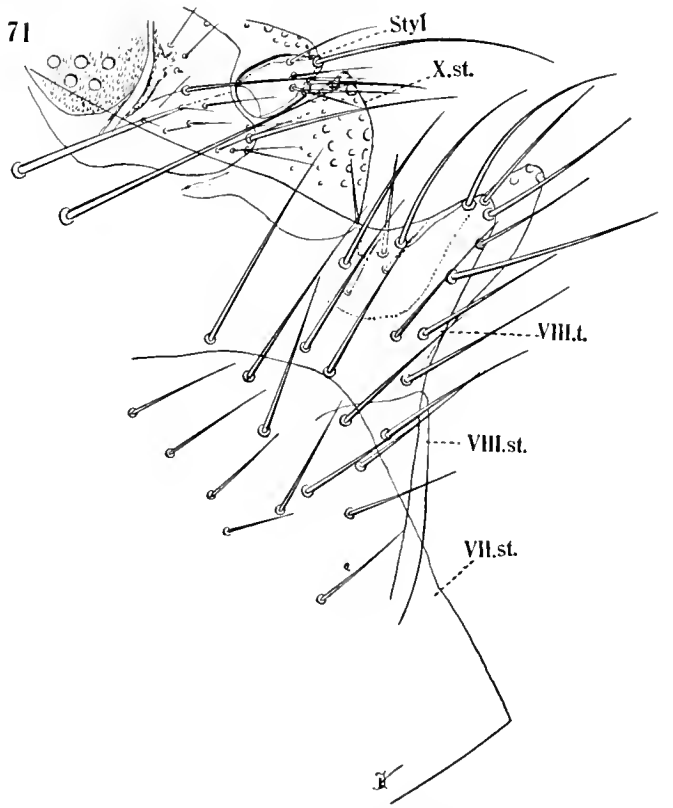
Ventral arm of IX. st. straight, its apex ventrally rounded, dorsally subacuminate. Apical tube of ejaculatory duct (Pen) with a dorsal hook which is longer than in *X. scopulifer* and much longer than in *X. tortus*.

37. **Parapulex chephrenis** Roths. 1903.

Egypt: Wady Ferran, on *Acomys dimidiatus*, 1 ♂, 2 ♀♀.

38. **Ctenocephalides felis strongylus** Jord. 1925.

Uganda: Butandiga, Mt. Elgon, on *Genetta servalina bettoni*, 1 ♀ (A. Loveridge).——Kenya: Elgonyi, Mt. Elgon, on *Lepus capensis kukumegae*, 1 ♂, 2 ♀♀ (A Loveridge).——Sudan: Mahangani, Blue Nile, on *Caracal caracal nubica*, 1 ♂, 2 ♀♀.



39. **Oropsylla stejnegeri** sp. nov. (text-fig. 71).

East Siberia: East Cape, on *Citellus stejnegeri*, 1 ♀.

Nearest to *O. alaskensis* Baker 1904, but differs much in the peculiar shape of the ventral portion of tergum VIII. Chaetotaxy nearly the same in the two species.

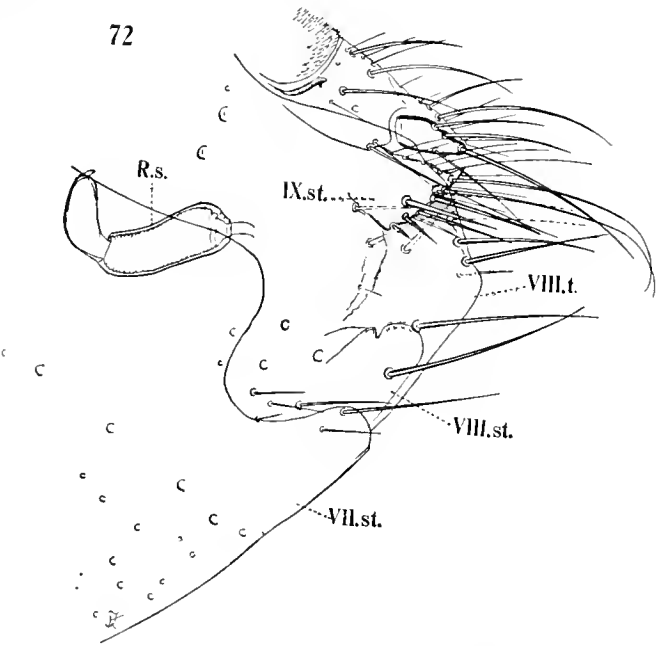
Proboscis reaching to underside of femur, apex of segment IV being on a level with apex of coxa. Pronotal comb with 24 spines. On metepimerum 14 bristles on one side and 17 on the other. Apical spines on abdominal terga (the two sides together), I 1, II 4, III 2. Bristles on abdominal segments as in

O. alaskensis; three antepygidial bristles, upper and lower about one-fourth shorter than middle one, upper slightly shorter than lower. Stigma of segment VIII as in *O. alaskensis*, larger than in *O. silantiewi* Wagn. 1898 and others; below this stigma two or three bristles. Sternum VII truncate, the upper angle rounded off. Lower portion of tergum VIII produced backwards into a prominent lobe, as shown in text-fig. 71, the lobe of the right side being much longer and narrower than that of the left side and having the shape of a long and narrow shoe-sole; this asymmetry suggests pathological development in the only specimen the collection contains. Distance of stylet from sensory plate (sensilium) less than half the length of the sensilium. Stylet short, not being quite twice as long as broad. Bristles of X. st. more numerous than in *O. alaskensis*. Spermatheca as large as in that species and of the same shape. Bristle of legs essentially as in *O. alaskensis*.

Length (somewhat distended): 4 mm.; hindfemur: 0·67 mm.

40. **Libyastus infestus duratus** Jord. 1931.

Tanganyika Territory: Mt. Meru, on "a squirrel or mouse," 1 ♀.——A squirrel-flea.



41. **Paraceras javanicus** Ewing 1924.

Java: Tjibodas, Mt. Gedeh, on *Halictis orientalis*, 1 ♂, 4 ♀♀.——Process P of the clasper is somewhat narrower than in our fig. 75 on p. 355 of Nov Zool., xxxviii (1933).

42. **Monopsyllus anadyrus** sp. nov. (text-figs. 72, 73).

East Siberia: Emma Harbour, on *Ochotona hyperborea*, 2 ♀♀.

Distinguished from the other species of the genus especially by sternum VII, the numerous bristles of the tibiae and tarsi and the long spermatheca.

Pronotal comb with 22 spines and in addition each side a very small one. On metepimerum 7 to 9 bristles. Apical spines on abdominal terga (the two sides together): I 2, II 4, III 2 in type, and I 2, II 2, III 2 in paratype. On mid- and hindtibiae 7 dorsal pairs of bristles in notches and a single dorsal bristle between sixth and seventh pairs; on outer surface of hindtibia 18 or 19 dorso-lateral bristles, not including the apical bristles; midtarsal segment I with many bristles at posterior margin in basal half; on I of hindtarsus (text-fig. 73) over 20 bristles in type, not quite so many in paratype. Stigma of segment VIII rather larger than usual in this genus. Sternum VII with rounded sinus, the lobes above and below the sinus likewise rounded, the upper one much broader than the lower, about the same size as the sinus. Stylet twice as long as broad, with three lateral bristles in type and two in paratype. Spermatheca (R.s.) nearly three times as long as broad, dorsally convex at posterior end, then slightly concave, ventrally convex anteriorly and posteriorly and slightly incurved in between; orifice terminal, as in the allied species; tail shorter than body.

Length: 2·8 mm.; hindfemur: 0·48 mm.

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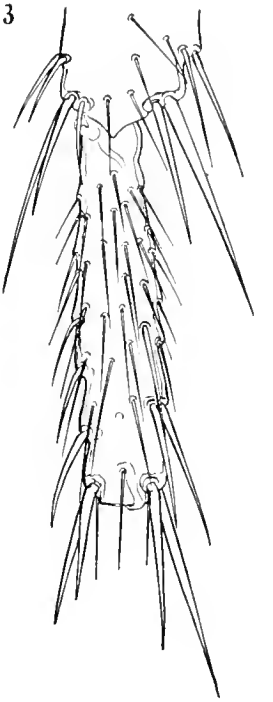

43. **Ceratophyllus hirundinis** Curtis 1826.

Belgium: Moortsel, from nest of *Chelidonaria urbica*, 1 ♀.

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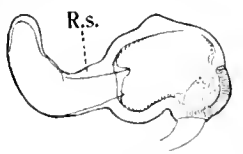

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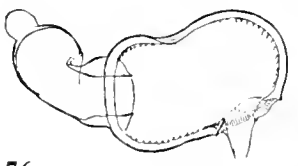

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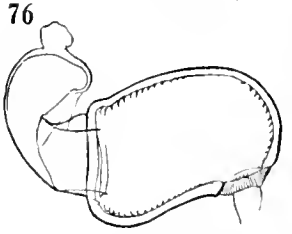

44. **Dinopsyllus lypusus** J. & R. 1913.

Kenya: Kaimozi, Nyanza Province, on *Dasymus helutus helutus*, 1 ♀, and on *Crocidura nyanzae nyanzae*, 1 ♀ (A. Loveridge).——Tanganyika Territory: Mt. Meru, on a squirrel or mouse, 2 ♀♀ (A. Loveridge).——Occurs on various mice and rats.

45. **Choristopsylla ochi** Roths. 1904 (text-fig. 74).

West Australia: Margaret River, on *Trichosurus vulpecula*, 1 ♀.

The spermatheca of the species not having been figured, I supply the want from the present specimen; the bursa copulatrix has unfortunately been destroyed in the process of clearing.

46. **Pygiopsylla hilli** Roths. 1904 (text-figs. 75, 76).

West Australia: Pemberton, on *Bettongia penicillata*, 1 ♂, 3 ♀♀, and on *Pseudochirus occidentalis*, 1 ♀.

The ♂ agrees nearly in all detail with the type specimen. In both sexes the spines of the pronotal comb are shorter than the pronotum, a character more

pronounced in these five specimens than in the unique type. Sternum VII of ♀ almost the same as in our text-fig. 229 in *Ectoparasites*, i, p. 237 (1922), the sinus being narrow and deep, and the inerassation placed for the greater part below it. Sternum X resembles that of *P. zethi* Roths. 1904, its underside not bearing a tubercle in middle, as it does in *P. hoplia* J. & R. 1922 and *P. congrua* J. & R. 1922. Head of spermatheca (text-figs. 75, 76) broader than in those two species and somewhat variable.

We shall refer in another article of the present issue to the question of which are the true females of *P. congrua* and *P. hoplia*.

47. **Pygiopsylla hoplia** J. & R. 1922.

Queensland: Lake Barrine, on *Parameles nasuta*, 1 ♂, 1 ♀.

48. **Stivalius torvus** Roths. 1908.

Belgian Congo: Lukulela, on *Crocidura occidentalis*, 1 ♂ (J. P. Chapin).

49. **Stivalius corrugis** Jord. 1933.

East New Guinea: Mt. Misim, on *Peroryctes ornatus*, 1 ♂ (H. Stevens).

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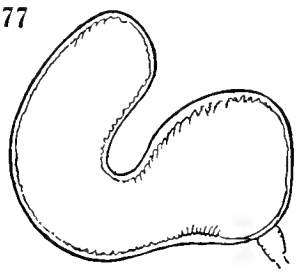

50. **Stivalius novaeguineae** Roths. 1904.

Same place and host as *St. corrugis*, 1 ♀ (H. Stevens).

51. **Stephanocircus dasyuri** Skuse 1893.

Queensland: Lake Barrine, on *Parameles nasuta*, 1 ♂, 2 ♀♀.

52. **Chiropteropsylla aegyptius** Roths. 1903 (text-fig. 77).

Egypt: Gizeh, on *Rhinopoma microphyllum*, 1 ♀.

We give a figure of the spermatheca of the present specimen, the organ not having been figured before.

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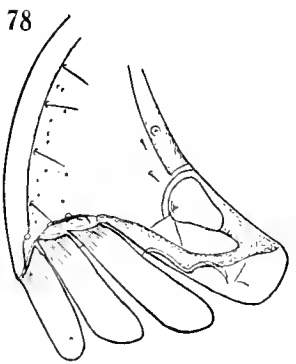


53. **Thaumapsylla breviceps** Roths. 1907.

Philippines: Nazareto Cave near Calapan, Mindoro, 1 ♂; Kilib Cave, Lubang Island, 1 ♂, 2 ♀♀; Dilirig, Province Bukidnar, Mindanao, 1 ♀; all on "bat."

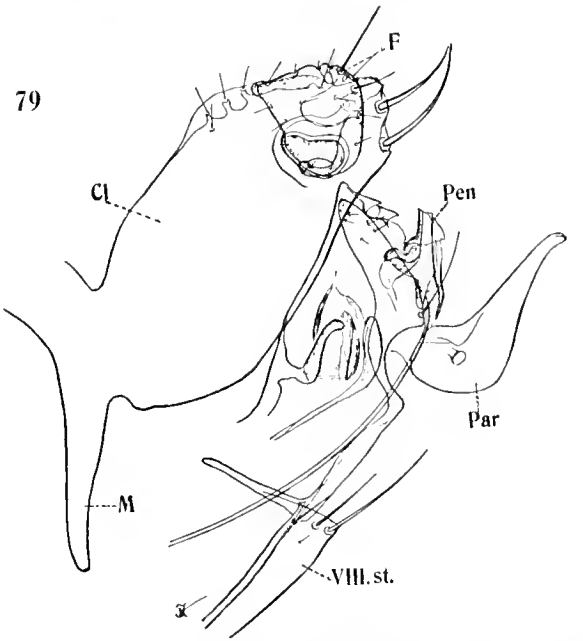
Originally described from South Africa; according to the specimens in the N. C. Rothschild collection occurs probably throughout the Oriental Region.

54. **Thaumapsylla dina** sp. nov. (text-figs. 78, 79).

Belgian Congo: Kalongi, west slope of Mt. Ruwenzori, 6,500 ft., on *Rousettus lanosus*, 1 ♂ (J. P. Chapin).

Differs from all other bat-fleas known in bearing on each side of the head three preoral spines instead of two. Agrees otherwise rather closely with *Th.*

breviceps. Frontal portion of head ventrally broader and genal lobe longer. Proboscis a little longer. Pronotal comb with fewer and broader spines, 24 instead of 30. On each side of mesonotum the two subapical spines of underside (in *Th. breciveps* sometimes three) farther apart. On metepimerum 12 bristles. Three short apical spines on metanotum each side, on abdominal tergum I also



three, on II and III a single one each side, these single spines not present in *Th. breviceps*. Genitalia of the same type as in *Th. breviceps*, but the body of clasper (Cl, text-fig. 79) much longer, apically narrower, and the two long bristles therefore nearer the upper apical angle ; finger F much broader, about as broad as long, its frontal side straight, not incurved, posterior side nearly straight in middle, dorsally and ventrally rounded. Apical lobe of IX. st. narrower than in *Th. breviceps*.

SOME SIPHONAPTERA FROM MOROCCO.

By DR. KARL JORDAN, F.R.S.

(With 2 text-figures.)

AS a member of a party of some thirty entomologists who made a week's excursion in North Spain before the meeting of the 6th International Congress of Entomology, Madrid, 1935, I had the pleasure of being together with Mons. and Mme. J. M. Mimeur, of the Institut Scientifique Chérifien, Rabat, Morocco, and when I incidentally mentioned that I should much like to know what kind of flea occurred on the North African *Atlantoxerus getulus* L. 1758, a representative of the tropical African ground-squirrels, Mons. Mimeur promised to get me the flea. Early this year I received from him the collection here recorded, containing a series of specimens taken on the ground-squirrel. I expected to obtain from *A. getulus* a species of *Libyastus* Jord. 1936, a genus known only from tropical Africa, or a *Myoxopsylla* Wagn. 1827, a Mediterranean genus, and was rather surprised that the species collected on this squirrel was a rat-flea of the genus *Nosopsyllus*, of which several species are known from North Africa.

I am very grateful to Mons. Mimeur and his friends for the specimens he has sent. The material is the more valuable as very few species of Siphonaptera have so far been recorded from Morocco, and I sincerely hope that he and his friends will continue to add to our knowledge of the flea fauna of that country.

1. **Echidnophaga gallinaceus** Westw. 1875.

Rabat, on domestic fowl, xi.36 (R. de Brettes), a series.

2. **Xenopsylla cheopis** Roths. 1903.

Rabat, on *Meriones shawi*, xii.36 (F. Nerneth), a series.

3. **Xenopsylla ramesis** Roths. 1904.

Goulmina, on *Meriones* sp., xii.1936 (J. de Lepiney), a small series.

4. **Ctenocephalides felis felis** Bouché 1835.

Rabat, on *Canis familiaris*, xi.36 (R. de Brettes), a series.

5. **Archaeopsylla erinacei maura** J. & R. 1912.

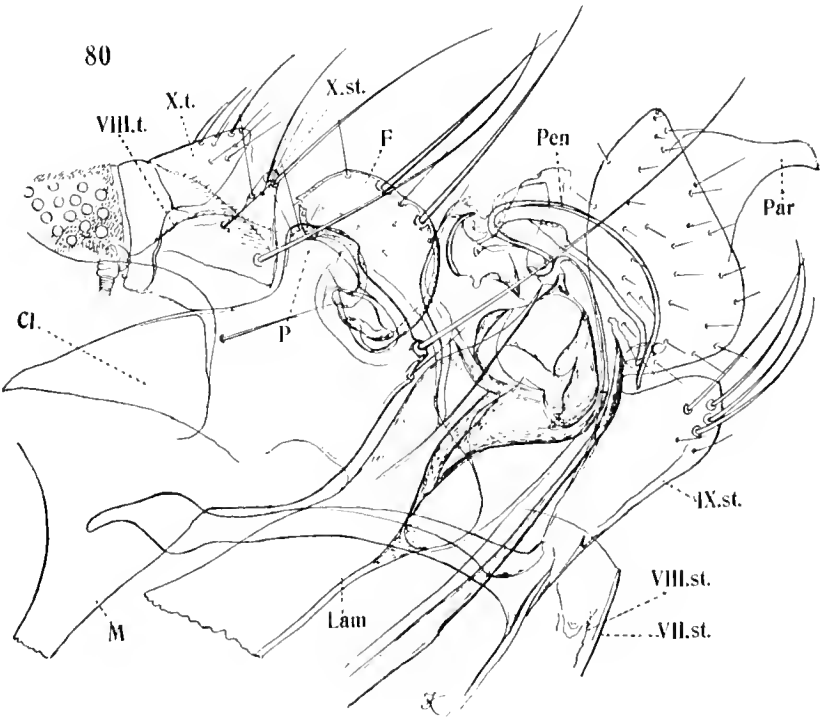
Rabat, on *Aethechinus algirus*, i.31 (F. Nerneth), a series.

6. **Nosopsyllus atlantis** sp. nov. (text-figs. 80, 81).

Anti-Atlas, south of Tiznit, on *Atlantoxerus getulus*, xii.36 (J. de Lepiney), 3 ♂♂, 6 ♀♀.

