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Bulletin of the British Museum (Natural History)

**The legume-feeding psyllids (Homoptera)
of the west Palaearctic Region**

I. D. Hodkinson & D. Hollis

**Entomology series
Vol 56 No 1**

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The legume-feeding psyllids (Homoptera) of the west Palaearctic Region

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Synopsis

Plant species of the papilionoid legume tribe, the Genisteae, have radiated considerably in the Mediterranean Basin and are exploited, as hosts, by psyllids of the subfamily Arytaininae; other leguminous hosts exploited by this group of psyllids belong to the papilionoid tribes Galegeae, Trifoleae, Loteae and Sophoreae; species of the related psyllid subfamily Acizziinae develop on host species in the mimosoid genera *Acacia* and *Albizia*.

The taxonomy of the psyllid groups Arytaininae and Acizziinae in the west Palaearctic Region is revised; the Arytaininae is considered to be a paraphyletic group but is retained for convenience; the Acizziinae is considered to be a monophyletic group. Emphasis is placed on characters of the genitalia in delimiting genera and five are recognised: *Arytaina* s. str. (11 species), *Livilla* (31 species), *Cyamophila* (4 species) and *Arytainilla* s.l. (21 species) in the Arytaininae, and *Acizzia* (4 species) in the Acizziinae. The genera *Floria* syn. n. and *Alloeoneura* syn. n. are synonymised with *Livilla*; *Amblyrhina* syn. n. is synonymised with *Arytaina*. Diagnostic keys are provided for the genera and identification keys are given for their included species except those of *Arytainilla*, a problematical genus that is discussed only in general terms. Sixteen new species are described; 3 new species-synonymies, 48 new combinations and one new name are proposed; one neotype and 5 lectotypes are designated; *Peripsyllopsis* is reinstated as a good genus.

The pattern of host/insect relationships between these psyllids and their leguminous hosts is examined and it is concluded that, with the present level of data, an understanding of psyllid interrelationships does not clarify the problems associated with the classification and evolution of the Genisteae.

Introduction

The Mediterranean Basin and the surrounding land areas of the west Palaearctic Region, together with Macaronesia, form an extensive area of endemism and diversity for a tribe of papilionoid leguminous plants, the Genisteae. This tribe has been successfully exploited as hosts by over 60 known species of jumping plant-lice, or psyllids, previously referred to the subfamily Arytaininae (Hodkinson, 1980). Other psyllids in this group colonise legumes in the papilionoid tribes Galegeae, Trifoleae, Loteae and Sophoreae and in the mimosoid genera *Acacia* and *Albizia*.

The detailed biologies of most of these psyllids are unknown. The free-living nymphs usually feed on the actively growing shoots of their hosts and can often reach high densities. Watmough (1968a, b) recorded peak densities of 6466 and 166 nymphs per 100 g of shoot material for *Arytainilla spartiophila* and *Arytaina genistae* respectively, on *Cytisus scoparius* in Britain. *Acizzia uncatoides* has caused severe damage to acacia trees where it has been introduced into California, France and Hawaii (Koehler *et al.*, 1966; Bain *et al.*, 1976; Leeper & Beardsley, 1976). Life history strategies and generation times appear to vary between species. *Arytainilla spartiophila*, in Britain, has a single generation per year with six months spent as an overwintering diapause egg. By contrast, *Arytaina genistae* overwinters as an adult and undergoes two or three generations per year on the same host.

The Arytaininae were reviewed by Loginova (1976a; 1977), who divided the group into two tribes. The genera *Arytaina*, *Amblyrhina*, *Alloeoneura*, *Floria*, *Livilla* and the central Asian *Astragalita* were included in the Arytainini; *Cyamophila*, *Acizzia*, *Arytainilla* and the North American *Amorhpicola* were included in the Cyamophilini. The monotypic genus *Pseudacanthopsylla* was omitted. White & Hodkinson (1985) placed *Acizzia* in a separate subfamily, the Acizziinae, primarily on the basis of the form of the male proctiger, and expressed uncertainty as to the true position of *Cyamophila*.

Examination of species within the above genera, together with new material, leads us to conclude that the major reorganisation of species within genera, proposed in this paper, is necessary if the generic classification is to reflect natural groupings. Previous classifications have been based largely on primitive characters and the resulting taxa have been heterogeneous and ill-defined, and closely related species have often been placed in separate genera. We have attempted here to recognise what we believe are monophyletic genera or groups based mainly on characters of the male genitalia.

Six legume-feeding genera are recognised in the west Palaearctic Region: *Arytaina* s. str., *Livilla*, *Cyamophila*, *Arytainilla*, *Acizzia* and *Pseudacanthopsylla*. *Amblyrhina*, *Floria* and *Alloeoneura* are placed in synonymy. *Arytainilla* is retained as an heterogeneous genus but we recognise that it may be polyphyletic. *Pseudacanthopsylla* shows affinities with undescribed Afrotropical groups and is excluded from further consideration. We recognise two separate subfamilies, the Acizziinae which contains *Acizzia*, and the Arytaininae which contains *Arytaina*, *Livilla*, *Cyamophila* and *Arytainilla*. The Acizziinae are defined by characters of the male genitalia. We are unable, however, to find synapomorphies that would define the Arytaininae reliably and separate it from the closest subfamilies, the Psyllinae and Ciriacreminae. Loginova (1976a) gave a lengthy description of the group, including both adult and larval morphology. A detailed study of these characters has shown that none is present in all Arytainines and absent from other groups within the Psyllidae, and several are either primitive or subject to homoplasy. Furthermore no previously unused characters could be found. We therefore regard the Arytaininae as paraphyletic with respect to the Ciriacreminae and Psyllinae but, nevertheless, we retain the group as a convenient and widely understood entity embracing groups of psyllids that feed on legumes.

This paper contains a complete account of *Arytaina* and *Livilla*, and accounts of those species of *Acizzia* and *Cyamophila* that occur in the west Palaearctic Region. *Arytainilla* is dealt with in less detail as the species have been well-described and figured by Šulc (1907; 1910a, b) and Loginova (1972a; 1976b). The pattern of host/psyllid relationships between the groups of

Genisteae genera and psyllid genera is also examined to see if there is any degree of congruence between their respective classifications.

Materials, methods and terminology

A detailed explanation of the terminology used in this paper is given by Hodkinson & White (1979b) and White & Hodkinson (1985). The following abbreviations are used to indicate the institutions in which material is deposited: British Museum (Natural History), London (BMNH); Muséum National d'Histoire Naturelle, Paris (MNHN); Musée de Zoologie in Lausanne (MZL); Zoological Institute, Academy of Sciences of the U.S.S.R., Leningrad (ZI); Moravian Museum, Brno (MM); Naturhistorisches Museum, Vienna (NM); Naturhistorisches Museum, Basel (NMB); Zoological Museum, University of Helsinki (ZMU); Természettudományi Múzeum, Budapest (TM); Zoological Institute, Polish Academy of Sciences, Warsaw (IZPAN); Entomological Institute Eidgenössische Technische Hochschule, Zurich (ETH); Museo Civico di Storia Naturale, Genova (MCSN); New Zealand Arthropod Collection, Department of Scientific and Industrial Research, Auckland (NZAC); University Museum, Melbourne (UMM); I. D. Hodkinson collection (IDH); P. Lauterer collection (PL); D. Burckhardt collection (DB). All drawings and measurements are made from slide-mounted material.

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We thank the authorities and curators at the institutions listed above for the loan of material. We also thank Dr P. Lauterer, Dr D. Burckhardt, Dr S. M. Klimaszewski, Dr C. Conci and the late Dr M. M. Loginova for the loan of interesting and often undescribed material.

Key to west Palaearctic genera of Arytaininae and Acizzinae

- 1 Male proctiger (Figs 9, 15) with a well-developed posterior lobe. On *Acacia* or *Albizia*.
(Genal cones shorter than the vertex, triangular or broadly rounded, rarely enveloping the frons. Antennae approximately 1.3–1.8 times head width. Propleurites broad, divided by a vertical suture. Forewing oblong-oval, with or without pattern but with a distinct costal break and pterostigma; cell cu_{1a} high. Basal metatarsus with 1 or 2 thick black spurs. Male paramere of various shapes). (Subfamily **ACIZZIIINAE**) **ACIZZIA** Heslop-Harrison (p. 4)
- Male proctiger (Figs 23, 68, 167) simple, without a well-developed posterior lobe (Subfamily **ARYTAININAE**) 2
- 2 Male paramere (Figs 23, 39, 75, 82) broad, more or less parallel-sided with a truncate apex which is extended anteriorly in the form of a pronounced tooth. 3
- Male paramere not of this form, either slender and gradually narrowed to apex which bears a slender inner anteriorly curving tooth (Figs 167, 176, 189, 195), or of more irregular shape. 4
- 3 Forewing (Figs 21, 26) usually oblong-oval, with both a well-developed pterostigma and a costal break; cell cu_{1a} high. Propleurites (Fig. 261) narrow, divided by a diagonal suture, pronotum deflexed downwards. Basal metatarsus with two thick black spurs. Not on Genisteae.
(Genal cones shorter than the vertex, broadly rounded, deflexed from the plane of the vertex. Eyes less convex than in other Arytainine genera. Antennae relatively stout, approximately 1.2–1.6 times the head width. Forewing with or without pattern). **CYAMOPHILA** Loginova (p. 7)
- Forewing (Figs 45, 49, 57) usually more oval, or more narrowly rounded at the apex, without well-developed pterostigma or costal break: cell cu_{1a} usually lower. Propleurites (Fig. 260) quadrate, divided by a vertical suture, pronotum flat. Basal metatarsus usually with one thick black spur. On host plants in the tribe Genisteae.
(Genal cones shorter than the vertex, triangular, broadly rounded or truncate. Eyes prominent. Antennae variable, stout to slender, 1.1–2.3 times head width.) **ARYTAINA** Förster (p. 10)
- 4 Male paramere (Figs 167, 176, 189, 195) a simple narrow lamellar structure gradually tapering to the apex, which bears a small inner denticle, the apex of which is directed anteriorly. Forewing (Figs 103, 107, 109, 115, 125, 135) of variable shape, usually with a distinct colour pattern or coriaceous brown or amber-coloured (*L. genistae* is the exception). Pterostigma, if present, very short; costal break present or absent. Genal cones (Figs 104, 114, 124, 154) usually long and broad, in lateral view (Fig. 259) weakly separated from the vertex (exceptions are *L. bivittata*, *L. cognata*, *L. burckhardti* and *L. vicina*) (Figs 105, 109, 110, 166). Vertex and

thorax usually covered in long dense setae (much reduced in *L. ulicis*, *L. vicina* and *L. bivittata*).

(Antennae slender, about 1.6–3.0 times width of the head. Eyes prominent. Pronotum flat; propleurites broad, divided by a vertical suture. Cell cu_{1a} of forewing usually low. Basal metatarsus with 0 to 2 thick black spurs (usually 1)). **LIVILLA** Curtis (p. 19)

- Male paramere not as above, often of more irregular shape or if evenly narrowed then much longer and thinner than those illustrated for *Livilla*. Forewing membrane without distinct pattern, occasionally with a pigment pattern confined to the veins, membrane usually clear, occasionally yellowish/orange but never coriaceous. Long pterostigma and costal break usually present (*A. nubivaga* and *A. devia* are the exceptions). Genal cones shorter, in lateral view usually separated from the vertex by a distinct step. Vertex and thorax not covered in long setae.

(Antennae slender, elongate, approximately 1.4–2.4 times head width. Propleurites broad, divided by a vertical suture. Forewing usually oblong oval, cell cu_{1a} low. Basal metatarsus with one thick black spur.) **ARYTAINILLA** Loginova (p. 41)

ACIZZIINAE White & Hodkinson

Acizziinae White & Hodkinson, 1985: 271.

The Acizziinae are separated from the Arytaininae/Psyllinae by the possession of a posteriorly lobed proctiger in the male. A single genus, *Acizzia*, occurs in the Palaearctic Region.

ACIZZIA Heslop-Harrison

Neopsylla Heslop-Harrison, 1949: 161; 1951: 417. Type-species: *Psylla acaciae* Maskell, 1894, by original designation. [Homonym of *Neopsylla* Wagner, 1903.]

Acizzia Heslop-Harrison, 1961a: 417; Loginova, 1976a: 596; 1977: 577; White & Hodkinson, 1985: 271.

[Replacement name for *Neopsylla* Heslop-Harrison.]

DIAGNOSIS. Male proctiger with a conspicuous posterior lobe which may or may not bear a secondary finger-like appendage (Figs 9, 15); forewing (Figs 1, 5) with a tapered pterostigma and a conspicuous costal break; cell cu_{1a} high and characteristically shaped, leaning towards the base of the wing; genal cones little deflexed, short, rounded or pyramidal, usually not completely enveloping the frons which bears the median ocellus (Figs 2, 8); basal metatarsus with 1 or 2 black spurs; apical segment of aedeagus often complex (Fig. 17); propleurites quadrate, divided by a vertical suture. Species feed on mimosoid legumes of the tribes Acacieae and Ingae, particularly *Acacia* and *Albisia*.

COMMENTS. *Acizzia* is a widely distributed genus of more than 30 described species found in Australia, New Zealand, the Old World tropics and extending through North Africa and the Middle East to the Mediterranean Basin. Four species occur in the area considered here, two of which are introduced from Australia.

Key to species

- 1 Forewing (Figs 5, 7) with pattern consisting of small diffuse spots primarily in the apical half. Male proctiger (Figs 15, 18) with long tubular apical portion and basal triangular lobe which bears a subsidiary finger-like projection (*acaciaebaileyanae*-group) 2
- Forewing without pattern, or pattern consisting of brown clouds adjacent to the wing apex, primarily around veins R_s , M_{1+2} , M_{3+4} and Cu_{1a} (Figs 2, 4). Male proctiger (Figs 9, 12) with single large triangular lobe without subsidiary projections (*hollisi*-group) 3
- 2 Male proctiger (Fig. 18) with the tubular apical portion short and broad. Paramere as in Fig. 19. Apex of aedeagus (Fig. 20) bulbous. Female proctiger (Fig. 294) with dorsal margin evenly bluntly acute. Forewing pattern (Fig. 7) overlying areas of conspicuously thickened spinules. Smaller species, head width less than 0.47 mm **acaciaebaileyanae** (Froggatt) (p. 5)
- Male proctiger (Fig. 15) with tubular apical portion longer and narrower. Paramere as in Fig. 16. Apex of aedeagus (Fig. 17) harpoon-shaped. Female proctiger (Fig. 293) with dorsal margin sinuous, apex slender. Forewing pattern (Fig. 5) not corresponding with areas of conspicuously thickened spinules. Larger species, head width more than 0.50 mm **uncatoides** (Ferris & Klyver) (p. 5)
- 3 Forewing (Fig. 3) with apical brown clouds, apex broadly rounded. Male proctiger (Fig. 12) with

- a broadly round posterior lobe. Aedeagus (Fig. 14) with a straight bulbous apex. (Israel, on *Acacia raddiana*.) **hollisi** Burckhardt (p. 6)
- Forewing (Fig. 1) without obvious colour pattern, apex narrowly rounded. Male proctiger (Fig. 9) with more triangular posterior lobe. Aedeagus (Fig. 11) with reniform apex. (Egypt, on unknown host.) **bicolorata** (Samy) (p. 7)

The *acaciaebaileyanae*-group

Defined by characters in couplet 1 of key. This group comprises the introduced Australian species.

Acizzia acaciaebaileyanae (Froggatt)

(Figs 7, 8, 18–20, 294)

Psylla acaciae-baileyanae Froggatt, 1901: 257; Tuthill, 1952: 257. Lectotype ♂, AUSTRALIA, designated by Yen, 1977: 15 (ANIC).

Arytaina acaciae-baileyanae (Froggatt) Pettey, 1924: 21.

Psylla uncata Ferris & Klyver, 1932: 53. Syntypes ♂, ♀, NEW ZEALAND (NZAC) [examined]. [Synonymised by Tuthill, 1952: 91.]

Neopsylla uncatata (Ferris & Klyver) Heslop-Harrison, 1949: 162. [Mis-spelling.]

Acizzia acaciaebaileyanae (Froggatt) Capener, 1970: 197; Loginova, 1977: 577; Hodkinson, 1983: 343; Morgan, 1984: 36.

Psylla acaciaebaileyanae Froggatt; Yen, 1977: 15.

DESCRIPTION. Coloration. General coloration of head and thorax dull orange-yellow with darker yellowish brown markings; abdominal sclerites yellowish brown, intersegmental membranes dull pale yellow; genitalia pale brown: forewing transparent with small irregular pale brown maculations; veins pale yellowish brown; antennae dull whitish yellow with apices of segments 3–7 infuscate and segments 8–10 entirely dark brown; legs pale whitish yellow, often with faint dusky markings on the femora.

Structure. Head (Fig. 8) robust, genal cones very short with broadly rounded apices. Forewing (Fig. 7) oblong oval, with a well-developed pterostigma and costal break; spinules present throughout all the cells, much larger in regions where the brown maculate pattern occurs than elsewhere; cell m_1 elongate; cell cu_{1a} high and strongly arched towards the wing base. Metatibia with 4 or 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 18) with a short and broad tubular apical projection and with a rounded posterior lobe bearing a subsidiary finger-like projection; paramere (Fig. 19) simple, broad basally, gradually tapering to rounded apex, with a small posteriorly directed subapical denticle on inner posterior margin; aedeagus (Fig. 20) with a bulbous apex and a long ductus ejaculatorius. Female terminalia (Fig. 294) with proctiger convex throughout dorsal margin, apex bluntly acute; ventral valve wedge shaped; circumanal pore ring simple, about one-third length of proctiger; ovipositor short and broad.

Measurements. See Table 1.

MATERIAL EXAMINED

12 ♂, 13 ♀, **Italy:** on *Acacia* sp. (BMNH).

HOST PLANT. *Acacia baileyana* F.v.M. and *A. podalyriaefoliae* Cunn.

PUBLISHED DISTRIBUTION. Australia (Froggatt, 1901; Yen, 1977; Morgan, 1984); introduced to New Zealand (Tuthill, 1952; Ferris & Klyver, 1932), South Africa (Petty, 1924; Capener, 1970), Italy (Rapisarda, 1985).

COMMENTS. This species is native to Australia and has recently been introduced into Italy on ornamental *Acacia* trees. It is distinguished from its close relative, *A. uncatoides*, by the shape of the genal cones and details of the male genitalia.

Acizzia uncatoides (Ferris & Klyver)

(Figs 5, 6, 15–17, 293)

Psylla uncatoides Ferris & Klyver, 1932: 53; Heslop-Harrison, 1949: 162; Tuthill, 1952: 89. Syntypes ♂, ♀, NEW ZEALAND (NZAC, BMNH) [examined].

Acizzia uncatoides (Ferris & Klyver) Loginova, 1977: 577; Hodkinson & White, 1981: 492; Hodkinson, 1983: 343.

DESCRIPTION. Coloration. General body colour orange throughout with paler markings on dorsum of thorax; forewing membrane pale yellow to pale amber with orange-brown maculations, veins concolorous with membrane but appearing slightly darker; antennal segments 1–3 orange-yellow, the remainder brown; legs slightly paler yellow-brown, often with a slight infuscation of the femora.

Structure. Head (Fig. 6) with vertex relatively long, genal cones triangular with rounded apices. Forewing (Fig. 5) oblong-oval, with well-developed pterostigma and costal break; spinules present throughout wing; cell m_1 elongate; cell cu_{1a} high and strongly arched towards the wing base. Metatibia with 4 or 5 thick black spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 15) with long tubular apical portion and a rounded posterior lobe bearing a subsidiary finger-like projection; paramere (Fig. 16) broad, with apex deflexed posteriorly; aedeagus (Fig. 17) with harpoon-shaped apex. Female terminalia (Fig. 293) short and truncate with a relatively large circumanal pore ring.

Measurements. See Table 1.

MATERIAL EXAMINED

Several hundred ♂, ♀, **Portugal, Israel, Chile** (IDH, DB, USNM).

HOST PLANT. In Europe this species occurs on *Acacia floribunda*, while in Israel it is found on *Acacia saligna*. Elsewhere it has been recorded from *Albizia lophantha*, *Acacia verniciflua*, *A. koaia*, *A. koa* and *A. confusa*.

PUBLISHED DISTRIBUTION. Australia (Hodkinson, 1983); introduced to France (Bain *et al.*, 1976), Italy (Arzone & Vidano, 1985), U.S.A.: California (Jensen, 1957; Koehler *et al.*, 1966; Madubunyi & Koehler, 1974; Munro, 1965), Hawaii (Gagne, 1971; Leeper & Beardsley, 1973; 1976), New Zealand (Tuthill, 1952), Mexico (Hodkinson & White, 1983).

COMMENTS. This species is native to Australia and has been introduced into several areas of the world where it has become a minor pest of ornamental or native acacias. Dr A. Yen (Australia) has compared our European material with material from Australia. *A. uncatoides* is separated from its close relative *A. acaciaebaileyanae* by the shape of the genal cones, the male proctiger, paramere and aedeagus.

The *hollisi*-group

Defined by characters in couplet 1 of key. This group includes the native North African or Middle East species.

Acizzia hollisi Burckhardt

(Figs 3, 4, 12–14, 262)

Acizzia hollisi Burckhardt, 1981: 216. Holotype ♂, SAUDI ARABIA (NMB) [not examined].

DESCRIPTION. Coloration. General body coloration dark reddish brown throughout with paler markings on dorsum of thorax; intersegmental membranes of abdomen lighter orange-yellow; male proctiger often bright red, parameres whitish yellow; female terminalia dark brown; forewing membrane clear with brown colour pattern, veins brown; antennae yellowish brown, darkening towards apex; femora dark brown, remainder of legs pale yellowish brown. Immature specimens light orange-yellow.

Structure. Head (Fig. 4) with vertex relatively short; genal cones shorter than vertex, triangular. Forewing (Fig. 3) oblong-oval, with well-developed pterostigma and costal break; spinules largely confined to apical half of wing and around vein Cu_2 ; cell cu_{1a} moderately strongly leaning towards wing base. Metatibia with 4 or 5 thick black spurs, basal metatarsus with 2 black spurs. Male proctiger (Fig. 12) with a broadly triangular posterior projection. Paramere (Fig. 13) with distinct notch in anterior margin; aedeagus (Fig. 14) with bulbous apex. Female terminalia (Fig. 262) relatively long and slender, with a relatively short anal pore ring.

Measurements. See Table 1.

MATERIAL EXAMINED

3 ♂, 3 ♀ (paratypes), 2 ♂, 1 ♀, **Israel** (BMNH, IDH).

HOST PLANT. *Acacia raddiana*.

PUBLISHED DISTRIBUTION. Saudi Arabia (Burckhardt, 1981; 1986), Israel (Burckhardt, 1981; Halperin *et al.*, 1982).

***Acizzia bicolorata* (Samy) comb. n.**

(Figs 1, 2, 9–11)

Psylla bicolorata Samy, 1973: 451. Holotype ♂, EGYPT (Agr. Coll. Cairo) [not examined].

DESCRIPTION. Coloration. General body coloration orange-yellow throughout; forewing membrane pale yellow, veins concolorous; antennae orange-yellow basally, becoming brown apically; legs concolorous with body (based on a single specimen). According to Samy the general colour is bright brown with whitish markings on head and dorsum of the thorax.

Structure. Head (Fig. 3) robust, genal cones shorter than vertex, with broadly rounded apices. Forewing (Fig. 2) with somewhat narrowly rounded apex; costal break and pterostigma well-developed; spinules confined to radular areas; cell cu_{1a} high but less strongly displaced towards wing base than in *uncatoides*. Metatibia with 4 or 5 thick black spurs, basal metatarsus with 2 black spurs. Male proctiger (Fig. 10) with narrowly triangular posterior lobe; paramere (Fig. 11) simple, almost parallel-sided, apex pointing anteriorly; apex of aedeagus (Fig. 12) somewhat reniform.

Measurements. See Table 1.

MATERIAL EXAMINED

1 ♂ (same data as holotype), **Egypt:** Oweinat, xi. 1937 (*Kasim*) (BMNH).

HOST PLANT. Unknown.

PUBLISHED DISTRIBUTION. Egypt (Samy, 1973).

COMMENTS. *A. bicolorata* is separated from the other west Palaearctic members of the genus by the lack of a forewing pattern.

ARYTAININAE Crawford

Arytainini Crawford, 1914: 106, in part; Heslop-Harrison, 1951: 417, in part.

Arytaininae Crawford; Vondráček, 1957: 176; Loginova, 1976a: 589; 1977: 577; White & Hodkinson, 1985: 272.

The Arytaininae, as here constituted, is probably paraphyletic and overlaps with the subfamily Psyllinae. The group has been separated previously from the Psyllinae by the more quadrate propleurites, the presence of one, rather than two metatarsal spurs, the absent or rudimentary pterostigma and the genal cones which are usually in the same plane as the vertex, rather than being deflexed downwards. In addition, Arytainine species usually occur on Leguminosae whereas Psyllinae species occur usually on Rosaceae and a variety of other dicotyledonous families. However, *Cyamophila*, which appears to have a similar form of advanced paramere to *Arytaina*, has narrower propleurites, a fully developed pterostigma and the 2 metatarsal spurs more typical of the Psyllinae.

Together the Arytaininae and Psyllinae are defined by the rounded forewing with the venation pattern in which veins Cu_1 and M possess a common stem and vein Cu_2 terminates adjacent to vein Cu_{1b} . The basal metatarsus usually possesses at least one spur, the genae are usually developed into cone-like processes and the 3rd antennal segment is the longest. The hind coxa also bears a well-developed meracanthus, and the male proctiger is simple and unipartite.

CYAMOPHILA Loginova

Cyamophila Loginova, 1976a: 596; 1977: 582; White & Hodkinson, 1985: 272. Type-species: *Psylla fabra* Loginova, 1964, by original designation.

DIAGNOSIS. Forewing (Figs 21, 26) with a well-developed pterostigma and costal break, cell cu_{1a} relatively high and arched towards base of wing; male paramere (Figs 24, 29) with apex truncate, formed of a large anteriorly directed denticle; basal metatarsus with 2 spurs; propleurites elongate, divided by a diagonal suture; genal cones (Figs 22, 27) short, in same plane as vertex, enveloping the median ocellus; eyes (Figs 22, 27) less bulbous than in many other genera; antennae relatively stout, usually less than $1.5 \times$ head width.

COMMENTS. *Cyamophila* is primarily a Palaearctic genus comprised of about 35 species distributed throughout the arid regions of Central Asia but extending into the Mediterranean Basin, China and Afghanistan, and known to feed on legumes within the papilionoid tribes Galegeae, Trifoliae, Loteae and Sophoreae.

Key to species

- 1 Forewing (Fig. 21) with diffuse reddish brown cloud around apex; radular spinules dense, dark brown, at low magnification appearing as small distinct spots around the wing margin. Cell $m_1 + 2$ long, at least as long as the stem of vein *M*. Vein Cu_{1b} very strongly curved before its junction with the marginal vein. On *Glycyrrhiza* species ***glycyrrhizae*** (Becker) (p. 8)
- Forewing (Figs 26, 31, 37) without pattern, radular spinules obvious but not forming distinct brown marks. Cell $m_1 + 2$ shorter than the stem of vein *M*. Vein Cu_{1b} less strongly curved before junction with the marginal vein. Not on *Glycyrrhiza* 2
- 2 Forewing (Fig. 26) with surface spinules occupying all the cells. Male paramere as in Figs 28, 29. On *Anthyllis* ***prohaskai*** Preisner (p. 9)
- Forewing (Figs 31, 37) without surface spinules except in the radular areas. Male paramere as in Figs 34, 40. Not on *Anthyllis* 3
- 3 Male paramere (Figs 33, 34) relatively broad, with an anterior subapical bulge. Turkey, on *Astragalus* ***stocklosai*** (Klimaszewski & Lodos) (p. 10)
- Male paramere (Fig. 40) narrower, without an anterior subapical bulge. South-western U.S.S.R., on *Medicago* and *Vicia* species ***medicaginis*** (Andrianova) (p. 9)

***Cyamophila glycyrrhizae* (Becker)**

(Figs 21–25, 93)

Psyllodes glycyrrhizae Becker, 1864: 486. Syntypes ♂, ♀, U.S.S.R. [not examined].*Psylla glycyrrhizae* (Becker) Löw, 1881: 262; 1883: 239; Puton, 1886: 91; Horvath, 1904: 579; Oshanin, 1907: 351; 1912: 127; Aulmann, 1913: 16; Sulc, 1910a: 21; Vondráček, 1953: 174; Klimaszewski, 1963: 427; 1968a: 230; 1969b: 222; 1973: 208; Loginova, 1964a: 465; 1968: 305; 1972b: 140; 1981: 26; Loginova & Baeva, 1972: 6; Baeva & Kankina, 1971: 84; Gegechkori, 1969a: 222; 1969b: 722; 1978: 20; Halperin *et al.*, 1982: 32.*Cacopsylla glycyrrhizae* (Becker) Klimaszewski & Lodos, 1977: 5.*Cyamophila glycyrrhizae* (Becker) Loginova, 1977: 582; 1981: 26; Klimaszewski & Lodos, 1979: 8; Gegechkori, 1981: 119; 1983b: 148; 1984: 104; Baeva, 1985: 206.*Cyamophila odontopyx* Loginova, 1978: 86. Holotype ♂, U.S.S.R. [not examined]. **Syn. n.**

DESCRIPTION. Coloration. General coloration of head and thorax orange-red with white markings, abdomen and terminalia somewhat paler; forewing pale yellow with diffuse apical reddish brown pattern and dark brown spots in the radular areas; antennal segments 1–8 yellow, segments 3–8 apically darkened, segments 9–10 dark brown. All the specimens to hand are immature and it is likely that fully mature specimens are darker.

Structure. Head (Fig. 22) robust, genal cones short and broad, with broadly-rounded apices. Forewing (Fig. 21) with well-developed pterostigma and costal break; spinules confined to radular areas where they form distinct black marginal punctuations; cell m_1 elongate, cell cu_{1a} high, vein Cu_{1b} strongly recurved adjacent to wing margin. Metatibia with 5 thick black spurs, basal metatarsus with 2 black spurs. Male proctiger (Fig. 23) simple; paramere (Fig. 24) parallel-sided with a large inner apical tooth; aedeagus (Fig. 25) with broad hooked apex. Female terminalia (Fig. 93) moderately long.

Measurements. See Table 1.

MATERIAL EXAMINED14 ♂, 6 ♀, **Israel** and **U.S.S.R.** (IDH); 1 ♂, 1 ♀, **Iran** (BMNH).**HOST PLANT.** *Glycyrrhiza glabra* L.

PUBLISHED DISTRIBUTION. Turkey (Klimaszewski & Lodos, 1977, 1979; Vondráček, 1953), Israel (Halperin *et al.*, 1982), Afghanistan (Loginova, 1972b; Loginova & Baeva, 1972), Iran (Loginova, 1972b; Loginova & Baeva, 1972), Mongolia (Klimaszewski, 1968b), U.S.S.R.: S. European part, Ukrainian SSR, Armenian SSR, Georgian SSR, Gruz SSR, Azerbaijan SSR, 'Transcaucasus', 'Pamir', Kazakh SSR, Uzbek SSR, Turkmen SSR, Tadjik SSR (Gegechkori, 1984; Baeva, 1985).

COMMENTS. *Cyamophila odontopyx* falls within the range of variation of *C. glycyrrhizae*. We are unable to separate material of both nominal species, determined by Loginova, and the two are here synonymized. *C. glycyrrhizae* is separated from other west Palaearctic members of the genus by the presence of a subapical band of infuscation in the forewing.

Cyamophila medicaginis (Andrianova)

(Figs 37–42)

Psylla medicaginis Andrianova, 1952: 270; Loginova, 1968: 306; 1972b: 141; Gegechkori, 1968: 510; 1969b: 723; 1970: 714; 1976: 65; Baeva & Kankina, 1971: 84; Klimaszewski, 1963: 428; 1969a: 47; 1973: 214; Gegechkori & Djibladze, 1976: 33. Syntypes, ♂, ♀, U.S.S.R. [not examined].

Cacopsylla medicaginis (Andrianova) Klimaszewski, 1975: 199.

Cyamophila medicaginis (Andrianova) Loginova, 1977: 582; 1981: 26; Gegechkori, 1978: 21; 1981: 121; 1984: 148.

DESCRIPTION. Coloration. Specimens to hand had the body, legs and antennae orange-yellow throughout. Slightly darker markings were present on dorsum of thorax.

Structure. Forewing (Fig. 37) oblong oval, with spinules confined to radular areas; pterostigma and costal break well-developed. Male proctiger (Fig. 39) simple; paramere (Fig. 40) parallel-sided, expanded apically into forward pointing tooth; apex of aedeagus slightly reniform. Female terminalia as in Fig. 42.

Measurements. See Table 1.

MATERIAL EXAMINED

2 ♂, 2 ♀, U.S.S.R.: Tabagatan, Semipal 6.vii.1962, (*Loginova*).

HOST PLANT. *Medicago sativa* L. and possibly *Vicia* sp.

PUBLISHED DISTRIBUTION. Southern U.S.S.R., 'Transcaucasus' (Gegechkori, 1968; 1969a; 1970; 1976; 1978; 1981; 1983b; 1984; Gegechkori & Djibladze, 1976), Ukrainian SSR (Klimaszewski, 1963), Pamir (Baeva & Kankina, 1971), Kazakh SSR (Andrianova, 1952; Loginova, 1972b), Central Asia (Gegechkori, 1984).

COMMENTS. This species has yet to be recorded from outside the U.S.S.R. but Klimaszewski (1969, 1975) includes it in his key to the Polish fauna on the grounds that as it occurs in the west U.S.S.R. it is likely to occur in Poland. We have followed Klimaszewski. It can be separated from the other clearwing west Palaearctic *Cyamophila* species by the following combination of characters: the lack of forewing spinules throughout the membrane, the shape of cells cu_{1a} and m_1 and the shape of the male paramere and aedeagus.

Cyamophila prohaskai (Preisner)

(Figs 26–30, 94)

Psylla prohaskai Preisner, 1927: 263; Prohaska, 1928: 4; Haupt, 1935: 234; Franz, 1943: 382; Schaefer, 1949a: 53; 1949b: 31; Wagner & Franz, 1961: 167; Kuwayama & Miyatake, 1971: 52; Klimaszewski, 1973: 219. Syntypes ♂ ♀, AUSTRIA [not examined].

Cyamophila prohaskai (Preisner) Loginova, 1977: 582; Burckhardt, 1983: 54; Conci & Tamanini, 1986: 60.

DESCRIPTION. Coloration. General body colour of mature specimens orange-red with white markings on dorsum of thorax; forewing membrane clear to pale yellow, veins yellow; antennal segments 1–8 yellow, segments 3–8 infusate apically, segments 9–10 dark brown; legs orange-yellow.

Structure. Head (Fig. 27) with relatively long genal cones. Forewing (Fig. 26) oblong-oval, with well-developed pterostigma and costal break; spinules present throughout all cells. Metatibia with 5 thick black apical spurs; basal metatarsus with 2 spurs. Male proctiger (Fig. 28) simple, paramere (Fig. 29) gradually broadening to a truncate apex, with an anteriorly directed apical tooth; aedeagus (Fig. 30) slender, with a slightly hooked apex. Female terminalia (Fig. 94) long and slender, with dorsal margin of proctiger sinuous; circumanal pore ring small.

Measurements. See Table 1.

MATERIAL EXAMINED

2 ♂, 2 ♀, **Switzerland** (DB).

HOST PLANT. *Anthyllis vulneraria* L.

PUBLISHED DISTRIBUTION. Austria (Preisner, 1927; Prohaska, 1928; Haupt, 1935; Franz, 1943; Wagner & Franz, 1961), Italy (Conci & Tamanini, 1986), Switzerland (Schaefer, 1949a, b; Burckhardt, 1983).

COMMENTS. The record for China published by Kuwayama & Miyatake (1971) is unlikely to be correct: all other records are from the European Alps. *C. prohaskai* can be distinguished from the other west Palaearctic clearwing *Cyamophila* species by the presence of dense spinules on the forewing membrane.

Cyamophila stoklosai Klimaszewski & Lodos

(Figs 31–36)

Cyamophila stoklosai Klimaszewski & Lodos, 1979: 9. Holotype ♂, TURKEY (Lodos, Klimaszewski collection) [not examined].

Material of this species was unavailable and the following description is based entirely on information given in the original description. The drawings are derived from photomicrographs presented by Klimaszewski & Lodos (1979).

DESCRIPTION. Head and body sandy yellow with rust-coloured patches and bands; abdominal sclerites brown, intersegmental membranes yellow; genitalia slightly paler brown than rest of abdomen; forewing transparent, slightly yellowish towards apex; antennae yellow except for segments 8–10 and the apices of segments 6–7 which are brown; legs yellow with brownish patches on femur.

Structure. Head (Fig. 32) robust, genal cones short, with broadly rounded apices. Forewing (Fig. 31) oblong-oval, with well-developed pterostigma and costal break; spinules confined to the radular areas; cell m_1 narrow; cell cu_{1a} high, strongly arched. Male proctiger (Fig. 33) simple; paramere (Fig. 35) with bulbous apex. Female terminalia as in Fig. 36.

Measurements. See Table 1.

HOST PLANT. *Astragalus* sp.

PUBLISHED DISTRIBUTION. Turkey (Klimaszewski & Lodos, 1979).

Table 1 Measurements of *Acizzia* and *Cyamophila* species. Males and females are given separately and all values are in mm.

		Head width	Antennal length	Forewing length	Female proctiger length	Male proctiger length	Male paramere length	Male aedeagus length
<i>Acizzia</i>								
<i>bicolorata</i>	m	0.54	0.93	1.50	—	0.18	0.18	0.16
	f	—	—	—	—	—	—	—
<i>hollisi</i>	m	0.57–0.65	1.00–1.14	1.63–1.83	—	0.20–0.23	0.17–0.24	0.15–0.19
	f	0.61–0.65	1.05–1.22	1.92–2.12	0.55–0.88	—	—	—
<i>uncatoides</i>	m	0.59–0.63	0.79–0.96	1.67–1.80	—	0.28–0.29	0.21–0.22	0.20–0.21
	f	0.58–0.61	0.83–0.88	1.80–1.91	0.35–0.39	—	—	—
<i>acaciae-</i>	m	0.34–0.42	0.55–0.60	1.17–1.24	—	0.12–0.14	0.12–0.13	0.12–0.13
<i>baileyanae</i>	f	0.37–0.44	0.60–0.64	1.30–1.61	0.30–0.31	—	—	—
<i>Cyamophila</i>								
<i>glycyrrhizae</i>	m	0.78–0.80	0.90–0.96	2.20–2.31	—	0.33–0.35	0.29–0.31	0.28–0.29
	f	0.79–0.81	1.00–1.10	2.30–2.32	0.70–0.72	—	—	—
<i>medicaginis</i>	m			not available				
	f							
<i>prohaskai</i>	m	0.75–0.78	1.07–1.10	2.42–2.44	—	0.31–0.33	0.26–0.27	0.27–0.29
	f	0.81–0.83	1.13–1.16	2.63–2.64	0.86–0.89	—	—	—
<i>stoklosai</i>	m	0.62	0.98	1.68	—	0.32	0.24	—
	f	0.66	1.10	1.98	0.66	—	—	—

ARYTAINA Förster

Arytaina Förster, 1848: 69; Pflugfelder, 1941: 76. Type-species: *Psylla spartii* Hartig, 1841 (= *Psylla genistae* Latreille, 1804), designated by Oshanin, 1912: 128.

Amblyrhina Löw, 1879: 599; 1888b: 382; Kieffer, 1905: 165; Heslop-Harrison, 1951: 425; Loginova, 1976a: 598; Hodkinson & White, 1979a: 59. Type-species: *Psylla torifrons* Flor, 1861, by monotypy. **Syn. n.** *Psyllopa* Crawford, 1911: 628. Type-species: *Psyllopa magna* Crawford, by original designation. [Synonymised by Crawford, 1914: 122.]

DIAGNOSIS. Head weakly deflexed, genal cones short and broad, with broadly rounded apices, in approximately same plane as vertex. Pronotum broad and flat, propleurites quadrate, divided by a vertical suture. Forewing oval to elongate-oval, usually broadest at or before middle; pterostigma and costal break absent; cell cu_{1a} low and rarely slanting towards base of wing. Basal metatarsus with one black spur. Male proctiger without posterior lobe; paramere broad with truncate apex, terminated by a characteristic anteriorly directed tooth; aedeagus with a strongly hooked apex. Associated with legumes of the tribe Genisteae.

COMMENTS. *Arytaina* is a monophyletic genus of 11 species associated with host-plants of the legume tribe Genisteae within the Mediterranean Basin. It contains the original core species related to the type-species plus most species hitherto referred to *Amblyrhina*. The synonymy given relates only to references not quoted under the individual species synonymies and to papers that deal specifically with the generic synonymy. Unfortunately *Arytaina* had become a holding genus for many other species, outside the area under study, which are unrelated to the type-species and it is necessary to reallocate these species, where possible, to other genera (see Hodkinson, 1983; Hodkinson & White, 1981; Jensen, 1957b; Tuthill, 1943; Mathur, 1975; Capener, 1970). The following species are here transferred to other genera as follows.

Acizzia obscura (Crawford, 1912; from *Psyllopa*). **Comb. n.**

= *A. spinosa* (Mathur, 1975; from *Arytaina*). **Syn. n., Comb. n.**

A. albizziae (Yang, 1984; from *Arytaina*). **Comb. n.**

Arytainilla devia (Loginova, 1976; from *Arytaina*). **Comb. n.** (see p. 42).

A. nubivaga (Loginova, 1976b; from *Arytaina*). **Comb. n.** (see p. 42).

Ceanothia assimilis (Crawford, 1914; from *Arytaina*). **Comb. n.**

C. bicolor (Jensen, 1957b; from *Arytaina*). **Comb. n.**

C. boharti (Jensen, 1957b; from *Arytaina*). **Comb. n.**

C. essigi (Jensen, 1957b; from *Arytaina*). **Comb. n.**

C. insolita (Tuthill, 1943; from *Arytaina*). **Comb. n.**

C. mitella (Jensen, 1957b; from *Arytaina*). **Comb. n.**

Euphalerus isitis (Cotes, 1893; from *Psylla*). **Comb. n.**

E. punctinervis (Crawford, 1919; from *Arytaina*). **Comb. n.**

Euryconus pulchra (Crawford, 1919; from *Arytaina*). **Comb. n.**

Insnesia brevigena (Crawford, 1919; from *Arytaina*). **Comb. n.**

I. crawfordi **nom. n.**

= *I. pulchra* (Crawford, 1920; from *Arytaina*). **Comb. n.** (homonym of *Arytaina pulchra* Crawford, 1919).

I. flava (Crawford, 1919; from *Arytaina*). **Comb. n.**

I. iolani (Crawford, 1919; from *Arytaina*). **Comb. n.**

I. meridionalis (Crawford, 1919; from *Arytaina*). **Comb. n.**

I. thakrei (Mathur, 1973; from *Arytaina*). **Comb. n.**

I. tuberculata (Crawford, 1917; from *Arytaina*). **Comb. n.**

I. uichancoi (Braza & Calilung, 1981; from *Arytaina*). **Comb. n.**

I. variabilis (Crawford, 1917; from *Arytaina*). **Comb. n.**

Peripsyllopsis ramakrishni (Crawford, 1912). **Stat. rev., Comb. rev.**

Retroacizzia mopanei (Pettey, 1924; from *Arytaina*). **comb. n.**

= *R. antennata* Heslop-Harrison, 1961b. **Syn. n.**

Spanioneura turkiana (Klimaszewski & Lodos, 1977; from *Amblyrhina*). **Comb. n.**

S. pechai (Klimaszewski & Lodos, 1977; from *Amblyrhina*). **Comb. n.**

Arytaina virgata Caldwell, 1944 and *A. cornicola* Frauenfeld, 1896 are both regarded here as nomina dubia, while *A. fasciata* Laing, 1930 remains the sole species which cannot be assigned to another genus at present.

Key to species

- 1 Forewing (Fig. 43) with cell m_{1+2} elongate, as long as stem of vein *M*. Cell cu_{1a} narrowly triangular, veins Cu_{1a} and Cu_{1b} almost straight ***longicella* sp. n.** (p. 16)
- Forewing (Figs 45, 51, 57) with cell m_{1+2} much shorter than length of vein *M*. Cell cu_{1a} not narrowly triangular, veins Cu_{1a} and Cu_{1b} more distinctly curved

- 2 Cells of forewing with distinct longitudinal brown or black pattern extending backwards from the apex (Figs 45, 47, 49) 3
- Cells of forewing without distinct longitudinal patterning (in *atlasiensis*, *adenocarpi* and *angustatipennis* (Figs 53, 61, 51) there is occasionally a faint clouding of the wing membrane and in the former this is accompanied by the presence of diffuse spots in the apical cells) 5
- 3 Forewing (Fig. 45) with costal margin comparatively straight, surface spinules present throughout cell r_1 . Genal cones (Fig. 46) broad with rounded apex. Male paramere (Fig. 66) comparatively short and broad. Aedeagus as in Fig. 67 *genistae* (Latreille) (p. 14)
- Forewing (Figs 47, 49) with costal margin more strongly curved; surface spinules absent throughout most of cell r_1 . Genal cones either broad with an angular apex (Fig. 48) or more slender with rounded apex (Fig. 50). Paramere relatively longer and narrower (Fig. 69, 72). Aedeagus as in Figs 70, 73 4
- 4 Forewing (Fig. 49) with surface spinules absent from cell $c+sc$ and the base of r_1 , and confined to narrow bands in the centres of cells r_s and m . Genal cones (Fig. 50) slender, with rounded apex. Male paramere and aedeagus as in Figs 71–73. Spain and Sicily
- *maculata* (Löw) (Spanish material) (p. 16)
- Forewing (Fig. 47) with spinules present throughout cells $c+sc$ and r_1 and broadly distributed throughout cells r_s and m . Genal cones (Fig. 48) broader and with a more angular apex. Male paramere and aedeagus as in Figs 68–70. Eastern Europe
- *maculata* (Löw) (Hungarian material) (p. 16)
- 5 Forewing (Fig. 51) strongly narrowed to an acute apex. Female proctiger (Fig. 101) long and slender, with a relatively small circumanal pore ring *angustatipennis* (Loginova) (p. 14)
- Forewing (Figs 55, 59, 61) less strongly narrowed, apex more broadly rounded. Female proctiger (Figs 92, 99, 100) less slender, relatively shorter or more robust, with a relatively longer circumanal pore ring 6
- 6 Forewing shaped as in Fig. 53 with cell $c+sc$ somewhat bowed outwards, vein Cu_{1b} strongly curved before its junction with the anal margin; nebulous brown spots present on membrane around the apex. (N.B. Several other species have dark spots where the longitudinal veins meet the marginal vein.) *atlasiensis* sp. n. (p. 14)
- Forewing (Figs 55, 59, 61) of different shape, without nebulous brown spots on membrane around apex (if pattern present as in *A. torifrons* (Fig. 57) then never consisting of spots); vein Cu_{1b} less strongly curved before its junction with the marginal vein 7
- 7 Forewing (Figs 55, 57) opaque amber or yellow-brown throughout or with suffused brown markings along veins around apex 8
- Forewing (Figs 59, 61) not amber or yellow-brown, and without brown patterning along vein margins and around apex 9
- 8 Forewing (Fig. 55) elongate oval, amber or yellow-brown throughout. Genal cones (Fig. 56) short with a broad base and a very broadly rounded apex. Male paramere (Fig. 74) less broad. Apex of aedeagus (Fig. 81) more strongly hooked *putonii* (Löw) (p. 17)
- Forewing (Fig. 57) more broadly oval, shorter, not amber or yellow-brown throughout; pattern somewhat variable but usually consisting of suffused brown markings along vein margins and around apex. Genal cones (Fig. 58) slightly longer and less broadly rounded at apex. Male paramere (Fig. 83) broader. Apex of aedeagus (Fig. 80) less strongly hooked
- *torifrons* (Flor) (p. 18)
- 9 Forewing (Fig. 59) broadest in basal third, with a narrowly rounded apex; vein Cu_{1a} weakly arched. Male paramere (Fig. 83) with a subapical lobe on the anterior margin. Aedeagus (Fig. 84) with a weakly curved tip *hispanica* sp. n. (p. 16)
- Forewing (Figs 61, 257) broadest towards the centre, with a more broadly rounded apex and with vein Cu_{1a} more strongly arched. Male paramere (Figs 74, 86, 89) without a subapical lobe on the anterior margin. Aedeagus (Figs 87, 90) usually with a strongly recurved tip 10
- 10 Male paramere (Fig. 74) almost as long as proctiger, with at most a short anteriorly directed apical tooth. Genal cones (Fig. 258) apparently much shorter. (Figures and description taken from the original, all type material is lost.) Libya *africana* Heslop-Harrison (p. 13)
- Male paramere (Figs 86, 89) distinctly shorter than the length of the proctiger, with a large apical tooth. Genal cones (Figs 62, 64) longer, with broadly rounded apices. France, Portugal and Spain 11
- 11 Forewing (Fig. 63) with dense spinules broadly distributed throughout all cells. Head (Fig. 64) more robust, vertex relatively long. Male paramere (Fig. 89) with a distinct anterior bulge at mid length and with a sinuously truncated apex which is developed anteriorly into a massive

tooth. Male aedeagus as in Fig. 90. Antennae more than twice as long as head width

- Forewing (Fig. 61) with less dense spinules which are confined to the apical areas of cells r_1 , r_s , m , m_{1+2} , cu_{1a} , the base of $c+sc$ and around vein Cu_2 . Head (Fig. 62) less robust, vertex relatively shorter. Male paramere (Fig. 86) more regularly shaped, curved posteriorly and with a smoothly convex apex which is developed anteriorly into a large but shorter tooth. Male aedeagus as in Fig. 87. Antennae less than twice head width *magnidentata* sp. n. (p. 17)
- Forewing (Fig. 61) with less dense spinules which are confined to the apical areas of cells r_1 , r_s , m , m_{1+2} , cu_{1a} , the base of $c+sc$ and around vein Cu_2 . Head (Fig. 62) less robust, vertex relatively shorter. Male paramere (Fig. 86) more regularly shaped, curved posteriorly and with a smoothly convex apex which is developed anteriorly into a large but shorter tooth. Male aedeagus as in Fig. 87. Antennae less than twice head width *adenocarp* Löw (p. 13)

Arytaina adenocarp Löw

(Figs 61, 62, 85–87, 99)

Arytaina adenocarp Löw, 1880: 552; 1883: 230; 1885: 150; Puton, 1886: 92; Aulman 1913: 32; Fuente, 1920: 321; Heslop-Harrison, 1951: 434; Ramirez Gomez, 1956: 75; Klimaszewski, 1973: 191; Loginova, 1976a: 598; Conci & Tamanini, 1984b: 262. Lectotype ♂, FRANCE, here designated (NM).
Arytaena adenocarp Löw; Oshanin, 1907: 366; 1912: 128.

DESCRIPTION. Coloration. All the available specimens are immature. General coloration of head, thorax and abdomen and appendages bright green, occasionally orange-yellow; often with orange markings on dorsum of head, thorax and abdomen; forewing clear, occasionally with faint brownish clouds; veins yellow to brown, always much darker at the points where they meet the marginal vein.

Structure. Head (Fig. 62) with genal cones swollen, with rounded apices. Forewing (Fig. 61) elongate oval; spinules sparse and confined to wing apex, the base of cell $c+sc$ and around vein Cu_2 ; pterostigma and costal break absent; cell m_1 of normal size, vein Cu_{1a} strongly curved. Metatibia with 5 thick black spurs; metatarsus with 1 black spur. Male proctiger (Fig. 85) simple; paramere (Fig. 86) parallel-sided, curved posteriorly in apical half, with a large inner apical tooth projecting anteriorly; aedeagus (Fig. 87) with moderately strongly hooked apex. Female terminalia as in Fig. 99.

Measurements. See Table 2.

MATERIAL EXAMINED

Lectotype ♂, **France**: 'Gallia, Landes. Type v. *Aryt. adenocarp* Löw' (NM). Paralectotype ♀, same data as lectotype. 7 ♂, 6 ♀, **Portugal** and **France**: 'Haute Pyrenees' (BMNH). In addition there is an abundance of material in the BMNH, presumably collected by Heslop-Harrison in Spain or Portugal, which does not bear data labels.

HOST PLANTS. *Adenocarpus complicatus* (L.) Gay and *Adenocarpus hispanicus* (Lam.) D.C. in Lam. & D.C.

PUBLISHED DISTRIBUTION. France (Löw, 1880; Aulmann, 1913), Spain (Fuente, 1920; Ramirez Gomez, 1956), Italy (Conci & Tamanini, 1984b).

COMMENTS. This species is closest to *A. magnidentata*. It can be separated by the form of the forewing spinule pattern and the shape of the male paramere and aedeagus.

Arytaina africana Heslop-Harrison

(Figs 74, 257, 258)

Arytaina africana Heslop-Harrison, 1951: 438; Loginova, 1972a: 16; 1976a: 598. Syntypes ♂ and ♀, LIBYA [not traced].

DESCRIPTION. Coloration. According to Heslop-Harrison this is a 'greenish or yellowish-brown insect with darker brown markings on the head and thorax, and brown maculations on the forewings; strongly resembling *A. genistae* in general appearance'.

Structure. Head (Fig. 258) with short genal cones. Forewing oval, cells m_1 and m_2 of moderate size, vein Cu_{1a} strongly arched; spinules present throughout all cells; pterostigma and costal break absent. Male proctiger (Fig. 74) simple; paramere (Fig. 74) long, parallel-sided, with a truncate apex. Shape of aedeagus and of female terminalia unknown.

Measurements. See Table 2.

HOST PLANT. 'A yellow flowered broom' (Heslop-Harrison, 1951).

PUBLISHED DISTRIBUTION. Libya (Heslop-Harrison, 1951) and possibly Morocco, although the specimens identified as this species by Loginova (1972) do not fit the original description very well.

COMMENTS. All type material of this species appears to be lost and we have seen no other authentic material. Our account is based entirely on Heslop-Harrison's original description. *A. africana* appears closest to *A. genistae* but the male paramere is more slender and the genal cones are less massive.

***Arytaina angustatipennis* (Loginova) comb. n.**

(Figs 51, 52, 81, 101)

Amblyrhina angustatipennis Loginova, 1972: 24; Loginova, 1976a: 598. Holotype ♂, MOROCCO (ZMU) [examined].

DESCRIPTION. Coloration. Dorsal surface of head and thorax brownish yellow with longitudinal reddish brown and orange markings; genal cones dirty yellow; abdominal sclerites reddish brown, darker above, intersegmental membranes yellow; genitalia yellowish brown; forewing membrane clear to very pale yellow; veins yellow basally, becoming dark brown apically; radular spinules prominent, forming dark brown spots at the wing margin; antennae yellow basally, darkening towards the apex; legs brownish yellow.

Structure. Head (Fig. 52) with vertex very short but broad; genal cones short and very broadly rounded. Forewing (Fig. 51) broadest in basal third, tapered to a narrow acute apex; spinules confined to the radular areas; cells m_1 and cu_{1a} of normal size; vein Cu_{1a} strongly curved; pterostigma and costal break absent. Metatibia with 5 thick black apical spurs; basal metatarsus with 2 spurs. Male proctiger (Fig. 81) simple; paramere (Fig. 81) parallel-sided with a truncate apex. Female terminalia (Fig. 101) long and slender.

Measurements. See Table 2.

MATERIAL EXAMINED

Holotype ♂, **Morocco**: Atlas Mountains, Reraia, 5–15.vi.1926 (Lindberg) (ZMU). Paratypes, 1 ♂, 1 ♀, same data as holotype.

HOST PLANT. Unknown.

PUBLISHED DISTRIBUTION. Morocco (Loginova, 1972).

COMMENT. This species is separated from other members of the genus by the apically tapered forewing.

***Arytaina atlasiensis* sp. n.**

(Figs 53, 54, 91)

DESCRIPTION. Coloration. Dorsal surface of head and thorax dirty yellow, with orange or reddish brown markings; genal cones yellow. Abdominal sclerites dark brown to black; intersegmental membranes yellow; genitalia dark brown to black; forewing membrane clear to pale yellow, veins concolorous; nebulous small brownish spots present towards wing apex; antennal segments 1–4 yellow; remainder dark brown; legs orange-yellow.

Structure. Head (Fig. 54) robust, genal cones short but massive, with broadly rounded apices. Forewing (Fig. 53) broadly oval, with cell $c+sc$ bulging outwards; costal break and pterostigma absent; vein R_1 reaching wing margin at or about the centre of the wing; cell m_1 narrow; cell cu_{1a} more strongly arched than normal; vein Cu_{1b} strongly recurved as it approaches wing margin; spinules confined to cells in basal half of wing. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 spur. Male unknown. Female terminalia (Fig. 91) long and robust.

Measurements. See Table 2.

Holotype ♀, **Morocco**: Middle Atlas, 18.v.1961 (Lawrence) (BMNH).

Paratypes. 3 ♀, same data as holotype.

HOST PLANT. Unknown.

COMMENTS. This species appears to be closest to *A. genistae* and *A. maculata* but can be distinguished by the characteristic shape and pattern of the forewing.

***Arytaina genistae* (Latreille)**

(Figs 45, 46, 65–67, 96)

Psylla genistae Latreille, 1804: 382; Guérin, 1843: 370; Burmeister, 1843: 139; Bolivar & Chicote, 1879: 183; Reiber & Puton, 1880: 75. Syntypes ♂, ♀, FRANCE [not traced].

Psylla ulicis Curtis, 1835: 565 (22a); Löw, 1883: 252. Syntypes [incomplete data], GREAT BRITAIN (UMM). [Synonymised by Löw, 1877: 126.]

Psylla spartii Hartig, 1841: 375; Förster, 1848: 69; Lethierry, 1874: 86; Löw, 1877: 126; 1883: 251; Flor, 1861: 358; Szulczewski, 1927: 199. Type [incomplete data], GERMANY; Berlin. [Synonymised by Löw, 1877: 126.]

Arytaina spartii (Hartig) Förster, 1848: 69; Löw, 1877: 126; Meyer-Dur, 1871: 404.

Psylla genistae Fabricius; Lethierry, 1869: 365. [Fabricius reference not traced.]

