

A SYNOPSIS OF THE AMPHISTERNINI (Coleoptera : Endomychidae)

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In Gerstaecker's prodrome of 1857 and monograph of 1858 the generic placement of some species of Endomychidae was based apparently on general habitus. Later authors seem to have followed the same practice at times. The genera *Amphisternus* and *Engonius* in particular have received dissimilar species.

Subsequent to 1858, Arrow's work of 1925 is the only treatise on the family of synoptic scope, but it is limited to the fauna of British India, including Burma and Tenasserim. My treatment of the genera in 1953 is useful but during its preparation I was unable to review critically the generic placement of all species and did not foresee opportunity to do so. In recent years, however, Grant G-9023 from the National Science Foundation has enabled me to visit the European repositories of type specimens. From some of these, types have been sent for study. My thanks are due the following gentlemen for their cordial assistance: Messrs. E. B. Britton, J. Balfour-Browne and M. E. Bacchus of London; Sven Larsson of Copenhagen; Heinz Freude of Munich; K. Delkeskamp of Berlin; Zoltan Kaszab of Budapest; Enrico Tortonese of Genoa; A. Descarpentries of Paris; R. Hertel of Dresden; L. Hoberlandt of Prague; A. M. R. Wegner of Ambon; O. L. Cartwright of Washington; Rupert Wenzel of Chicago; H. B. Leech of San Francisco; J. L. Gressitt of Honolulu.

The intent of this paper, and of others projected on the Endomychidae, is to establish usage of specific names based on study of holotypes or lectotypes. Most of the species treated here are known from very little material, often a single specimen, and original descriptions are in some cases indecisive. The "*" indicates that the type (holotype or lectotype) was studied in the preparation of the synopsis.

While showing a number of common characters, the Endomychidae are a rather heterogeneous group of beetles, seemingly of more recent origin than most other families, but including relict forms of peripheral distribution. The Eumorphinae may be briefly characterized as having the occiput minutely cross-striate and the front margin of the pronotum extended as membrane over the striated area. This *stridulatory membrane* of Arrow is not present in the genus *Beccariola* and is also absent, apparently by atrophy, in some species of eumorphine genera occurring in Africa, Madagascar and South America.

The members of the Amphisternini are characterized by a notably transverse mesosternum, and maxilla of which the lacinia is subequal in size to the galea, with apex truncate and densely setose. The transverse mesosternum seems to be derived from the pentagonal type of mesosternum seen in *Beccariola* and *Cymbachus* by a slight elongation which carries the

two front edges of the pentagon backward to form a broad, v-shaped ridge across the mesosternum. This type of mesosternum also occurs in the genus *Dryadites*, which comprises coccinelloid forms having the galea very broad, the lacinia slender and tapering. With the Amphisternini I include the genus *Cacodaemon* Thomson since most of its species have been referred to *Amphisternus*, with which it agrees in forked prosternum and elytra with carinate umbones and discal verrucae or spine.

From the small amount of material known and from distribution data I am led to the hypothesis that the Amphisternini are older types of endomychids which are being superseded by such forms as *Eumorphus*. Of the species occurring on the Asiatic mainland very few specimens have been taken, in strong contrast to the large series of various species of *Eumorphus* accumulated in museums. Speculation may be permitted that identity of ecological niche and habitat niche of these fungivorous beetles results in stringent competition.

KEY TO GENERA OF AMPHISTERNINI

1. Apex of prosternal process entire.....2
Apex of prosternal process deeply incised..... 5
2. Elytral umbones strongly inflated and/or elytron of ♂ with decurved spine..... 4
Elytra with umbones moderately inflated, unspined.....3
3. Form short and broad; sternite 5 of ♂ without tubercle **Brachytrycherus**
Form long-parallel; sternite 5 of ♂ with transverse tubercle..... **Ohtaius**
4. Elytron of ♂ unspined; umbones highly inflated (Ceylon).....**Stictomela**
Elytron of ♂ with decurved spine **Spathomeles**
5. Last joint of maxillary palp expanding distad **Amphistethus**
Last joint of maxillary palp cylindric or tapering..... 6
6. Lacinia of maxilla equal to galea; antennae stout **Amphisternus**
Lacinia narrow and tapering; antennae slender..... **Cacodaemon**

Genus **Brachytrycherus** Arrow

Brachytrycherus Arrow, 1920, Trans. Ent. Soc. Lond., p. 12 (Type: *B. perotetti* Arrow);
1925, Fauna Br. India, Erotyl., p. 291.

The 2 species first placed in this genus by Arrow are very similar and undoubtedly congeneric. My association of *Engonius gemmatus* Arr. and a new species is less satisfactory. The alternative, however, is either the erection of a new genus or amalgamation of 3 genera. With the sparse material available I am unwilling now to make a decision. *Amphisternus rudepunctatus* Gorham, transferred to this genus by Arrow, and *Brachytrycherus concolor* Arrow should be grouped, on the basis of sternal and maxillary structure and ♂ aedeagus, with *Dryadites*.

KEY TO SPECIES OF BRACHYTRYCHERUS

1. Front angles of pronotum thickened, rugose..... **gemmaus**
Front angles normal, not rugose 2
2. Elytra widest behind middle, strongly convex.....**convexus**
Elytra widest before middle, moderately convex..... 3
3. Elytra thickly punctured.....**madurensis**

Elytra sparsely punctured **perotetti**

Brachytrycherus perotetti Arrow Figs. 1, 2.

**Brachytrycherus perotetti* Arr., 1920, Trans. Ent. Soc. Lond., p. 13; *Ibid.*, 1925, Fauna Br. India, Erotyl., p. 292.

I have seen but 2 ♀ specimens. The color is black, each elytron with 2 red marks of indistinct boundaries. Length 7 mm.

DISTRIBUTION: both specimens studied were collected in the Nilgiri Hills of southern India. Type ♀ in British Musum.

Brachytrycherus madurensis Arrow Fig. 3.

**Brachytrycherus madurensis* Arr., 1920, Trans. Ent. Soc. Lond., p. 14; 1925, Fauna Br. India, Erotyl., p. 292, fig. 52.

Similar in form to *perotetti*, black, elytron with 2 ragged transverse bands of red or orange. The type is a ♀ but a ♂ specimen in the British Museum is undoubtedly conspecific. In the ♂ the front and mid tibiae are enlarged distally, the front ones internally excavate near apex. The form of this species is more tapered than indicated in the habitus figure given by Arrow. Two ♀♀ of paler coloration in the Hungarian Mus. have also been studied. In my judgment the paler color is teneral. Length 7 mm.

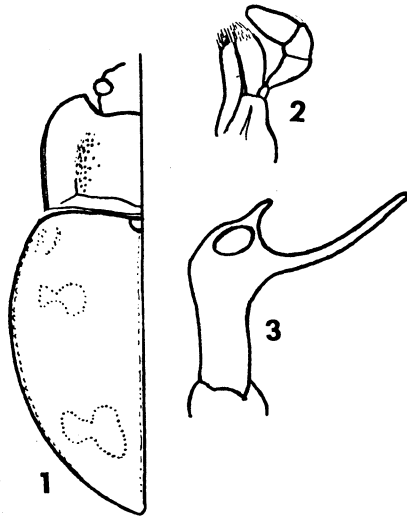
DISTRIBUTION: all specimens from the vicinity of Madura in southern India. Type ♀ in the British Museum.

Brachytrycherus convexus Strohecker, n. sp. Figs. 4, 5, 13-16.

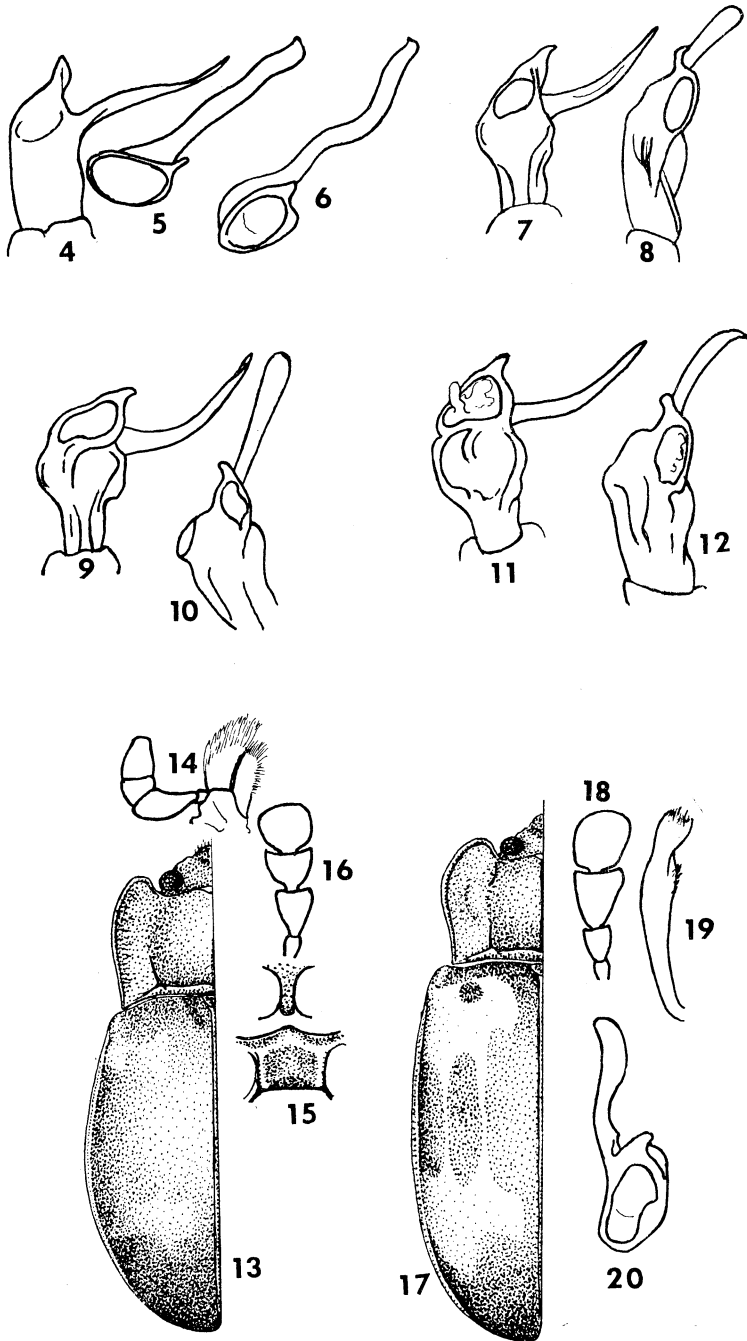
Form broadly oval, strongly convex, black and shining, elytron with 2 (or 3?) red marks. Length 9.2 mm.

Antenna with all articles of the stalk longer than broad, 3, 3/4 as long as 4+5, club broad, its articles convex above. Pronotum broad, front angles obtusely produced, sides rounded and somewhat convergent basad, hind angles produced and somewhat acute, basal sulcus shallow, lateral sulci deep and reaching middle of disc. Median longitudinal sulcus visible on basal 1/2 of pronotum. Disc finely and closely punctured. Elytra at base scarcely wider than pronotum but widening caudad to beyond mid-length, thence abruptly rounded to apex. Side margins moderately broad. Red markings of elytra a small rectangular spot behind umbo which is narrowly confluent with a mesal triangular spot, and a transverse band before apex. Punctuation of elytra dense and fine but coarser than that of pronotum. Ventral surface black.

The single specimen at hand is a ♂. Its protibiae are enlarged distally with inner edge



Figs. 1-3. 1, *Brachytrycherus perotetti* Arrow, ♀; 2, maxilla. 3, *B. madurensis* Arrow, aedeagus, dorsal face.



Figs. 4-20. 4, *Brachytrycherus convexus* n. sp., aedeagus, dorsal face; 5, aedeagus, apical view. 6, *B. gemmatus* (Arrow), aedeagus, apical view. 7, *Stictomela chrysomeloides* Gorham, aedeagus, left-dorsal view; 8, aedeagus, left face. 9, *S. opulenta* Gorham, aedeagus, left-dorsal view; 10, aedeagus, left face. 11, *S. inflata* (Gorham), aedeagus, left-dorsal view; 12, aedeagus, left face. 13, *Brachytrycherus convexus* n. sp., ♂; 14, maxilla; 15, pro- and mesosternum; 16, antennal club. 17, *Ohtaius signatus* n. sp., ♂; 18, antennal club; 19, protibia of ♂; 20, aedeagus, apical view.

sinuately excavate near apex. A brush of hairs precedes the excavation. The mid and hind tibiae are enlarged and incurved distally. Sternite 5 has 5 longitudinal ridges on each side near its hind margin. The insect is evidently flightless, the wings reduced to narrow straps no longer than the elytra.

Holotype ♂ (BMNH), Lohit Valley, Assam Front, 610-914 m, 21/31. III. 1923, F. K. Ward & R. J. H. Kaulback.

Brachytrycherus gemmatus (Arrow), n. comb. Fig. 6.

**Engonius gemmatus* Arr., 1928, Faune Col. Francaises 2: 344.

Black, feebly shining, densely punctured, elytron with 3 yellow marks; a small rotund spot on umbo, an oval patch in the same transverse line at mid-width, and a pre-apical bar. Sides of pronotum undulately subparallel, the front angles strongly produced, very blunt, striately punctured.

But one specimen has been seen, the ♂ monotype from Louang-Prabang, Laos in the British Mus. The protibiae are apically enlarged and excavate, the mesotibiae slightly incurved. Length 7.5 mm.

Genus **Stictomela** Gorham

Stictomela Gor., 1886, Proc. Zool. Soc. Lond., p. 155 (type: *S. chrysoloides* Gor.; BMNH).—Arrow, 1925, Fauna Br. India, Erotyl., p. 288.

The 3 known species are confined to Ceylon. Since Gorham has presented fine habitus figures of 2 of the species and Arrow has reviewed the genus, I shall merely catalogue the species and figure the aedeagi of the types.

Stictomela chrysoloides Gorham Figs. 7, 8.

**Stictomela chrysoloides* Gor., 1886, Proc. Zool. Soc. Lond., p. 156, pl. 17, fig. 6.—Arrow, 1925, Fauna Br. India, Erotyl., p. 288.

Four specimens from Dikoya, Ceylon were reported by Gorham. Of these, 2♂♂, including the type, are in the British Mus.

Stictomela opulenta Gorham Figs. 9, 10.

**Stictomela opulenta* Gor., 1886, Proc. Zool. Soc. Lond., p. 156.—Arrow, 1925, Fauna Br. India, Erotyl., p. 289.

The ♂ type from Bogawantalawa, Ceylon in the British Mus. is the only specimen known to me.

Stictomela inflata (Gorham) Figs. 11, 12.

**Spathomeles inflatus* Gor., 1886, Proc. Zool. Soc. Lond., p. 154, pl. 17, fig. 5.

Stictomela inflata Arrow, 1925, Fauna Br. India, Erotyl., p. 290.

The specific name refers to the highly inflated umbones. The colors in the figure given by Gorham are too somber; the elytra are brilliant orange-red. The British Museum contains 2♂♂, type and and co-type, both from Dikoya.

Genus *Ohtaius* Chûjô

Ohtaius Chûjô, 1938, Trans. Nat. Hist. Soc. Formosa **28**: 398.

Engonius (in part) Gerstaecker, 1857, Archiv Naturg. **23**: 220; 1858, Mon. Endom., p. 69; and other authors.

Type species: *Brachytrycherus mushanus* Ohta.

The species grouped under *Ohtaius* resemble those of the genus *Engonius* in their rather elongate, subparallel form, but the structure of mesosternum, maxilla, and ♂ aedeagi and tibiae demonstrate their relation to *Stictomela*. The most distinctive feature of *Ohtaius* is the transverse, bilobed tubercle on sternite 5 of the ♂♂.