The species belongs to the section *Gerbillophilus* Wagn. 1834, with some long bristles on the hindtarsus. Its nearest ally is *N. maurus* J. & R. 1912, collected by me in Algeria on *Meriones shawi*, but in our collection also from

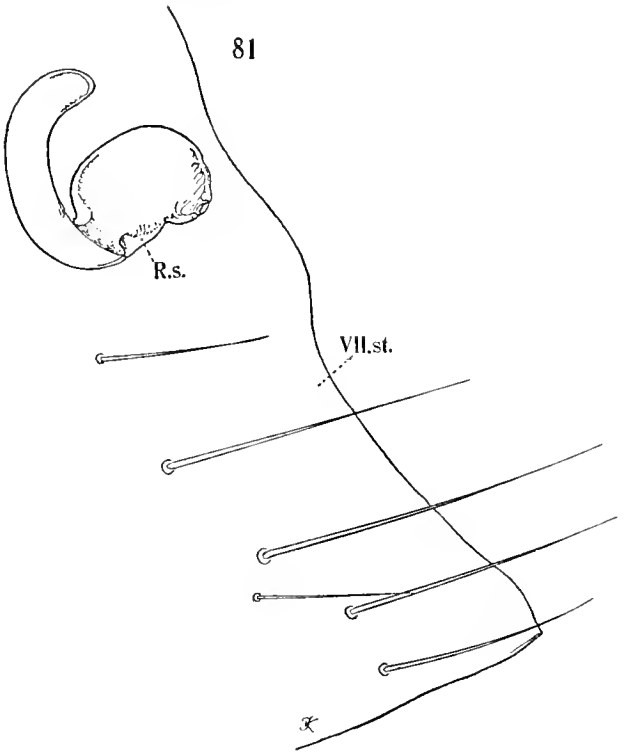
Suakin, Sudan, where it was found on *Ictonyx libyca* by Dr. J. Anderson. The ♂ of the new species differs (*inter alia*) in the finger of the clasper being short and bearing two long strong bristles and in the submedian lobe of the ninth sternite bearing long bristles; in the ♀ the head of the spermatheca is less rounded than in *N. maurus*, the duct of the bursa copulatrix and the stylet are shorter, and the seventh sternite has a slanting apical margin. Abdominal sterna of ♂ and ♀ with fewer bristles than in *N. maurus*, the numbers being, on the two sides together, in ♂ on III to VIII 6, on VII sometimes with a smaller additional bristle, in ♀ on III 6 to 8, IV 6 or 7, V 6 to 8, VI 6 or 7, VII 11 to 15, usually 12.



Apical spines on abdominal terga slightly more numerous; in ♂ I 4 to 6, II 4 to 6, III 2 to 4, V 0 or 1; in ♀ I 4 to 6, II 4 to 6, III 2 to 6, IV 0 to 4, usually 2, V 0; average of total number in ♂ 18·3, in ♀ 15·0; in 5 ♂♂ and 5 ♀♀ of *N. maurus* the averages are ♂ 12·6, ♀ 9·6, there being no spine on tergum IV of ♀. The long bristles of hindtarsus thinner than in *N. maurus*; on segment I one apical bristle of posterior side extends well beyond apex of II, whereas the longest apical bristle of the anterior side does not nearly reach apex of II, the posterior apical bristle of II does not reach beyond apex of IV and the one on anterior side extends at most a little beyond III.

♂. On tergum VIII (text-fig. 80, VIII. t.) only four bristles, of which one or two are long. Clasper (Cl) longer than in *N. maurus*, not ventricose, the sinus below M small, the one above M very shallow; M narrowing to apex, almost pointed; one or two long acetabular bristles at ventral apical angle below the lowest point of F, below the long bristle a small one; process P broad,

incurved on posterior side ; sclerite F almost evenly curved, about as broad at apex as at base, with two long strong bristles above middle of posterior margin. Lobe of sternum IX anterior to median sinus with three or four long bristles, whereas there are in *N. maurus* only two short stout nearly spiniform ones ; bristles of apical lobe thin. Apical tube of ejaculatory duct (Pen) long and curved downward-forward as in the other species of *Nosopsyllus*. Paramere (Par) not claw-like as in *N. maurus*, but broadish, the apex rounded above and



acuminate below.——♀. On tergum VIII 5 or 6 small bristles above stigma, two long ones below stigma, accompanied by one or two small hairs, on lower area 12 to 14 bristles inclusive of marginal ones, and on inner surface 3 lateral and 1 marginal. Sternum VII (text-fig. 81, VII. st.) with slanting apical margin, not differing much from VI. st. in outline, the upper angle completely rounded, the margin varying somewhat individually. Stylet only twice as long as broad. Head of spermatheca somewhat variable, being sometimes rather shorter than in our figure. Duct of bursa copulatrix (i.e. the tube with a darker appearance than the rolled-up bursa) shorter than midfemur is broad at its widest point.

Length : ♂ 2·5–2·7 mm., ♀ 3·1–3·4 mm. ; hindfemur : ♂ 0·43–0·45 mm., ♀ 0·48–0·51 mm.

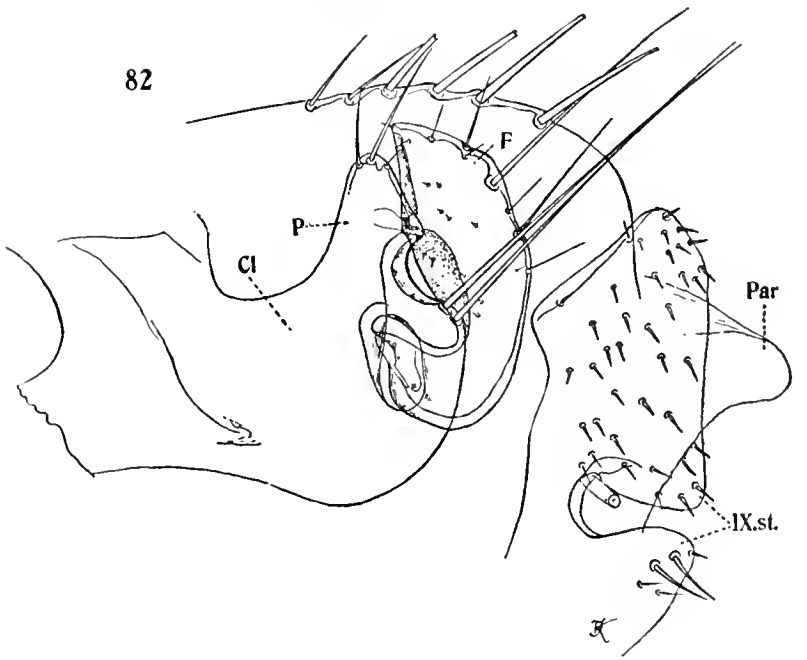
A NEW FLEA FROM CHINA.

By DR. KARL JORDAN, F.R.S.

(With 2 text-figures.)

Nosopsyllus nicanus sp. nov. (text-figs. 82, 83).

DR. E. LANDAUER, of the Wei Shen Shu (National Health Administration), Nanking, China, has sent me a number of specimens of a *Nosopsyllus* collected on rats (mostly *R. r. norvegicus*) at Lungyen, South Fukien, which he considered different from *N. fasciatus* Bosc 1801. The species proves to be



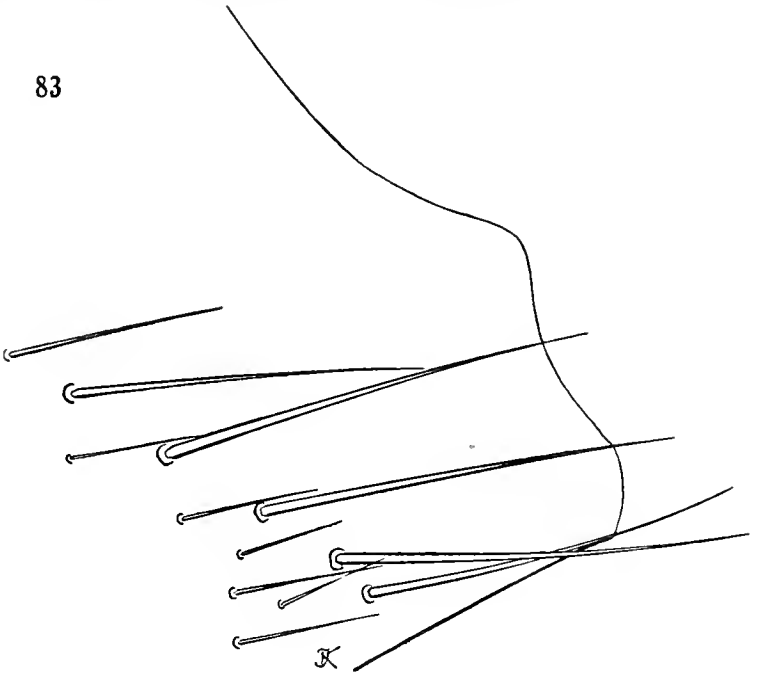
close to *N. punjabensis* J. & R. 1921, but approaches *N. fasciatus* in the dorso-posterior margin of tergum IX of abdomen being much more rounded than in any of the Indian species allied to *N. fasciatus* and described in *Ectoparasites*, i, pp. 184–197 (1921).

As in *N. punjabensis* the head is dimorphic, in some specimens the frons bearing a normal sharp tubercle (*Ectoparasites*, fig. 190), whereas in others the tubercle is replaced by a conical projection (l.c., fig. 189).

♂. As compared with *N. punjabensis*, clasper (Cl) dorsally more deeply incurved, process P therefore longer (text-fig. 82). Acetabular bristles above base of F, or at least the upper of the two above lowest point of anterior margin of F. Finger F also longer, ventrally narrower and at supramedian angle of anterior margin somewhat broader than in *N. punjabensis*. Paramere (Par)

broader, apex obtuse, rounded. As in *N. punjabensis* short upper antepygidial bristle broader than long bristle ; in one ♂ there are two such short bristles on one side and one on the other.

♀. Sternum VII (text-fig. 83) much more strongly narrowed, somewhat resembling that of certain specimens of *N. simla* J. & R. 1921, the apical



lobe truncate, with the apical margin distinctly incurved. Spermatheca as in *N. punjabensis*. Duct of bursa copulatrix a trifle shorter.

I thank Dr. E. Landauer very much for the type and other specimens presented to the N. C. Rothschild (British Museum) collection.

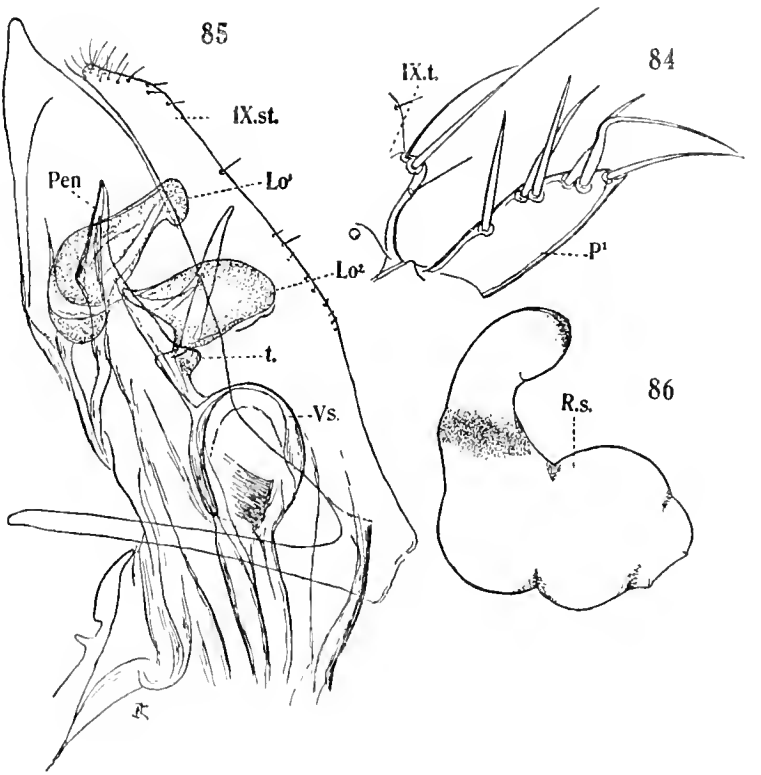
At the same place and on the same hosts the collectors also obtained rather commonly another Ceratophylline flea, *Monopsyllus anisus* Roths. 1907.

A NEW *XENOPSYLLA* FROM NYASALAND (SIPHONAPTERA).

By DR. KARL JORDAN, F.R.S.

(With 3 text-figures.)

I AM indebted to Dr. W. A. Lamborn for a small collection of fleas obtained from various rodents in the neighbourhood of Fort Johnston, Nyasaland. The hosts are not yet properly identified, and for that reason I postpone recording the fleas, but describe here a new *Xenopsylla* which is represented in the collection by a series of specimens of both sexes.



Xenopsylla syngenis sp. nov. (text-figs. 84, 85, 86).

♂♀. Close to *X. tortus* J. & R. 1908, but in the somewhat larger eye, the more numerous bristles on sternum VII of ♀ and the more ventricose tail of the spermatheca somewhat approaching *X. scopulifer* Roths. 1905.

♂. On abdominal sternum VIII about 20 bristles each side. At apical margin of tergum IX behind the sensilium (text-fig. 84) four bristles, the one at the angle long, the others thinner and much shorter, the fourth subdorsal, small, separated by a wide interspace. Sternum IX (text-fig. 85, IX. st.) nearly as in

X. tortus, but the ventral arm proximally broader than in that species. Process P^1 of clasper as in *X. tortus*, but curved-up apex of P^2 shorter. Phallosome (= aedeagus) different : apical tube of penis (Pen) longer, as in *X. tortus* without the dorsal hook of *X. scopulifer*, but with a distinct obtuse elbow ; on the ventral side of the penis-tube near the vesicle (Vs) a tubercle (t.) which has nearly the same position as in *X. scopulifer*, whereas in *X. tortus* it is far removed from the vesicle. On each side of the penis-tube two flaps, one distal and dorsal, projecting downwards at the side of the tube ; apex of this flap (Lo^1) rounded, with the anterior angle projecting forward, forming a short blunt hook ; in *X. tortus* this flap is apically divided into two projections ; second flap (Lo^2) very much broader than in *X. tortus*, apically rounded, at the side of it a dagger-like process which is feebly chitinized.

♀. Sternum VII, on the two sides together, with 27 to 35 bristles, usually more than 30. On outer surface of tergum VIII 12 to 20 on side and 13 to 16 in a marginal row. Tail of spermatheca (text-fig. 86) ventricose, but usually less so than in the specimen from which the figure is taken.

The names of the four rodents on which the species was found will be supplied when the skins are determined.

THREE NEW BIRD-FLEAS FROM KASHMIR.

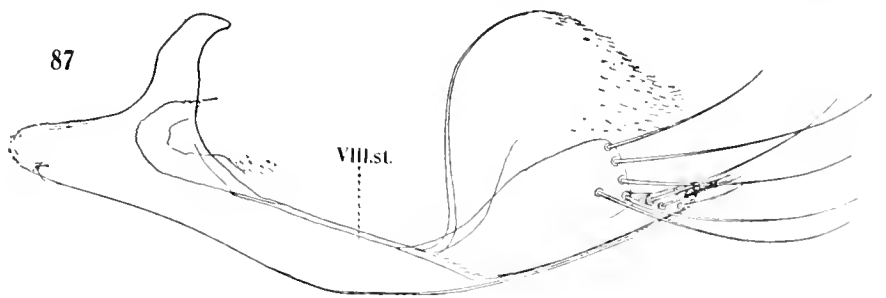
By DR. KARL JORDAN, F.R.S.

(With 6 text-figures.)

THE species here described were collected by Mr. H. Whistler at Dras, Ladakh, Kashmir, 10,500 ft., in May 1928, on *Chelidonaria urbica* (presumably in its nest) and sent to me by Mr. G. B. Thompson, of the staff of the British Museum (Natural History), to both of whom I tender thanks. There are altogether 18 specimens, mounted by Mr. Thompson, which represent four species. One of the species is the common martin-flea (*Ceratophyllus hirundinis* Curtis 1826), the one ♂ and the series of ♀♀ agreeing well with European examples. Two others also belong to *Ceratophyllus* Curtis 1826, presenting the general characteristics of the Ceratophylli living in martins' nests, while the third species is nearly related to the European *Ceratophyllus waterstoni* Jord. 1925, which is not a true *Ceratophyllus* and is placed here into a separate genus. This new species and *C. waterstoni* are of a different phyletic origin than *C. hirundinis* and congeners, being bird-fleas derived from *Citellophilus* Wagner 1934, with which they show a striking affinity, or, in other words, being originally mammal-fleas which have taken to birds' nests and acquired characteristics of bird-fleas.

1. **Ceratophyllus orites** sp. nov. (text-figs. 87, 88, 89).

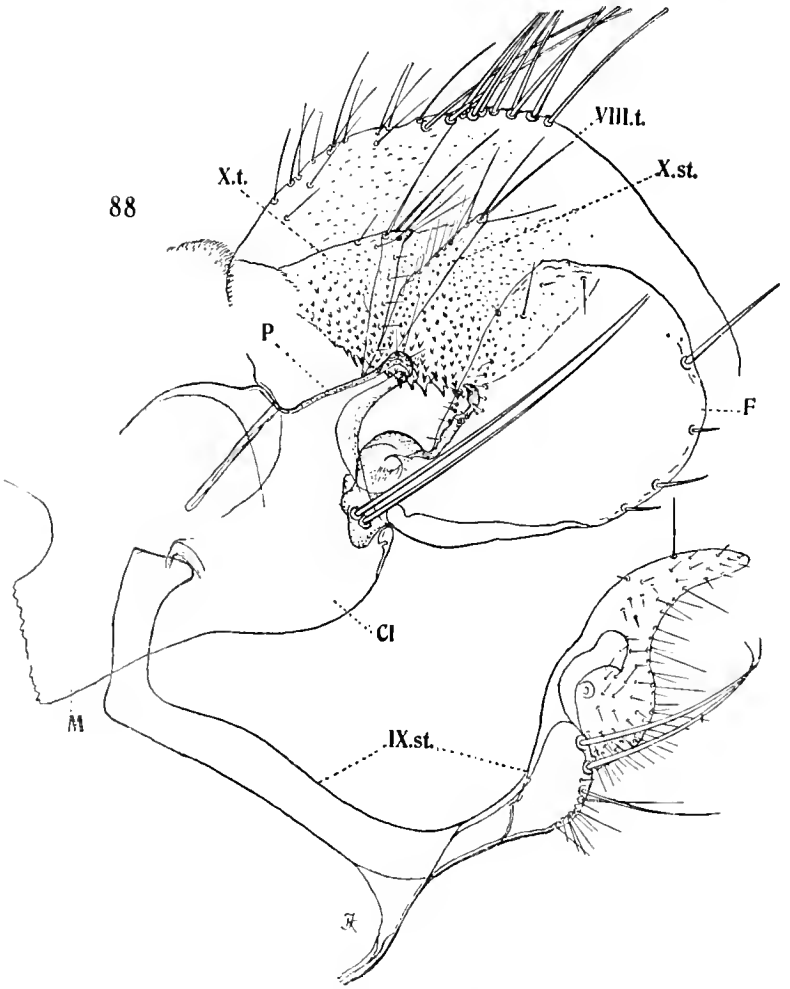
♂♀. As in various species of fleas breeding in martins' nests the apex of the metanotum is very feebly chitinized, the marginal area being membranaceous



from the row of long bristles, and the apical spines of the metanotum and abdominal terga pale and narrow. Chaetotaxy nearly as in *C. hirundinis*. Pronotal comb with more than 30 spines (32–34). One long antepygidial bristle, above and below it a very minute one in ♂, in ♀ the upper about the size of the anterior small bristles of VII. t. and the lower one absent.