Arytaena ulicis (Curtis) Scott, 1876: 529.

Chermes (*Ataenia*) *genistae* (Latreille) Thomson, 1877: 828.

Chermes genistae (Latreille) Douglas, 1878: 41.

Arytaena genistae (Latreille) Löw, 1879: 597; Scott, 1880: 132; 1882a: 14; 1882b: 255; Reuter, 1881: 162; Edwards, 1896: 250; Oshanin, 1907: 366; 1912: 128; Heslop-Harrison, J. W., 1915: 401; Van der Goot, 1912: 284; Britten, 1930: 75; Wahlgren, 1934: 89; Haupt, 1935: 241; Murray, 1936: 138; Schaefer, 1949a: 54; 1949b: 31; Vondráček, 1951b: 128; Smreczynski, 1954: 141; Glowacka & Harisanov, 1983: 64.

Arytaina genistae (Latreille) Löw, 1883: 239; 1884: 149; 1888a: 19; Puton, 1886: 92; Hueber, 1904: 275; Heslop-Harrison, 1937: 2; 1951: 428; Lauterer, 1971: 197; Loginova, 1976a: 598. (All other references listed under distribution refer to *Arytaina genistae* unless listed above.)

Psyllopa magna Crawford, 1911: 628. Syntypes ♂, ♀, U.S.A. [Synonymised by Crawford, 1914: 126.]

Arytaina genistae (Latreille) Halbert, 1934: 310. [Mis-spelling.]

DESCRIPTION. Coloration. Immature specimens with body coloration bright green often with orange or brown markings on the dorsum. Mature specimens with dorsal surface of head and thorax yellowish white with extensive longitudinal brown or orange-brown markings; genal cones yellowish white; abdominal sclerites dark brown to black; intersegmental membranes yellow; genitalia dark brown; forewing membrane clear with brown or sometimes greyish longitudinal pattern; veins brown; antennal segments 1–5 brownish yellow, remainder dark brown; legs dirty yellow, usually with femora darkened above.

Structure. Head (Fig. 46) moderately robust, genal cones short and moderately broadly rounded. Forewing (Fig. 45) oval, pterostigma and costal break absent; spinules present in all cells; cells m_1 and cu_{1a} of average size for genus; vein cu_{1a} strongly curved. Metatarsus with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 65) simple; paramere (Fig. 66) relatively broad, parallel-sided with a truncate apex which is developed into an anteriorly directed tooth; aedeagus (Fig. 67) with strongly hooked apex. Female terminalia as in Fig. 96.

Measurements. See Table 2.

MATERIAL EXAMINED

The material is too extensive to list. It includes all the material in the BMNH, together with material in the collections of IDH and DB.

HOST PLANTS. Occurs primarily on *Cytisus scoparius* (L.) Link but is also recorded in the literature from *Chamaecytisus austriacus* (L.) Link, *Chamaecytisus heuffelii* (Wierzb.) Rothm. and *Genista tinctoria* L. These published records require confirmation as they may reflect the confusion between this species and *A. maculata*.

PUBLISHED DISTRIBUTION. Austria (Löw, 1888a), Bulgaria (Glowacka & Harisanov, 1983), Czechoslovakia (Löw, 1888a; Duda, 1892; Šulc, 1905a; Vondráček, 1957; Lauterer, 1977), Denmark (Jacobsen, 1919), France (Lethierry, 1869; Reiber & Puton, 1880; Carpentier & Dubois, 1892; Dominique, 1902; Lambertie, 1910), Great Britain (Scott, 1880; Edwards, 1896; Britten, 1930; Heslop-Harrison, J. W., 1915; Heslop-Harrison, 1936a,b,c; Murray, 1936; Ing, 1966; 1971; 1974; Watmough, 1968a,b; Hodkinson, 1976; 1978; Hodkinson & White, 1979b; White & Hodkinson, 1982), German D.R. (Lauterer, 1966; Emmrich, 1976; 1978), German F.R. (Förster, 1848), Ireland (Halbert, 1935), Italy (Ferrari, 1888), Netherlands (Van der Goot, 1912; Blöte, 1926), Poland (Szulczewski, 1927; Smreczynski, 1954; Klimaszewski, 1961; 1967; 1969a; 1971; 1973; 1975; 1979; Zgardinska, 1976; Glowacka, 1979), Spain (Bolivar & Chicote, 1879; Vondráček, 1951b), Sweden (Reuter, 1881; Wahlgren, 1934; Ossiannilsson, 1952; 1971), Switzerland (Schaefer, 1949a,b; Burckhardt, 1983), Rumania (Dobreanu & Manolache, 1962), U.S.A. (introduced) (Crawford, 1914; Van Duzee, 1917; Tuthill, 1943; Vondráček, 1953).

COMMENTS. Early records of this species from Hungary have been shown to relate to *A. maculata* Löw (Horvath, 1918). The two species are easily confused and the records given above should be treated with care, particularly those for eastern Europe and Italy where their ranges appear to overlap. The two species can be distinguished by the shape of the forewing and the form of the male genitalia.

Arytaina hispanica sp. n.

(Figs 59, 60, 82–84, 92)

DESCRIPTION. Coloration. Dorsal surface of head and thorax brownish yellow with darker brown longitudinal markings; abdominal sclerites dark brown above, paler beneath; intersegmental membranes dull yellow; genitalia yellow-brown to brown; forewing membrane very pale yellowish orange; veins concolorous; antennal segments 1–2 yellow; segments 3–4 yellow basally, infusate apically; segments 5–10 brown; legs brownish yellow.

Structure. Head (Fig. 60) with genal cones shorter than vertex and broadly rounded at apex. Forewing (Fig. 59) semi-opaque, broadest towards base, tapering to narrowly rounded apex; veins thick; spinules dense and present in all cells; cell m_1 of average size; cell cu_{1a} small with vein Cu_{1a} weakly curved. Metatibia with 5 thick black apical spurs; metatarsus with 1 black spur. Male proctiger (Fig. 82) simple; paramere (Fig. 83) with distinct subapical bulge on anterior margin; aedeagus (Fig. 84) weakly hooked at apex. Female terminalia as in Fig. 92.

Measurements. See Table 2.

Holotype ♂, **Spain:** Sierra Nevada, Loma del Mulhacen, 3200 m, 30.viii.1975 (*Barfuss*) (ETH).

Paratypes. 6 ♀, same data as holotype.

HOST PLANT. Undetermined '*Genista*' species.

COMMENTS. This species has the short, oval wing as found in *A. torifrons* but in other respects resembles species such as *A. adenocarpi*. The form of the male genitalia is characteristic.

Arytaina longicella sp. n.

(Figs 43, 44, 95)

DESCRIPTION. Coloration. The type specimen is probably immature. General colour of body and appendages dull dirty yellow throughout (possibly greenish in life). Forewing membrane very pale yellow, slightly opaque; veins dull yellow.

Structure. Head (Fig. 44) with genal cones shorter than vertex, very broad and truncate at the apex. Forewing (Fig. 43) oval with narrowly rounded apex; lacking spinules except in radular areas and around vein Cu_2 ; cell m_1 very long and narrow; cell cu_{1a} triangular, vein Cu_{1a} straight; pterostigma and costal break absent. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Female terminalia as in Fig. 95. Male unknown.

Measurements. See Table 2.

Holotype ♀, **Spain:** Sierra de Guadarrama, vii.1926 (*Uvarov*) (BMNH).

HOST PLANT. Unknown.

COMMENTS. This species is based on a single female but the wing venation is so different it should not be confused with other species.

Arytaina maculata (Löw) comb. n.

(Figs 47–50, 68–73, 97)

Amblyrhina maculata Löw, 1886: 157; 1888b: 382; Horvath, 1886: 313; 1918: 58; Puton, 1886: 92; Ragusa, 1907: 237; Oshanin, 1907: 366; 1912: 128; Aulmann, 1913: 32; Haupt, 1935: 241; Vondráček, 1951b: 128; 1957: 180; Klimaszewski, 1969b: 44; 1970: 422; 1973: 189; 1975: 129; Loginova, 1964: 464; 1976a: 598; Lauterer, 1977: 98; Dobreanu & Manolache, 1962: 147; Andrianova & Klimaszewski, 1983: 38; Glowacka & Harisanov, 1983: 64. Syntypes ♂, ♀ HUNGARY (not located).

Ambly[r]rhina maculata Löw; Löw, 1888a: 19.

[*Arytaina genistae* (Latreille), partim; Löw, 1888a: 19; Horvath, 1886: 314; 1918: 58. Misidentifications.]

Amblyrhina maculosa Löw; Klimaszewski, 1965. [Mis-spelling.]

DESCRIPTION. Coloration. Immature specimens with body colour bright green throughout. Mature specimens with genal cones, vertex and dorsal part of thorax yellowish white with light brown and orange markings; underside of head and thorax yellow with dark brown markings; abdominal sclerites dark brown to black; intersegmental membranes orange-yellow; genitalia orange-yellow to dark brown; forewing membrane clear with brown or sometimes greyish longitudinal pattern; veins brown; antennal segments 1–5 yellow, 5–10 dark brown; femora dark brown above, remainder of legs dirty yellow.

Structure. Head (Figs 48, 50) with genal cones shorter than vertex, broad; more slender in the Spanish specimens. Forewing (Figs 47, 49) oval, without pterostigma or costal break; with spinules present throughout all cells except for r_1 , where they are at most confined to the apex; in the Spanish material they are also absent from cell $c+sc$; cells m_1 and cu_{1a} of average size, vein Cu_{1a} strongly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 68) simple; paramere (Fig. 69) parallel-sided, truncate, with apical forward-pointing tooth; aedeagus (Fig. 70) strongly hooked. In Spanish males the paramere is more slender (Figs 71–73). Female terminalia as in Fig. 97.

Measurements. See Table 2.

MATERIAL EXAMINED

The only material in the Löw collection comes from a different locality to that stated in the original description. 1 ♂, 1 ♀, **Hungary**: Szomotor (det. Löw) (NM). 4 ♂, 8 ♀ **Italy** and **Spain** (BMNH, PL).

HOST PLANTS. *Chamaecytisus ratisbonensis* (Schaeffer) Rothm. and *Chamaecytisus borysthenicus* (Gruner) A. Klaskova.

PUBLISHED DISTRIBUTION. Bulgaria (Klimaszewski, 1965, 1970; Glowacka & Harisanov, 1983), Czechoslovakia (Vondráček, 1957; Lauterer, 1977), Hungary (Löw, 1886, 1888a; Horvath, 1886, 1918a; Haupt, 1935), Italy, Sicily (Ragusa, 1907), Rumania (Dobreanu & Manolache, 1962), U.S.S.R.; central and southern European part (Loginova, 1964; Andrianova & Klimaszewski, 1983), Yugoslavia (Horvath, 1918b).

COMMENTS. This species is very close to *A. genistae* with which it has been confused in the past. It is possible that some of the published records for *A. genistae* refer to this species. The specimens from Sicily have slightly more slender genal cones and parameres than Löw's material from Austria. Similarly the Spanish material listed is included under *maculata* primarily because of the similarity of the wing pattern. In several other respects such as the shape of the genae and parameres it is close to *adenocarpi*. This whole group warrants further detailed investigation. The *maculata* complex is similar in several respects to *A. genistae* but can be distinguished by the shape of the forewing and the form of the male genitalia.

Arytaina magnidentata sp. n.

(Figs 63, 64, 88–90)

DESCRIPTION. Coloration. Unknown; the type-material is slide mounted. Forewing clear, without pattern on membrane but veins darkened at the point where they meet the marginal vein.

Structure. Head (Fig. 64) robust, genal cones large and broadly rounded at apex, slightly shorter than length of vertex. Forewing (Fig. 63) oval, without pterostigma or costal break; dense spinules present throughout all cells; cells m_1 and cu_{1a} of average size for genus; vein Cu_{1a} strongly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 88) simple; paramere (Fig. 89) with a massive apical tooth; aedeagus (Fig. 90) with a very strongly hooked apex. Female unknown.

Measurements. See Table 2.

Holotype ♂, **Portugal**: Rio Mandego, vii.1953 (*Heslop-Harrison*) (BMNH).

HOST PLANT. Unknown.

COMMENTS. Although based on a single male this species is quite distinct from other *Arytaina* species. It is closest to the other clear elongate-oval winged species, *A. adenocarpi*, but differs in characters of the forewing and the shape of the male paramere and aedeagus.

Arytaina putonii (Löw) comb. n.

(Figs 55, 56, 75–77, 100)

Amblyrhina putonii Löw, 1888b: 381; Aulmann, 1913: 32. Syntypes ♂, ♀, FRANCE (missing from Löw collection).

Amblyrhina putoni Löw; Puton, 1899: 113; Oshanin, 1907: 365; 1912: 128; Lambertie, 1910: 96; Vondráček, 1951b: 128; Klimaszewski, 1973: 190; Loginova, 1976a: 598.

DESCRIPTION. Coloration. General body coloration bright green with orange markings on the dorsum of the head, thorax and abdomen; forewing membrane amber coloured, slightly darker towards apex, veins concolorous; antennal segments 1–2 green; segments 3–6 yellowish brown, becoming infusate towards the apex; segments 7–10 brown; legs greenish yellow.

Structure. Head (Fig. 56) short and broad; genal cones very broad basally and appearing to curve round to give broadly truncate apices. Forewing (Fig. 55) short and oval, of somewhat rugose texture, narrowly rounded at apex; spinules absent except from radular areas; cells m_1 and cu_{1a} of average size, vein Cu_{1a} weakly curved to straight; costal break and pterostigma absent. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 75) simple; paramere (Fig. 76) parallel-sided with large apical anteriorly directed tooth; aedeagus (Fig. 77) with hooked apex. Female terminalia as in Fig. 100.

Measurements. See Table 2.

MATERIAL EXAMINED

10 ♂, 7 ♀, **Portugal and Spain** (BMNH).

HOST PLANT. Recorded by Löw (1888) from '*Cytisus spinosus*' which, in all probability, is *Calicotome spinosa* (L.) Link.

PUBLISHED DISTRIBUTION. France (Löw, 1888b; Lambertie, 1910; Aulmann, 1913; Vondráček, 1951b).

COMMENTS. This species is closest to *A. torifrons* but differs in the shape and coloration of the forewing, the shape of the genal cones and the form of the male aedeagus and paramere.

Table 2 Measurements of *Arytaina* species. Males and females are given separately and all values are in mm.

		Head width	Antennal length	Forewing length	Female proctiger length	Male proctiger length	Male paramere length	Male aedeagus length
<i>adenocarpis</i>	m	0.77–0.83	1.38–1.59	1.91–2.19	—	0.39–0.42	0.31–0.32	0.28–0.30
	f	0.80–0.89	1.55–1.65	2.14–2.45	0.76–0.85	—	—	—
<i>africana</i>	m	0.78	—	2.38	—	—	—	—
	f	—	(data from original description)			—	—	—
<i>angustatipennis</i>	m	—	—	2.57	—	0.25?	0.20?	—
	f	0.92–0.98	1.65–1.70	2.70–2.82	0.62–0.80	—	—	—
<i>atlasensis</i>	m	—	—	unknown	—	—	—	—
	f	1.00–1.02	1.56–1.58	2.54–2.56	0.89–0.97	—	—	—
<i>genistae</i>	m	0.90–0.96	2.05–2.20	2.35–2.75	—	0.39–0.44	0.37–0.39	0.30–0.32
	f	0.95–1.05	1.90–2.25	2.40–3.00	0.89–0.99	—	—	—
<i>hispanica</i>	m	0.85	—	2.01	—	0.38	0.31	0.31
	f	0.86–0.90	1.27–1.29	2.32–2.34	0.85–0.86	—	—	—
<i>longicella</i>	m	—	—	unknown	—	—	—	—
	f	0.83	—	2.34	0.96	—	—	—
<i>maculata</i>	m	0.86	1.68	2.35	—	0.39	0.33	0.33
	f	0.86	1.46	2.35	0.91	—	—	—
<i>magnidentata</i>	m	0.79	1.61	2.12	—	0.37	0.33	0.27
	f	—	—	unknown	—	—	—	—
<i>putonii</i>	m	0.81–0.86	1.10–1.14	1.90–2.03	—	0.36–0.38	0.31–0.32	0.30–0.31
	f	0.86–0.93	1.15–1.16	2.09–2.20	0.72–0.80	—	—	—
<i>torifrons</i>	m	0.73–0.75	0.85–0.95	1.55–1.59	—	0.34–0.36	0.25–0.27	0.26–0.28
	f	0.70–0.83	0.85–1.00	1.68–2.02	0.64–0.71	—	—	—

Arytaina torifrons (Flor) comb. n.

(Figs 57, 58, 78–80, 102)

Psylla torifrons Flor, 1861: 360. LECTOTYPE ♂, FRANCE (NM), here designated [examined].

[*Psylla spartiophila* Förster sensu Puton, 1871: 437. Misidentification.]

Amblyrhina torifrons (Flor) Löw, 1879: 600; 1882b: 259; 1883: 252; 1888b: 382; Puton, 1886: 92; Oshanin, 1907: 365; 1912: 128; Aulmann, 1913: 32; Klimaszewski, 1973: 190; Loginova, 1976a: 598; Hodkinson & White, 1979a: 59.

DESCRIPTION. Coloration. Immature specimens pale greenish yellow throughout. Mature specimens with dorsal surface of head and thorax reddish orange; genal cones yellow; abdomen yellowish brown to dark

brown; genitalia brown; forewing clear to pale yellowish, veins pale brown to dark brown, pigment spreading from the veins onto immediately adjacent areas of the membrane, apical pattern consisting of diffuse brown clouds of irregular form; antennal segments 1–6 brownish yellow; segments 7–10 brown; legs brownish yellow.

Structure. Head (Fig. 58) relatively broad, with genal cones convergent in front of frons. Forewing (Fig. 57) short and broad, oval; without pterostigma or costal break; spinules confined to radular areas; cells m_1 and cu_{1a} of normal shape; vein Cu_{1a} weakly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 78) simple; paramere (Fig. 79) relatively broad and appearing swollen along anterior margin, with large apical anteriorly directed tooth; aedeagus (Fig. 80) with apex strongly recurved. Female terminalia as in Fig. 102.

Measurements. See Table 2.

MATERIAL EXAMINED

Lectotype ♂, **France**: 'Gallia, Marseilles, type v. *Aryt. torifrons* Flor.' (NM). Paralectotype ♀, same data as lectotype. 78 ♂, ♀, **France** and **Spain** (BMNH, PL, IDH).

HOST PLANT. *Genista hispanica* L.

PUBLISHED DISTRIBUTION. France (Flor, 1861; Aulmann, 1913; Hodkinson & White, 1979a).

COMMENTS. This species is closest to *A. putonii* but differs in the shape and coloration of the forewing, the shape of the genal cones and the form of the male paramere and aedeagus.

LIVILLA Curtis

Livilla Curtis, 1836: 625; Löw, 1863: 106; Puton, 1876: 288; Kieffer, 1905: 163; Oshanin, 1907: 366; 1912: 128; Pflugfelder, 1941: 75; Heslop-Harrison, 1951: 421; Loginova, 1976a: 599. Type-species: *Livilla ulicis* Curtis, 1836, by monotypy.

Floria Löw, 1879: 590; Kieffer, 1905: 164; Heslop-Harrison, 1951: 421; Oshanin, 1907: 367; 1912: 128; Pflugfelder, 1941: 77; Heslop-Harrison, 1951: 421; Loginova, 1976a: 598; Hodkinson & White, 1979a: 55. Type-species: *Psylla pyrenaea* Mink, 1859, designated by Oshanin, 1912: 128 (not by Haupt, 1935: 241 as indicated by Hodkinson & White, 1979a: 55). **Syn. n.**

Alloeoneura Löw, 1879: 594; Oshanin, 1907: 368; 1912: 128; Pflugfelder, 1941: 77; Heslop-Harrison, 1951: 421; Loginova, 1976a: 599. Type-species: *Arytaina radiata* Förster, 1848, by monotypy. **Syn. n.**

Allaeoneura Löw; Puton, 1886: 93; Kieffer, 1905: 163. [Mis-spelling.]

Floria (*Floriella*) Ramirez Gomez, 1956: 87. Type-species: *Psylla pyrenaea* Mink, 1859, by monotypy. [Objective synonym of *Floria*.] **Syn. n.**

DIAGNOSIS. Head weakly deflexed, in same plane as thorax, eyes hemispherical, antennae usually slender, at least twice as long as head width; genal cones usually elongate and slender, little deflexed from the plane of the vertex. Pronotum broad and flat; propleurites quadrate, divided by a vertical suture. Forewing oval to oblong-oval, usually membranous but short and coriaceous in a few species. Costal break present or absent; pterostigma, if present, short; cell cu_{1a} not tall and usually not strongly arched. Basal metatarsus usually with 1 black spur, occasionally with 2 or 0. Male proctiger simple, without posterior process; paramere long and slender, tapered to a hooked apex; aedeagus with apex generally rounded, not strongly hooked as in *Arytaina*. Head and thorax often covered in abundant long setae. Associated with legumes of the tribe Genisteae.

COMMENTS. As defined above the genus *Livilla* probably constitutes a monophyletic group of 31 species living on legume hosts of the Genisteae, primarily within the Mediterranean Basin. The single South African species *annosa*, which Heslop-Harrison (1961b) designated type-species of the subgenus *Brinckitia*, is excluded from the study. The synonymy given above relates only to references not quoted under the individual species synonyms and to papers which deal specifically with generic synonymy. The genus now contains species previously included under the old generic names *Livilla*, *Floria* and *Alloeoneura* plus one species from *Amblyrhina*. We could find no characters that warrant the recognition of *Floria* and *Alloeoneura*. The general body form and genitalia of all the species is very similar and they differ from one another primarily in the form of the forewing. We regard the development of short, coriaceous forewings in some species merely as a specific adaptation for ensheathing the body to conserve water in a dry environment rather than as a generic synapomorphy. Based on characteristics of the forewing, six loosely defined groups of species can be recognised: the *ulicis*-, *horvathi*-, *burckhardti*-, *radiata*- and *spartiisuga*-groups, with a residual assemblage of heterogeneous species.

Key to species

- 1 Forewing (Figs 103, 105, 107) coriaceous and strongly convex, oval, little more than twice as long as broad (*ulicis*-group) 2
- Forewing (Figs 109, 115, 125, 139, 153) membranous, not strongly convex; usually longer and more oblong-oval in shape; if short and/or oval (*L. burckhardti* (Fig. 165) and *L. radiata* (Fig. 125)) then with apical brown patterning 4
- 2 Genal cones (Fig. 104) massive, longer than the vertex. Forewing (Fig. 103) dark brown throughout; cell m_{1+2} elongate, longer than the stem of vein M_1 ; wing membrane with short distinct furrows arising from and at right angles to the veins. General body colour shining dark brown to black throughout *ulicis* Curtis (p. 23)
- Genal cones (Fig. 106, 108) shorter. Forewings (Figs 105, 107) yellowish to amber or brown, with a whitish basal patch; cell m_{1+2} shorter than stem of vein M ; membrane without distinct furrows. Body either reddish brown with paler markings or dark brown with 2 large white streaks which extend onto the base of the wings 3
- 3 Forewing (Fig. 105) brown with broad white basal patch, costal margin weakly curved in basal third, cell cu_{1a} upright, surface spinules absent from most cells. Genal cones (Fig. 106) with very broadly rounded apices. Male genitalia as in Figs 170–172. Iberian Peninsula *bivittata* sp. n. (p. 24)
- Forewing (Fig. 107) yellow to amber throughout, without white basal patch, costal margin strongly curved in basal third, cell $c+sc$ appearing to bulge outwards, cell cu_{1a} leaning towards base of wing, surface spinules obvious in all cells. Genal cones (Fig. 108) acutely tapered. Male genitalia as in Figs 173–175. Austria, Switzerland, N. Italy *vicina* (Löw) (p. 24)
- 4 Forewing (Fig. 109) broadest in basal third, acutely tapering towards apex. Genal cones (Fig. 110) very short, extending little beyond the vertex (*burckhardti*-group) *cognata* (Löw) (p. 25)
- Forewing (Figs 115, 125, 149, 165) broadest at or beyond the middle, not acutely tapering towards apex. Genal cones (Figs 116, 126, 150, 166) much longer 5
- 5 Forewing (Fig. 165) with subapical brown chevron pattern, wing apex narrowly rounded. Female terminalia (Fig. 270) long and slender. Genal cones shorter than the length of the vertex (*burckhardti*-group) *burckhardti* sp. n. (p. 25)
- Forewing pattern, if present (Figs 121, 144, 157), not consisting of brown chevrons, wing apex more broadly rounded. Female terminalia (Figs 287–292) more robust. Genal cones (Figs 116, 122, 126, 132) usually at least as long as vertex 6
- 6 Forewing (Fig. 153) clear, without colour pattern or suffused apex *genistae* Ramirez Gomez (p. 38)
- Forewing (Figs 131, 144, 161) either with a colour pattern or infusate apically 7
- 7 Forewing (Fig. 125) short and broad, at most 2·1 times as long as broad, with colour pattern as shown in Fig. 125; cell r_1 short and broad. Genal cones (Fig. 126) very long and slender (*radiata*-group) *radiata* (Förster) (p. 29)
- Forewing (Figs 117, 121, 123, 127, 161) longer and narrower, more than 2·1 times as long as broad (except some male *L. poggii* (Fig. 142)); pattern not as in Fig. 125; cell r_1 longer and narrower. Genal cones (Figs 118, 122, 124) usually shorter, if long (*L. spectabilis* (Fig. 162)) then more robust 8
- 8 Forewing pattern (Figs 111, 113, 115, 117, 155) consisting of longitudinal brown streaks *horvathi*-group) 9
- Forewing pattern consisting of brown clouds (Fig. 119), small roundish maculations (Fig. 131), infuscation of the wing apex and/or the area adjacent to the anal margin (Figs 159, 163) or a combination of these characters (Figs 138, 139) 13
- 9 Forewing pattern (Fig. 111) consisting of narrow longitudinal streaks immediately adjacent to the veins in the apical half of the wing. Female circumanal pore ring (Fig. 287) small, at most 0·19 times length of proctiger *nervosa* sp. n. (p. 27)
- Forewing pattern (Figs 113–115, 117, 155) consisting of an anterior streak which may or may not be confined to the apex of vein R_s , and a posterior streak extending along the anal margin. Female circumanal pore ring (Figs 284, 288, 289, 290) at least 0·21 times length of proctiger 10
- 10 Forewing (Figs 113, 115) with anterior streak confined to the apex of vein R_s , not extending into the basal half of the wing 11
- Forewing (Figs 117, 155) with anterior streak extending across vein R_s into the basal half of wing 12
- 11 Forewing (Fig. 113) with anterior streak consisting of a small spot around the apex of vein R_s ;

- costal margin of the wing weakly curved so that apex of cell r_1 is abruptly truncated by vein R_s . Genal cones (Fig. 114) strongly divergent, outer margins strongly concave, apex broadly rounded. Male proctiger (Fig. 182) somewhat lobed posteriorly. Male aedeagus as in Fig. 184. N. Africa **nigralineata** sp. n. (p. 27)
- Forewing (Fig. 115) with a larger spot or streak around vein R_s ; costal margin more strongly curved so that apex of cell r_1 is more narrowly truncated by vein R_s . Genal cones (Fig. 116) less divergent, outer margins at most weakly concave, apex narrowly rounded. Male proctiger (Fig. 185) less obviously lobed. Male aedeagus as in Fig. 187. E. Europe **horvathi** (Scott) (p. 26)
- 12 Forewing (Fig. 117) elongate oblong-oval; anterior streak adjoining the costal margin and extending basally to just beyond bifurcation of vein R . Genal cones (Fig. 118) longer and slenderer. Male aedeagus (Fig. 190) with a hooked apex. C. Europe **vittipennella** (Reuter) (p. 28)
- Forewing (Fig. 155) more broadly oval; anterior streak not adjoining the costal margin, leaving a long clear area, but extending to base of wing. Genal cones (Fig. 156) shorter and more robust. Male aedeagus (Fig. 232) with a bulbous apex. Afghanistan **klapperichi** sp. n. (p. 28)
- 13 Forewing (Figs 119, 121, 123) with the two apical branches of the M vein strongly divergent, vein M_{1+2} meeting the marginal vein well above the wing apex (**radiata**-group) 14
- Forewing (Figs 131, 132, 135, 157) with the branches of vein M not strongly divergent, vein M_{1+2} meeting the marginal vein at or below the wing apex 16
- 14 Forewing pattern (Fig. 123) consisting of small round brown maculae which become confluent and form an irregular brown pattern in the apical and posteroapical regions of the wing; costal margin strongly curved throughout. Dorsum of thorax uniformly shining chocolate brown. Genal cones (Fig. 124) conical. On *Genista fasselata* **syriaca** (Löw) (p. 31)
- Forewing (Figs 119, 121) without small brown maculae, pattern consisting primarily of brown clouds or bold markings in the apical third of the wing, occasionally with slight infuscation in the basal half; costal margin almost straight between the points where veins R_1 and R_s meet the marginal vein. Dorsum of thorax not uniformly shining chocolate brown. Genal cones (Figs 120, 122) more elongate. On other hosts 15
- 15 Veins in apical third of forewing (Fig. 121) dark brown to black, pattern very dark brown; occasionally with the basal half of the wing weakly infusate. Genal cones (Fig. 122) divergent. Basal metatarsus with one thick black spur. Male paramere (Fig. 195) with a strongly serrated anterior margin and a massive apical tooth. Male aedeagus (Fig. 196) with thin shaft and relatively large apex. Host plant unknown **lautereri** sp. n. (p. 30)
- Veins in the apical third of forewing (Fig. 119) not dark brown to black, pattern more widespread but less intense, mid brown; basal part of wing not infusate. Genal cones (Fig. 120) not divergent. Basal metatarsus without thick black spurs. Male paramere (Fig. 192) without strongly serrated anterior margin and with a small apical tooth. Male aedeagus (Fig. 193) with a broader shaft and a relatively small apex. On *Retama* sp. **retamae** (Puton) (p. 30)
- 16 Forewing (Fig. 161) long and narrow, of a characteristic shape, pattern consisting of an irregular brown or orange-brown infuscation of the membrane, primarily in the apical third and a darker brown spot around vein Cu_{1b} . Genal cones (Fig. 162) very long, at least 1.3 times length of vertex. Antennae very long, at least 2.85 times head width. On *Spartium junceum* **spectabilis** (Flor) (p. 37)
- Forewing (Figs 131, 151, 157, 161) relatively shorter and broader, pattern not as above. Genal cones (Figs 132, 152, 158, 164) less than 1.3 times length of vertex. Antennae relatively shorter, less than 2.85 times head width. On other hosts 17
- 17 Forewing (Fig. 157) with distinct chocolate brown colour pattern distributed around the apex of vein R_s , the apical half and branches of vein M and around veins Cu_{1a} and Cu_{1b} (**spartiisuga**-group) **pseudoretamae** sp. n. (p. 35)
- Forewing (Figs 131, 144, 145, 159) without distinct chocolate brown patterning in apical third; if similarly shaped pattern to *pseudoretamae* present then much paler, more diffuse and overlaid with small round maculations 18
- 18 Forewing (Fig. 159) slightly rugose, small maculae absent, yellow-brown to orange-brown infuscation occupying a continuous band extending around the apex and along the posterior wing margin; remainder of membrane lighter; pigment darker along vein margins giving a somewhat furrowed appearance. Male proctiger (Fig. 239) with a slight basal posterior lobe **adusta** (Löw) (p. 39)
- Forewing (Figs 131, 139) usually with small maculae present and broadly distributed through-

- out the wing, often overlying the areas of infuscation when present. If maculae apparently absent (in some specimens of *L. variegata* and *L. maura* they are nebulous and indistinct) then infuscation distributed as in Fig. 169, or forewing membrane uniformly yellow to orange (Fig. 151). Male proctiger (Figs 203, 206, 209, 245) without basal posterior lobe 19
- 19 Forewing (Figs 127, 131, 135, 137, 142) with small brown maculae distributed throughout (*spartiisuga*-group) 20
- Forewing (Figs 151, 163) with maculae absent or very indistinct; when present very nebulous and confined to the apical half of wing 30
- 20 Sexually dimorphic species. Male forewing (Fig. 142) with a pale maculation-free band running transversely across the centre. Female forewing (Fig. 141) maculate throughout; vein *M* very strongly arched in both sexes, cell *cu*₁ very short and high. Apex of male aedeagus as in Fig. 226. On *Genista corsica* in Sardinia *poggii* (Conci & Tamanini) (p. 36)
- Forewing (Figs 129, 131, 133, 137) without transverse pale band, occasionally with a pale longitudinal band; vein *M* less strongly arched and cell *cu*_{1a} flatter and more elongate. Apex of male aedeagus (Figs 217, 220, 223) of different shape. On other host plants 21
- 21 Ground coloration of forewing membrane (Figs 127, 129, 131, 133), excluding maculae, uniform, clear to pale yellow throughout 22
- Ground coloration of forewing membrane (Figs 135, 144, 145, 147, 149), excluding maculae, two-tone, clear to pale yellow along anterior half of wing, pale brown to orange-brown along posterior half and/or around the apex 27
- 22 Maculae absent from a broad band running along anterior margin of forewing (Fig. 133); wing with a somewhat truncate apex. Male and female genitalia as in Figs 212–214, 274. On *Calicotome spinosa* and *Genista pilosa* *pyrenaea* (Mink) (p. 34)
- Maculae present in area along anterior margin of forewing (Figs 129, 131, 137); wing shaped differently, with a less truncate apex. Male and female genitalia as in Figs 206–208, 209–211, 221–223, 271–272. On other hosts 23
- 23 Maculae absent from a longitudinal band running the length of cell *r*_s (Fig. 137). Male paramere (Fig. 219) long and curved posteriorly in apical half. Apex of aedeagus (Fig. 220) smoothly rounded *spartiisuga* (Puton) (p. 31)
- Maculae present throughout cell *r*_s (Figs 127, 129, 131, 139). Male paramere (Figs 204, 207, 222) usually shorter and broader, if long (Fig. 210) then straighter. Apex of aedeagus (Figs 205, 208, 211, 223) more angular 24
- 24 Forewing (Figs 129, 131) long and parallel-sided, costal margin beyond the pterostigma weakly curved to straight; cell *cu*_{1a} elongate 25
- Forewing (Figs 127, 139) broader and more oval, costal margin beyond the pterostigma strongly curved, cell *cu*_{1a} shorter and more upright 26
- 25 Vein *R*_s of forewing (Fig. 129) strongly curved upwards to meet the costal margin, cell *r*₁ broad; veins *M* and *Cu* with a longish common stem. Male paramere (Fig. 207) broad basally, gradually narrowing and curving posteriorly towards the apex; basal posterior margin with conspicuous thick setae. Male aedeagus (Fig. 208) short and robust. Genal cones (Fig. 130) long and slender. Smaller species; head width less than 0.7 mm. Iberian Peninsula and N. Africa *maculipennis* sp. n. (p. 33)
- Vein *R*_s of forewing (Fig. 131) more sinuous, less strongly curved towards costal margin, cell *r*₁ narrower; veins *M* and *Cu* with a short common stem. Male paramere (Fig. 210) long and thin, posterior margin with normal setae. Male aedeagus (Fig. 211) longer and more slender. Genal cones (Fig. 132) shorter and more robust. Larger species; head width greater than 0.7 mm. Sicily *siciliensis* sp. n. (p. 32)
- 26 Forewing (Fig. 127) with a broadly rounded apex; vein *R*_s weakly sinuate, vein *Cu*_{1a} weakly curved in apical half. Male paramere (Fig. 204) broad and parallel-sided. Weakly tapered towards the apex. Apex of male aedeagus as in Fig. 205. Spain and S. France *cataloniensis* (Hodkinson & White) (p. 32)
- Forewing (Fig. 139) with a narrowly rounded apex; vein *R*_s strongly sinuate, vein *Cu*_{1a} strongly curved in apical half. Male paramere (Fig. 222) narrower and more tapered towards the apex. Apex of male aedeagus as in Fig. 223. Greece and Crete *hodkinsoni* (Burckhardt) (p. 33)
- 27 Forewing (Fig. 199) with maculae around apex of vein *R*_s dark brown to black, distinct, much darker than those elsewhere on the wing; brown ground colour not extending right round the wing apex; wing oval, broadest in the middle, with a narrowly rounded apex. Male paramere and aedeagus as in Figs 254–256. Corsica and Sardinia *bimaculata* sp. n. (p. 34)
- Forewing (Figs 135, 144, 145, 147) with maculae around apex of vein *R*_s similar in colour to

- those elsewhere on the wing; brown ground colour extending further around the wing apex; wing oblong oval, broadest in apical third, with a broadly rounded apex. Male paramere and aedeagus as in Figs 215–217, 236–238, 251–252 28
- 28 Larger species, head width greater than 0.70 mm, wing length greater than 2.1 mm. Male paramere (Fig. 216) long and narrow, with a kink at mid length and without very thick basal posterior setae. Male aedeagus (Fig. 217) very long and narrow. Genal cones (Fig. 136) somewhat divergent. Forewing (Fig. 135) usually without clear pale areas at the apices of cells r_s , m_{1+2} and m . Sicily on *Genista aetnensis* *magna* sp. n. (p. 36)
- Smaller species, head width less than 0.70 mm, wing length less than 2.10 mm. Male paramere (Figs 237, 252) shorter and broader, without a kink at mid length but with conspicuous basal posterior setae. Male aedeagus (Figs 238, 253) shorter. Genal cones (Figs 146, 148) less divergent. Forewing (Figs 144, 145, 147) often with clear areas at the apices of cells r_s , m_{1+2} and m . Not known from Sicily; on other hosts 29
- 29 Forewing (Figs 144, 145) relatively narrow, cell r_1 elongate, cell cu_{1a} moderately long, patterning as in Fig. 145 although in some specimens, including the type series, the extent of the markings is reduced (Fig. 144). Male paramere (Fig. 237) narrowly tapered to apex. Male aedeagus (Fig. 238) with apex weakly hooked. Genal cones (Fig. 146) long and slender. On *Genista hirsuta* *blandula* (Horvath) (p. 35)
- Forewing (Fig. 147) broader, cell r_1 shorter and broader, cell cu_{1a} shorter and more upright. Male paramere (Fig. 252) more broadly tapered to apex. Male aedeagus (Fig. 253) with apex strongly hooked. Genal cones (Fig. 148) slightly shorter and more robust. On *Genista triacanthos* *lusitanica* sp. n. (p. 36)
- 30 Forewing (Fig. 163) long, broadest in apical third, veins very fine and indistinct, concolorous with membrane; membrane whitish, often with apex infusate; when infusate then pale areas absent from apices of cells r_s , m_{1+2} and m . Genal cones (Fig. 164) slender, longer than vertex. Female circumanal pore ring (Fig. 269) less than 0.3 times proctiger length. Larger species, head width greater than 0.67 mm, wing length greater than 2.6 mm. Male genitalia as in Figs 245–247. Europe, on *Laburnum* spp. *variegata* (Löw) (p. 38)
- Forewing (Fig. 151) relatively shorter and broader, broadest in middle, veins more robust, darker than membrane, apex not infusate, membrane yellow to pale amber with small paler patches at the apex of cells r_s , m and m_{1+2} . Genal cones (Fig. 152) more robust, shorter than the vertex. Female circumanal ring (Fig. 282) relatively longer, more than 0.3 times proctiger length. Smaller species, head width less than 0.66 mm, wing length less than 2.5 mm. Male unknown. N. Africa, host unknown *maura* (Vondráček) (p. 39)

The *ulicis*-group

The species in this group all possess short, oval, coriaceous forewings.

Livilla ulicis Curtis

(Figs 103, 104, 167–169, 263)

Livilla ulicis Curtis, 1836: 625; Förster, 1848: 68; Meyer-Dür, 1871: 404; Scott, 1876: 528; 1882a: 14; 1882b: 255; Reiber & Puton, 1880: 75; Löw, 1883: 252; Horvath, 1886: 314; 1918a: 58; Ferrari, 1888: 76; Edwards, 1896: 250; Dubois, 1898: 239; Puton, 1899: 113; Hueber, 1904: 276; Olivier, 1904: 96; Oshanin, 1907: 366; 1912: 128; Reuter, 1909: 63; Joakimov, 1909: 1; Lambertie, 1910: 96; Aulmann, 1913: 33; Prohaska, 1928: 5; Haupt, 1935: 231; Schaefer, 1949a: 19; 1949b: 30; Vondráček, 1951b: 128; 1957: 185; Tamanini, 1955: 11; Ramirez Gomez, 1956: 96; Wagner & Franz, 1961: 163; Dobreanu & Manolache, 1962: 146; Lauterer, 1965: 174; 1977: 98; Loginova, 1964: 462; 1976a: 599; Klimaszewski, 1964: 65; 1965: 203; 1967: 14; 1969a: 43; 1973: 195; 1975: 133; Hodkinson & White, 1979b: 39; White & Hodkinson, 1982: 26; Burckhardt, 1983: 55. Syntypes ♂, ♀, GREAT BRITAIN: England (UMM).

Psylla coleoptera Waltl, 1837: 277. Types (not stated), GERMANY. [Synonymised by Löw, 1883: 252.]

Psylla callunae Rudow, 1875: 7. Types (not stated), GERMANY. [Synonymised by Löw, 1883: 252.]

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax shining, dark brown; sclerites of abdomen dark brown, intersegmental membranes reddish yellow; genitalia brown; forewing uniform shining brown, veins concolorous; antennal segments 1–3 yellow; segments 4–10 dark brown; legs yellowish brown.

Structure. Head (Fig. 104) with massive sub-cylindrical genal cones, much longer than vertex. Forewing (Fig. 103) oval short, coriaceous, strongly convex; costal break and pterostigma absent; spinules, if

present, confined to radular areas; vein R_s almost straight; cell m_{1+2} elongate; vein M_1 reaching to wing apex; cell cu_{1a} small and flat; vein Cu_{1a} almost straight; short furrows running through membrane at right angles to the veins. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 167) simple; paramere (Fig. 168) with a few slightly thickened basal setae on the posterior margin; aedeagus (Fig. 169) with bulbous apex. Female terminalia as in Fig. 263.

Measurements. See Table 3.

MATERIAL EXAMINED

This is too extensive to list but includes all the material deposited in the BMNH.

HOST PLANTS. *Genista tinctoria* L. and possibly *Ulex europaeus* L. The record for *Ononis spinosa* L. by Ferrari (1888) is unlikely to be correct.

PUBLISHED DISTRIBUTION. Austria (Prohaska, 1928; Haupt, 1935); Bulgaria (Joakimov, 1909; Klimaszewski, 1965), Czechoslovakia (Vondráček, 1957; Lauterer, 1965, 1977; France (Reiber & Puton, 1880; Dubois, 1898; Olivier, 1904; Reuter, 1909; Lambertie, 1910), German D.R. (Förster, 1848), German F.R. (Haupt, 1935), Great Britain (Curtis, 1836; Scott, 1876; Edwards, 1896; Hodkinson & White, 1979b; White & Hodkinson, 1982), Hungary (Löw, 1888a; Horvath, 1886, 1918a), Italy (Ferrari, 1888; Vondráček, 1951b; Tamanini, 1955), Poland (Klimaszewski, 1964a, 1967, 1969a, 1975), Rumania (Dobreanu & Manolache, 1962), Switzerland (Schaefer, 1949a,b; Burckhardt, 1983), U.S.S.R.: European part (Loginova, 1964).

COMMENTS. *Livilla ulicis* is closest to *L. bivittata* from which it can be distinguished by the longer genal cones and the shape of cells cu_1 and m_1 of the forewing.

Livilla bivittata sp. n.

(Figs 105, 106, 170–172, 264)

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax dark shiny brown with a pale median streak running medially along head and thorax from base of genal cones to apex of scutellum; further pale streaks running across humeral region and extending on to wing base; abdominal sclerites and underside of head and thorax paler yellowish brown; terminalia brown; forewing membrane brown with a pale longitudinal streak at the base, veins concolorous; antennal segments 1–2 yellow; segments 3–5 brownish yellow, apically infusate; segments 6–10 dark brown; legs brownish yellow.

Structure. Head (Fig. 106) with short cylindrical genal processes which are evenly rounded at the apex. Forewing (Fig. 105) coriaceous, strongly convex; lacking spinules; short, oval shaped; vein R_s straight; cell m_1 and cu_{1a} small, vein M_{1+2} reaching to just below wing apex; pterostigma and costal break absent. Metatibia with 5 thick black apical spurs; metatarsus with 1 black spur. Male proctiger (Fig. 170) simple; paramere (Fig. 171) without stout basal posterior spines; aedeagus (Fig. 172) with slightly hooked apex. Female terminalia as in Fig. 264.

Measurements. See Table 3.

Holotype ♂, **Portugal**: Villa Formosana, 1954 (*Heslop-Harrison*) (BMNH).

Paratypes. 1 ♂, 1 ♀ same data as holotype, 3 ♂, 2 ♀ from unknown locality, but intermixed with specimens from Spain and Portugal (*Heslop-Harrison*) (BMNH). In addition there is a lot of material of this species without locality labels and in poor condition in the Heslop-Harrison collection (BMNH) which is not included in the type series.

HOST PLANT. Unknown.

COMMENTS. This species is closest to *Livilla ulicis*, but can be distinguished from it by the shorter genal cones and the shape of cells m_1 and cu_1 of the forewing.

Livilla vicina (Löw) comb. n.

(Figs 107, 108, 173–175, 265)

Floria vicina Löw, 1886: 159; 1888a: 20, Puton, 1886: 92; Hueber, 1904: 276; Oshanin, 1907: 367; 1912: 128; Aulmann, 1913: 35; Prohaska, 1928: 5; Haupt, 1935: 242; Klimaszewski, 1973: 195; Loginova, 1976a: 599; Burckhardt, 1983: 55. Syntypes ♂, ♀, AUSTRIA [missing from Löw collection, NM].

Arytaena montana Cerutti, 1939a: 448; 1939b: 583; Schaefer, 1949a: 55; 1949b: 31. Lectotype ♂, SWITZERLAND, designated by Burckhardt, 1983 (MZL). [Synonymised by Burckhardt, 1983: 55.]

Arytaina montana (Cerutti) Heslop-Harrison, 1951: 435; Tamanini, 1955: 11; 1977: 109; Klimaszewski, 1973: 191, Loginova, 1976a: 598.

DESCRIPTION. Coloration. Genal cones, vertex and thoracic dorsum dirty orange-yellow, with indistinct darker orange markings on thorax; abdominal sclerites brown, intersegmental membranes yellowish orange; genitalia dirty yellow to brown; forewing coriaceous, membrane yellow to orange, veins concolorous; antenna orange-yellow basally becoming darker towards apex; legs orange-yellow.

Structure. Head (Fig. 108) with genal cones slightly shorter than vertex, proximate, with rounded apices. Forewing (Fig. 107) short and broad, oblong-oval; cell $c+sc$ bulging outwards; costal break and pterostigma absent; spinules present throughout all cells; vein Rs sinuous, not strongly curved at apex; cell m_{1+2} narrow; vein M_{1+2} reaching margin below wing apex; cell cu_{1a} large and leaning towards base of wing; vein Cu_{1a} weakly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 173) simple; paramere (Fig. 174) slender, without thickened setae on basal posterior margin; aedeagus (Fig. 175) with strongly recurved apex. Female terminalia as in Fig. 265.

Measurements. See Table 3.

MATERIAL EXAMINED

9 ♂, 11 ♀, **Switzerland** and **Italy** (BMNH, DB, IDH, MM).

HOST PLANT. *Genista radiata* (L.) Scop.

PUBLISHED DISTRIBUTION. Austria (Löw, 1886, 1888a; Prohaska, 1928; Haupt, 1935), Italy (Tamanini, 1955, 1977), Switzerland (Cerutti, 1939a,b; Schaefer, 1949a,b; Burckhardt, 1983).

COMMENTS. It is a measure of the confusion that has existed within the Aryanini that this species has belonged simultaneously to two separate genera. *L. vicina* resembles *L. ulicis* and *L. bivittata* in possessing short oval coriaceous forewings, but it can be distinguished from both these species by the shape and detailed venation of the forewing and by the shape of the head and genal cones.

The burckhardti-group

The two members of this group have the forewing apex narrowly rounded, and very short genal cones.

Livilla burckhardti sp. n.

(Figs 165, 166, 248–250, 270)

DESCRIPTION. Coloration. Specimens in the type series appear to have been taken while developing their full adult coloration. General body colour (preserved in alcohol) dirty yellow, possibly green in life; sclerites of abdomen beginning to turn brown; forewing clear, with brown colour pattern; veins yellow; antennae and legs concolorous with body.

Structure. Head (Fig. 166) with short, broad genal cones. Forewing (Fig. 165) short and oval; pterostigma and costal break absent; spinules present throughout all cells; vein Rs strongly curved towards marginal vein; vein M evenly curved; vein M_{1+2} reaching to just below wing apex; vein Cu_{1a} strongly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 248) simple; paramere (Fig. 249) relatively short and broad; aedeagus as in Fig. 250. Female terminalia (Fig. 270) long and slender with dorsal margin of proctiger shallowly convex.

Measurements. See Table 3.

Holotype ♂, **Spain:** Pyrenees, Ordesa National Park, 160 m, on spiny *Genista* (Lienhard) (ETH).

Paratypes. 1 ♂, 2 ♀, same data as holotype.

HOST PLANT. The type series was collected from a spiny *Genista* species.

COMMENTS. *L. burckhardti* appears to be closest to *L. cognata* but the resemblance may be superficial. It can be separated from all other members of the genus by the chevron patterning in the forewing.

Livilla cognata (Löw) comb. n.

(Figs 109, 110, 176–178, 266)

Amblyrhina cognata Löw, 1882b: 258; Oshanin, 1907: 365; 1912: 128; Puton, 1886: 92; Haupt, 1935: 241; Vondráček, 1951b: 128; 1957: 178; Wagner & Franz, 1961: 162; Lauterer, 1965: 174; 1977: 98; Loginova, 1976a: 598; Klimaszewski, 1970: 420; 1973: 189; Gegechkori, 1984: 147; Tamanini, 1977: 107; Glowacka & Harisanov, 1983: 64. **LECTOTYPE** ♂, AUSTRIA, here designated (NM) [examined].

Ambly[r]rhina cognata Löw; Löw 1888a: 19. [Mis-spelling.]

DESCRIPTION. Coloration. General colour of head, thorax and abdomen bright green, often with orange

markings on dorsum of thorax; forewing membrane clear, occasionally with faint brown clouds in apical half of wing; veins pale, weakly pigmented; antennae green, apical segments infusate, legs green. Specimens to hand are probably immature and it is likely this species darkens as it becomes older.

Structure. Head (Fig. 110) short and broad, with small broadly rounded genal cones. Forewing (Fig. 109) oval, with a narrowly rounded apex; costal break and pterostigma absent; spinules confined to apices of cells; vein R_s not strongly curved to wing margin; vein M_1 evenly curved; vein M_{1+2} reaching to just below wing apex; cell cu_{1a} flat; vein Cu_{1a} weakly curved. Metatibia with 5 thick black spurs at apex; basal metatarsus with 1 black spur. Male proctiger (Fig. 176) simple; paramere (Fig. 177) slender, without thickened basal posterior spines; aedeagus (Fig. 178) with a weakly angled apex. Female terminalia as in Fig. 266.

Measurements. See Table 3.

MATERIAL EXAMINED

Lectotype ♂, **Austria**: 'Austria inf., Modling, det Löw' (NM).

Paralectotype ♀, same data as lectotype. 2 ♂, 2 ♀ **Austria** (BMNH).

HOST PLANTS. *Chaemaecytisus ratisbonensis* (Schaeffer) Rothm., *Chamaecytisus supinus* (L.) Link, *Genista germanica* L.

PUBLISHED DISTRIBUTION. Austria (Löw, 1882b, 1888a; Vondráček, 1951b; Wagner & Franz, 1961), Bulgaria (Klimaszewski, 1970; Glowacka & Harisanov, 1983), Czechoslovakia (Lauterer, 1965, 1977; Vondráček, 1957), France (Aulmann, 1913), 'Germania' (Haupt, 1935), Italy (Tamanini, 1977), U.S.S.R.: Caucasus (Gegechkori, 1983).

COMMENTS. This species has been separated from those with which it had previously been placed within the genus *Amblyrhina*. The characters of the genitalia suggest that it belongs in *Livilla*, even though the genal cones are much shorter than is usual for the genus. It is distinguished further from other *Livilla* species by the narrowly rounded apex of the forewing.

The *horvathi*-group

Members of this group are recognised by the longitudinal brown banding patterns on the forewing membrane.

Livilla horvathi (Scott) comb. n.

(Figs 115, 116, 185–187, 289)

Floria horvathi Scott, 1879: 84; Löw, 1883: 240; 1888a: 20; Horvath, 1886: 314; 1918a: 58; Puton, 1886: 93; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 34; Klimaszewski, 1964: 64; 1967: 14; 1968b: 781; 1969a: 46; 1973: 193; 1975: 130; Loginova, 1964: 464; 1976a: 599; Vondráček, 1957: 192; Lauterer, 1977: 98; Klimaszewski & Lodos, 1979: 7; Glowacka & Harisanov, 1983: 64; Onucar, 1983: 56. Holotype ♀, HUNGARY [not traced].

[*Floria vittipennella* Reuter sensu Vondráček, 1951b: 128; Smrezynski, 1954: 141. Misidentifications.]

DESCRIPTION. Coloration. Body colour of immature specimens green throughout. Mature specimens with vertex and thoracic dorsum dirty greenish yellow with brown markings; genal cones dirty yellow to pale brown; abdominal sclerites dark brown, intersegmental membranes greenish yellow; genitalia yellow-brown to brown; forewing membrane clear, veins dirty yellow to pale brown; colour pattern orange-brown; antennal segments 1–4 dirty yellow, 2–4 apically darkened, remainder brown; legs brownish yellow, femora occasionally brown above.

Structure. Head (Fig. 116) with long divergent genal cones with narrowly rounded apices. Forewing (Fig. 115) elongate oval, without pterostigma or costal break; fine spinules distributed throughout all cells; vein R_s moderately strongly curved towards margin; vein M slightly sinuous; vein M_{1+2} reaching to wing apex; cell cu_{1a} moderately long but not high; vein Cu_{1a} evenly arched. Metatibia with 5 thick black spurs at apex; basal metatarsus with 1 black spur. Male proctiger (Fig. 185) simple; paramere (Fig. 186) without stout setae on basal posterior margin; aedeagus (Fig. 187) with curved bulbous apex. Female terminalia as in Fig. 289.

Measurements. See Table 3.

MATERIAL EXAMINED

1 ♂, 1 ♀, 'Scott collection' [no further data] (BMNH). 16 ♂, 16 ♀, **Greece, Bulgaria and Czechoslovakia** (DB, MM, IDH).

HOST PLANT. *Chamaecytisus austriacus* (L.) Link.

PUBLISHED DISTRIBUTION. Bulgaria (Klimaszewski, 1967; Glowacka & Harisanov, 1983), Czechoslovakia (Vondráček, 1957; Lauterer, 1977), Greece (Vondráček, 1951*b*), Hungary (Lôw, 1888*a*; Horvath, 1886, 1918*a*), Poland (Klimaszewski, 1964, 1967, 1968*b*, 1969*a*, 1975; Smrezynski, 1954), Rumania (Dobreanu & Manolache, 1962), Turkey (Klimaszewski & Lodos, 1979; Onucar, 1983), European U.S.S.R. (Loginova, 1964).

COMMENTS. This appears to be the sister species of *L. nigrilineata*. The two species differ from each other in the distribution of brown markings on the forewing and in the shape of the genal cones and male genitalia, particularly the aedeagus.

Livilla nigrilineata sp. n.

(Figs 113, 114, 182–184, 288)

DESCRIPTION. Coloration. The type series comprises specimens which probably have not developed their full adult coloration. General colour pale green throughout with orange markings on the dorsum of the head, thorax and abdomen. Forewing membrane clear, wing pattern reddish brown. Antennae with segments 6–10 dark brown.

Structure. Head (Fig. 114) with genal cones widely divergent, longer than vertex, with evenly rounded apices. Forewing (Fig. 113) elongate oval, almost parallel-sided; costal break and pterostigma absent; spinules fine, present in all cells but restricted in the cells along the anterior edge of wing; cell cu_{1a} moderately long; vein Cu_{1a} moderately strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 thick black spur. Male proctiger (Fig. 182) simple; paramere (Fig. 183) relatively stout, parallel-sided; aedeagus (Fig. 184) with slightly hooked apex. Female terminalia as in Fig. 288.

Measurements. See Table 3.

Holotype ♂, **Algeria**: Mtns de Belezma, 1500 m, 5.viii.1980 (*Remane*) (BMNH).

Paratypes. 1 ♂, 2 ♀, same data as holotype.

HOST PLANT. Unknown.

COMMENTS. This appears to be the sister species to *horvathi*. It is separated from the latter by the smaller patch of brown markings around the apex of vein *Rs* and by the more divergent genal cones.

Livilla nervosa sp. n.

(Figs 111, 112, 179–181, 287)

DESCRIPTION. Coloration. Mature specimens with head, thorax and abdomen pale dirty yellow; dorsum of thorax and vertex with pale orange or pale brown markings; abdomen yellowish or green, turning brownish in older specimens; genitalia yellow to brownish yellow; forewing membrane clear to pale yellow, veins yellow; patterning pale brown; antennal segments 1–2 yellow, segments 3 to 5 darkened apically, segments 6 to 10 dark brown; legs yellow.

Structure. Head (Fig. 112) with slender divergent genal cones, slightly longer than vertex. Forewing (Fig. 111) elongate oblong-oval, almost parallel-sided; costal break and pterostigma absent; fine spinules present throughout all cells. Vein *Rs* strongly curved towards wing margin; vein *M* long and evenly curved; vein M_{1+2} meeting margin well above wing apex; cell cu_{1a} moderately long. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 179) simple; paramere (Fig. 180) curved posteriorly, with thickened setae present on basal posterior margin; aedeagus (Fig. 181) with angular bulbous apex. Female terminalia (Fig. 287) with very short circumanal pore ring.

Measurements. See Table 3.

Holotype ♂, **Spain**: Cordoba, Embalse de Iznajar, nr Iznajar, 12.vi.1977, (*Hollis*) (BMNH).