KEY TO SPECIES OF OHTAIUS

- | | |
|--|--------------------|
| 1. Elytra pubescent | 2 |
| Elytra glabrous..... | 5 |
| 2. Median sulcus of pronotum linear (Ceylon) | lunulatus |
| Median sulcus of pronotum dilated in front..... | 3 |
| 3. Postmedian elytral bar broad (Ceylon) | annularis |
| Postmedian elytral bar narrow..... | 4 |
| 4. Specimens from Bombay region..... | vicinus |
| Specimens from southern China..... | laticollis |
| 5. Pronotum without median sulcus | mushanus |
| Pronotum with median sulcus | 6 |
| 6. Anterior pale area of elytra lunate..... | 7 |
| Anterior pale area of elytra large, quadrate..... | signatus |
| 7. Pronotum with shining areas..... | signifer |
| Pronotum completely opaque, unpunctured | opacicollis |

Ohtaius lunulatus (Gerstaecker) n. comb. Figs. 28, 29.

Engonius lunulatus Grstkr., 1857, Archiv Naturg. **23**: 222; 1858, Mon. Endom., p. 77.—Arrow, 1925, Fauna Br. India, Erotyl., p. 314.

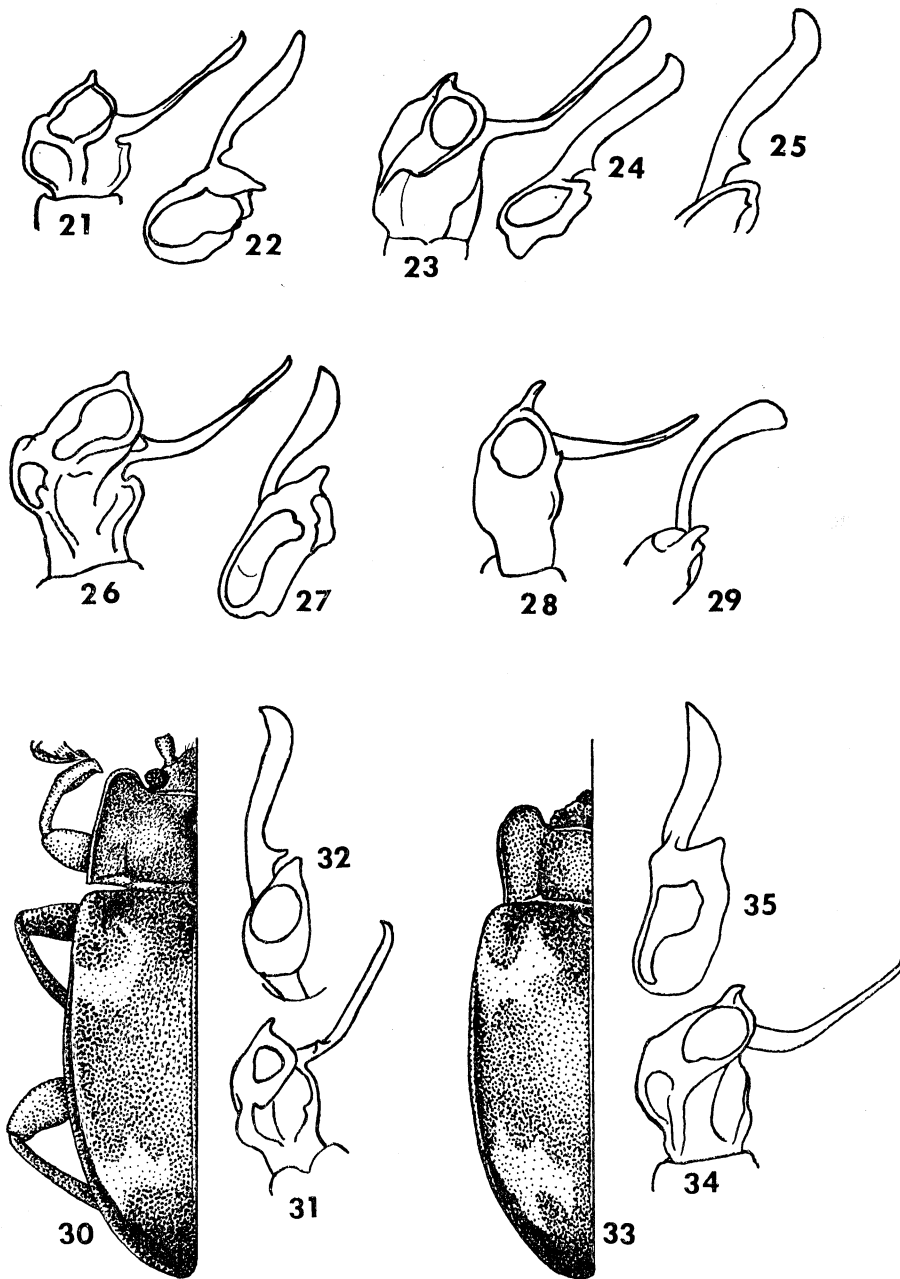
Black, with erect yellow pubescence, elytron with a posthumeral red lunule and a pre-apical red bar transversely placed and constricted at middle. Length 9–11 mm. In the ♂ the protibia is internally excavate at its apex, with a minute tooth proximal to the excavation. The tubercle on sternite 5 is setose and bicarinate.

Type ♂ from Colombo, Ceylon in the Berlin Mus. The British Mus. has a specimen from Ceylon which Arrow compared with the type. The drawing were made from this specimen. Four other ♂♂ and 4♀♀ from Ceylon are also in the British Museum.

Ohtaius annularis (Gerstaecker), n. comb. Figs. 23, 24.

Engonius annularis Grstkr., 1857, Archiv Naturg. **23**: 221; 1858, Mon. Endom., p. 75, pl. 2, fig. 3.—Arrow, 1925, Fauna Br. India, Erotyl., p. 312.

Oblong, subparallel, black with fine gray pubescence. Sides of pronotum parallel behind, slightly convergent to the bluntly rounded front angles. Median sulcus of pronotum linear behind, dilated in front with a minute tubercle in dilatation. Elytra have a red posthume-



Figs. 21-35. 21, *Ohtaius signifer* (Gorham), aedeagus, dorsal view; 22, aedeagus, apical view. 23, *O. annularis* (Gerstaecker), aedeagus, dorsal view; 24, aedeagus, apical view. 25, *O. vicinus* (Arrow), aedeagus, apical view. 26, *O. opacicollis* (Arrow), aedeagus, dorsal view; 27, aedeagus, apical view. 28, *O. lunulatus* (Gerstaecker), aedeagus, dorsal view; 29, aedeagus, apical view. 30, *O. laticollis* (Achard), ♂; 31, aedeagus, dorsal view; 32, aedeagus, apical view. 33, *O. mushanus* (Ohta), ♂; 34, aedeagus, dorsal view; 35, aedeagus, apical view.

ral lunule and pre-apical bar. The ♂ tibial characters and abdominal tubercle very similar to the same features in *lunulatus*. Length 8.5 mm.

Male type from Ceylon in the Berlin Mus. The British Mus. has a single ♂, also from Ceylon, from which my drawings were made.

Ohtaius vicinus (Arrow), n. comb. Fig. 25.

**Engonius vicinus* Arr., 1925, Fauna Br. India, Erotyl., p. 313.

The general description of *O. annularis* fits this species closely and the aedeagi are also very similar. The 2 species show strong relationship and I cannot form a confident opinion that they are distinct. Arrow notes "the different male characters", chiefly the nodule on sternite 5. Length 9–11 mm.

Male type from Belgaum, India in British Mus. Two other ♂♂ are also in this institution, one without data, the other from Assam. A ♀ specimen from Dehra Dun: Porahat, Bihar and Orissa, seems also to be of this species.

Ohtaius laticollis (Achard), n. comb. Figs. 30–32.

**Engonius laticollis* Ach., 1922, Fragments Ent., p. 28.

Exceedingly similar in all features to the 2 preceding species. Perhaps these 3 names have been applied to a single wide-ranging species, but clarification of their status cannot be accomplished without additional material. Length 9 mm.

Male monotype from Foo Chow, China is in the Prague Museum.

Ohtaius mushanus (Ohta) Figs. 33–35.

Brachytrycherus mushanus Ohta, 1931, J. Fac. Agric. Hokkaido Univ. **30**: 216, pl. 3, fig. 16.
Ohtaius mushanus: Chûjô, 1938, Trans. Nat. Hist. Soc. Formosa **28**: 398.

Unique in the genus in lacking a median pronotal sulcus. Pronotum thickly and coarsely punctured, its disc feebly shining, lateral areas dull. Elytra thickly and conspicuously punctate, shining, with usual posthumeral lunule and pre-apical bar. In the ♂ the protibia is enlarged and excavate as usual in the genus, and the mesotibia is feebly bowed. Tubercle of sternite 5 is strongly bicarinate. Length 8 mm. Only 2 specimens have been studied, a ♂ collected at Bukai, Taiwan and a ♀ from Wong Sa Shui, Kiangsi, China, both by Gressitt. These specimens are in the Bishop Museum and the California Academy of Sciences. The type is in the collection of Hokkaido University.

Ohtaius signifer (Gorham), n. comb. Figs. 21–22.

**Engonius signifer* Gor., 1875, Trans. Ent. Soc. Lond., p. 311.—Arrow, 1925, Fauna Br. India, Erotyl., p. 316.

Very similar to the following species but with pale markings of elytra less extensive. The anterior mark is a sickle-shaped lunule, broadly open in front. The posterior mark is the usual transverse bar. Length 8–9 mm.

The monotype from "northern India" in the British Mus. is a ♀. My drawings were made from a ♂ from Gopaldhara, Sikkim determined by Gilbert Arrow. The British Mus.

has another ♂ and 2 ♀♀ from Gopaldhara, and a ♀ from Thayetinyo, Lower Burma may be *signifer*. A ♀ of *signifer* or of some similar species, from Rangoon, is in the Philadelphia Academy.

Ohtaius signatus Strohecker, n. sp. Figs. 17-20.

Long parallel in form, elytra rounded to apex. Black and shining, elytron with 2 large yellow areas. Length 8.8 mm. Of the pale elytral marks the anterior lies across the umbo and extends inward almost to the suture, leaving the elytral base narrowly black and enclosing a small, round, black spot in front. Posterior yellow mark broad and transverse. It emits a sharp ray from its posterior margin and 2 rays from its front margin. The 2 anterior rays are joined by narrow yellow lines to spur-like extensions of the hind margin of the yellow humeral patch.

Very close to *O. signifer*. In fact the single ♂ at hand was labeled "*Engonius signatus*" by Gorham, apparently a lapsus for *signifer*. In this ♂ specimen the front tibiae are apically enlarged and internally excavate near apex. Mid and hind tibiae a little enlarged apically and inbent, the curvature of the mesotibia greater. Sternite 4 has a pair of small ridges, widely separated, and sternite 5 bears a bituberculate elevation flanked on each side by a broad, shallow fossa. Antennae stout but with all stalk articles longer than wide, club broad and flattened with articles 10 and 11 almost 2× as broad as 9. Pronotum strongly transverse, front angles much rounded, sides rounded and convergent basad, hind angles rectangular, basal sulcus deep, lateral sulci short and not reaching to middle of disc. There is a linear median sulcus. Pronotal disc rather closely but finely punctured and shining, the marginal areas transversely striate, opaque, slightly reflexed.

Holotype ♂ (BMNH), Manipur, India Orientalis, Doherty. No ♀♀ can be certainly associated with this ♂ but 2 ♀ specimens labeled "Munphu, Atkinson coll." may be conspecific. They have been identified as *signifer* by Gorham and are left in that series.

Ohtaius opacicollis (Arrow), n. comb. Figs. 26, 27.

**Engonius opacicollis* Arr., 1920, Ann. Mag. Nat. Hist., ser. 9, 5: 323.

The sparsely punctured and totally opaque pronotum distinguish this from all other known species of the genus. Pronotum of monotype broadest at mid-length, a little narrowed basad and also cephalad to the roundly produced front angles. Elytra have the pale humeral lunule and pre-apical bar usual in the genus. Length 9 mm. Front tibiae internally excised near apex, posterior femur and tibia with long hairs. Tubercle of sternite 5 quadrate and bicarinate.

Male monotype from Xieng Khouang, Laos in the British Museum.

Genus **Spathomeles** Gerstaecker

Spathomeles Grstkr., 1857, Archiv Naturg. 23: 218; 1858, Mon. Endom., p. 61.—Arrow, 1925, Fauna Br. India, Erotyl., p. 307.—Strohecker, 1949, Proc. Hwn. Ent. Soc. 13: 438.

Except for tubercle or spine on the elytra of the ♂♂ (and of ♀♀ in a few species), I have found no decisive features separating this genus from *Stictomela*, and the development of this elytral spine may have occurred more than once in the genus *Spathomeles* as now

understood. The femora are markedly clavate, the enlarged apical portion occupying less than half the femoral length and 3× as broad as the basal portion. In the larger species the last article of the maxillary palp is quadrate and broadly truncate, in the smaller species tapering and longer than wide. The prosternal process, very broad in the larger forms, is hardly different, in the smaller forms, from that seen in *Brachytrycherus* and *Ohtaius*.

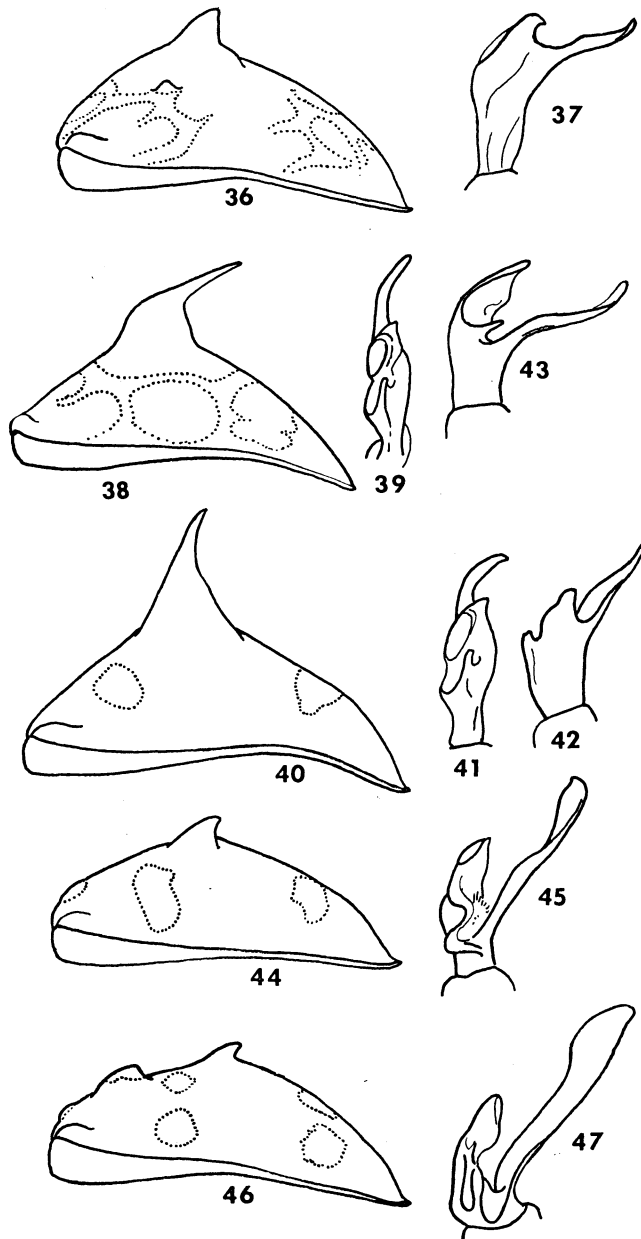
KEY TO SPECIES OF SPATHOMELES

1.	Elytra with short, dense pubescence	anceps
	Elytra glabrous	2
2 (1).	Pronotum dull, without impressions, punctures indistinct	3
	Pronotum shining and/or distinctly punctured	6
3 (2).	Each elytron with a long, sharp spine	4
	Each elytron (♂) with a low cone	wegneri
4 (3).	Elytra marked with network of reddish lines	retiarus
	Each elytron with 1 or 2 yellow or red marks.....	5
5 (4).	Elytral markings oval and yellow	turritus
	Elytral markings transverse red bars.....	frivaldzskyi
6 (2).	Metasternum without a deep pit	7
	Metasternum with a deep pit in front	11
7 (6).	Strongly shining, elytral punctures irregular (Celebes)	8
	Weakly shining, elytral punctures close and regular	9
8 (7).	Each elytron with 3 yellow calluses.....	bonthainicus
	Each elytron with 6 yellow calluses.....	politus
9 (7).	Each elytron with 5 small yellow calluses	moloch
	Each elytron with 2 or 3 yellow calluses.....	10
10 (9).	Anterior callus obliquely oblong.....	elegans
	Anterior callus extensive, irregular.....	dohrnii
11 (6).	Elytra subopaque, mid callus double.....	decoratus
	Elytra shining, mid callus large, oval	12
12 (11).	Mid callus of elytron roundly elevated	anaglyptus
	Mid callus conical or subconical (Mindanao).....	13
13 (12).	Basal elytral callus small (eastern Mindanao).....	darwinista
	Basal callus large (western Mindanao).....	rizali

Spathomeles anceps (Gorham), n. comb. Figs. 36, 37.