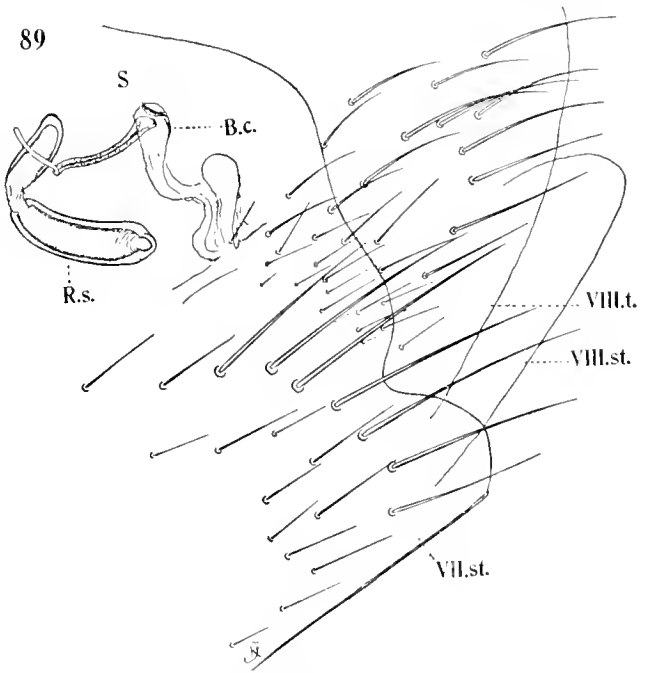
Genitalia.——♂. Tergum VIII strongly rounded, at dorsal margin about a dozen thin bristles, some of them on inside, upon these follows a densely packed row of long ones, 8 to 10 altogether (text-fig. 88); there are no bristles on the lower area of VIII. t. The spiculose area of inner surface large, almost elliptical, fading away dorso-apically, sharply defined ventrally, the most ventral spicules

large, dentiform, directed downward. Apex of sternum VIII (text-fig. 87, VIII. st.) with ventral apical horizontal projection which bears 5 shortish strong bristles a little longer than the sternite is broad in middle, proximally to the horizontal projection the segment is widened dorsally, this area apically truncate and bears 5 or 6 long bristles, 4 of them in a vertical row and 1 or 2 in front of



the row, another long bristle on the apical process ; a large apical flap, sharply defined on frontal side and here rounded, the posterior outline not well marked in the two specimens, this portion of the drawing therefrom possibly incorrect. Clasper (text-fig. 88, Cl) short, the bay above process P small ; two long acetabular bristles placed about halfway between lower and upper margins of acetabulum ; process P narrow, slightly rounded-dilated at apex. Finger F rounded-pyriform, more strongly rounded ventrally and apically than dorsally, strongly chitinized basally, very pale distally, at dorso-apical angle apparently membranaceous, base rounded and projecting dorsally ; very few bristles : one strong one below

middle of apical margin, as stout as acetabular bristles, but not so long as anterior margin of process P; in outer half of ventral margin 3 short stout bristles, the upper the shortest, middle one the longest, being less than half the length of the bristle of apical margin; along the basi-dorsal incrassation and above it some small bristles as usual, and towards dorso-apical angle a very short, somewhat stumpy, marginal bristle, on a level with it a thin hair and another hair near apical margin. Sternum IX similar to that of *C. hirundinis*, but anterior



portion with two strong bristles as stout as the acetabular ones, but much shorter, anterior to them thin marginal bristles and two longish ones.—— ♀. Sternum VII (text-fig. 89, VII. st.) with a distinct rounded sinus on a level with the fourth long bristle of the posterior row, the ventral lobe below the sinus rounded, the apical margin above the sinus first rounded, then gently incurved and finally again rounded. Stylet a little longer than in *C. hirundinis*. Spermatheca (R.s.) also longer, its tail without appendix. Apex of bursa copulatrix (B.c.) with a sclerification (S) opposite the base of the duct of the spermatheca, this sclerification not present in *C. hirundinis*.

Length: ♂ 2·7, ♀ 2·9 mm.; hindfemur: ♂ 0·43 0·48, ♀ 0·45 0·51 mm.

Two pairs.

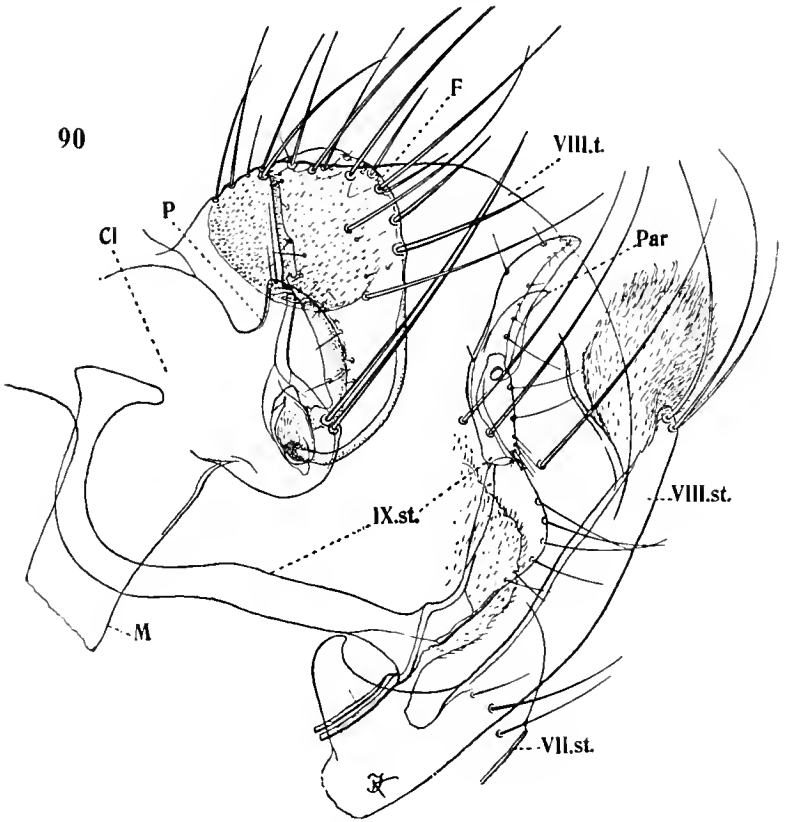
2. **Ceratophyllus caliotes** sp. nov. (text-figs. 90, 91).

♂♀. Likewise a true martin-flea in the apical area of the metanotum being membranous and its spines resembling a bristle in shape. Differs from both *C. hirundinis* and *C. orites* sp. nov. in the smaller number of spines in the pronotal comb and in the longer bristles of the hindtarsus, besides the modified

segments. Nearest to *C. rusticus* Wagn. 1903, tergum VIII different in both sexes.

Smaller than the preceding species. Comb with 27 or 28 spines. Longest apical bristle of hindtarsal segments I and II projecting well beyond apex of segment following. Lower minute antepygidial bristle absent, upper one very thin, longer in ♀ than in ♂.

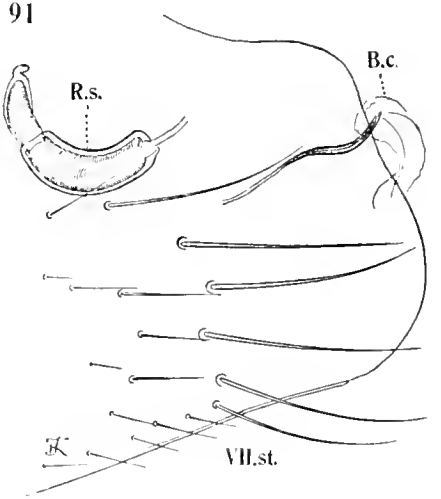
Genitalia.——♂. Tergum VIII (text-fig. 90, VIII. t.) strongly rounded, with a dozen bristles in dorsal area and 3 in lower area, the spiculose area of inner



surfaee round, about as broad as long, the spicules near ventral margin of area much smaller than in *C. orites* and pointing upwards. Sternum VIII with 6 or 7 long slender bristles at apex (on the two sides together); filamentous flap large, rotundate on the two sides, the rim supporting the flap on anterior side free in upper half. Clasper (Cl) short, dorsal bay at anterior side of process P small; two long acetabular bristles on a level with middle of acetabulum, the elasper ventrally strongly convex between manubrium and acetabular bristles. Process P short, its sides almost parallel, apex obliquely rounded, projecting upwards on anterior side, posterior angle almost effaced. Finger F almost gradually widening from base to middle, angle of anterior margin in middle, the margin incurved from this angle to base and straight to anterior apical angle, apical and posterior margins rounded together, width of F at middle like length

of straight portion of anterior margin ; in upper half of posterior margin 4 strong bristles, almost evenly spaced, the lower two somewhat stronger than the acetabulars, but much shorter, the third thin and shorter, the fourth also thinner, but nearly as long as second ; near anterior apical angle a very thin dorso-marginal bristle ; along anterior margin a number of small bristles ; F resembles to some extent that of *C. lunatus* J. & R. 1920, but that species is otherwise very different. Posterior apical nose of vertical arm of sternum IX long ; ventral arm narrow, at ventral margin of proximal half 6 or 7 slender bristles ; apical half narrower than in *C. hirundinis*, the lobe projecting frontad being particularly narrow, the thin bristles less numerous than in *C. hirundinis*. Paramere (Par) shorter.——♀. In the only specimen of this sex (text-fig. 91) sternum VII covers tergum VIII, projecting beyond it ; its apical margin is evenly rounded up to two-thirds, then slightly incurved, the upper angle round and the dorsal margin again somewhat incurved ; bristles on VII. st. and VIII. t. less numerous than in *C. orites* and *C. hirundinis* ; upper angle of dilated portion of VIII. t. completely rounded. Stylet as short as in *C. hirundinis*. Spermatheca (R.s.) as in *C. hirundinis*; but oral end subtruncate ; tail with appendix. Bursa copulatrix (B.c.) without sclerification at apex.

91



Length : ♂ 1·9, ♀ 2·1 mm. ; hind femur : ♂ 0·35, ♀ 0·39 mm.

Two ♂♂, one ♀.

Among the true Bird-Ceratophylli—i.e. the species in which the body of the spermatheca is long, sausage-like, and the basal portion of the duct of the spermatheca darkened—I find in our collection only three species besides *C. caliotes* in which the apex of the bursa copulatrix has no sclerification in the posterior wall : *C. hirundinis* Curtis 1826, *C. rusticus* Wagn. 1903 and *C. rossittensis* Dampf. 1912. The sclerification is present in *C. numidus* J. & R. 1915, a martin-flea from North Africa.

Orneacus gen. nov.

♂♀. Agrees with *Ceratophyllus* Curtis 1826, s. restr., in the eye being large, the bristles of segment II of antennae long, some projecting in ♂♀ beyond apex of club, the pronotal comb containing a large number of spines (more than 30 in both species of *Orneacus*) and in the ventral apical pair of bristles of segment V of fore- and midtarsus being long in both sexes, resembling fourth lateral bristle, not being incrassate in ♂. In spite of these similarities with *Ceratophyllus*, *Orneacus* is an offshoot from a different group of Ceratophylline fleas, being akin to *Citellophilus* Wagner 1934, a genus of mammal-fleas. Inner surface of mid- and hindcoxae with a row of slender bristles from near apex to near base, as in *Oropsylla*, *Citellophilus* and other genera, but the number of bristles reduced. Apical marginal area of metanotum very much shorter than that of mesonotum, but not entirely membranous as in the Martin-Ceratophylli ; apical

spines short, somewhat smaller than those on abdominal terga I to IV, being much shorter and broader than in *Ceratophyllus hirundinis* and allies. One long antepygidial bristle, in ♂ accompanied by two minute ones, of which the lower one is sometimes missing, in ♀ these small bristles longer and thicker than the penultimate bristles of tergum VII.

Genitalia.——♂. Tergum VII without spiculose dorsal area or this area vestigial only. Apical lobe of ventral arm of sternum IX broad, subtruncate, the forward projection so long that the bristles of its apex and those of the strongly convex portion of the anterior half of IX. st. are close together; apex of vertical area feebly or not at all curved backwards. Tendons of IX. st. and of phallosome short, curved upwards, but not making half a convolution. Phallosome of a similar structure as in *Citellophilus*; apical, protruding, portion of ejaculatory duct broad, more or less transversely ribbed (the duct itself perhaps narrow, but surrounded by glandular tissue; a similar structure obtains in *Citellophilus*). Anal sternum (divided into a right and a left lobe) longer than in *Ceratophyllus*. F of clasper of the *Citellophilus* type.——♀. Spermatheca with oblong body. Bursa copulatrix short, broad, upright, apex and wide basal portion of duct of spermatheca enveloped by glandular tissue, which is partly lamellate or somewhat densely folded; no sclerification. Short bristles of anal sternum stout and curved (as in *Citellophilus dolabris* Roths. 1911).

Genotype: *O. waterstoni* Jord. 1925 (= *Ceratophyllus rothschildi* Waterst. 1910, nec Rainbow 1905).

It is an interesting and for our understanding of evolution significant case of the creation of a type of bird-flea from a branch of mammal-fleas, the attributes acquired, evidently in connection with the adoption of the martin as host and the hard nest as breeding-place, being external.

3. **Orneacus oreinus** sp. nov. (text-fig. 92).

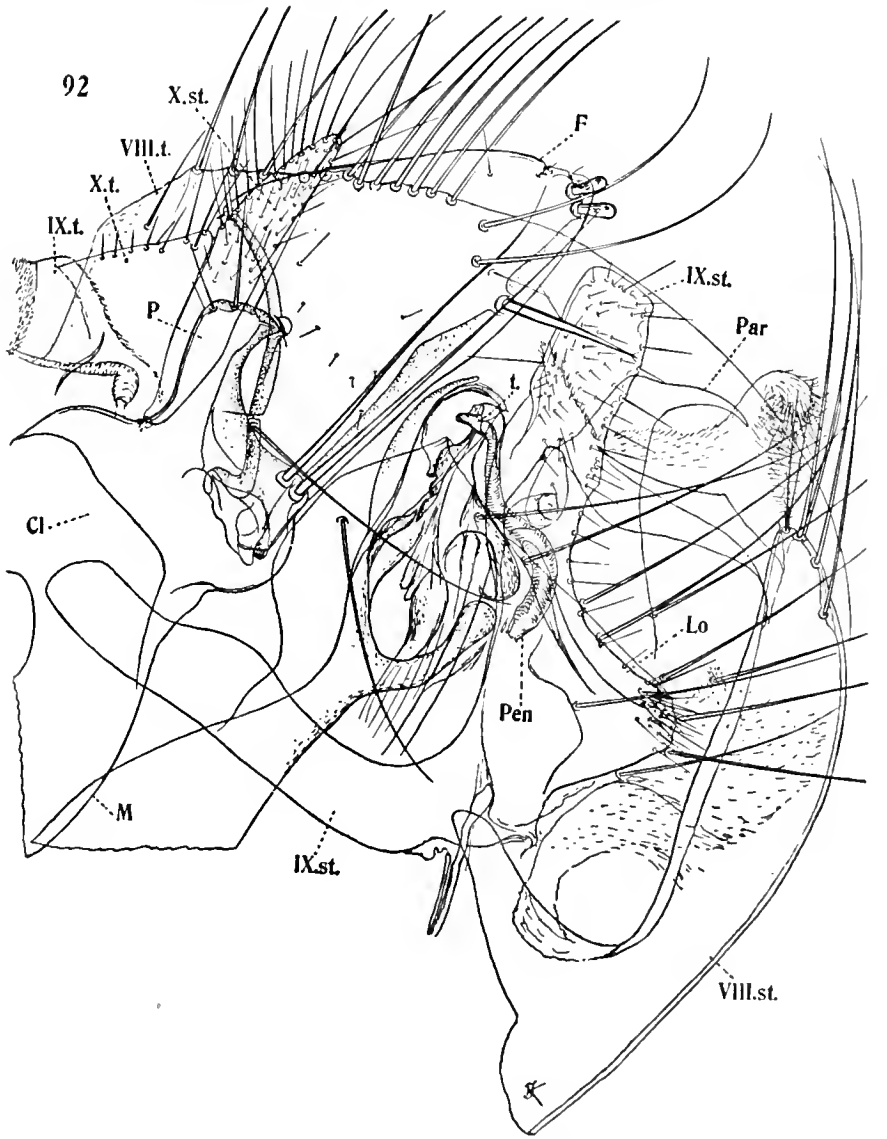
♂. Similar to the ♂ of *O. waterstoni*, distinguished by the long dorsal bristles of the thorax and anterior abdominal segments and by the tail-end.

Frontal tubercle sharp, sunk, but distinctly projecting. In front of row of three eye-bristles one single small bristle, placed towards antennal groove. On occiput three bristles above antennal groove, first short or long, second and third long, the last being the ventral bristle of the posterior row, at some distance behind and above median bristle a small one; dorsal groove of occiput shallow. Proboscis reaching to apex of forecoxa. At least six of the bristles of antennal segment II reach well beyond club.

Spines of pronotal comb longer than notum; dorsal bristles longer than lateral ones, but shorter than most ventral one; on mesonotum dorsal bristles likewise prolonged and in front of row two or three long additional bristles, on metanotum one such additional long bristle; metanotum one spine each side (in *O. waterstoni* two or three), this spine smaller than in *O. waterstoni*, as are also those of abdomen.

Dorsal bristles of posterior row of abdominal terga I to III more or less prolonged, at least longer than in *O. waterstoni*; number of apical spines on two sides together: I 4, II 5 or 6, III 4, IV 3 or 4; two rows of bristles on I to VII, an incomplete third row and a few additional dorsal bristles. Bristles on sterna on two sides together: III 5 or 7, IV 5 or 6, V 7 or 8, VI 5 or 7, VII 2 or 4, total in type 25, in paratype 31.

On hindtibia 8 dorsal notches, bristles of third and sixth notches small. None of the hindtarsal bristles reach beyond apex of segment following. First pair of plantar bristles of segment V of fore- and midtarsi bent inward; on sole



of V minute hairs from apex to second pair of plantar bristles. Proportions of hindtarsal segments: 41, 28, 16, 10, 20.