Paratypes. **Spain**: 8 ♂, 15 ♀, same data as holotype; 1 ♀, 1 nymph, Andalusia, Porto de los Alazores, 800 m, 30.viii.1975 (*Lienhard*) (DB).

HOST PLANT. *Genista radiata* (L.) Scop.

COMMENTS. The upturned vein M_{1+2} of the forewing also resembles that found in members of the *radiata*-group; otherwise *L. nervosa* resembles members of the *horvathi*-group. It is distinguished by the characteristic forewing pattern.

***Livilla vittipennella* (Reuter) comb. rev.**

(Figs 117, 118, 188–190, 290)

Psylla vittipennella Reuter, 1875: 333. Syntypes ♂, ♀ YUGOSLAVIA [not located].*Floria vittipennella* (Reuter) Löw, 1879: 593; 1888a: 20; Puton, 1886: 93; Hueber, 1904: 276; Oshanin, 1907: 367; 1912: 128; Prohaska, 1928: 5; Haupt, 1935: 242; Burckhardt, 1983: 54.*Livilla vittipennella* (Reuter) Aulmann, 1913: 34.*Floria lineata* Cerutti, 1939a: 445; 1939b: 583; Schaefer, 1949a: 55; 1949b: 31; Klimaszewski, 1973: 193; Loginova, 1976a: 599; Tamanini, 1977: 111. Lectotype ♂, SWITZERLAND (MZL) designated by Burckhardt, 1983. [synonymised by Burckhardt, 1983: 54.]*Floria vittipennella* (Reuter); Klimaszewski, 1973: 195; Loginova, 1976a: 599.

DESCRIPTION. Coloration. Mature specimens with dorsum of thorax and vertex brownish yellow with orange markings; genal cones yellow; remainder of body orange-yellow; forewing membrane clear, veins yellow; colour pattern reddish brown; antennal segments 1 and 2 yellow-orange, remainder pale brownish becoming darker towards antennal apex; legs orange-yellow. In some less mature specimens the body coloration often has a greenish tinge.

Structure. Head (Fig. 118) with genal cones long and slender and with narrowly rounded apices. Forewing (Fig. 117) oblong-oval with a somewhat truncate apex; costal break and rudimentary pterostigma usually absent; fine spinules present throughout all cells; vein *Rs* strongly curved towards the margin; vein *M* evenly curved; vein M_{1+2} reaching to wing apex; cell cu_{1a} shortish but tall; vein Cu_{1a} strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 188) simple; paramere (Fig. 189) with inner tooth somewhat set back from apex and without thickened setae on basal posterior margin; aedeagus (Fig. 190) with strongly recurved apex. Female terminalia as in Fig. 290.

Measurements. See Table 3.

MATERIAL EXAMINED10 ♂, 11 ♀, **Switzerland** and **Italy** (IDH, BMNH, DB).**HOST PLANT.** *Genista radiata* (L.) Scop.**PUBLISHED DISTRIBUTION** Austria (Löw, 1888a; Prohaska, 1929; Haupt, 1935), Italy (Tamanini, 1977), Switzerland (Cerutti, 1939a,b; Schaefer, 1949a,b; Burckhardt, 1983), Yugoslavia (Reuter, 1875).**COMMENTS.** *L. vittipennella* is distinguished from other members of the genus by the extensive brown band extending along the fore margin of the wing.***Livilla klapperichi* sp. n.**

(Figs 155, 156, 230–232, 284)

DESCRIPTION. Coloration. Genal cones, vertex and dorsum of thorax brick red with white markings; underside of head and thorax orange-yellow; abdomen brownish yellow; genitalia yellow; forewing membrane clear with reddish brown pattern; veins yellow to brown; antennal segments 1–8 dirty yellow, segments 4–8 apically infuscate; segments 9–10 dark brown; legs orange-yellow.

Structure. Head (Fig. 156) with genal cones somewhat divergent, about as long as vertex, with narrowly rounded apices. Forewing (Fig. 155) oblong-oval, broadest at about two-thirds the length; costal break and rudimentary pterostigma present; fine spinules present throughout all cells; cell m_1 small; vein M_{1+2} reaching to wing apex; cell cu_{1a} relatively long, with vein Cu_{1a} relatively weakly curved; vein *M* evenly curved; vein *Rs* moderately strongly curved to wing margin. Metatibia with 4 thick black apical spurs; basal metatarsus with 2 black spurs. Male proctiger (Fig. 230) simple; paramere (Fig. 231) moderately stout, without basal posterior thickened setae; aedeagus (Fig. 232) with large bulbous apex. Female terminalia (Fig. 284) shorter and more wedge-shaped than in most other species.

Measurements. See Table 3.

Holotype ♂ (on two slides), **Afghanistan**: Kamdesch, Bashguit, Nuristan, 2200 m, 17.vii.1952 (*Klapperich*) (BMNH).**Paratypes.** 1 ♂, 1 ♀ and one specimen lacking genitalia, same data as holotype. One female is on the same slide as the holotype, with the wing on a separate slide labelled paratype.**HOST PLANT.** Unknown.

COMMENTS. The name *klapperichi* is a manuscript name used by Vondráček. This species, which differs from other representatives of the genus in having 2 basal metatarsal spines and only 4 spines at the apex of the tibia. It is somewhat atypical and represents the easternmost record for the genus *Livilla*.

The *radiata*-group

Members of this group can be recognised by the strongly upturned apex of vein *Rs* and the vein *M*₁₊₂ which reaches the wing margin well above the wing apex.

Livilla radiata (Förster) comb. n.

(Figs 98, 125, 126, 200–202)

Arytaina radiata Förster, 1848: 70. Holotype ♀, AUSTRIA [not examined].

Psylla lactea Costa, 1863: 47; Löw, 1877: 125; 1883: 241; Puton, 1876: 284. Type [sex not stated], ITALY [not examined]. [Synonymised by Löw, 1877: 125.]

Psyllodes cytisi Becker, 1867: 113; Löw, 1879: 595; 1883: 236. Type [incomplete data], U.S.S.R. [not examined]. [Synonymized by Löw, 1879: 595.]

Psylla radiata (Förster) Löw, 1877: 125.

Alloeoneura radiata (Förster) Löw, 1879: 595; 1882a: 168; 1883: 248; 1884: 150; 1888a: 20; Horvath, 1886: 315; 1918: 59; Duda, 1892: 38; Aulmann, 1913: 35; Oshanin, 1912: 128; Sulc, 1905a: 4; Haupt, 1935: 241; Prohaska, 1928a: 5; Klimaszewski, 1964: 65; 1965: 203; 1967: 13; 1969a: 46; 1973: 189; 1975: 132; Loginova, 1964: 464; 1966: 135; 1976a: 599; Lauterer, 1963: 148; 1977: 98; Vondráček, 1951b: 127; 1957: 189; Wagner & Franz, 1961: 162; Dobreanu & Manolache, 1962: 137; Andrianova & Klimaszewski, 1983: 38; Glowacka & Harisanov, 1983: 64.

Allaoneura radiata (Förster); Puton, 1886: 93; Hueber, 1904: 276. Oshanin, 1907: 368. [Mis-spelling.]

Aleuroneura radiata (Förster); Klimaszewski, 1961: 79. [Mis-spelling.]

DESCRIPTION. Coloration. Mature specimens with head and thorax yellowish brown. Abdomen brown with yellow intersegmental membranes; genitalia yellow-brown; forewing membrane translucent white, veins yellow, markings chocolate brown; antennae yellow, apices of segments 3–8 brown, segments 9 and 10 completely brown; legs yellowish brown; apices of tibiae and tarsi dark brown.

Structure. Head (Fig. 126) with genal cones long and slender, much longer than the vertex. Forewing (Fig. 125) oblong-oval, very short and broad; costal break and pterostigma usually absent; fine spinules present throughout all cells; vein *Rs* short, strongly curved to wing margin; vein *M* short, slightly sinuous; vein *M*₁₊₂ meeting wing margin well above the apex; cell *cu*_{1a} short and relatively high, vein *Cu*_{1a} strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 200) simple; paramere (Fig. 201) without thickened setae along basal posterior margin; aedeagus (Fig. 202) with slightly reniform apex. Female terminalia as in Fig. 98.

Measurements. See Table 3.

MATERIAL EXAMINED

2 ♂, 3 ♀, Austria, West Germany and Czechoslovakia (BMNH, DB).

HOST PLANTS. *Chamaecytisus ratisbonensis* (Schaeffer) Rothm., *Chamaecytisus austriacus* (L.) Link, *Chamaecytisus borysthenticus* (Gruner) A. Klaskova, *Lemboptropis nigricans* (L.) Griseb.

PUBLISHED DISTRIBUTION. Austria (Förster, 1848; Löw, 1863, 1888a; Prohaska, 1928a; Haupt, 1935; Wagner & Franz, 1961), Bulgaria (Klimaszewski, 1965; Glowacka & Harisanov, 1983), Czechoslovakia (Löw, 1888a; Duda, 1892; Sulc, 1905a; Haupt, 1935; Vondráček, 1957; Lauterer, 1977), Hungary (Löw, 1888a; Horvath, 1886, 1918), Italy (Aulmann, 1913), Poland (Klimaszewski, 1961, 1964, 1967, 1969, 1975), Rumania (Dobreanu & Manolache, 1962), U.S.S.R., southern European part (Loginova, 1964, 1966; Andrianova & Klimaszewski, 1983), Yugoslavia (Löw, 1888a; Aulmann, 1913), 'S. Germany' (Haupt, 1935).

COMMENTS. This species has been recognised as the type-species of the monotypic genus *Alloeoneura* Löw, 1879 for over 100 years. There is, however, little reason why it should be regarded as a distinct genus. *L. radiata* is distinguished by the short broad wing, with the characteristic pattern, and the very long genal cones.

***Livilla retamae* (Puton) comb. n.**

(Figs 119, 120, 191–193, 291)

Psylla retamae Puton, 1878: 134; Bolivar & Chicote, 1879: 184. Syntypes 6 ♂, 12 ♀, 1 ?sex, SPAIN (MM, MNHN) [examined].*Floria retamae* (Puton) Löw, 1883: 248; Puton, 1886: 93; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 34; Ramirez Gomez, 1956: 85; Loginova, 1976a: 599; Klimaszewski, 1973: 194; Samy, 1973: 452; Halperin *et al.*, 1982: 34.*Floria* (*Brinckitia*) *retamae* (Puton); Loginova, 1971: 629; 1972a: 27.*Alloeoneura retamae* (Puton) Vondráček, 1951b: 127.

DESCRIPTION. Coloration. Immature specimens greenish throughout, developing pale orange markings on dorsum of thorax. Mature specimens with genae, vertex and dorsum of thorax dirty yellow, with orange markings on thorax and vertex; ventral parts of head and thorax pale orange-yellow; dorsal abdominal sclerites brown, intersegmental membranes yellow; underside of abdomen greenish to brown; genitalia dirty yellow to brown; forewing membrane clear, veins clear to pale yellow; pattern brown; antennae dirty yellow, segments 3–6 darkened apically, segments 6–10 dark brown; legs dirty yellow.

Structure. Head (Fig. 120) with genal cones slender, longer than the vertex, with narrowly rounded apices. Forewing (Fig. 119) elongate oblong-oval; costal break and rudimentary pterostigma present; spinules absent or thinly scattered in areas of brown patterning; vein *Rs* curved towards wing margin; vein *M* sinuous; vein *M*₁₊₂ meeting wing margin well before apex; cell *cu*_{1a} moderately large, vein *Cu*_{1a} strongly arched. Metatibia with 5 thick black spurs, basal metatarsus without black spurs. Male proctiger (Fig. 191) simple; paramere (Fig. 192) slightly expanded subapically, inner tooth partially hidden in side view; aedeagus (Fig. 193) with slightly hooked apex. Female terminalia as in Fig. 291.

Measurements. See Table 3.

MATERIAL EXAMINED16 ♂, 32 ♀, **Israel, Egypt, Algeria, Morocco, Portugal and Spain** (IDH, ZI, ZMU, BMNH, MM, MNHN, DB, PL).

HOST PLANTS. *Retama sphaerocarpa* (L.) Boiss, *R. monosperma* (L.) Boiss and *R. raetam* (Forskal) Webb & Berth.

PUBLISHED DISTRIBUTION. Algeria (Aulmann, 1913), Egypt (Samy, 1973), Israel (Halperin *et al.*, 1982), Morocco (Loginova, 1972a), Portugal (Aulmann, 1913), Spain (Puton, 1878; Bolivar & Chicote, 1879; Vondráček, 1951b; Ramirez Gomez, 1956).

COMMENTS. A widely distributed species which occurs right across the southern part of the Mediterranean Basin. It is distinguished from other members of the genus by the characteristic pattern and somewhat oblong shape of the forewing.

***Livilla lautereri* sp. n.**

(Figs 121, 122, 194–196, 292)

DESCRIPTION. Coloration. Available specimens do not appear to have developed the full mature coloration. General coloration of head and thorax brownish yellow, abdomen slightly darker above; genitalia brown; forewing membrane clear with very pale yellow clouds and very distinct dark brown markings towards apex; veins yellowish basally becoming dark brown at wing apex; antennae brownish yellow, segments becoming infusate towards apex; legs yellowish brown.

Structure. Head (Fig. 122) with genal cones widely separate and longer than vertex. Forewing (Fig. 121) oblong-oval, almost parallel-sided, with broadly rounded apex; spinules confined to apical cells and around base of vein *Cu*₂; costal break and pterostigma absent; vein *Rs* strongly curved to wing margin; vein *M* evenly curved; vein *M*₁₊₂ reaching wing margin well above apex; cell *cu*_{1a} moderately large, vein *Cu*_{1a} straight in apical half. Metatibia with 4 or 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 194) simple; paramere (Fig. 195) with highly serrated anterior margin and large apical tooth; aedeagus (Fig. 196) very thin with angular apex. Female terminalia as in Fig. 292.

Measurements. See Table 3.

Holotype ♂, **Algeria:** Massiv de l'Aures, 6 km Arris, 1300 m, 6.vi.1980 (*Remane*) (BMNH).

Paratype. 1 ♀, same data as holotype.

HOST PLANT. Unknown.

COMMENTS. The forewing shape is similar to *L. retamae* but the pattern is quite different and characteristic, separating *L. lautereri* from other members of the genus.

***Livilla syriaca* (Löw) comb. n.**

(Figs 123, 124, 197–199, 286)

Floria syriaca Löw, 1882b: 262; 1883: 252; Puton, 1886: 93; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 35; Loginova, 1976a: 599; Halperin *et al.*, 1982: 34. Holotype ♀, SYRIA [not located, missing from Löw collection (NM)].

Floria syriac[e]a Löw; Klimaszewski, 1973: 194. [Mis-spelling.]

DESCRIPTION. Coloration. Mature specimens with dorsum of thorax shining chocolate brown, remainder of thorax brownish yellow, occasionally with a greenish tinge; vertex and genal cones brownish yellow, occasionally greenish, marked along posterior and eye margins in darker brown; abdomen with dorsal sclerites brown, intersegmental membranes yellowish or greenish; ventral sclerites brown, occasionally greenish; genitalia yellow-brown to brown; forewing membrane clear to pale yellow, veins yellow to dark brown where they are overlaid with dark brown maculations; antennae yellowish brown, apices of segments 3–8 and whole of segments 9 and 10 brown.

Structure. Head (Fig. 124) with genal cones triangular, widely divergent, about equal in length to vertex. Forewing (Fig. 123) oblong-oval but becoming broader towards the somewhat truncate apex; costal break and rudimentary pterostigma present; vein *Rs* strongly curved towards margin; vein *M* strongly sinuous; vein M_{1+2} meeting wing margin well above apex; cell cu_{1a} relatively tall, vein Cu_{1a} strongly curved. Metatibia with 5 thick black spurs; basal metatarsus with 1 spur. Male proctiger (Fig. 197) simple; paramere (Fig. 198) long and slender without thickened setae on basal posterior margin; aedeagus (Fig. 199) bulbous and slightly recurved at apex. Female terminalia as in Fig. 286.

Measurements. See Table 3.

MATERIAL EXAMINED

2 ♂, 13 ♀, **Cyprus** (BMNH, MM).

HOST PLANT. *Genista fasselata* Decne and *Genista acanthoclada* D.C.

PUBLISHED DISTRIBUTION. Syria (Löw, 1882b) and possibly Israel (Halperin *et al.*, 1982).

COMMENTS. The types of this species are missing from the Löw collection in the NM, Vienna. We have followed Loginova's interpretation of the species which is, in all probability, correct. This species is distinguished by the forewing, which is strongly narrowed toward the base, and by the widely divergent genal cones.

The *spartiisuga*-group

Members of this group are characterised by the forewing pattern consisting primarily of small round maculations.

***Livilla spartiisuga* (Puton) comb. n.**

(Figs 137, 138, 218–220, 276)

Psylla spartiisuga Puton, 1876: 283. Lectotype ♂, ALGERIA (MNHN), here designated [examined].

Floria spartiisuga (Puton) Löw, 1879: 593; 1883: 251; Puton, 1886: 92; Oshanin, 1907: 367; 1912: 128; Aulmann, 1913: 34; Loginova, 1971: 629; 1976a: 599.

DESCRIPTION. Coloration. Mature specimens with dorsum of thorax orange-red with brownish markings; head including genal cones orange; abdominal sclerites brown, intersegmental membranes reddish orange; genitalia orange-brown to dark brown; forewing membrane clear to pale yellow, veins yellow, maculations pale brown; antennae yellow with apices of segments black; legs yellowish orange.

Structure. Head (Fig. 138) with genal cones slightly longer than vertex, stout and broadly rounded. Forewing (Fig. 137) elongate oblong-oval; with costal break and rudimentary pterostigma present; spinules present throughout all cells; vein *Rs* moderately strongly curved towards margin; vein *M* evenly curved throughout; vein M_{1+2} reaching to wing apex; cell cu_{1a} moderately long and flat. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 218) simple; paramere (Fig. 219) long and slender; aedeagus (Fig. 220) with rounded bulbous apex. Female terminalia as in Fig. 276.

Measurements. See Table 3.

MATERIAL EXAMINED

Lectotype ♂, **Algeria**: Bône, with Puton type label (MNHN). 2 ♂, 4 ♀ paralectotypes, same data as lectotype (MNHN).

HOST PLANT. *Genista* sp.

PUBLISHED DISTRIBUTION. Algeria (Puton, 1876).

COMMENTS. This species is close to *siciliensis* and known only from the type series. It can be separated from all other 'spotted-wing' species by the absence of maculations from a band stretching primarily across cell r_s of the forewing.

Livilla siciliensis sp. n.

(Figs 131, 132, 209–211, 273)

DESCRIPTION. Coloration. Immature specimens pale greenish to yellow throughout. Some of the more mature specimens are more yellowish and are beginning to develop orange markings on the dorsum of the thorax and vertex and the abdominal sclerites are beginning to darken. Genitalia yellow to brown; forewing membrane clear to pale yellowish, veins yellowish to pale brown; maculations brown; antennal segments 1–4 yellow, segments 3–4 infusate at apex; segments 5–10 dark brown; legs dirty yellow.

Structure. Head (Fig. 132) with genal cones rather stout, about as long as vertex, with broadly rounded apices. Forewing (Fig. 131) oblong-oval, almost parallel-sided; costal break and rudimentary pterostigma present; fine spinules present throughout all cells; vein R_s curved towards margin; vein M long and very slightly sinuous; cell m_{1+2} small. Vein M_{1+2} reaching to wing apex; cell cu_{1a} relatively flat. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 209) simple; paramere (Fig. 210) long and slender; aedeagus (Fig. 211) with slightly angular bulbous apex. Female terminalia as in Fig. 273.

Measurements. See Table 3.

Holotype ♂, **Italy**: Sicily, Palermo c. 750 m, 28.v.1979 (*D. & S. Sutton*) (BMNH).

Paratypes. 10 ♂, 18 ♀, same data as holotype except that some were collected on 26.v.1979 and 5.vi.1979.

HOST PLANT. *Genista* sp.

COMMENTS. Morphologically this species is closest to *L. maculipennis* but it is much larger.

Livilla cataloniensis (Hodkinson & White) comb. n.

(Figs 127, 128, 203–205, 271)

Floria cataloniensis Hodkinson & White, 1979a: 55. Holotype ♂, FRANCE (BMNH) [examined].

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax orange-yellow with paler longitudinal markings; genal cones and underside of thorax brownish yellow; abdominal sclerites brown, often darker above; intersegmental membranes yellow, occasionally with greenish tinge in younger specimens; genitalia yellow to yellow-brown; forewing membrane clear to very pale yellow throughout, maculae brown; antennal segments 1–2 yellow; segments 3–7 yellow with infusate apex; segments 9–10 dark brown; legs brownish yellow.

Structure. Head (Fig. 128) with genal cones conical, slightly longer than the vertex, with narrowly rounded apices. Forewing (Fig. 127) oblong-oval with broadly rounded apex; pterostigma rudimentary; costal break occasionally present; fine spinules present throughout all cells; vein R_s weakly curved towards margin; vein M evenly curved; vein M_{1+2} reaching to wing apex; cell cu_{1a} short and high; vein Cu_{1a} strongly arched. Metatibia with 5 thick black apical spurs at apex; basal metatarsus with 1 black spur. Male proctiger (Fig. 203) simple; paramere (Fig. 204) relatively stout and straight, without thick basal setae along posterior margin; aedeagus (Fig. 205) with bulbous apex. Female terminalia as in Fig. 271.

Measurements. See Table 3.

MATERIAL EXAMINED

♂ holotype, **France**: Pyrénées-Or., Argeles, 16.v.1977 (*White*) (BMNH). 15 ♂, 21 ♀ including paratypes, **France** and **Spain** (BMNH, IDH). There is also a lot of material from unnamed localities in the Heslop-Harrison collection (BMNH).

HOST PLANT. *Ulex parviflorus* Pourret.

PUBLISHED DISTRIBUTION. France and Spain (Hodkinson & White, 1979a).

COMMENTS. This species can be distinguished from other spotted-wing species by the relatively broader forewing.

***Livilla hodkinsoni* (Burckhardt) comb. n.**

(Figs 139, 140, 221–223, 277)

Floria hodkinsoni Burckhardt, 1979: 391. Holotype ♂, GREECE (ETH) [examined].

DESCRIPTION. Coloration. Immature specimens bright green throughout with orange markings on dorsum of head and thorax. Mature specimens with dorsal surface of head and thorax brown with yellow markings; underside of head and thorax with dark brown markings; abdominal sclerites dark brown, intersegmental membranes paler; genitalia yellow-brown to brown; forewing membrane clear to pale yellow with brown maculations; antennal segments 1–7 yellow, segments 4–7 infusate at apex; segments 8–10 dark brown; legs brownish yellow.

Structure. Head (Fig. 140) with genal cones longer than vertex, with somewhat angular apices. Forewing (Fig. 139) oblong-oval, with rudimentary pterostigma and costal break present; fine spinules present throughout all cells; vein R_s moderately strongly curved towards margin; vein M slightly sinuous; vein M_{1+2} reaching to just below the wing apex; cell cu_{1a} moderately long, of characteristic shape. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 221) simple; paramere (Fig. 222) without thickened basal posterior setae; aedeagus (Fig. 223) with bulbous apex. Female terminalia as in Fig. 277.

Measurements. See Table 3

MATERIAL EXAMINED

♂ holotype, **Greece**: Pelopones, Bilos, 16.v.1979 (*Burckhardt*) (ETH). 13 ♂, 15 ♀ including paratypes, **Greece**, including **Crete** (ETH, DB, BMNH, MM, PL).

HOST PLANT. *Genista acanthoclada* D.C., not a *Cytisus* species as stated in the original description (*Burckhardt*, pers. comm.).

PUBLISHED DISTRIBUTION. Greece (*Burckhardt*, 1979).

COMMENTS. *L. hodkinsoni* is closest to *L. cataloniensis* from which it is separated by the shape of cells m_1 and cu_{1a} of the forewing.

***Livilla maculipennis* sp. n.**

(Figs 129, 130, 206–208, 272)

DESCRIPTION. Coloration. Body colour of immature specimens bright green to yellow, usually with orange or orange-brown markings on dorsum of vertex and thorax. Mature specimens darker, general colour pale brown with darker brown markings; abdominal sclerites dark brown with yellow intersegmental membranes; forewing membrane clear, veins pale yellow, maculations brown; antennal segments brownish yellow basally becoming dark brown towards apex.

Structure. Head (Fig. 130) with genal cones divergent, narrowly rounded at apex, slightly longer than vertex. Forewing (Fig. 129) elongate, oblong-oval, almost parallel-sided, pterostigma almost lost, costal break often present; fine spinules present throughout all cells; vein R_s moderately strongly curved towards wing margin; vein M slightly sinuous; vein M_{1+2} reaching to wing apex; cell cu_{1a} very long and low. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 206) simple; paramere (Fig. 207) curved posteriorly beyond middle, with numerous thickened setae on basal posterior margin; aedeagus (Fig. 208) with apex somewhat reniform. Female terminalia as in Fig. 272.

Measurements. See Table 3.

Holotype ♂, **Spain**: Huelva, 26 km, S. Almonte, 13.vi.1977 (*Hollis*) (BMNH).

Paratypes. **Spain**: 11 ♂, 11 ♀, same data as holotype. **Algeria**: 7 ♂, 3 ♀, Theniet al Had, Zedernwald, 1700 m, 31.vii.1980 (*Remane*) (PL); 10 ♂, 6 ♀, N El Gor, 900 m, 28.vii.1980 (*Remane*) (PL); 7 ♂, 11 ♀, Monte de Tlemcen, 18 km NW. Sebdou, 27.vii.1980 (*Remane*) (PL). **Morocco**: 1 ♂, N Taferat, 25.vii.1980 (*Remane*) (PL).

HOST PLANT. *Genista* sp.

COMMENTS. *L. maculipennis* is separated from the other spotted-wing species by its small size and the elongate cell cu_{1a} of the forewing.

***Livilla pyrenaee* (Mink) comb. n.**

(Figs 133, 134, 212–214, 274)

Psylla pyrenaee Mink, 1859: 430. Syntypes, FRANCE [not located].

Floria pyrenaee (Mink) Löw, 1879: 592; 1883: 247; Chicote, 1880: 202; Puton, 1871: 438; 1886: 92; Oshanin, 1907: 367; 1912: 128; Aulmann, 1913: 34; Vondráček, 1951b: 128; Loginova, 1976a: 599; Hodkinson & White, 1979a: 57.

Floria (Floriella) pyrenaee (Mink); Ramirez Gomez, 1956: 87.

Floria pyreneae (Mink); Klimaszewski, 1973: 194. [Mis-spelling.]

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax dark orange or orange-brown with paler longitudinal markings; genal cones and underside of thorax brownish yellow; abdominal sclerites dark brown with yellow intersegmental membranes, often with a greenish tinge in less mature specimens; genitalia yellow to brown; forewing membrane clear; maculae brown, absent from area adjacent to wing margin, making leading edge of wing appear white from a distance; antennal segments 1–2 yellow; segments 3–7 yellow with infusate apex; segments 9–10 brown; legs brownish yellow.

Structure. Head (Fig. 134) with genal cones somewhat triangular, divergent, longer than vertex. Forewing (Fig. 133) oblong-oval with a somewhat truncate apex; costal break and pterostigma usually absent; fine spinules present throughout all cells; vein *Rs* curved towards wing margin; vein *M* evenly curved; vein M_{1+2} reaching to wing apex; cell cu_{1a} moderately long. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 212) simple; paramere (Fig. 213) relatively short, parallel-sided; aedeagus (Fig. 214) robust, with slightly reniform apex. Female terminalia as in Fig. 274.

Measurements. See Table 3.

MATERIAL EXAMINED

20 ♂, 19 ♀, **France** and **Spain** (BMNH, IDH, MM).

HOST PLANTS. *Calicotome spinosa* (L.) Link. and *Genista pilosa* L.

PUBLISHED DISTRIBUTION. Spain (Chicote, 1880; Ramirez Gomez, 1956; Hodkinson & White, 1979a), France (Mink, 1859; Puton, 1871; Vondráček, 1951b, Hodkinson & White, 1979a).

COMMENTS. A characteristic species with maculations absent from the leading margin of the forewing. It also differs from other spotted-wing species by having a slightly obliquely truncated wing apex.

***Livilla bimaculata* sp. n.**

(Figs 149, 150, 254–256, 280)

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax pale reddish brown with paler markings; genal cones and ventral parts of thorax brownish yellow; abdominal sclerites dark brown; intersegmental membranes yellowish; genitalia brown; forewing membrane two-tone, clear and yellow-brown; maculae generally mid brown, those around the apex of vein *Rs* darker, almost black; antennae with segments 1–4 primarily yellow, segments 6–10 primarily dark brown; legs brownish yellow.

Structure. Head (Fig. 150) with genal cones somewhat divergent, as long as vertex. Forewing (Fig. 149) elongate oval, broadest in basal half; fine spinules present throughout all cells; vein *Rs* strongly curved towards wing margin; vein *M* sinuous; vein M_{1+2} reaching to wing apex; pterostigma at most rudimentary; costal break occasionally present. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 254) simple; paramere (Fig. 255) slender, with numerous stout spines on basal posterior margin; aedeagus as in Fig. 256. Female terminalia as in Fig. 280.

Measurements. See Table 3.

Holotype ♂, **France**: Corsica, Gorge du Ristomica nr Corte, 12.vi.1976, on *Genista* sp. (J.M.P.) (BMNH).

Paratypes. 6 ♂, 10 ♀, same data as holotype. **Italy**: 4 ♂, 4 ♀, Sardinia, Genova Borzonasea, Passo, Boco (*Conci*) 16.vi.1984 (IDH).

HOST PLANT. *Genista salzmanii* DC.

Comments. This species is separated from other 'spotted-wing' *Livilla* species by the presence of a much darker patch of maculations around vein *Rs*.

***Livilla blandula* (Horvath) comb. n.**

(Figs 144–146, 236–238, 278)

Floria blandula Horvath, 1905: 277; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 34; Ramirez Gomez, 1956: 84; Klimaszewski, 1973: 193; Loginova, 1976a: 599. LECTOTYPE ♂, SPAIN (TM) here designated [examined].

[*Floria maura* Vondráček sensu Loginova, 1972a: 27. Misidentification.]

DESCRIPTION. Coloration. Body colour of immature specimens brownish yellow. Mature specimens with dorsum of thorax and vertex chocolate brown with white markings; genal cones and underside of thorax brownish yellow; dorsum of abdomen brown, remainder pale green to yellow; genitalia greenish yellow to brown; forewing membrane two-tone, clear and yellow-brown; maculae mid to dark brown; antennae with segments 1–5 primarily yellow, segments 6–10 primarily brown.

Structure. Head (Fig. 146) with genal cones slightly longer than vertex, slightly divergent, with apices narrowly rounded. Forewing (Figs 144, 145) oblong-oval; costal break and rudimentary pterostigma often present; fine spinules present throughout all cells; vein *Rs* weakly curved towards wing margin; vein *M* slightly sinuous; vein M_{1+2} reaching to wing apex. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 236) simple; paramere (Fig. 237) with numerous thick setae on basal posterior margin; aedeagus (Fig. 238) with slightly hooked apex. Female terminalia as in Fig. 278.

Measurements. See Table 3.

MATERIAL EXAMINED

Lectotype ♂, **Spain:** 'Hispania. Ciudad Real, det. Horvath' (TM).

1 ♂, 4 ♀ (paralectotypes), same data as lectotype; 19 ♂, 27 ♀, **Portugal, Morocco** (BMNH, ZMU, ZI).

HOST PLANT. *Genista hirsuta* Vahl.

PUBLISHED DISTRIBUTION. Spain (Horvath, 1905), Morocco (Loginova, 1972a).

COMMENTS. This is the species illustrated as *maura* by Loginova (1972a). The forewing of *maura* is relatively broader and with only scattered indistinct maculations. This species shows considerable variation in the wing pattern and the two extremes are illustrated for comparison. *Livilla blandula* is closest to *L. lusitanica* and *L. pseudoretamae*. It can be distinguished from the former by the narrower forewing and from the latter by the lack of a distinct dark brown forewing pattern.

***Livilla pseudoretamae* sp. n.**

(Figs 157, 158, 233–235, 285)

DESCRIPTION. Coloration. Vertex, genal cones and dorsum of thorax pale greyish brown, occasionally with a greenish tinge, thorax with chocolate brown markings; abdominal sclerites ranging from green to brown, with pale intersegmental membranes; genitalia dirty yellow to brown; forewing membrane clear, veins yellow to very pale brown; wing pattern light chocolate-brown; antennae dirty yellow basally, segments 5–10 dark brown; legs brownish yellow throughout. The specimens to hand have probably not developed their full coloration.

Structure. Head (Fig. 158) with genal cones slightly longer than vertex, with evenly rounded apices. Forewing (Fig. 157) oblong-oval; with costal break and rudimentary pterostigma present; fine spinules present throughout all the cells; vein *Rs* moderately strongly curved towards margin; vein *M* moderately sinuous; vein M_{1+2} short but reaching to wing apex; cell cu_{1a} short and high, vein Cu_{1a} strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 233) simple; paramere (Fig. 234) straight, with thickened setae present on basal posterior margin; aedeagus (Fig. 235) with a slightly hooked apex. Female terminalia as in Fig. 285.

Measurements. See Table 3.

Holotype ♂, **Algeria:** Gran Kabylie, Djurdjura, 3.viii.1980 (*Remane*) (BMNH).

Paratypes. 2 ♂, 5 ♀, same data as holotype; 3 ♂, 9 ♀, Kabylie, Col de Talmetz (*Remane*). (BMNH, PL.)

HOST PLANT. Unknown.

COMMENTS. This species is very close to *L. blandula* but the wing pattern, which lacks the characteristic spots, is more distinct and superficially resembles that of *Livilla retamae*.

***Livilla lusitanica* sp. n.**

(Figs 147, 148, 251–253, 279)

DESCRIPTION. Coloration. Mature specimens with dorsum of head and thorax brown with whitish markings; genal cones and underside of thorax brownish yellow; abdominal sclerites dark brown, intersegmental membranes yellowish brown; genitalia brown; forewing membrane two-tone, clear and yellow-brown; maculae mid to dark brown; antennae with segments 1–5 primarily yellow, segments 6–10 primarily dark brown; legs brownish yellow.

Structure. Head (Fig. 148) with genal cones stout, about as long as vertex. Forewing (Fig. 147) broadly oblong-oval, with costal break and rudimentary pterostigma present; fine spinules present throughout all cells; vein *Rs* moderately strongly curved towards wing margin; vein *M* slightly sinuous; vein *M*₁₊₂ reaching wing apex; cell *cu*_{1a} strongly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 251) simple; paramere (Fig. 252) stout, with dense thickened setae on the basal posterior margin; aedeagus (Fig. 253) with apex somewhat reniform. Female terminalia as in Fig. 279.

Measurements. See Table 3.

Holotype ♂, **Portugal**: 29 km E. Coimbra, 21.vi.1977 (Hollis) (BMNH).

Paratypes. 7 ♂, 10 ♀, same data as holotype; 3 ♂, 3 ♀, Porto, 2–12.viii.1962 (J. Abraham & L. Horascek) (BMNH).

HOST PLANT. *Genista triacanthos* Brot.

COMMENTS. This species resembles *blandula* in several respects but the forewing is consistently shorter and broader and the genal cones slightly shorter.

***Livilla magna* sp. n.**

(Figs 135, 136, 215–217, 275)

DESCRIPTION. Coloration. Immature specimens pale green to yellow throughout. Mature specimens with vertex and dorsum of thorax brownish yellow with orange or chocolate brown markings; underside of thorax often with most of sclerites dark brown to black; genal cones brownish yellow; sclerites of abdomen dark brown, occasionally paler along ventral parts; intersegmental membranes brownish yellow; forewing two-tone, clear to pale yellow contrasted with amber; maculations medium brown; antennal segments 1–4 yellow, segments 3–4 infusate at apex; segments 5–10 dark brown; legs brownish yellow, femora occasionally darkened above.

Structure. Head (Fig. 136) with divergent triangular genal cones as long as vertex. Forewing (Fig. 135) elongate oblong oval; rudimentary pterostigma and costal break present; vein *Rs* moderately curved to margin; fine spinules present in all cells; cells *cu*_{1a} and *m*₁₊₂ of average size for genus; vein *M*₁₊₂ reaching to wing apex. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 215) simple; paramere (Fig. 216) long and thin with a kink in the middle; aedeagus (Fig. 217) long with an angular bulbous apex. Female terminalia as in Fig. 275.

Measurements. See Table 3.

Holotype ♂, **Italy**: Sicily, Catania, 1.vi.1979 (D. & S. Sutton) (BMNH).

Paratypes. 5 ♂, 9 ♀, same data as holotype; 2 ♂, 8 ♀, same data as holotype except 4.vi.1979; 1 ♂, 7 ♀, Sicily, Etna, 1100 m, 16.vii.1977 (D'Illuso) (PL); 1 ♂, 3 ♀, Sicily, Etna, 1100 m, 19.ix.1977 (Asche) (PL).

HOST PLANT. *Genista aetnensis* (Biv.) DG.

COMMENTS. This species is much larger than the other spotted-wing species. Morphologically it is closest to *L. siciliensis* but it differs in the shape of the forewing and details of the male genitalia.

***Livilla poggii* (Conci & Tamanini) comb. n.**

(Figs 141–143, 224–226, 281)

Floria poggii Conci & Tamanini, 1984a: 43. Holotype ♂, ITALY: Sardinia (MCSN) [not examined].

DESCRIPTION. Coloration. General coloration dirty yellow to greyish yellow throughout, occasionally with brown markings on the dorsum of the thorax; genitalia yellow to dark brown; forewing membrane clear to

yellowish but covered in brown maculations which are often coalescent; in the female the maculations are spread throughout the wing whereas in the male there is a transverse maculation-free band across the middle; also in the latter the apical maculations appear darker than the basal ones; antennal segments 1–8 yellow, segments 3–8 apically infusate; segments 9–10 dark brown; legs orange-yellow.

Structure. Head (Fig. 143) with genal cones weakly divergent, with narrowly rounded apices, about as long as vertex. Forewing (Figs 141, 142) elongate oval, more so in the female; costal break and pterostigma usually absent; fine spinules present in all cells; vein R_s strongly curved towards wing margin; vein M strongly sinuous; vein M_{1+2} meeting margin just above wing apex; cell cu_{1a} short and tall; vein Cu_{1a} strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 224) simple; paramere (Fig. 225) relatively short and stout; aedeagus (Fig. 226) with an irregularly angled apex. Female terminalia as in Fig. 281.

Measurements. See Table 3.

MATERIAL EXAMINED

2 ♂, 3 ♀ (paratypes), **Italy** (IDH).

HOST PLANT. *Genista corsica* (Loisel.) DC in Lam. & DC.

PUBLISHED DISTRIBUTION. Italy, Sardinia (Conci & Tamanini, 1984a).

COMMENTS: This is an interesting species which is strongly sexually dimorphic in the wing-pattern, an unusual occurrence in the psyllids. The host plant is endemic to Sardinia and Corsica.

Residual assemblage

Livilla spectabilis (Flor) comb. n.

(Figs 161, 162, 242–244, 268)

Psylla spectabilis Flor, 1861: 362. Syntypes ♂, ♀ FRANCE (not located).

Floria spectabilis (Flor) Löw, 1879: 594; 1883: 251: 1888a: 20; Chicote, 1880: 202; Ferrari, 1888: 76; Puton, 1886: 93; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 34; Horvath, 1918b: 331; Haupt, 1935: 242; Schaefer, 1949a: 56, 1949b: 31; Vondráček, 1951b: 128; Klimaszewski, 1968b: 781; 1973: 194; Novak & Wagner, 1962: 43; Loginova, 1976a: 599; Burckhardt, 1983: 54.

DESCRIPTION. Coloration. Immature specimens pale green to greenish yellow throughout. Mature specimens with genal cones, vertex and dorsum of thorax dirty orange-yellow with darker orange and paler streaks; abdominal sclerites dark brown, intersegmental membranes orange-yellow; genitalia orange-yellow to brown; forewing membrane clear basally becoming orange-brown apically, with a dark spot around vein Cu_{1a} ; antennae dirty yellow, except segments 3 and 4 apically darkened, segments 5 to 10 brown; legs dirty yellow.

Structure. Head (Fig. 162) with massive genal cones which are much longer than the vertex. Forewing (Fig. 161) elongate oval, of characteristic shape, with a strongly curved costal margin throughout; costal break and rudimentary pterostigma normally absent; fine spinules present throughout all cells; vein R_s weakly curved towards margin; vein M evenly curved; vein M_{1+2} reaching to wing apex; cell cu_{1a} relatively small; vein Cu_{1a} strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 242) simple; paramere (Fig. 243) straight and slender; aedeagus (Fig. 244) with recurved apex. Female terminalia as in Fig. 268.

Measurements. See Table 3.

MATERIAL EXAMINED

10 ♂, 9 ♀, **Italy, Greece** including **Crete, Yugoslavia, France** (MM, BMNH, IDH, DB, PL). There is 1 ♂, 1 ♀ in the ZI, Leningrad labelled Uppsala, Sweden, F. Ossiannilsson. Dr Ossiannilsson informs us that this is a mistake; the species does not occur in Sweden.

HOST PLANT. *Spartium junceum* L.

PUBLISHED DISTRIBUTION. France (Puton, 1871), Italy (Ferrari, 1888), Portugal (Aulmann, 1913), Spain (Chicote, 1880), Switzerland (Schaefer, 1949a,b; Burckhardt, 1983).

COMMENTS. This species has no known close relative within the genus. It is separated from other members by the narrow forewing of characteristic shape and the very long genal cones.

***Livilla variegata* (L  w) comb. n.**

(Figs 163, 164, 245–247, 269)

Floria variegata L  w, 1882b: 261; 1883: 253; 1888a: 20; Ferrari, 1888: 76; Puton, 1886: 92; Oshanin, 1907: 367, 1912: 128; Aulmann, 1913: 35; Klimaszewski, 1973: 194; Loginova, 1976a: 599; Hollis, 1978: 149; Hodkinson & Hollis, 1980: 171; Hodkinson & White, 1979a: 63; White & Hodkinson, 1982: 25; Burckhardt, 1983: 54. Syntypes, ♂ ♀, YUGOSLAVIA (MM) [examined].

Floria alpina Cerutti, 1939a: 447; 1939b: 583; Schaefer, 1949a: 55; 1949b: 31; Klimaszewski, 1973: 193; Loginova, 1976a: 599; Tamanini, 1977: 111. Lectotype ♂, SWITZERLAND (MZL) [not examined]. [Synonymised by Burckhardt, 1983: 54.]

DESCRIPTION. Coloration. Immature specimens pale green to greenish yellow with orange markings on dorsum of thorax. Mature specimens with dorsum of head and thorax orange-yellow with paler longitudinal markings; genal cones orange-yellow; abdominal sclerites dark brown, intersegmental membranes yellow; genitalia orange-brown; forewing membrane clear to pale yellow basally, apical suffusion grey to pale yellowish brown, veins pale yellow to very pale brown; antennae dirty yellow, apices of segments 3 to 6 and whole of segments 7 to 10 dark brown; legs dirty yellow.

Structure. Head (Fig. 164) with genal cones slender, slightly longer than vertex, with narrowly rounded apices. Forewing (Fig. 163) oblong-oval; costal break and rudimentary pterostigma present; veins very delicate; dense fine spinules present throughout all cells; vein *Rs* weakly curved to margin; vein *M* evenly curved; vein M_{1+2} reaching to wing apex; cell cu_{1a} strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 245) simple; paramere (Fig. 246) slender, with thickened setae present on basal posterior margin; aedeagus (Fig. 247) with bulbous apex. Female terminalia as in Fig. 269.

Measurements. See Table 3.

MATERIAL EXAMINED

27 ♂, 32 ♀, **Yugoslavia, Rumania, Italy, Switzerland, France, Spain, England** (MM, IDH, BMNH, DB).

HOST PLANTS. *Laburnum anagyroides* Medicus and *Laburnum alpinum* (Miller) Berchtold & J. Presl.

PUBLISHED DISTRIBUTION. France (Hodkinson & White, 1979a), Great Britain (Hollis, 1978; Hodkinson & Hollis, 1980; White & Hodkinson, 1982), Italy (Ferrari, 1888; Tamanini, 1977), Switzerland (Cerruti, 1939a,b; Schaefer, 1949a,b; Burckhardt, 1983), Yugoslavia (L  w, 1882b; 1888a).

COMMENTS. *Floria alpina* was, for a long time, recorded as a separate alpine species but it has now been shown to be synonymous with *L. variegata*. *L. variegata* can be separated from other members of the genus by the broad forewing which lacks a distinct pattern and by the veins which are unusually fine and lightly coloured.

***Livilla genistae* Ramirez Gomez**

(Figs 153, 154, 227–229, 283)

Livilla genistae Ramirez Gomez, 1956: 98; Klimaszewski, 1973: 195; Loginova, 1976a: 600. NEOTYPE ♂, SPAIN (BMNH) here designated.

DESCRIPTION. Coloration. Mature specimens with head and thorax yellowish brown with slightly darker reddish brown markings; abdominal sclerites occasionally darker than thorax, terminalia yellow-brown to brown; forewing membrane clear, without pattern; veins yellowish brown; antennal segments 1–2 yellow, segments 3–4 yellow and infusate at apex; segments 5–10 dark brown; legs brownish yellow.

Structure. Head (Fig. 154) with genal cones almost as long as vertex, somewhat divergent with broadly rounded apices. Forewing (Fig. 153) elongate oval without pterostigma or costal break; spinules present throughout all cells; vein *Rs* strongly curved towards wing margin; vein *M* evenly curved; vein M_{1+2} reaching to just below wing apex; cell cu_{1a} short and tall; vein cu_{1a} strongly curved. Metatibia with 5 apical thick black spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 227) simple; paramere (Fig. 228) sinuous, with thick setae at base of posterior margin; aedeagus (Fig. 229) with weakly angled apex. Female terminalia (Fig. 283) with very short circumanal pore ring.

Measurements. See Table 3.

MATERIAL EXAMINED

Neotype ♂, **Spain**: Huesca, Barluenga, 1.vi.1976, on ? *Genista* (Hollis) (BMNH); 8 ♀, **Spain** (BMNH).

HOST PLANT. This was omitted from the original description: the name *genistae* suggests that it feeds on a '*Genista*' species. The neotype designated above was collected from a plant thought to be a *Genista* species while 4 of the additional females were collected from *Cytisus purgans*.

PUBLISHED DISTRIBUTION. Spain (Ramirez Gomez, 1956).

COMMENTS. The original type-material of this species has been destroyed. The above material collected in Spain corresponds closely with the original description. This species is somewhat intermediate between the short coriaceous wing *Livilla* species (*ulicis*-group) and the longer wing forms with spotted or longitudinally striped wing patterns (*spartiisuga*- and *horvathi*-groups). It is recognised by the oval wing and the absence of any wing patterning.

***Livilla adusta* (Löw) comb. n.**

(Figs 159, 160, 239–241, 267)

Floria adusta Löw, 1882b: 260; 1883: 230; Puton, 1886: 92; 1889: 113; Oshanin, 1907: 367; 1912: 128; Aulmann, 1913: 34; Klimaszewski, 1973: 193; Loginova, 1976a: 599. ? Holotype ♀, SPAIN [missing from Löw collection (NM)].

DESCRIPTION. Coloration. Immature specimens greenish yellow throughout, developing pale orange markings on dorsum of thorax. Mature specimens with genal cones, vertex and dorsum of thorax brownish orange with indistinct brown or paler markings; abdominal sclerites dark brown to black, intersegmental membranes orange-brown. Forewing two-tone, clear and orange-brown; veins yellow to yellow-brown; antennae dirty yellow, segments 3–4 darkened apically, segments 5–10 dark brown; legs dirty yellow.

Structure. Head (Fig. 160) with genal cones as long as vertex, slightly divergent with narrowly rounded apices; forewing (Fig. 159) elongate oblong-oval, with evenly rounded apex; costal break and pterostigma rudimentary; fine spinules present throughout all cells; veins *Rs* upturned to wing margin; vein M_{1+2} reaching to wing apex. Metatibia with 5 thick black spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 239) simple but broadest at base; paramere (Fig. 240) long, thin, parallel-sided, with large inner apical tooth, bearing a few stout setae at base of posterior margin; aedeagus as in Fig. 241. Female terminalia (Fig. 267) with a slightly upturned apex to the proctiger.

Measurements. See Table 3.

MATERIAL EXAMINED

9 ♂, 12 ♀, **Algeria** and **Spain** (BMNH, MNHN, MM).

HOST PLANT. Unknown. Some specimens in BMNH were collected from *Cytisus scoparius* ?

PUBLISHED DISTRIBUTION. Spain (Löw, 1882b; Aulmann, 1913).

COMMENTS. This species is not very close to any other member of the genus. It is easily recognised by the distribution of darker pigment along the forewing veins which gives a furrowed appearance.

***Livilla maura* (Vondráček) comb. n.**

(Figs 151, 152, 282)

Floria maura Vondráček, 1951a: 119; 1951b: 128; Klimaszewski, 1973: 193; Loginova, 1976a: 599. Syntypes ♀, MOROCCO (MM) [examined].

DESCRIPTION. Coloration. Mature specimens with vertex and dorsum of thorax deep brownish orange with darker brown markings; genal cones brown; abdomen dark brown to black, intersegmental membranes brownish orange; genitalia brownish yellow to dark brown; forewing membrane, pale brownish orange throughout, veins concolorous with membrane; apical pattern very diffuse, pale brown; antennae with segments 1–4 dirty yellow, 3–4 apically brown, the remaining segments brown; legs with femora pale brown, the remainder orange-yellow.

Structure. Head (Fig. 152) with genal cones about as long as vertex, relatively slender, with narrowly rounded apices. Forewing (Fig. 151) oblong-oval, relatively broad; costal break and rudimentary pterostigma present; fine spinules present throughout all cells; vein *M* evenly curved; vein M_{1+2} reaching to wing apex; cell cu_1 relatively short with vein Cu_{1a} strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Female terminalia as in Fig. 282. Male unknown.

Measurements. See Table 6.

MATERIAL EXAMINED

2 ♀ (syntypes), **Morocco** (MM). In addition, there are 2 heads, 5 wings, 2 female genitalia and other oddments on slides labelled 63–69 *Floria maura* type series (MM).

HOST PLANT. Unknown.

PUBLISHED DISTRIBUTION. Morocco (Vondráček, 1951*a, b*).

COMMENTS. This species was described from several females. The male is unknown and this makes it difficult to characterize the species. It appears to differ from other members of the genus in possessing a relatively broad forewing of uniform brownish orange coloration.

Table 3 Measurements of *Livilla* species. Males and females are given separately and all values are in mm.

		Head width	Antennal length	Forewing length	Female proctiger length	Male proctiger length	Male paramere length	Male aedeagus length
<i>adusta</i>	m	0.63–0.74	1.47–1.66	2.25–2.50	—	0.37–0.39	0.35–0.37	0.26–0.28
	f	0.67–0.74	1.55–1.69	2.28–2.48	0.59–0.63	—	—	—
<i>bimaculata</i>	m	0.70–0.73	1.32–1.37	1.84–1.91	—	0.35–0.38	0.33–0.36	0.28–0.30
	f	0.72–0.76	1.25–1.34	2.15–2.24	0.54–0.59	—	—	—
<i>bivittata</i>	m	0.82–0.83	1.63–1.67	1.91–1.95	—	0.40–0.41	0.31–0.33	0.31–0.33
	f	0.89–0.91	1.65–1.68	2.48–2.50	0.82–0.84	—	—	—
<i>blandula</i>	m	0.51–0.67	1.14–1.32	1.70–2.01	—	0.29–0.34	0.22–0.26	0.19–0.23
	f	0.59–0.72	1.22–1.40	1.70–2.30	0.56–0.62	—	—	—
<i>burckhardtii</i>	m	0.62–0.63	1.14–1.16	1.86–1.90	—	0.32	0.29	0.29
	f	0.64–0.65	1.13–1.16	2.18–2.20	—	—	—	—
<i>cataloniensis</i>	m	0.61–0.68	1.18–1.34	1.69–2.04	—	0.30–0.34	0.25–0.29	0.24–0.26
	f	0.64–0.73	1.19–1.36	1.96–2.33	0.67–0.74	—	—	—
<i>cognata</i>	m	0.80	1.63	2.10	—	0.38	0.35	0.31
	f	0.83	1.76	2.46	0.93	—	—	—
<i>genistae</i>	m	0.72	1.21	1.99	—	0.40	0.42	0.36
	f	0.74–0.76	1.22–1.24	2.16–2.33	0.87–0.93	—	—	—
<i>hodkinsoni</i>	m	0.64–0.69	1.42–1.54	1.90–2.00	—	0.32–0.33	0.32–0.33	0.28–0.29
	f	0.69–0.74	1.52–1.68	2.26–2.38	0.71–0.79	—	—	—
<i>horvathi</i>	m	0.69–0.79	1.80–2.04	2.51–2.73	—	0.40–0.47	0.29–0.35	0.28–0.29
	f	0.71–0.83	1.77–2.04	2.68–3.06	0.75–0.89	—	—	—
<i>klapperichi</i>	m	0.45	—	1.50	—	0.24	0.23	0.20
	f	0.49	—	1.86	0.60	—	—	—
<i>lautereri</i>	m	—	—	1.91	—	0.28	0.29	0.25
	f	0.69	1.63	2.12	0.71	—	—	—
<i>lusitanica</i>	m	0.62–0.65	1.17	0.67–0.85	—	0.29–0.32	0.24–0.26	0.17–0.21
	f	0.64–0.67	1.09–1.24	1.84–1.97	0.53–0.55	—	—	—
<i>maculipennis</i>	m	0.57–0.68	1.25–1.40	1.84–2.13	—	0.32–0.34	0.27–0.31	0.22–0.23
	f	0.63–0.68	1.16–1.38	2.03–2.24	0.54–0.59	—	—	—
<i>magna</i>	m	0.89–0.98	2.33–2.56	3.09–3.35	—	0.44–0.50	0.44–0.47	0.38–0.40
	f	0.99–1.02	2.48–2.67	3.60–3.77	1.04–1.08	—	—	—
<i>maura</i>	m	unknown			male unknown			
	f	0.58–0.65	1.23	1.81–2.27	0.55–0.58	—	—	—
<i>nervosa</i>	m	0.74–0.81	1.88–2.06	2.39–2.72	—	0.45–0.49	0.39–0.41	0.35–0.39
	f	0.73–0.86	1.80–2.18	2.60–3.15	1.09–1.15	—	—	—
<i>nigralineata</i>	m	0.74	1.76	2.33	—	0.38	0.31	0.30
	f	0.81	1.97	2.71	0.86	—	—	—
<i>poggii</i>	m	0.54–0.59	1.06–1.41	1.33–1.57	—	0.27–0.29	0.26–0.27	0.19–0.20
	f	0.58–0.63	1.06–1.19	1.76–1.94	0.58–0.59	—	—	—
<i>pseudoretamae</i>	m	0.65–0.66	1.38–1.40	1.91–1.99	—	0.31–0.36	0.24–0.25	0.22–0.23
	f	0.71–0.73	1.40–1.42	2.18–2.29	0.60–0.61	—	—	—
<i>pyrenaea</i>	m	0.62–0.78	1.50–1.72	2.02–2.49	—	0.37–0.41	0.26–0.31	0.25–0.29
	f	0.71–0.85	1.54–1.82	2.33–2.85	0.76–0.83	—	—	—

Table 3—cont.

		Head width	Antennal length	Forewing length	Female proctiger length	Male proctiger length	Male paramere length	Male aedeagus length
<i>radiata</i>	m	0.73–0.82	1.59–1.78	2.70–2.80	—	0.40–0.41	0.35–0.37	0.30
	f	0.78–0.84	1.82–1.92	2.60–2.70	0.85	—	—	—
<i>retamae</i>	m	0.84–1.00	2.19–2.75	2.81–3.18	—	0.46–0.53	0.43–0.47	0.37–0.40
	f	0.95–1.09	2.21–2.75	2.96–3.51	1.00–1.08	—	—	—
<i>siciliensis</i>	m	0.74–0.81	1.72–1.78	2.35–2.50	—	0.37–0.40	0.37–0.39	0.31–0.32
	f	0.80–0.85	1.86–1.88	2.69–2.79	0.83–0.87	—	—	—
<i>spartiisuga</i>	m	0.73–0.75	1.81–1.83	2.43–2.44	—	0.36–0.38	0.31–0.33	0.33–0.35
	f	0.81–0.82	1.94–1.96	2.80–2.86	0.94	—	—	—
<i>spectabilis</i>	m	0.94–1.00	2.80–3.06	3.42–3.52	—	0.51–0.54	0.41–0.44	0.35–0.37
	f	1.00–1.09	3.29–3.52	3.83–4.14	0.90–0.92	—	—	—
<i>syriaca</i>	m	0.67–0.70	1.67–1.88	1.95–1.97	—	0.35–0.42	0.30–0.34	0.24–0.27
	f	0.65–0.78	1.89–1.90	2.17–2.30	0.67–0.69	—	—	—
<i>ulicis</i>	m	0.70–0.75	1.37–1.50	1.69–1.81	—	0.36–0.37	0.35–0.36	0.28–0.29
	f	0.74–0.79	1.38–1.60	1.84–2.10	0.78–0.85	—	—	—
<i>variegata</i>	m	0.67–0.78	1.78–2.23	2.76–3.06	—	0.40–0.44	0.30–0.34	0.26–0.29
	f	0.71–0.87	1.74–2.25	2.82–3.59	0.82–0.84	—	—	—
<i>vicina</i>	m	0.82–0.83	1.41–1.50	2.12–2.20	—	0.36–0.45	0.38–0.44	0.33–0.35
	f	0.86–0.87	1.39–1.42	2.37–2.39	0.77–0.83	—	—	—
<i>vittipennella</i>	m	0.71–0.76	1.74–1.81	2.35–2.58	—	0.37–0.42	0.37–0.40	0.30–0.33
	f	0.67–0.75	1.48–1.79	2.42–2.66	0.80–0.81	—	—	—

ARYTAINILLA Loginova

Spartina Heslop-Harrison, 1951: 443; 1961a: 417. Type-species: *Psylla spartii* Guérin, by monotypy. [Homonym of *Spartina* Harris & Burrows, 1891.]

Lindbergia Heslop-Harrison, 1951: fig. 2, a,b. Nomen nudum [no included species] (*nec Lindbergia* Riedel, 1958).