**Amphisternus anceps* Gor., 1895, Ann. Soc. Ent. Belg. 39: 328.—Arrow, 1925, Fauna Br. India, Erotyl., p. 287.

Black, covered with dense, fine, yellow pubescence, elytra highly convex. Elytron with an orange ring on base and an incomplete posthumeral ring of the same color, the 2 rings united by an oblique band. There is also a post-median orange bar of irregular contour. On each elytron, near the suture is a strong, slightly retrorse tubercle, and the umbo is roundly tuberculate. Between these 2 prominences is a small tubercle. Length 10 mm. In the ♂ the front and mid tibiae are a little curved, with a small tooth just distad of mid-length. This is an anomalous form which should be perhaps the type of a new genus. The prosternum is broad, produced but little beyond the procoxae, with the lateral angles



Figs. 36-47. 36, *Spathomeles anceps* (Gorham), left elytron of ♂; 37, aedeagus, dorsal view. 38, *S. retarius* Strohecker, left elytron of ♂; 39, aedeagus, right face. 40, *S. turritus* Gerstaecker, left elytron of ♂; 41, aedeagus, right face; 42, aedeagus, dorsal view. 43, *S. wegneri* Strohecker, aedeagus, dorsal view. 44, *S. bonthainicus* Heller, left elytron of ♂; 45, aedeagus, dorsal view. 46, *S. politus* n. sp., left elytron of ♂; 47, aedeagus, dorsal view.

of the apex briefly produced. This feature led Gorham to place the species in the genus *Amphisternus*, but it is better associated, I think, with the species grouped under *Spathomeles*.

Male monotype from Kanara, India in the Oberthür Coll. in the Paris Mus. The British Mus. has a ♂ specimen from the Nilgiri Hills, southern India. My sketches were made from this specimen. A ♀ taken at Bhimpedi Tal, Nepal, 7. IV. 1962 by G. Ebert is in the Bavarian State Coll.

***Spathomeles retiarius* Strohecker** Figs. 38, 39.

Spathomeles retiarius* Strkr., 1949, Proc. Hwn. Ent. Soc. **13: 438, figs. 1, 2.

General color blackish brown, elytra with a network of reddish lines co-planar with the general surface. Each elytron has, near mid-length and close to the suture, a high spine. In the ♂ this spine is abruptly bent backward; in the ♀ it is erect. The tibiae of the ♂ are more enlarged apically than those of the ♀. Other than these differences the 2 sexes are much alike in appearance. Length 8.5–10.8 mm.

The ♂ monotype was lost in the mail during its return to the Bishop Museum so I have selected a neotype which comes from the same locality.

Neotype ♂ (BMNH), Sandakan, Br. N. Borneo, 1919, C. F. Baker. Two ♀♀ in the British Mus. are also from British N. Borneo, 1 from Lumu Lumu, Mt. Kinabalu, the other from Kubat. The Bishop Mus. has a ♀ taken by T. C. Maa at Tenompok near Jesselton, and the Berlin Museum has a ♀ from "Borneo."

***Spathomeles turritus* Gerstaecker** Figs. 40–42.

Spathomeles turritus* Grstkr., 1857, Archiv Naturg. **23: 220; 1858, Mon. Endom.—Strohecker, 1949, Proc. Hwn. Ent. Soc. **13**: 438, figs. 3.

In both sexes each elytron has a high erect spine. In the ♂ the apex of the spine is slightly bent. Color deep black, each elytron usually with 2 low, orange calluses, 1 near the base and oblique, the other behind the spine. In the form *dispar* Frivaldzsky the anterior callus is lacking.

Holotype ♂ (Copenhagen Mus.), Penang I. (Westermann Coll.). The British Mus. has specimens from Kedah Peak, Malaya; Malacca; Mt. Matang, Sarawak; Quop, Sarawak; Penang I. A. M. R. Wegner collected 2 specimens on Gununsari, Borneo in 1956.

***Spathomeles turritus dispar* Frivaldzsky**

Spathomeles turritus dispar* Frvdszky., 1883, Termesz. Fuzetek **6: 126.

This form differs in no structural features from *turritus*. Specimens from Mt. Matang, Sarawak in the British Museum are typical of *dispar*; other specimens show clearly intermediate pattern.

Male monotype in the Hungarian Mus.

***Spathomeles frivaldzskyi* Strohecker**

Spathomeles frivaldzskyi* Strkr., 1957, Ann. Hist. Nat. Mus. Nat. Hungarici **8: 280.

Very similar in structure, including aedeagus, to *S. turritus* but elytra with a bluish sheen and the markings consist of an angulated red band, obliquely located in front of the spine

and a transverse red band half way between spine and apex of elytron. In *turritus* the elytra are distinctly and closely punctured along the side, while in *frivaldzskyi* punctures may be seen only near the base of the spine and are there indistinct. Whether these differences represent specific cleavage or local variance within a species cannot now be adequately judged.

Male monotype from the Baram River Region, Borneo in the Hungarian Mus. The British Mus. has a ♂ specimen from Lubnan, Borneo.

***Spathomeles wegneri* Strohecker** Fig. 43.

**Spathomeles wegneri* Strkr., 1958, *Treubia* 25: 243, fig. 1.

Short-oval in outline, pronotum with front angles very broadly rounded, the disc smooth and rather flat. Ground color black, elytron with 3 red marks, 1 basal, another lateral and near mid-length, the 3rd a transverse double spot before apex. Elytral prominences of the ♂ are low and bluntly rounded. ♀ unknown. Length 9 mm.

Male monotype from Tabang, Bengen River, Borneo in Bogor Mus.

***Spathomeles elegans* Gorham** Figs. 48–50.

**Spathomeles elegans* Gor., 1873, *End. Recitati*, p. 32.—Strohecker, 1949, *Proc. Hwn. Ent. Soc.* 13: 440, figs. 4, 5.

The figures should permit ready identification of ♂ specimens. Females are similar but without elytral spines. General color black or bluish black, each elytron with 2 large yellow areas, the anterior obliquely oval, the posterior transverse. Pronotum typically punctate but in some specimens rather opaque. There is a median sulcus and 2 discal impressions. Some difference in the elytral spines may be noted; in 1 ♂ it is hardly more than a high tubercle. Slight variation in the metatibial flange of ♂♂ may be seen but for the present these differences are not considered of specific moment. Length 9–11 mm.

The ♂ monotype from Penang I. is in the British Mus., which also has specimens from Banjar, Borneo; Merang, Sumatra; Sinkip I., Malaya. The Bogor Mus. has specimens from Banka, Penang, and material from Tebing-tinggi, Sumatra is in the Deutsches Entomologisches Institut.

***Spathomeles bonthainicus* Heller** Figs. 44, 45.

Spathomeles bonthainicus Hell., 1898, *Abhandl. Mus. Dresden* 7: 39, pl. 3, fig. 13.

Black and brilliantly shining, elytron with bluish luster. Each elytron has 3 orange calluses, the 1st somewhat triangular and near base, the 2nd lateral and behind umbo, the 3rd a transverse ovoid of undulate outline on posterior 1/3 of elytron. Pronotum with front angles much thickened and obtusely rounded, disc minutely punctate. Elytral punctures sparse and coarse basally, finer toward apex. Length 10–11 mm. In the ♂ each elytron bears, just before mid-length, a low, backwardly directed conical elevation. The front and hind tibiae are abruptly enlarged at apex, mid tibia minutely toothed internally in its distal 1/3. Front femur bears a stout tooth. All these features are absent in the ♀.

♂ type: Mt. Bonthain, Celebes in Dresden Museum. Material from Lompoh Batang, S. Celebes is in the Bogor Museum.

Spathomeles politus Strohecker, n. sp. Figs. 46, 47.

Long-oval, black and shining, each elytron with 6 yellow calluses. Length 11.5 mm.

Antennae short, when reflexed reaching the elytral umbo, article 3 shorter than 4+5, articles 7 & 8 but little longer than wide, club compact and flattened, normal for the genus. Pronotum with sides sinuate, front angles produced and rather narrowly rounded, hind angles slightly produced and acute, disc finely and sparsely punctured, with an impression on each side and a median sulcus on basal 1/2. Lateral sulci and transverse sulcus as usual in the genus. Elytra almost 4× as long as pronotum with prominent umbones, wide margins, surface coarsely and sparsely punctured. Of the yellow calluses the 1st is somewhat tear-shaped and located close to the base and suture, the 2nd, more strongly elevated, is placed obliquely behind the 1st, the 3rd continues the oblique line, while the 4th is close to the outer margin and on a transverse line with the 3rd. All 4 calluses lie in front of mid-length and form a rough arc embracing the shoulder area. The 2 posterior calluses are roughly quadrate and obliquely arranged. Elytral apex narrowly subtruncate.

In the ♂ each elytron has, at mid-length and close to the suture, a low, retrorse, conical elevation, front tibia distally incurved with a small pre-apical excision, mid tibia incurved and broadly, shallowly excised near its apex, hind tibia broadening in its apical 1/3. Front femur may be unarmed or bear a minute tooth.

Holotype ♂ (Copenhagen Mus.), Celebes, Dr. Kühn. Allotype ♀, same data as holotype. Paratypes: 4 ♂♂ and 1 ♀, same data as types (Copenhagen Mus., BMNH and author's collection).

Spathomeles moloch Strohecker Fig. 55.

**Spathomeles moloch* Strkr., 1958, Fieldiana, Zool. 42: 41, fig. 11.

Although known only from ♀♀ this large endomychid shows highly distinctive features. The pronotum is relatively narrow with sides parallel, front angles strongly produced and narrowly rounded, disc coarsely and very thickly punctured. The elytra are also closely punctured, black, each with 5 orange calluses, 1 of which is on the summit of a high tubercle. Length 18 mm. Holotype ♀ (Chicago Mus.), Mt. Apo, Davao Province, Mindanao.

Spathomeles dohrnii Gerstaecker Figs. 51, 52.

Spathomeles dohrnii Grstkr., 1857, Archiv Naturg. 23: 219; 1958, Mon. Endom., p. 64.—

Strohecker, 1949, Proc. Hwn. Ent. Soc. 13: 440.

Eumorphus quadrisignatus Guérin, 1857, Archives Ent. 1: 257, pl. 13, fig. 12.

Rhachidophorus quadrisignatus: Guér., 1858, Revue et Mag. Zool. (2), 10: 61.

A distinctive feature is the diagrammed marking of the elytra. Ground color of elytra bluish black; punctuation dense. Prosternal process broad and rough, metasternum with a deep fovea on each side and a median roughened area, this deeper in the ♂. The sexes are much alike externally but the ♂ has a low cone on each elytron, the front femur toothed and the mid tibia angulately widened at its distal 2/3. Length 13–14 mm.

Of the pair of Sumatra specimens studied by Gerstaecker, the ♂ in the Stettin Mus. may be considered the lectotype. The ♀ is in the British Mus. Six other specimens seen in the present study have come from Sumatra or Java.

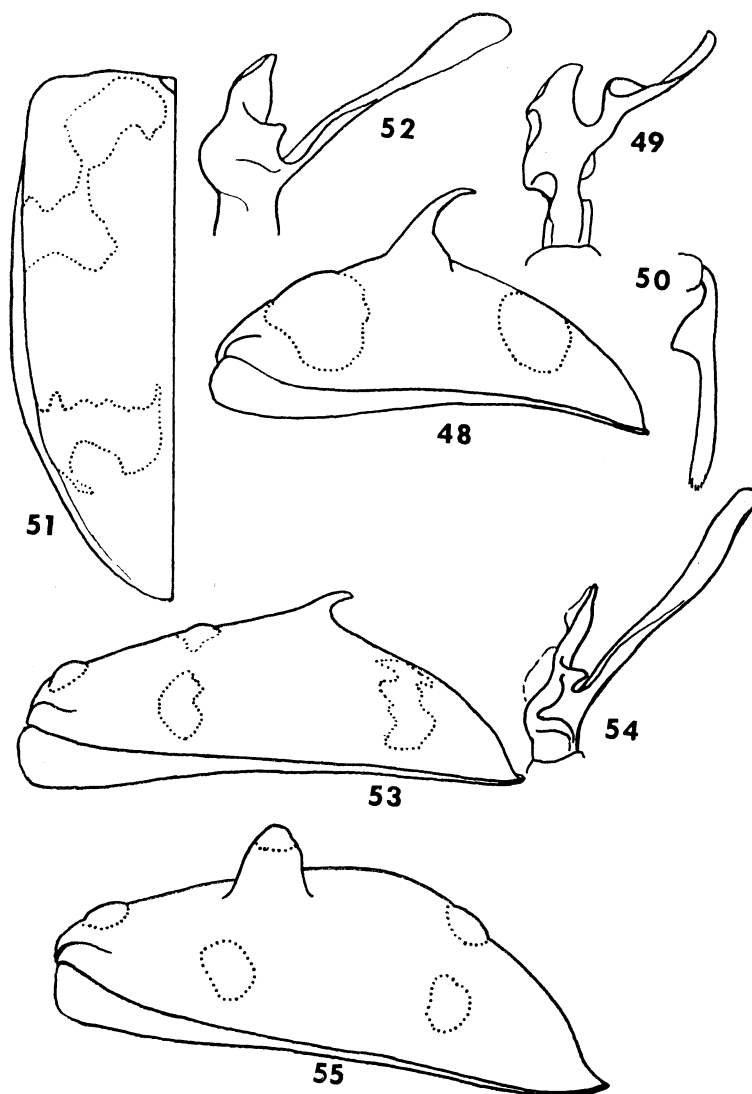
Spathomeles decoratus Gerstaecker Figs. 53, 54.

**Spathomeles decoratus* Grstkr., 1857, Archiv Naturg. 23: 219; 1858, Mon. Endom., p. 66.—

Arrow, 1925, Fauna Br. India, Erotyl., p. 308, fig. 54.

Cacodaemon hamatus Thomson, 1857, Archives Ent. 1: 154.

Rhachidophorus latreillei Guérin, 1858, Rev. Mag. Zool. 10: 61.



Figs. 48-55. 48, *Spathomeles elegans* Gorham, left elytron of ♂; 49, aedeagus, dorsal view; 50, metatibia of ♂. 51, *S. dohrnii* Gerstaecker, left elytron of ♀; 52, aedeagus, dorsal view. 53, *S. decoratus* Gerstaecker, left elytron of ♂; 54, aedeagus, dorsal view. 55, *S. moloch* Strohecker, left elytron of ♀.