Genitalia.——Tergum VIII (text-fig. 92, VIII. t.) broadly rounded, with a dorso-marginal row of long bristles, some of them close together, one or two lateral ones (drawn as they are on the slides, forced downward), and on lower area from 8 to 12 long bristles, partly arranged in a vertical row; close to dorsal

margin indications of spicules on inner surface. Sternum VIII elongate-boat-shaped, convex ventrally, dorsally nearly straight, with a slight upward bend in central area ; anterior upward-projection measured from ventral surface of VIII. st. more than twice as long as VIII. st. is broad in centre ; apex of VIII. st. subacuminate, with 3 or 4 long bristles and a pair of much thinner and shorter apical ones ; filamentous flap with a narrow upward lobe and a broader apical lobe. Clasper (Cl) short ; two long acetabular bristles close together, below them the clasper strongly convex. Process P twice as long dorsally as medianly broad, apex rounded-truncate, posterior nose pointed, projecting. Finger F triangular, ventral margin the longest, anterior margin the shortest, the proportions of the three sides being 55, 41, 30 ; at the posterior angle two short broad spiniforms close together, rounded-dilated at apex ; above three-fourths of ventral margin a large bristle which is about as long as its distance from upper angle. Vertical arm of sternum IX convex in middle of posterior side, otherwise nearly straight, apex rounded, not curved backwards ; proximal half of ventral arm with broad, irregularly rounded, downward projection bearing a number of bristles ; the distal half with nearly parallel sides from middle to apex, which is rounded-truncate (more irregular in paratype than in type figured) ; its forward extension (Lo) long and slender, reaching to the trichose area of anterior half. Paramere with a long and narrow hook (Par). Free apical section of ejaculatory duct (Pen) somewhat resembling an elephant's trunk ; at apex of penis-tube a dorsal projection (t.) which is strongly chitinized.

Length : 2·6 mm. ; hindfemur : 0·48 mm.

Two ♂♂.

TWO NEW FLEAS FROM SOUTH AMERICA (SIPHONAPTERA).

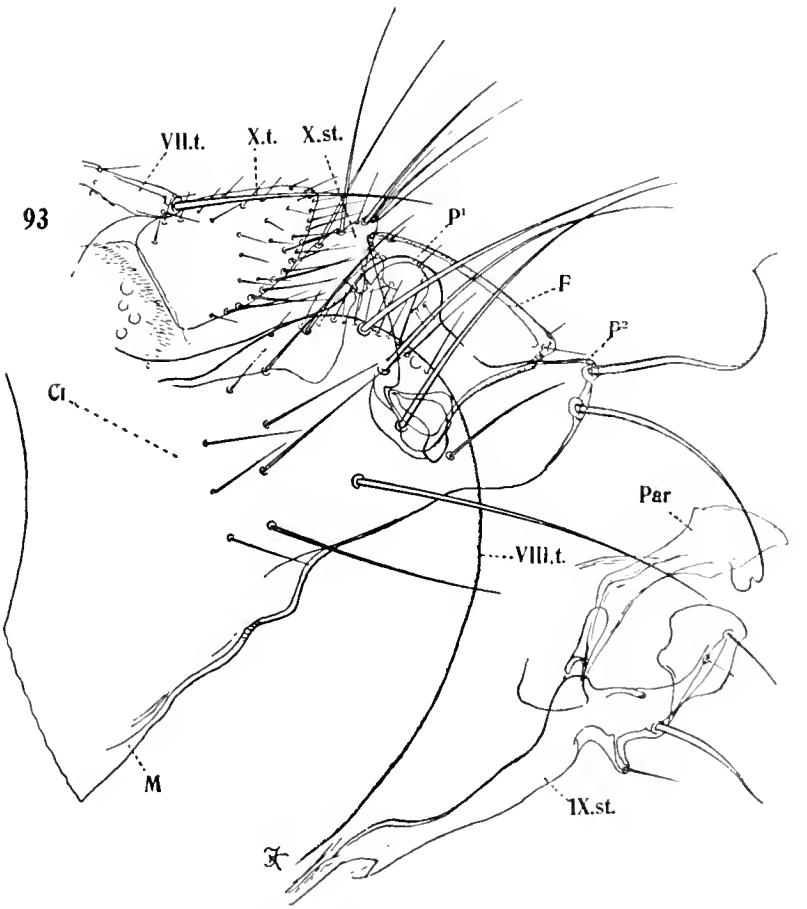
By DR. KARL JORDAN, F.R.S.

(With 5 text-figures.)

1. **Myodopsylla notialis** sp. nov. (text-fig. 93).

♂. Near *M. insignis* Roths. 1903, but posterior bristles of abdominal tergites III to VI not modified into false combs and the genitalia very different.

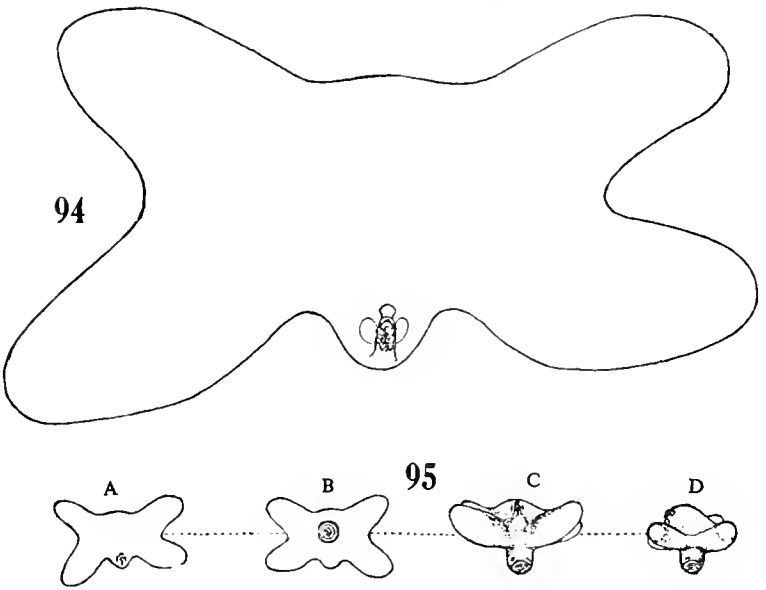
Pronotal comb apparently contains fewer than 35 spines. Dorsal bristles of posterior row of mesonotum longer than lateral ones, very much longer than



in *M. insignis*, being nearly as long as their distance from base; in front of the row two dorsal bristles each side also prolonged; the apex of the mesonotum dorsally collapsed (feebly chitinized or affected by the clearing agent ?). On metanotum each side two apical spines; dorsal bristles of posterior row some-

what shorter than lateral ones and a little thicker, longer than in *M. insignis* and not forming a comb, 13 on the two sides together. On metepimerum 8 or 9 bristles, of which 4 or 5 small, 4 long, the two at posterior margin shorter than the other two long ones and about as thick, not thicker.

On abdominal tergum I 6 dorsal bristles of the posterior row are shorter and thicker than the lower ones, on II only 4, on the other terga none; on I each side two short apical spines; number of bristles: terga I 22, 14, II 13, 16,



III 9, 16, IV 8, 15, V 7, 13, VI 6, 14, VII 3, 14, on II and III an additional small bristle below stigma; sterna III 2, IV 4, V 2, VI 4, VII 4.

Hindtarsal segment I shorter, being 1·6 times as long as II, in *M. insignis* 1·8 times; apical and subapical bristles of I thicker and longer, the apical one reaching close to apex of II, and the corresponding bristle of II to or beyond apical fourth of III.

Modified Segments.—Tergum VIII (text-fig. 93, VIII. t.) strongly rounded, without an angle; there are 6 or 7 large bristles and about 8 smaller ones at the margin and on lateral surface, and about a dozen thin ones at the dorso-apical margin, most of them on inside. Sternum VIII truncate, with the angles rounded off, at the apical margin a row of 6 bristles, which are much shorter than the segment is broad, near ventral margin a large brush of long thin hairs, and below dorsal margin a densely packed, horizontal, slightly S-shaped, row of about 20 bristles, broadish at base, about as long as the segment is broad, most of them leaning backwards. Clasper (Cl) apically divided by a broad sinus into a round upper process P^1 and a longer lower one P^2, the latter bearing two long bristles, one at apex and the other below apex. The finger F triangular, the dorsal margin the longest, the ventral margin slightly longer than anterior one. Sternum IX slender in proximal two-thirds, its dorsal margin with rounded hump at two-thirds, opposite this convexity a short process at ventral margin

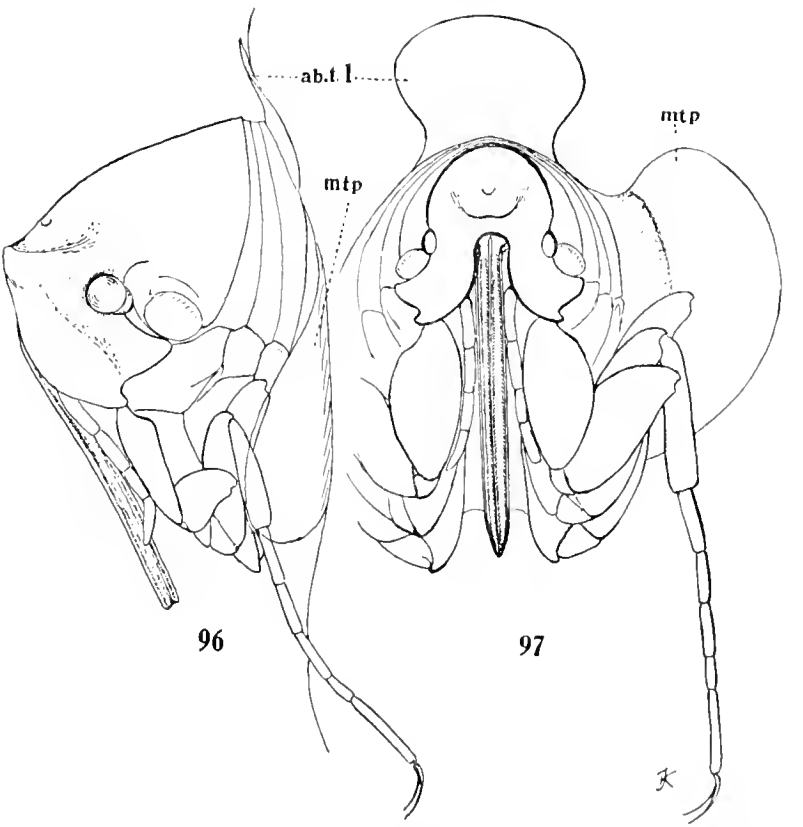
bearing a short bristle, a little farther distal a stout, sharply pointed bristle, about as long as its distance from apex of IX. st., apical lobe nearly as broad as long, rounded distally, incurved dorsally and excurved ventrally, near apex a thin bristle, another farther frontad on inner surface. Anal tergite (X. t.) with numerous bristles along ventral margin.

Length: 2·7 mm. (extended); hindfemur: 0·45 mm.

Brazil: Porto Joffre, Rio S. Lourenço, tributary of Rio Cuyaba, Matto Grosso, ii. 1933, on *Molossus obscurus*; 1 ♂, received from Mr. G. B. Thompson, British Museum (Nat. Hist.).

2. **Tunga terasma** (text-figs. 94–97).

One gravid ♀ from Annapolis, southern part of State of Goyaz, Brazil, 5. xi. 1936, collected by Mr. G. B. Fairchild from within the ventral skin of a soft-tailed armadillo (*Cabassous unicinctus*), between the foreleg and neck.



A wonder flea. Whereas the gravid ♀ of all the other known species of *Tunga* are as round as a pea, the distended body of the present species is quadrilobate, the lobes not being quite the same size, but all subcylindrical and round at the end. They are semi-transparent, and long ovarian tubules are more or less plainly visible within. There are two lobes each on right and left sides, one being

dorsal and the other ventral. The distended body is covered by the membrane between abdominal segments I and II; head, thorax (inclusive of metepimerum) and abdominal tergum I being separated from the other segments by the distended body. In a frontal view (text-fig. 94 and fig. 95, A) only the anterior portion of the insect is visible, the proboscis and legs pointing downward as indicated in the figures. Figs. A to D are natural size, the greatest transverse diameter of the specimen being 14 mm. In a view from the anal side (B) the abdominal segments appear as concentric rings (only some of them indicated in the figure). Below the head and thorax there is a ventral swelling, a vestigial fifth lobe, quite low and rounded, as shown in fig. C, which represents a ventral view. Here the posterior region of the insect projects as a cylindrical cone, which is about as long as broad, and shows near the concentric rings small sclerites as remnants of segment II. In a lateral view (fig. D), i.e. the specimen so turned that the pair of right lobes of fig. C is directed towards the eyes of the observer (a turning of 90° of fig. C), the head and thorax appear on left side above the left lobe and the anal cylinder below as in fig. C.

The specimen is being kept in liquid, as mounting for the microscope would destroy the peculiarities of the distended body. The drawings of the anterior part of the insect from the side (text-fig. 96) and from front (text-fig. 97), therefore, have no claim to accuracy in the detail. Measurements have been taken with a high power of the binocular dissecting microscope. The few bristles which are visible in the opaque specimen have been left out in the drawings, as they might be more misleading than helpful. Head and thorax are very similar to those of *T. penetrans* L. 1758, the head being a little shorter dorsally. Eye large. Genal margin anteriorly with a short projection. Proboscis ending on a level with posterior coxa. Metepimerum (mtp) appearing as a sort of wing, more than its outer half being detached from the membrane of the distended body and curled sidewards and a little forward (text-fig. 96). Above the thorax there is an apically rounded-dilated sclerite also free at its upper end; this is abdominal tergum I (ab. t. I). On the right side the tarsus of foreleg and on left side that of midleg are preserved, they resemble the tarsi of *T. penetrans*, but may possibly be slightly different in chaetotaxy. The cone of posterior abdominal segments is much longer than in distended ♀♀ of *T. penetrans*.

In congratulating Mr. Fairchild on this surprising discovery I express the hope that more specimens will be found, permitting preparations for the microscope to be made.

ON SOME AUSTRALIAN SIPHONAPTERA.

By DR. KARL JORDAN, F.R.S.

(With three text-figures.)

1. **Pygiopsylla congrua** J. & R. 1922 and **P. hoplia** J. & R. 1922.

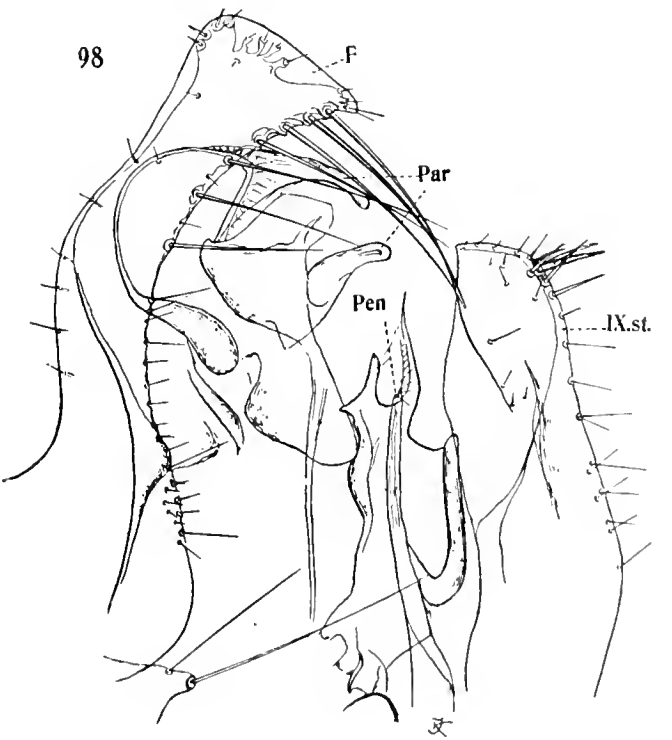
FAIRLY extensive material collected in Queensland convinces me that in the original descriptions of the above species the mating of the sexes was erroneous. What we described and figured as the ♀ of *P. congrua* is that sex of *P. hoplia* and vice versa. The synonymy, therefore, is as follows:

(*a*) *P. congrua* Jord. & Roths., *Ectoparasites*, p. 234, no. 2, text-fig. 226 (1922), ♂ only.

P. hoplia iid., l.c., p. 236, no. 3, text-fig. 228 (1922), ♀ only.

(*b*) *P. hoplia* iid., l.c., p. 236, no. 3, text-fig. 227 (1922), ♂ only.

P. congrua iid., l.c., p. 234, no. 2, text-fig. 229 (1922), ♀ only.



2. **Stivalius molestus** Jord. 1936 (text-fig. 98).

Described from a series of ♀♀ in *Proc. Linn. Soc. N.S.W.*, lxi, p. 135, text-figs. 1, 2 (1936), obtained in Queensland on *Rattus culmorum*. Mr. Frank H. Taylor has now sent me other specimens of this species among which are some

♂♂. I am much indebted to Mr. Taylor, and to Mr. W. A. McDougall who collected the additional series at Mackay on the same host. As in ♀ the margin of the frons longer than in the allied species; upper bristles of upper row of frons nearer the dorsal margin. Sclerite F of genitalia more stumpy, its nose much shorter; the small ventral bristles in proximal half less numerous than in *St. mordax*. Upper process of paramere (Par) long, lower one slightly curved, not straight as in *St. rectus* J. & R. 1922. Ventral arm of sternum IX similar to that of *St. mordax*; its apical angle pointed, bristles somewhat variable in number.

Acedestia gen. nov.

Only the ♀ known. It represents a new species which does not fit into any of the genera hitherto described and has affinities with *Neopsylla* Wagn. 1902 as well as with *Ctenophthalmus* Kolen. 1857. The new genus proposed here for the species may provisionally be placed in the neighbourhood of *Ctenophthalmus*, although the presence of a patch of small spiniforms on the inner surfaee of the hindcoxa removes it from that neighbourhood. Perhaps the discovery of the ♂ will throw more light on the relationship of this peculiar species.

Head integricipit, much shorter than broad. Antennal groove closed. Frontal tubercle sunk, ventrally straight, with sharp point. Proboscis short, with 5 segments, last a little longer than II to IV together, apex excised. Eye present, but much reduced. In front of it a row of four bristles, first at antennal groove; no other bristles on frons. On occiput a subapical row, no other bristles apart from a few minute ones above antennal groove. Club of antenna longer than broad. Behind eye from antennal groove to maxillary palp an oblique row of four spines.

Prothorax short; pronotum with comb, the spines except lower ones much longer than notum; one row of bristles. Mesonotum measured from base to row of bristles (true apex) shorter than metanotum, the same applies to overlapping apical areas, one row of bristles, as is also the case with abdominal terga II to VII, on I an incomplete additional row. On underside of overlapping apical margin of mesonotum a dorsal and a subventral slender spine. Metepimerum extending upward far above its stigma. Metepisternum inclining forward.