Arytainilla Ramirez Gomez, 1956: 76. Nomen nudum [type-species not designated].

Alloeoneura (*Hispaniola*) Ramirez Gomez, 1956: 91, partim. Nomen nudum [type-species not designated].

Arytainilla Loginova, 1972a: 17. Type-species: *Psylla delarbrei* Puton, 1873, designated by Loginova, 1972a: 17.

COMMENTS. All described species of *Arytainilla* occur in the west Mediterranean area and the Macaronesian Islands (Table 4). This is an heterogeneous genus and is almost certainly not a monophyletic group. The type-species, *A. delarbrei*, is exceptional in having 8-segmented antennae, long genal cones, an oval forewing with a short pterostigma and unusual male parameres. Most other congeners have 10-segmented antennae, short genal cones, an oblong-oval forewing and simple parameres. *Arytainilla* species are well illustrated by Šulc (1907a; 1910a,b) and Loginova (1972a; 1976b) and there is little point in repeating their descriptions. Further collecting is required to establish relationships between the species and we have confined ourselves to recognising species-groups where possible (Table 4). The *spartiophila*-group is separated from the rest of *Arytainilla* by the characteristic upturned and pointed apex of the female proctiger. The *dividens*-group comprises species that have oblong-oval forewings, short genal cones, moderate to long female terminalia of normal form and male parameres of various shape but most usually slender and with a bulge or projection on the anterior margin. The *proboscidea*-subgroup is defined by the elongate rostral segments and the spotted patterning along the forewing veins. Members of the *dividens*-subgroup have parameres with a large bulge on the anterior margin, whereas those in the *prognata*-subgroup have a smaller ill-defined bulge. The *equitans*-subgroup consists of species similar to those above but with parameres that lack the anterior bulge.

The remaining species tend to have unique characters that set them apart from the rest of the genus. *A. delarbrei* has already been mentioned; it does, however, have a tendency to the same form of female terminalia as that of the *spartiophila*-group. *A. cytisi* has a truncate female ventral valve and a massive ovipositor. *A. umbonata* has a more elongate, parallel-sided forewing and a distinct bulge on the ventral valve of the female terminalia. The female of *A. egena* has long genal cones and short terminalia that are of

a characteristic shape. *Arytainilla nubivaga* (Loginova) **comb. n.** and *A. devia* (Loginova) **comb. n.**, two distinctive Macaronesian species, are transferred to *Arytainilla* from *Arytaina* until a more satisfactory position can be found for them within the classification. Nevertheless, they do show some similarity with *delarbrei* and the remaining species, *A. ima*, particularly in the longer genal cones and the forewing shape of *A. devia*. The paramere shape in these two Canary Island species is complex and unique in the genus.

Table 4 Species-groups within *Arytainilla* with information on host plant and distribution.

	Host plant	Distribution
<i>spartiophila</i> -group		
<i>spartiophila</i> (Förster, 1848)	<i>Cytisus scoparius</i>	Britain Spain France Netherlands Switzerland Austria Portugal
<i>spartiicola</i> (Šulc, 1907)	<i>Cytisus scoparius</i>	France Switzerland
<i>gredi</i> (Ramirez Gomez, 1956) comb. n.	<i>Cytisus scoparius</i> ?	Spain
<i>dividens</i> -group		
<i>dividens</i> -subgroup		
<i>dividens</i> Loginova, 1976b	<i>Cytisus proliferus</i>	Canaries
<i>modica</i> Loginova, 1976b	unknown	Canaries
<i>hakani</i> Loginova, 1972a	unknown	Morocco
<i>cognata</i> Loginova, 1972a	unknown	Morocco
<i>pileolata</i> Loginova, 1976b	unknown	Canaries
<i>proboscidea</i> -subgroup		
<i>proboscidea</i> Loginova, 1976b	<i>Adenocarpus anagyris</i>	Canaries
<i>nigralineata</i> Loginova, 1976b	<i>Adenocarpus</i> or <i>Cytisus</i>	Canaries
<i>prognata</i> -subgroup		
<i>prognata</i> Loginova, 1976b	unknown	Canaries
<i>incuba</i> Loginova, 1976b	unknown	Madeira
<i>equitans</i> -subgroup		
<i>equitans</i> Loginova, 1976b	unknown	Canaries
<i>diluta</i> , Loginova, 1976b	unknown	Canaries
Residual species		
<i>delarbrei</i> (Puton, 1873)	<i>Genista tinctoria</i>	France Spain
<i>cytisi</i> (Puton, 1876)	<i>Calicotome spinosa</i>	Algeria France Israel (IDH) Italy Spain Yugoslavia Turkey
<i>ima</i> Loginova, 1972a	unknown	Morocco
<i>egena</i> Loginova, 1972a	<i>Retama raetam</i>	Morocco, Libya (BMNH)
<i>umbonata</i> Loginova, 1976b	indet. legume	
<i>devia</i> (Loginova, 1976b) comb. n.	<i>Cytisus proliferus</i>	Canaries
	<i>Adenocarpus anagyris</i>	
<i>nubivaga</i> (Loginova, 1976b) comb. n.	<i>Cytisus fragrans</i>	Canaries

Discussion

The legume-feeding psyllid fauna of the west Palaearctic appears to comprise a number of evolutionary lines that are identified and diagnosed in this paper as separate monophyletic genera or species-groups within the Acizzinae and Arytaininae. *Arytaina* is defined by characters that include the broad form of the male paramere, the aedeagus with a strongly hooked apex and the lack of a pterostigma and costal break in the forewing. *Livilla* is defined by the narrow elongate paramere and the long bulbous or weakly hooked apex of the aedeagus. *Cyamophila* possesses a paramere that resembles that of *Arytaina* but the propleurites/pronotum structure is more advanced and the costal break and pterostigma are well-developed in the forewing. We have suggested that *Arytainilla* is heterogeneous and probably comprises a number of distinct evolutionary lines. *Acizzia* is separated from the other genera, into the subfamily Acizzinae, by the presence of lateral lobes on the male proctiger. The extent of homoplasy in several of the other characters examined makes it difficult to suggest clear relationships between genera. Thus we have concluded that *Arytaina*, *Livilla*, *Cyamophila* and *Arytainilla*, together with the monotypic central Asian genus *Astragalita*, should be retained, for the present, in the subfamily Arytaininae. We recognise, however, that there are no good autapomorphies that define the subfamily and separate it from the Psyllinae. It remains, nevertheless, a convenient and widely recognised grouping. The Acizzinae is a distinct evolutionary line warranting subfamily status.

Arytaina, *Livilla* and some groups within *Arytainilla* are most diverse in the Mediterranean Basin and are associated with papilionoid legumes of the tribe Genisteae, which itself has a primarily Mediterranean distribution. By contrast, most *Cyamophila* species occur in the arid regions of central Asia and are associated with other tribes of papilionoid legumes, particularly Galegeae, Trifoleae, Loteae and Sophoreae. The genus is not known from Africa and the one west European species, *C. prohaskai*, represents the western limit of this genus. *Acizzia* species are widespread throughout Africa, Arabia, India, South East Asia and Australasia. They are primarily associated with the equally widely distributed mimosoid legume genera *Acacia* and *Albizia*. *Acizzia* appears to be an old genus with a very wide distribution that reaches its natural northern and western limits in the area under consideration.

Legume systematics, particularly of the tribe Genisteae, have been the subject of much debate (Bisby, 1981). It is of interest to see if the pattern of host plant relationships for the different psyllid groups can contribute to an understanding of legume classification and vice versa. In a recent classification of the legumes Bisby (1981) split the Genisteae into two subtribes, the Lupininae and the Genistinae. He subdivided the latter into three main groups of genera (Table 5). His *Cytisus*-group contains the arytainine host genera *Cytisus*, *Laburnum* and *Chamaecytisus*; the *Genista*-group contains *Genista*, *Ulex* and *Retama*, while the outliers include *Adenocarpus*, *Calicotome* and *Spartium*.

Table 5 shows the distribution of psyllids across their host plants in the Genisteae. Each record indicates a known association between a psyllid species and a species of host plant. Species of *Livilla* are concentrated on hosts within Bisby's *Genista*-group, particularly the large genus *Genista* itself, but also on *Ulex* and *Retama*. However, some species also feed on genera in Bisby's other two groups of Genistinae. Of the two psyllid species known to feed on the outlier group, *spectabilis* is monophagous on *Spartium junceum*, whereas *pyrenaea* is recorded from *Calicotome* and *Genista*. Among the three species feeding on the *Cytisus*-group (*radiata*, *cognata* and *variegata*) *cognata* also has a known host in the *Genista*-group, while *radiata* is oligophagous on several species of *Chamaecytisus*. The core species of *Livilla*, the *spartiisuga*- and *horvathi*-groups, tend to occur on *Genista*. The morphologically isolated species, such as *variegata* and *spectabilis*, tend to occur on the more taxonomically isolated groups of host plants.

By contrast with *Livilla*, the hosts of *Arytaina* and *Arytainilla* are more evenly spread across the Genisteae. Within the *Cytisus*-group, *Arytaina genistae* and *A. maculata* occur on *Cytisus* and *Chamaecytisus*, whereas *Arytainilla* species such as *gredi*, *spartiophila*, *spartiicola*, *devia*, *dividens* and *nubivaga* are concentrated on *Cytisus*. The *Genista*-group supports just four species, *Arytaina genistae* (record requires confirmation), *A. torifrons* and *Arytainilla delarbrei*

Table 5 Host plant relationships of *Livilla*, *Arytaina* and *Arytainilla* species across the Genisteae. The number of species in each genus (N) is taken from Bisby (1981) except for *Argyrolobium* which is taken from *Flora Europaea* (Tutin *et al.*, 1964).

	N	<i>Livilla</i>	Number of host records		Total
			<i>Arytaina</i>	<i>Arytainilla</i>	
Subtribe Lupininae		0	0	0	0
Subtribe Genistinae					
<i>Cytisus</i> -group					
<i>Laburnum</i>	2	2	0	0	2
<i>Hesperolaburnum</i>	1	0	0	0	0
<i>Podocytisus</i>	1	0	0	0	0
<i>Cytisophyllum</i>	1	0	0	0	0
<i>Petteria</i>	1	0	0	0	0
<i>Argyrocytisus</i>	1	0	0	0	0
<i>Cytisus</i>	33	2	1	6	9
<i>Chaemaecytisus</i>	30	6	5	2	13
<i>Genista</i> -group					
<i>Retama</i>	4	3	0	1	4
<i>Genista</i>	87	18	2	1	21
<i>Echinospartum</i>	3	0	0	0	0
<i>Stauracanthus</i>	2	0	0	0	0
<i>Ulex</i>	20	2	0	0	2
Outlier group					
<i>Argyrolobium</i>	2	0	0	0	0
<i>Adenocarpus</i>	15	0	2	2	4
<i>Calicotome</i>	2	1	1	1	3
<i>Erinacea</i>	1	0	0	0	0
<i>Spartium</i>	1	1	0	0	1
<i>Gonocytisus</i>	3	0	0	0	0

on *Genista*, and *Arytainilla egena* on *Retama*. The outlier plant group supports *Arytaina putonii* and *Arytainilla cytisi* on *Calicotome*, and *Arytaina adenocarpi* and *Arytainilla devia* on *Adenocarpus*.

Table 5 indicates that the larger the plant genus the more psyllid species that genus is likely to support, with a psyllid feeding record for about every four species of plants. This relationship can be interpreted in two ways. It may indicate a simultaneous diversification of both plants and insects (coevolution), but, more likely, it is the result of an initial plant species radiation with a subsequent radiation of the insects, made successful by their high degree of monophagy (see Benson *et al.*, 1976; Vane-Wright, 1978).

Overall, however, our present level of knowledge of psyllid host plant relationships adds little to an understanding of the classification and evolution of the Genisteae. There is already a high level of incongruence between legume classifications based on morphology and those based on other biological characteristics (Bisby, 1981). The lack of clear specialisations by the different psyllid groups adds further to this incongruity.

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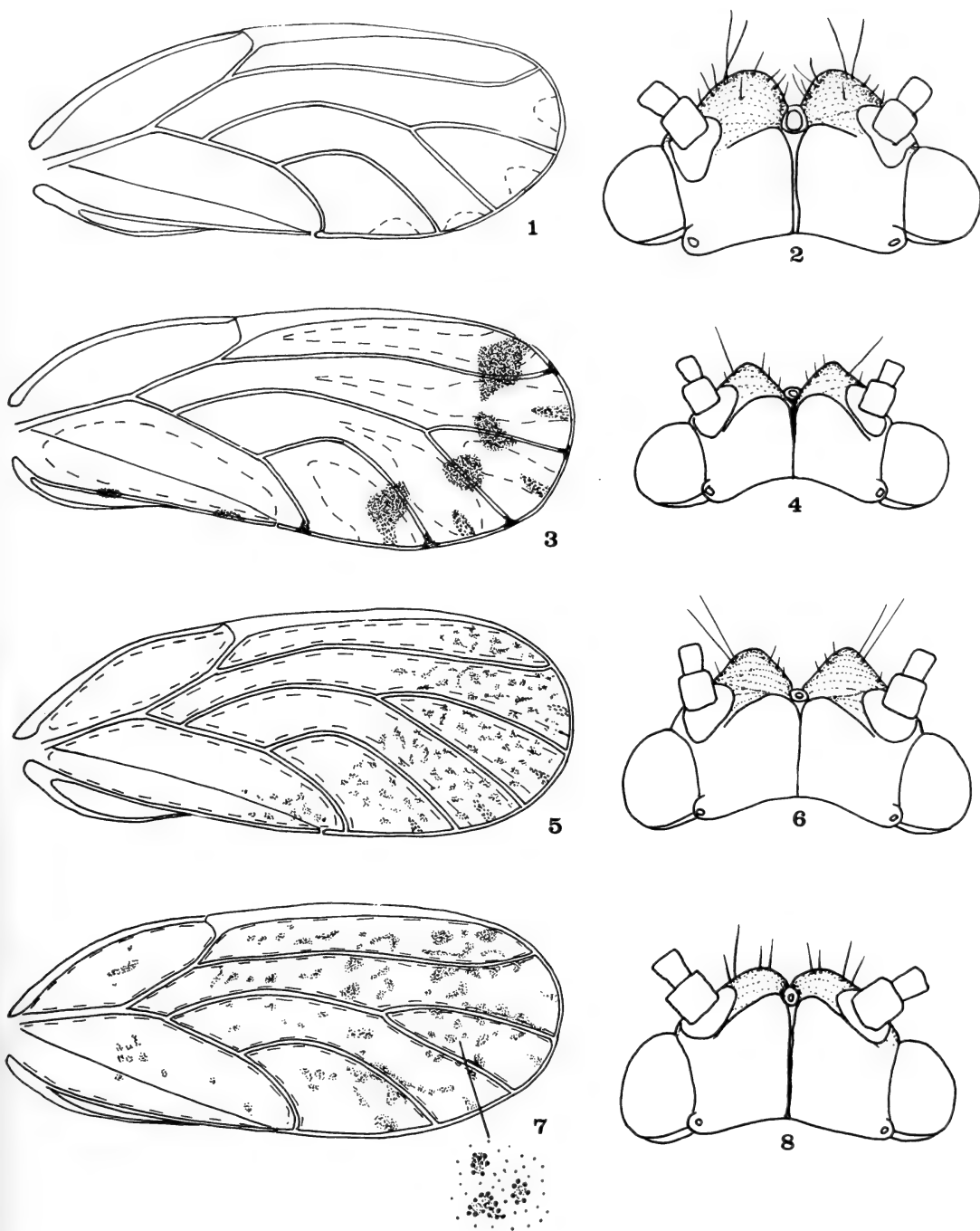
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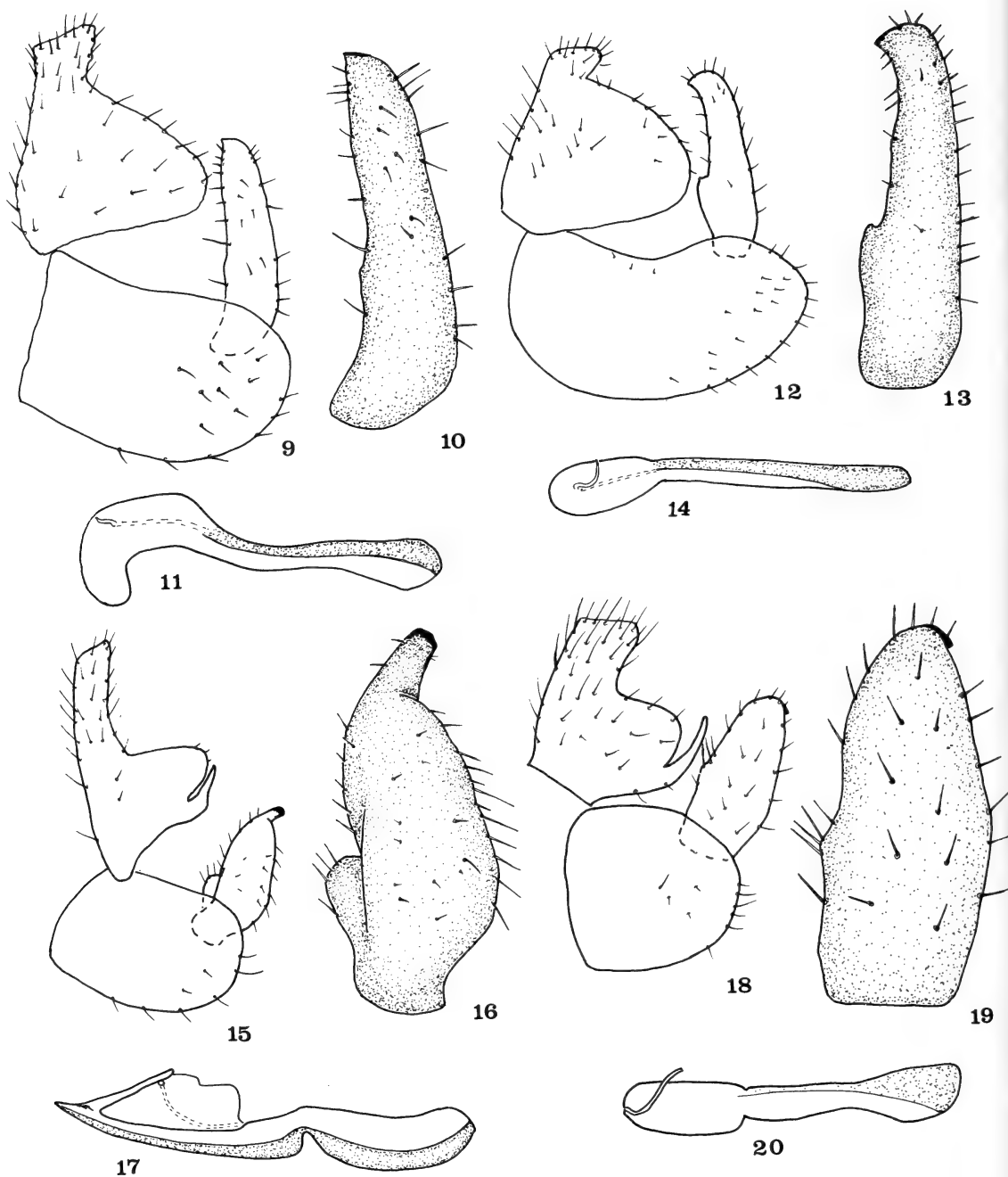
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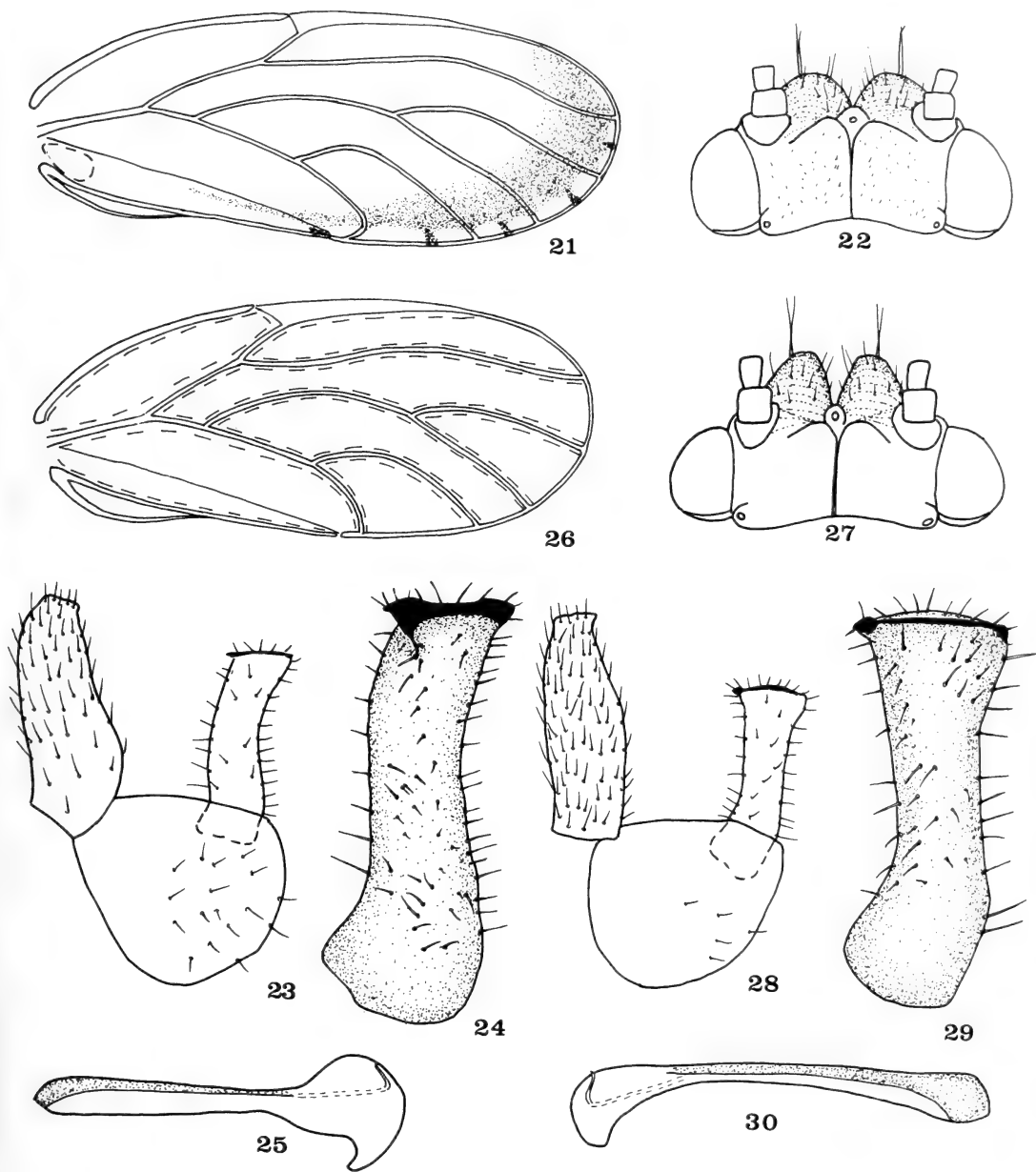
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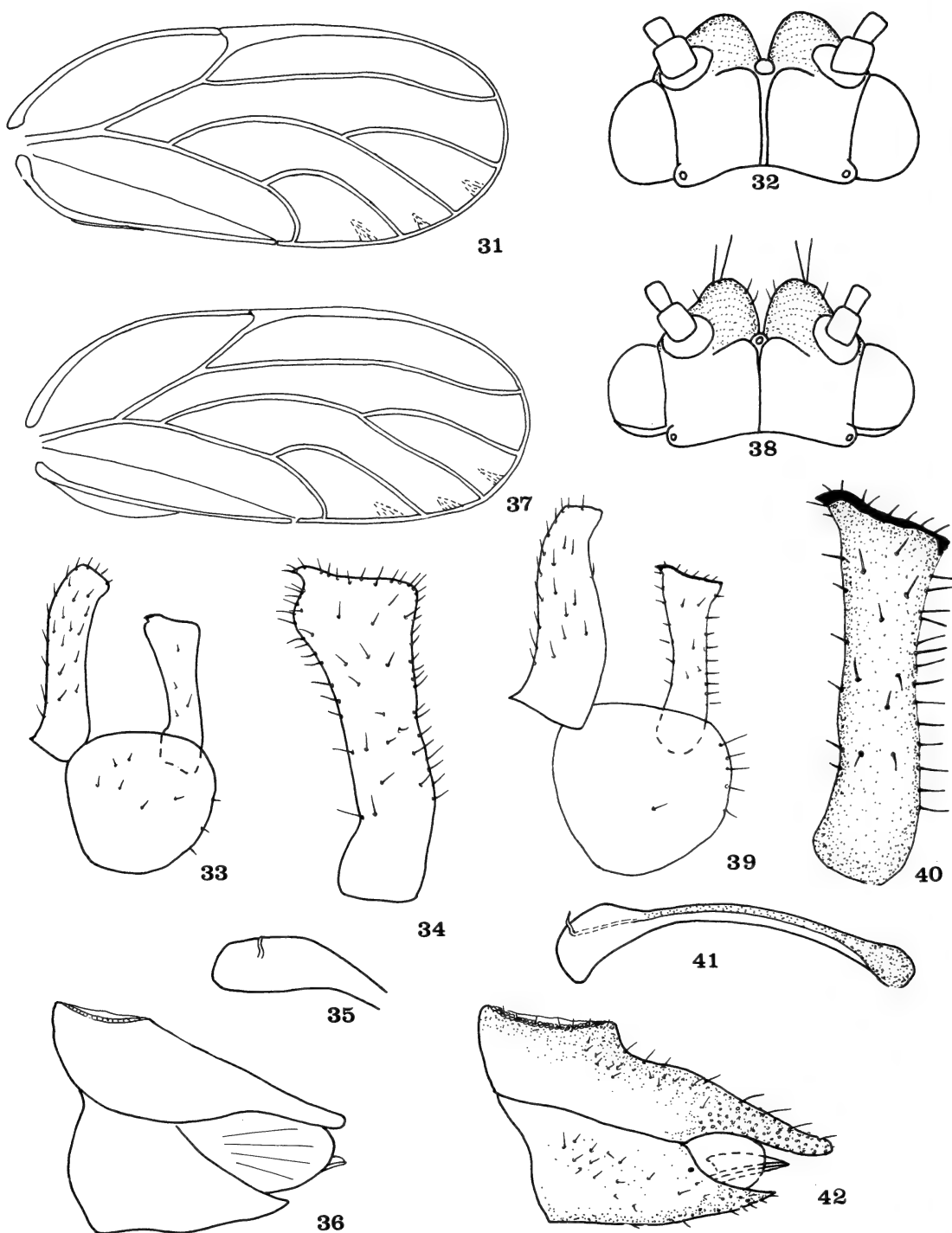
Figs 1–8 *Acizzia* species. 1, 2, *bicolorata*: (1) forewing; (2) head. 3, 4, *hollisi*: (3) forewing; (4) head. 5, 6, *uncatoides*: (5) forewing; (6) head. 7, 8, *acaciaebaileyanae*: (7) forewing; (8) head.



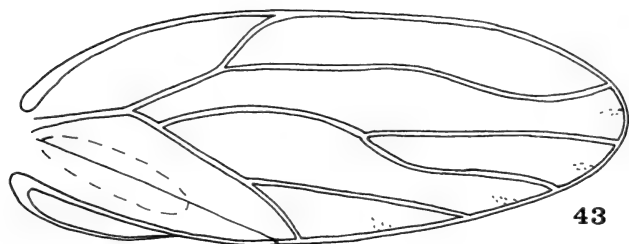
Figs 9–20 *Acizzia* species. 9–11, *bicolorata*: (9) ♂ genitalia, lateral view; (10) ♂ paramere, outer view; (11) apical segment of aedeagus. 12–14, *hollisi*: (12) ♂ genitalia, lateral view; (13) ♂ paramere, outer view; (14) apical segment of aedeagus. 15–17, *uncatoides*: (15) ♂ genitalia, lateral view; (16) ♂ paramere, outer view; (17) apical segment of aedeagus. 18–20, *acaciaebaileyanae*: (18) ♂ genitalia, lateral view; (19) ♂ paramere, outer view; (20) apical segment of aedeagus.



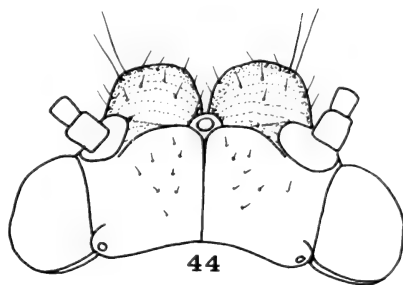
Figs 21–30 *Cyamophila* species. 21–25, *glycyrrhizae*: (21) forewing; (22) head; (23) ♂ genitalia, lateral view; (24) ♂ paramere, inner view; (25) apical segment of aedeagus. 26–30, *prohaskai*: (26) forewing; (27) head; (28) ♂ genitalia, lateral view; (29) ♂ paramere, inner view; (30) apical segment of aedeagus.



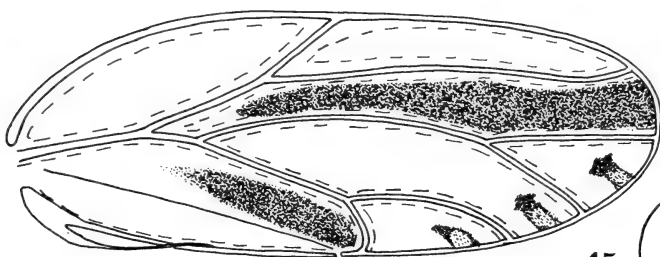
Figs 31–42 *Cyamophila* species. 31–36, *stoklosai* (after Klimaszewski & Lodos): (31) forewing; (32) head; (33) ♂ genitalia, lateral view; (34) ♂ paramere; (35) apical segment of aedeagus; (36) ♀ terminalia, lateral view. 37–42, *medicaginis*: (37) forewing; (38) head; (39) ♂ genitalia, lateral view; (40) ♂ paramere; (41) apical segment of aedeagus; (42) ♀ terminalia, lateral view.



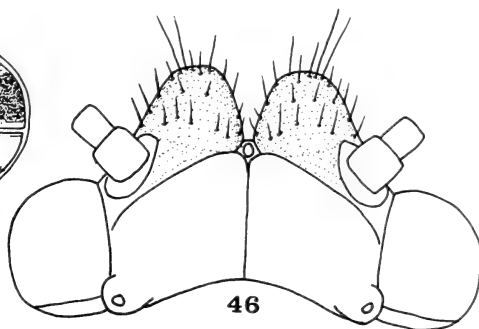
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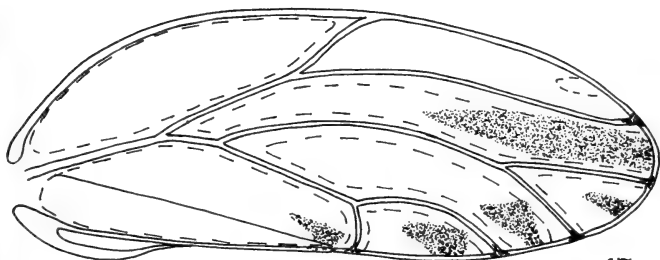
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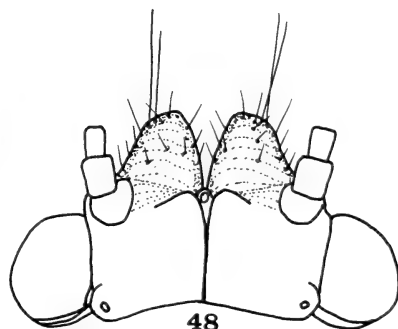
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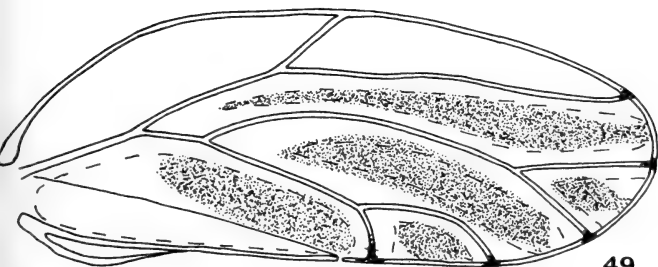
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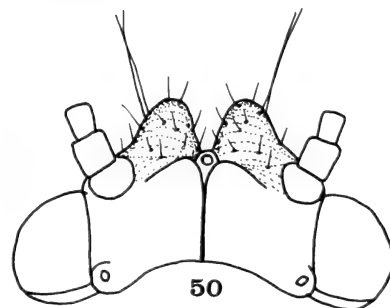
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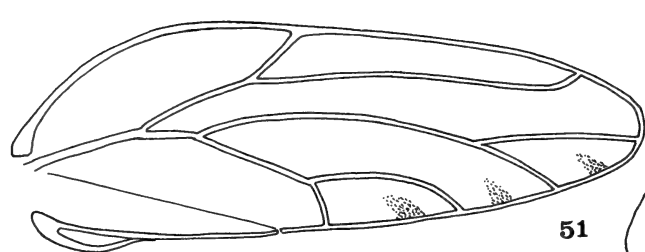


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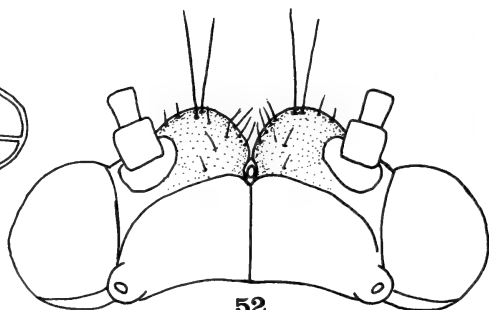


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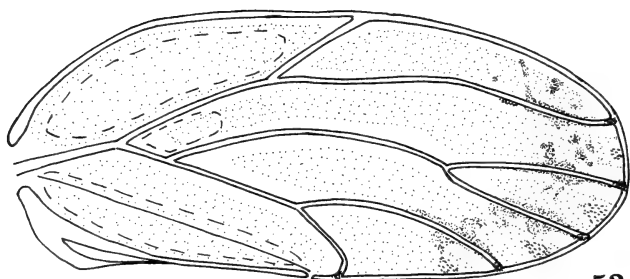
Figs 43–50 *Arytaina* species. 43, 44, *longicella*: (43) forewing; (44) head. 45, 46, *genistae*: (45) forewing; (46) head. 47, 48, *maculata*: (47) forewing; (48) head. 49, 50, *maculata* (Spanish material): (49) forewing; (50) head.



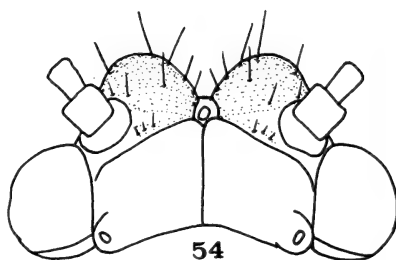
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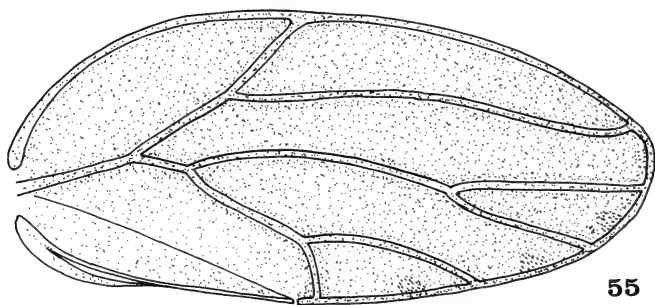
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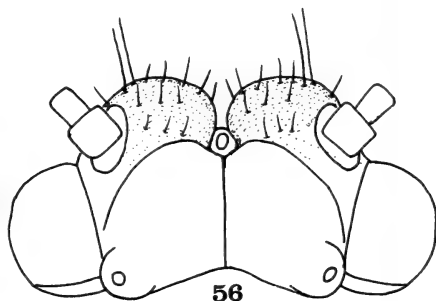
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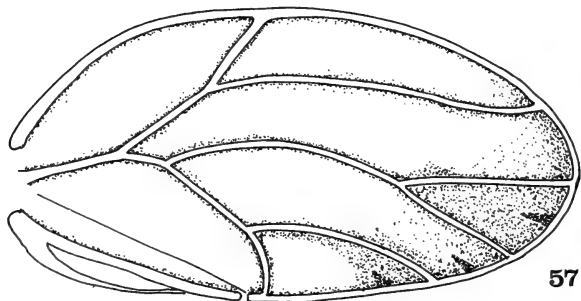
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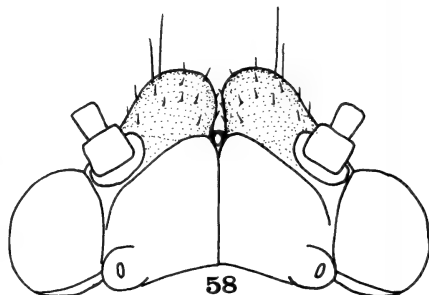
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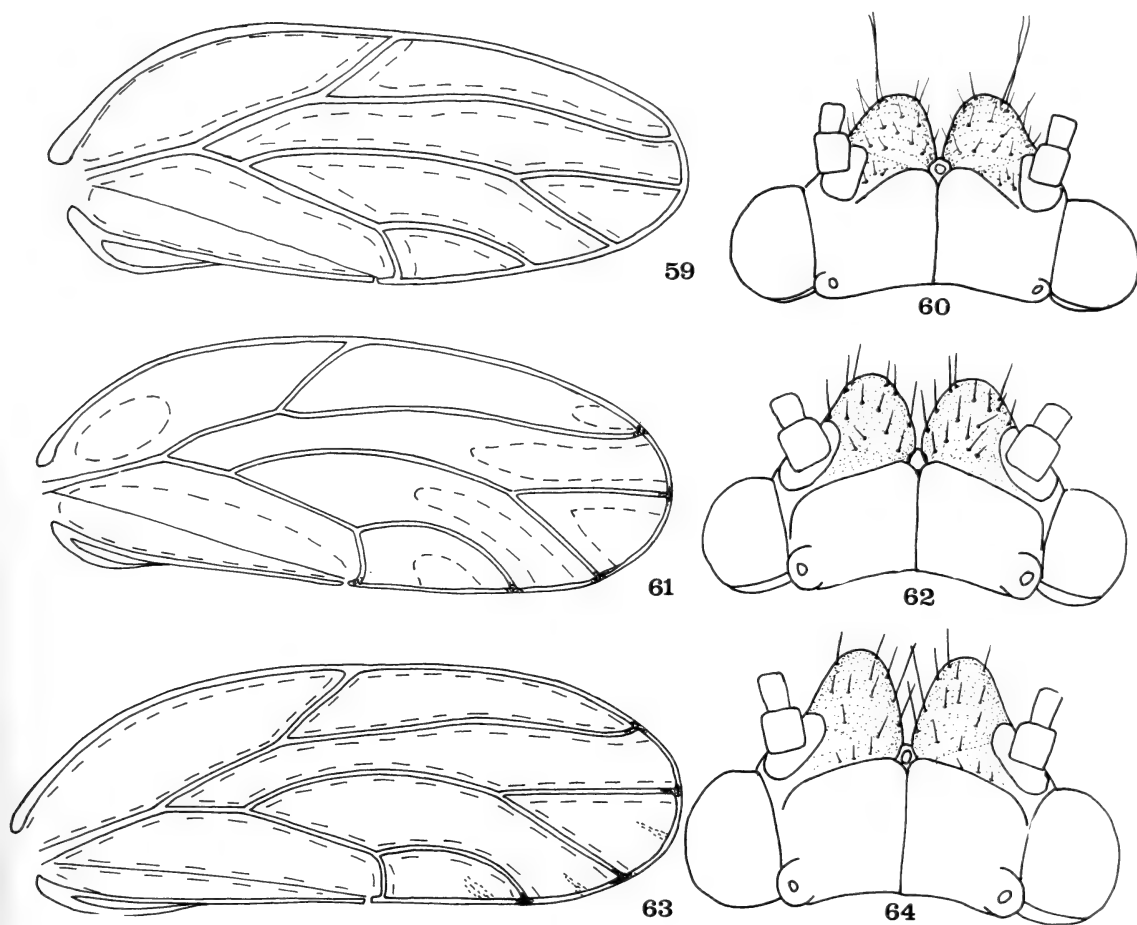


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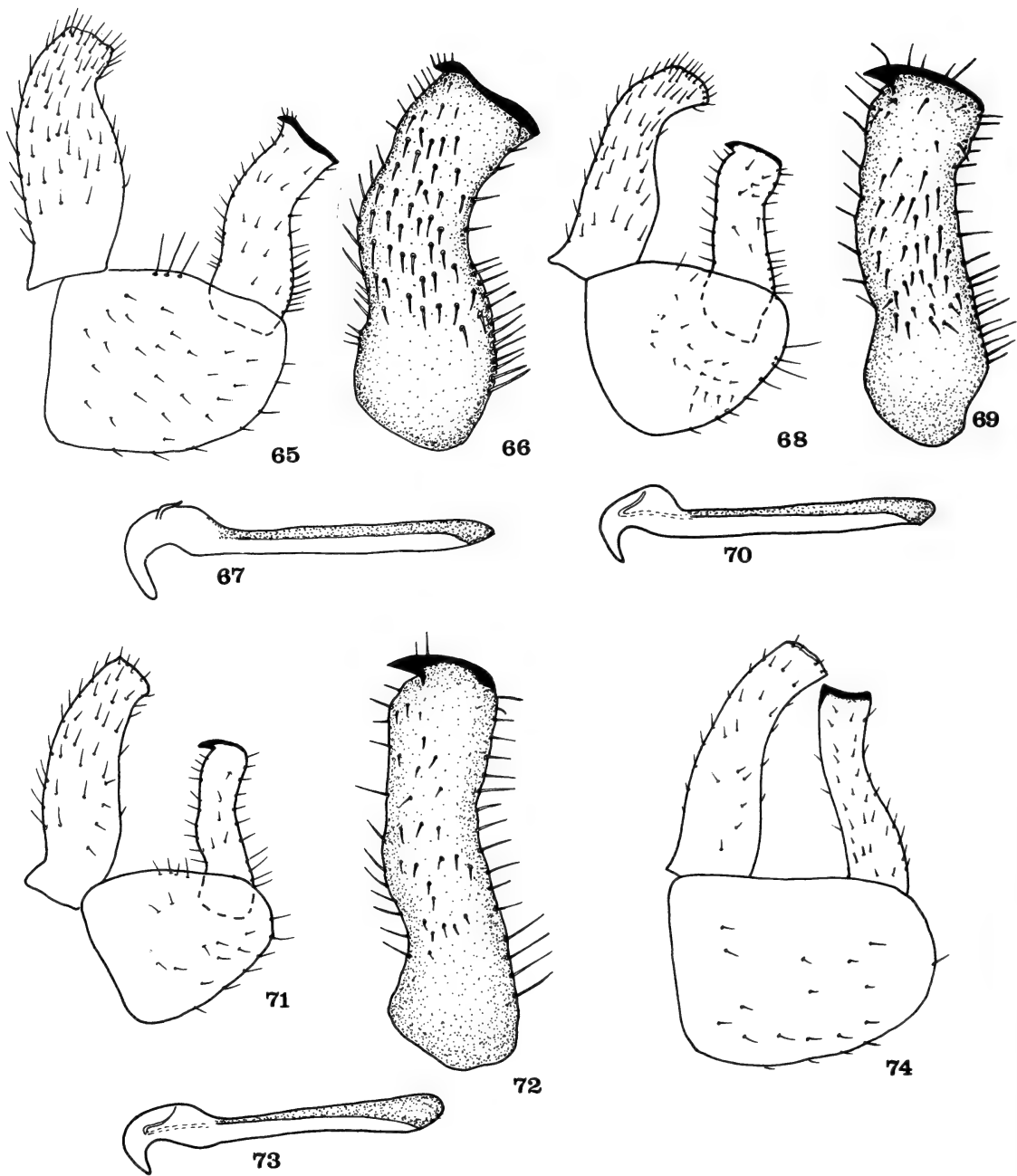


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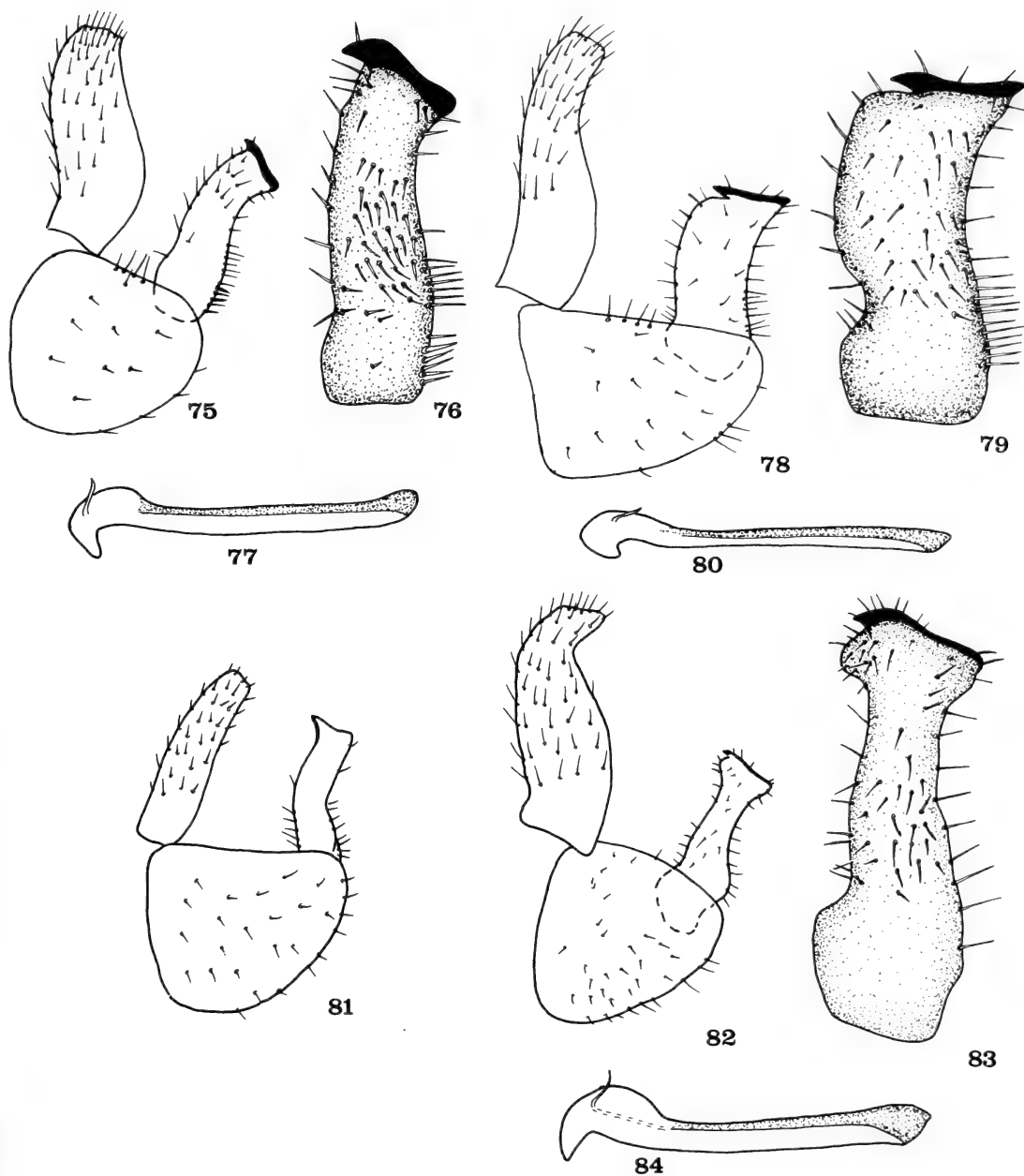
Figs 51–58 *Arytaina* species. 51, 52, *angustatipennis*: (51) forewing; (52) head. 53, 54, *atlasiensis*: (53) forewing; (54) head. 55, 56, *putonii*: (55) forewing; (56) head. 57, 58, *torifrons*: (57) forewing; (58) head.



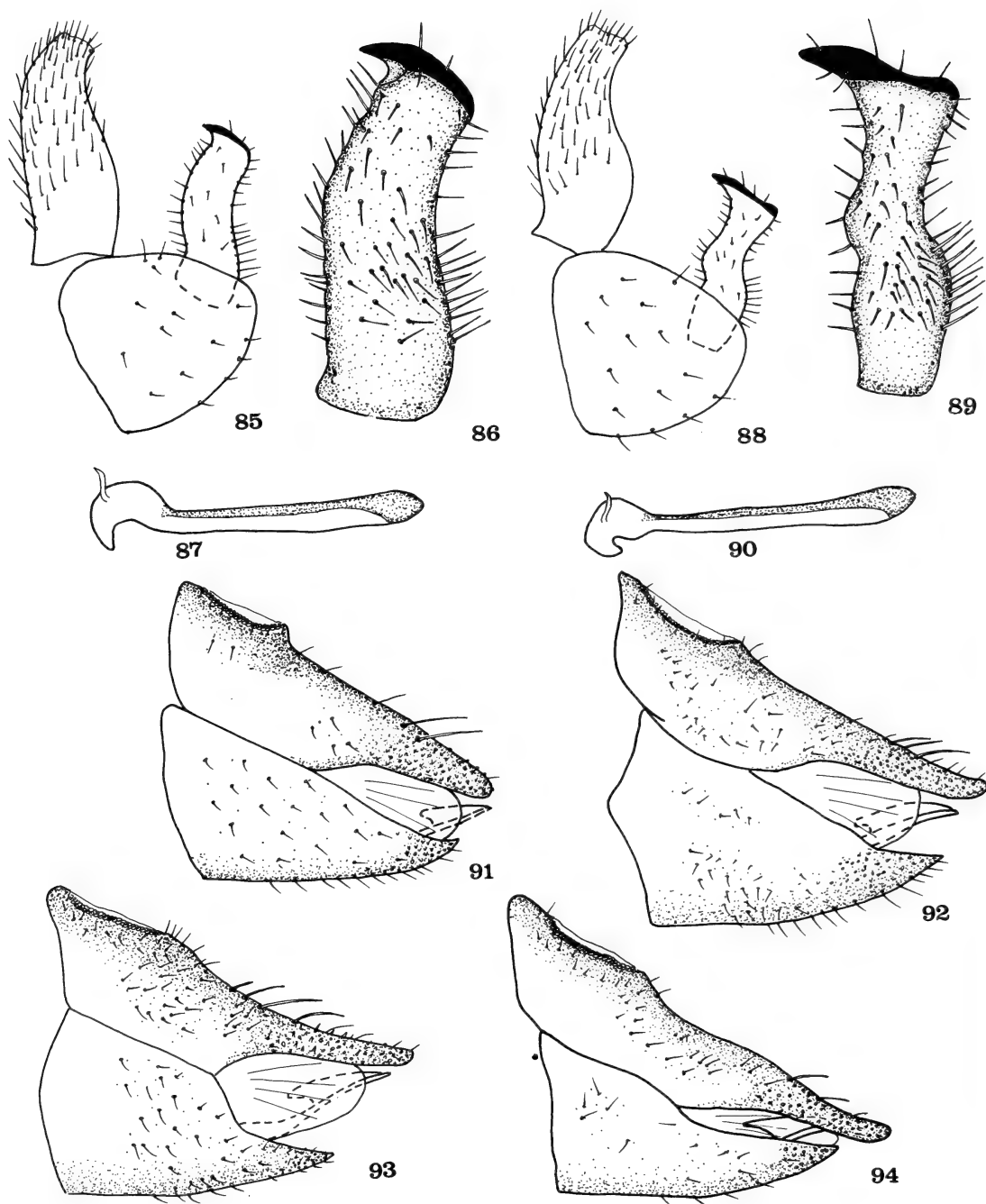
Figs 59–64 *Amarygda* species. 59, 60, *hispanica*: (59) forewing; (60) head. 61, 62, *adenocarpi*: (61) forewing; (62) head. 63, 64, *magnidentata*: (63) forewing; (64) head.



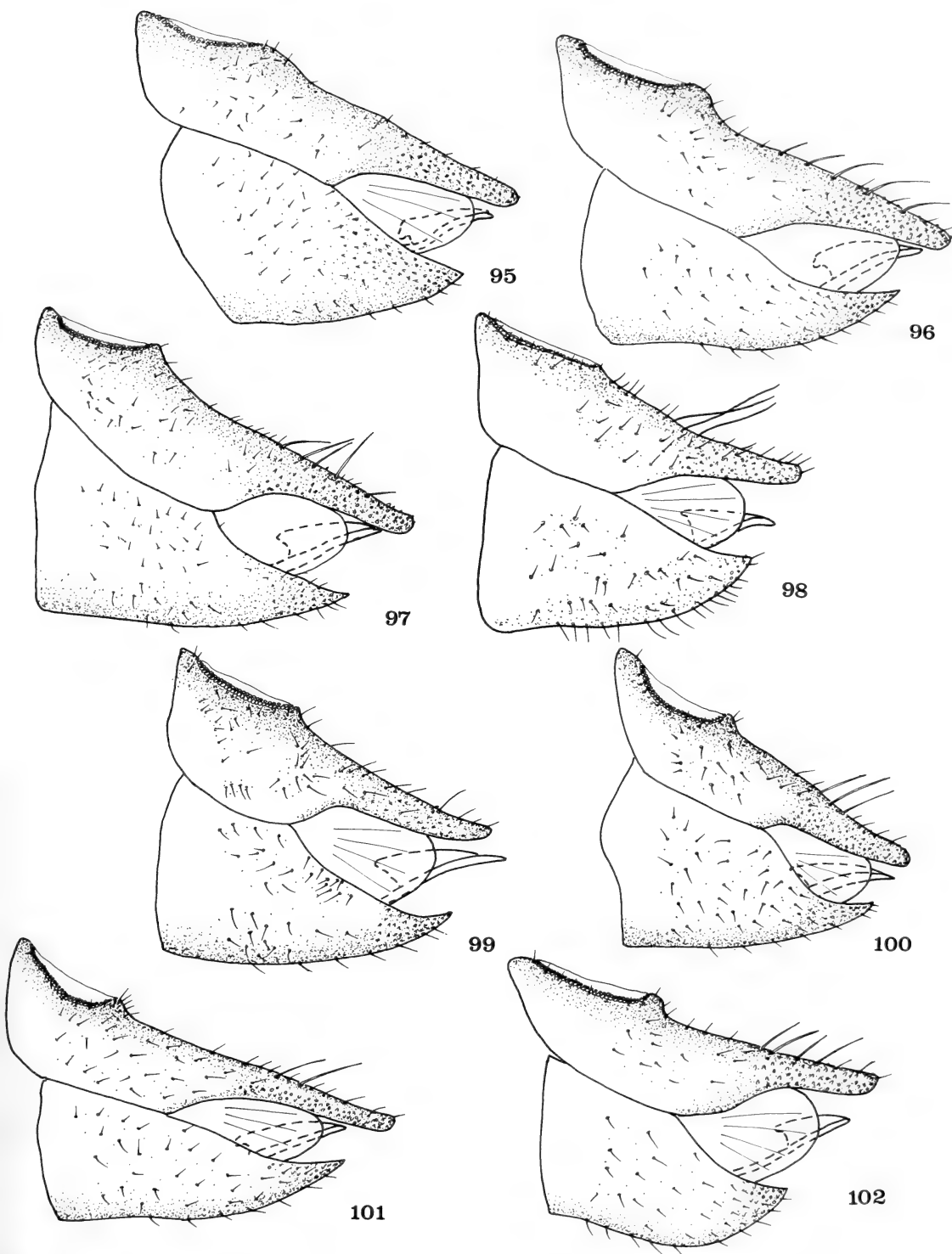
Figs 65-74 *Arytaina* species. 65-67, *genistae*: (65) ♂ genitalia, lateral view; (66) ♂ paramere, inner view; (67) apical segment of aedeagus. 68-70, *maculata*: (68) ♂ genitalia, lateral view; (69) ♂ paramere, inner view; (70) apical segment of aedeagus. 71-73, *maculata* (Spanish material): (71) ♂ genitalia, lateral view; (72) ♂ paramere, inner view; (73) apical segment of aedeagus. 74, *africana*: ♂ genitalia, lateral view (after Heslop-Harrison).



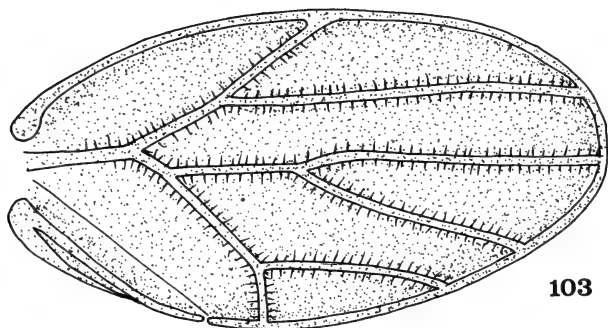
Figs 75–84 *Amarygmodon* species. 75–77, *putonii*: (75) ♂ genitalia, lateral view; (76) ♂ paramere, inner view; (77) apical segment of aedeagus. 78–80, *torifrons*: (78) ♂ genitalia, lateral view; (79) ♂ paramere, inner view; (80) apical segment of aedeagus. 81, *angustatipennis*: ♂ genitalia, lateral view; (82) ♂ genitalia, lateral view; (83) ♂ paramere, inner view; (84) apical segment of aedeagus.



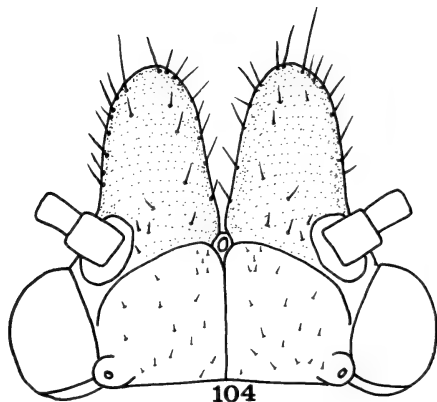
Figs 85–94 *Arytaina* and *Cyamophila* species. 85–87, *A. adenocarpi*: (85) ♂ genitalia, lateral view; (86) ♂ paramere, inner view; (87) apical segment of aedeagus. 88–90, *A. magnidentata*: (88) ♂ genitalia, lateral view; (89) ♂ paramere, inner view; (90) apical segment of aedeagus. 91, *A. atlasiensis*: ♀ terminalia, lateral view. 92, *A. hispanica*: ♀ terminalia, lateral view. 93, *C. glycyrrhizae*: ♀ terminalia, lateral view. 94, *C. prohaskai*: ♀ terminalia, lateral view.