Black, weakly shining, each elytron with 3 yellow calluses on anterior 1/2 and a ragged transverse fascia before apex. Of the anterior calluses the parascutellar one is obliquely elliptic, the 2nd callus is considerably raised and located on the disc just in front of mid-length, the 3rd is feebly raised and lateral to the 2nd. The pre-apical fascia is plane with the general surface. Length 13–14 mm. In the ♂ the mid tibia has a short, stout tooth at its distal 1/3 and each elytron has a short, deflexed hook near the suture and just back of mid-length.

Male lectotype and ♀ lectoallotype from "East Indies" are in the British Mus.

Thomson's specimen was supposedly from Java and the label may have been correct. Gerstaecker reported a specimen from Dohrn's collection as having the label "Adelaide." This, as Gerstaecker judged, is undoubtedly a case of mislabeling.

Spathomeles decoratus ornatus Gorham

Spathomeles decoratus ornatus Gor., 1886, Proc. Zool. Soc. Lond., p. 155.

Differs from nominate *decoratus* in having the 2 middle elytral calluses confluent but intermediate specimens are known. This form typically has, in the ♂, the hind tibia spined near its base.

The male lectotype and 2 ♀♀ from Assam are in the British Mus. That institution also has a series collected by R. Vitalis de Salvaza in Laos.

Spathomeles anaglyptus Gerstaecker Figs. 59, 60.

Spathomeles anaglyptus Grstr., 1857, Archiv Naturg. **23**: 219; 1858, Mon. Endom., p. 62.

—Strohecker, 1949, Proc. Hwn. Ent. Soc. **13**: 442.

Cacodaemon hopei Thomson, 1857, Archives Ent. **1**: 154.

Eumorphus hopei: Guérin, Archives Ent. **1**: 255.

Rhachidophorus hopei: Guérin, 1858, Rev. Mag. Zool. **10**: 59.

Elytra thickly punctured, with bluish sheen, each with a rather large, round, yellow basal spot, a very large and transversely oval yellow area before mid-length, and a large, rounded, yellow spot before apex; all of these a little raised. Elytral hamuli of ♂ slender and strongly deflexed, approximately horizontal throughout their length. Metatibia of ♂ strongly spined near its base. Length 13–14 mm.

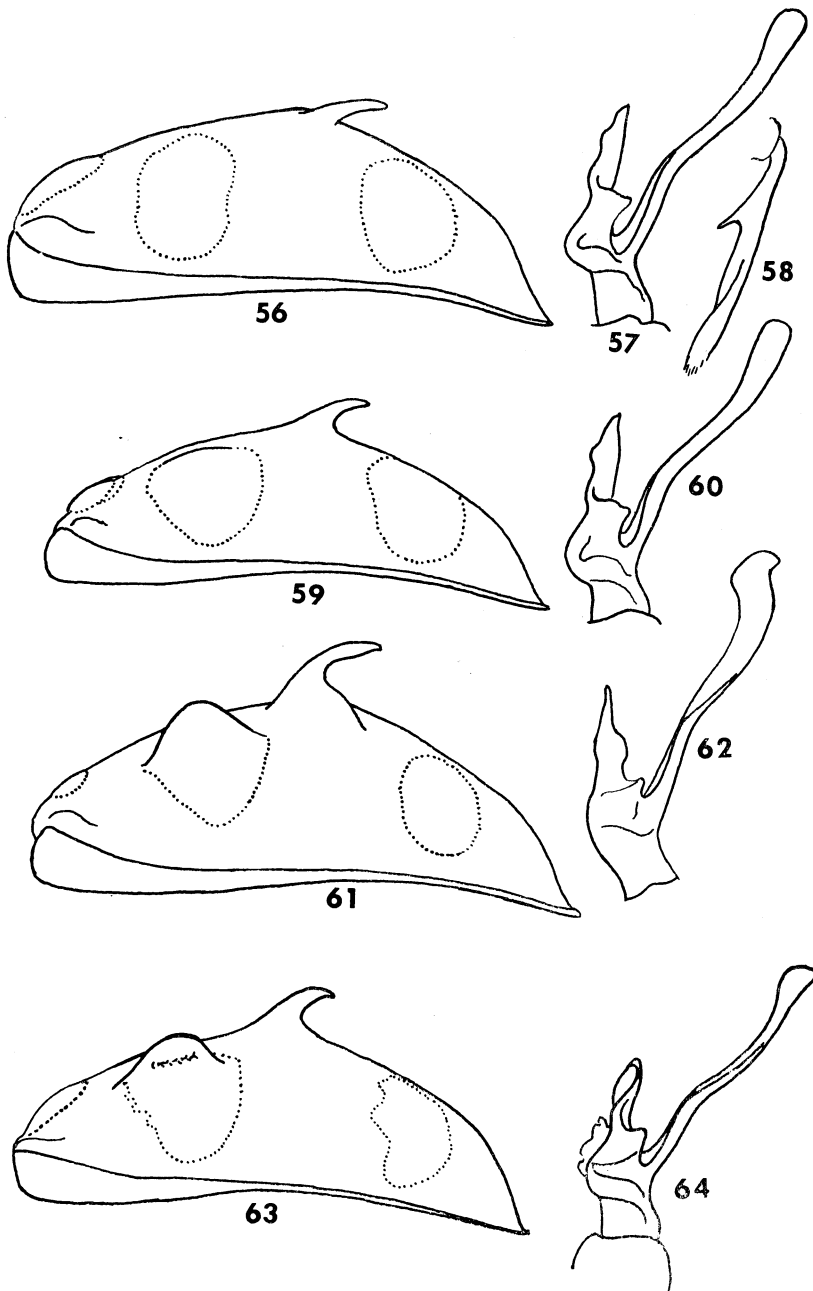
Male type from Penang Island in Berlin Mus. Another specimen studied by Gerstaecker is in the Copenhagen Mus. I have seen specimens from Medan, Sumatra and Malacca also. The species has been recorded from Java.

Spathomeles anaglyptus insuspectus Gorham Figs. 56–58.

Spathomeles insuspectus* Gorh., 1873, End. Recitati, p. 31.—Strohecker, 1949, Proc. Hwn. Ent. Soc. **13: 442.

Differs from nominate *anaglyptus* chiefly in the larger size of the yellow markings of the elytra. The basal and middle spots are approximate and, in some specimens, coalescent. The middle spot is less tumid than in *anaglyptus* but otherwise structure, including ♂ characters, is closely similar.

The British Mus. has specimens from the Baram District of Sarawak and other specimens



Figs. 56-64. 56, *Spathomeles anaglyptus insuspectus* Gorham, left elytron of ♂; 57, aedeagus, dorsal view; 58, metatibia of ♂. 59, *S. anaglyptus* Gerstaecker, left elytron of ♂; 60, aedeagus dorsal view. 61, *S. darwinista* Dohrn, left elytron of ♂; 62, aedeagus, dorsal view. 63, *S. rizali* n. sp., left elytron of ♂; 64, aedeagus, dorsal view.

labeled "Borneo", "N. Borneo" or "Sarawak." Specimens in my collection have labels similar to these. The Bishop Mus. has material collected by T. C. Maa in the Merirai Valley, Kapit District, Sarawak and at Ranau, W. Coast Residency, B. N. Borneo in August and September 1958. The Hungarian Mus. has several specimens with the orange or yellow areas darkened. Csiki has attached the labels "*S. quadrimaculatus*" and "*S. unicolor*" to these but the names have never been published. The totally dark color is quite certainly due to poor preservation.

Male type in the British Mus.

***Spathomeles darwinista* Dohrn** Figs. 61, 62.

Spathomeles darwinista Dohrn, 1873, Stettiner Ent. Zeit., p. 322.—Strohecker, 1949, Proc. Hwn. Ent. Soc. 13: 442, figs. 9–11.

**Spathomeles pyramidalis* Gorham, 1873, End. Recitati, p. 31.

Although I have not examined the type of *darwinista*, there is no question of the accuracy of Csiki's opinion that *S. darwinista* Dohrn and *S. pyramidalis* Gorham apply to one species. A question does exist as to priority of publication which, I presume, Csiki considered when placing *pyramidalis* in synonymy in 1901.

In this species the generic features reach an extreme development. The elytra are strongly convex, the surface densely punctured but shining with steel-blue luster, the apical portion of the elytra more gradually narrowed than in *anaglyptus* or *decoratus*. The basal yellow spot is very small; the 2nd spot is large and covers a high, conical elevation; the pre-apical spot is round. The elytral hooks of the ♂ are broad at base and ascendant, the apical 1/2 strongly deflexed, tapering and acute. The distal excision in the front tibia of the ♂ is unusually deep and the hind tibia is unarmed or has a small tubercle on its basal 1/3. In both sexes the metasternal pit is very deep and strongly strigose, more so in the ♂. Length 12–13 mm.

I have seen 1 specimen from Bohol. All others with definite labels have come from Mindanao but several specimens labeled "Philippines" have been studied. In my collection are specimens from Surigao. The Bishop Mus. has material collected by H. Torrevall as at the following localities in Misamis Oriental: Mt. Balatukan, 15 km s. w. Gingoog, 1–5.V. & 27–30.IV.1960; Minalwang, 24.III.1961; Minubanan, 5.IV.1961. A ♀ from Matatungan, Davao is in the Chicago Mus.

Male type from "Philippines" in Stettin Museum. Male type of *pyramidalis* from "Philippines" in British Mus.

***Spathomeles rizali* Strohecker, n. sp.** Figs. 63, 64.

Black, shining, each elytron with 3 orange calluses, 1 basal, 1 just in front of mid-length and covering a high conoid, 3rd pre-apical and transversely elliptic. Basal callus circular, much larger than in *darwinista*, separated from humeral margin by much less than its own diameter. Conoid elevation of 2nd callus lower than in *darwinista*, in frontal view projecting but little above the sutural level. Length 12.5 mm. In the ♂ the front tibia is curved and internally excised apically, the mid tibia bears at its distal 1/3 a stout, short tooth and the hind tibia is armed in its basal 1/3 with a slender, obliquely deflected spine. Elytral spines shorter than in *darwinista*, shorter, stouter and less deflected than in *anagly-*

ptus.

While this forms something of a transition between *anaglyptus* and *darwinista* and may be representative of a cline, it is best, for the present, to note it as a species. Named after Dr. José Rizal, Philippine patriot.

Holotype ♂ (CAS) Kabasalan, Zamboanga, Mindanao, H. C. Muzzal. Allotype ♀ same data as holotype. Paratypes: 1 ♂, 2 ♀♀ same data as holotype.

Genus **Amphistethus** Strohecker, n. gen.

General form long-oval, humeri inflated, not carinate but with a spine in one of the species. Pronotum with front angles strongly produced, their margin thickened and strigose punctate. Mandible with apex chisel-shaped, the tip minutely incised. Maxilla with galea and lacinia subequal, the lacinia with inner edge densely ciliate in distal 1/2, tapering toward apex, which is densely setose. Maxillary palp stout, its terminal article broadening to apex, transverse. Prosternum very broad between coxae, which it scarcely surpasses posteriorly, its apex broadly excised. Excision approximately rectangulate. Mesosternum transverse, its posterior portion depressed and with several fine, longitudinal grooves.

Differs from *Amphisternus* in maxillary palp, mandible, elytral humeri and the thickened front angles of pronotum. There is some resemblance to *Spathomeles* but the prosternum is deeply excised.

Type of genus: *Amphistethus superbus* n. sp.

KEY TO SPECIES OF AMPHISTETHUS

1. Elytral umbo with spine **astarte**
Elytral umbo without spine 2
2. Each elytron with 2 large, yellow spots **phyllocerus**
Elytra with basal spots and transverse fasciae.....3
3. Elytral umbo subcarinate, unmarked **superbus**
Elytral umbo with pale spot, rounded..... **pustulifer**

Amphistethus astarte (Strohecker), n. comb.

**Amphisternus astarte* Strkr., 1951, Pan-Pac. Ent. 37: 158, fig. 1.

Black, elytra with brassy reflections, each with 5 reddish yellow calluses, a rounded one near scutellum, 2 lateral and in front of mid-length, and 2 of irregular outline before apex. Length 10 mm.

Monotype ♀ collected by J. L. Gressitt at Bukai, Taiwan is in the California Academy of Sciences. A ♂ specimen is in the Berlin Mus. (Sauter Coll.). In this specimen the humeral spine is long, acuminate and directed at right angle to the body axis.

Amphistethus phyllocerus (Arrow), n. comb. Fig. 70.

**Amphisternus phyllocerus* Arr., 1920, Trans. Ent. Soc. Lond., p. 15; 1925, Fauna Br. India, Erytl., p. 286, fig. 51.

Purplish black, each elytron with 2 large, round bright yellow patches. Length 7.5 mm.

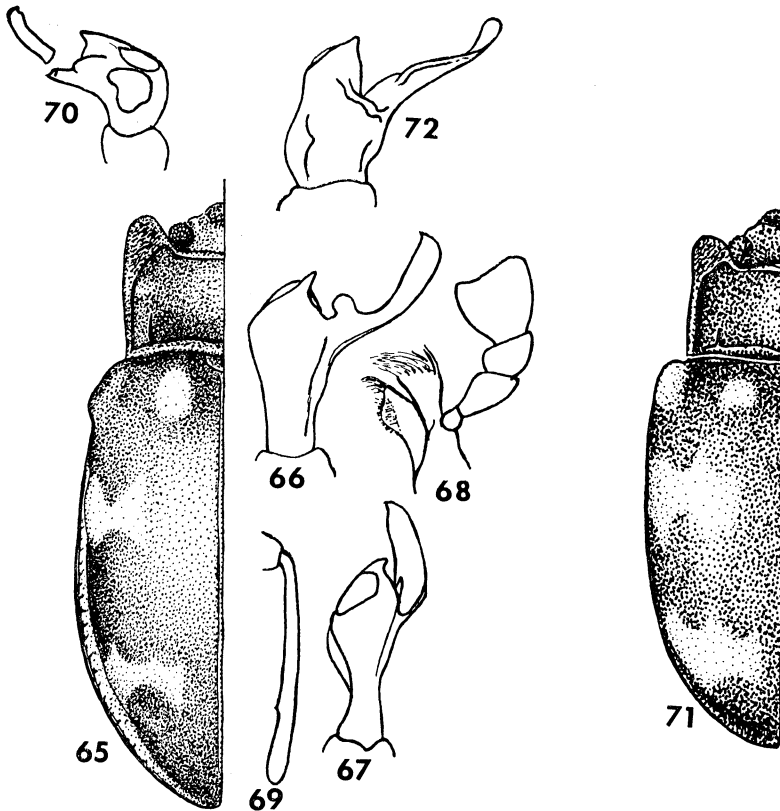
Protibia of ♂ abruptly bent outward at mid-length, thence evenly incurved to apex.

Monotype ♂ from Patkai Hills, Assam in the British Mus.

***Amphistethus superbus* Strohecker, n. sp.** Figs. 65-69.

Form long, subparallel. Black, each elytron with a basal tubercle and 2 orange-yellow, transverse fasciae.

Antennae slender, elongate, nearly 2× as long as head and pronotum combined, each of articles 1-8 longer than broad, club moderately broad, flattened. Pronotum with sides subparallel but feebly widened at mid-length, front angles protuberant, bluntly rounded, disc thickly punctured, basal sulcus deep and undulate at middle, lateral sulci short but sharply impressed. Elytra abruptly wider than pronotum, humeri protuberant, sides subparallel, gradually narrowed from posterior 1/3 to apex, conspicuously and closely punctured. Basal elytral spot lozenge-shaped and feebly convex. Anterior fascia u-excavate in front, feebly biconcave behind, remote from suture. Posterior fascia triconcave in front,



Figs. 65-72. 65, *Amphistethus superbus* n. sp., ♂; 66, aedeagus, dorsal view; 67, aedeagus, right face; 68, maxilla; 69, metatibia of ♂. 70, *A. phyllocerus* (Arrow), aedeagus, ventral view. 71, *A. pustulifer* (Gorham), ♂; 72, aedeagus, dorsal view.

arcuately excised behind. Length 11 mm.