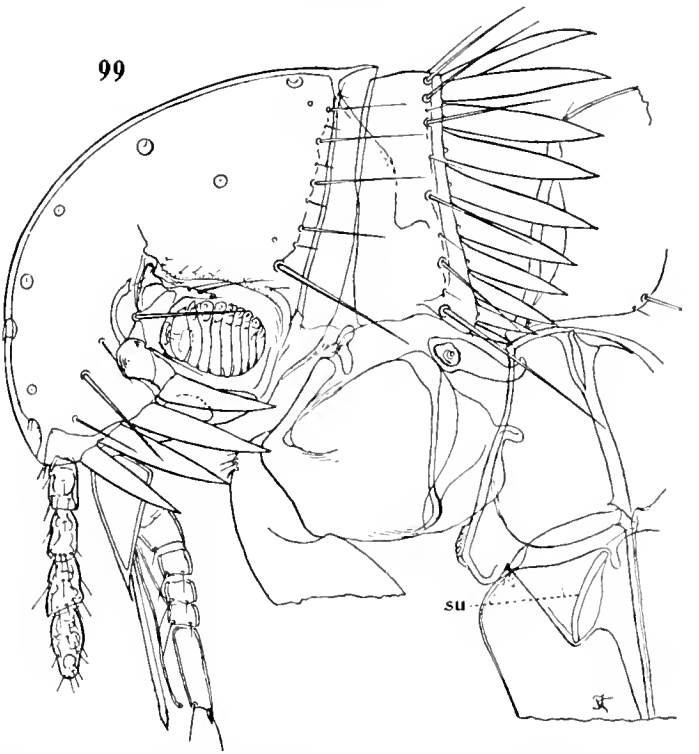
Two antepygidial bristles, upper one short and stout, lower one long. Stylet long and slender, with a long apical bristle and two minute ones close to it. Pygidium not quite flat, posteriorly very slightly convex, hair-like spicules broad at base, resembling those of *Ceratophyllus* Curtis 1826 (and many other genera); apparently 24 grooves. Sternum VIII without apical bristles, pointed. Stigmata of abdominal segments II to VII and metepimerum ovate, subacuminate posteriorly, that of VIII. t. large.

Radial suspenders (su) of innerside of mid- and hindcoxae short, in midcoxa equalling two-fifths and in hindcoxa one-fourth of length of coxa; on innerside of hindcoxa a subapical patch of small spiniforms. No lateral bristles on inner and outer surfaces of femora. Segment V of fore- and midtarsi with four lateral pairs of plantar bristles and a fifth pair in between second, this first pair absent from hindtarsus.——Genotype: new species here described.

The internal loop of gena and the infraoesophageal bar (trabeculum, Wagner) are absent.

3. **Acedestia chera** sp. nov. (text-figs. 99, 100).

♀. The long and sharply pointed spines of the genal and pronotal combs and the absence of bristles in front of the subapical row on the terga of thorax and abdomen (except ab. t. 1) and on the abdominal sterna are very striking distinctions. Head almost evenly rounded—slanting from posterior upper angle to preoral angle. Of the bristles in front of eye first and third long, second small or minute, fourth small, but larger than second; the occipital row contains five

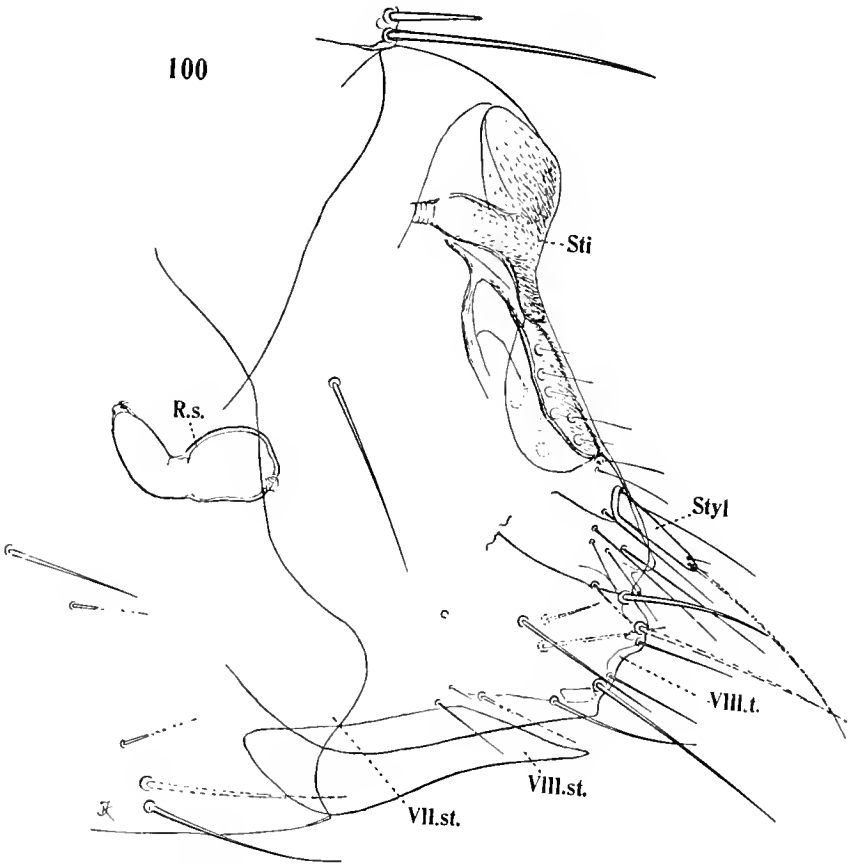


bristles each side. Antennal segment II with two bristles and a minute hair dorsally and two very thin short bristles at lower angle, none in between. Proboscis reaching approximately to middle of forecoxa, segments II to IV broader than long.

Pronotal comb with 20 spines, lower ones gradually smaller; a row of 12 bristles (on the two sides together). On mesopleura 5 or 6 bristles: one before meral suture, one or two ventral behind the suture, and three in a subapical vertical row, ventral one long and rather stout, larger than any bristle of head and pronotum, the upper one of the three the smallest. Row on mesonotum and metanotum with 10 bristles; at basal margin of mesonotum fewer than 10 small hairs (two sides together). Length of mesonotum from base to bristles 16, of metanotum 18, apical area of mesonotum 9, of metanotum 15. Metepisternum with one bristle, pale area longer than broad, subelliptical; metasternite with two bristles, lower one as large as largest of mesopleura; incrassation at anterior margin of metasternite vestigial, narrow. Metepimerum large, extending up-

wards to level of third bristle of metanotum, upper angle acute ; below stigma two longish bristles with a minute one in between, farther down a close-set vertical row of three or four, the lowest much the longest, being as large as the large bristle of metasternite ; in specimen from Queensland four bristles below stigma on one side.

On abdomen terga II to IV with a short apical spine each side, in Queensland specimen I with a spine on one side only ; bristles : I 5, 7, II 11, III to VI 10,



VII 8, on the two sides together ; stigma in the row above lowest bristle ; bristles on sterna : III 5, IV to VI 6, VII 11.

Posteriorly at apex of mid- and hindcoxae two bristles. At dorsal margin of femora fewer than 12 small bristles ; ventrally one longish subapical bristle ; the short one of the dorso-apical pair rather stumpy, as are the outer bristles in the dorsal notches of the tibiae ; dorsolateral row of hindtibia containing 5 bristles ; longest bristle of postmedian notch barely reaches apex of tibia, and longest apical one does not quite attain apex of tarsal I. Apical bristles of hindtarsal segments rather stout, those of I not reaching to apex of II, longest of II nearly reaching apex of III, that of III surpassing IV ; minute hairs on sole of V numerous in all tarsi in apical half, a few hairs farther towards base, apical

ventral pair of small bristles far apart and thin. Proportions of segments: midtarsus 12, 13, 9, 6·5, 13; hindtarsus: 22, 17, 10, 7, 15.

Modified Segments.—Sternum VII gradually narrowed, apex truncate-sinuate, lobe above sinus rounded, much larger than lower lobe. No bristles above stigma of VIII. t.; some distance below stigma one long bristle, on ventral area inclusive of apical margin 10 bristles. Stylet almost linear, four times (or nearly) as long as basally broad; at angle in front of stylet a single bristle. Body of spermatheca one-half longer than broad, strongly convex dorsally; slightly incurved ventrally in middle, orifice subterminal, not projecting; tail as long as body, with appendix.

Length: 2·1 mm.; hindfemur: 0·44 mm.

West Australia: Mahogany Creek, Perth, on *Isoodon obesulus*, one ♀, type, we have to thank Mr. L. Glauert, of the Perth Museum, for the discovery of this strange species.——Another ♀ from Queensland: Yorke Pen., off *Parameles gunnei*, collected by F. Wood Jones and sent to me for determination by Mr. H. Womersley.

The Queensland specimen agrees well with the type; but its spermatheca is more rounded, this difference evidently being due to pressure in mounting. It is most satisfactory to have a second example for comparison and I am grateful to Mr. Womersley for having sent me the specimen.

SPOLIA MENTAWIENSIA: PAPILIONIDAE.

By DR. KARL JORDAN, F.R.S.

(With Plate 14.)

THE account of the nature of the Mentawi Islands and their mammalian fauna published by Mr. C. Boden Kloss in *Proc. Zool. Soc. Lond.* 1927, p. 797, is a most instructive introduction to the articles dealing with the specimens collected on the expedition and should carefully be read by everybody considering the relationships of geographical races or geographically restricted species and their origins. The general conclusions drawn by Mr. C. Boden Kloss from the study of the mammals are very interesting and, to a large extent, are confirmed by the Lepidoptera. As Mr. Louis B. Prout's preface to his paper on the Geometridae of the Mentawi Islands published in this journal, vol. xxxvii, p. 1 (1931), can be consulted by the reader, it is not necessary to repeat here the information on the expedition and the islands supplied to him by Mr. C. Boden Kloss.

The only papers published on the Butterflies of the Mentawi Islands are those by Hagen, in *Entom. Nachr.* 1898, p. 193, and *Abh. Senckenb. Ges.* 1902, p. 320.

Although the Butterflies collected by Boden Kloss and his companion, Mr. N. Smedley, have all been identified, we have as yet not found time to study more closely the relationship of the new forms discovered, with the exception of the *Papilionidae,* which are the subject of this paper.

Apart from 3 species collected in West Sumatra and of no particular interest for the present purpose, altogether 11 species of Papilionids were found, 10 of them on the Mentawis and 1 on P. Tello, Batu Islands. The P. Tello one is *P. nephelus tellonus*, closely related to *P. nephelus siporannus* from Sipora. On Nias 14 species of Papilionids are represented; we may, therefore, expect that there are more than 10 on the Mentawi Islands. The relationships of the 10 are as follows:

(*a*) 3 are Malaysian, the specimens being like those from Sumatra: *P. demolion demolion, P. memnon ancens* and *P. agamemnon agamemnon.*

(*b*) 1 is nearly related to a Sumatran subspecies: *P. nox* subsp. nov.

(*c*) 4 are nearly related to or identical with Nias subspecies.

(*d*) 2 are nearly related to or identical with subspecies from Batu and likewise close to subspecies from Sumatra.

The absence of any affinity with the Nicobars and Andamans is most marked. All the Mentawian Papilionids are of an originally Sumatran and Malaysian stock, and this fact makes the study of the Lepidoptera of the islands so very interesting. The distances of the various groups of West Sumatran islands from each other and from Sumatra is not very great, and nevertheless the percentage of special subspecies on each island or group is very high. This fact becomes particularly striking, if we compare, for instance, the Lepidoptera of the Natuna Islands in the Borneo sea, which islands are twice as distant from Borneo as are the West Sumatran islands from Sumatra and yet have but a

few recognizable subspecies. The age of the islands gives the explanation. In the chain of West Sumatran islands the southernmost, Engano, surrounded by deep sea, is evidently the oldest, and consequently—I use this adverb deliberately—the majority of its species of Lepidoptera are represented by strongly modified subspecies.

The question of the relationship of the Mentawi Lepidoptera with those of Nias is better discussed when all the Butterflies of the collection can be quoted in evidence. But one point illustrated by the Papilios is worth emphasizing here. Of the widely distributed Kite Swallowtails with green markings and, on the underside of the hindwing, red spots, 4 are represented on Nias by subspecies in which the red spots are enlarged, distinguishing these subspecies from those inhabiting Sumatra, Java, Borneo and other areas. If anybody should be inclined to consider these parallel modifications as accidental, he might profitably seek advice from Scotland Yard about the probability of the same accident happening four times in the same place. There is a common factor underlying these instances, a factor not yet known, but connected with the island. One of this interesting quartet occurs on Mentawi, evidently in an identical subspecies, *P. doson rubroplaga* ; a second has the enlarged red spots, but is otherwise somewhat different, *P. sarpedon* subsp. ; in the third, *P. evemon* subsp., the red spots are small, as in Sumatran specimens, but there are some differences in the other markings ; and the fourth, *P. agamemnon agamemnon*, is not modified at all. The 4 Papilios, evidently, exemplify three stages in the evolution of races, *P. agamemnon* being the latest arrival on the Mentawis from Sumatra, *P. evemon* an older inhabitant and *P. doson* and *P. sarpedon* the oldest. The modification attained by *P. evemon* being but slight, as is so very often the case in subspecies, these Papilios afford evidence that evolution depends on time and is gradual. Gradualness is still better illustrated by the *Troides* occurring on Mentawi and Batu ; the subspecies is not different in all specimens from the Nias series. Intergrading or morphologically overlapping subspecies require to be studied genetically by breeding. Although I cannot distinguish the Mentawi males of *Troides amphrysus* from the Nias males, the difference in the two female populations, slight as it is, suggests that the fathers of these two sets of mothers are also different.

1. **Troides amphrysus vistara** Fruhst. 1906.

Ornithoptera amphrysus vistara Fruhstorfer, *Entom. Zeitschr.* xx, p. 105, no. 1 (1906) (Batu).
Papilio amphrysus vistara, Jordan, in *Seitz, Grossschmett.* ix, p. 27 (1908) (Batu).
Troides amphrysus v. *vistara*, Bryk, in Strand, *Lep. Cat.* 35, p. 53 (1929) (Batu).

Siberut, 26 ♂♂ 11 ♀♀ ; Sipora, 2 ♂♂, 2 ♀♀ ; North Pagi, 1 ♂, 1 ♀.

Distinguishable from *T. a. niasicus* Fruhst. 1897 only in the ♀. The ♂♂ from Nias, Batu and Mentawi differ from *T. a. ruficollis* Butl. 1879 (Sumatra, Malay Peninsula) in the hindwing being slightly more deeply scalloped and more broadly margined with black (as in most ♂♂ of *T. a. amphrysus* Cram. 1779 from Java), the black projections into the golden area being a little longer and broader. The ♂-genitalia are alike. The long series of Mentawi specimens exhibits considerable individual variability, as *T. amphrysus* does elsewhere.

♂. Length of forewing 77–99 mm. On upperside the yellow markings of forewing in apex of cell are sometimes represented by a small number of scales, sometimes by a spot in upper cell-angle nearly 10 mm. long anteriorly and 5 mm.

at cell-fold, and a narrow arc at lower cell-angle, the majority of specimens standing in between these extremes. The vein-streaks down to R^3 usually reach to cell, but sometimes their proximal ends are effaced. The narrow black streak which runs before anal angle of hindwing into the golden area is sometimes absent; the median veins of hindwing are in most specimens a little more broadly black than in *T. a. ruficollis*.——On underside the cell of forewing has a large oblong spot in upper angle and an arched or angulate line in lower angle; yellow colouring of light markings very variable in intensity and extent, some specimens have some yellow only in the cell and close to it, while in others the yellow is intense in and around the cell and all the streaks are more or less shaded with yellow right to the ends.

♀. Differs from the ♀ of *T. a. niasicus* in the grey colouring in and around the cell of forewing being somewhat more extended in most specimens and in the golden discal spot R^1–R^2 of hindwing (6th from behind) being longer than broad (as is usually also the case in *T. a. ruficollis*). In worn examples the proximal half of forewing-upperside is faded to a greyish brown. Anterior spot of golden area of hindwing varies, in Siberut specimens, from being absent to being 15 mm. long and 3 mm. broad; in the 2 ♀♀ from Sipora the breadth is 1·5 mm., in the ♀ from North Pagi 4 mm. (in our only ♀ from Batu 3·5 mm.) The size of this spot, therefore, is not of diagnostic value. The black discal spots of hindwing large in all specimens and closely pressed together; the one below cell-apex (in R^3–M^1) as a rule penetrating deeper into the golden area than in *T. a. niasicus* and *T. a. ruficollis*, the golden projections along the veins being somewhat longer than the golden patch measured from apex of black spearhead. Yellow submarginal spots small, the two in the same marginal cell not connected with each other in any specimen.——On the underside the grey cell-patch varying from being entire to being divided into a large anterior spot and a smaller posterior one. In most specimens one or more of the posterior yellow submarginal spots connected with the marginal ones by a longitudinal grey smear.

I said in *Seitz, l.c.*, that in the ♂ of *T. a. niasicus* the vein-stripes of the forewing and the cell-spot were somewhat more yellowish than in *T. a. ruficollis*. The present series of *T. a. vistara* ♂♂, however, proves that such distinctions do not hold good if a larger material is available.

Fruhstorfer, in *Iris* xxvii, p. 133 (1913), separates the Sumatran *T. amphrysus* as a distinct subspecies under the name of *Ornithoptera amphrysus euthydemus*, distinguishing it in the ♂ by the vein-stripes of the forewing-underside being yellow only near the cell and almost pure white distally, whereas the stripes " in *ruficollis* remain yellow to very near the distal margin." Our series of 9 ♂♂ from the Malay Peninsula and 10 ♂♂ from Sumatra contradicts that statement. Of the Sumatran ♀♀ Fruhstorfer says that " it is not only always larger, but has the black submarginal spots of the hindwing always longer and closely pressed together." The length of the forewing varies in our Sumatran ♀♀ from 77 to 97 mm., in our Malacean ♀♀ from 67 to 88 mm. (in Sumatra ♂♂ from 61 to 84 mm., in Malacean ones from 58 to 75 mm.). As regards the size of the black spots on the hindwing about which Fruhstorfer is so positive, I said in *Seitz, l.c.*, that these spots " in a large percentage of (Malayan) specimens are partly separated from one another and the anterior ones rounded, but the same characters also occur in Sumatra, although rarely, so that it is so far impossible without indication of locality to say with certainty of any specimen whether it comes

from Sumatra or Malacca." That Fruhstorfer, in face of this statement, could maintain that in Sumatran ♀♀ the black spots are *always* larger and closely pressed together only shows that one must not take his descriptions too literally. His *always* should be replaced by *mostly*. However, it is of no great importance whether we treat *euthydemus* as a synonym of *ruficollis* or not, the main point is that the *amphrysus* populations of Sumatra and the Malay Peninsula are not identical; there is no gap between them, but the majorities are different in their make-up; the populations may be compared to two constituencies, the one conservative, the other liberal, which distinction does not mean that all the voters in the one constituency are conservatives and those of the other liberals. I personally look upon *euthydemus* as a synonym of *ruficollis*, because I consider the series of specimens we have far too small for ascertaining the real range of variability and the true average of *T. amphrysus* on Sumatra and the Malay Peninsula.

2. **Papilio nox smedleyi** subsp. nov.

Siberut, 1 ♀.

Wings above and below paler than body, mummy brown, somewhat paler than even in ♀ of *P. nox nox* Swains. 1822 from Java; pale stripes along veins of forewing a little narrower than in *P. nox petronius* Fruhst. 1901 from Nias and broader than in *P. nox solokanus* Fruhst. 1902 from S.W. Sumatra, much duller than in both, a darkish wood-brown, slightly lighter in tint in anterior half of wing. The vein-stripes of hindwing very diffuse, less contrasting with the ground than in *P. n. solokanus*.——Also on underside the vein-stripes broader than in the Sumatra race and narrower than in the Nias one, much less whitish, diffuse at outer margin, on hindwing indicated, much less distinct than in the two neighbouring subspecies.