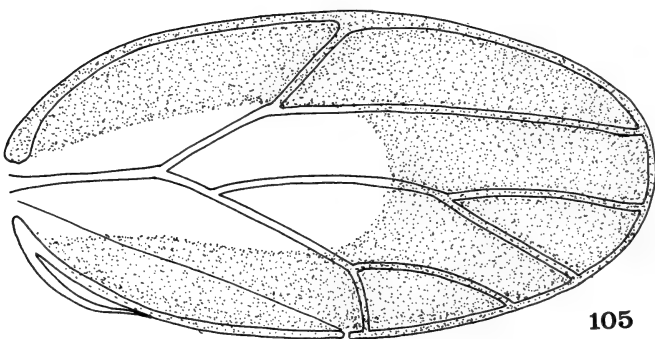
Figs 95–102 *Arytaina* and *Livilla* ♀ terminalia, lateral view. 95, *A. longicella*. 96, *A. genistae*. 97, *A. maculata*. 98, *L. radiata*. 99, *A. adenocarpi*. 100, *A. putonii*. 101, *A. angustatipennis*. 102, *A. torifrons*.



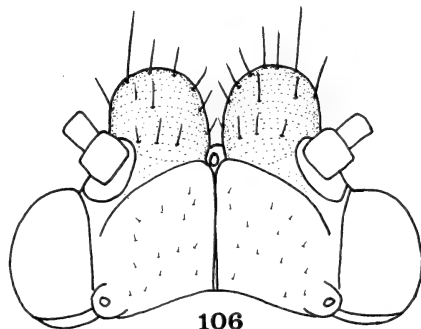
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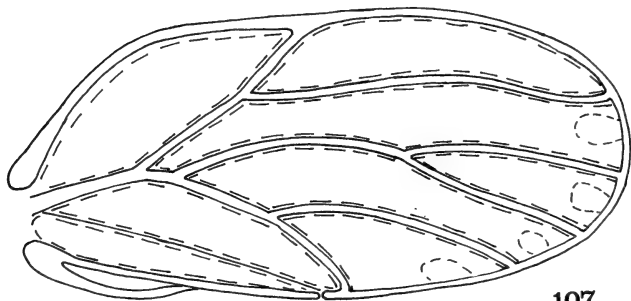
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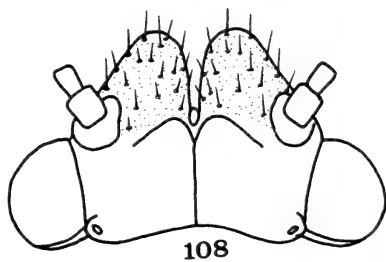
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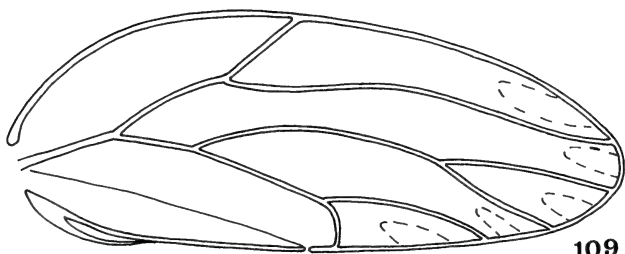
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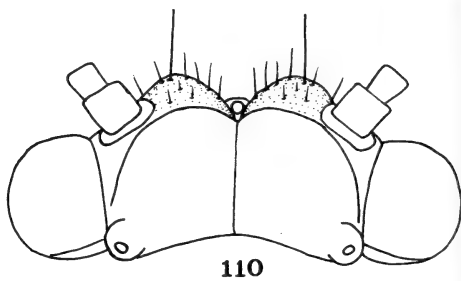
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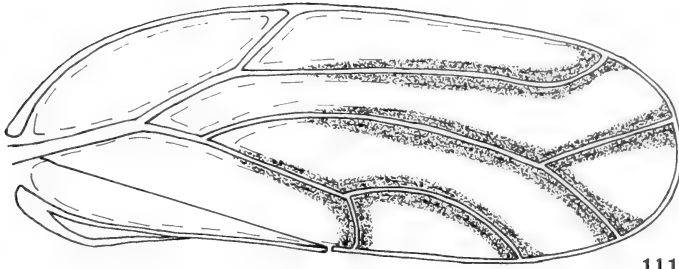


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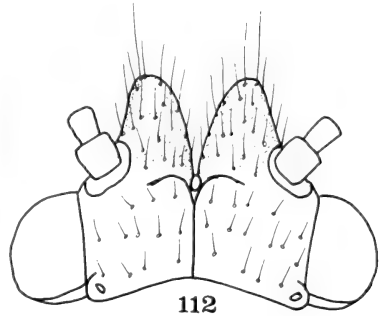


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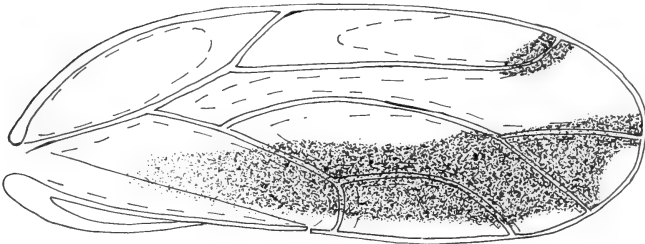
Figs 103–110 *Livilla* species. 103, 104, *ulicis*: (103) forewing; (104) head. 105, 106, *bivittata*: (105) forewing; (106) head. 107, 108, *vicina*: (107) forewing; (108) head. 109, 110, *cognata*: (109) forewing; (110) head.



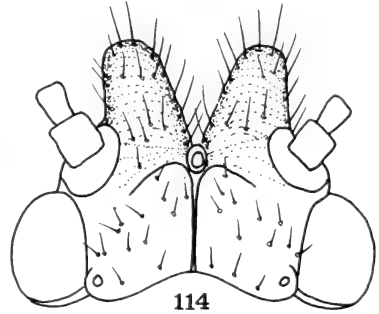
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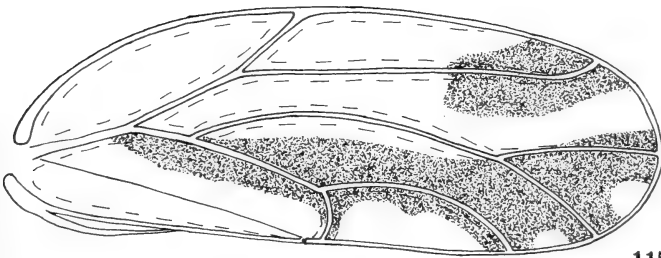
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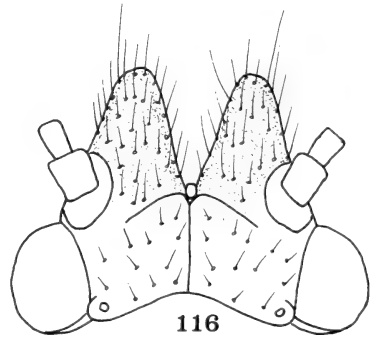
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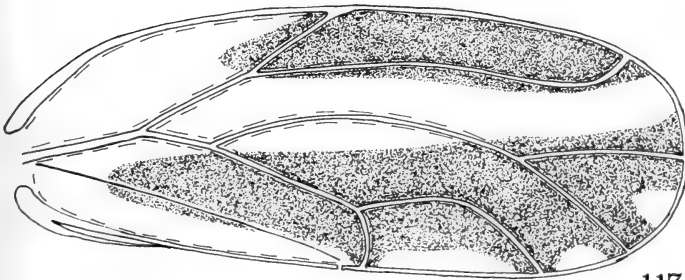
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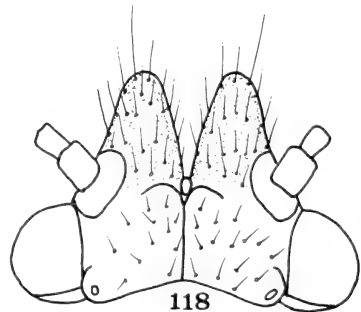
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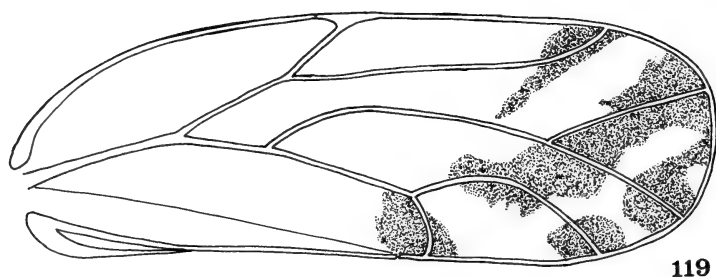


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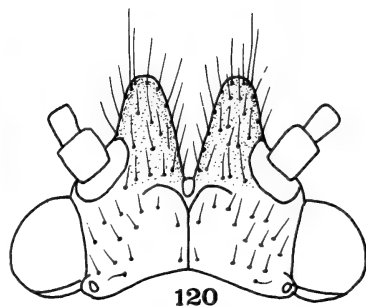


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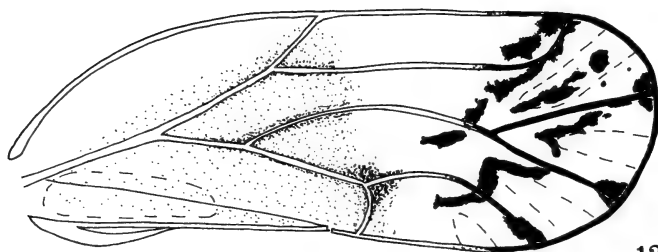
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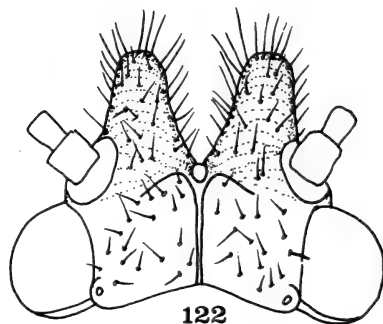
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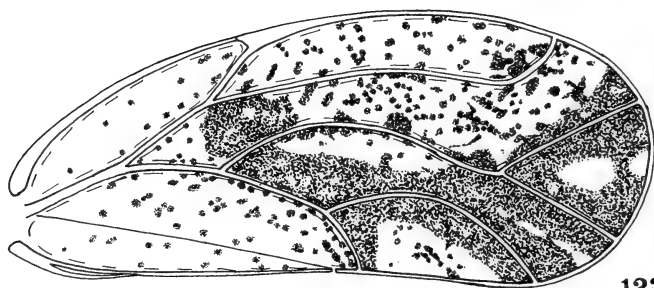
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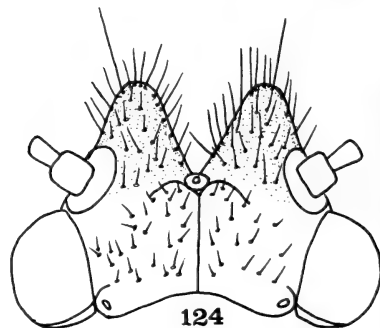
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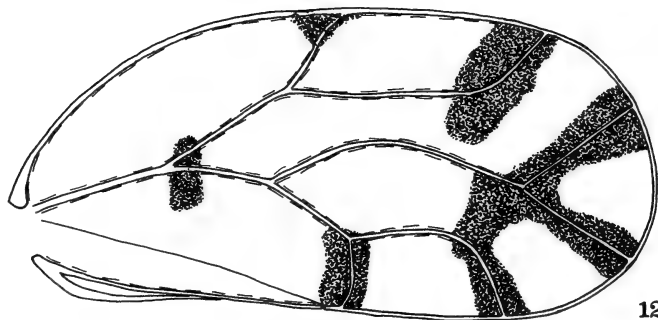
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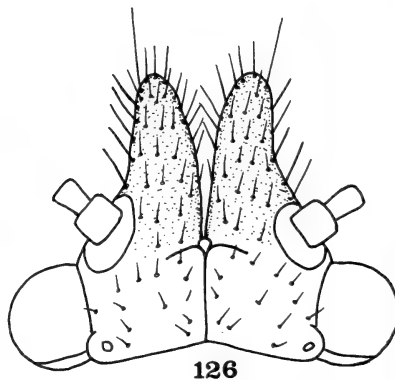
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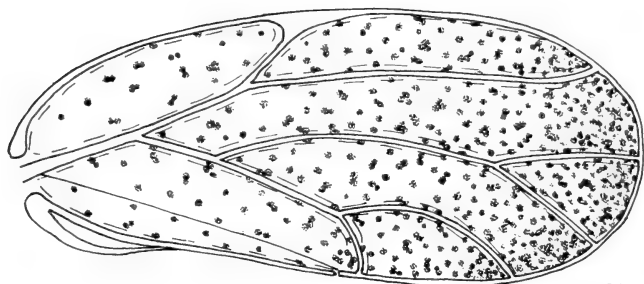


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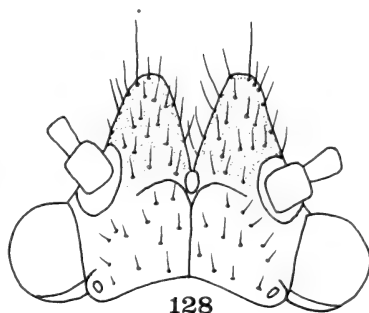


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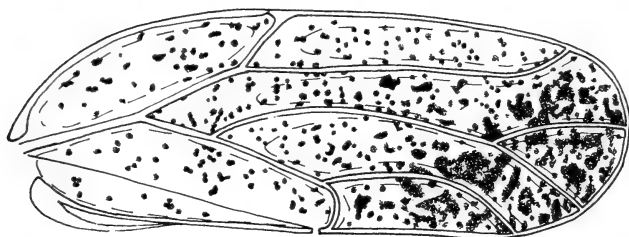
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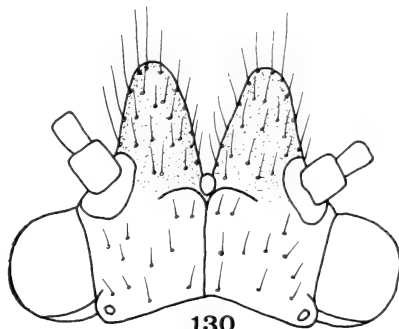
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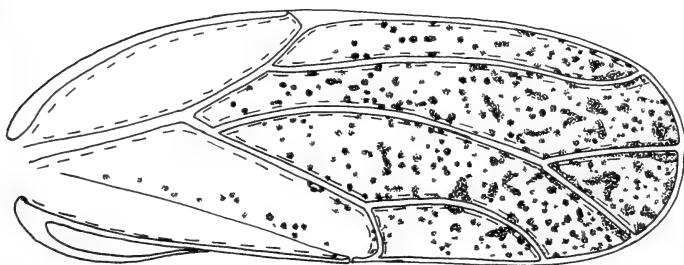
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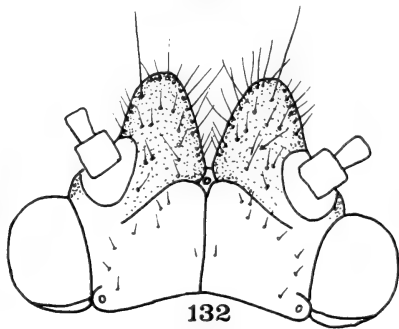
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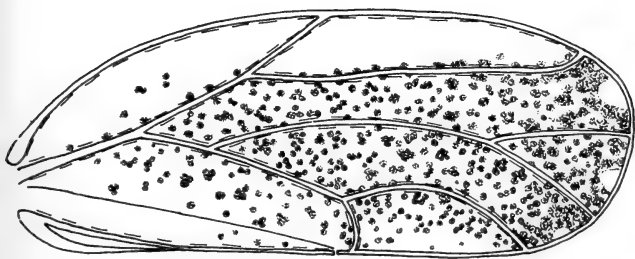
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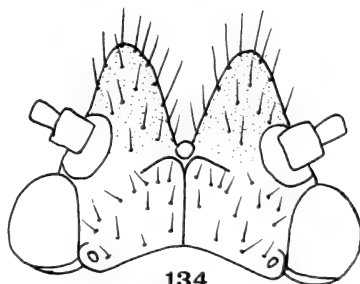
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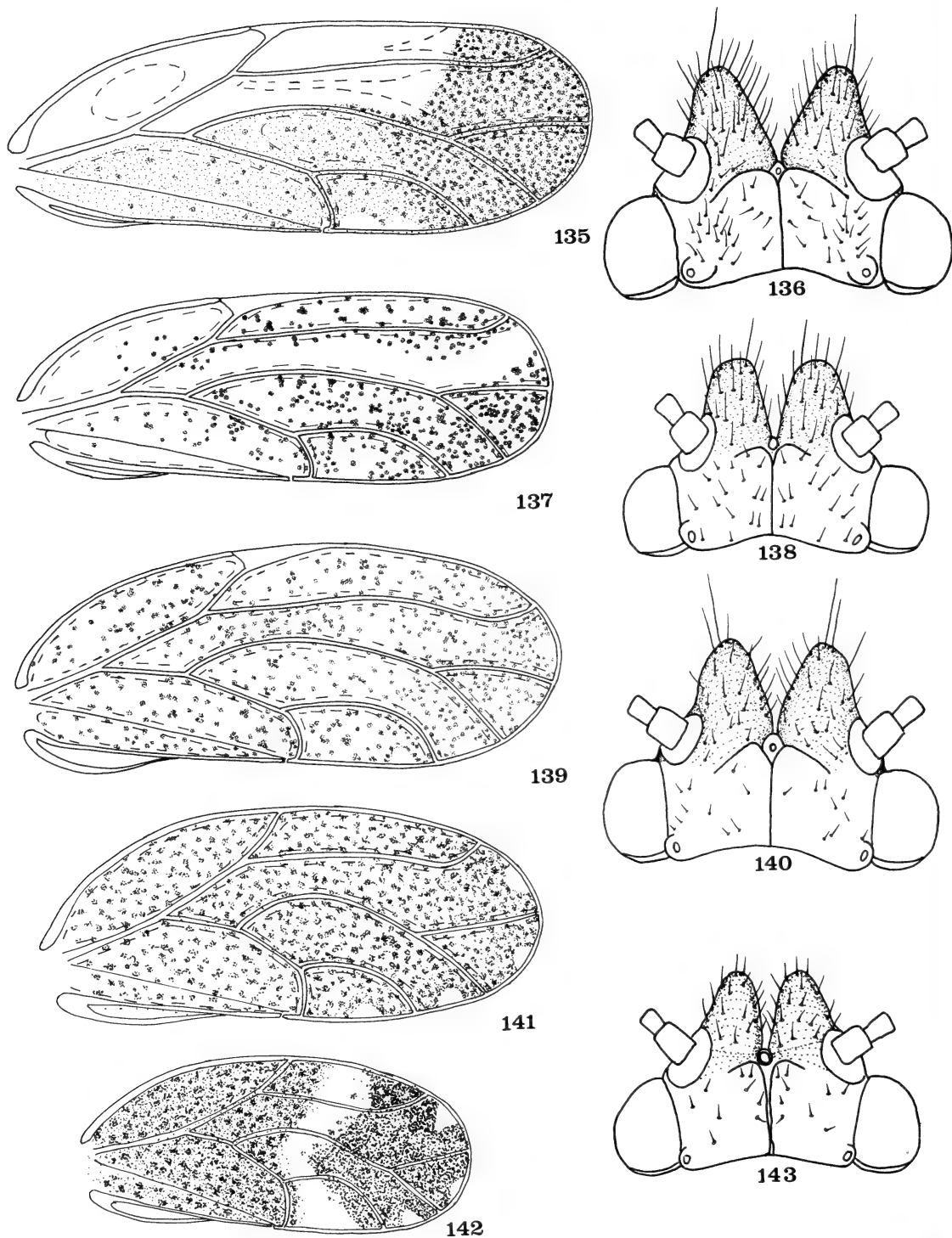


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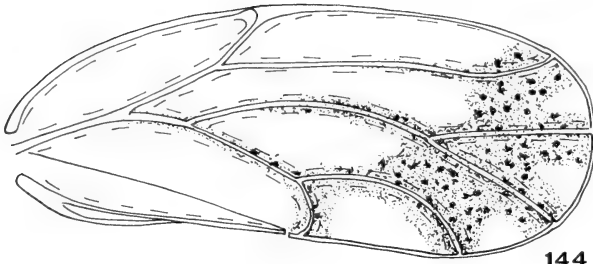


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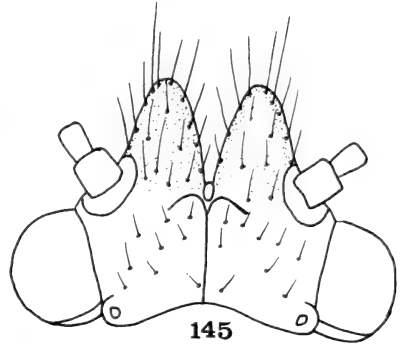
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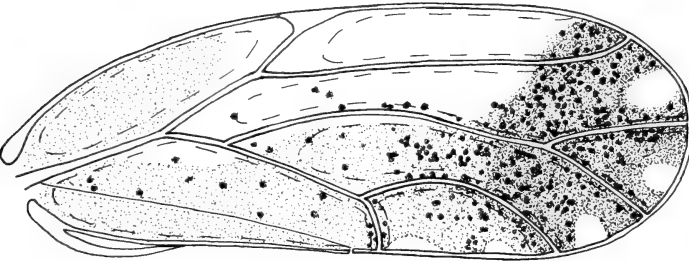
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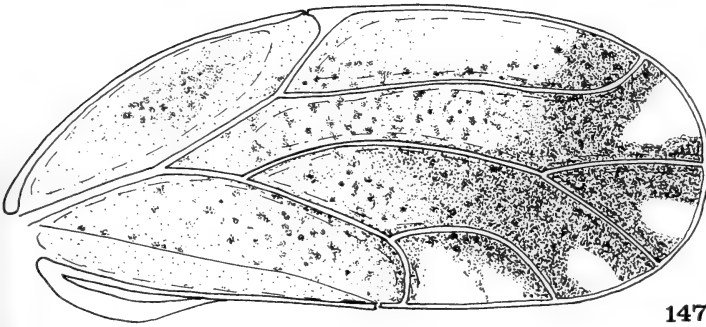
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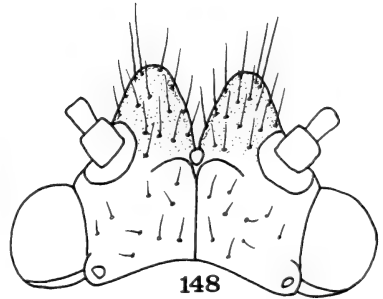
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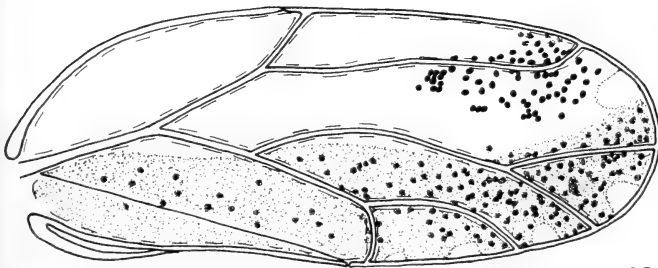
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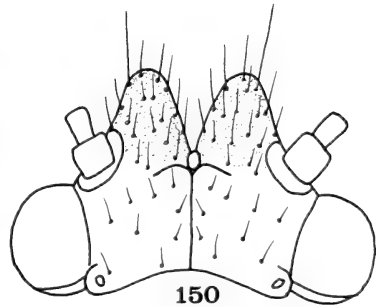
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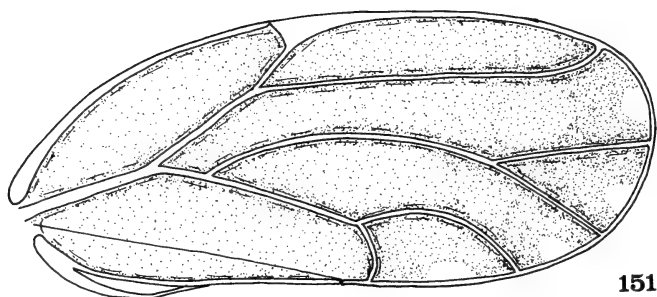


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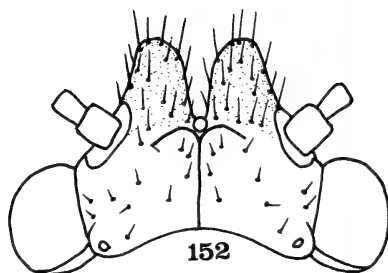


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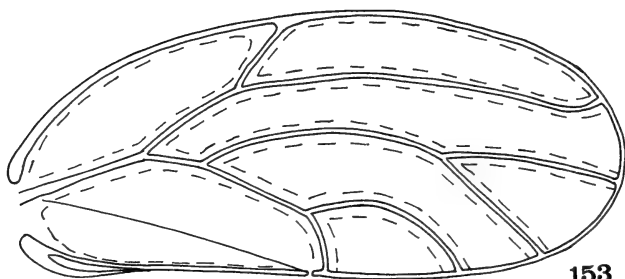
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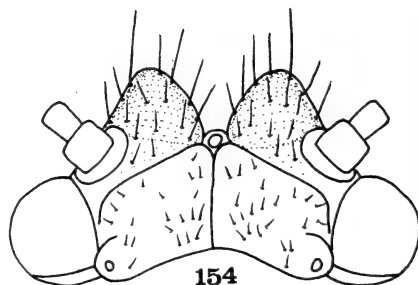
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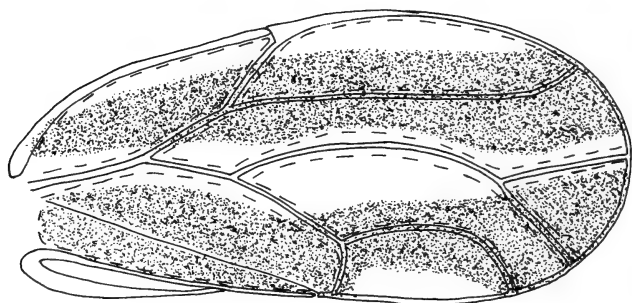
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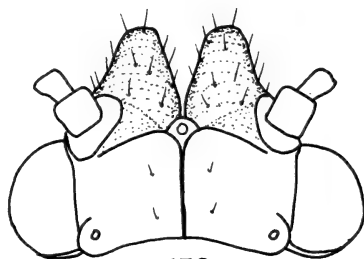
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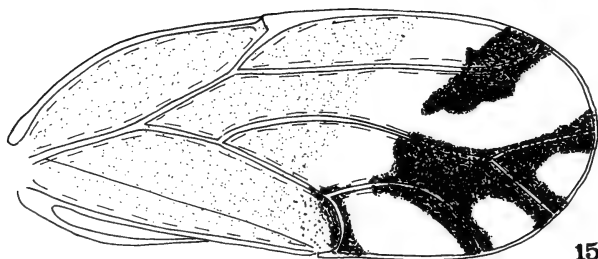
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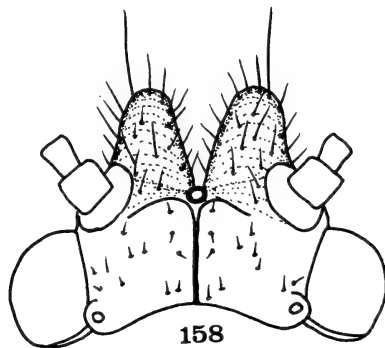
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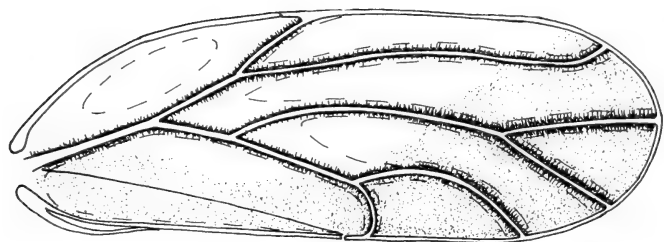


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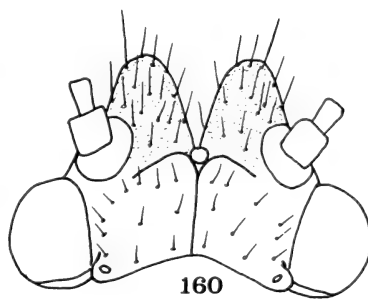


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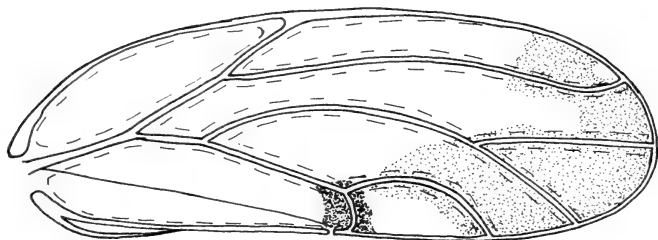
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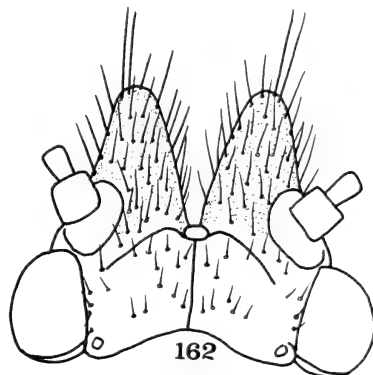
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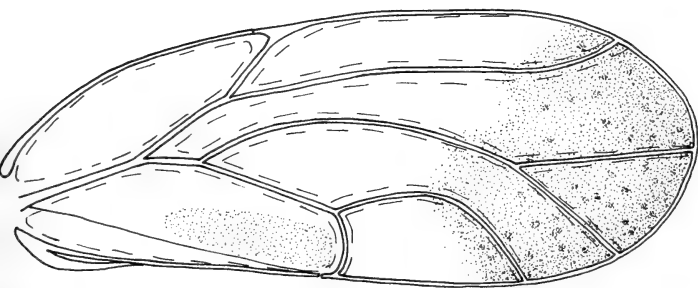
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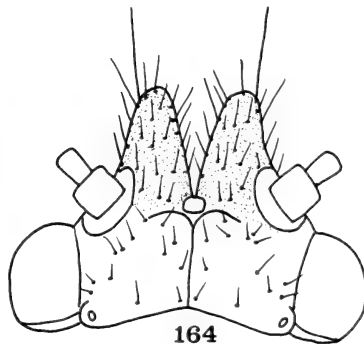
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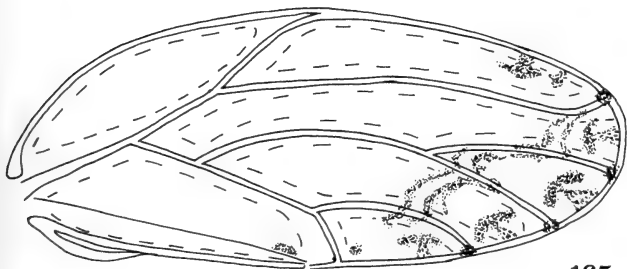
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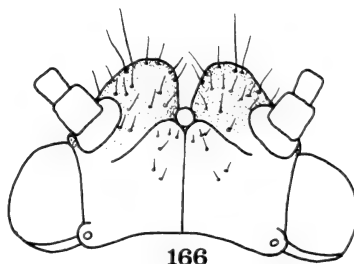
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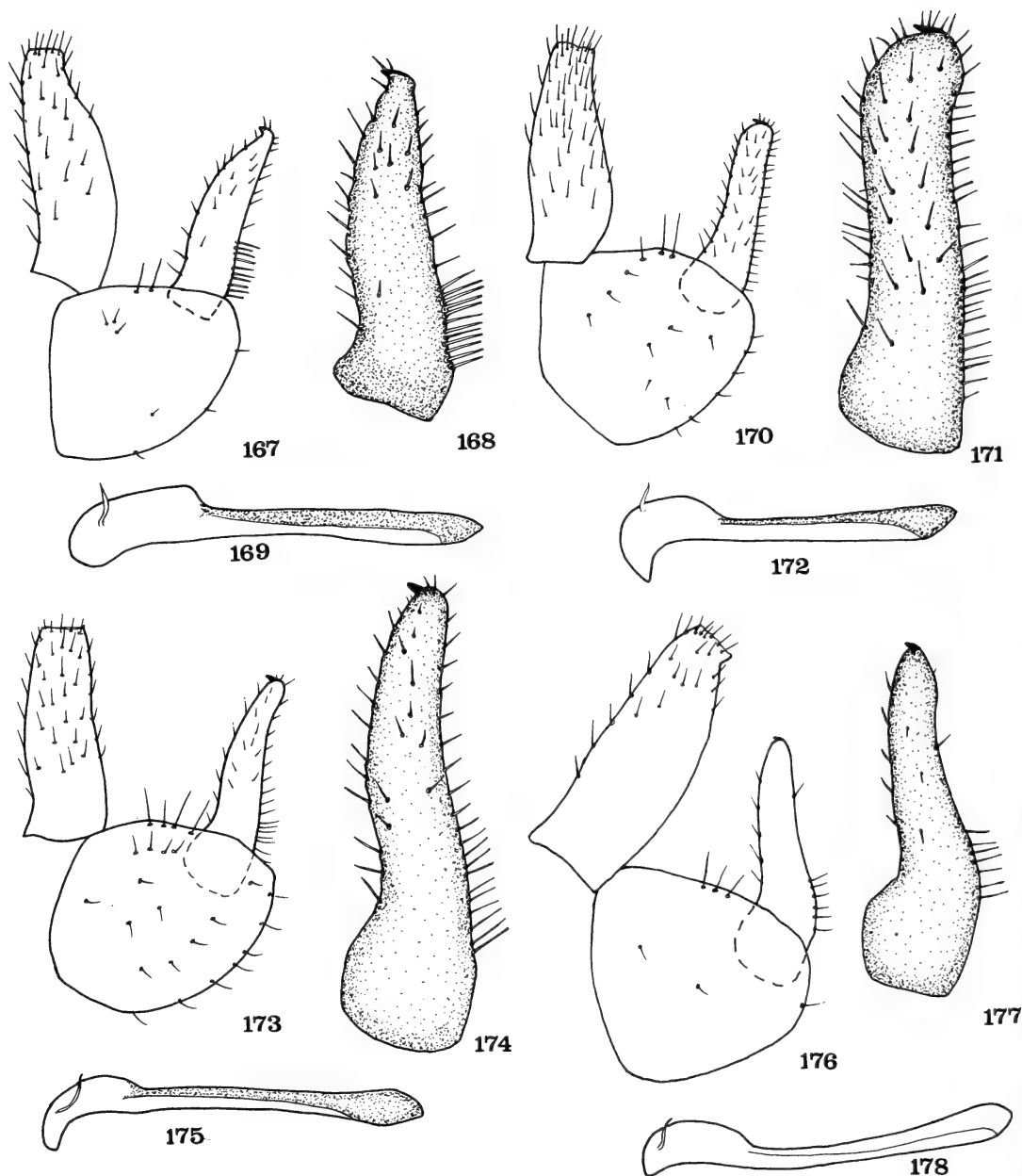


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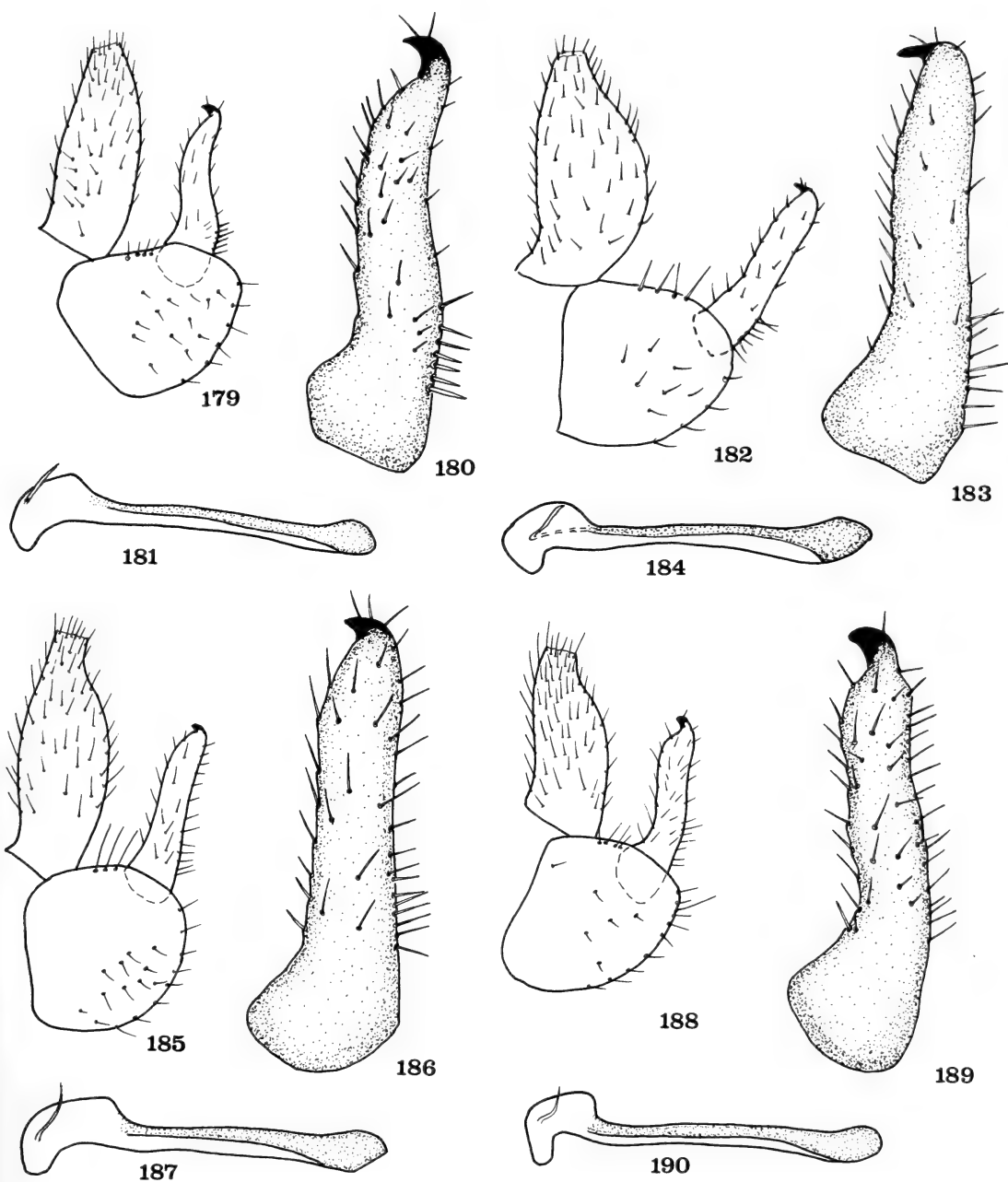


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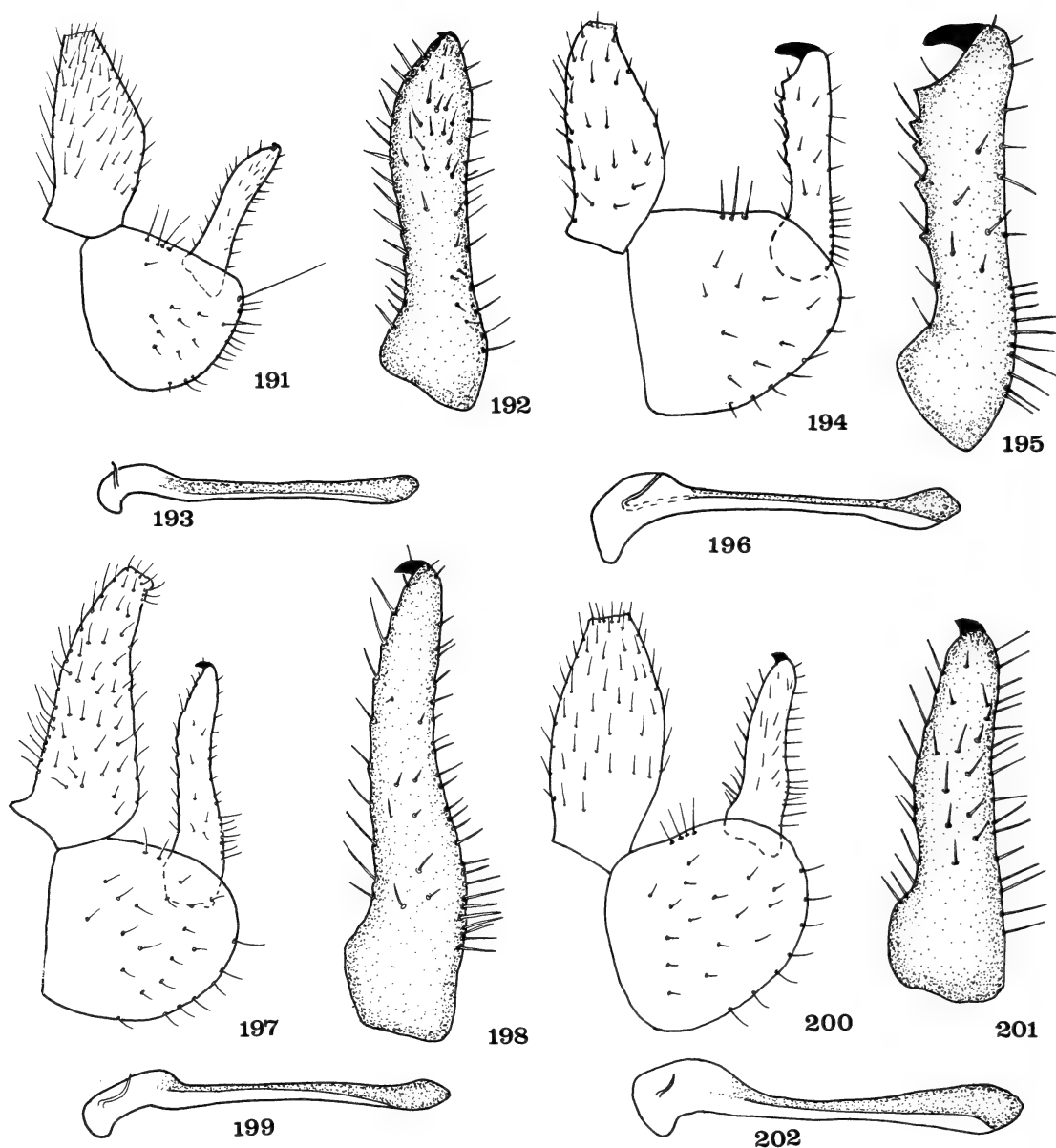
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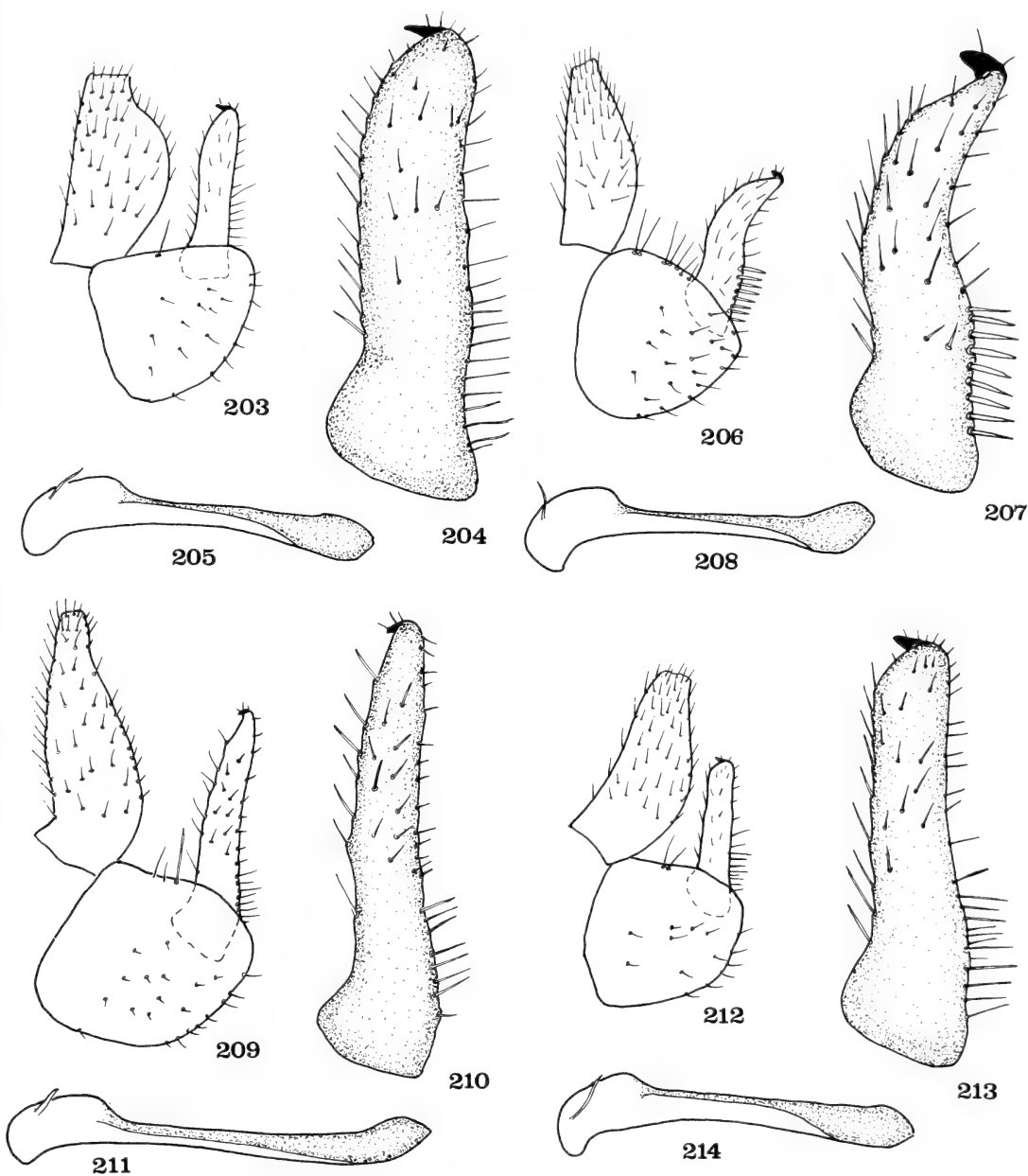
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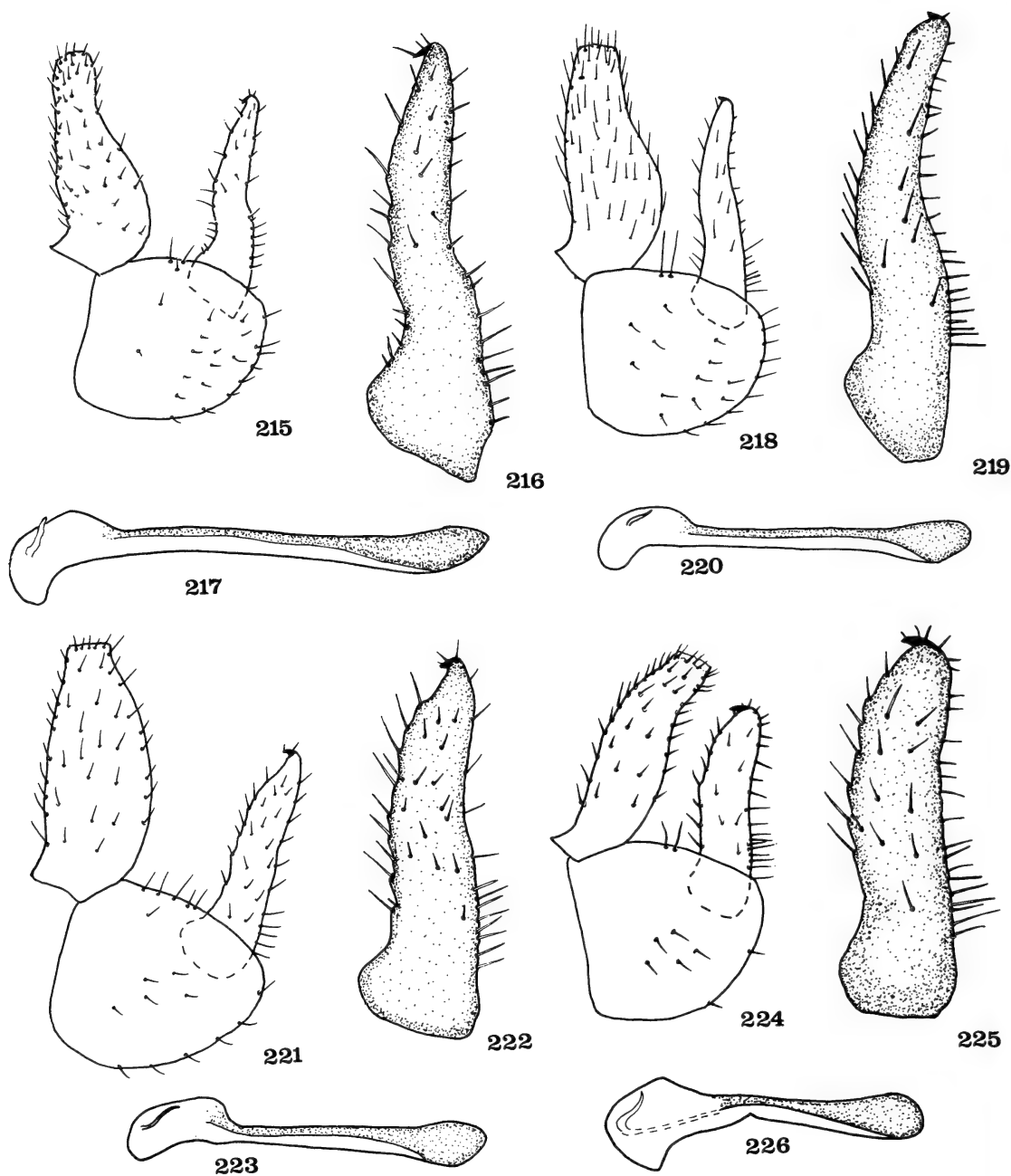
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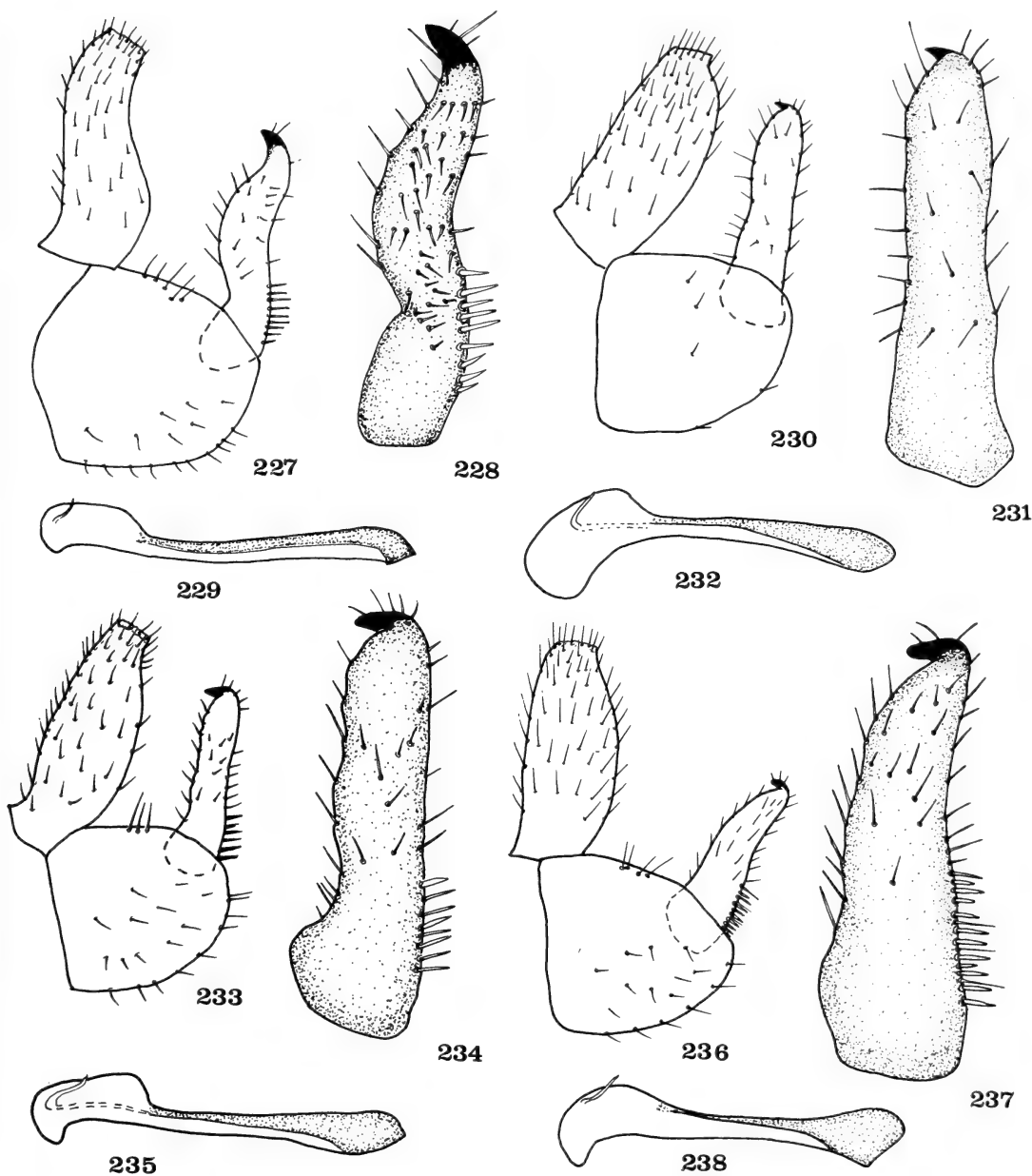
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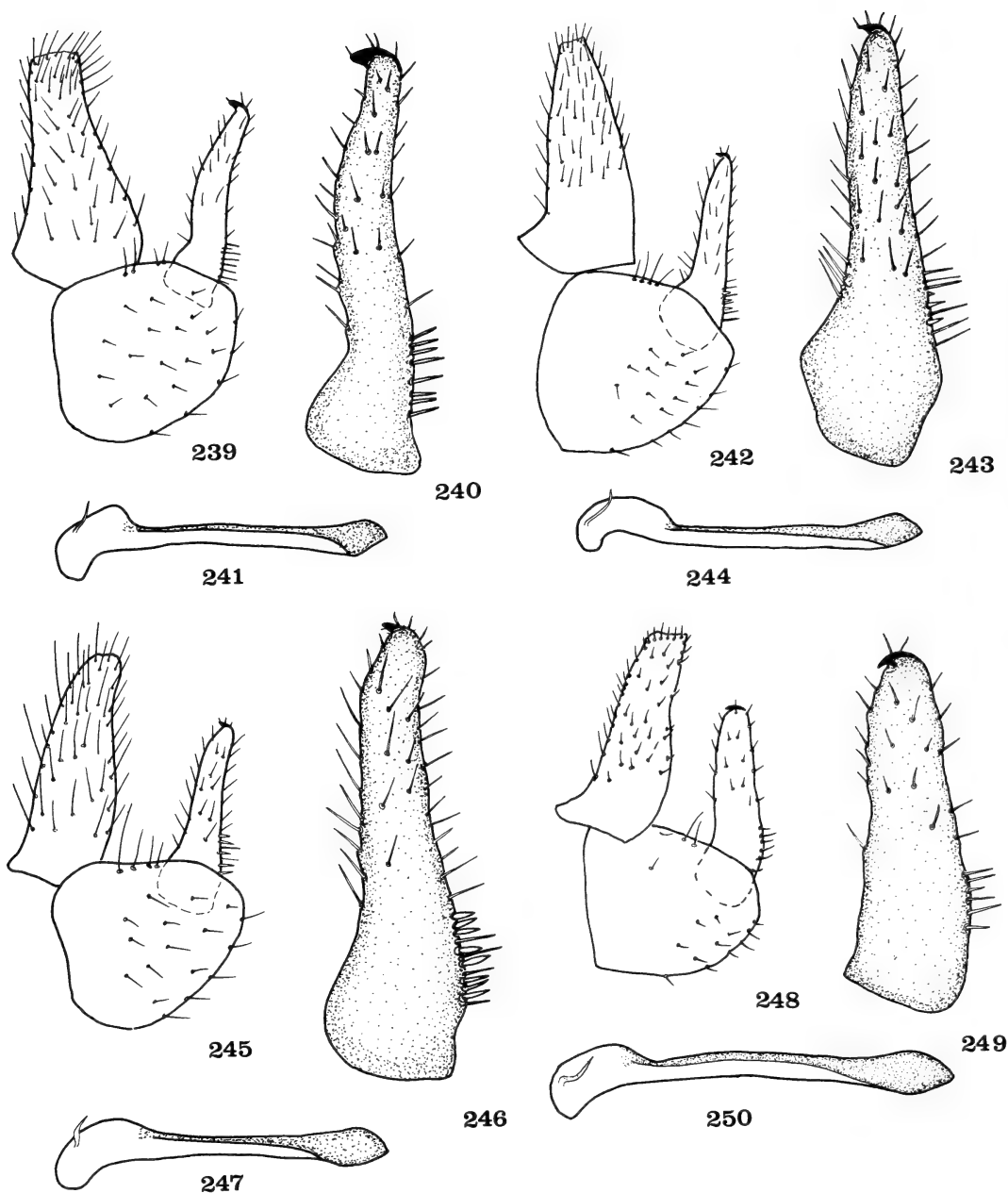
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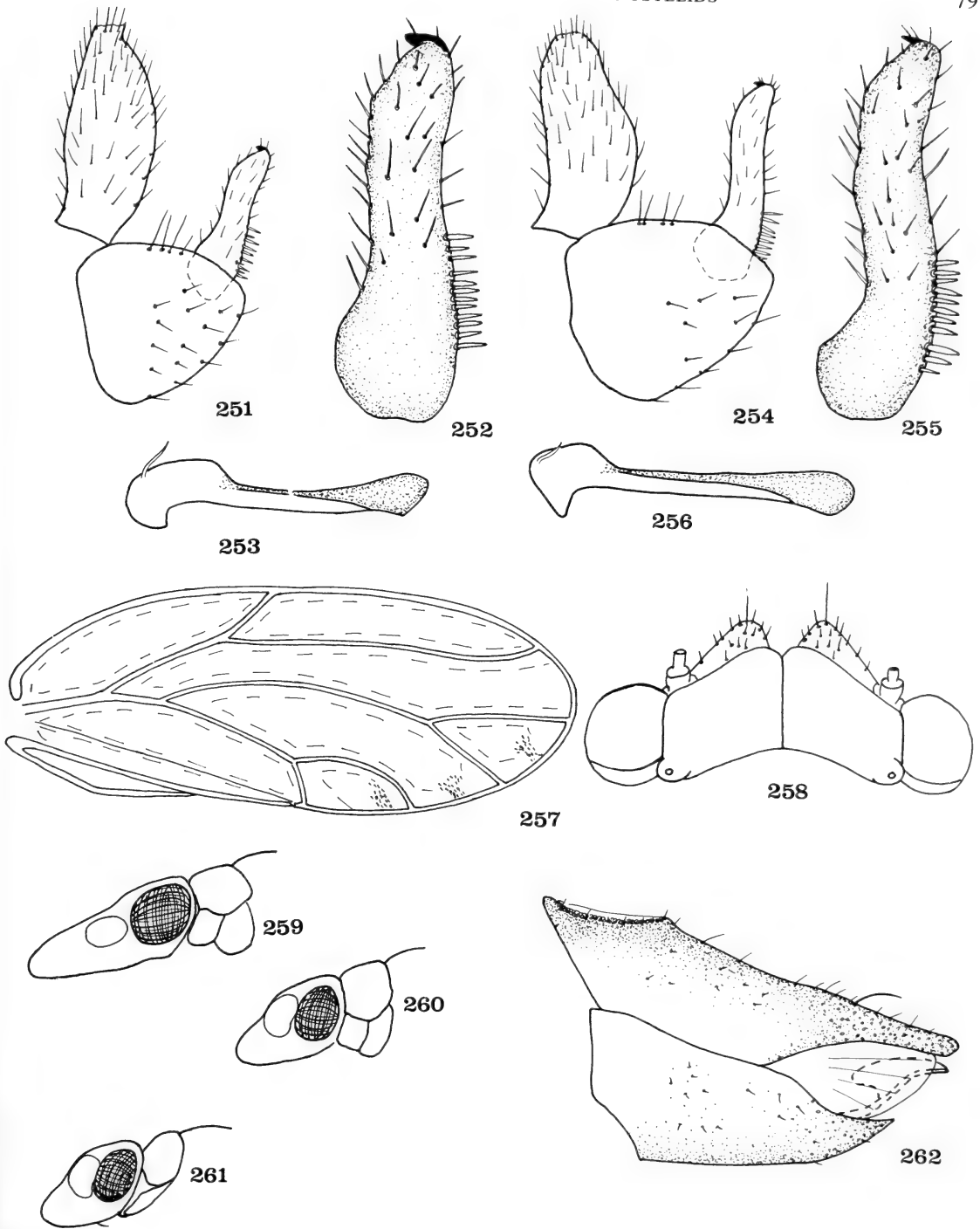
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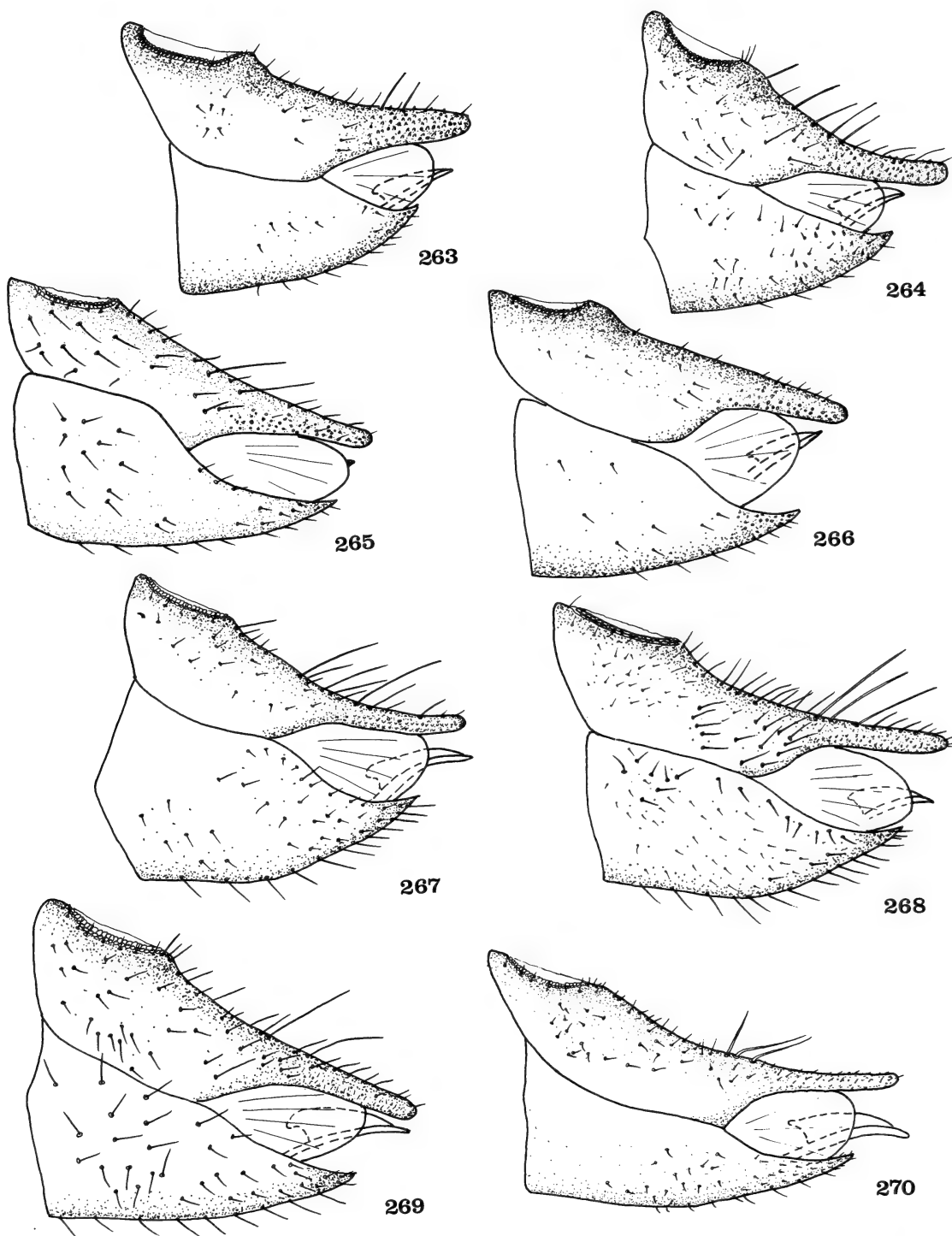
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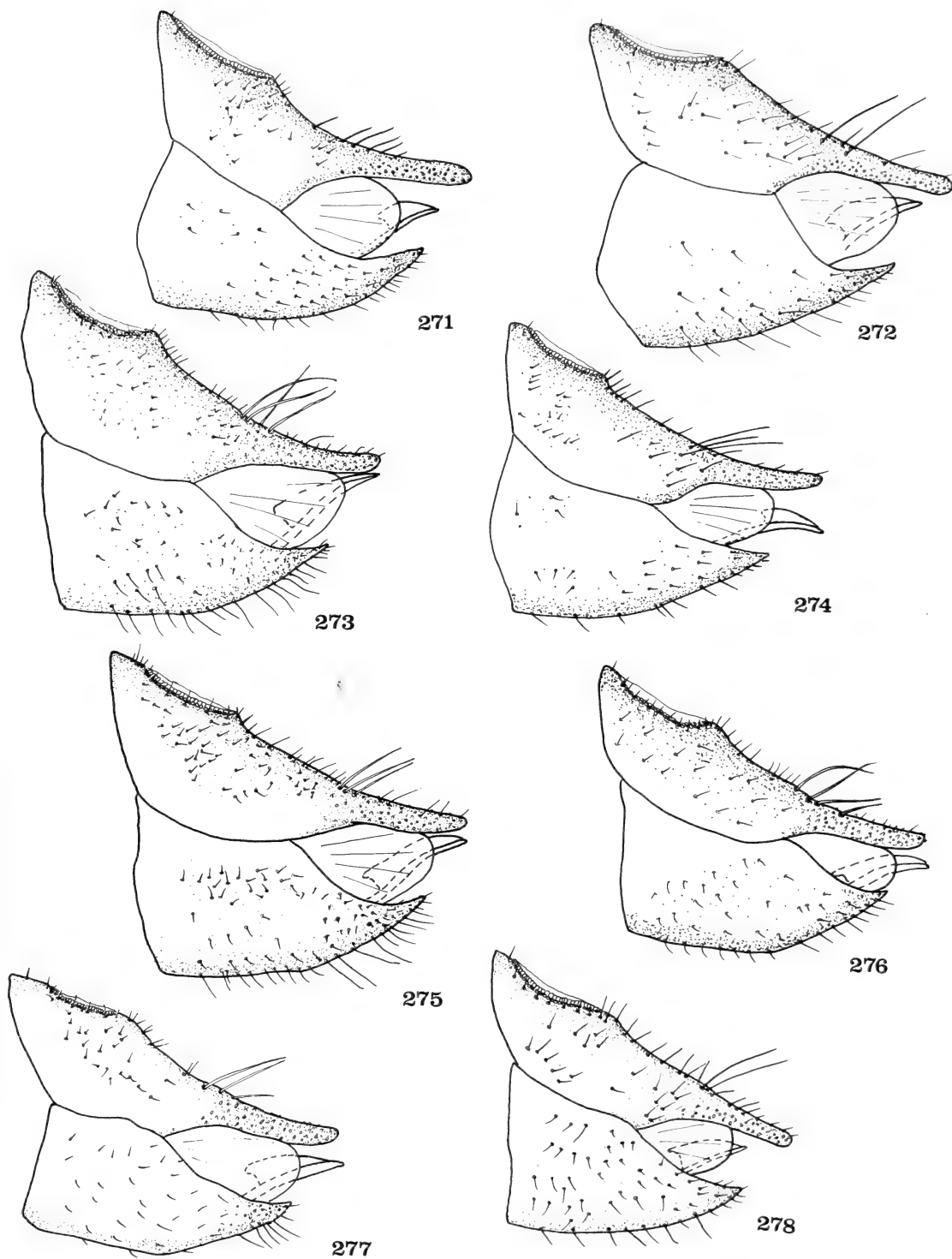
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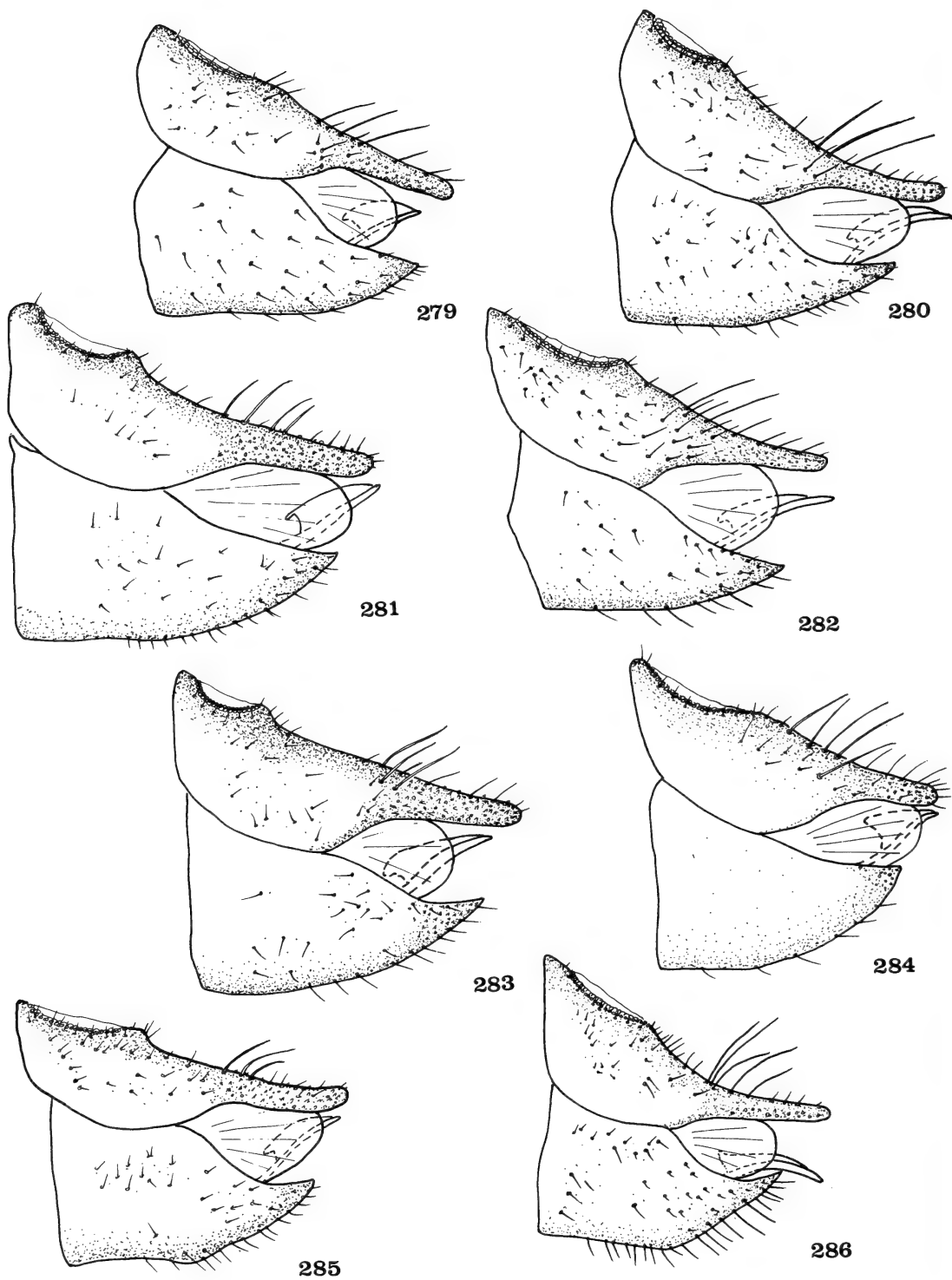
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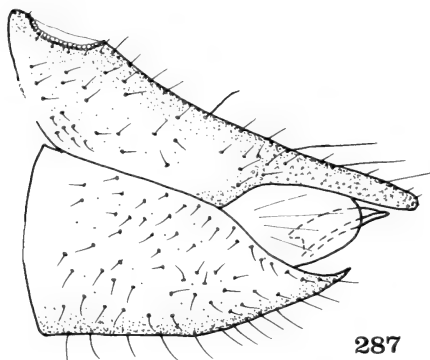
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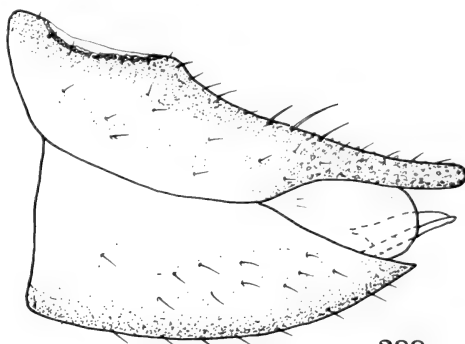
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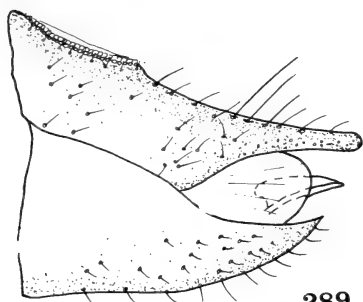
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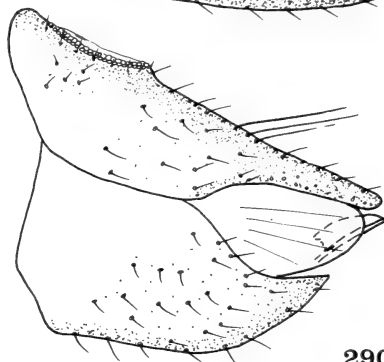
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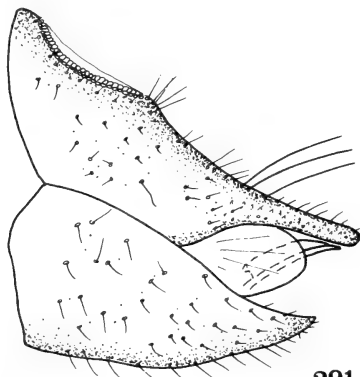
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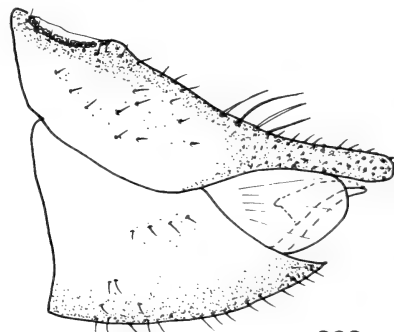
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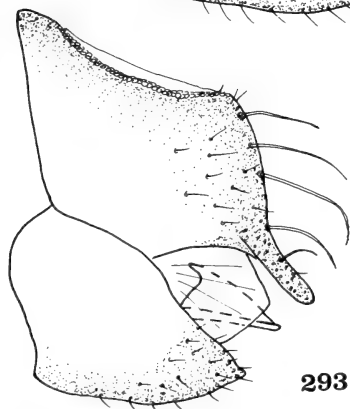
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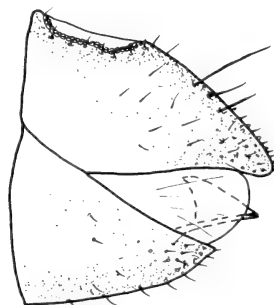
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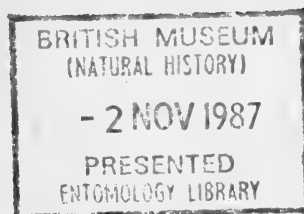
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**A review of the Malvales-feeding psyllid
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D. Hollis