The single ♂ specimen, has the front tibia thickened apically with a dense pad of black hair internally. Mid tibia is very feebly sinuate, the hind tibia slender with a small tubercle on its inner edge a little distal to mid-length. The last sternite is broadly and shallowly emarginate at apex, with a semi-cycloid impression basally.

Holotype ♂ (BMNH), Tam Dao, Tonkin, H. Perrot.

Amphistethus pustulifer (Gorham), n. comb. Figs. 71, 72.

Amphisternus pustulifer Gor., 1896, Ann. Mus. Genova **36**: 291.—Arrow, 1925, Fauna Br. India, Erotyl., p. 285.

Black, feebly shining, each elytron with 2 yellow spots near base, the outer on humerus and 2 broad and irregular yellow cross-bands. Front angles of pronotum strongly produced, rounded and thickened, their puncturing rugose or strigose. Length 9 mm. The ♂ has the protibia weakly toothed at mid-length, the mid and hind tibiae bowed, the hind margin of the sternite 5 produced into 2 rounded processes.

Although Arrow (*l. c.*) noted that he had examined the type, Dr. Tortonese was unable to find it in the Genoa Mus. The Hungarian Mus. has a ♀ cotype and the British Mus. contains a pair taken at Xieng Khouang, Laos by R. Vitalis de Salvaza. My drawings were made from the ♂ of this pair.

Genus **Amphisternus** Germar

Amphisternus Germ, 1843, Ersch u. Gruber, Allgemein. Ency. Wissensch. **39**: 85 (Type of genus: *A. tuberculatus* Germar).—Gerstaecker, 1857, Archiv Naturg. **23**: 216; 1858, Mon. Endom., p. 44.—Arrow, 1925, Fauna Br. India, Erotyl., p. 282.

Prosternal process prolonged behind the front coxae and deeply cleft. Mandible with apex minutely bifid and with an internal tooth. Lacinia of maxilla about equal to galea and setose at tip. Elytra verrucose to spinose, humeri carinate, with a spine in some species. Elytral spines, when present, do not reach a length and acuteness equal to those in *Cacodaemon*. The 2 genera differ strongly in maxillary structure and the possession of elytral spines must, I think, have been attained separately in the genera, albeit as expressions of genetic constitution common to both taxa.

The biological value of these elytral excrescences, which are about equally developed in both sexes, is not apparent to me. Possibly they may be some protection against small vertebrate predators. *Amphisternus* and *Cacodaemon*, and *Spathomeles* as well, seem to be waning types of endomycids, now largely confined to the periphery of SE Asia and not abundant there, as judged by the number of specimens which have found their way into museums.

DISTRIBUTION: Burma, Indo-China, Malaya and Indonesia

KEY TO SPECIES OF AMPHISTERONUS

1. Elytral umbo without spine 2
- Elytral umbo with cylindrical or conical spine.....9

2 (1).	Wingless, elytral humeri strongly oblique	3
	Winged, humeri subrectangular	5
3 (2).	Elytra wholly black, very coarsely punctured	sordidus
	Elytra with red or yellow areas.....	4
4 (3).	Elytra with 2 pre-apical spots (Sumatra)	nanus
	Elytra with single pre-apical spot (Java)	verrucosus
5 (2).	Umbonal carina without tubercle	6
	Umbonal carina with tubercle	8
6 (5).	Elytra but little longer than their combined width	7
	Elytra 1.5× as long as combined width	opacus
7 (6).	Elytra abruptly rounded to apex (Java)	tuberculatus
	Elytra distinctly tapering behind middle	eruptus
8 (5).	Elytra with a discal subcarinate tubercle.....	corallifer
	Elytra with a high discal prominence	vomeratus
9 (1).	Elytra much prolonged at apex	caudatus
	Elytra rather abruptly rounded to apex.....	10
10 (9).	Discal prominence of elytron truncate.....	grandjeani
	Discal prominence of elytron rounded at apex	11
11 (10).	Elytron with broad post-median pale bar.....	malaccanus
	Elytron with 2 small spots behind middle.....	mucronatus

Amphisternus sordidus Arrow Figs. 77, 78.

* *Amphisternus sordidus* Arr., 1928, Faune Col. Françaises 2: 342.

Form short and broad. Entirely black. Pronotum opaque and unpunctured, with a pair of discal tubercles and a low rounded elevation near each side margin. Elytra very coarsely, rugosely punctate, each with 4 low, subcarinate tubercles. Length 7.5 mm.

Male type from Dalat, Annam, 9.IV.1924, R. Vitalis de Salvaza, in the British Mus. This and another ♂ with the same data are the only specimens known to me.

Amphisternus nanus Strohecker, n. sp. Figs. 75, 76.

Small for the genus. General form short-oval but bases of pronotum and elytra strongly constricted. Purplish black, each elytron with a basal yellow tubercle and 2 pre-apical yellow spots. Length 6.3 mm.

Antennae stout, 1.5× as long as head and pronotum together, club narrow and not much flattened. Pronotum with sides strongly rounded to front angles, which are rectangular or slightly acute. Posteriorly the sides are constricted and meet base rectangularly. Basal sulcus undulate at middle, lateral sulci short, linear. Disc of pronotum finely granulate unpunctured, feebly bituberculate. A broad, low elevation on each side within reflexed margin. Elytra no wider at base than pronotum, shoulders obliquely widened and carinate. Surface of elytra coarsely and rather sparsely punctured. Basal tubercle low-conoid, smooth and orange-yellow. In front of mid-length and on median line of each elytron is a smooth, dark, carinate tubercle, which is followed, on posterior 1/3 of elytron, by a pair of yellow spots plane with the general surface. In the paratype these spots are confluent.

Holotype ♂ (BMNH) W. Sumatra, Gunung Singgaland, E. Jacobson, 1800 m, 1925.

Paratype ♂, same data as holotype (authors coll.). These ♂♂ have a sharp tooth on the distal 1/3 of the inner edge of the front tibia.

Amphisternus verrucosus Gorham Figs. 73, 74.

Amphisternus verrucosus Gorh., 1897, Proc. Zool. Soc. Lond., p. 456, pl. 32, fig. 3.

General color black but tinged with brown in some specimens, probably a teneral condition. Sides of pronotum well rounded anteriorly to the blunt front angles, contracted posteriorly to the feebly acute hind angles. Disc minutely muricate, unpunctured, with 2 low discal tubercles and a low rounded swelling on each side near margin. Basal tubercle of elytron dark, discal tubercle orange somewhat higher. Pre-apical yellow spot feebly callosed, and oval in form. Elytral surface, except callosities, thickly and rugosely punctured, the punctures somewhat seriate. Length 6.5–7 mm.

Male type from Java, collected by Frühstorfer, presumably in Belgian National Mus. A series now distributed between the Bogor Mus. and my collection included the following data: Mons Tjikorai, 1892, 4000', H. Frühstorfer;—Gunung Tangkoeban Prahoe, Preanger, 4000–5000', 27.VIII.1929, F. C. Drescher; 14.I.1930, F. C. Drescher; VII.1937, I. 1937, XII. 1928, XI. 1937, Drescher.

Amphisternus tuberculatus Germar Figs. 81, 82.

Amphisternus tuberculatus Germ., 1843, Ersch u. Gruber, Allgemein. Ency. Wissensch. 39: 85.—Gerstaecker, 1857, Archiv Naturg. 23: 216; 1858, Mon. Endom., p. 49.

The mature coloration of this insect is black, each elytron with a small basal tubercle and a larger orange-yellow discal tubercle, and a large, transversely oval, orange spot before apex. Humeral carina may also be of orange or reddish color. Some of the specimens seen have a brownish tint but this seems to be an immature condition. The ♂ has a short, sharp tooth at the distal 1/3 of the front tibia. Length 8–9.3 mm.

The presumed type, according to Arrow, is in the Halle Mus. The British Mus. has a series of 4 ♂♂ and 4 ♀♀ from "Java" and 3 ♂♂ and 2 ♀♀ taken in Java by Horsfield.

Amphisternus eruptus Gorham

Amphisternus eruptus Gorh., 1901, Stettiner Ent. Zeit. 62: 196.—Arrow, 1925, Fauna Br. India, Erotyl., p. 283.

This may be, as considered by Arrow, a subspecies of *A. tuberculatus*. It is smaller than *tuberculatus*, with the elytra distinctly tapering to apex rather than abruptly rounded as in *tuberculatus*. The pronotum is opaque, the basal portion of the elytra near the suture shining and subseriately punctured. In other characters, including the ♂ aedeagus, it is scarcely distinguishable from *tuberculatus*. Length 7 mm.

Type from Soekaranda, Sumatra in the Stettin Mus. The British Mus. has specimens from Perak and Pahang.

Amphisternus opacus Strohecker

**Amphisternus opacus* Strkr., 1957, Ann. Hist.-Nat. Mus. Nat. Hungarici 8: 281.

Closely allied to and possibly a subspecies of *tuberculatus*, but differs in its more elongate form and lesser development of the humeral carina of the elytra. The greatest width of this carina is anterior, not at its apex as in *tuberculatus*. The basal tubercle of the elytra distinctly is more carinate in *opacus*. From *eruptus* this form differs in its longer elytra, which are subparallel and suddenly rounded to apex. Length 9.5–10 mm.

Male holotype from Pontianak, Borneo in Hungarian Nat. Mus. A ♀ from Mt. Dulit, Sarawak is in the British Mus. and the Bishop Mus. has a ♂ from Merirai, Kapit District, Sarawak.

Amphisternus corallifer Gerstaecker Figs. 83, 84.

Amphisternus corallifer Grstkr., 1857, Archiv Naturg. **23**: 216; 1858, Mon. Endom., p. 48, pl. 2, fig. 1.—Arrow, 1925, Fauna Br. India, Erotyl., p. 284; 1928, Faune Col. Françaises **2**: 342.

Amphisternus laotianus* Achard, 1926, Fragments Ent., p. 141.—Arrow, 1928, Faune Col. Françaises **2: 284.

Similar in form and size to *tuberculatus* but differing in the following features: humeral carina with a prominent orange tubercle, discal elytral tubercle subcarinate, elytron with 2 pre-apical spots, these sometimes confluent. Length 9 mm.

The type has been designated by Arrow as the specimen in the Dohrn Coll. at Stettin, the Berlin Mus. specimen as co-type. The ♀ type of *A. laotianus* is in the Prague Mus.

Arrow in 1925 reported the species from Karen Hills and Dawna Hills in Burma, and from Tenasserim. The British Mus. also has specimens collected at various localities in Indo-China by Perrot and Vitalis and listed by Arrow in 1928. Two specimens in my collection are from Burma.

Amphisternus vomeratus Gorham Figs. 90, 91.

Amphisternus vomeratus Gorh., 1901, Stettiner Ent. Zeit. **62**: 197.

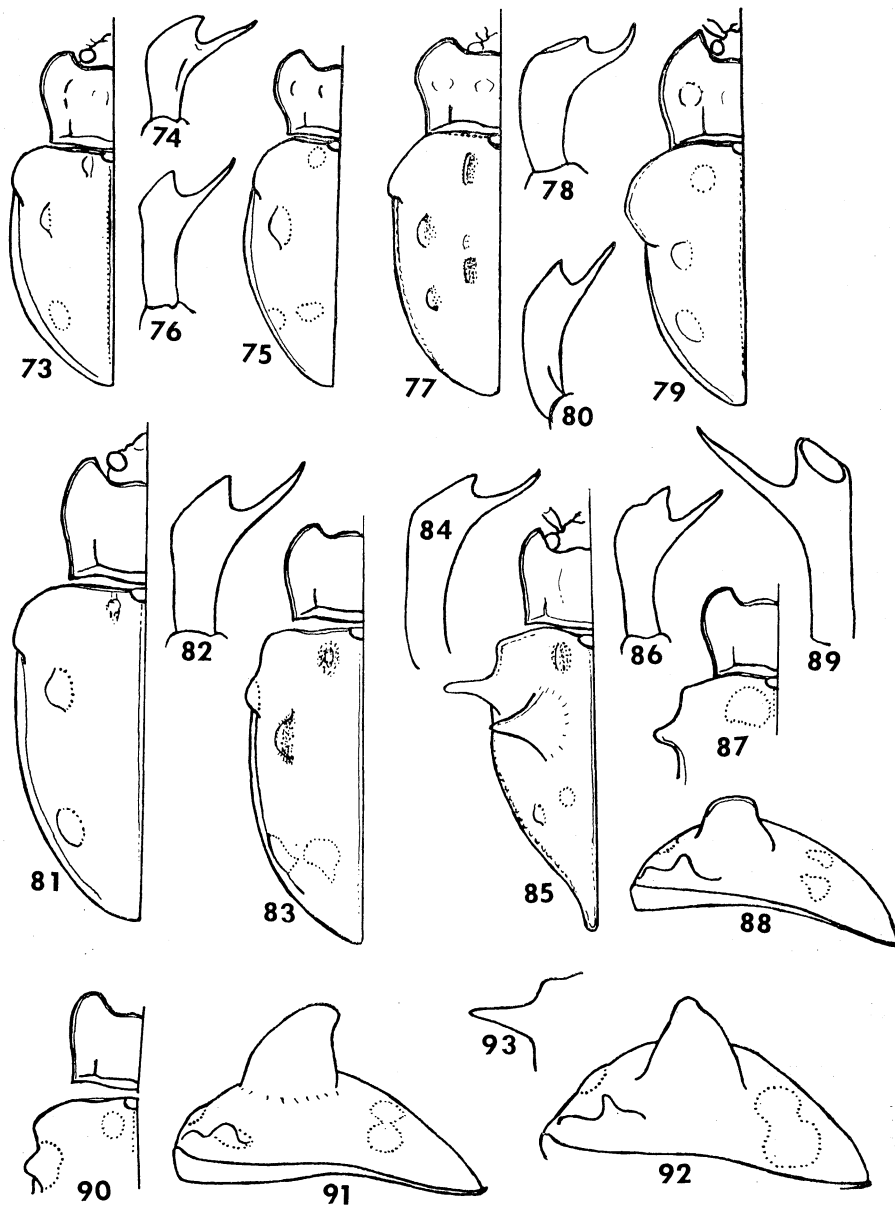
Opaque black, each elytron with 3 yellow or orange markings, a small pimple on the base, a prominent tubercle on the humeral carina and a pre-apical transverse band, medially constricted. Pronotal disc unpunctured, the front angles bluntly rounded. Elytra finely and rather sparsely punctured, their apices evenly approximate and not at all truncate. Tibiae of ♂ feebly bowed but unarmed. Length 7.5 mm.

Type from Soekaranda, Sumatra in the Stettin Mus. Two specimens from Malacca have been studied. These are in the Berlin Mus. and my collection. In one of these specimens the pale elytral markings are very large but this is clearly due to the teneral condition of the insect.

Amphisternus caudatus Strohecker n. sp. Figs. 85, 86.

Black, opaque, elytra strongly attenuate, each with a basal and 2 post-median red pustules and 2 spiniform prominences, 1 humeral the other discal. Length 7.4 mm.