3. **Papilio demolion demolion** Cram. 1776.

Papilio Eques Achivus demolion Cramer, *Pap. Exot.* i, p. 140, tab. 89, figs. A, B (1776) (Java).
Papilio demolion demolion, Jord., in Seitz, *Grossschmett.* ix, p. 51 (1909).
Papilio demolion v. *demolion*, Bryk, in Strand, *Lep. Cat.* 37, p. 154 (1930).

Sipora, 2 ♀♀, one a mere remnant.

The species not previously recorded from the West Sumatran islands except Nias, where *P. d. energetes* Fruhst. 1908 occurs, differing from the widely distributed Malaysian *P. d. demolion* in the band of the hindwing being a trifle narrower. The Siporan specimens have the broader band of *P. d. demolion*.

4. **Papilio nephelus siporanus** Hagen 1898 (pl. 14, fig. 4 ♂).

Papilio siporanus Hagen, *Entom. Nachr.* xxiv, p. 193 (1898) (Sipora, 1 ♀); *id.*, *Abhandl. Senckenb. Ges.* xx, p. 320, no. 1, tab. 1, fig. 1 (1902).
Papilio nephelus siporanus, Fruhstorfer, *Entom. Zeitschr.* xx, p. 105 (1906) ("*Abhandl. Senkenb.* 1899" false); Jord., in Seitz, *Grossschmett.* ix, p. 52 (1909); Seitz, *ibid.* p. 118 (1908) ("*Ber. Senck.* 1899" false).
Papilio nephelus v. *siporanus*, Bryk, in Strand, *Lep. Cat.* 37, p. 157 (1930) ("*Ent. Nachr.*— t. 1, f. 1, ♂," false).

Siberut, 1 ♂.

The ♀ described by Hagen from Sipora was the only specimen recorded when this ♂ arrived. Both sexes differ from all other subspecies of *P. nephelus* in the white markings being larger. The ♂ is similar to that of *P. n. tellonus* Fruhst. 1906, which we figure for comparison (pl. 14, fig. 3). Upperside: white

discal band of 5 spots nearer the cell than in any other ♂ of *P. nephelus*, tho middle spot being only 1 mm. distant from cell, all a little larger than in *P. n. tellonus* and the vein-stripes between them very thin ; before tornus 2 spots, the posterior one small, touching neither hindmargin nor submedian vein, the anterior spot luniform, sharply defined, not diffuse, measuring 2 by 4 mm., lower end more distal and more pointed than upper end. Creamy white area of hindwing extending into extreme tip of cell and reaching close to abdominal margin, consisting of 7 divisions, the last smallest and on distal side excised.—— Underside : band of forewing a little broader than above, the spots being slightly more extended distad except last one ; the spots at tornus more than twice as large as above. The white area of hindwing somewhat narrower than above, remaining separate from cell ; submarginal spots diffuse (possibly owing to the indifferent state of preservation of the specimen).

The expedition also obtained the following Batu race :

Papilio nephelus tellonus Fruhst. 1906 (pl. 14, fig. 3).

Papilio nephelus tellonus Fruhstorfer, *Entom. Zeitschr.* xx, p. 105 (1906) (P. Tello) ; Jord., in Seitz, *Grossschmett.* ix, p. 52 (1909).

Papilio nephelus v. *tellonus*, Bryk, in Strand, *Lep. Cat.* 37, p. 157 (1930).

Batu Islands : P. Tello, 2 ♂♂ ; in Mus. Tring also 2 ♂♂ labelled simply Batoe (H. R. Raap, 1896–1897).

The ♀ not yet known.

Upperside : the band of forewing 3 to 4 mm. distant from cell in middle, the spots separate ; before tornus one spot, more or less diffuse, varying in size and shape. Creamy white area of hindwing entering extreme apex of cell or touching it, consisting of 6 divisions, of which the last two usually are rounded distally ; between the patch and abdominal margin an indication of a white bar in 4 of the 5 specimens compared.

Underside : submarginal spots of hindwing clearly marked in the " Batoe " specimens (which are fresh) and diffuse (rubbed) in the two from P. Tello.

Fruhstorfer says of the ♂ he describes that the white apical marginal spot of the forewing is not present. That statement may be due to an error of observation, but would be very interesting if true, because all specimens I have seen of *P. nephelus* have that spot, even *P. n. uranus* Weym. 1885 from Nias in which the band of the forewing is absent. The yellowish tint of the markings of the upperside in Fruhstorfer's specimen is not present in those before me and is probably due to exposure.

Both *P. n. tellonus* and *P. n. siporanus* come near to *P. n. albolineatus* Forbes 1885 from Sumatra, of which a ♀ was collected on C. Boden Kloss's expedition at Padang.

5. **Papilio memnon anceus** Cram. 1782.

Papilio Eques Achivus anceus Cramer, *Pap. Exot.* iii, p. 44, tab. 222, figs. A, B (1782) (West Sumatra).

Papilio memnon anceus, Jordan, in Seitz, *Grossschmett.* ix, p. 78 (1909) (Sumatra, Nias, Batu).

Papilio memnon v. *anceus*, Bryk, in Strand, *Lep. Cat.* 37, p. 207 (1930) (Sumatra, Nias, Batu).

Siberut, 3 ♂♂.——Not previously recorded from Mentawi. We have from Batu 2 ♂♂ and 3 ♀♀, two of the ♀♀ being tailless, with dark upperside to the hindwing, and the third tailed.

6. **Papilio antiphates rhabdotus** subsp. nov. (pl. 14, fig. 1).

Sipora, 4 ♂♂.

Similar to *P. antiphates antiphonus* Fruhst., *Soc. Ent.* xvi, p. 170 (1902), from Nias. We do not possess this subspecies, but Fruhstorfer's description does not agree with the Sipora specimens. Upperside: marginal and submarginal bands of forewing merged together from R^2, the transparent band between them consisting of only 4 divisions instead of 5 or 6 as in *P. a. itamputi* Butl. 1885 from Sumatra, with which Fruhstorfer compares *P. a. antiphonus*; the transparent band, moreover, thinner; the marginal band continued well below submedian fold. On hindwing the slaty grey caudal area anteriorly not narrowed, its proximal margin being slightly incurved instead of rounded, the black submarginal bar on costal side of this area distinct, though thin; black marginal lunules broader than in most specimens of *P. a. itamputi*.——Underside: marginal band of forewing reaching to near tornus, and submarginal one to or well below lower median vein, the light band between them as above narrower than in *P. a. itamputi*. On hindwing the orange discal spots more intense, the bluish line of the black anal spot at most indicated, the black submarginal spots more or less united into transverse anguliform bars.

7. **Papilio sarpedon phyris** subsp. nov.

Sipora, 4 ♂♂, type; Siberut, 1 ♂.

Nearest to *P. s. rufoferridus* Fruhst. 1897 from Nias. Upperside: Green band narrower, on forewing uniform in colour, without a yellowish green tint in the anterior spots, diameter (parallel with veins) of last two sections shorter than that of black terminal area. On hindwing last section of band much smaller than in *P. s. rufoferridus*, measuringly only 2·0–2·5mm. in width and at distal side 5·0–6·5 mm. in length, the vein-streak separating it from cell-patch black bordered with white.——Underside: red spots of hindwing as conspicuous as in the Nias race, but the costal bar less broad, being narrower than the black bar which separates it from the band; a small red spot in cell behind subcosta close to band; last section of band not reaching to red anal spot.

It will be noticed that this subspecies has, in the development of the red costal bar of the underside of the hindwing, not quite so far advanced as the Nias race, being a little closer to the Indo-Malayan stock.

8. **Papilio doson rubroplaga** Roths. 1895.

Papilio eurypylus ruboplaga Rothschild, *Nov. Zool.* ii, p. 504 (1895) (Nias).
Papilio doson rubroplaga, Jordan, in Seitz, l.c. ix, p. 97 (1909).
Papilio doson v. *rubroplaga*, Bryk, in Strand, *Lep. Cat.* 37, p. 278 (1930).

Sipora, 1 ♂; Siberut, 1 ♂.——I do not see any difference from our series of Nias specimens.

9. **Papilio evemon hetaerias** subsp. nov. (pl. 14, fig. 2).

Siberut, 2 ♂♂.

Green band of both wings as in *P. e. igneolus* Fruhst. 1901 from Nias, narrower than in *P. e. eventus* Fruhst. 1908 (type from Palembang; *P. e. orthia* Jord. 1909, type from Malay Pen.) and *P. e. evemon* Boisd. 1836 from Java. Differs from the Nias race especially on the underside: the submarginal spots

being smaller and the red spots not enlarged. Light-coloured markings more reduced than in any other subspecies, this being particularly striking on the underside ; submarginal spots of forewing very little larger than on upperside, the middle ones linear, their diameter (parallel to veins) less than half the width of the black terminal area, fourth spot of median band counted from behind irregularly ovate, very little longer than broad, the small spot attached to the elliptical spot placed behind stalk of subcostal fork quite minute, cell-bars as in *P. e. igneolus*, smaller than in *P. e. eventus*. On hindwing the submarginal spots larger than above, but not nearly so much enlarged as in *P. e. eventus*, their diameters much shorter than their distances from margin ; the two lines below the upper two spots quite thin ; triangular end-section of median band remaining distant from the last but one red spot ; the red spots as small as in *P. e. eventus*, none of them margined with white.

Especially interesting on account of the non-enlargement of the red spots, the race standing clearly in between the advanced Nias race and the less advanced Malayan one.

10. **Papilio agamemnon agamemnon** L. 1758.

Papilio Eques Achivus agamemnon Linnaeus, *Syst. Nat.* ed. x, p. 462, no. 21 (1758) (China).
Papilio agamemnon agamemnon, Jord., in Seitz, *Grossschmett.* ix, p. 101 (1909) (S. China, etc.; Batu).

Siberut, 2 ♀♀ ; Sipora, 1 ♂ ; North Pagi, 1 ♀. Also 1 ♀ from Padang, West Sumatra.

Like Indo-Malayan specimens. The Nias race differs in the red subcostal lunule on the underside of the hindwing being much more strongly developed.

The ♀♀ of this species are more frequently obtained than those of the allied species, the habits presumably being different.

ON SOME OLD-WORLD LEPIDOPTERA.

By DR. KARL JORDAN, F.R.S.

(With Plate 14.)

NYMPHALIDAE.

1. Charaxes tectonis sp. nov.

♂. Near *Ch. eudoxus* Drury 1782 and *Ch. fallax* Riehelm. 1913, but in the tawny markings of the upperside rather closely resembling *Ch. druceanus kirnanus* Jord. 1925; the tawny colouring in anterior half of forewing much more extended, isolating black spots in cell and on disc, as in *Ch. druceanus*, the tawny band being forked anteriorly, its outer branch slightly curved and maculate, consisting of 4 rounded spots, the proximal branch of two spots, the tawny band centrally with indications of blackish spots. On hindwing the tawny-orange admarginal band much narrower than in any known form of *Ch. eudoxus*, black submarginal band of almost equal width throughout, bearing in posterior half 4 blue dots as in *Ch. d. kirnanus*, and at anal angle a buffish green admarginal bar as in *Ch. d. druceanus*; tails narrow and rather long, especially the anterior one longer than in *Ch. eudoxus*.

Markings of underside of the *Ch. eudoxus* type, not as in *Ch. druceanus*. On forewing three black cell-bars margined with silver, first consisting of two small dots, on discocellulars a fourth bar, broader, parallel with third and as far separate from it as is second bar, below cell a silver-margined bar between median veins, a somewhat smaller one behind it a little more basal with silvery margin incomplete; the discal series of black bars consists of an anterior one from subcosta to R^2, nearly all silvery, composed as in *Ch. eudoxus* of three sections and a subcostal streak, the next two bars inclining towards cell, much narrower than broad, silver-margined; below these bars follow two small black spots with the white margins vestigial, one below the other, far separated from the antemedian spot, whereas in *Ch. eudoxus* and *Ch. fallax* the black spots below lower median vein and cell are large and usually confluent or connected with one another; the orange-tawny band corresponding to the one on upperside consists of rounded spots paler than the costal area on both sides of the silvery costal bar, inconspicuous, the upper four bounded on proximal side and on the veins by bluish grey, this scaling continued as a line toward hindmargin of wing, but quite inconspicuous and more whitish in the pale posterior area; the posterior orange-tawny spots completely merged together as a band which is widened to the black bars behind M^2, being divided only by the greyish line just mentioned; on distal side the orange-tawny spots contiguous with black spots, last three merged together into a large transverse patch bearing three bluish grey spots, the one before the patch rounded-triangular, shorter than its distance from distal margin and like the other five small ones margined with bluish grey. Hindwing like forewing paler than in *Ch. eudoxus* and *Ch. fallax*, transverse lines as thin as in *Ch. fallax*, outer half of wing remarkably different: the white discal line, crossing R^3 close to bend of this vein, entirely separated from the

silvery median bars, broader and more diffuse than in *Ch. fallax*, not containing any black bars except before abdominal margin ; the band outside this line dull ochraceous-tawny, bounded on distal side by black bars of which the anterior three are straight, the others luniform ; the narrow admarginal buffish orange band bounded on basal side by black bars, the first nearly straight, the others curved, with distal side convex, these bars and those of the preceding row form two rings, filled in with bluish grey scaling, one at anal angle bearing two white dots, and one before posterior tail somewhat smaller, with one white dot near its outer margin, these ocelliform spots corresponding to similar spots of *Ch. druceanus*.

Length of forewing :

West Africa : Msungli, Cameroon, Bamenda Division, Feb.–March. 1934, 3,000–4,000 ft. (F. Carpenter), 1 ♂.

2. **Charaxes xiphares reducta** Roths. 1929.

Syn. : *Ch. xiphares elatias* Jordan, *Nov. Zool.* xxxix, p. 331 (1936).

RIODINIDAE.

3. **Dicallaneura kirschi pelidna** subsp. nov.

♂. Upperside of wings as in *D. ribbei* Röber 1886 blue, without markings, but the blue duller, with a brownish tint. Underside as in *D. kirschi* Röber 1886, agreeing best with the ♂ of *D. k. fulgurata* Grose-Smith 1901 ; on forewing the large spot outside apex of cell narrower, more luniform, before distal margin a row of 8 white dots, first small, with a black dot on basal side, second large, third smaller, the other five small but distinct, the last two of them approximated. Hindwing as in *D. k. fulgurata*.

Dutch New Guinea : Momi (= Wariab), Arfak coast, 1928 (Dr. E. Mayr), 1 ♂.

Remarkable for its great resemblance to *D. ribbei*.

LYCAENIDAE.

4. **Ogyris faciepicta** Strand 1911 (pl. 14, fig. 8, ♂).

O. faciepicta Strand, *Mitt. Berlin. Mus.* v, p. 472, no. 24, text-fig. (1911) (Sepik R., Mandated N. Guinea, 1 ♂).

We have a ♂ from the eastern side of New Guinea, Lower Mambaré R., collected by A. G. Meek in 1906, which differs but slightly from the specimen described by Strand. On the underside the narrow discal band is not interrupted and the submarginal one is more sharply defined. The specimen represents possibly a subspecies. As the tails in Strand's example are injured, and drawn too short, we give a photograph of our specimen.

In NOV. ZOOL. xxxvi, p. 147 (1930) I gave an account of two species of *Deudorix* occurring in New Guinea, pointing out the differences between *D. grandis* R. & J. 1905 and *D. dohertyi* Oberth. 1894 and the various subspecies into which each has developed. To assist in the determination of the subspecies we figure here three ♀♀ :

5. **Deudorix grandis jactantis** Jord. 1930 (pl. 14, fig. 5).

6. **Deudorix grandis fortis** Jord. 1930 (pl. 14, fig. 6).

7. **Deudorix dohertyi cholas** Jord. 1930 (pl. 14, fig. 7).

SPHINGIDAE.

8. **Rethera brandti euteles** subsp. nov.

♂. Differs from *R. b. brandti* Bang-Haas, *Entom. Zeitschr.* xl, p. 562, text-fig. 1 (1937), from the Elburs Mts., N. Persia, in the total absence of red colouring on the upperside of the hindwing; head and thorax without red or only with a slight red wash. On underside no red except on hindwing, which has a feeble pink blush.

South Persia: Curum, between Shiraz and Boushir, iii.–v., 1937 (F. H. Brandt), a small series; five more specimens in coll. Brandt.

As Herr O. Bang-Haas says, one of the most interesting discoveries in the Palaearctic region during recent years. The species differs from *R. komarovi* Christ. in the longer antenna, the laterally long-hairy palpi and the presence of a paronychium, which has one lobe each side.

EPIPYROPIDAE.

9. **Epipyrops malagassica** Jord. 1928.

The specimen without abdomen described in vol. xxxiv, p. 138, of this Journal as a ♂ on account of the long pectinations of the antenna is a ♀. We have now found two more specimens, also from Diego Suarez, June 1917 (G. Melon), both ♂♂. Pectinations of antenna much longer than in ♀, the longest nearly as long as five segments of the shaft. Eye much larger and frons correspondingly narrower, being ventrally only as broad as the apex of forecoxa; segments of antenna longer than in ♀, there being 12 or 13 instead of 11; as in ♀ the outside branches of the proximal segments curved away from the eye towards the branches of the inner side, almost lying along them.

HEPIALIDAE.

10. **Charagia floralis** sp. nov.

Charagia cuggma Roths. & Jord., *Dents. Ent. Zeitschr.* p. 198 (1907), partim, "♀" only.

When Mr. N. B. Tindale studied the Oriental Hepialids in the Tring collection this spring he found, on denuding the tail-ends, that the gorgeous green and red specimen we had described as the ♀ of a green and white ♂ was also a ♂, representing another species. The green and white ♂ being selected as the type of *Ch. cuggma*, the green and red one requires a name. We were evidently misled by analogy with some dimorphic species of *Charagia* in which the ♂ is green and white and the ♀ of a darker colour.

EXPLANATION OF PLATE XIII

EXPLANATION OF PLATE XIV

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NOVITATES ZOOLOGICAE.

A Journal of Zoology.

EDITED BY

LORD ROTHSCHILD, PH.D., F.R.S.,

AND DR. K. JORDAN, F.R.S.

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NOVITATES ZOOLOGICAE

Vol. XL. DECEMBER 1937. No. 3.

SOME NEW AFRICAN SIPHONAPTERA.

By DR. KARL JORDAN, F.R.S.

(With 8 text-figures.)

THE British Museum Expedition to Mt. Ruwenzori and Mt. Elgon obtained several new fleas, the full descriptions of which will be published in the Report on the Expedition. As Mr. G. H. E. Hopkins, Senior Entomologist of the Agricultural Laboratories, Kampala, Uganda, is working at a Key to the East African Siphonaptera and would like to include the new species, I publish here preliminary descriptions and some figures sufficient for the recognition of the species. I add a further species lately sent to me by Mr. Hopkins, for which I here thank him.

1. **Ctenophthalmus stenurus** sp. nov. (text-fig. 101).

♂. Near *Ct. eumecis* J. & R. 1913, but the distal margin of clasper not sinuate, the lower apical angle therefore not projecting as a separate process; digitoid F much narrower, upper margin of exposed outer half straighter and bearing only 6 or 7 bristles; ventral arm of sternite IX shorter; ventral hook of paramere longer and narrower.