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A review of the Malvales-feeding psyllid family Carsidaridae (Homoptera)

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SW7 5BD



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Synopsis

The psyllid family Carsidaridae is characterised and considered to be the sister-group of the Homotomidae. It is shown that the monophyletic group, Carsidaridae + Homotomidae, is trophically linked to hostplants of the dicotyledonous superorder Malviflorae. Eight genera, *Epicarsa*, *Carsidara*, *Tyora*, *Tenaphalara*, *Protyora*, *Paracarsidara*, *Mesohomotoma* and a new genus *Allocarsidara*, are recognised in the family; they are diagnosed and a key is given for their identification. It is considered that *Mastigimas* is not a carsidarid and is provisionally placed in the Calophyidae. *Stroglylocephala* is confirmed as a good genus, with *Synaphalara* **syn. n.** as its junior synonym; it is removed from the family and placed, again provisionally, in the Calophyidae. Species within each genus are reviewed; six new species are described, eight new combinations are proposed and one subspecies is given species status. Hostplants of all recognised species are restricted to the families Sterculiaceae, Bombacaceae and Malvaceae, within the order Malvales. A phylogeny for the Carsidaridae is proposed which suggests that the group followed the radiation of the Malvales prior to the separation of the African and South American continents.

Introduction

The Psylloidea or jumping plant-lice comprise a group of small, phloem-feeding sternorrhynchous Homoptera with a world-wide distribution. Individual psyllid species show a high degree of hostplant specificity, particularly during the larval stages, and related species tend to develop on related species or groups of dicotyledonous angiosperms. At present about 2000 species are described but collecting in the last 20 years in the tropics and southern temperate regions indicates that the group is probably four times as large.

Until recently the higher classification of the group was based on the Holarctic fauna but this has proved inadequate for the inclusion of the rest of the world's species. With such a

large proportion of undescribed taxa it is useful to be able to classify them into biologically meaningful groups and use their high degree of hostplant specificity to predict probable host ranges.

White & Hodkinson (1985) attempted, with a good measure of success, to produce such a classification based largely on larval morphology and cladistic methodology. It is now desirable to test this classification using adult morphology. White & Hodkinson's Clade 2 (Family Triozidae) has been reviewed (Hollis, 1984) and shown to be a good monophyletic group. They suggested that the sister-group of the Triozidae is the family Carsidaridae (Clade 4) and I attempt here to test the monophyly of this group, discuss its sister-group relationships, diagnose the included genera and review the known species.

Carsidarids are restricted in their hostplant preferences to the families Sterculiaceae, Bombacaceae and Malvaceae within the Malvales, although three recently described Chinese species (Yang & Li, 1985*b*) have been recorded (possibly as vagrants) from other, unrelated families. Each genus that is recognised here is usually restricted to only one of the above families or to the Malvaceae and Bombacaceae together, but the *Mesohomotoma* species-complex seems able to develop on Malvaceae and Sterculiaceae. Several of the host species are of some economic importance, e.g. cocoa (*Theobroma cacao*), durian (*Durio zibethinus*), silk cotton (*Bombax buonopozense* and *B. ceiba*) and kapok (*Ceiba pentandra*); several strong-fibre sources (*Abutilon indicum*, *Firmiana simplex* and *Hibiscus tiliaceus*); and *Heritiera littoralis*, the wood of which is used in boat-building. Psyllid damage to these plants is not well-documented but high infestations of *Tenaphalara acutipennis* on *Bombax ceiba* cause wilting and premature leaf-fall (Sohi & Sandu, 1978), and *Mesohomotoma tessmanni* can cause desiccation and death of terminal shoots of *Theobroma cacao* in Africa (Wood, 1980).

Life history information is available for *Tenaphalara acutipennis* on *Bombax ceiba* (= *malabaricum*) in Bihar, India (Rahman, 1932), *Mesohomotoma tessmanni* on cocoa in Ghana (Kaufmann, 1973) and *Protyora sterculiae* on *Brachychiton populneum* in Australia (Froggatt, 1923; Morgan, 1984). In these species the larvae are free-living, tend to feed in aggregations and produce copious amounts of wax during their later stages. Larvae are known for a further nine species and all are morphologically similar, suggesting similar lifestyles.

Little is known of the natural enemies of the group. Cotterell (1927) recorded larvae of the syrphid flies *Baccha sinuata*, *B. praeusta* and *B. picta* feeding on colonies of larvae of *Mesohomotoma tessmanni* in West Africa, and Leston & Gibbs (1968) recorded the mirid bug *Deraeocoris crigi* preying on the same psyllid. Bhatia & Shaffi (1933) recorded the larvae of the syrphid flies *Baccha pulchraformis* and *Sphaerophoria javana* feeding on larvae of *Tenaphalara acutipennis* on *Bombax ceiba* in India.

Materials, methods and terminology

Most of the material studied is deposited in the British Museum (Natural History) (BMNH), with supplementary specimens from the Bernice P. Bishop Museum, Honolulu (BPBM), and the National Museum of Natural History, Washington (USNM). Type material is deposited in BMNH; BPBM; USNM; Australian National Insect Collection, Canberra (ANIC); Beijing Agricultural University Insect Collection, China (BAUIC); Forest Research Institute, Dehra Dun, India (FRI); Institut Royal des Sciences Naturelles de Belgique, Bruxelles (IRSNB); Museum für Naturkunde der Humboldt-Universität, Berlin (MNHU); National Collection of Insects, Plant Protection Research Institute, Pretoria (NCI); Naturhistorisches Museum, Vienna (NM); Osaka Museum of Natural History, Japan (OMNH); and Természettudományi Múzeum, Budapest (TM).

All measurements are quoted in millimetres and were taken from slide-mounted specimens. Reference points, from which measurements were taken of the various structures, are given in Hollis (1976; 1984).

Apart from the head illustrations, all figures were drawn from slide-mounted specimens; setosity of heads and forewings is not shown. The inner surface of the right paramere is shown, apart from Figs 47, 49, 52, 55, which were drawn in anterior view. Dorsal and ventral views of the

caudal areas of larvae are illustrated. Structural terminology follows that of Vondráček (1957) and Hollis (1976; 1984).

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CARSIDARIDAE Crawford

Prionocnemidae Scott, 1882: 466. [Invalid name.]

Prionocnemina Scott; Löw, 1886: 160.

Prionocneminae Scott; Froggatt, 1901: 286; Kieffer, 1906: 387.

Carsidarinae Crawford, 1911: 481, in part; 1914: 53, in part; 1919: 155, in part; Wu, 1935: 126; Tuthill, 1950: 52, in part; Brues *et al.*, 1954: 156; Heslop-Harrison, 1958: 578, in part; Braza & Calilung, 1981: 352, in part; Yang, 1984: 168, in part; Brown, 1985: 245.

Tenaphalarini Heslop-Harrison, 1958: 578, in part.

Carsidaridae Crawford; Klimaszewski, 1964: 12, fig. 7, in part; Bekker-Migdisova, 1973: 98, in part; Morgan, 1984: 118, in part; Brown, 1985: 244, in part.

DIAGNOSIS. Antennal sockets enlarged and swollen ventromedially and vertex often deeply divided by median suture giving the head a 'cleft' appearance in dorsal view; antennal flagellum with a single subapical rhinarium present on flagellomere 3 in addition to those on flagellomeres 2, 4, 6 and 7. False (non-tracheate) *rs-m* crossvein present in forewing or *Rs* and M_{1+2} in broad contact; costal break absent (present in *Protyora*); radular spinules sharply defined into narrow triangular patches, often absent from cu_1 , a patch of spinules present in cell *c+sc*. Ventral sense organs of hind femur in a basal position and not arranged linearly; hind tibia with a well-developed basal spine; hind basitarsus with a single apical spur. Male subgenital plate with a pair of secondary lobes anterior to parameres, these lobes appearing to be sclerotised projections arising from the membrane lining the inner surface of the subgenital plate.

Final instar larva elongate, clearly divided into head, thorax and abdomen; antennae elongate, 10-segmented; legs elongate, tarsal arolium sessile and fan-shaped or globular; wing buds small, without humeral lobes; thoracic sclerites poorly differentiated; caudal region of abdomen differentiated and bearing convoluted pore bands, anus terminal or terminodorsal; body setae mainly simple but scattered, small, lanceolate setae present on caudal sclerites marginally and submarginally.

HOSTPLANTS. Malvales (Sterculiaceae, Bombacaceae and Malvaceae).

DISCUSSION. An historical account of the early conceptual development of the family is given by Hollis (1976: 4). Heslop-Harrison (1958) considered the group as a tribe within the Ciriacreminae including the genera *Carsidara*, *Mastigimas*, *Mesohomotoma*, *Protyora*, *Epicara* and *Diceraopsylla*, and separated these genera from another of his Ciriacreminae tribes, the Tenaphalarini, containing *Tenaphalara*, *Stroglycephala*, *Togepsylla* and *Tyora*. Hollis (1984) referred *Diceraopsylla* to the Aphalaridae and White & Hodkinson (1985) placed *Togepsylla* in the same family.

Vondráček (1957: fig. 52) considered the Carsidaridae as the sister-group of the Triozidae, differentiating both families from the Ciriacreminae which he placed in the Psyllidae. Klimaszewski (1964: fig. 7) agreed with these concepts. Bekker-Migdisova (1973) recognised seven subfamilies in her interpretation of the Carsidaridae which amounted to a very large assemblage of many quite unrelated genera.

White & Hodkinson (1985: 242, 273) considerably restricted their concept of the family to the genera *Mastigimas*, *Tenaphalara*, *Protyora*, *Mesohomotoma*, *Paracarsidara*, *Carsidara* and tentatively *Aconopsylla*, *Carsidaroida*, *Nesiope* and *Tyora*. They placed *Epicara* in the Phacopteronidae, considering the anastomosis of *Rs* and M_{1+2} as the important synapomorphy. For reasons given below (p. 90) *Mastigimas* is now removed from the family and placed provisionally in the Calophyidae; *Carsidaroida* and *Nesiope* are synonyms of *Tyora*, and *Aconopsylla* is referred to the Aphalaridae, close to *Haplaphalara* and *Diclidoph-*

lebia which are also Malvales-feeding. Brown (1985) removed *Epicarsa* from the Phacopterionidae to the Carsidaridae, using the presence of supplementary lobes on the male subgenital plate as a more reliable synapomorphy. This character, and the presence of a non-tracheate *rs-m* crossvein in the forewing, are the best pair of autapomorphies for the Carsidaridae. A crossvein of this type is unique to the family. The supplementary male subgenital lobes occur elsewhere in the Psylloidea only in the Oriental *Cedrela*-feeding genus *Trisetipsylla* Yang & Li (1985a) which, in other characters, is a member of the family Psyllidae. The male hypovalves and tracheate *rs-m* crossvein of *Ciriacremum* (Psyllidae) are not homologues (Hollis, 1976).

White & Hodkinson diagnosed the family on the following larval characters: anal pore field arranged in convoluted bands; dorsal surface of abdomen lacking distinct sclerites; body margin and dorsal surface without setae or derivable structures. To this character-set can be added that poorly defined lanceolate setae are present marginally and submarginally on the caudal plate. These same authors postulated that the Carsidaridae formed the sister-group of the Trioziidae, citing the absence of a costal break and the presence of fewer than six apical spurs on the hind tibia as adult synapomorphies, but they suggested no larval synapomorphies. These two adult characters are probably unreliable as they are subject to homoplasy within the Psylloidea generally.

Brown (1985) considered the family to be the sister-group of the *Ficus*-feeding Homotomidae, citing the 'cleft head', weakly sclerotised A_2 vein and the absence of A_1 in the hindwing and a patch of spinules in $c+sc$ of the forewing as synapomorphies. This is a more acceptable hypothesis, although A_1 is present in the hindwing of many homotomids. Further synapomorphies for the two groups are the development of a pair of strong epiphyses on the metapostnotum, and the position and arrangement of the ventral sense organs of the hind femur. The former structures appear to function as 'tethering posts' for both pairs of wings when these are in the resting position. Similar but probably non-homologous structures occur on the metascutellum in some trioziids. The basal position of the ventral sense organs on the hind femur is considered to be primitive (Hollis, 1984: 11) but in homotomids and carsidarids they are not linearly arranged and the proximal sensillum is placed at right-angles to the other two.

White & Hodkinson (1985: 274) provisionally placed *Mastigimas* in the Carsidaridae, presumably on larval characters, and Brown (1985) did not dispute this. However the only carsidarid adult character which *Mastigimas* displays is the enlarged antennal sockets giving the head a cleft appearance. The apical rhinarium is absent from the third flagellomere, there is no *rs-m* crossvein, no metapostnotal epiphyses, the forewing radular areas are diffuse, one of the metafemoral sensoria is medial, the basal spine of the hind tibia is absent, there are two apical spurs on the hind basitarsus and there are no supplementary lobes on the male subgenital plate. Furthermore the larva lacks lanceolate setae marginally and submarginally on the caudal plate, and the host plants of all known species are species of *Cedrela* (Meliaceae). For these reasons *Mastigimas* is excluded from the Carsidaridae but this raises the difficult question of where to place the genus in White & Hodkinson's system. A sister-group relationship cannot be argued for it with either the Carsidaridae or the Carsidaridae + Homotomidae and I provisionally place *Mastigimas* near *Apsylla* which White & Hodkinson tentatively referred to the Calophyidae.

The Carsidaridae, as it is recognised here, contains eight genera: *Epicarsa*, *Carsidara*, *Tyora*, *Tenaphalara*, *Prottyora*, *Paracarsidara*, *Mesohomotoma* and a new genus, *Allocarsidara*. These are diagnosed below and a key is given for their identification. Nominal species within each genus are discussed in general terms. Insufficient material and incomplete hostplant data prevent thorough revision to species level at present.

Key to genera

- 1 Forewing widening to a broadly rounded apex, *Rs* and M_{1+2} in broad contact, cu_1 almost as high as wide and with a value of less than 1.3 (Fig. 18); antennal flagellum thickened, 1st flagellar segment short and broad, not more than four times longer than its greatest width (Fig. 2)

EPICARSA (p. 91)
- Forewing narrowing to a subacute apex, *Rs* and M_{1+2} not in contact but connected by a false *rs-m* crossvein (Figs 19–39), cu_1 much wider than high and with a value of at least 1.6; antennal flagellum elongate, 1st flagellar segment long and narrow, not less than nine times longer than its greatest width 2
- 2 Pterostigma absent and $M+Cu$ about half as long as *Cu* stem (Figs 36–39); male proctiger bipartite, with a large, anvil-shaped median posterior lobe in addition to lateral lobes (Fig. 77)

MESOHOMOTOMA(p. 106)
- Pterostigma present (Figs 19–31, 35), if absent (Figs 32–34) then $M+Cu$ almost twice as long as *Cu* stem; male proctiger unipartite, without median posterior lobe, with or without lateral lobes (Figs 40, 43, 46, 51, 57, 66, 75) 3

- 3 *M+Cu* very short, about one-third as long as *R* stem and less than half as long as *Cu* stem (Fig. 19); female terminalia, in profile, rounded dorsally, ventrolateral margins of proctiger with dense fringes of setae, lateral palps ridged (Fig. 79) **CARSIDARA** (p. 92)
- *M+Cu* longer, about as long as or longer than *R* stem and *Cu* stem (Figs 20–35); female terminalia, in profile conical, proctiger sometimes with a median lobe posterior to anal pore, lateral palps not ridged (Figs 80–89) 4
- 4 False *r₁-rs* crossvein present in addition to *rs-m* crossvein (Figs 20–26) 5
- *r₁-rs* crossvein absent (Figs 27–35) 6
- 5 Radular area present in *cu_{1a}*, claval suture reaching hind margin of forewing very close to apex of *Cu_{1b}* (Figs 20–24) **TYORA** (p. 95)
- Radular area absent from *cu_{1a}*, claval suture reaching hind margin of forewing distant from apex of *Cu_{1b}* (Figs 25, 26) **TENAPHALARA** (p. 97)
- 6 Costal break present (Figs 27, 28); apical segment of aedeagus with strongly expanded apex (Fig. 45); male proctiger without lateral expansions (Fig. 43) **PROTYORA** (p. 94)
- Costal break absent (Figs 29–35); apical segment of aedeagus not or only weakly expanded apically (Figs 59, 62, 65, 68, 71, 74, 76); male proctiger with lateral expansions (Figs 57, 60, 63, 66, 69, 72, 75) 7
- 7 Anteorbital lobes strongly developed into ‘horn-like’ structures, lateral and posterior margins of vertex rounded (Figs 11, 12); apex of ductus ejaculatorius enclosed within apical lobes of aedeagus (Figs 59, 62, 65, 68, 71, 74) **ALLOCARSIDARA** (p. 100)
- Anteorbital lobes very weak; lateral margins of vertex sharply raised, posterior margin angular (Figs 14, 15); apex of ductus ejaculatorius extended beyond apical lobes of aedeagus (Fig. 76) **PARACARSIDARA** (p. 104)

EPICARSA Crawford

Epicara Crawford, 1911: 488; 1914: 56; Hodkinson & White, 1981: 496; White & Hodkinson, 1985: 241, 243, 272; Brown, 1985: 258. Type-species: *Epicara corniculata* Crawford, by original designation and monotypy.

Epicias Caldwell, 1941: 419. [Misspelling.]

Epicrasa Caldwell, 1941: 421. [Misspelling.]

DESCRIPTION (only slide-mounted material available for study). Integument of head and thorax very sparsely short setose. Head (Fig. 2) with disc of vertex convex, discal foveae shallow, frontal margin not clearly defined but deeply incised by median suture, lateral and hind margins rounded, lateral ocelli placed anteriorly on vertex, anterolateral tubercles well-developed; antennal sockets enlarged, flagellum short, 2·12 times longer than head width, 1st flagellar segment short and swollen, less than 4 times longer than its greatest width; genal cones present as a pair of small tubercles on either side of mid ventral suture immediately above clypeus; ultimate rostral segment relatively short, less than 3 times longer than its greatest width.

Forewing (Fig. 18) obovate, rounded apically, 2·3–2·6 times longer than wide; costal break absent, pterostigma short and triangular, *r₁-rs* crossvein absent, *Rs* arched downwards towards and in broad contact with *M₁₊₂*, *M+Cu* stem slightly longer than *Cu* stem and about as long as *M* stem, *cu₁* cell value about 1·0 and without radular spinules, apex of claval suture distant from apex of *Cu_{1b}*; hindwing with grouped costal setae; apical spurs of hind tibia arranged 1+2(or 3)+1.

♂ proctiger unipartite with strongly expanded lateral lobes, each with a secondary inwardly pointing subapical lobe.

♀ proctiger abruptly stepped in apical fifth, apical part with a dense covering of short, spine-like setae, apex upcurved (see Ferris, 1928: figs 3a–c); subgenital plate short, similarly stepped apically.

LARVA. Unknown.

HOSTPLANT GENUS. *Ceiba* (Bombacaceae).

COMMENTS. Although possessing most of the features of the family character-suite, the forewing shape, venation and pattern of *Epicara* (Fig. 18) is quite unlike other carsidarids. These forewing characters are similar to many homotomids, the carsidarid sister-group, but the similarity may be convergent. Further characters shared between *Epicara* and homotomids are the thickened antennal flagellum (Fig. 2) and the bifid lateral lobes of the male proctiger. For these reasons I consider *Epicara* to be the sister-group of the rest of the carsidarids.

Brown (1985: 259, fig. 98H) described the endtube of the ductus ejaculatorius of this genus as being

barbed and, from this, suggested a close relationship to the other South American carsidarid genus *Paracarsidara* (and therefore, by inference, to *Mesohomotoma*). I have not examined this character in the holotype of *E. corniculata* and the only other males known (Ferris, 1928) are whole-mount, permanent, microslide preparations in which the structure is obscured.

Included species

Epicarsa corniculata Crawford

(Figs 2, 18)

Epicarsa corniculata Crawford, 1911: 488; 1914: 56; 1925b: 56; Ferris, 1928: 244; Costa Lima, 1942: 103; Tuthill, 1950: 58; Hodkinson & White, 1981: 496; Brown, 1985: 260. Holotype ♂, BRAZIL (USNM) [not examined].

Epiciasa corniculata Caldwell, 1941: 419. [Misspelling.]

Epicrasa corniculata Caldwell, 1941: 421. [Misspelling.]

RECORDED DISTRIBUTION. Brazil (Crawford, 1911), Panama (Brown, 1985), Mexico (Ferris, 1928). All other authors refer to these records.

MATERIAL EXAMINED

2 ♂, 2 ♀, **Panama, Mexico** (slide-mounted material of Ferris (1928) and Brown (1985)).

HOSTPLANT. *Ceiba* sp.

CARSIDARA Walker

Carsidara Walker, 1869: 329; Scott, 1882: 466; Kieffer, 1906: 387, in part; Enderlein, 1910: 138; Aulmann, 1913: 79, in part; Heslop-Harrison, 1960: 241; Hodkinson, 1983: 344; 1986: 303. Type-species: *Carsidara marginalis* Walker, by monotypy.

Dynopsylla Crawford, 1915: 264, in part.

Thysanogyna Crawford, 1919: 157; Wu, 1935: 126. Type-species: *Dynopsylla minor* Crawford, by original designation and monotypy. [Synonymised by Crawford, 1924: 619.]

Eustigmia Enderlein, 1921: 119. Type-species: *Dynopsylla minor* Crawford, by original designation and monotypy. [Junior objective synonym of *Thysanogyna*.]

DESCRIPTION. Integument of head and thorax with dense, moderately long setae. Head (Figs 3, 4) with disc of vertex concave, discal foveae clearly marked as broad longitudinal oblique grooves, frontal margin sharply defined and deeply incised by median suture, lateral and hind margins prominent but obtuse, lateral ocelli placed posteriorly on vertex, anterolateral tubercles well-developed; antennal sockets enlarged, flagellum 2.4–2.8 times longer than head width, 1st flagellomere elongate, more than 9 times longer than its greatest width; genae swollen ventrally on either side of median suture anterior to clypeus, each with a prominent papilla, weak lateroventral tubercles also present; apical rostral segment elongate, more than four times longer than its greatest width.

Forewing (Fig. 19) ovate with subacute apex, 2.4–2.9 times longer than wide; costal break absent, pterostigma present, r_1 -rs crossvein absent, $M+Cu$ stem very short, about one-third as long as R stem and 0.4–0.5 times as long as Cu stem, cu_1 cell value 2.33–3.75, without radular spinules, apex of claval suture adjacent to apex of Cu_{1b} ; hindwing with grouped costal setae; apical spurs of hind tibia arranged 1+3+1.

♂ proctiger (Fig. 40) unipartite, lateral lobes moderately developed; apex of basal segment of aedeagus expanded and strongly sclerotised, apical segment of aedeagus highly modified (Fig. 42), endtube of ductus ejaculatorius heavily sclerotised.

♀ proctiger (Fig. 79) without posterodorsal lobe, apex strongly sclerotised and upcurved, posterolateral margins with fringes of long setae; lateral palps heavily ridged.

LARVA. Unknown.

HOST PLANT GENERA. *Brachychiton* and *Firmiana* (Sterculiaceae).

COMMENTS. *Carsidara* is distinct from the rest of the family and is diagnosed by its broader forewing, the very short $M+Cu$ stem in the forewing, the modified distal segment of the male aedeagus and the structure of the female genital apparatus. I regard the genus as the sister-group of the rest of the family less *Epicarsa*.

Included species

Carsidara marginalis Walker

Carsidara marginalis Walker, 1869: 329; Scott, 1882: 467; Aulmann, 1913: 79; Crawford, 1924: 619; Heslop-Harrison, 1960: 237 *et seq.*; Hodkinson, 1983: 344; 1986: 304. Holotype ♀, 'CELEBES' (BMNH) [examined].

Dynopsylla minor Crawford, 1915: 263. Holotype ♂, PHILIPPINES (?USNM) [not examined]. [Synonymised by Crawford, 1924: 619.]

Thysanogyna minor (Crawford) Crawford, 1919: 158; Miyatake, 1981: 37.

Eustigmia minor (Crawford) Enderlein, 1921: 119.

RECORDED DISTRIBUTION. Philippines, Sulawesi, Tanimbar Is.

MATERIAL EXAMINED

1 ♂, 9 ♀, from **Malaya, Hong Kong** (on *Brachychiton rupestris*), **Sabah, Sulawesi**.

HOSTPLANT. *Brachychiton rupestris*.

COMMENTS. Crawford (1919) records slight differences in colour and forewing vein proportions in the Tanimbar Is specimens. The Malayan and Hong Kong material studied differs from Walker's holotype in that there is no brown pattern on the forewing around the radular spinules or apices of M_{1+2} , M_{3+4} or Cu_{1a} , and M_{1+2} is less strongly arched basally. The significance of these differences is not apparent and further material with accurate hostplant data is required.

Carsidara limbata (Enderlein)

Thysanogyna limbata Enderlein, 1926: 397; Wu, 1935: 126. Syntypes ♂, ♀, CHINA [not examined].

Carsidara limbata (Enderlein) Hodkinson, 1986: 303.

RECORDED DISTRIBUTION. Only known from the type-series, 'China. Tsingtau'.

HOSTPLANT. Unknown.

COMMENTS. Enderlein separated this species from *marginalis* (as *minor*) on its larger size (forewing length 5.25–5.75 mm), the brown pattern on the posterior margin of the forewing and some slight venational differences.

Carsidara shikokuensis (Miyatake) **comb. n., stat. n.**

Thysanogyna minor shikokuensis Miyatake, 1981: 37. Holotype ♂, JAPAN: Kashima Is (OMNH) [not examined].

RECORDED DISTRIBUTION. Only known from the type series.

HOSTPLANTS. *Firmiana simplex*; also found on *Mallotus japonicus*.

COMMENTS. Miyatake's figures (1981: figs 1A–G), especially of the male genitalia, show this taxon to be quite distinct from *marginalis* and it is given full species status. However, there is a strong possibility that it is synonymous with *limbata*.

Carsidara africana **sp. n.**

(Figs 3, 4, 19, 40–42, 79)

Body ochraceous to mid brown, mesopraescutum with a dark brown anteromedial patch and mesonotum dark brown laterally; antennal flagellomeres 1–6 dark brown apically, 7–8 entirely dark brown; forewing hyaline, with brown pattern as in Fig. 19.

Head and dorsum of thorax with moderately long, dense setae. Antennal flagellum 2.7–3.0 times longer than head width, 1st flagellomere more than nine times longer than its median width and with 6–12 rhinaria in apical third, 2nd flagellomere with 10–20 rhinaria in apical half, 3rd flagellomere with 5–7 rhinaria in apical quarter, 4th flagellomere with 2 subapical rhinaria and up to 5 more in apical third, 5th flagellomere with 0 or 1 subapical rhinarium and up to 3 more in apical third, 6th flagellomere with 2 subapical rhinaria, 7th flagellomere with a single subapical rhinarium; ultimate rostral segment more than 6 times longer than wide.

Forewing (Fig. 19) 2.47–2.63 times longer than wide and about 1.6 times longer than hindwing;

pterostigma short, less than half as long as R_1 ; $M+Cu$ stem about 0.33 times as long as R stem and about 0.5 times as long as Cu stem, cu_1 value 2.33–3.39.

♂ genitalia as in Figs 40–42; proctiger about 1.4 times longer than wide; paramere with an outwardly directed, rounded, posteroapical lobe in addition to posteroapical hook.

♀ terminalia as in Fig. 79.

Measurements (3 ♂, 1 ♀). Head width, ♂ 0.95–1.01, ♀ 1.01; length of antennal flagellum, ♂ 2.68–2.82, ♀ 2.81; length of ultimate rostral segment, ♂ 0.43–0.45, ♀ 0.48; length of forewing, ♂ 4.98–5.71, ♀ 5.54; length of hind tibia, ♂ 1.08–1.24, ♀ 1.14.

LARVA AND HOSTPLANT. Unknown.

Holotype ♂, **Angola**: 7 mls W. Gabela, 16–18.iii.1972, at light (*D. Hollis*) (BMNH); dry-mounted.

Paratypes. **Ghana**: 2 ♀, Northern Region, Garu, 250 m, N 10.51–W 0.12, 27.x.1971, Nr 510 soil trap (*Endrody-Younga*). **Nigeria**: 1 ♂, Ile-Ife, 26.ii.1970 (*J. T. Medler*). **Uganda**: 2 ♂, Kampala, 7.iii.1933 (*H. Hargreaves*). (BMNH; TM); slide- and dry-mounted.

COMMENTS. The male and female genitalia of this species are remarkably similar to *marginalis* but the two species differ markedly in antennal structure, that of *marginalis* being simple, with a single subapical rhinarium on flagellomeres 2, 3, 4, 6, and 7.

Carsidara sp.

Carsidara sp. Heslop-Harrison, 1960: 241.

A single damaged female of this genus is in BMNH from Madagascar, Nosy Komba. The antennae are missing and I am unable to identify the specimen.

PROTYORA Kieffer

Protyora Kieffer, 1906: 390; Aulmann, 1913: 29; Tuthill & Taylor, 1955: 250; White & Hodkinson, 1985: 242, 273. Type-species: *Tyora sterculiae* Froggatt, by monotypy.

Neocarsidara Crawford, 1925a: 32; 1927: 31; Tuthill & Taylor, 1955: 250. Type-species: *Tyora sterculiae* Froggatt, by monotypy. [Junior objective synonym.]

DESCRIPTION. Integument of head and thorax almost glabrose. Head (Figs 5, 6) with disc of vertex weakly concave, foveae present as broad longitudinal grooves, hind and lateral margins of vertex rounded, anterior margin not sharply defined but deeply incised by median suture, lateral ocelli placed posteriorly on vertex, anterolateral tubercles absent or present; antennal sockets enlarged, antennal flagellum about 3.7 times longer than head width, 1st flagellomere more than 10 times longer than wide; genal cones present as a pair of small tubercles on either side of mid ventral suture immediately anterior to clypeus, lateroventral tubercles absent; ultimate rostral segment 2.7–3.8 times longer than wide.

Forewing (Figs 27, 28) narrow-elongate, 2.9–3.3 times longer than wide, with a narrowly rounded or subacute apex, costal break present, pterostigma present, r_1 - rs crossvein absent, $M+Cu$ stem almost as long as or longer than R stem and Cu stem, cu_1 cell value greater than 2.0, radular spinules absent or very weakly present in cu_1 , apex of claval suture distant from apex of Cu_{1b} ; hindwing with grouped costal setae; apical spurs of hind tibia arranged 1+2+1.

♂ proctiger (Fig. 43) unipartite, flask-shaped, with poorly developed lateral lobes; apex of aedeagus (Fig. 45) with enlarged apical lobes, endtube of ductus ejaculatorius simple.

♀ proctiger (Fig. 80) short, conical in profile, without posterodorsal lobe.

LARVA. Caudal plate as in Fig. 90.

HOSTPLANT GENUS. *Brachychiton* (Sterculiaceae).

COMMENTS. The two main features of this genus are the presence of a costal break in the forewing and the swollen and modified apex of the aedeagus. The costal break is either primitively retained or secondarily derived and, as I consider its absence as a groundplan feature of the family, I postulate the latter. The form of the aedeagal apex is also regarded as a derived character but not strictly homologous with that of *Carsidara*. Apart from the simple, flask-shaped male proctiger, *Protyora* shares other characters, such as the narrow-elongate forewing and long $M+Cu$ stem vein, with the *Tyora* + *Tenaphalara* group and the *Allocarsidara* + *Paracarsidara* + *Mesohomotoma* group; it is regarded as the sister-group of these genera.

Until now *Protyora* was thought to be a purely Australian genus, unique in this respect within the Carsidaridae. The discovery of another species in Indonesia shows the genus to have a closer relationship with the Oriental fauna and to be less isolated.

Tuthill & Taylor (1955) regarded *Neocarsidara* as a nomen nudum but under Article 12(b)(5) of *The International Code of Zoological Nomenclature* (3rd edn) the name is valid. However, it has the same type-species as *Protyora* and is therefore an objective synonym.

Included species

Protyora sterculiae (Froggatt)

(Figs 27, 90)

Tyora sterculiae Froggatt, 1901: 289; 1923: 84. Syntypes ♂, ♀ and larvae, AUSTRALIA (NSW on *Brachychiton populneum*, QLD on *Brachychiton* sp.) (ANIC) [not examined].

Protyora sterculiae (Froggatt) Kieffer, 1906: 390; Aulmann, 1913: 29; Tuthill & Taylor, 1955: 250; Morgan, 1984: 37, 68.

Neocarsidara sterculiae (Froggatt) Crawford, 1925a: 32; 1927: 31. [Invalid combination, Tuthill & Taylor, 1955: 250.]

HOSTPLANT. *Brachychiton populneum* (Sterculiaceae).

RECORDED DISTRIBUTION. Australia (QLD, NSW, SA).

MATERIAL EXAMINED

Adults and larvae from **Australia** (QLD, ACT).

COMMENTS. Brief accounts of the life-history of this species are given by Froggatt (1923) and Morgan (1984). It differs from the new species described below in that the anterolateral tubercles of the vertex are poorly developed, the 1st flagellomere is relatively shorter (10 times longer than its greatest width), the forewing (Fig. 27) is relatively broader (2.9–3.0 times longer than wide) and has a more rounded apex, the pterostigma is broader, *M+Cu* stem is relatively longer, the male parameres and aedeagal apex are of a different shape and the female proctiger is more obtuse apically (Morgan, 1984).

Protyora wilsoni sp. n.

(Figs 5, 6, 28, 43–45, 80)

DESCRIPTION. Similar to *sterculiae*. Differs in that antennal flagellum is 3.28–3.75 times longer than head width and has alternating ochraceous and dark brown rings, 1st flagellomere longer and narrower, about 15 times longer than its greatest width; anterolateral tubercles of vertex more strongly developed.

Forewing (Fig. 28) 3.14–3.25 times longer than wide and with a more acute apex, pterostigma narrow, *M+Cu* stem almost as long as *R* stem and *Cu* stem, *cu*₁ cell value 2.35–3.0.

♂ paramere and aedeagal apex as in Figs 44, 45.

♀ proctiger (Fig. 80) more acute and slightly upcurved apically.

Measurements (2 ♂, 2 ♀). Maximum width of head, ♂ 0.70–0.71, ♀ 0.74–0.77; length of antennal flagellum, ♂ 2.51–2.65, ♀ 2.52–2.64; length of ultimate rostral segment, ♂ 0.20, ♀ 0.21; length of forewing, ♂ 3.67–3.70, ♀ 4.24–4.28; length of hind tibia, ♂ 0.62, ♀ 0.66.

LARVA AND HOSTPLANT. Unknown.

Holotype ♂, **Indonesia**: Sulawesi Utara, Dumoga Bone NP, Hogs Back camp, 21.vi.1985, swept (*M. R. Wilson*) (BMNH); dry-mounted.

Paratypes. 2 ♂, 2 ♀, same data as holotype; 1 ♀, 6.vi.1985; 1 ♂, 1 ♀, 25.x.1985 (*M. Asche*); 1 ♀, 13.xi.–4.xii.1985, malaise trap (BMNH); 2 ♂, x.1985 (*Bosmans & Van Stalle*) (IRSNB). Slide- and dry-mounted.

TYORA Walker

Tyora Walker, 1869: 330; Scott, 1882: 470; Kieffer, 1906: 387, in part; Enderlein, 1910: 138; Crawford, 1911: 483; 1920: 355; 1925a: 32; 1927: 30; Aulmann, 1913: 80, in part; Hodkinson, 1983: 366; Yang & Li, 1985b: 206, 215. Type-species: *Tyora congrua* Walker, by monotypy.

Nesiope Kirkaldy, 1908: 389; Aulmann, 1913: 81; Crawford, 1919: 160; Tuthill, 1964: 356; Hodkinson, 1983: 354; 1986: 319. Type-species: *Nesiope ornata* Kirkaldy, by monotypy. [Synonymised with *Carsidaroida* by Crawford, 1919: 161, and with *Tyora* by Crawford, 1920: 355.]

Carsidaroida Crawford, 1917: 164. Type-species: *Carsidaroida heterocephala* Crawford, by original designation and monotypy. [Synonymised by Crawford, 1920: 355.]

DESCRIPTION. Integument of head and thorax very sparsely short haired. Head (Figs 7, 8) with disc of vertex flat or weakly concave, foveae present as shallow circular depressions or furrows, lateral and hind margins of vertex sharply raised, anterior margin sharply defined but weakly incised by median suture, lateral ocellae placed posteriorly on vertex, anterolateral tubercles weak or well-developed; antennal sockets enlarged, flagellum 2.3–3.0 times longer than head width, first flagellomere more than 12 times longer than its median width; genal cones present as a pair of small tubercles on either side of mid ventral line immediately anterior to clypeus, weak lateroventral tubercles also present; occiput with a small tubercle on each side below eye; ultimate rostral segment long, more than 4 times longer than wide.

Forewing (Figs 20–24) narrow, about 3 times longer than wide, with subacute apex, costal break absent, pterostigma present, r_1 - rs crossvein present in addition to rs - m crossvein, $M+Cu$ stem as long as R stem and Cu stem, cu_1 cell value 1.6 or greater and with radular spinules, apex of claval suture adjacent to apex of Cu_{1b} ; hindwing usually with ungrouped costal setae (grouped in *T. striata*); apical spurs of hind tibia arranged 1+2+2.

♂ Proctiger (Figs 46, 48) unipartite, with well-developed lateral lobes; apex of aedeagus narrow, endtube of ductus ejaculatorius slightly swollen (Fig. 50).

♀ proctiger (Figs 81, 82) triangular in profile, usually without posterodorsal lobe (present in *T. striata*).

LARVA. Undescribed (see Miyatake (1965)).

HOSTPLANT GENERA. *Sterculia* and *Heritiera* (Sterculiaceae).

COMMENTS. Like *Tenaphalara* an additional; r_1 - rs crossvein is present in *Tyora* and the apical spurs of the hind tibia are arranged 1+2+2. I regard these two characters as autapomorphies for the two genera. *Tyora* differs from *Tenaphalara* in the raised margins of the vertex, swollen antennal sockets, presence of radular spinules in cell cu_1 , close proximity of the apex of the claval suture to the apex of Cu_{1b} , ungrouped costal setae of the hindwing, well-developed lateral lobes of the male proctiger and the absence of a specialised posterodorsal lobe on the female proctiger, although a simple conical lobe is present in *T. striata*. The two genera are taken to be the sister-group of the *Allocarsidara* + *Paracarsidara* + *Mesohomotoma* complex.

Included species

Further collecting with accurate hostplant data is required before the validity of all the taxa presently included in the genus can be adequately assessed. *T. ornata* and *T. striata* appear to be good species but it is possible that the remainder represents a single species with highly variable forewing pattern.

Tyora buxtoni Crawford

(Figs 22, 46, 47)

Tyora buxtoni Crawford, 1927: 30; 1928: 34; Hodkinson, 1983: 366; Yang & Li, 1985b: 207, 215. Syntypes, 2 ♂, SAMOA [1 ♂ labelled 'Type' in BMNH examined].

HOSTPLANT. Unknown.

RECORDED DISTRIBUTION. Samoa.

MATERIAL EXAMINED

Further specimens with a similar forewing pattern have been examined from various islands in the Solomons group.

COMMENTS. Although the forewing pattern (Fig. 22) is consistently different from *T. congrua*, the male and female genitalia of *buxtoni* are morphologically identical to that species.

Tyora congrua Walker

(Figs 7, 8, 20, 21, 50, 81)

Tyora congrua Walker, 1869: 330; Scott, 1882: 471; Aulmann, 1913: 80; Crawford, 1920: 355; Hodkinson, 1983: 366; Yang & Li, 1985b: 206, 215. Holotype ♂, MYSOL Is [not 'India: Mysore' as in Yang & Li (1985b)] (BMNH) [examined].

Carsidaroida heterocephala Crawford, 1917: 165; 1920: 355. Syntypes ♂, ♀, PHILIPPINES (USNM) [examined]. [Synonymised by Crawford, 1920: 355.]

Nesiopie heterocephala var. *intermedia* Crawford, 1919: 161. Syntypes ♂, ♀ TANIMBAR IS, JAVA [not examined].

HOSTPLANTS. *Sterculia ureolata*, *S. lanceolata* (Sterculiaceae) (BMNH).

RECORDED DISTRIBUTION. Indonesia (Java, Tanimbar Is, Mysol Is), Philippines.