Antennae stout but with stalk articles longer than wide, club moderately broad and flattened, article 9 narrower than 10. Pronotum with sides gently sinuate, basal angles feebly acute, apical angles much rounded, disc feebly punctured and with a large impression on



Figs. 73-93. 73, *Amphisternus verrucosus* Gorham, ♂; 74, aedeagus, dorsal view. 75, *A. nanus* n. sp., ♂; 76, aedeagus, dorsal view. 77, *A. sordidus* Arrow, ♂; 78, aedeagus, dorsal view. 79, *Cacodaemon proavus* n. sp., ♂; 80, aedeagus, dorsal view. 81, *Amphisternus tuberculatus* Germar, ♂; 82, aedeagus, dorsal view. 83, *A. corallifer* Gerstaecker, ♂; 84, aedeagus, dorsal view. 85, *A. caudatus* n. sp., ♂; 86, aedeagus, dorsal view. 87, *A. grandjeani* Pic, pronotum and humerus. 88, left elytron of ♂; 89, aedeagus, ventral view. 90, *A. vomeratus* Gorham, pronotum and humerus; 91, left elytron of ♀, 92, *A. malaccanus* Pic, left elytron of ♀; 93, humeral spine.

each side, lateral sulci very short, basal sulcus shallow. Elytra with apices narrowed and extended, apices rounded. There is a short, blunt-tipped spine on the humeral carina and a high conoidal prominence on the disc. Discal conoid slightly compressed with its front edge carinate. Basal red pustule somewhat elongate. Between discal spine and apex are 2 red pustules, obliquely placed. Surface of insect dull except carinae of shoulder and of elytral spines. There are no external sexual differences worth remark.

Holotype ♂ (BMNH), Mt. Kinabalu, Br. N. Borneo, 1524 m, 23.V.1932, Clemens. Allotype ♀ (BMNH), Mt. Kinabalu, Lumu Lumu, 1524 m, 8.IV.1929, H. M. Pemberton. Paratypes: 1♂, same data as allotype (author's coll.), and a ♂ collected by T. C. Maa at Tenompok, Br. N. Borneo, 1460 m (BISHOP).

***Amphisternus grandjeani* Pic** Figs. 87-89.

Amphisternus grandjeani* Pic, 1930, Mél. Exot.-Ent. **55: 6.

Opaque black. Pronotum with sides strongly rounded to front angles, convergent toward base, surface unpunctured. Elytra coarsely punctured, each with a large orange spot on base, enclosing a feeble callus, and 2 pre-apical orange spots transversely arranged. Humeral carina has a short, stout, blunt-tipped process. High discal prominence truncate at its summit. Elytral apices evenly convergent, not truncate. Length 7 mm.

Male monotype in the Pic Coll. at the Paris Mus. It comes from Banguey Island.

***Amphisternus malaccanus* Pic** Figs. 92, 93.

Amphisternus malaccanus* Pic, 1930, Mél. Exot.-Ent. **55: 5.

Opaque black. Pronotum as in *A. grandjeani*. Elytra coarsely punctured, each with a round, orange basal spot which covers a small pustule, and a rather broad, orange, transverse band before apex. Humeral spine longer than in *grandjeani* and more narrowly rounded at apex. Discal elytral prominence compressed conoid in form and rather narrowly rounded at its apex. Length 8 mm.

While compared with *A. papulatus* Gorham (= *Cacodaemon bellicosus* Gerstaecker) by Pic, this form is nearest *A. mucronatus* Grstkr. and is possibly a color phase of that species.

Female monotype from Malacca in the Pic Coll. at the Paris Mus.

***Amphisternus mucronatus* Gerstaecker** Figs. 94, 95.

Amphisternus mucronatus Grstkr., 1857, Archiv Naturg. **23**: 217; 1858, Mon. Endom., p. 51. *Amphisternus cultratus* Gorham, 1901, Stettiner Ent. Zeit. **62**: 197.—Arrow, 1923, Trans. Ent. Soc. Lond., p. 485.

Opaque black, each elytron with a basal red spot enclosing a small pustule, and 2 small post-median red pustules. Pronotum unpunctured, its front angles bluntly rounded, its sides slightly convergent behind. Elytra coarsely and rather sparsely punctured, humeral spine moderately long (1.3 mm), bluntly to subacutely rounded at apex. Discal prominence of elytron at least as high as long with apex well rounded. The material studied shows some variation in the elytral prominences. The specimens illustrated represents a condition toward the extreme bluntness of both processes. The elytral apices are evenly rounded, not truncate.

Length 7.5 mm. The protibia of the ♂ has a small tubercle at the distal 1/3 of its inner edge.

Types of *mucronatus* and *cultratus* in the Stettin Mus.

All records and material examined pertain to Borneo. Borneo, Mjoberg (author's coll., CAS) Gunungsari, 14. VIII. 1956, A. M. R. Wegner (BOGOR Mus., author's coll.); junction Tinjar and Lejok, Mt. Dulit, Sarawak, 11. X. 1932, B. M. Hobby & A. W. Moore (BMNH); between Tinjar and Rumah Bulan Ding, Sarawak, 10. XI. 1932, Hobby & Moore, (BMNH).

Genus *Cacodaemon* Thomson

Cacodaemon Thomson, 1857, Archives Ent. 1: 153.

Amphisternus (in part) Gerstaecker, 1857, Archiv Naturg. 23: 216; 1858, Mon. Endom., p. 44.

This genus, as already noted, shares a number of features with *Amphisternus*. The prosternal process is prolonged and deeply bifid, the mesosternum strongly transverse and declivent behind. The mandible is minutely cleft at apex and has an internal tooth. The maxilla, however, is quite different. The lacinia is narrow, tapering to its apex, ciliate along its median edge but without the dense brush of setae at its apex. The galea is very broad and somewhat triangular in outline.

Under the generic name *Cacodaemon* Thomson placed 5 species, the first 2 of which Gerstaecker placed in synonymy under species of *Spathomeles*. The other 3 Gerstaecker transferred to *Amphisternus*, placing 2 of the names in synonymy. Thomson indicated no type of his genus *Cacodaemon* and his diagnosis seems largely drawn from the forms placed in *Amphisternus* by Gerstaecker.

Type of genus (here designated): *Eumorphus satanas* Thomson.

The distribution is largely peripheral. Two species occur in Indo-China, all the rest in Borneo, Sumatra and the southern part of the Malay Peninsula.

KEY TO SPECIES OF CACODAEMON

- | | | |
|--------|--|----------------------------|
| 1. | Elytron with posthumeral, lateral spine | 6 |
| | Elytron without posthumeral spine | 2 |
| 2 (1). | Wingless; humeri broad and oblique..... | proavus |
| | Winged; humeri rectangular | 3 |
| 3 (2). | Elytron with a very low discal carina | sexcristatus |
| | Elytron with high discal prominence | 4 |
| 4 (3). | Elytral prominence inflated, mastoid..... | mastophorus |
| | Elytral prominence cariniform | 5 |
| 5 (4). | Cariniform prominence bilobate..... | tuberifer |
| | Cariniform prominence straight..... | hamatus; acuminatus |
| 6 (1). | Elytra truncate, outer apical angle spiniform..... | 7 |
| | Outer apical angle at most flap-like | 14 |
| 7 (6). | Front angles of pronotum elongate, narrow | 8 |
| | Area of front angles forming equilateral triangle..... | 11 |
| 8 (7). | Front angles very long, slender, spiniform..... | 9 |

	Front angles long, but flattened, sometimes upturned	10
9 (8).	Disc of elytron unispinose	spinicollis
	Disc of elytron bispinose.....	satanas
10 (9).	Front angles of pronotum slightly reflexed.....	spinusos
	Front angles strongly upturned	gracilis
11 (7).	Discal prominence of elytron mammiform.....	laotinus
	Discal prominence with spine	12
12 (11).	Basal and pre-apical pustules dark	armatus
	Elytral pustules red.....	13
13 (12).	Elytron with 1 pre-apical pustule.....	bellicosus ; borneensis
	Elytron with 2 pre-apical pustules	hystricosus
14 (6).	Front angles of pronotum elongate, narrow.....	15
	Area of front angles forming equilateral triangle	18
15 (14).	Front angles of pronotum directed forward.....	16
	Front angles strongly upturned	17
16 (15).	Upper surface sooty black, punctures very fine.....	nigrellus
	Upper surface dull black, densely punctured.....	atramentus
17 (15).	Base of elytra shining, rugosely punctured.....	auriculatus
	Elytra dull black, punctures fine and separate	gracilis
18 (14).	Discal prominence of elytron rounded above.....	kaszabi
	Discal prominence with apical spine.....	19
19 (18).	Elytra dull, punctures separate.....	20
	Elytra shining, punctures rugose, confluent	22
20 (19).	Elytra with soft bluish sheen	freudei
	Elytra black	21
21 (20).	Elytral dull, sooty black, punctures minute	bakeri
	Elytra with feeble sheen, punctures distinct	gerstaeckeri
22 (20).	Elytral pustules dark	aculeatus
	Elytral pustules red	arrowi

Cacodaemon proavus Strohecker, n. sp. Figs. 79, 80.

Form short and broad, entirely black, feebly shining, each elytron with 3 low tubercles arranged in a longitudinal row. Length 7 mm.

Antennae rather stout but with articles 3-8 each longer than broad, joint 3 but little shorter than 4-5 together, club narrow and moderately flattened. Pronotum strongly transverse, its sides much rounded, both basal and apical angles slightly acute, marginal areas reflexed and rugosely punctured, lateral sulci deep and short, basal sulcus deep and sinuate at middle. Pronotal disc punctured in ♂ but unpunctured in 2 ♀ specimens. Elytra with humeral carina broadly explanate and projecting beyond lateral margin, disc coarsely and thickly but not rugosely punctured. There is a rounded tubercle close to the base and suture, another near the hind margin of the humeral carina and a 3rd mid-way between the 2nd tubercle and elytral apex.

In the ♂ the front tibia has a tooth-like angulation at the distal 1/3 of its inner edge.
 Holotype ♂ (BMNH), Mauson, Tonkin, A. de Cooman. Allotype ♀ (BMNH), same data as holotype. Paratype: 1 ♀, same data as holotype, (author's coll).

Cacodaemon sexcristatus (Frivaldzsky), n. comb. Fig. 96.

**Amphisternus sexcristatus* Frdzsky., 1883, Tetmész. Füzetek 6: 125, pl. 1, fig. 2.

Form rather elongate for the genus. Color shining black, each elytron with a discal, basal and pre-apical red spot. Pronotum narrowed basad, sides moderately rounded to front angles, which are narrowly rounded but not sharp, surface thickly punctured, lateral sulci deep and long, basal sulcus deep. Elytra with humeral carina somewhat reflexed with sinuate margin. Basal tubercle of elytron low cariniform and there is a low carina on elytral disc bearing a small red spot on its anterior end. Elytral surface thickly and evenly punctured. Length 8 mm.

Holotype ♀ from Sarawak in Hungarian Mus. A ♀ collected at Peugaron by Doherty is in the British Mus.

Cacodaemon hamatus (Guérin), n. comb. Figs. 97, 98.

**Eumorphus hamatus* Guérin, 1837, Iconogr. Regne Animal, Insectes, p. 36, pl. 50, fig. 7.
Amphisternus inaequalis Germar, 1843, Ersch u. Gruber, Allgemein. Ency. Wissensch. 39: 85.
Amphisternus hamatus: Gerstaecker, 1857, Archiv Naturg. 23: 216; 1858, Mon. Endom., p. 47.

Form elongate for the genus. Black, each elytron with basal, discal and pre-apical red spot. Length 10–11 mm. Pronotum muricate, dull, unpunctured, sides rounded to front angles, slightly convergent basad. Elytra tapering to apex, which is somewhat prolonged, their surface weakly shining and finely punctured. Basal red spot of elytron lies upon a low, oval tubercle, the discal spot is on the anterior end of a high, oblique carina, and the pre-apical spot is somewhat pustulate.

Male monotype from Java in British Mus. Additional specimens studied have also been labeled "Java".

Cacodaemon acuminatus (Achard), n. comb. Fig. 99.

**Amphisternus acuminatus* Ach., 1925, Fragments Ent., 140.

Probably a subspecies of *C. hamatus*, but differs in the greater attenuation of the elytral apices, especially in the ♀. Aedeagal differences are evident but slight.

Female monotype from Dolok-Baros, Medan, Sumatra, in the Prague Mus. Three other specimens labeled "Sumatra" have been seen.

Cacodaemon tuberifer (Frivaldzsky), n. comb. Fig. 100.

**Amphisternus tuberifer* Frdzsky, 1883, Termész. Füzetek 6: 123, pl., figs. 1, 1a.

Pronotum densely but obsoletely punctured, its sides sinuate, front angles narrowly rounded. Elytra sparsely punctured, each with a red pustule at base and another before apex, and a high, oblique discal carina which is deeply interrupted. Length 9–10 mm. In the ♂ the front coxa is dentiform, sternite 5 has 2 small tubercles, the protibia bears a small tooth near its apex and proximal to this tooth is broadly and rather deeply excised.

Male monotype from Mt. Matang, Borneo in Hungarian Mus. The British Mus. contains a ♀ collected by Shelford in Sarawak and the Berlin Mus. has a ♂ specimen from Borneo.

Cacodaemon mastophorus (Strohecker), n. comb. Fig. 101.

Amphisternus mastophorus* Strkr., 1957, Ann. Hist.-Nat. Mus. Nat. Hungarici **8: 282, figs. 54A, B.

Much like the preceding species in size and form and even in the structure of ♂ pro-tibia and aedeagus. The discal prominence of the elytron, however, is roundly inflated and surmounted by a sinuous carina which ends posteriorly in a nipple-like projection. Length 10 mm.

Male monotype collected at Sandakan, Borneo by C. F. Baker is in U. S. Nat. Mus. The British Mus. has a ♂ specimen also taken at Sandakan by Baker.

Cacodaemon spinicollis (Gerstaecker), n. comb. Fig. 106.

Amphisternus spinicollis* Grstker, 1857, Archiv Naturg. **23: 218; 1858, Mon. Endom., p. 59. *Cacodaemon cerberus* Thomson, 1857, Archives Ent. **1**: 155.

Front angles of pronotum reflexed backward and upward as long, thin, sharp-tipped spines. There is a slender, sharp spine on the humeral carina and another on the elytral disc. The discal spine may be erect or somewhat deflected. Upper surface opaque black, each elytron with a red pustule on base and another near apex. Pronotum somewhat rugosely punctured, elytral punctures rather large, dense but not confluent. Length 6 mm.

Male lectotype from Borneo in Copenhagen Mus., cotype in Stettin Mus.

Data from other material studied are: Pahang, Malaysia; Mt. Kinabalu, Borneo; Mt. Tanggamoes, Sumatra; Sandakan Bay, N. Borneo; Tabang, E. Borneo; Nunukan Island. The specimens are in the Bishop Mus., Bogor Mus., Chicago Mus., British Mus. and my collection.

Cacodaemon satanas (Thomson) Fig. 107.

Eumorphus satanas Thoms., 1856, Revue et Magas Zool. (2) **8**: 416, pl. 23, fig. 6.