East side of Mt. Elgon, 11,000 ft., ii.1935, off *Rhabdomys pumilio diminutus*; 1 ♂.

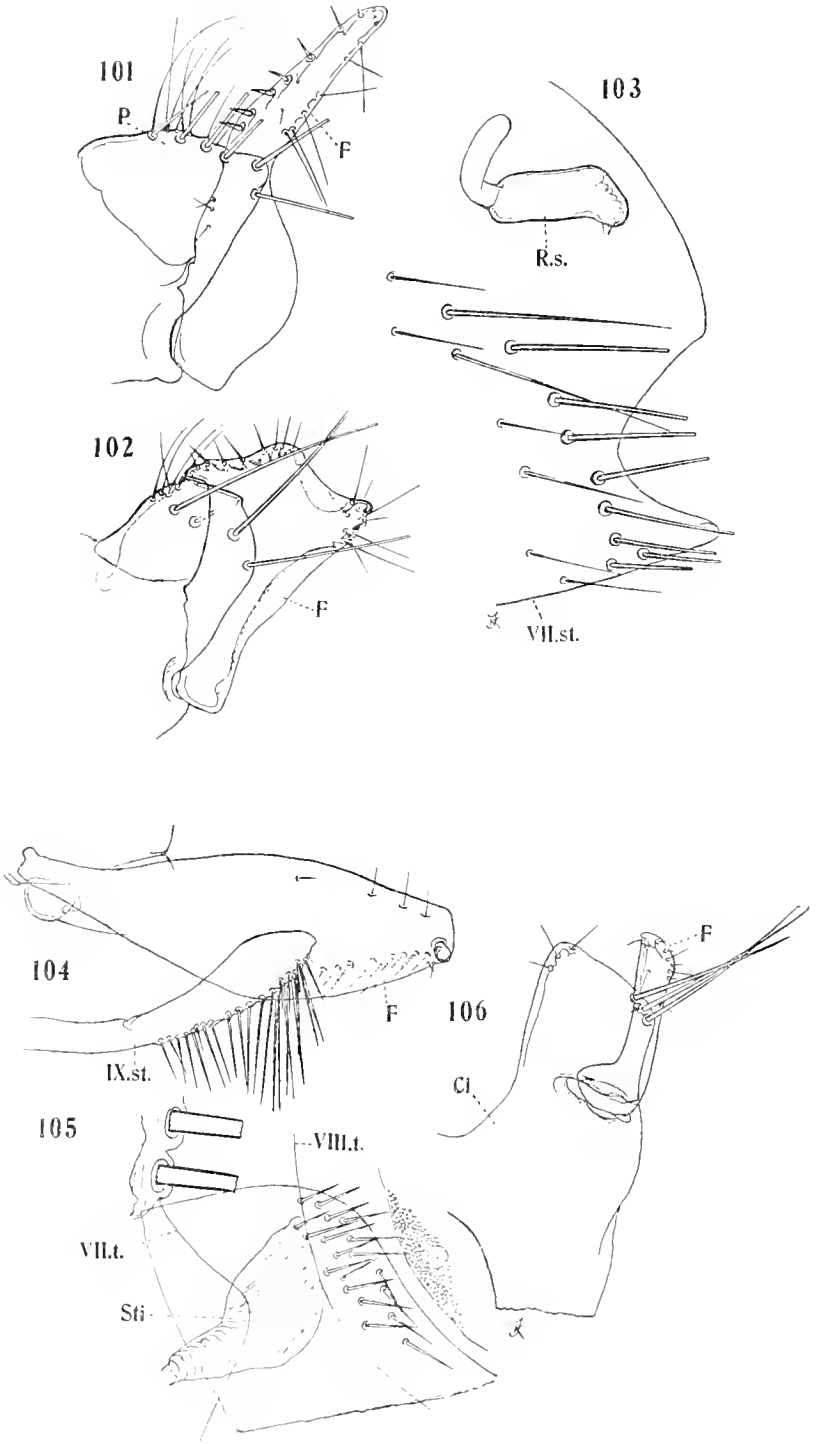
2. **Ctenophthalmus edwardsi** sp. nov. (text-figs. 102, 103).

♂♀. Nearest to *Ct. audax* J. & R. 1913; proboscis long and second and third genal spines obtuse, as in that species. Clasper broader, truncate, with the ventral margin rounded; digitoid F quite different, irregularly triangular, its distal margin twice incurved and in middle excurved. Ventral arm of sternite IX much shorter. In ♀ sternum VII with large, more or less rounded sinus, the lower lobe narrow and at least as long as the broad upper lobe; body of spermatheca (R.s.) variable, usually shorter and broader than in text-fig. 103.

Mt. Elgon, 11,000 ft., ii.1935, off *Tachyoryctes* and *Otomys jacksoni*; a series.

3. **Dinopsyllus semnus** sp. nov. (text-figs. 104, 105).

♂♀. Very near to *D. hirsutus* Roths. 1908. On tergum IX between sensillum and stigma of VIII a cluster of bristles, in ♂ about 18, in ♀ (text-fig. 105) about 20. Digitoid F of ♂ widest in middle, a little over thrice as long as broad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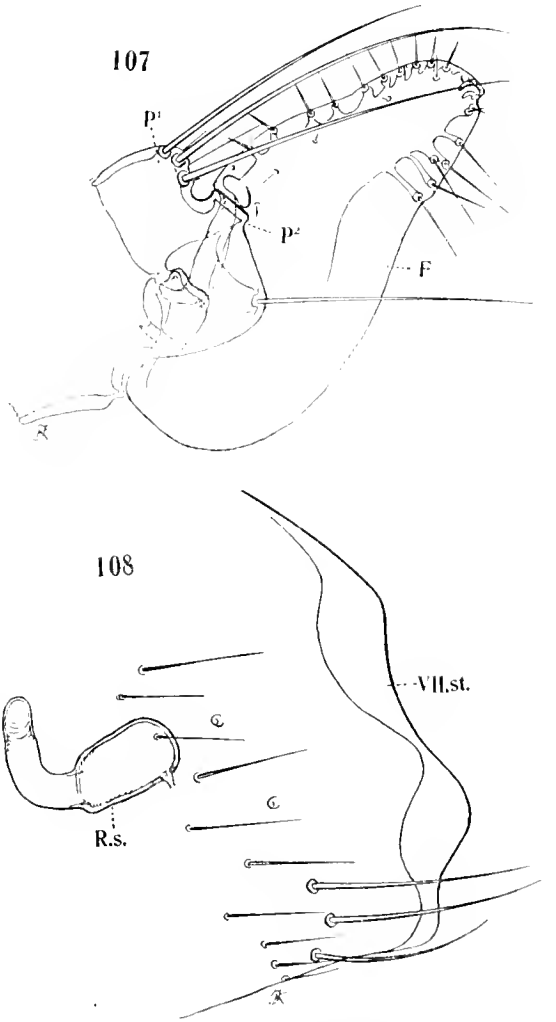
(10 : 3) ; ventral arm of sternite IX with an uninterrupted ventral row of bristles from apex to median joint. In ♀ sternum VII without distinct lateral sinus and ventral apical angle of tergum VIII rounded off, not projecting as a triangular lobe.

Mt. Sabinio, Kigezi, off *Cricetomys*, xi.34 ; 1 ♂, 1 ♀.

4. **Ischnopsyllus ectopus** sp. nov. (text-fig. 106).

♂. Spines of metathoracic and abdominal combs reduced in number and size : 4, 4, 2, 2. Clasper longer than broad, dorsal and ventral margins almost parallel, apical margin oblique, nearly straight, ventral apical angle rounded off, with three



long bristles, upper angle smaller ; digitoid F almost straight, slightly widened apically, projecting beyond lower angle of clasper, its dorsal margin measured from subbasal bend as long as the clasper is broad. Sternite IX strongly elbowed

in middle, the elbow strongly projecting distad, the corresponding sinus of anterior (= dorsal) side regularly semicircular. The pair of processes of parameres very long.

Mt. Elgon, on bat, no further data ; 1 ♂.

5. **Ctenophthalmus segregus** sp. nov. (text-figs. 107, 108).

♂♀. Very near to *Ct. bacopus* Jord. 1933. Differs in the ♂ in the upper apical process P^1 of the clasper being wider than the lower P^2, whereas in *Ct. bacopus* P^2 is wider than P^1; ventral margin of clasper ventricose ; digitoid F obtuse, the apex being more rounded, the upper margin slightly bent down in middle ; ventral arm of sternite IX broader. In ♀ sternum VII twice incurved, upper angle obtuse and rounded, median and ventral lobes strongly rounded, median one more projecting than ventral one ; body of spermatheca (R.s.) somewhat shorter than tail.

Uganda : Arua, West Nile, vii.37, off *Arvicanthis abyssinicus* subsp., and Attiak, Gulu, vii.37, off *A. abyss. rubescens* (G. H. E. Hopkins), 4 ♂♂, 2 ♀♀.

The ♀♀ are very different from the Nakuru specimens described by me as that sex of *Ct. bacopus*, and suggest that we do not yet know the true ♀ of that species.

NOTE.—The genotype of *Meringis* Jord., NOV. ZOOL. xl. p. 268 (1937) is *M. parkeri* Jord., l.c. p. 269.

NEW ANTHRIBIDAE FROM INDIA AND JAVA.

By DR. KARL JORDAN, F.R.S.

Peribathys gen. nov.

♂♀. Whereas in *Xenocerus* Schönh. 1833 the frons bears two carinae separated by a shallow channel, there is in the present genus a deep straight sulcus the margins of which are not cariniform, the sulcus extending on to rostrum and occiput.——Genotype: *Xenocerus everetti* Jord. 1894; here also belong *Xenocerus russatus* Jord. 1903, *X. lautus* Jord. 1904 and a new species here described.

The species are more cylindrical than *Xenocerus*, and the elytra more or less elouded with white, grey or buff and dotted or tessellated with brownish black.

1. **Peribathys beesoni** sp. nov.

♂. Differs from the other species of this genus in segment III of the antenna being more than twice as long as broad, resembling in this character *Xenocerus flagellatus* Fåhrs. 1839 and allies.

As narrow as small ♂♂ of *P. russatus* Jord. 1904, densely pubescent grey, slightly buff, with diffuse indistinct white tessellation on elytra and black markings on upperside. On occiput a black median stripe, slightly wider behind than in front, abruptly terminating at median fossa. Antenna black, with short whitish grey pubescence at least at bases of segments and in middle of I, no longish pile on underside of I to IV.

Pronotum and its lateral carina more strongly rounded than in the other species, no basal longitudinal carinula; a median stripe black, narrower than buffish grey side, somewhat constricted before middle and apically bearing an inconspicuous grey median line, at side of this stripe in middle a conspicuous black spot and a little farther lateral indications of three small elongate spots, below lateral carina a black stripe which encroaches a little on upperside in middle and at apex. Scutellum white.

Brownish black markings of elytra contrasting with the buffish grey and whitish pubescence: a transverse spot at base surrounding, an irregular one on and below shoulder, a large transverse band from interspace VII, with some projections in front and behind, a transverse irregular spot on apical declivity and about 16 more or less distinct dots.

On abdomen a row of distinct subventral black spots and a row of more or less indistinct lateral ones. Tips of tibiae and of segments II and IV of tarsi black.

Length 10·5 mm.; width 3·6 mm.

India: Sukna, Kurseong, Bengal, 29.v.1936 (Dr. C. F. C. Beeson), 1 ♂: named in honour of the donor, to whom we owe so many discoveries in Anthribidae.

2. **Phaulimia rhadina** sp. nov.

♂. Slenderer than any other known species of this genus, pronotum and elytra together being well over twice as long as broad. Rufous and brown, evidently not quite mature. Rostrum not quite twice as broad as long (7 : 4), rather

densely pubescent greyish white, as is anterior portion of frons, base somewhat depressed in middle. Frons less than half as broad as rostrum (3 : 7), posterior portion and occiput irrorated with greyish white. Antenna rufous, club a trifle shorter than segments II to V together, X longer than broad. Pronotum one-tenth broader than long, rather strongly shagreened ; rufous, basal angle and a basal area each side of middle brown, in mature specimens probably the greater part of the derm brown, greyish white pubescence scattered, but forming on each side of disc three small dots and at base above angle a slightly larger one, in middle a short grey stripe from base across carina, pointed, reappearing at apical margin ; angle of carina a very little larger than 90°, with the tip rounded off, lateral arm of carina somewhat slanting ; subbasal transverse carinula parallel with dorsal carina, and longitudinal lateral carinula running in the same direction as lateral carina.

Elytra subcylindrical, rufous, sutural area except base of suture blackish to apical declivity and pubescent greyish white irrorated with blackish, behind middle of interstice III a somewhat prominent greyish white oblong spot, interstices V, VII and IX more or less distinctly dotted with brown, lines of punctures indistinct in apical fourth. Pygidium brownish at base, whitish grey at apex.

Underside rufous, abdomen with a lateral row of brown spots ; sides of thoracic sterna with coarse punctures. Middle of femora and of tibiae and knees brown or blackish.

Length 3·6 mm. ; width 1·6 mm.

Java : Telawa, teak forest, 16.v.37 (Dr. L. G. F. Kalshoven), 1 ♂.

3. **Hucus bicolor** sp. nov.

♀. Pale creamy (not quite mature), rostrum, antenna, sides of pronotum and of elytra black-brown, tarsi and tips of tibiae black. Rostrum with three dorsal carinae, which do not extend on to widened apical area, and a dorsolateral one from eye to near antennal groove. Antenna pale at base, club deeper black than shaft and somewhat broader than usual in this genus. Occiput with brown triangular mark each side, fading away on frons.

Pronotum strongly narrowing forward, creamy median area about twice as broad behind as in front, with a small tooth each side in middle, the area anteriorly narrower and posteriorly broader than dark lateral area, upper-margin and anterior portion of lower-margin of dark area parallel, about as wide as eye, anteriorly with a short creamy streak and laterally shaded with creamy pubescence ; angle of carina less than 90°, side somewhat incurved in front of angle, extreme basal edge of notum serrate, interspaces wider than the teeth. Scutellum creamy.

Elytra oblong, somewhat flattened above, with a broad basal depression and another behind slight subbasal swelling, very feebly punctate-striate, the stripes obsolete posteriorly, black-brown lateral area anteriorly from margin to above shoulder, corresponding to the dark area of pronotum, in middle expanded to third stripe and then gradually narrowed, reaching to apical curve of lateral margin, not extending along apical margin, the dorsal expansion rounded, between it and base the dorsal margin twice slightly incurved. Pygidium and underside creamy. Segment I of fore- and midtarsi with some creamy pubescence.

Length 4 mm. ; width 2 mm.

India : Makum, Lakhimpur, Assam, 9.i.36 (Dr. C. F. C. Beeson), 1 ♀.

4. **Deropygus chaerilus** sp. nov.

♀. Body black, pubescence of underside grey, of upperside yellowish grey and broken up into spots. A broad species. Derm of head somewhat luteous. Frons as broad as eye is high (dorsal aspect). Antenna blackish, segments I and II and apex of XI pale luteous. Pronotum rather strongly reticulate, with yellowish grey markings as follows: an apical marginal band quadrisinuate behind and bisinuate in front, the marginal sinus corresponding to a pale spot in the derm behind eye, posteriorly in middle an elongate-oblong stripe and nearer side than middle a longitudinal spot the anterior end of which curves upwards-backwards, the spot in other specimens possibly forming a half-ring; angle of carina obtuse.

Elytra more strongly granulate than is usual in this genus, interspaces somewhat convex, markings probably variable, in the unique specimen: a small spot each side of scutellum, a spot both before and behind middle of suture, the postmedian one larger and posteriorly excised, a largish spot above shoulder, a small one behind feeble subbasal swelling, another in middle in interstices IV and V, several minute ones farther back, and a marginal irregular stripe occupying interstices IX and X and widening at apex, here occupying nearly the whole declivous area, in addition scattered yellowish grey hair-scales single or in clusters. Pygidium broader than long, very densely punctate-granulate, the pair of carinae flanking basal median channel extending to near middle, smooth at side, beyond middle a transverse ridge, highest in middle, almost gradually diminishing in height at side and here slightly curving basad, tip of pygidium glossy.

Legs pale luteous, knees and apical third (or nearly half) of tibiae brown, tarsal segment I slightly brownish.

Length 2·4 mm.; width 1·2 mm.

India: Sampagi, Coorg, 27.iv.1937 (N. C. Chatterjee), 1 ♀, ex *Kydia calycina*.

REPORT ON A SECOND COLLECTION OF MAURITIAN ANTHRIBIDAE SENT BY MR. J. VINSON.

By DR. KARL JORDAN, F.R.S.

(With 5 text-figures.)

IN the paper on the Mauritian Anthribidae published in vol. xxxix of this journal, pp. 275–92 (1936), the total number of described species was given as 22. The present Report brings the number up to 36, no less than 13 of the species sent this time by J. Vinson, F.R.E.S., being new. They are all small insects which require great patience and care in collecting, and Mr. Vinson is much to be congratulated on the result of his researches. Of some of the species represented in the first collection by single specimens additional material has been found and submitted, enabling me to supplement the original descriptions. Several of the new species do not fit into any of the known genera, it being necessary to erect for their reception no less than four new genera. Some of the generically different species resemble each other closely in general appearance, being cylindrical and glossy black, so that they are easily mistaken one for the other. It would be interesting to know something of the habits of these tiny insects which might throw some light on the striking resemblance, and I express the hope that Mr. J. Vinson will some day be able to deal with this question.

1. **Eucorynus crassicornis** Fabr. 1801.

Porte aux Sables, xi.36 (J. Vinson), 1 ♂, 1 ♀.

2. **Nesidobius ramulus** Jord. 1936.

Le Pouce, xi.33 (Ray. Mamet), 1 ♂.——The pubescence of this specimen is in beautiful condition: there is on the elytra a broad white sutural area expanding at base from shoulder to shoulder, gradually narrowing posteriorly, reaching to apical declivity, where it joins a transverse band that runs obliquely forward towards margin; on apical declivity a brown transverse band.

3. **Monosirhapis morini** Jord. 1936.

Rivière Noire, xii.36 (G. Morin); Montagne Ory, xi.36 (J. Vinson).——A small series of both sexes; the abdomen of ♀ not flattened in middle.

4. **Monosirhapis cosmia** sp. nov.

Le Pouce, xi.36 (J. Vinson), 1 ♂.

♂. Close to *M. morini*; angle of pronotal carina rather more obtuse, and pattern of elytra very distinctive. Pronotum with broad brown transverse median band as in *M. morini*. On elytrum a large rounded patch on subbasal swelling touching basal margin, a larger patch in middle extending obliquely to lateral margin and laterally reaching forward to shoulder angle, a transverse band on apical declivity not reaching lateral margin, but complete across suture where it is wider than laterally, these markings brown, separated by two sharply de-

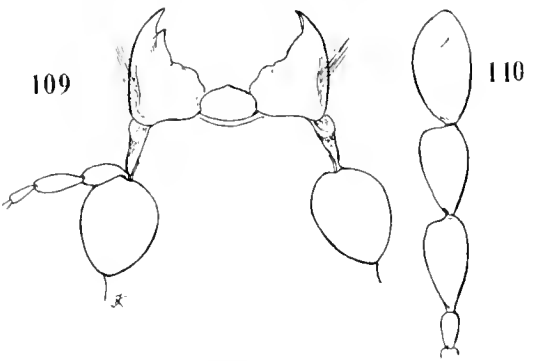
fined, narrow, whitish grey, obliquely transverse bands which join a narrow whitish grey sutural stripe, apical margin also whitish grey.