MATERIAL EXAMINED

Adults from **Hong Kong** (on *Sterculia lanceolata*), **West Malaysia** (Pahang), **Indonesia** (Java on *S. ureolata*, Sulawesi Utara, Mysol Is), **Philippines**, **Papua New Guinea** (Morobe Prov., New Britain on *Sterculia* sp.).

COMMENTS. Walker's holotype male is very badly damaged and only part of the thorax, one hind leg, the abdomen and shreds of wing remain. A microslide preparation of the genitalia, made in 1964, has discoloured badly but sufficient remains visible to say that the genitalia are morphologically very similar to those of all other specimens examined. The forewing pattern (Figs 20, 21) varies in extent and intensity in the material studied, being most dense and extensive in specimens from Sulawesi Utara and least so in the Malayan and Hong Kong material.

Tyora guandongana Yang & Li

Tyora guandongana Yang & Li, 1985b: 212, 215. Holotype ♂, CHINA: Guandong (BAUIC) [not examined].

HOSTPLANT. Unknown.

COMMENTS. From the original figures it appears that this species is not distinct from *T. congrua* but, as there is a dark patch of pattern bordering *R+M+Cu* stem and *R* stem (Yang & Li, 1985b: fig. 8b) which is not present in all material of *congrua* examined, formal synonymy is not established.

Tyora ornata (Kirkaldy)

(Figs 23, 48, 49)

Nesiopie ornata Kirkaldy, 1908: 390; Aulmann, 1913: 81; Laing, 1922: 555; Tuthill, 1964: 357; Miyatake: 1965: 175; Hodkinson, 1983: 354. Syntypes (? sex), FIJI [not examined].

Tyora ornata (Kirkaldy) Crawford, 1920: 355; Caldwell, 1942a: 21; Tuthill, 1951: 273; Yang & Li, 1985b: 206, 215.

HOSTPLANT. *Heritiera littoralis* (Sterculiaceae).

RECORDED DISTRIBUTION. Ryukyu Is, N. Borneo, S. Marinana Is, Caroline Is, Fiji.

MATERIAL EXAMINED

Adults from **Fiji** (on *H. littoralis*), **East Malaysia** (Sabah).

COMMENTS. This species is distinguished from *T. congrua* by the shape of the male paramere and the female proctiger and the pattern of the forewing (Figs 23, 49).

Tyora striata (Crawford)

(Figs 24, 82)

Tenaphalara striata Crawford, 1919: 166; Miyatake, 1972: 13; Hodkinson, 1983: 360. Syntypes ♂, ♀, SINGAPORE (USNM) [examined].

Tyora striata (Crawford) Yang & Li, 1985b: 206, 215.

Tenaphalara sulcata Crawford, 1919: 167, nomen nudum [? in error for *striata*].

HOSTPLANT. Unknown.

RECORDED DISTRIBUTION. Singapore.

MATERIAL EXAMINED

Adults from **Singapore** and **Brunei**.

COMMENTS. The presence of a simple posterodorsal lobe on the female proctiger and the grouped costal setae of the hindwing distinguish this species from its congeners.

TENAPHALARA Kuwayama

Tenaphalara Kuwayama, 1908: 155; Aulmann, 1913: 75; Crawford, 1919: 163, in part; Mathur, 1975: 165; Hodkinson, 1983: 360, in part; 1986: 331, in part; Yang, 1984: 181; White & Hodkinson, 1985: 240, 242;

Yang & Li, 1985b: 207, 214. Type-species: *Tenaphalara acutipennis* Kuwayama, by original designation and monotypy.

DESCRIPTION. Integument of head and thorax almost glabrous. Head (Figs 9, 10) with disc of vertex convex, foveae present as very shallow circular depressions, hind and lateral margins of vertex rounded, frontal margin not sharply defined but deeply incised by median suture, lateral ocellae placed posteriorly on vertex, anterolateral tubercles absent; antennal sockets slightly enlarged, antennal flagellum about 2.3 times longer than head width, 1st flagellomere more than 8 times longer than its median width; genal tubercles minute, lateroventral tubercles absent; ultimate rostral segment about 5 times longer than wide.

Forewing (Figs 25, 26) elongate narrow, with subacute apex, about 3.5 times longer than wide, costal break absent, pterostigma present, r_1 - rs crossvein present in addition to rs - m crossvein, $M+Cu$ slightly longer than R stem and slightly longer than Cu stem, cu_1 cell value greater than 2.0 and without radular spinules, apex of claval suture distant from apex of Cu_{1b} ; hindwing with grouped costal setae; apical spurs of hind tibia arranged 1+2+2.

♂ proctiger (Figs 51, 54) unipartite, with or without lateral lobes; apex of aedeagus narrow, endtube of ductus ejaculatorius simple (Figs 53, 56).

♀ proctiger (Fig. 83) with a well-developed dorsal lobe posterior to anal pore.

LARVA. For descriptions of the larval stages of *T. acutipennis* see Rahman (1932) and Yang (1984). The 5th instar larva of *T. pseudonervosa* is described by Mathur (1973). Wax pore ring arrangement of *T. camerunus* as in Fig. 91.

HOSTPLANT GENERA. *Bombax*, *Ceiba* (Bombacaceae).

COMMENTS. *Tenaphalara* is considered here to be the sister-group of *Tyora* but has many more derived features than the latter. The margins of the vertex are rounded, the antennal sockets are much less swollen, the genae bear minute mid ventral tubercles, radular spines are absent from cell cu_1 of the forewing and the apex of the claval suture is distant from the apex of Cu_{1b} , the costal setae of the hindwing are grouped and the female proctiger bears a well-developed and specialised posterodorsal lobe.

The genus has been the most widely misunderstood of the family. The confusion stemming from Crawford's (1919) misinterpretation when he included species belonging to other carsidarid genera, e.g. *malayensis* (Crawford) (see p. 101), *juliana* (Crawford) (see p. 102) and *striata* (Crawford) (see p. 97) and some non-carsidarid species, e.g. *fascipennis* (Crawford) (see p. 99) and *triozipennis* (Crawford) (see p. 100). Yang & Li (1985b) were aware of this confusion and removed several species from *Tenaphalara* but recombined only *fascipennis* and *striata* with more appropriate genera.

Both included and excluded species are listed below with all the latter recombined.

Included species

Tenaphalara acutipennis Kuwayama

(Figs 25, 51–53)

Tenaphalara acutipennis Kuwayama, 1908: 156; Crawford, 1911: 491; 1919: 164 [possible misidentification]; Aulmann, 1913: 75; Ramakrishna Ayyar, 1924: 623; Boselli, 1930: 188; Kuwayama, 1931: 125; Mathur, 1935: 63; 1975: 166; Beeson, 1941: 595; Heslop-Harrison, 1951: 26; Sohi & Sandhu, 1978: 237; Hodkinson, 1983: 360; 1986: 331; Yang, 1984: 181; Yang & Li, 1985b: 206, 214. Syntypes ♂, ♀, JAPAN, ? TAIWAN [not examined].

Tenaphalara elongata Crawford, 1912: 432; 1919: 164; Rahman, 1932: 367; Yang & Li, 1985b: 206, 214.

Syntypes ♂, ♀, INDIA: on 'Silk cotton' [not examined]. [Synonymised by Crawford, 1919: 164.]

Ctenophalara elongata Bhatia & Shaffi, 1933: 545 *et seq.* [Misspelling.].

HOSTPLANTS. *Bombax ceiba* (Bombacaceae). Crawford's (1919) record on *Sterculia foetida* and BMNH specimens on *Hibiscus esculentus* are regarded as doubtful host records.

RECORDED DISTRIBUTION. India, Taiwan, Japan, Philippines.

MATERIAL EXAMINED

Adults and larvae from **Pakistan** (on *Bombax ceiba*), **India**, **Bangladesh** (on *Bombax ceiba* and *Hibiscus esculentus*).

COMMENTS. Most authors have accepted Crawford's synonymy of *elongata* with *acutipennis* but Yang & Li (1985b), basing their judgement on a combination of Kuwayama's (1908) and Mathur's (1975) figures,

regarded *acutipennis* and *elongata* as separate species. Evidence from the BMNH collections suggests that only one species is involved.

***Tenaphalara camerunus* (Aulmann) comb. n.**

(Figs 9, 10, 26, 54–56, 83)

Carsidara camerunus Aulmann, 1912b: 21; 1913: 79. Holotype ♂, CAMEROON (MNHU).

HOSTPLANTS. *Ceiba pentandra*, *Bombax buonopozense* and *B. sessile* (Bombacaceae).

MATERIAL EXAMINED

Adults and larvae from Senegal, Sierra Leone, Ghana, Nigeria, Cameroon, Zaire and Zanzibar.

COMMENTS. Although the holotype has not been examined there are several samples of this species in BMNH collections; a study of these and the original description has shown that *camerunus* should be placed in *Tenaphalara*. The species is similar to *acutipennis* but differs in that the apical segment of the aedeagus is relatively shorter (Fig. 56), the male proctiger has weakly developed lateral lobes (Fig. 54), the paramere is of a different shape (Fig. 55) and the female subgenital plate is trilobed apically (Fig. 83).

***Tenaphalara gossampini* Yang & Li**

Tenaphalara gossampini Yang & Li, 1985b: 208. Holotype ♂, CHINA: on *Bombax ceiba* [as '*Gossampinus malabarica*'] (BAUIC) [not examined].

COMMENTS. From the original figures (Yang & Li, 1985b) of this and the following three species, it is likely that all four are synonyms of *T. acutipennis* but formal synonymy is not established without reference to type material. No larvae were mentioned in the original data for all these species and it is improbable that *Aphanamixis grandifolia* (Meliaceae), *Mangifera indica* (Anacardiaceae) or *Dimocarpus longana* (Sapindaceae) are true hostplants.

***Tenaphalara aphanmixis* Yang & Li**

Tenaphalara aphanmixis Yang & Li, 1985b: 209. Holotype ♂, CHINA: on *Aphanamixis grandifolia* (BAUIC) [not examined].

***Tenaphalara dimocarpi* Yang & Li**

Tenaphalara dimocarpi Yang & Li, 1985b: 211. Holotype ♀, CHINA: on *Dimocarpus longana* (BAUIC) [not examined].

***Tenaphalara mangiferae* Yang & Li**

Tenaphalara mangifera Yang & Li, 1985b: 210. Holotype ♂, CHINA: on *Mangifera indica* (BAUIC) [not examined].

***Tenaphalara pseudonervosa* (Mathur) comb. n.**

Nesiopse pseudonervosa Mathur, 1973: 71; Hodkinson, 1986: 319. Holotype ♂, INDIA: on *Bombax ceiba* (FRI) [not examined].

Tyora pseudonervosa (Mathur) Yang & Li, 1985b: 207, 215.

HOST PLANT. *Bombax ceiba* (Bombacaceae).

COMMENTS. This new combination is made on the basis of the original description; the type material has not been examined. Mathur's figures show a convex vertex, absence of radular spinules from cell *cu*₁ and the characteristically specialised posterodorsal lobe of the female proctiger.

Excluded species

***Strogilocephala fascipennis* Crawford**

Strogilocephala fascipennis Crawford, 1917: 167; Yang & Li, 1985b: 207, 215. Syntypes ♂, ♀, PHILIPPINES (USNM) [examined, all damaged].

Tenaphalara fascipennis (Crawford) Crawford, 1919: 165; Miyatake, 1971: 68.

COMMENTS. Crawford (1919) placed this Philippines species in *Tenaphalara* and synonymised *Strogylocephala* with *Tenaphalara*. This synonymy was accepted by some subsequent authors (Yu, 1957; Miyayake, 1971) but Yang & Li (1985b) disputed this and regarded *Strogylocephala* as a valid genus. Yu (1957) described *Tenaphalara confluens* from Taiwan, on *Palaquium formosanum* (Sapotaceae), and suggested it was closely related to *fascipennis*. Yang & Li (1985b) placed *confluens* also in *Strogylocephala*. Chung Tu Yang (1984) redescribed *confluens* and placed it in a new genus *Synaphalara*, in the subfamily Carsidarinae.

After examining Crawford's type material of *fascipennis* and recently collected specimens of the same species from Sulawesi Utara, on *Palaquium* sp. I agree with Yang & Li (1985b) that *Strogylocephala* is a distinct genus. It is quite unrelated to the Carsidaridae and I tentatively place it in the Calophyidae. Furthermore I consider *Synaphalara* to be a junior synonym of *Strogylocephala* (**syn. n.**) and it is likely that *confluens* and *fascipennis* are synonyms.

Placing *Strogylocephala* in the Calophyidae conflicts with published data on the larva of the type-species which was clearly described as a trioqid larva by Chung Tu Yang (1984: 186). However, when the Sulawesi specimens of *fascipennis* were collected, larvae, which agree generally with Yang's description, and a single adult trioqid were taken at the same time. This trioqid is an undescribed *Trioza* species belonging to the Sapotaceae/Ebenaceae-feeding *obsoleta*-group (Hollis, 1984). It is therefore possible that the larvae described by Yang belong to this trioqid species and are not associated with the *Strogylocephala* species.

***Strogylocephala confluens* (Yu)**

Tenaphalara confluens Yu, 1956: 46. Holotype ♂, TAIWAN [not examined].

Synaphalara confluens (Yu) Chung Tu Yang, 1984: 185.

Strogylocephala confluens (Yu) Yang & Li, 1985b: 207, 216.

COMMENTS. See under *S. fascipennis*.

***Allocarsidara juliana* (Crawford) comb. n.; see below (p. 102)**

***Allocarsidara malayensis* (Crawford) comb. n.; see below (p. 101)**

***Tenaphalara sulcata* Crawford, 1919: 167, nomen nudum; see above (p. 97)**

***Trioza triozipennis* (Crawford) comb. n.**

Tenaphalara triozipennis Crawford, 1919: 167. Holotype ?sex [abdomen missing], SINGAPORE (USNM) [examined].

? *Tenaphalara triozipennis* Crawford; Yang & Li, 1985b: 207, 216.

COMMENTS. The holotype is clearly a trioqid, probably related to *T. umalii* (Miyatake) (see below), and is provisionally placed in *Trioza*.

***Trioza umalii* (Miyatake) comb. n.**

Tenaphalara umalii Miyatake, 1972: 11. Holotype ♀, PHILIPPINES (OMNH) [not examined].

? *Tenaphalara umalii* Miyatake; Yang & Li, 1985b: 207, 216.

COMMENTS. From Miyatake's description there can be little doubt that this species is a trioqid and is probably related to *triozipennis* (Crawford). The above new combination is therefore proposed.

ALLOCARSIDARA gen. n.

[*Tenaphalara* Crawford, 1919: 163, in part; Hodkinson, 1983: 360, in part; 1986: 331, in part; Braza & Calilung, 1981: 354. Misinterpretations.]

Type-species: *Tenaphalara malayensis* Crawford.

DESCRIPTION. Integument of head and thorax almost glabrous. Head (Figs 11, 12) with disc of vertex flat or convex, foveae weak, lateral and hind margins of vertex rounded, anterior margin not clearly defined and weakly incised by median suture, lateral ocelli placed medially on vertex, anterolateral tubercles well-developed; antennal sockets enlarged, flagellum 3.26–4.60 times longer than head width, first flagellomere more than 10 times longer than wide; genal cones present as a pair of very weakly developed

humps on either side of mid ventral line anterior to clypeus, genae also with an outer pair of lateroventral tubercles, occiput with a small tubercle on each side below eye; ultimate rostral segment more than four times longer than wide.

Forewing (Figs 29–34) narrow elongate, at least 2.8 times longer than wide and with an acute apex, costal break absent, pterostigma present or absent, r_1 -rs crossvein absent, $M+Cu$ stem as long as R stem and more than 1.7 times longer than Cu stem, cu_1 cell value 1.76–2.70 and without radular spinules, apex of claval suture distant from apex of Cu_{1b} ; hindwing with grouped costal setae; apical spurs of hind tibia arranged 1+2+1.

♂ proctiger (Figs 57, 60, 63, 66, 69, 72) unipartite, with well-developed lateral lobes that are sometimes subdivided posteroapically, each inner lateral surface with a patch of differentiated spinules; apical segment of aedeagus straight or flexed, aedeagus narrow apically with endtube of ductus ejaculatorius contained within apical lobes (Figs 59, 62, 65, 68, 71, 74).

♀ proctiger (Figs 84–87) with or without a posterodorsal lobe.

LARVA. As in Fig. 92.

HOSTPLANT GENUS. *Durio* (Bombacaceae).

COMMENTS. The sister-group relationship of *Allocarsidara* needs to be resolved. The genus is placed with *Paracarsidara* and *Mesohomotoma* on the structure of the male proctiger but it differs from these genera in having rounded lateral and posterior margins of the vertex, well-developed anterolateral tubercles on the vertex, a simple endtube of the ductus ejaculatorius that is enclosed within the apical lobes of the aedeagus, and a patch of differentiated spinules on each inner lateral surface of the male proctiger. Some species have lost the pterostigma of the forewing as in *Mesohomotoma*.

Yang & Li (1985b) expressed doubt that *Tenaphalara malayensis* Crawford and *T. juliana* Crawford belonged in *Tenaphalara* and this suggestion is confirmed here. Crawford (1919) misinterpreted the genus *Tenaphalara* (see above, p. 98) and his two species *malayensis* and *juliana* are transferred to *Allocarsidara*. A further four new species are described below.

Relationships among these species are not at all clear. A variety of characters appear in the group, e.g. the absence of a pterostigma, an apically bifid male paramere, a flexed distal aedeagal segment, the male proctiger with subdivided lateral lobes, and the female proctiger with a posterodorsal lobe. However, the distribution of these characters within the genus (Table 1) gives little indication of sister-group relationships. The six species included in *Allocarsidara* may be separated from one another by using the character-matrix in Table 1; three are known to develop on *Durio zibethinus*.

Table 1 *Allocarsidara* spp., character-matrix. Primitive condition given in parenthesis.

Character	pterostigma absent (present)	Posterodorsal lobe of ♀ proctiger present (absent)	♂ paramere truncate (conical)	apical segment of aedeagus flexed (straight)	lateral lobes of ♂ proctiger divided (entire)
Species					
<i>malayensis</i>	(–)	+	+	(–)	(–)
<i>iriana</i>	(–)	?	+	(–)	(–)
<i>incognita</i>	(–)	+	(–)	+	+
<i>bakeri</i>	+	?	(–)	+	(–)
<i>juliana</i>	+	(–)	+	+	(–)
<i>elongata</i>	+	+	(–)	(–)	(–)

Included species

Allocarsidara malayensis (Crawford) comb. n.

(Figs 29, 57–59, 86)

Tenaphalara malayensis Crawford, 1919: 165; 1928: 425; Laing, 1930: 39; Hodkinson, 1983: 360; 1986: 332.

Syntypes, ♂, ♀, MALAYA (Penang) and SINGAPORE (USNM) [examined].

? *Tenaphalara malayensis* Crawford; Yang & Li, 1985b: 207, 216.

HOSTPLANT. *Durio zibethinus* (Bombacaceae).

RECORDED DISTRIBUTION. Malaya, Singapore, Sumatra, Java. Braza & Calilung (1981: 355) record this species from the Philippines but their material represents a different species (see below).

MATERIAL EXAMINED

Adults and larvae from **Thailand, Malaya and Java.**

Allocarsidara juliana (Crawford) **comb. n.**

(Figs 32, 66–68, 84)

Tenaphalara juliana Crawford, 1919: 166; 1920: 355; Hodkinson, 1983: 360. Holotype, ? sex, 'BORNEO' (BPBM) [examined].

? *Tenaphalara juliana* Crawford; Yang & Li, 1985b: 207, 216.

LARVA AND HOSTPLANT. Unknown.

RECORDED DISTRIBUTION. Sabah.

MATERIAL EXAMINED

Holotype (? sex), **East Malaysia**: Sabah ('Sandakan, Borneo, Baker'); 1 ♂, 1 ♀, same data as holotype (USNM); 2 ♀, Sarawak, offshore gas platform (BMNH).

COMMENTS. This species was described from a single specimen of unknown sex (the posterior half of the abdomen was missing) from Sabah, and further recorded (Crawford, 1920) from a single female from an unstated locality but presumably in Borneo as the paper in which the specimen is recorded deals with Bornean psyllids. Apart from the holotype (BPBM), there are three specimens bearing the type data, under the name '*Tenaphalara juliana*', in USNM; two complete males and a complete female. The two males are not conspecific with each other and neither can be positively identified as the same species as the damaged holotype of *juliana*. The complete female agrees well with the holotype and I assume that it is the specimen Crawford recorded as *Tenaphalara juliana* in 1920. As well as the locality label this specimen also bears a handwritten label '11734', which is almost certainly an original Baker collection label. One of the two males also bears a similar label and, therefore, I regard it as having been collected by Baker at the same time as the female. I consider this specimen to be the male of *Allocarsidara juliana* and figure it below (Figs 32, 66–68). The other male in USNM is described below as *A. bakeri* sp. n. (p. 103).

Allocarsidara juliana differs from *malayensis* in lacking a pterostigma in the forewing (Fig. 32), lacking a posterodorsal lobe on the female proctiger (Fig. 84) and having a flexed apical aedeagal segment in the male (Fig. 68). It is apparently closest to *bakeri* (see below) but differs from that species in the shape of the paramere (Figs 67, 70).

Allocarsidara incognita sp. n.

(Figs 30, 72–74, 85, 92)

[*Tenaphalara malayensis* Crawford; Braza & Calilung, 1981: 355. Misidentification.]

DESCRIPTION (only slide-mounted and spirit-stored material available for study). Antennal flagellum 3.83–4.30 times longer than head width, 1st flagellomere more than 13 times longer than wide; ultimate rostral segment 1.52–2.17 times longer than flagellomeres 7+8 together.

Forewing (Fig. 30) 2.99–3.18 times longer than wide, pterostigma present, *Cu* stem 3 times longer than *Cu_{1b}*, *cu₁* cell value 1.83–2.62.

♂ genitalia as in Figs 72–74; lateral lobes of proctiger each with a supplementary apicoposterior lobe; paramere narrow apically and with an inwardly directed spine, apical segment of aedeagus flexed.

♀ terminalia as in Fig. 85, proctiger with a well-developed posterodorsal lobe.

Measurements (7 ♂, 7 ♀). Maximum width of head, ♂ 0.67–0.71, ♀ 0.71–0.74; length of antennal flagellum, ♂ 2.67–2.90, ♀ 2.74–3.06; length of ultimate rostral segment. ♂ 0.26–0.30, ♀ 0.30–0.31; length of forewing, ♂ 3.32–3.53, ♀ 3.65–3.89; length of hind tibia, ♂ 0.68–0.76, ♀ 0.71–0.74.

LARVA. Abdominal wax pore rings as in Fig. 92.

HOSTPLANT. Adults and larvae collected from *Durio zibethinus* (Bombacaceae).

Holotype ♂, **Indonesia**: Sulawesi Utara, Dumoga Bone NP, Bungalows light trap, 21.xi.1985 (*RESL Project Wallace*) (BMNH); slide-mounted.

Paratypes. **Indonesia**: 1 ♀, same locality data as holotype, Base Camp light trap, 26.x.1985. **Philippines**: 1 ♀, Davao Exp. Stn, ground level trap, xi.1962 (*M. R. Gavarra*); 2 ♂, 2 ♀, larvae, Davao City, 2.x.1975, *Durio zibethinus* (*M. Gavarra*). **East Malaysia**: 5 ♂, 4 ♀, Sarawak, vi.1963, Maize (*C. R. Wallace*) (BMNH).

COMMENTS. This species is very similar to *malayensis* but can be recognised by the structure of the male genitalia; females of the two species are very difficult to separate from one another.

Allocarsidara iriana sp. n.

(Figs 11–13, 31, 63–65)

DESCRIPTION. Body mid brown dorsally and laterally, ochraceous ventrally; head black but with a median longitudinal pale stripe on vertex, apices of anterolateral tubercles ochraceous; antenna with scape and pedicel ochraceous, flagellum black; forewing hyaline; femora ochraceous, brown anterodorsally, fore and mid tibiae and tarsi dark brown, hind tibia and tarsus ochraceous.

Antennal flagellum relatively short, 3.26 times longer than head width, first flagellomere 10 times longer than its greatest width, seventh flagellomere with a very long subapical seta (Fig. 13); ultimate rostral segment 1.46 times longer than flagellomeres 7+8 together.

Forewing (Fig. 31) 2.86 times longer than wide, pterostigma present, *M+Cu* stem just over twice as long as *Cu* stem, *Cu* stem twice as long as *Cu_{1b}*, *cu₁* value 2.13.

♂ genitalia as in Figs 63–65; lateral lobes of proctiger short, not subdivided posteroapically; paramere broad apically, with an anteriorly directed spine and an apicoposterior tubercle; apical segment of aedeagus straight.

♀ unknown.

Measurements (1 ♂). Maximum width of head, 0.58; length of antennal flagellum, 1.88; length of ultimate rostral segment, 0.23; length of forewing, 3.00; length of hind tibia, 0.76.

LARVA AND HOSTPLANT. Unknown.

Holotype ♂, **New Guinea**: NW, Nabire, S. Goelvink Bay, 7.ix.1962, light trap in jungle (*H. Holtman*) (BPBM); slide-mounted.

COMMENTS. The forewing of this species has a pterostigma, as in *malayensis* and *incognita*, but it may be recognised by the shape of the male paramere and aedeagus, the relatively short antennal flagellum and the long subapical seta on flagellomere seven.

Allocarsidara bakeri sp. n.

(Figs 33, 69–71)

DESCRIPTION. Body light brown, head darker; antenna with scape, pedicel and first flagellomere dark brown, rest of flagellum lighter; forewing hyaline; legs ochraceous, fore and mid femora with dark anterodorsal stripes, mid tibia and tarsus darker.

Antennal flagellum 4.66 times longer than head width, first flagellomere 12 times longer than its greatest width.

Forewing (Fig. 33) 3.45 times longer than wide, pterostigma absent, *Cu* stem 3.5 times longer than *Cu_{1b}*, *cu₁* cell value 2.7.

♂ genitalia as in Figs 69–71; lateral lobes of proctiger long but not subdivided posteroapically; apex of paramere narrow and with an inwardly directed curved spine; apical segment of aedeagus flexed.

♀ unknown.

Measurements (1 ♂). Maximum width of head, 0.59; length of antennal flagellum, 2.77; length of ultimate rostral segment, 0.24; length of forewing, 3.12; length of hind tibia, 0.57.

LARVA AND HOSTPLANT. Unknown.

Holotype ♂, **East Malaysia**: Sabah; 'Sandakan, Borneo, Baker' (USNM); slide-mounted.

COMMENTS. This species is very similar to *juliana* but differs in that the lateral lobes of the male proctiger are longer (Figs 66, 69), the paramere is narrow apically (Figs 67, 70), the apex of the aedeagus is of a different shape (Figs 68, 71) and the forewing is relatively narrower (3.10 times longer than wide in *juliana*).

Allocarsidara elongata sp. n.

(Figs 34, 60–62, 87)

DESCRIPTION (only slide-mounted and spirit-preserved material available for study). Antennal flagellum 3.98–4.60 times longer than head width, first flagellomere 16 times longer than its greatest width; ultimate rostral segment relatively long, 2.54–2.89 times longer than flagellomeres 7+8 together.

Forewing (Fig. 34) 3.21–3.35 times longer than wide, pterostigma absent, *Cu* stem about 4 times longer than *Cu_{1b}*, *cu₁* cell very small.

♂ genitalia as in Figs 60–62; lateral lobes of proctiger undivided posteroapically; apex of paramere narrow, with a large and inwardly directed apical tubercle; apical segment of aedeagus straight.

♀ terminalia as in Fig. 87, proctiger with a well-developed posterodorsal lobe.

Measurements (6 ♂, 7 ♀). Maximum width of head, ♂ 0.64–0.73, ♀ 0.69–0.75; length of antennal flagellum, ♂ 2.83–3.00, ♀ 3.11–3.26; length of ultimate rostral segment, ♂ and ♀ 0.31–0.33; length of forewing, ♂ 3.47–3.59, ♀ 3.81–4.14; length of hind tibia, ♂ 0.69–0.73, ♀ 0.71–0.74.

HOSTPLANT. Adults and larvae collected from *Durio zibethinus* (Bombacaceae).

Holotype ♂, **West Malaysia**: Malaya, Alor Star, Jitra, 3.xii.1985, *Durio zibethinus* (N. K. Ho) (BMNH); slide-mounted.

Paratypes. 7 ♂, 9 ♀, same data and depository as holotype; slide- and dry-mounted.

COMMENTS. This species resembles *juliana* and *bakeri* in lacking a pterostigma in the forewing; it differs from both in having a straight apical aedeagal segment, and from *juliana* in having an apically narrow paramere and a well-developed posterodorsal lobe on the female proctiger.

PARACARSIDARA Heslop-Harrison

[*Carsidara* Walker; Crawford, 1911: 484; 1914: 57; Tuthill & Taylor, 1950: 53; Brues *et al.*, 1954: 156; Morgan, 1984: 19, fig. 15. Misinterpretations.]

Paracarsidara Heslop-Harrison, 1960: 244; Hodkinson & White, 1981: 505; Brown, 1985: 246. Type-species: *Carsidara dugesii* Löw, by original designation.

DESCRIPTION. Integument of head and thorax almost glabrous. Head (Figs 14, 15) with disc of vertex concave, foveae present as deep oblique grooves, lateral margins of vertex sharply raised, posterior margin angular, anterior margin sharply defined and deeply incised by median suture, lateral ocellae placed posteriorly on vertex, anterolateral tubercles very weak or absent; antennal sockets swollen, flagellum 2.5–3.5 times longer than head width, 1st flagellomere more than 10 times longer than its greatest width; genae with a pair of small mid ventral tubercles anterior to clypeus, each gena with a larger lateroventral tubercle; occiput, on each side below, eye with a small tubercle or swelling; ultimate rostral segment more than 6 times longer than wide.

Forewing (Fig. 35) narrow-elongate, about 2.8 times longer than wide and with a subacute apex, costal break absent, pterostigma present, *r₁-rs* crossvein absent, *M+Cu* stem almost as long as *R* stem and *Cu* stem, *cu₁* cell value greater than 2.7 and without radular spinules, apex of claval suture distant from apex of *Cu_{1b}*, costal setae of hindwing grouped; apical spurs of hind tibia arranged 1+3+1.

♂ proctiger (Fig. 75) unipartite, expanded basally and with 2 small apicolateral lobes; aedeagus narrow apically, sometimes lobed basoventrally, endtube of ductus ejaculatorius enlarged and with lateral and apical hooks (Fig. 76).

♀ terminalia (Fig. 88) conical, proctiger more or less 'stepped' posteriorly, apical part narrow and bearing short, thick, spiniform setae and sometimes an apical hook.

LARVA. Caudal plate as in Fig. 93.

HOSTPLANT GENERA. *Ceiba* (Bombacaceae), *Malva* and *Wissadula* (Malvaceae).

COMMENTS. On the basis of the narrow-elongate forewing, absence of *r₁-rs* crossvein, long *M+Cu* stem, presence of lateral lobes on the male proctiger and narrow apex of the aedeagus, *Paracarsidara* is grouped with *Allocarsidara* and *Mesohomotoma*. The modified endtube of *Paracarsidara* is very similar to that of *Mesohomotoma* and is used as a synapomorphy for these two genera. Brown (1985) also related *Paracarsidara* to *Mesohomotoma*, even doubting their separate identities, but I regard the absence of a pterostigma and the bipartite male proctiger that bears a median posterior lobe in addition to the lateral lobes sufficient to recognise the latter genus.

Included species***Paracarsidara dugesii* (Löw)**

(Figs 75, 76, 88, 93)

Carsidara dugesii Löw, 1886: 160; Crawford, 1911: 486; 1914: 58; Aulmann, 1913: 79; Laing, 1923: 698; Caldwell, 1941: 421, 1944: 58; Tuthill, 1950: 53; Silva *et al.*, 1968: 200 [?misidentification]. Syntypes ♂, ♀, MEXICO: 'planta Malvacea' (NM) [not examined].

Paracarsidara dugesii (Löw) Heslop-Harrison, 1960: 246; Hodkinson & White, 1981: 506; Brown, 1985: 250.

Carsidara concolor Crawford, 1911: 484; 1914: 58; Caldwell, 1942b: 28; Caldwell & Martorell, 1951: 604. Syntypes ♂, ♀, CUBA (USNM). [Synonymised by Heslop-Harrison, 1960: 246.]

Paracarsidara concolor (Crawford) Heslop-Harrison, 1960: 246; Hodkinson & White, 1981: 505.

[*Carsidara gigantea* Crawford; Laing, 1923: 698. Misidentification.]

HOSTPLANTS. *Malva* sp., *Wissadula perplicifolia* (Malvaceae). Silva *et al.* (1968) record this species from Brazil, on *Bombax cyathophorum* (Bombacaceae), but this is likely to be a misidentification.

RECORDED DISTRIBUTION. Mexico, Guatemala, Cuba, Puerto Rico, Dominica and Jamaica; [?Brazil].

MATERIAL EXAMINED

Adults and larvae from **Mexico** and **Jamaica** (on *Wissadula perplicifolia*).

***Paracarsidara gigantea* (Crawford)**

(Figs 14, 15, 35)

Carsidara gigantea Crawford, 1911: 486; 1914: 57; Ferris, 1928: 244; Caldwell, 1941: 421. Syntypes ♀, NICARAGUA (USNM).

Paracarsidara gigantea (Crawford) Heslop-Harrison, 1960: 246; Hodkinson & White, 1981: 506; Brown, 1985: 253.

HOSTPLANTS. *Ceiba* sp., *C. burchellii* (BMNH).

RECORDED DISTRIBUTION. Mexico, Guatemala, Belize, Nicaragua, St Kitts, Cuba, Colombia, Brazil.

MATERIAL EXAMINED

Adults and larvae from **Mexico**, **Panama** and **Brazil** (on *Ceiba burchellii*).

COMMENTS. Tuthill (1950) synonymised this species with *dugesii* but Brown (1985) considered it to be distinct after examining relevant type material.

***Paracarsidara rostrata* (Crawford)**

Carsidara rostrata Crawford, 1911: 486; 1914: 58; Tuthill, 1950: 53. Syntypes ♀, NICARAGUA (USNM).

Paracarsidara rostrata (Crawford) Heslop-Harrison, 1960: 246; Hodkinson & White, 1981: 506; Brown, 1985: 256.

HOSTPLANT. Unknown.

RECORDED DISTRIBUTION. Nicaragua, Panama.

COMMENTS. Crawford (1914) regarded this species as a synonym of *dugesii* and this was followed by Tuthill (1950). Heslop-Harrison raised *rostrata* from synonymy and Brown (1985) confirmed this after examining type material.

Nomen dubium

Carsidara mexicana Crawford, 1911: 487; 1914: 58 (as a possible synonym of *dugesii*). Holotype ♂, MEXICO [specimen missing from pin, USNM].

Paracarsidara mexicana (Crawford); Heslop-Harrison, 1960: 246; Hodkinson & White, 1981: 248 (as a nomen dubium).

Undescribed species

Brown (1985) recorded two undescribed species from Panama and there are some poorly preserved specimens of a further undescribed species from Trinidad on *Malachra alceifolia* (Malvaceae) in BMNH.

MESOHOMOTOMA Kuwayama

Mesohomotoma Kuwayama, 1908: 180; Aulmann, 1913: 36; Crawford, 1920: 356; 1925a: 32; Tuthill & Taylor, 1955: 249; Miyatake, 1971: 58; Mathur, 1975: 144; Braza & Calilung, 1981: 356; Hodkinson, 1983: 352; 1986: 317; Yang, 1984: 178; White & Hodkinson, 1985: 242. Type-species: *Mesohomotoma camphorae* Kuwayama, by original designation and monotypy.

Udamostigma Enderlein, 1910: 138. Type-species: *Tyora hibisci* Froggatt, by original designation and monotypy. [Synonymised by Crawford, 1920: 356.]

[*Tyora* Walker; Crawford, 1919: 159. Misinterpretation.]

[*Tyor[i]a* Walker; Uichanco, 1921: 279. Misinterpretation; misspelling.]

DESCRIPTION. Integument of head and thorax almost glabrous. Head (Figs 16, 17) with disc of vertex deeply divided by median suture, foveae present as deep oblique grooves, lateral and hind margins of vertex obliquely raised, anterior margin poorly defined but deeply incised by median suture, anterolateral tubercles well-defined, lateral ocellae posteriorly placed; antennal sockets enlarged, flagellum 2.4–3.0 times longer than head width, 1st flagellomere at least 9 times longer than its median width; genae with a small tubercle on either side of mid ventral suture immediately anterior to clypeus, lateral tubercles absent; occiput with a small tubercle on each side below eye; ultimate rostral segment at least 5 times longer than wide.

Forewing (Figs 36–39) narrow, elongate, 2.5–3.0 times longer than wide, with subacute apex; costal break, pterostigma and r_1 -rs absent, $M+Cu$ stem short, about two-fifths as long as R stem and half as long as Cu stem, cu_1 cell value almost 2.0 and without radular spinules, Cu_{1a} strongly arched towards M stem, apex of claval suture distant from apex of Cu_{1b} ; costal setae of hindwing grouped; apical spurs of hind tibia arranged 1+3+1.

♂ proctiger (Fig. 77) bipartite, a strong anvil-shaped median posterior lobe present in addition to well-developed lateral lobes; aedeagus (Fig. 78) narrow apically, apex of ductus ejaculatorius prominent, strongly produced from aedeagal apex and expanded apically.

♀ proctiger (Fig. 89), in profile, strongly stepped posteriorly, apical part narrow elongate and bearing short and thickened setae, apex weakly barbed.

LARVA. Caudal plate as in Fig. 94. Larval stages of *M. camphorae* described by Yang (1984).

HOSTPLANT GENERA. *Hibiscus*, *Thespesia*, *Abutilon*, *Urena* (Malvaceae); *Cola*, *Theobroma*, *Sterculia*, *Heritiera* (Sterculiaceae).

COMMENTS. *Mesohomotoma* differs from all other carsidarids in having a bipartite male proctiger that bears a median posterior lobe in addition to the lateral lobes. Like *Carsidara* the $M+Cu$ stem is short but this is probably a primitive feature; the pterostigma is absent, resembling some species of *Allocarsidara* but this is likely to be a parallel development in the two genera; the form of the apical segment of the aedeagus and particularly the endtube of the ductus ejaculatorius is similar to *Paracarsidara* and this is considered as a synapomorphy for the two genera.

Included species

A great deal of confusion exists over the identity and validity of the six species currently recognised in this genus. I have not examined original type-material but have seen a large number of specimens from most of the areas from where these species were described. There is considerable variation in size, body coloration and forewing pattern and vein proportions (Figs 36–39) between, but not within, samples, although this variation does not correlate well with hostplant data or geographical distribution. Male and female genitalia and larval morphology are, however, remarkably consistent throughout the geographical and hostplant ranges of the material.

The most commonly encountered species is *M. hibisci* and its hostplant, *Hibiscus tiliaceus*, is common in strandline and coastal vegetation throughout the Pacific and Indian Ocean regions from Polynesia to the East and South African coast. *M. camphorae* and *M. lineaticollis*, both originally described from Taiwan, have been subsequently recorded on *Hibiscus tiliaceus* and other malvaceous hosts such as *Urena lobata* and *Abutilon indicum*, in South East Asia. *M. lutheri*, described from Sri Lanka, is recorded from *Hibiscus tiliaceus* and *Urena lobata* in India, Sri Lanka, Réunion and Madagascar. *M. africana* was described from Natal without host data but there are *Mesohomotoma* samples in BMNH collected from *Hibiscus* in eastern Tanzania, Kenya, Uganda and Zaïre; *M. tessmanni* is widespread in Central and West Africa on *Cola*, *Theobroma* (cocoa) and other sterculiaceous hosts.

I suspect that *camphorae*, *lineaticollis*, *lutheri* and *africana* are synonyms of *hibisci*. Furthermore, there appear no consistent morphological characters, either in the adult or larva, that will separate *tessmanni*

from *hibisci* but the sterculiaceous hostplant preferences of the West and Central African populations suggest some genetic isolation from the Malvaceae-feeding populations. *Hibiscus tiliaceus* does occur around the coastal areas of West Africa but it is not known if these bushes support populations of *Mesohomotoma*. Further collecting here would be useful. Experimental work involving hostplant transfers and crossbreeding techniques is required to clarify the problem.

***Mesohomotoma hibisci* (Froggatt)**

(Figs 36, 37, 77, 78, 89, 94)

Tyora hibisci Froggatt, 1901: 287. Syntypes ♂, ♀, AUSTRALIA: Queensland, on *Hibiscus tiliaceus* (ANIC) [not examined].

Udamostigma hibisci (Froggatt) Enderlein, 1910: 138; Aulmann, 1913: 81.

Mesohomotoma hibisci (Froggatt) Crawford, 1920: 356; 1925a: 34; 1927: 30; Klyver, 1933: 25; Caldwell, 1942: 21; Tuthill, 1943: 71; 1951: 273; 1964: 355; Tuthill & Taylor, 1955: 250; Hodgkinson, 1983: 353; 1986: 317; Morgan, 1984: 29.

HOSTPLANTS. *Hibiscus tiliaceus*, *H. rosasinensis*, *H. boryanus* (Malvaceae).

RECORDED DISTRIBUTION. Polynesia (Society, Austral and Rapa Is), Melanesia (Fiji and Solomon Is, New Caledonia), Micronesia (Marianas and Caroline Is), Australia (Queensland).

MATERIAL EXAMINED

Numerous adults and larvae from: **Polynesia** (Cook, Society, Tonga, Samoa and Ellice Is), **Melanesia** (Fiji, Loyalty, New Caledonia, Solomons, Bismark Is and Papua New Guinea), **Micronesia** (Caroline, Marianas and Gilbert Is), **Australia** (N.S.W.), **Indonesia** (Sulawesi), **Philippines**, **Hong Kong**, **India**, **Chagos Arch.**, **Seychelles**, **Réunion**, **Mauritius**, **Madagascar**, **Zaire**, **Uganda**, **Kenya**, **Tanzania**, **Zimbabwe**, **South Africa** (Natal).

***Mesohomotoma africana* Pettey**

Mesohomotoma africana Pettey, 1924: 29; 1925: 138; Capener, 1970: 199. Syntypes ♂, ♀, SOUTH AFRICA (Natal) (NCI; BMNH) [1 ♀ examined].

HOSTPLANT. *Hibiscus* sp. (Malvaceae).

RECORDED DISTRIBUTION. South Africa (Natal).

***Mesohomotoma camphorae* Kuwayama**

Mesohomotoma camphorae Kuwayama, 1908: 181; Aulmann, 1913: 36; Crawford, 1925a: 33; 1927: 31; 1928: 34; Kuwayama, 1931: 123; Takahashi, 1936: 292; Sasaki, 1954: 32; Miyatake, 1964: 123; 1965: 174; 1971: 58; Hodgkinson, 1983: 352; 1986: 317; Yang, 1984: 178. Syntypes ♂, ♀, JAPAN (Osagawara Is) and TAIWAN, on 'Kampferbaume' [not examined].

HOSTPLANTS. *Hibiscus tiliaceus*, *H. mutabilis*, *Abutilon indicum*, *Thespesia populnea*, *Urena lobata* (Malvaceae); *Cinnamomum camphora* (Lauraceae) but Sasaki (1954) regards the camphor records as erroneous.

RECORDED DISTRIBUTION. Samoa, Fiji, Philippines, Japan (Osagawara and Ryukyu Is), Taiwan.

***Mesohomotoma lineaticollis* Enderlein**

Mesohomotoma lineaticollis Enderlein, 1914: 232; Crawford, 1925a: 35; Boselli, 1930: 188; Kuwayama, 1931: 123; Braza & Calilung, 1981: 356; Hodgkinson, 1983: 353. Holotype ♂, 'FORMOSA' [not examined].

HOSTPLANT. *Urena lobata* (Malvaceae). Also recorded (probably in error) on *Cordia dichotoma* (Boraginaceae).

RECORDED DISTRIBUTION. Taiwan, Philippines.

***Mesohomotoma lutheri* (Enderlein)**

Udamostigma lutheri Enderlein, 1918: 484. Syntypes ♂, ♀, SRI LANKA [not examined].

Tyora indica Crawford, 1919: 159. Syntypes ♂, ♀, AMBOINA and INDIA [not examined]. [Synonymised by Crawford, 1925a: 34.]

Tyor[i]a indica Crawford; Uichanco, 1921: 279. [Misspelling.]

Mesohomotoma lutheri (Enderlein) Crawford, 1925a: 34; 1927: 31; Mathur, 1975: 146; Hodkinson, 1983: 353; 1986: 317.

Mesohom[a]toma lutheri (Enderlein); Orian, 1972: 2. [Misspelling.]

HOSTPLANTS. *Hibiscus* sp., *Urena lobata* (Malvaceae).

RECORDED DISTRIBUTION. Amboina, Philippines, India, Ceylon, Réunion, Madagascar.

***Mesohomotoma tessmanni* (Aulmann)**

(Figs 16, 17, 38, 39)

Udamostigma tessmanni Aulmann, 1912a: 10; 1912b: 101; 1913: 81. Syntypes ♂, 'SPANISH GUINEA' [not examined].

Mesohomotoma (*Udamostigma*) *tessmanni* (Aulmann) Cotterell, 1927: 109.

Mesohomotoma tessmanni (Aulmann); Alibert, 1951: 44; Eastop, 1961: 167; Forsyth, 1966: 73; Leston & Gibbs, 1968: 73; Roberts, 1969: 76; Leston, 1973: 322.

Tyora tessmanni (Aulmann) Eastop, 1958: 19; Kaufmann, 1973: 285.

Tyora (*Mesohomotoma*) *tessmanni* (Aulmann); Wood, 1980: 174.

HOSTPLANTS. *Cola* spp., *Theobroma cacao*, *Sterculia tragacantha* (see Forsyth, 1966), *Heritiera* spp. (BMNH) (Sterculiaceae); *Desplatzia lutea* (BMNH) (Tiliaceae); *Chytranthus talbotii* (see Forsyth, 1966) (Sapindaceae); *Cleistopholis* sp. (BMNH) (Annonaceae) (possible host misidentification).

RECORDED DISTRIBUTION. Ghana, Nigeria, Equatorial Guinea.

MATERIAL EXAMINED

Numerous adults and larvae from

Sierra Leone (on *Heritiera*, *Cola*, *Theobroma*), **Ivory Coast** (on *Heritiera*), **Ghana** (on *Theobroma*, *Desplatzia*), **Nigeria** (on *Cola*, *Theobroma*), **San Tomé** (on *Theobroma*), **Cameroon** (on *Cola*, *Theobroma*), **Central African Republic** (on *Cola*), **Gabon** (on *Cleistopholis*), **Uganda** (on *Cola*), **Zaire** and **Angola**.

COMMENTS. Cotterell (1927) records this species as a minor pest of cocoa (*Theobroma cacao*) in West Africa, damaging young shoots and shortening internodes, which causes 'bunching'. Wood (1980) summarises that, under conditions of drought and high insolation, heavy infestations cause dessication and death of terminal buds. However, Kaufmann (1973) reports that when the insects infest the flower buds there is little effect on pod production and the insects may be involved in flower pollination.

Phylogeny, biogeography and hostplants

(Summary Fig. 1)

The Carsidaridae and Homotomidae are considered here to be sister-groups, the pair being characterised as follows: antennal sockets enlarged and giving the head a cleft appearance in dorsal view; paired metapostnotal epiphyses present; ventral sense organs of hind femora situated basally and not arranged linearly. Hostplants of both families are in the Malviflorae (sensu Thorne, 1983). Homotomids have a characteristic bipartite male proctiger and many have a thickened and densely hirsute antennal flagellum, although the *Macrohomotoma*-group of genera have a simple filiform flagellum. All homotomids develop on species of *Ficus* (Urticales) and are distributed mainly in the Old World tropics, but one small genus occurs in Central and northern South America. Two species occur in the Mediterranean Basin on *Ficus carica*, and a third species extends into eastern South Africa on *Ficus petersii*. Carsidarids are diagnosed by the character-suite given on p. 89 and are restricted to hostplants in the Malvales; the group is almost entirely pantropical.

Within the Carsidaridae the Central American genus *Epicara* has a distinctive forewing and antennal flagellum; the structure of the male proctiger is unique and the genus is considered to be the sister-group of the rest of the family. The single known species is found on *Ceiba* (Bombacaceae). Apart from *Epicara* and the Central and South American genus *Paracarsidara* the rest of the family is distributed in the Old World. *Carsidara* is quite distinct, having highly modified female terminalia and male aedeagal apex; it also retains the primitively broad forewing and very short *M+Cu* stem and has species in tropical Africa, Madagascar and South East Asia

on sterculiaceous hosts. Of the narrow-winged genera *Protyora* is unique in retaining the primitive features of a costal break in the forewing and a simple, flask-shaped male proctiger; it is separated from the rest of the group by the derived state of the aedeagal apex. Two species are known, one in Sulawesi Utara and another in Australia on a sterculiaceous host. The remaining genera are difficult to characterise as a whole; they all possess a male proctiger that is enlarged basally and bears small or large lateral lobes but this character is also shared by *Carsidara* and is not likely to be a parallel development in this genus. Within this assemblage *Tyora* and *Tenaphalara* are grouped together, having an additional r_{1+rs} crossvein and hind tibial spurs arranged 1+2+2. *Tyora* species have retained many primitive features, including the presence of radular spinules in cell cu_1 and the close proximity of the apex of the calval suture to the apex of Cu_{1b} ; they are restricted to sterculiaceous hosts in South East Asia. *Tenaphalara* has more derived features, its species occur in both Africa and the Oriental Region on hostplants in the Bombacaceae. *Mesohomotoma*, with species in the Afrotropical, Malagasy, Oriental, Australasian and Pacific Regions, has a distinctive bipartite male proctiger that bears a median posterior lobe; it also lacks a pterostigma in the forewing but this feature is shared, probably by convergence, with some species of *Allocarsidara*. The form of the endtube of the ductus ejaculatorius is similar to that of *Paracarsidara* and this is considered as a synapomorphy for the two genera. *Mesohomotoma* species usually develop on malvaceous hosts but one African species is known to live on various Sterculiaceae. Species of the Central and South American genus *Paracarsidara* develop on both Bombacaceae and Malvaceae. Little is known of the hostplants of the South East Asian genus *Allocarsidara* but three species develop on *Durio zibethinus* (Bombacaceae). The sister-group relationship of *Allocarsidara* is not resolved. It has rounded margins of the vertex, as in *Tenaphalara*, and some of the species lack a pterostigma, as in *Mesohomotoma*, but both these characters are likely to be parallel developments.

A list of characters is given below and the matrix, from which the phylogeny (Fig. 1) was generated, is given in Table 2.

Raven & Axelrod (1974), in their review of angiosperm biogeography, state, with reservations, that the primary radiation of both the Malvales and the Moraceae occurred in Africa and South America in the Upper Cretaceous period. In the Malvales, the Sterculiaceae were the first group to reach Eurasia, followed by the Bombacaceae and then the Malvaceae. This is reasonably congruent with the hostplant preferences of the carsidarid genera. Those displaying more primitive features, e.g. *Carsidara*, *Tyora* and *Protyora*, are on Sterculiaceae, while those with more derived features, e.g. *Tenaphalara*, *Allocarsidara*, *Paracarsidara* and *Mesohomotoma*, are on Bombacaceae and Malvaceae. *Mesohomotoma* is anomalous as its species develop on both Malvaceae and Sterculiaceae, but the Sterculiaceae-feeding habit is restricted to one African *Mesohomotoma* species and may well be a secondarily derived condition.

If Fig. 1 is a good reflection of carsidarid phylogeny, the subgroups must have been differentiated before the complete separation of Africa from South America (100 m.y.B.P.) as elements of the assemblage showing the most derived characters, e.g. *Allocarsidara* + *Paracarsidara* + *Mesohomotoma*, are present today in both continents, and this is unlikely to be through subsequent dispersal from West Africa to the Caribbean. However, this is the weakest part of the projected phylogeny as these genera are not diagnosed as a group.

List of characters

Primitive condition is given in parenthesis

1. Integument of head and thorax sparsely short-setose or almost glabrous. (Integument of head and thorax densely long-setose.)
2. Flagellomeres thickened. (Flagellomeres narrow, elongate.)
3. Flagellomeres thickened and densely hirsute. (Flagellomeres narrow, elongate.)
4. Flagellomere 3 with subapical rhinarium. (Rhinarium absent from flagellomere 3.)
5. Forewing angular apically. (Forewing rounded apically.)
6. Forewing narrow. (Forewing broad.)
7. Costal break absent. (Costal break present.)
8. Pterostigma absent. (Pterostigma present.)
9. R_s and M_{1+2} anastomosing. (R_s and M_{1+1} parallel, not in contact.)

Table 2 Character-matrix of Carsidaridae and Homotomidae. Character numbers refer to list of characters in text. [+] denotes not common to all members.

Character	3	15	4	14	20	7	2	9	19	10	5	23	26	27	1	6	12	22	17	18	11	13	25	21	8	4	16
Group	+	+									[+]				[+]	[+]											
Homotomidae			+	+	+	+	+	+	+	+		+					+										
<i>Epicarsa</i>			+	+	+	+							+							+							
<i>Carsidara</i>			+	+	+									+			+	+									
<i>Protyora</i>			+	+	+										+		+	+									
<i>Tyora</i>			+	+	+	+									+		+			+	+						
<i>Tenaphalara</i>			+	+	+	+	+								+		+	+									
<i>Allocarsidara</i>			+	+	+	+	+								+		+	+									
<i>Paracarsidara</i>			+	+	+	+	+								+		+	+	+								
<i>Mesohomotoma</i>			+	+	+	+	+								+		+			+							

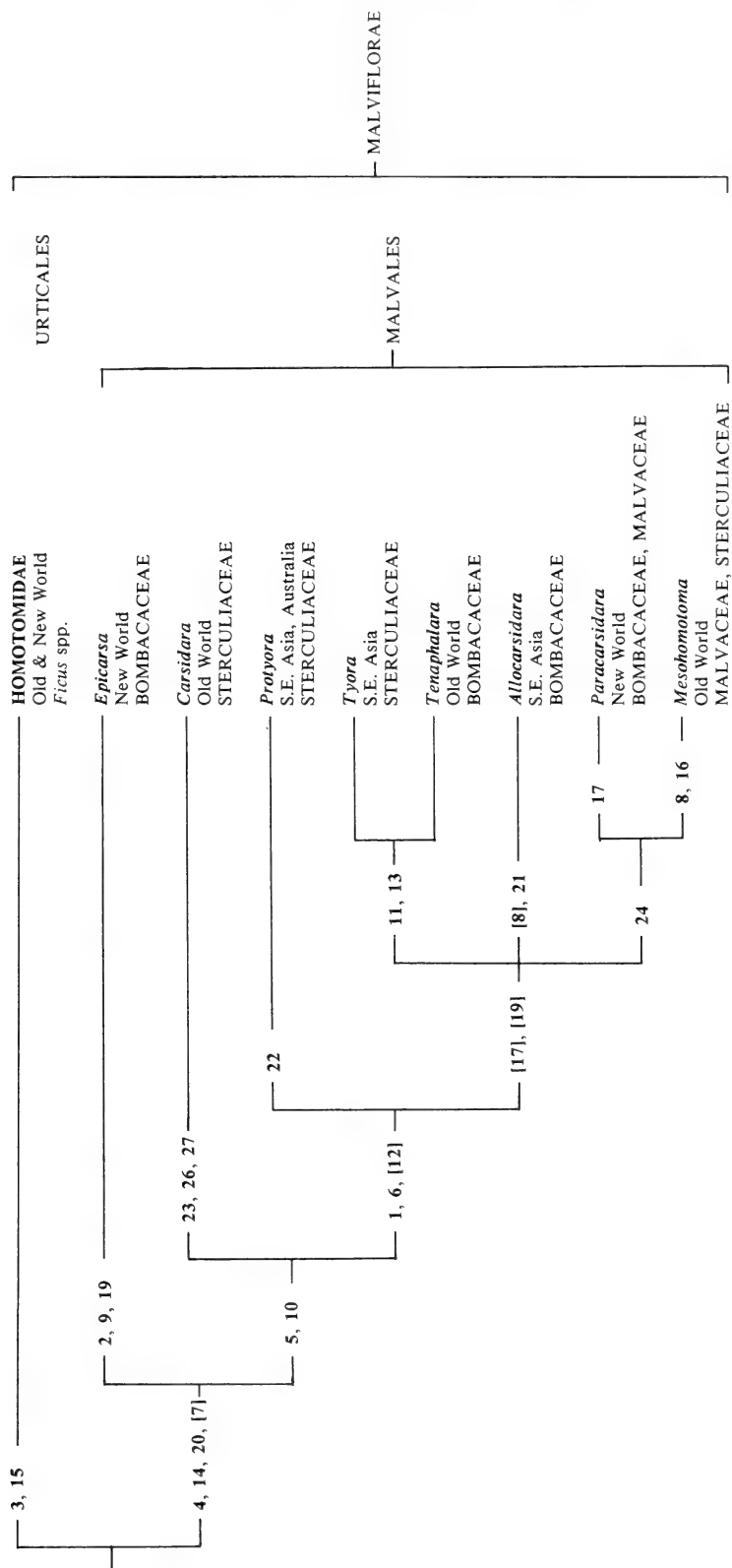


Fig. 1 Summary of phylogeny, distribution and hostplant groups of the Carsidaridae. [] denotes character not shared by all members of group. For characters relating to numbers see 'List of characters' in text (p. 109).