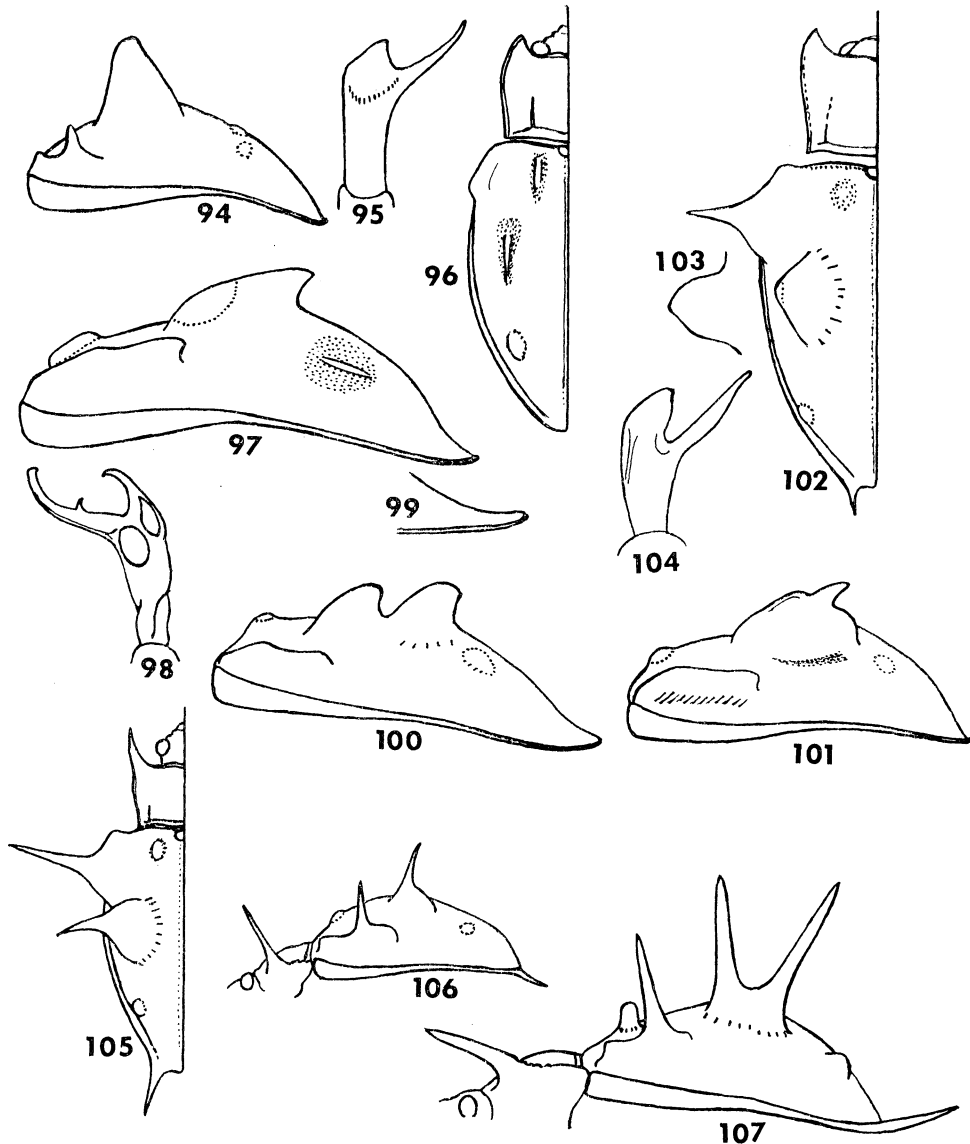
Cacodaemon satanas: Thomson, 1857, Archives Ent. **1**: 155.

Amphisternus satanas: Gerstaecker, 1857, Archiv Naturg. **23**: 217; 1858, Mon. Endom., p. 52.

In structure, this is one of the most spectacular beetles. Pronotum with front angles reflexed upward and backward as long spikes, disc very uneven, finely tuberculate and subopaque. Elytra with surface shining, rugosely and confluent punctate. Basal elytral tubercle is a high cylinder, rounded at summit; preapical tubercle prominent and subcarinate. In most specimens these tubercles are concolorous with the disc but I have seen a few specimens in which the summit of the basal tubercle is red. Humeral spine of elytra not unusual for the genus but discal prominence bears 2 divergent spines. Elytral apex truncate with the outer angle produced into a long, sharp spine. Length 9 mm.

Male with a short, broad tooth on distal 1/3 of front tibia. Female monotype from Borneo unknown.

Labels on specimens studied are: Kuching, N. W. Borneo, 2. XII. 1899 & 27. VII. 1900; Gunungsari, E. Borneo, 17. VIII. 1956, A. M. R. Wegner; Mt. Dulit, Sarawak, 25. VII & 13. IX. 1932, Hobby & Moore; Mt. Matang, Sarawak, XI. 1914; Mt. Murud, Sarawak, XI. 1914;



Figs. 94-107. 94, *Amphisternus mucronatus* Gerstaecker, left elytron of ♂; 95, aedeagus, dorsal view. 96, *Cacodaemon sexeristatus* (Frigvaldzsky), ♀. 97, *C. hamatus* (Guérin), left elytron of ♂; 98, aedeagus, ventral view. 99, *C. acuminatus* (Achard), elytral apex, ♀. 100, *C. tubifer* (Frigvaldzsky), left elytron of ♂. 101, *C. mastophorus* (Strohecker), left elytron of ♂. 102, *C. laotinus* (Arrow), ♂; 103, profile of discal cone; 104, aedeagus, dorsal view. 105, *C. spinosus* (Gorham) ♂. 106, *C. spinicollis* (Gerstaecker), ♂. 107, *C. satanas* (Thomson), ♀.

Tenompok nr. Jesselton, 26. I. 1959, T. C. Maa; Kampong Pueh, Liundu Distr., Sarawak, 25. V. 1958, Maa.

Cacodaemon spinosus (Gorham), n. comb. Fig. 105.

Amphisternus spinosus Gorb., 1901, Stettiner Ent. Zeit. **62**: 199.

Upper surface very dull sooty black, punctures shallow, fairly dense on pronotum, sparse on elytra. Front angles of pronotum very long and sharp, bent slightly upward at their origin but straight beyond this point. Elytron with humeral and discal spine slender and sharp and with outer apical angle extended as a long, sharp spine. Elytron bears 2 red pustules, 1 basal the other pre-apical. Length 7 mm.

Monotype from Soekaranda, Sumatra in Stettin Mus. A specimen in the British Museum, compared with type by Arrow, bears the label "Ceylon" but this is undoubtedly erroneous. Two ♂ specimens from Kwala-Kangsar, Perak have been seen.

Cacodaemon laotinus (Arrow), n. comb. Figs. 102–104.

Amphisternus bellicosus laotinus* Arr., 1920, Ann. Mag. Nat. Hist., ser. 9, **5: 322.

Amphisternus laotinus Arr., 1928, Faune Col. Françaises **2**: 343.

Among the species of *Cacodaemon* with apical elytral spines *laotinus* is unique in the form of the discal elytral prominence which is conoidal with rounded apex. Upper surface subopaque, pronotum obsoletely punctured, elytra with fine and shallow, well-spaced punctures. Length 8 mm.

The protibia of the ♂ has a sharp tooth at mid-length.

Female holotype from Xieng Khouang, Laos in the British Mus. A pair from the same locality is also in the British Mus.

Cacodaemon laotinus yunnanensis (Kryzhanovskij), n. comb.

Amphisternus laotinus yunnanensis Kryzj., 1960, Revue d'Ent. URSS **39**: 880, figs. 28, 29.

Differs from nominate *laotinus* in having tips of femora and antennal article 1 red. The published figures of this race indicate no structural differences.

Monotype ♂ from Yuili, W. Yunnan in the Zool. Inst. at Leningrad.

Cacodaemon armatus (Gorham), n. comb. Figs. 120, 121.

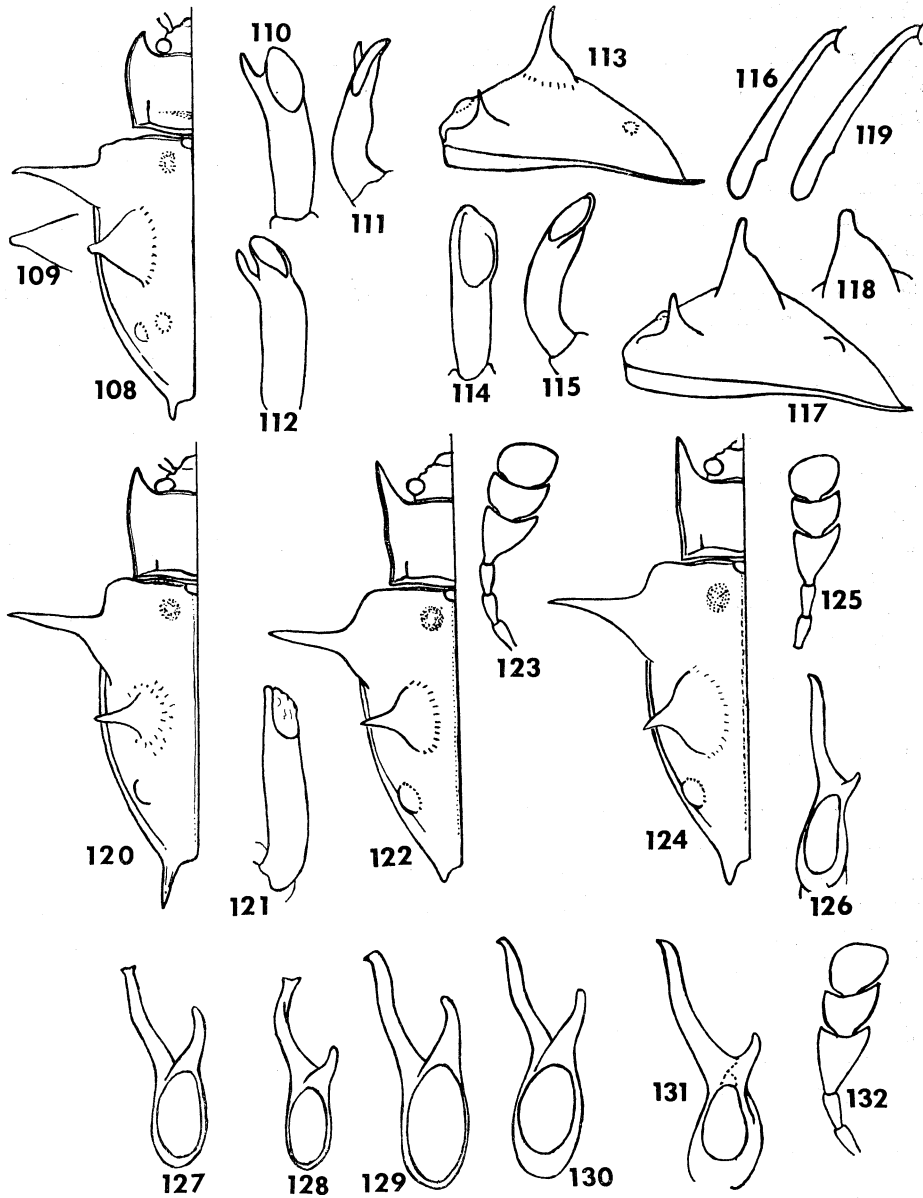
Amphisternus armatus* Gorb., 1892, Proc. Zool. Soc. Lond., p. 86, pl. 4, fig. 3.—Arrow, 1937, Ann. Mag. Nat. Hist., ser. 10, **20: 111.

Amphisternus metallicus* Pic, 1930, Mél. Exot.-Ent. **55: 5.

Apparently related to *bellicosus* but larger and with apical elytral spine greatly developed. Upper surface subopaque blue-black but in some specimens the basal margin of pronotum, elytral spines and dark tubercles have a brilliant, brassy sheen. Punctures of pronotum obsolete, of elytra moderately large, dense but well separated. Length 7–8 mm.

Female lectotype (Arrow), collected at Kina Balu, Borneo by Whitehead, in British Mus. A pair with the same data are cotypes. The British Mus. has a specimen taken by B. M. Hobby & A. W. Moore in moss forest at 4000' on Mt. Dulit. It carries a note "exudes fluid from swelling on femora." The Bishop Mus. has material collected by T. C. Maa at Tenompok, 18 km E. Jesselton in January and February 1959.

The monotype of *A. metallicus* is in the Pic Coll. in the Paris Mus.



Figs. 108-132. 108, *Cacodaemon hystricosus* (Gerstaecker), ♂; 109, profile of discal cone; 110, aedeagus of lectotype, dorsal view; 111, aedeagus of lectotype, left face; 112, aedeagus of Bornean specimen. 113, *C. bellicosus* (Gerstaecker), left elytron of ♀; 114, aedeagus, dorsal view; 115, aedeagus, left face; 116, protibia of ♂. 117, *C. borneensis* (Fruvaldzsky), left elytron of ♂; 118, profile of discal cone; 119, protibia of ♂. 120, *C. armatus* (Gorham), ♂; 121, aedeagus, dextro-dorsal view. 122, *C. nigrellus* (Strohecker), ♀; 123, antennal club. 124, *C. atramentus* n. sp., ♀; 125, antennal club. 126, *C. atramentus* n. sp., aedeagus. 127, *C. bakeri* (Strohecker), aedeagus, apical view. 128, *C. freudei* (Strohecker), aedeagus, apical view. 129, *C. gerstaeckeri* (Strohecker), aedeagus, apical view. 130, *C. aculeatus* (Gerstaecker), aedeagus, apical view. 131, *C. gracilis* n. sp., aedeagus, apical view; 132, antennal club.

Cacodaemon bellicosus (Gerstaecker), n. comb. Figs. 113–116, 136.

Amphisternus bellicosus* Grstkr., 1857, Archiv Naturg. **23: 218; 1858, Mon. Endom., p. 57.
Amphisternus papulatus Gorham, 1901, Stettiner Ent. Zeit. **62**: 195.—Arrow, 1923, Trans. Ent. Soc. Lond., p. 484.

There is little to add to the description given in the key and illustrations. The upper surface is thickly punctured and rather dull. Some variation in the apical elytral spine occurs. In the ♀ lectotype it is quite sharp but in other specimens its apex is minutely rounded. Length 7–7.5 mm.

The ♂ has a short, triangular tooth on the distal 1/3 of the front tibia. Female lectotype from Penang Island in Copenhagen Mus. Cotype in Stettin Mus. The British Museum has material from Singapore, Penang, Perak, and Gunung Tahan, Pahang. The Bogor Museum has specimens taken on Gunung Tanggamoos, Sumatra by F. C. Drescher.

Cacodaemon borneensis (Frivaldzsky), n. comb. Figs. 117–119, 133–135.

Amphisternus hystricosus borneensis* Frdzsky., 1883, Termész. Füzetek **6: 126.

Closely similar to *C. bellicosus* but of stouter form. Front angles of pronotum narrowly rounded but not acuminate as in *bellicosus*, the disc more convex. Humeral spine of elytron shorter, stouter and less acute, discal spine blunt, its conoid base inflated and very coarse, ly punctured. Outer apical angle of elytron briefly subspinose. Length 8–8.5 mm. Male with a minute tooth at apical 1/3, this tooth more distant from apex than in *bellicosus*.

Female monotype from Sarawak in Hungarian Museum. Other specimens have come from Quop and Mt. Dulit in Sarawak (British Mus.) and from Sandakan Bay (Bishop Mus.).

Cacodaemon hystricosus (Gerstaecker), n. comb. Figs. 108–112.

Amphisternus hystricosus* Grstkr., 1857, Archiv Naturg. **23: 218; 1858, Mon. Endom., p. 58.

Very similar in size and form to *C. bellicosus* but easily recognized by the 2 small, well-raised, red pustules on the apical slope of the elytron. Pronotum more than usually convex, surface somewhat shining and thickly punctured. Spine at elytral apex short and best described as cylindric. Length 7–7.8 mm. The Bornean specimens may be representative of a subspecies. Small differences in the aedeagi of Bornean and Sumatran ♂♂ can be seen, but I shall not pursue the matter at present.

Male lectotype from Penang in the Copenhagen Mus. Cotype from Borneo in the Stettin Mus. The Chicago Mus. has specimens from Padang and Ranan, Sumatra. The British Mus. has a ♂ specimen from Mt. Dulit, Sarawak.

Cacodaemon nigrellus (Strohecker), n. comb. Figs. 122, 123.

Amphisternus nigrellus* Strkr., 1957, Ann. Hist.-Nat. Mus. Nat. Hungarici **8: 282, fig. 53.

Upper surface very dull, sooty black, each elytron with 2 elevated red pustules. Pronotum unpunctured. Elytral punctures sparse, fine and inconspicuous. Front angles of pronotum much longer than their basal width, a little reflexed at their origin, apically acute. Length 8 mm. The ♀ has the outer apical angle of the elytron briefly, triangularly produced but rounded at end. I have not recognized any specimen as the ♂ of this species.

Female monotype from Sandakan, Borneo (C. F. Baker) in U. S. National Mus. A ♀

taken by Atkinson at Sandakan is in the British Mus.