Underside as in *M. morini*; middle of femora, knees, tips of tibiae and the tarsi brownish.

Catephina gen. nov. (text-figs. 109, 110).

♂♀. In the compact body and short antenna not unlike *Anthribus* Geoff. 1763 (= *Brachytarsus* Schönh. 1823), but nearly related to *Balanodes* Waterh. 1876, which is known only from Rodriguez (one species). As in *Balanodes* the antennal groove contiguous to eye (i.e. without any interspace), segment III of antenna shorter than II, club loose, its segments much longer than broad; differs in the mandible, pronotal carina, legs and other detail.

Proboscis very short, slightly narrowing to apex, apical margin sinuate in middle; left mandible with subapical tooth, which is absent from right mandible,



both mandibles with subbasal transverse double ridge or swelling. Eye lateral, truncate in front, with small sinus. Pronotum and elytra evenly convex; dorsal carina basal, lateral angle somewhat produced laterad, acute, lateral carina not reaching apical margin (as it does in *Balanodes*). Basal margin of elytrum distinctly rounded forward. Pygidium nearly semicircular. Forecoxae well separated; intercoxal process of mesosternite subvertical, truncate, with the angles projecting sideward. Segment I of tarsi not longer than IV, III narrow; in ♂ foretibia and segment I of foretarsus hairy beneath (in *Balanodes* ♂ the foretibia curved, beneath hairy and dentate, forefemur with two apical teeth and small teeth between apex and base; foretarsus broad and hairy beneath, III broad in all tarsi).——Genotype: *C. velutina* sp. nov.

5. **Catephina velutina** sp. nov. (text-figs. 109, 110).

Rivière Noire, xii.36 (S. Morin), 2 pairs.

♂♀. Elongate-elliptical; upperside blackish, but derm of whitish grey pubescent areas rufescent; base of antenna, the legs and underside of body pale rufous. Head grey, rostrum and frons slightly flattened in middle. Pronotum nearly twice as broad at base as at apex and one-third broader than long, smooth (apart from the sockets of the pubescence), with indication of reticulate punctuation before base; blackish brown, a large basal median patch whitish grey, widest behind middle of disc with a central forward projection, this pubescence

extending along carina and widening forward before reaching lateral angle, apical margin likewise whitish grey, this border narrow in middle or interrupted; dorsal carina broadly concave in middle and slightly convex towards sides, the basal margins of the elytra fitting against it. Scutellum minute. Elytra for the greater part whitish grey, on each a large subrotundate patch near base between lines of punctures II to VII (the short basi-sutural line not counted in), and another, larger and more irregular, patch before apex blackish brown or black, between them a diffuse brownish area and behind shoulder a sublateral brownish patch; lines of punctures very distinct from base to apex, interstices slightly convex.

Pubescence of underside whitish grey; centre of metasternum and abdomen more flattened in ♂ than in ♀. Forelegs slightly darkened.

Length 2·6–3·3, width 1·2–1·7 mm.

Gomphides Jord. 1936.

Further specimens, of both sexes, prove this genus to be close to *Achoragus* Jord. 1913. The lateral angle of the pronotal carina more rounded than in *Achoragus*, not projecting sidewards. The species of *Achoragus* clayish ochraceous, of *Gomphides* glossy black. In *Gomphides* the hindfemur of ♂ reaches to apex of abdomen.

6. **Gomphides entornus** Jord. 1936.

Le Pouce, xi.36 (J. Vinson), 2 pairs.——Pygidium a little shorter and broader in ♂ than in ♀, its apical margin visibly straightened in middle, less rounded than in ♀.

7. **Gomphides balius** sp. nov.

Forest side, xi.32 (Ray. Mamet), 1 ♀.

♀. Like *G. entornus*, but the white blade-hairs much reduced in number, the upperside being black, with small white spots; pronotum somewhat shorter, angle of carina less rounded, and pygidium much more narrowed towards apex. On pronotum there are white blade-hairs along apical margin and carina, the posterior inconspicuous border widened forward each side of middle, on disc two or three small spots each side. On elytra a short basal sutural streak, another in interstice III, a third in V, this joining a posthumeral spot; before middle in II and IV a linear spot, the two posteriorly connected by a smaller spot in III, in posterior half of each elytrum from suture to middle of side-margin about half a dozen spots or traces of them, at apical margin a spot at sutural angle and a smaller one laterally; in *G. entornus* the elytra bear together a large area of white or buffish blade-hairs from base to beyond middle.

Megatermis gen. nov. (text-fig. 111).

♂♀. Close to *Achoragus* Jord. 1913 and *Gomphides* Jord. 1936, differing from both in the long terminal segment of the antenna.

Apical margin of rostrum with broad shallow sinus. Antennal groove broad, extending to eye, but gradually becoming shallow towards eye. Segment XI of antenna longer than IX + X, III to VIII very short. Eye entire. Dorsal carina of pronotum well separated from base, concave, lateral angle rounded; below angle a short transverse carinula and a short oblique longitudinal one, the

two forming a very obtuse angle and more or less joining the one the dorsal and the other the lateral carina; lateral carina extending to near apex, but anterior portion sometimes obsolescent. Short scutellar line of punctures of elytra present. Pygidium of ♀ with rather large rounded impression. Middle of abdomen of ♂ flattened and villose. Tarsal segment IV longer than I in all tarsi.——Genotype: *M. mameti* sp. nov.

The three species here described are glossy black like *Gomphides*. Whereas in that genus and most of the allied ones the sides of the thoracic sterna bear large punctures, the undersides of all three *Megatermis* are minutely coriaceous without distinct punctures.

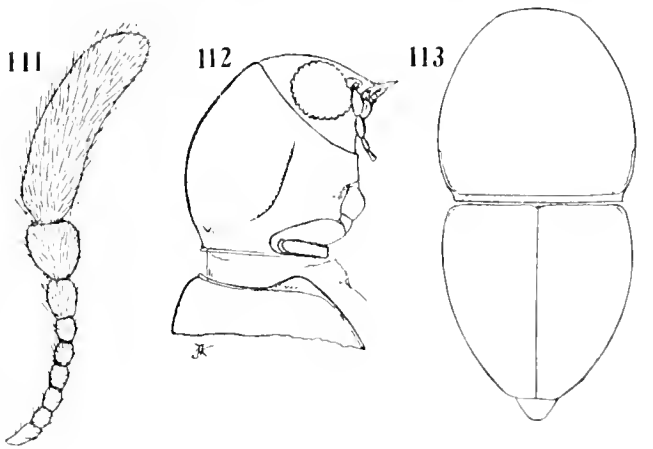
8. **Megatermis mameti** sp. nov. (text-fig. 111).

Corps de Garde, xii.32 (Ray, Mamet), 1 ♂, type; Le Pouce, xi.36 (J. Vinson), 1 ♀.

♂♀. Cylindrical, two and one-half times as long as broad; pitchy black, glossy, mouth-parts, shaft of or nearly the entire antenna, tibiae and tarsi pale luteous; pubescence of upperside represented by short hairs in the punctures, with a few additional hairs in the interstices of the elytra, no pattern; on underside pubescence denser, particularly on side of meso-metasternites.

Rostrum and frons coriaceous-rugose, occiput posteriorly punctate. Segment II of antenna as long as III to V together, III to VIII each less than twice as long as broad, IX about twice as broad as VIII, X twice as broad as IX and as broad as long, XI somewhat curved, a little broader than X, in ♂ about thrice, in ♀ twice as long as broad.

Pronotum rounded at sides from base to apex, widest behind middle, as long as broad, evenly convex, almost evenly punctate, punctures well defined, on the whole smaller than the interspaces. Elytra three-fifths longer than broad, a



trifle broader than pronotum (31 : 30) and seven-tenths longer; cylindrical, polished, punctate in rows, punctures large in basal third, smaller posteriorly, but the rows remaining distinct to apex. Pygidium minutely punctate, rounded, in ♂ a little and in ♀ much broader than long.

Sides of meso-metasternites silky white. Abdominal depression of ♂ well defined, gradually narrowing towards base and apex.

Length 2·1, width 0·8 mm.

9. **Megatermis proximus** sp. nov.

Le Pouce, xi.36 (J. Vinson), 1 ♀.

♀. Like the preceding, but pronotum more densely reticulate, somewhat rugate, with the interspaces of basal and lateral areas minutely coriaceous, the surface less glossy than in *M. mameti*; angle of carina less rounded off; elytra more strongly punctate, which is especially noticeable on and before apical declivity; metasternite laterally with vestiges of large punctures.

10. **Megatermis brevior** sp. nov.

Le Pouce, xi.36 (J. Vinson). 1 ♀.

♀. Broader than the preceding species, shorter, pronotum and elytra more convex; pronotum more strongly rounded, densely punctate-reticulate, the ridges between the meshes densely and minutely coriaceous with the exception of the apical marginal area; angle of carina more strongly rounded than even in *M. mameti*; elytra less coarsely punctate, the interstices of the rows slightly coriaceous and less polished, hairs longer; groove of pygidium smaller, partly divided by a basal median carina.

Length 1·8, width 0·8 mm.

11. **Araecerus simulatus** Gyllh. 1833.

Roches Noires, iii.36, and Flat Island, viii.36 (J. Vinson), 3 ♀♀.

Prototropis gen. nov.

♂♀. Near *Notioxenus* Wollast. 1870; pronotal carina antebasal as in that genus, but curved forward at sides to near apex; below the lateral carina a well-defined bare stripe nearly reaching apical margin. Eye with a very small sinus. No short basi-sutural line of punctures on elytra. Segment I of all tarsi shorter than IV; hindtibia dorsally at apex with notch and crest of stiff bristles; hindfemur of ♂ reaching to apex of abdomen. Upperside with large white hairs resembling short blades of grass, as in *Gomphides*. Derm glossy black.—— Genotype: D. *xestus* sp. nov.

12. **Prototropis xestus** sp. nov.

Le Pouce, xi.36, 1 ♂, type, and Montagne Ory, xi.34, 1 ♀ (J. Vinson).

♂♀. Two and one-half times as long as broad, constricted between the prothorax and elytra. Black, polished, mouth-parts and antenna pale luteous, club darker, legs pitchy. Head and rostrum with a small number of scattered white blade-hairs; apical margin of rostrum very slightly incurved. Eye strongly elevate posterio-laterally, facets coarse. Pronotum one-eighth longer than broad, evenly convex, rounded at sides, a little narrower at base than at apex, white blade-hairs in small clusters, more numerous along lateral carina; puncturation neither dense nor deep, the whole surface very minutely coriaceous; carina very low, in front of scutellum almost effaced.

Elytra less than one-twentieth broader than pronotum, more than one-third longer than broad, convex like pronotum, rounded at side, basal margin incurved, white blade-hairs not numerous, scattered singly as well as in small clusters; seriated punctures very large in basal half, gradually smaller and disappearing towards apex. Pygidium broader than long, rounded, basal median groove of ♀ rounded.

Underside minutely coriaceous, meso-metasternites pubescent white at side, similar pubescence below naked stripe of prosternum, rest of underside glabrous, without distinct large punctures on thoracic sternites; on abdominal segments I to III laterally a transverse row of punctures at base, traces of this row on IV; antecoxal area of prosternum much longer than coxa is broad in lateral aspect. Hindfemur nearly as long as pronotum is broad.

Length 1·4, width 0·58 mm.

13. **Prototropis pulicarius** sp. nov.

Le Pouce, xi.36 (J. Vinson), 2 ♂♂.

♂. A little shorter than *P. xestus*; eye less elevate and somewhat larger; pronotum densely coriaceous, with fewer and shallower large punctures, carina higher; prosternum and hindfemur shorter.

14. **Prototropis nitidus** sp. nov.

Reduit, x.36, 1 ♂, 1 ♀, and Curepipe, iii.37, 1 ♀ (J. Vinson).

♂♀. Broader than the two preceding species; white blade-hairs more numerous; eye as in *P. pulicarius*; pronotum a trifle longer than broad ($\frac{1}{24}$), puncturation deeper than in the other species, interspaces polished, not coriaceous except at base and side, carina sharply elevate; puncturation of elytra as large as in *P. xestus*; pygidium with two clusters of white blade-hairs, the basal median groove of ♀ narrow; prosternum and hindfemur as in *P. pulicarius*.

Length 1·3, width 0·6 mm.

The number of specimens being so small in all three species, I have not dissected any; further material is required for supplementing the descriptions.

Mesidiotropis gen. nov. (text-fig. 112).

♂♀. Close to *Prototropis* (cf. p. 340), but antebasal carina of pronotum absent, whereas the lateral longitudinal carina is retained; this carina low and thin, but quite distinct, not reaching apical margin and, in lateral aspect (text-fig. 112), its posterior end curved upwards at a considerable distance from basal margin; this margin sharply raised, cariniform, appressed to the basal margin of elytra. Prothorax and elytra strongly rounded, more coarsely sculptured than in *Prototropis*; blade-hairs more numerous and thinner, less conspicuous. Basisutural short row of punctures of elytra present. ♂ differs from ♀ in the base of abdomen being flattened medianly, sternum V being shorter, hindfemur longer and pygidium without distinct minute setiferous granules.——Genotype: *M. rotundipennis* sp. nov.

The state of development of the pronotal carina is most interesting, representing a stage intermediate between the complete loss of the carina in *Homocoderа* Wollast. 1870 and the normal carina of *Prototropis*, the carina of *P. xestus* being another, less advanced, step in the direction from completeness to total loss.

15. **Mesidiotropis rotundipennis** sp. nov. (text-fig. 112).

Le Pouce, xi.36 (J. Vinson), 1 ♂, 1 ♀.

♂♀. Pitchy black, glossy, legs, antenna and mouth-parts pale luteous; a little over twice as long as broad, prothorax and elytra strongly rounded. Mandibles with sharp subapical tooth. Rostrum and head rugate-reticulate, the meshes more deeply impressed on occiput, pubescence rather dense; head inclusive of eyes in ♂ nearly thrice, in ♀ almost twice as wide as frons. Antenna uniformly pale luteous, segment II shorter than I, III shorter than II, not quite twice VIII, which is less than one-half longer than broad; club slightly widened to apex, about as long as V to VIII together, IX as long as broad, X a little shorter, XI somewhat longer than broad. Eye narrowed forward, with small sinus. Cariniform upper edge of antennal groove curved and reaching to eye. Pronotum as long as broad, strongly convex, widest in middle, the whole surface strongly punctate-reticulate, the interspaces polished. Scutellum convex.

Elytra polished, about one-fourth longer than broad, strongly convex, widest in middle and highest before middle, shoulders rounded, basal margin of the two elytra together incurved, apical margin in a view from behind subtruncate, slightly incurved; seriate punctures large, smaller and partly obsolescent in posterior third. Pygidium evenly rounded, nearly twice as broad as long, in both sexes with the usual median groove at base.

Underside polished with the exception of the sides of meso-metasternites; prosternum coarsely punctate, below lateral carina an impunctate stripe which widens behind, antecoxal area somewhat rugate, about as long as the coxa is wide. Abdomen with a small number of rather inconspicuous punctures from side to side, V minutely granulate-coriaceous. Legs uniformly pale luteous, IV longer than I in all tarsi.

Length 1·8–2·0 mm.; width 0·84–0·9 mm.

16. **Choragus vinsoni** sp. nov.

Le Pouce, xi.36 (J. Vinson), a short series.

♂♀. Nearest to *Choragus bolus* Jord. 1913 from the Seychelles; much narrower, eye vertically less long, pronotum shorter, abdominal segments of ♂ medianly much less strongly depressed, legs pitchy black.

In appearance similar to *Gomphides*, but without the white blade-hairs. Pitchy black, sometimes paler (immature ?), two and one-half times as long as broad. Rostrum and frons with some white hairs at sides. Antenna pitchy. Pronotum densely, but somewhat irregularly, reticulate, as long as broad, sparsely pubescent; carina nearer the base than in *Ch. bolus*. Elytra one-half longer than broad, coarsely punctate in rows, the punctures small in apical area and sparser, on apical marginal area impunctate, in basal two-thirds the interspaces swollen, the surface therefore uneven, pubescence dispersed, rather denser in basi-sutural area, here the hairs more or less directed obliquely sideward. Pygidium as long as broad, minutely coriaceous, gradually narrowed to apex, which is rounded.

Prosternum with large punctures which, in central area, are ill-defined and very shallow, below lateral carina a small impunctate space, derm between punctures of side distinctly coriaceous. Meso-metasternites laterally with a small number of large punctures. Abdomen impunctate except for a basal row

on segment I ; in ♂ I to V flattened in middle. Hindfemur of ♂ reaching to apex of abdomen.

Length 1·7–2·2 mm. ; width 0·7–0·9 mm.

17. **Choragus faucium** sp. nov.

Gorges, Rivière Noire, i.37 (J. Vinson), 1 ♂, 1 ♀.

♂♀. Very similar to *Ch. vinsoni* ; but eye broader ; reticulation of pronotum denser, the ridges less elevate and the derm quite distinctly coriaceous as at side of prosternum, pronotum slightly broader ; elytra less coarsely punctate, the interspaces much less uneven, apical area more distinctly punctate ; punctures in central area of prosternum more sharply defined ; abdomen of ♂ with deeper, elongate-elliptical, depression from base to apex.

18. **Scirtetinus mauritianus** sp. nov. (text-fig. 113).

Curepipe, iii.37 (J. Vinson), 2 ♀♀.

♀. A nearly elliptical species, strongly convex, with very large and strongly punctate pronotum. Pitchy black, glossy ; tibiae and tarsi and base of antenna luteous. Rostrum and head with very shallow grooves, almost reticulate, interspaces minutely coriaceous. Rostrum twice as broad as narrowest point of frons. Pronotum less than one-thirtieth longer than broad (33 : 32), very slightly, but measurably broader than elytra (32 : 31), moderately rounded at sides, broader at base than at apex, very densely and strongly punctate-reticulate ; antebasal carina curved forward in a broad arc to middle. Elytra broadest at base, gradually narrowed, very little longer than broad (33 : 31) and as long as pronotum, shoulder strongly rounded in lateral aspect, apex nearly truncate ; with rows of punctures, which are large in basal area and partly effaced in apical area, interstices polished. Pygidium longer than broad, with some shallow grooves, apex rounded.

Underside minutely coriaceous ; prosternum with numerous large deep punctures, posteriorly below lateral carina an impunctate space. Mid- and hind-coxae close together ; on side of metasternite large punctures ; abdomen with few distinct punctures.

Length 1·5 mm. ; width 0·7 mm.

EDITORIAL.

The present number completes the series of volumes of *Novitates Zoologicae* issued at the expense of the late Lord Rothschild's Zoological Museum.

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All communications to be addressed to Dr. Karl Jordan, F.R.S., Zoological Museum, Tring, Herts.

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