Cacodaemon atramentus Strohecker, n. sp. Figs. 124-126.

Very similar in size and form to *C. nigrellus*, with front angles of pronotum prolonged, sharp, slightly reflexed at origin. From *nigrellus* it differs (♀♀) in narrower antennal club, thickly punctured surface and greater extension of the elytral apex. Length 8 mm. A ♂ specimen from Maxwell Hill, Perak may be of this species. The front angles of its pronotum are missing except the basal part of the left one. Discal elytral spine shorter than in ♀ type and elytral apices truncate. This last feature is a common sexual character in the genus.

Holotype ♀ (BMNH), Sandakan Agong, Kormechi Lake, Sumatra, 750 m, V-VI, 1914.

Cacodaemon auriculatus (Gerstaecker), n. comb. Fig. 141.

Amphisternus auriculatus Grstrkr., 1857, Archiv Naturg. 23: 217; 1858, Mon. Endom., p. 55.

—Strohecker, 1957, Ann. Hist.-Nat. Mus. Nat. Hungarici 8: 283, fig. 35B.

Pronotum with sides gently undulate, front angles greatly prolonged, tapering, acuminate, sharply upturned, disc thickly punctured. Elytra shining and rugosely punctate at base, each with a low-conical basal tubercle and a subcarinate tubercle on posterior slope, both tubercles dark. Spines long and sharp. Length 7.5-8 mm. Male with elytral apices truncate, outer angle obtuse. Females with outer angle of apex extended as a flat, triangular process.

Male type in Stettin Mus. Recorded as from "Borneo."

Labels of material studied are: Sarawak, Xántus (Hungarian Mus.); Tabang, E. Borneo, 9. X. 1956, A. M. R. Wegner (Bogor Mus.); Mt. Matang, Sarawak, 22. XI. 1914, Pemberton (BMNH); Mt. Dulit, Sarawak, 16. X. to 20. XI. 1932, B. M. Hobby, A. W. Moore & J. Ford, in primary forest at 860 m (BMNH).

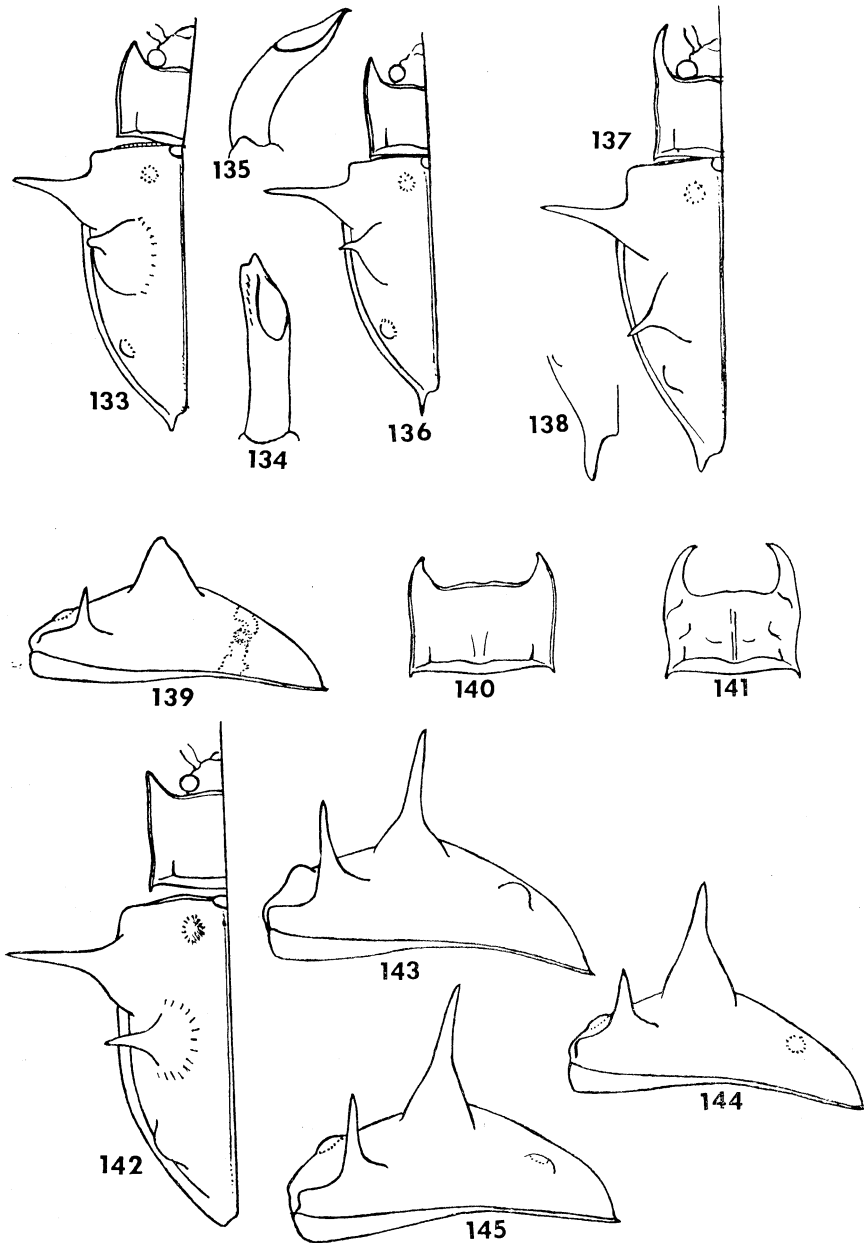
The British Mus. has 8 ♀ specimens which closely resemble *C. auriculatus* but have the front angles of the pronotum directed forward. I think it significant that all these are ♀♀, and my present surmise is that they represent *auriculatus*. Additional material may show this idea erroneous.

Cacodaemon gracilis Strohecker, n. sp. Figs. 131, 132, 137, 138.

Upper surface, including elytral tubercles, black, opaque except the tubercles and spines which are shining.

Antennae very slender, article 3 as long as 4+5 8, 2× as long as wide, club broad and flat, its 1st 2 articles internally acute at apex, its last article subquadrate, truncate. Pronotum with front angles much produced, narrow, reflexed, acuminate, hind angles briefly spiniform, basal sulcus deep, lateral sulci narrowly linear, shallow, disc obsoletely and sparsely punctured, with a faint median groove. Elytra with long humeral and discal spines, basal tubercle low-conoid, pre-apical tubercle subcarinate, disc coarsely, thickly, shallowly punctate. Length 7.5-8.3 mm. In the ♂ the outer apical angle of the elytron is briefly triangular (much as in ♀ of *nigrellus*). In the ♀ this angle is much produced, flat, with subparallel sides and rather narrowly rounded apex.

Holotype ♂ (BISHOP 3604), Tenompok, 1460 m, Jesselton 18 km E., British North Borneo



Figs. 133-145. 133, *Cacodaemon borneensis* (Frialdzsky), ♂; 134, aedeagus, dorsal view; 135, aedeagus, left face. 136, *C. bellicosus* (Gerstaecker), ♀. 137, *C. gracilis* n. sp., ♂; 138, apex of elytron, ♀. 139, *C. kaszabi* (Strohecker), left elytron of ♂. 140, *C. freudei* (Strohecker), pronotum. 141, *C. auriculatus* (Gerstaecker), pronotum. 142, *C. aculeatus* (Gerstaecker), ♂; 143, left elytron of ♂. 144, *C. gerstaeckeri* (Strohecker), left elytron of ♂. 145, *C. arrowi* n. sp., left elytron of ♂.

26–31. I. 1959, T. C. Maa. Allotype ♀, same data as holotype. Paratypes: ♂, Gomanting Caves, Sandakan Res., 22–26. XI. 1958, L. W. Quate & T. C. Maa; ♂, same data as holotype; ♀, Bundu Tukan 18. II. 1959, Maa.

Cacodaemon kaszabi (Strohecker), n. comb. Fig. 139.

Amphisternus kaszabi* Strkr., 1957, Ann. Hist.-Nat. Mus. Nat. Hungarici **8: 281, fig. 51.

Pronotum with sides subparallel, feebly sinuate, front angles produced, flat, subacuminate. Elytra with basal and pre-apical red pustules, sharp humeral spine and conoid prominence on disc. Surface finely muricate, dull, punctures dense and moderately large but shallow and not confluent. Aedeagus similar to that of *C. aculeatus* but general appearance of 2 species is very different. Length 8.6 mm.

Male monotype in the Hungarian Nat. Mus. This is the only specimen known. The elytra are truncate with outer angle obtuse, but the ♀ probably has this angle briefly extended.

Cacodaemon freudei (Strohecker), n. comb. Figs. 128, 140.

Amphisternus freudei* Strkr., 1957, Ann. Hist.-Nat. Mus. Nat. Hungarici **8: 283, fig. 55A.

Upper surface subopaque but with a soft bluish sheen, punctures of pronotum obsolete, of elytra fine and rather widely separated. Pronotum with disc roundly elevated, front angles subacute and somewhat inturned at apex. Elytra with basal and apical pustules dark, humeral and discal spines slender, acute. Length 7.8–9.4 mm. The ♂ has the elytra truncate at apex. In the ♀ the outer apical angle is briefly, triangularly prolonged.

Male holotype from Tebing-Tinggi, Sumatra in Bavarian State Coll. Other material studied comes from Soekaranda, Sumatra, and specimens in the British Mus. collected in Perak by Doherty and on Mt. Matang and Mt. Merinjak in Sarawak by G. E. Bryant seem to be of this species.

Cacodaemon bakeri (Strohecker), n. comb. Fig. 127.

Amphisternus bakeri* Strkr., 1957, Ann. Hist.-Nat. Mus. Nat. Hungarici **8: 281, fig. 52.

Upper surface very dull and sooty black, each elytron with 2 red pustules, the basal one feebly elevated. Pronotum with disc obsoletely punctured, front angles rather sharp, sides subparallel. Elytral punctures coarse but well separated and inconspicuous. Spines slender and sharp. Length 6.9–8.3 mm. Male with elytral apex truncate, the outer angle obtuse. Female with outer apical angle briefly triangular.

Male holotype and ♀ allotype from Sandakan in U. S. Nat. Mus.

In 1957 I reported 6 specimens collected at Sandakan, Borneo by Baker. Another of his specimens is in the British Mus. J. L. Gressitt took this species on Sandakan Bay and Maa collected it at Tenompok, 18 km E. Jesselton, in October and November 1957–58, these specimens are in the Bishop Mus.

Cacodaemon gerstaeckeri (Strohecker), n. comb. Figs. 129, 144.

Amphisternus gerstaeckeri* Strkr., 1959, Mitteil. Zool. Mus. Berlin **35: 180.

Pronotum with disc thickly punctured, sides almost straight, front angles produced and

narrowly rounded at apex. Elytra each with basal and pre-apical red pustule and discal and humeral spines. Length 9–9.5 mm. Very similar in size and form to the next 2 species but with elytral spines shorter. Surface of elytra but feebly shining, except pustules and spines, thickly but rather finely punctured, punctures not at all rugose or confluent. Male with elytral apex truncate, the outer angle obtuse. Female with outer apical angle of elytron briefly produced.

Holotype ♂ from Borneo in Berlin Mus.

A. M. R. Wegner collected a series at Tabang, E. Borneo in 1959. These specimens are in the Bogor Mus. and my collection.

Cacodaemon aculeatus (Gerstaecker), n. comb. Figs. 130, 142, 143.

**Amphisternus aculeatus* Grstrk., 1857, Archiv Naturg. 23: 217; 1858, Mon. Endom., p. 54.
Cacodaemon lucifer Thomson, 1857, Archives Ent. 1: 150.

Shining black, elytral spines and pustules with bluish reflections. Pronotum with disc closely punctured, sides parallel, front angles subacute. Elytron with a low conoid tubercle on base and a subcarinate tubercle on apical slope. Elytral spines long and sharp but showing some variation in length. Surface of elytra coarsely and confluent punctured. Male with elytra truncate. Female with elytral apex briefly prolonged. Length 9.5–10.5 mm.

Lectotype ♂ from Borneo in Copenhagen Museum. Cotype in Stettin Museum.

Many specimens have been studied, a number labeled "Borneo." More definite labels are: Sarawak: Mt. Merinjak, 21. V. 1914, G. E. Bryant; Lundu, 4–6. I. 1914, Bryant; Mt. Matang, 21. X. 1913–27. I. 1914, Bryant; Quop, II–III. 1914, Bryant; Kuching, III. 1914, Bryant; Lio Matu, Baram River, 24. X. 1920, J. C. Moulton; Leppu Aga, 8. X. 1920, Moulton. All Sarawak specimens in the British Mus.

Cacodaemon arrowi Strohecker, n. sp. Fig. 145.

Black, each elytron with 2 red pustules, 1 basal, 1 pre-apical, and 2 long sharp spines. Length 9.5–9.7 mm.

Antennae elongate, slender, each of the stalk articles except the 2nd longer than wide, club broad and much flattened. Pronotum with sides parallel, a little wider at mid-length, slightly sinuate to the briefly spiniform hind angles. Front angles subacute but not spiniform, their area forming an equilateral triangle. Disc of pronotum very irregular, coarsely and closely punctured and with a rather deep median groove. Elytra shining, coarsely and confluent punctured at base and along sides. Basal red pustule low, not at all conoid, posterior pustule more elevated but hardly carinate. Humeral spine sharp, its length slightly more than breadth of an elytron, discal spine similar. Male with elytral apex truncate. Female with elytral apex produced as a short triangular flap.

This form is very much like *aculeatus* and I have decided more than once that no specific difference exists. The features separating *arrowi* from *aculeatus*, while not great, seem to be consistent, and the specimens at hand do appear to represent a distinctive population but possibly not specifically separate. The aedeagi of the 2 nominal species are much alike, if not indeed identical.

Holotype ♂ (BMNH), Mt. Dulit, Sarawak, junction of Rivers Tinjar and Lejok, 2. VIII.

1932, B. M. Hobby & A. W. Moore. Allotype ♀ (BMNH), same locality, 12. IX. 1932, Hobby & Moore. Paratypes: 4 ♂♂ taken at type locality, 21. VIII—1. X. 1932; 1 ♀ collected by Hobby & Moore at Long Miwah, Mt. Kalulong, 2. XI. 1932 (BMNH, BISHOP, and author's coll.)

NEW RECORDS AND DESCRIPTIONS OF RHINONYSSIDAE, MOSTLY FROM NEW GUINEA

(Acarina: Mesostigmata)¹

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Abstract: The genus *Mesonyssoides* Fain & Nadchatram is synonymized with *Mesonyssus* Fain and the following 7 new species of *Mesonyssus* are described from New Guinea: *epileus* n. sp., *gourae* n. sp., *tetae* n. sp., *pilinopi* n. sp., *alisteri* n. sp., *neopsittaci* n. sp. and *domicellae* n. sp. Records are given for 13 other species from New Guinea, Hawaii and North America. Keys to the species of *Mesonyssus* from Falconiformes, Columbiformes and Psittaciformes are presented.

The nasal mites of birds have been known since 1871 and in recent years have received increased attention from workers in many parts of the world. Despite the increased interest in this group of parasites there are still many groups of birds and faunal areas which have not been studied. One such area is New Guinea which has had only one species of nasal mite, *Ptilonyssus novaeguineae* (Hirst), described from its rich avifauna.

In 1962 several months were spent in West New Guinea collecting ectoparasites, including avian nasal mites (Wilson, 1964). Since then Bishop Museum field associates have continued to sample the avifauna and as a result a large collection of nasal mites are at hand from this region. This paper lists several new records and species from New Guinea, some new records from North America, and the first records from Hawaii.

The holotypes are deposited in the acarology collection of Bishop Museum. Paratypes, insofar as they were available, have been deposited in the collections of Dr. R. W. Strandtmann and the United States National Museum. The measurements given first are the mean

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