10. Non-tracheate *rs-m* crossvein present. (*rs-m* crossvein absent.)
11. Non-tracheate *r₁-rs* crossvein present. (*r₁-rs* crossvein absent.)
12. *M+Cu* stem long. (*M+Cu* stem short.)
13. Apical spurs of hind tibia arranged 1+2+2. (Hind tibial spurs arranged 1+2(or 3)+1.)
14. Metabasisarsus with a single apical spur. (Metabasisarsus with two apical spurs.)
15. Male proctiger bipartite, apical section consisting of a simple anal tube. (Male proctiger unipartite, tubular.)
16. Male proctiger bipartite, apical section having a median posterior lobe in addition to anal tube. (Male proctiger unipartite, tubular.)
17. Male proctiger with enlarged basal portion subdivided posteroapically into small lateral lobes. (Male proctiger tubular.)
18. Male proctiger with well-developed, simple lateral lobes. (Male proctiger tubular.)
19. Lateral lobes of male proctiger each with a secondary inward-pointing lobe. (Secondary, inward-pointing lobes absent.)
20. Male subgenital plate with supplementary lobes. (Male subgenital plate without supplementary lobes.)
21. Inner lateral surfaces of male subgenital plate with patches of spinules. (These spinules not differentiated.)
22. Apex of aedeagus enlarged, endtube of ductus ejaculatorius simple. (Apex of aedeagus narrow, endtube of ductus ejaculatorius simple.)
23. Apex of aedeagus enlarged, complex, endtube of ductus ejaculatorius laterally compressed and heavily chitinated. (Apex of aedeagus narrow, endtube of ductus ejaculatorius simple.)
24. Ductus ejaculatorius with a complex endtube bearing ridges and hooks. (Endtube of ductus ejaculatorius without ridges or hooks.)
25. Female proctiger with a posterodorsal lobe. (Female proctiger without a posterodorsal lobe.)
26. Lateral margins of female proctiger densely long-setose. (Lateral margins of female proctiger sparsely short-setose.)
27. Lateral palps of ovipositor heavily ridged. (Ovipositor palps not ridged.)

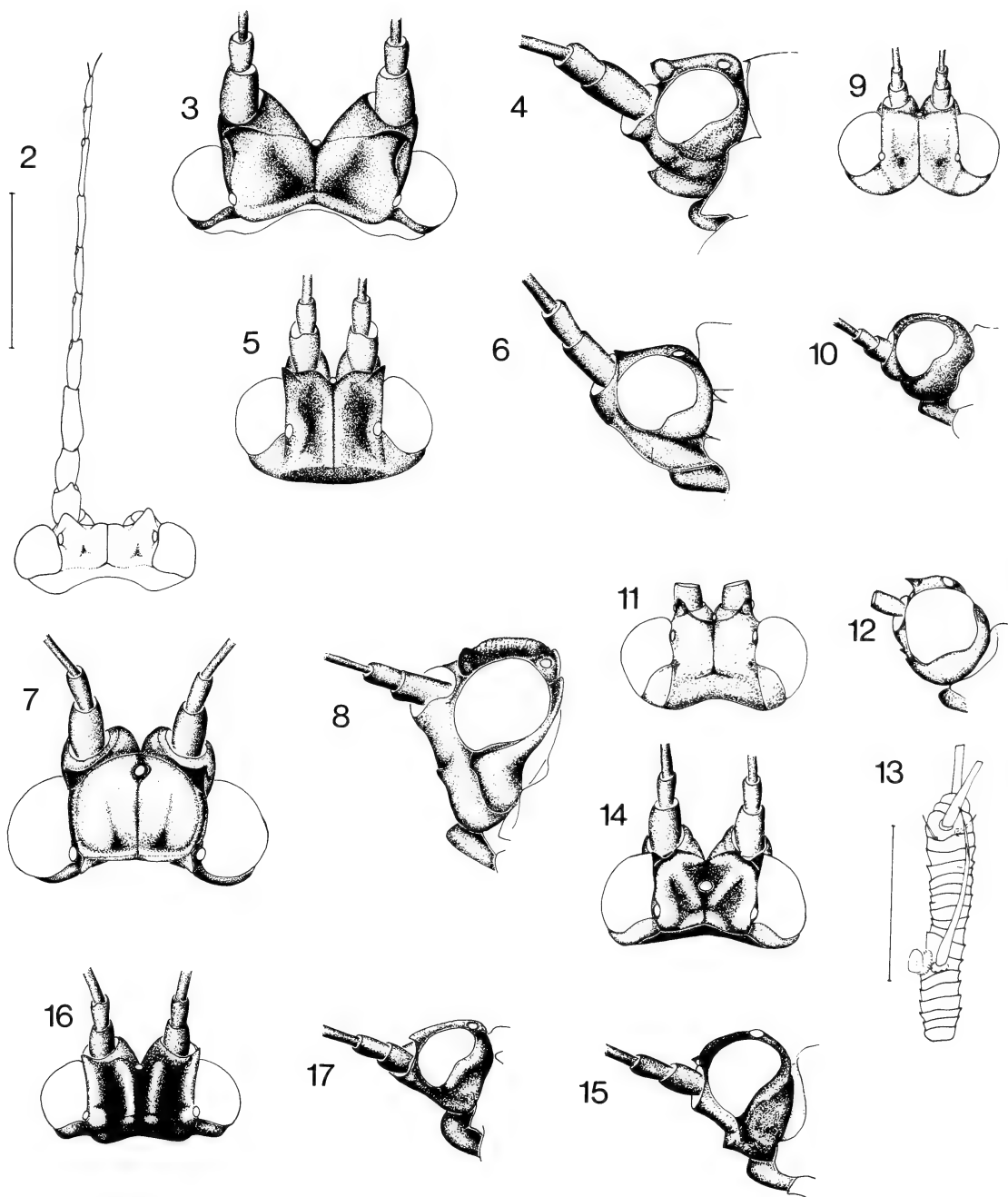
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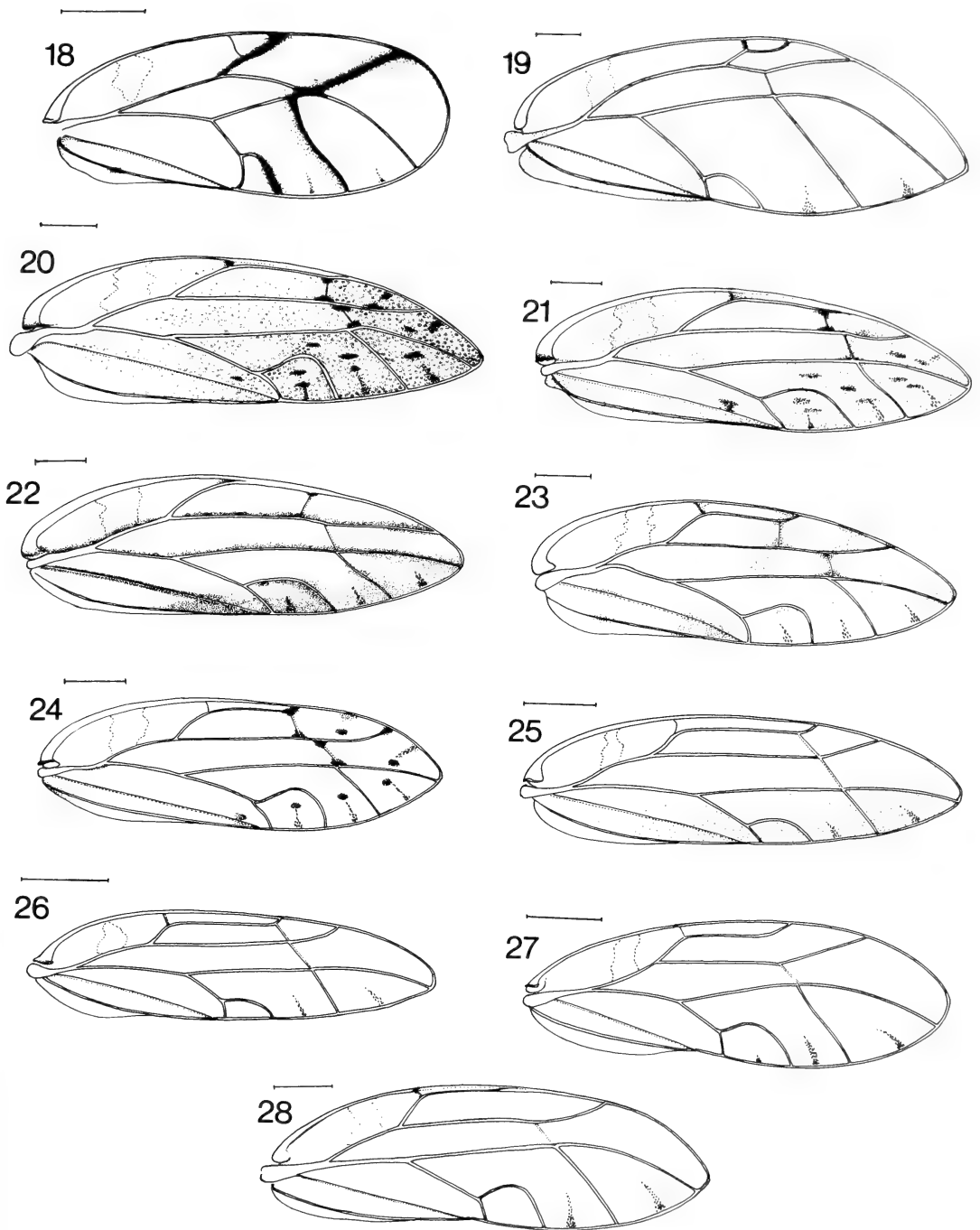
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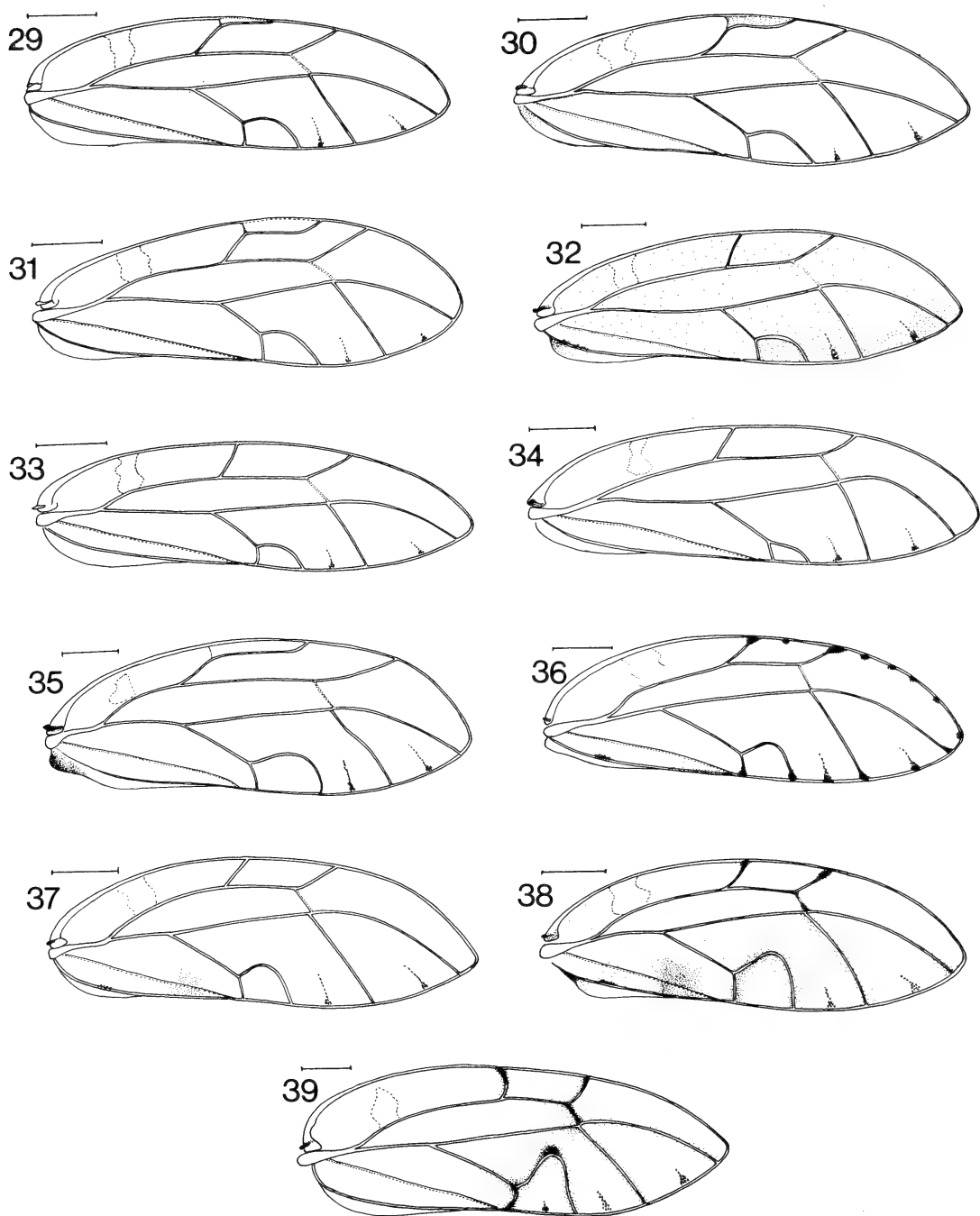
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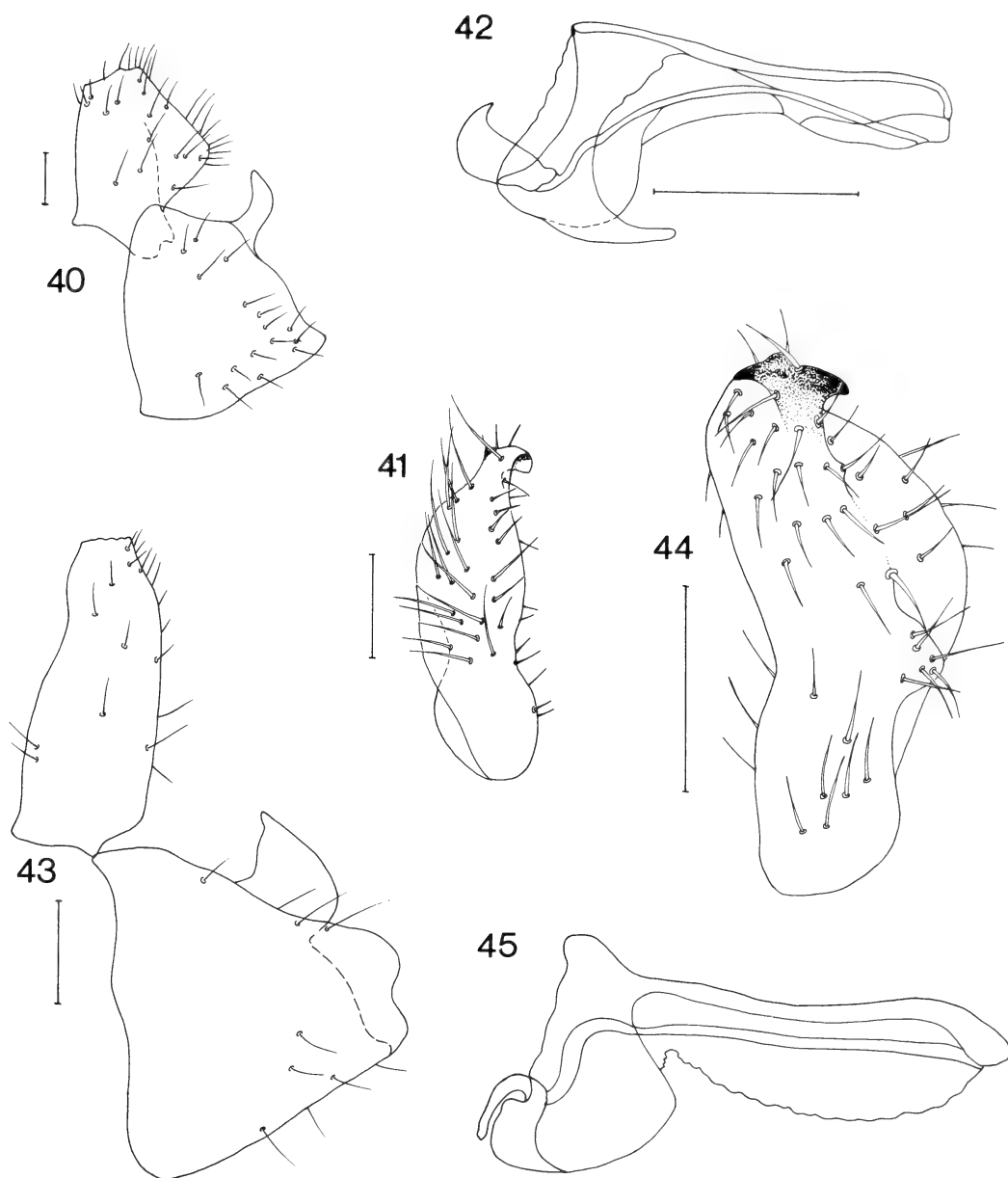
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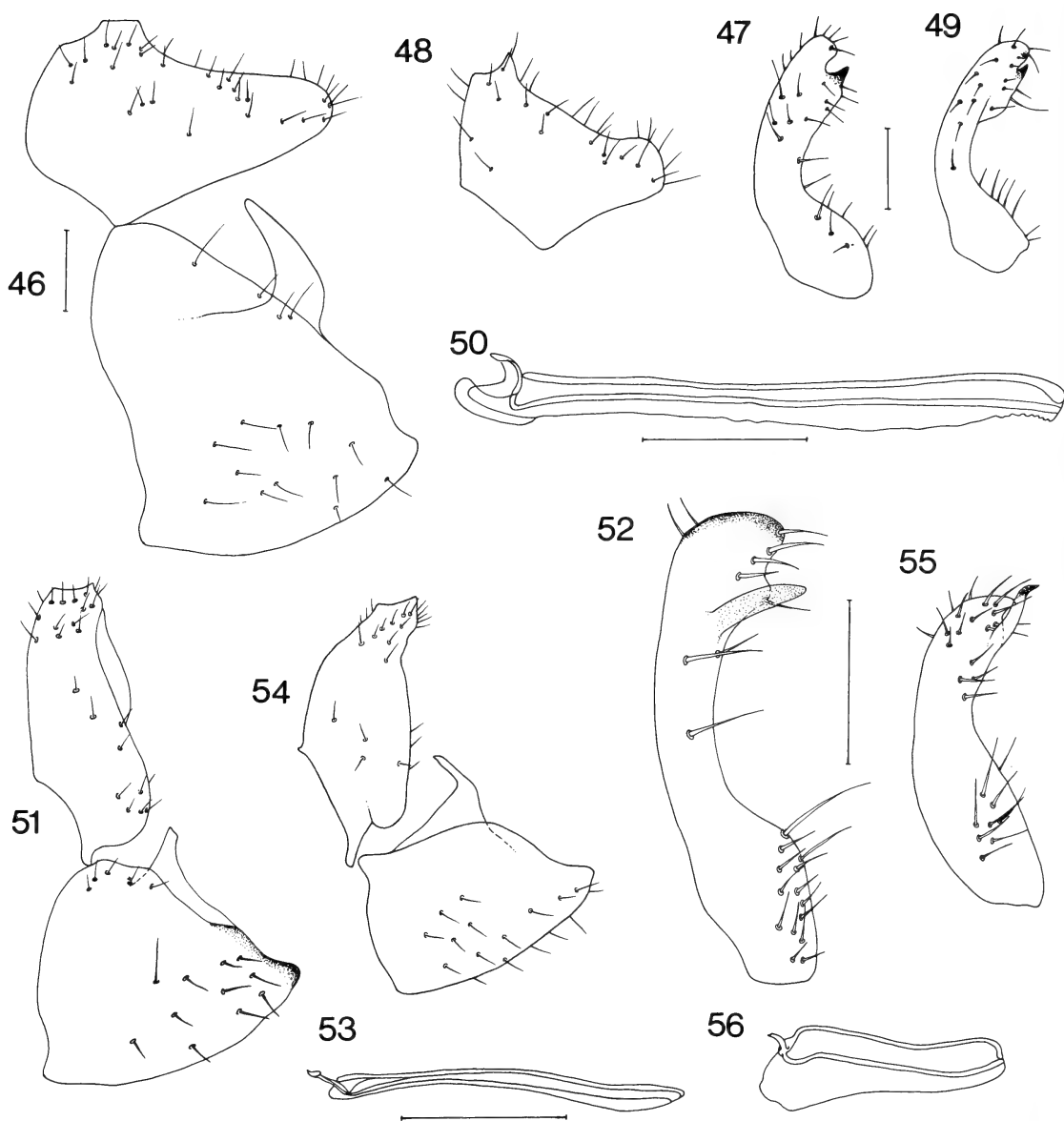
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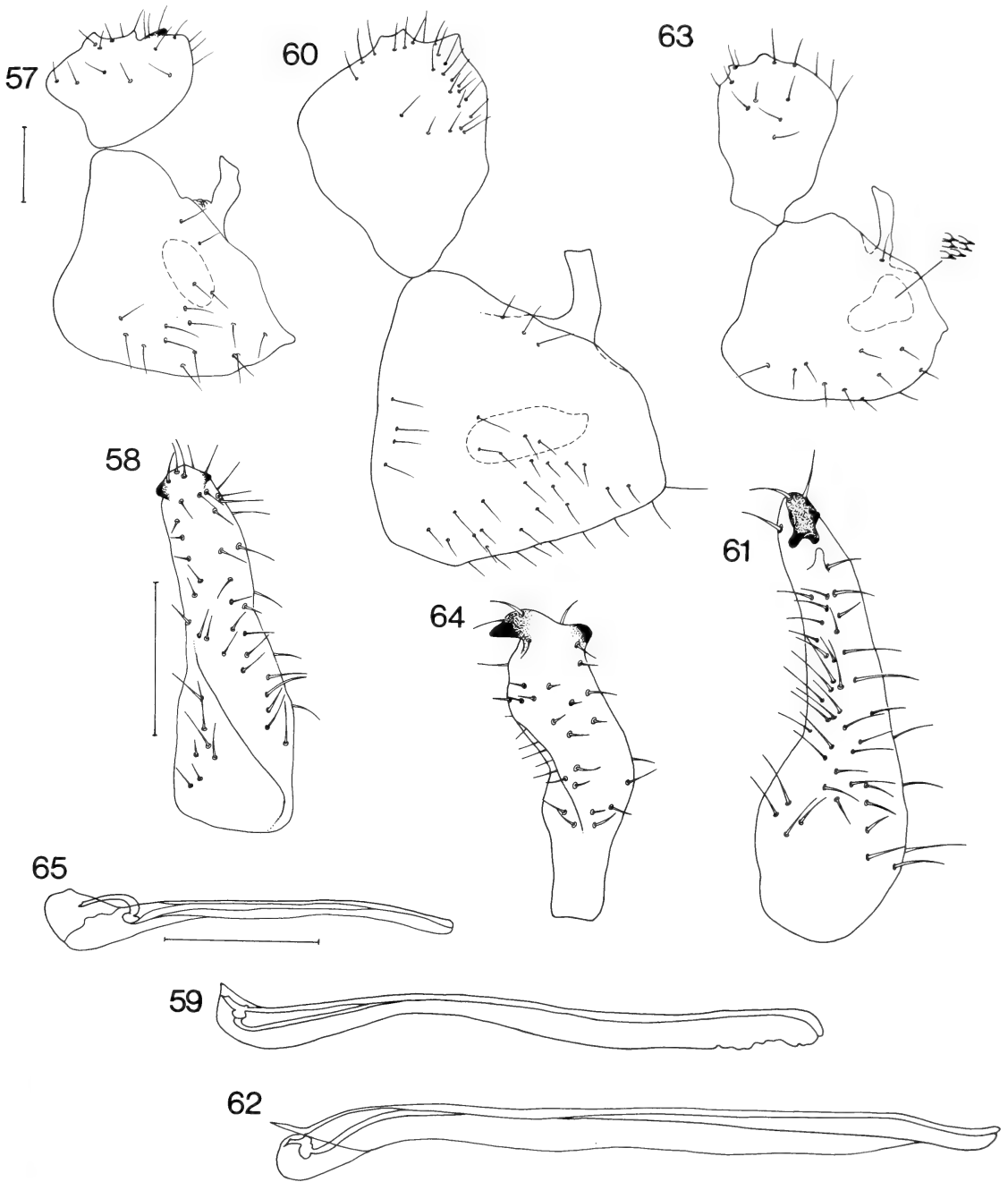
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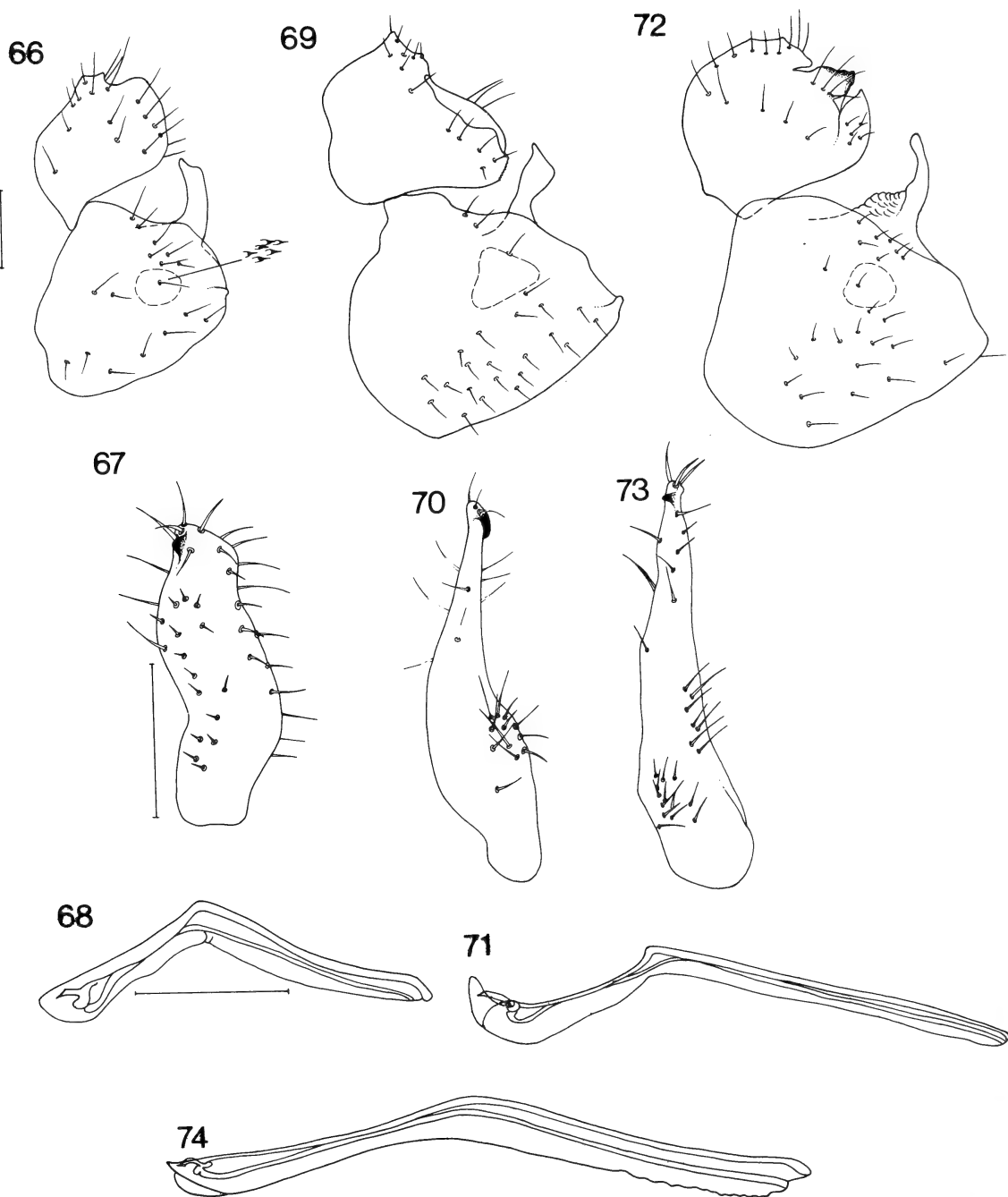
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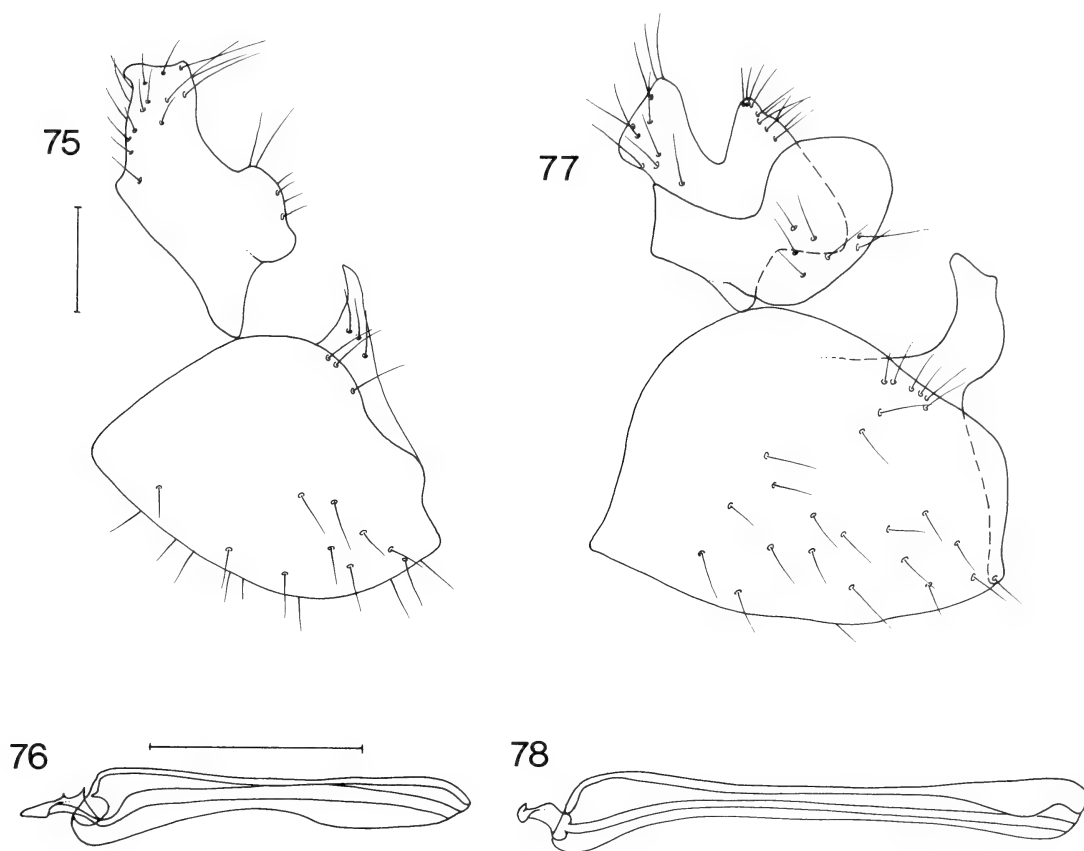
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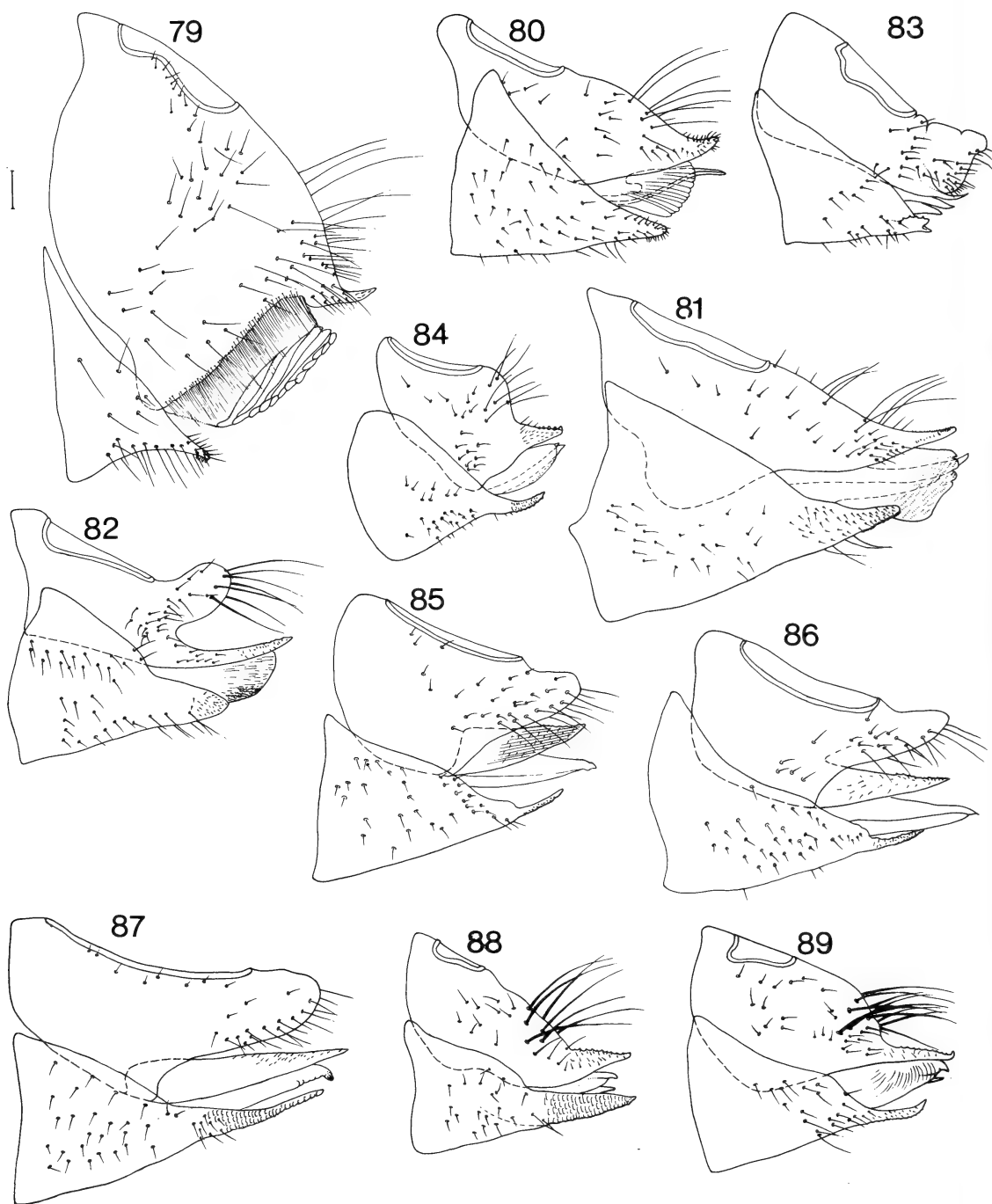
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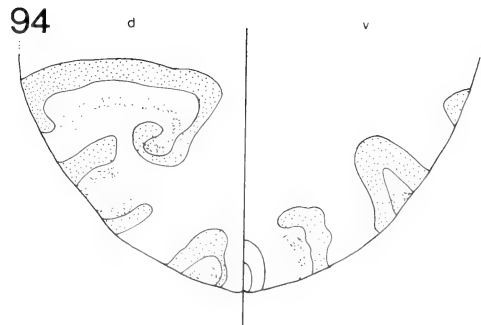
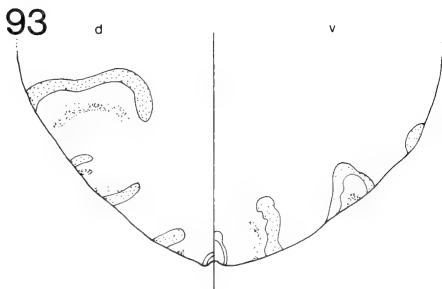
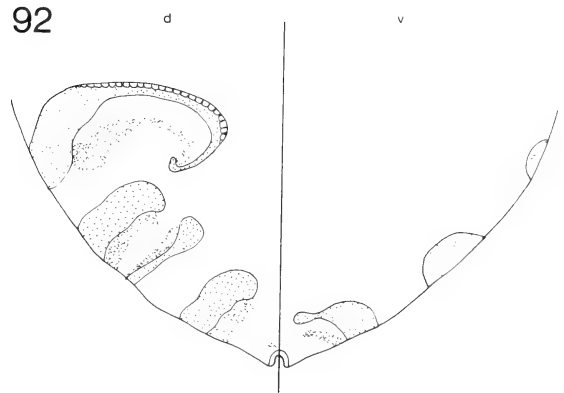
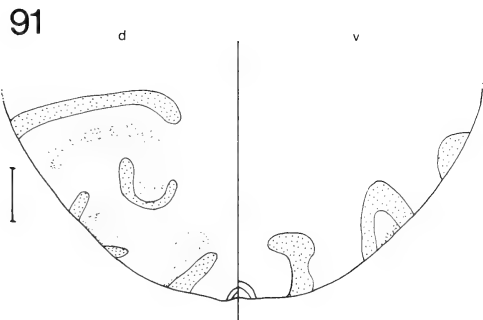
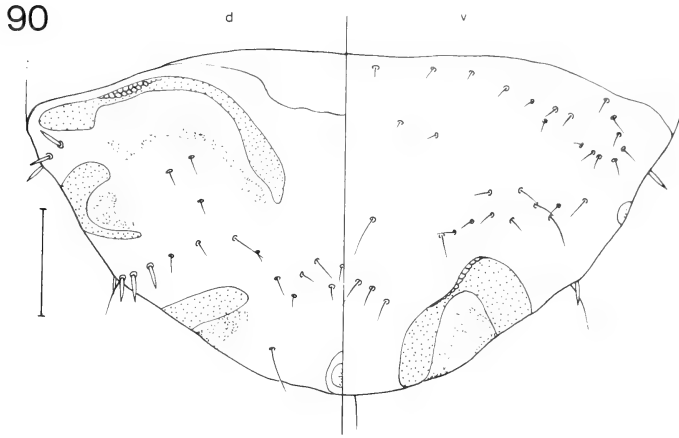
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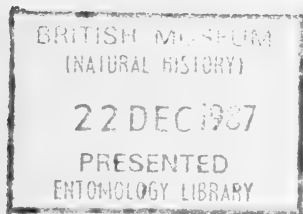
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A review of the Rhadalinae
(= Aplocneminae)
(Coleoptera: Melyridae)

Enid R. Peacock

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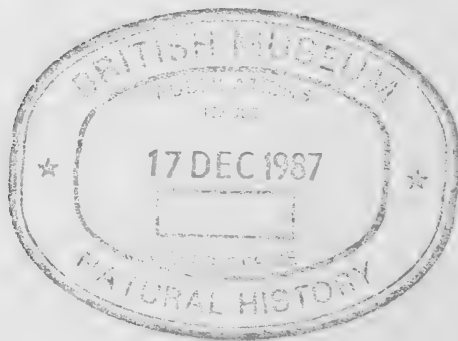
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A review of the Rhadalinae (= Aplocneminae) (Coleoptera: Melyridae)

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Synopsis

Thirteen world genera of Rhadalinae (Melyridae) are recognized here, of which three are included in the subfamily for the first time: *Antinea* Peyerimhoff, *Indiodasytes* Pic and *Hemipleurus* gen. n., erected for *H. floriger* sp. n. from Borneo. A generic key is given together with a diagnosis and type species citation for each genus. *Eurelymis* Casey (NW. America), from the Melyrinae, and *Celsus* Lewis (Japan), from the Dasytinae, are regarded as junior synonyms of *Semijulistus* Schilsky (Holarctic Region), *Cymbolus* Gorham is synonymized with *Rhadalus* LeConte and *Xamerpus* Fairmaire with *Malthacodes* Waterhouse. The two Indian species of *Aplocnemus* Stephens, *A. indicus* Champion and *A. moestus* Gorham, are transferred to *Malthacodes* Waterhouse. *Malthacodes parvus* nom. n. is proposed as a replacement name for *M. minutus* (Pic, 1931) [originally in *Xamerpus*] (nec Pic, 1906). Checklists of genera and species are provided. Distinguishing features are given for adult and larval Melyridae and Rhadalinae and comments are made on the biology of the latter.

Introduction

The Melyridae (sensu Crowson, 1964 and Lawrence, 1982) is the largest family in the superfamily Cleroidea, with at least 200 genera. Crowson (1964) considered it to be divisible into five subfamilies: the Rhadalinae (Aplocneminae), the Melyrinae, the Malachiinae, the Prionocerinae and the Dasytinae. These subfamilies have all, at one time or another, been given family rank and some are currently considered as such by recent authors (e.g. Constantin, 1965; Liberti, 1984; Wittmer, 1984 etc.). In spite of its size the family has been poorly studied in recent years, except for the subfamily Malachiinae which has been the subject of extensive studies by Wittmer (1930 *et seq.*). At the beginning of the century and before, there were several prolific writers whose unco-ordinated descriptive efforts, mainly at specific level, caused a certain amount of taxonomic confusion in the family.

The first author to create some order out of this confusion was Crowson who, in his major work on the higher classification of Coleoptera (1955) and in subsequent works (1964, 1970), keyed out and defined the superfamilies, families and subfamilies. Since then, Majer (1987) has produced a useful work completely revising the phylogeny and taxonomy of the family. He introduced new taxa, divided the family into subfamilies, supertribes and tribes and discussed in detail the supposed phylogeny of the group.

In the course of his study of the Melyridae, Crowson (1964) discovered a distinctive group of genera whose close relationship had been hitherto overlooked and for which he erected a new subfamily, the Aplocneminae. This included genera from the melyrid subfamilies Melyrinae and Dasytinae, the Cleridae and the Rhadalidae (*Coleopterorum Catalogus*, Pic, 1929, 1937; Corporaal, 1950; Pic, 1926). However, Crowson overlooked the fact that a family group name (Rhadalidae) was already in use for one of his included genera: *Rhadalus* LeConte. The name Rhadalinae therefore has priority (Article 23(a), *International Code of Zoological Nomenclature*, 1985) and is employed here.

These discoveries, along with some additional genera, nomenclatural changes, new generic synonymies and the erection of a new genus, indicated the need for a review of the entire subfamily and hence this study.

In the present paper Crowson's (1964) treatment of the subfamily is reappraised, decisions concerning the status of the included genera being based on the study of their type species (something that Crowson failed to do). As a result 12 of the 25 nominal genera are regarded as valid and one additional genus is described as new.

Although the Rhadalinae comprises only 13 (out of 25 nominal) genera, its distribution is almost world-wide. The group seems to be restricted mainly to semi-dry forested, mountainous or hilly areas, although some species have been collected on sea beaches. The adult beetles are found on flowers, shrubs or on the leaves or bark of coniferous or deciduous trees and although most are carnivorous to a certain extent, some are pollinivorous or both carnivorous and pollinivorous. The subfamily is well defined, all of its species exhibiting the unusual feature of the connation of the first two visible abdominal sternites. This feature is found in no other group of Melyridae nor in other cleroid families. Its other unusual and notable feature is the sclerite articulated to the (morphologically) dorsal side of the median lobe of the aedeagus. This sclerite articulates at its basal end with the median lobe in a hinge-like joint, and is freely moveable in all the genera examined except *Microjulistus*, in which it appears to be fused at the base to the median lobe. The only genus in the group lacking this sclerite (or appendage) is the Indian *Indiodasytes*.

MELYRIDAE Leach, 1815¹

Distinguishing features

Adults. Adult Melyridae are generally distinguished from related families by the following characters: antennae usually 11-segmented and serrate or filiform, but sometimes pectinate or with some basal segments modified, apical segments not differentiated to form a club; claws either simple, split, toothed or with membranous appendages; front coxal cavities open behind, coxae large and projecting, with exposed trochantins; tarsi 5-segmented, sometimes 4,5,5 in male [exception *Anthriboclerus*, 4,4,4] and without strongly lobed segments; prothorax usually with distinct side margins; elytra without striae (except in some *Melyris* spp. which also have costae); sometimes with exsertile vesicles at anterior angles of prothorax and abdominal pleura; abdomen with 6 visible sternites which are usually free but occasionally with the first two connate; aedeagus with undivided tegmen.

Larvae. Melyrid larvae can be distinguished from those of all other cleroid families [except Phycosecidae] by the following characters: head with a well-marked median epicranial suture and no endocarina; mouthparts retracted, stipes much longer than cardo; spiracles annuliform (Crowson, 1970); mandible with a long, stiff prosthecal process near the middle or at the base of inner margin (Böving & Craighead, 1930). They differ from Phycosecidae in possessing 1–5 ocelli on each side instead of 6. [The larvae of other cleroid families have the following characters: head rarely with a distinct median cranial suture, but if so,

¹ *Fide* Watt (1975: 33). Pic (1937: 3) and Majer (1987: 784) give Olivier, 1790 as author but there is no family group name in that work.

then with mouthparts strongly protracted and stipes not longer than cardo; endocarina usually distinct; spiracles usually bicameral; mandible either without a prosthecal process or with a short one.]

RHADALINAE LeConte

Rhadalini LeConte, 1861: 191, 194; LeConte & Horn, 1883: 213, 216.

'Haplocnemates' Mulsant & Rey, 1868: 181.

Rhadalinae LeConte; Casey, 1895: 457; Blaisdell, 1938: 3; Hatch, 1962: 86; Arnett, 1968: 609, 611, 613; Blackwelder, 1975: R67.10.

Rhadalidae LeConte; Pic, 1926a: 3; Crowson, 1964: 315, 320.

Aplocneminae ([*erratum* Haplocneminae] Crowson, 1964: 316, 317, 318, 319, 320; Constantin, 1965: 92; Vinson, 1967: 330); Majer, 1983: 387. **Syn. n.**

Aplocnemina; Majer, 1987: 800.

Taxonomy and distinguishing features

Adults Adult Rhadalinae are distinguished from the other subfamilies of Melyridae by the following characters in combination:- first two visible abdominal sternites connate; apical segment of maxillary palps broadened, securiform or triangular except in some species of *Aplocnemus* Stephens); median lobe of aedeagus with dorsal appendage (Fig. 7) or 'lever' (Majer, 1982).

Members of the Rhadalinae are diverse in appearance but all have the three characters mentioned above, except for *Aplocnemus* (*Ischnopalpus*) which has a spindle-shaped apical segment to the maxillary palps, and *Indiodasytes* which lacks the dorsal appendage to the median lobe of the aedeagus. They are also characterized by the following features:- antennae usually serrate, sometimes pectinate; eyes entire or weakly emarginate; head generally broader than long, often retractable under pronotum; body usually densely hairy and strongly convex; tarsi varying from finely elongate and simple to short, broad and weakly lobed, segment 1 normally at least as long as 2; tarsal claws toothed or with free membranous appendages; dorsum either unicolorous or patterned; puncturation on head simple, rimmed, or confused; pronotal punctures entirely simple, or simple on disc but rimmed or tuberculate at sides, or all rimmed or all tuberculate, or confused so that individual punctures are not distinguishable; elytral punctures usually simple, sometimes with a seta emerging from the puncture, but more usually from beside it; epipleura well developed at base; wing venation variable as shown in Figs 48–59.

Crowson (1964) erected the subfamily Aplocneminae (as Haplocneminae) [= Rhadalinae] for the following genera: *Anthriboclerus* Schenkling, [*H*] *aplocnemus* Stephens, *Cymbolus* Gorham, *Diplambe* Schilsky, *Donaldia* Alluaud, *Eucymbolus* Champion, *Ischnopalpus* Schilsky, *Julistus* Kiesenwetter, *Malthacodes* Waterhouse, *Pelecophora* Dejean, *Rhadalus* LeConte, *Trichocele* Thomson and *Xamerpus* Fairmaire. Majer (1983), who regards the group as of lower taxonomic rank than subfamily, added *Kubanius* Majer, *Semijulistus* Schilsky and *Microjulistus* Reitter. In this paper I add: *Antinea* Peyerimhoff, *Celsus* Lewis, *Eurelymis* Casey, *Indiodasytes* Pic and *Hemipleurus* gen. n. A complete checklist of included genera is provided below.

Larvae. The known rhadaline larvae (*Trichocele*, *Aplocnemus*, and *Pelecophora*) possess the following characters (Crowson, 1964): head with 2 ocelli on each side, the larger one being anterior to the smaller, so that a line through the 2 would pass through the antennal foramen; urogomphi, on abdominal tergite 9, varying from minute to very long; abdominal tergite 9 either with a membranous appendage in the middle of each side (*Pelecophora* and *Aplocnemus*), or with a group of setiferous tubercles (unnamed larva from Chile) or forming a large flat plate with minute, widely separated urogomphi (*Trichocele*).

Rhadaline and melyrine larvae have glandular openings on the 9th abdominal tergite only (Crowson, 1981) and some *Aplocnemus* larvae have dark subcuticular patches on abdominal segments 1–8, usually 2 pairs on each segment. Vinson gives a detailed description of a larva assumed to be *Pelecophora pikei* Vinson (1957).

Larvae of the other melyrid subfamilies usually have more ocelli, but if there are only two on each side, then they are one above the other so that a line through them would not pass through the antennal foramen. Tergite 9 is without the above mentioned structures.

Biology

With the exception of Australasia, species of Rhadalinae are known to occur in all major biogeographic regions, but little is known about their biology.

Most adult rhadalines are probably carnivorous to a certain extent. Examination of the gut contents of adult species of *Aplocnemus*, *Trichocele*, *Pelecophora* and *Donaldia* [= *Malthacodes*] has revealed insect

fragments (Vinson, 1946; Crowson, 1964), but in species of *Rhadalus* and *Indiodasytes* only pollen grains were found (Crowson, 1964; Peacock, pers. obs.). Denticulation of the cutting edge of the mandible, a character indicating pollinivorous habits, is absent in most Rhadalinae, although it is shown in a figure of a mandible of *Pelecophora* (Vinson, 1946), indicating perhaps that this genus is both carnivorous and pollinivorous.

It is likely that the larvae of this group are carnivorous as are most cleroid larvae, even though the examination of some larval gut contents by Crowson (1964) revealed no identifiable remains. This view is supported by the presence of a pedunculate seta (Vinson called it a 'lacinia') on the maxillary mala of a larva of *Pelecophora* (Vinson, 1957), a character peculiar to all known carnivorous cleroid larvae (Crowson, 1964).

There appear to be scant records of habitat preference and the few larvae that have been collected seem to live concealed either on or in the soil or in decaying wood. The following paragraphs give an indication of the habitat preferred by some adults.

In Mauritius, *Pelecophora* and *Donaldia* [= *Malthacodes*] have been found during the day on the leaves and branches of shrubs and trees, where they were probably feeding on small insects (Vinson, 1946). Vinson noticed that these seemingly carnivorous beetles are constantly associated with the indigenous vegetation, occurring in their greatest numbers during the hot season from November to March. He also found a *Pelecophora* larva under a stone in association with an adult crawling out of a pupal cell (1957).

Adults of the North American *Eurelymis* [= *Semijulistus*] are often found at high altitudes. They are attracted to wood smoke (Leech, 1931) and have been found on *Achillea* (Hatch, 1961). *E.* [= *S.*] *atra* LeConte has been reared from pupae which were found in bee burrows, in sand, in Alberta, Canada, and *E.* [= *S.*] *flavipes* LeConte was found on *Pyrocantha* in California [specimens loaned to author]. *Cymbolus* [= *Rhadalus*] *elongatus* Champion was collected in Temascaltepec, Mexico, in large numbers on *Mimosa* and *Spondias* spp. and several individuals of *C.* [= *R.*] *wolcotti* Hinton were collected on *Pinus pseudostrobus* Lindley (Hinton, 1934).

In Japan, *Celsus* [= *Semijulistus*] is not common and has only been seen in recent years (Nakane, pers. comm.). In Kogoshima, Nakane found adults in abundance on flowers of *Viburnum*, *Rosa*?, *Prunus*? etc. in April and May, but collected only one in July. They were usually captured singly or in pairs except in mid-April when as many as 45, of both sexes, were seen at a time. No larvae were found.

In Central Europe *Aplocnemus* is found on the flowers of pine trees, but has also been collected on deciduous trees, and *Trichocle* (widespread but not common) has been found on flowering shrubs and in dry wood under trees (Lohse, 1979). *Aplocnemus* has been recorded on oak in Spain (Constantin, 1965) and *Kubanius elegans* Majer (U.S.S.R.) was 'reared in *Picea schrenckiana*' (Majer, 1983).

Checklist of the genera of the Rhadalinae

ANTHRIBOCLERUS Schenkling, 1922: 328.

ANTINEA Peyerimhoff, 1929: 191.

APLOCNEMUS Stephens, 1830: 316.

Elicopis Stephens, 1829: 136.

Haplocnemus Stephens; Agassiz, 1846[7]: 29.

Helicopis Stephens; Agassiz, 1846[7]: 29.

Subgenus **APLOCNEMUS** Stephens, 1830: 316.

Subgenus **DIPLAMBE** Schilsky, 1894: 234.

Subgenus **HOLCOPLEURA** Schilsky, 1894: 234.

Subgenus **ISCHNOPALPUS** Schilsky, 1894: 235.

Subgenus **PSEUDAPHYCTUS** Pic, 1896: 47.

EUCYMBOLUS Champion, 1913: 129.

HEMIPLEURUS gen. n.

INDIODASYTES Pic, 1916: 14.

KUBANIUS Majer, 1983: 385.

MALTHACODES Waterhouse, 1876: 116,

Xamerpus Fairmaire, 1886: 41. **Syn. n.**

Donaldia Alluaud, 1898: 102.

MICROJULISTUS Reitter, 1889a: 111.

Ceralliscus Bourgeois, 1894: 121.

PELECOPHORA Dejean, 1821: 115.

Diglobicerus Latreille, 1829: 475.

RHADALUS LeConte, 1852: 212.

Cymbolus Gorham, 1886: 324. **Syn. n.**

SEMIJULISTUS Schilsky, 1894: 227.

Celsus Lewis, 1895: 118. **Syn. n.**

Eurelymis Casey, 1895: 600. **Syn. n.**

TRICHOCEBLE Thomson, 1859: 109.

Julistus Kiesenwetter, 1859: 175.

Notes on the key and checklists of species

The measurements of approximate body length in the descriptions are taken from the front of the pronotum to the apex of the elytra, since in many genera the head is retractable under the pronotum and hence only partially visible from above.

The term 'free' when describing the membranous appendages on the claws means that they are attached to the claws at the base only (Fig. 15). In most dasytines possessing these structures, the appendage is attached to the claw along its length almost to the apex, or for at least half its length (Blaisdell, 1938: pl. 2, figs 1–20).

A 'rimmed' puncture means that there is a circle around the puncture but the area within this is not raised above the surrounding surface (Fig. 1). A 'tuberculate' puncture is within a circular area which is raised above the surrounding surface (Figs 21, 22, 24).

In the species checklists it should be noted that the species of earlier authors are taken from the *Coleopterorum Catalogus* (Pic, 1926, 1929, 1937) in order to complete the lists and have not in all cases been examined. However, the references have been checked and many errors have been rectified. The varieties cited in Pic's catalogue have been listed here in synonymy. The generic names in parentheses denote the genus in which the species was described, if not the current genus.

Abbreviations

BMNH British Museum (Natural History), London.

MCZ Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

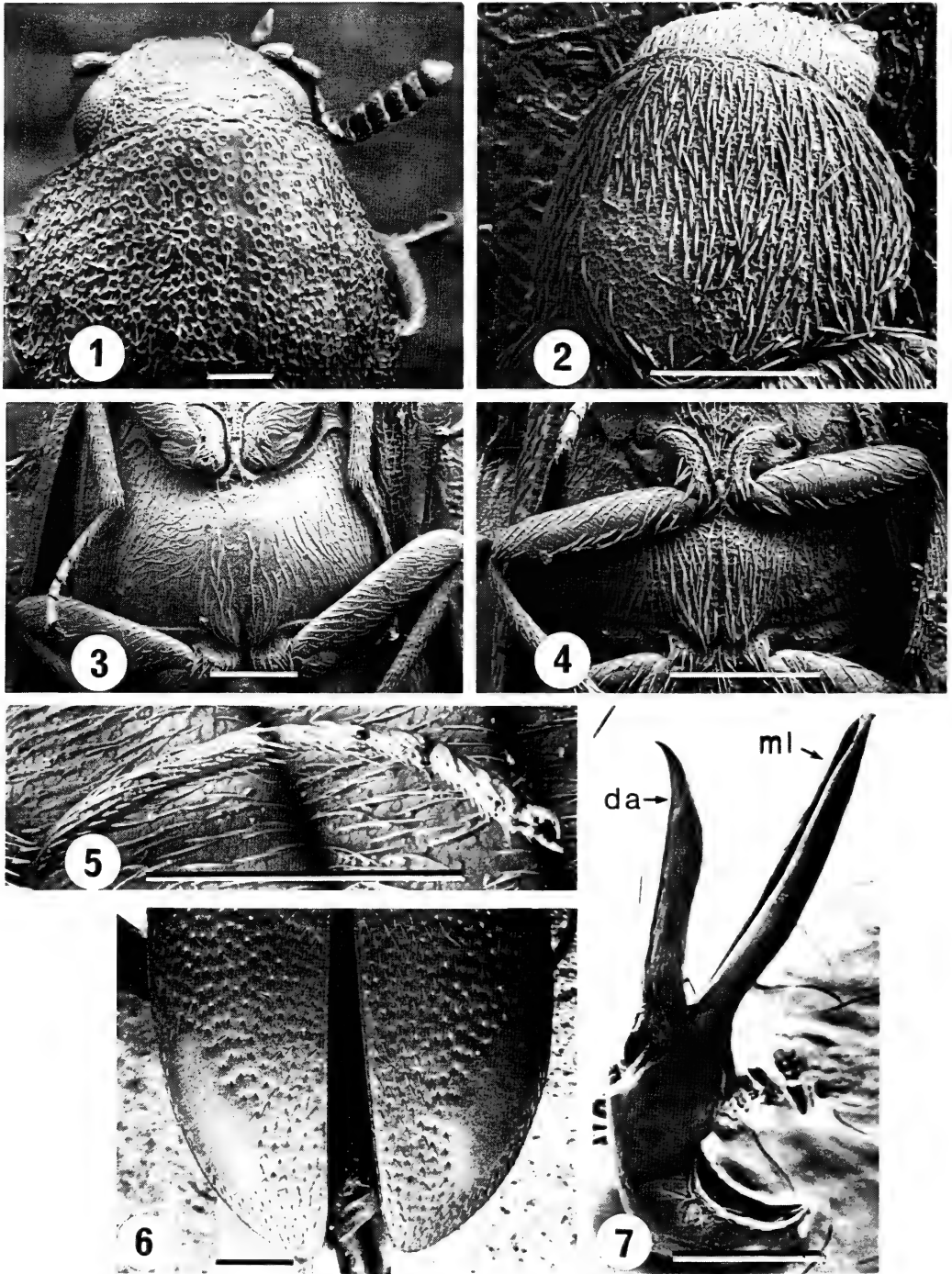
MNHN Muséum national d'Histoire naturelle, Paris.

USNM National Museum of Natural History [U.S. National Museum], Smithsonian Institution, Washington, D.C.

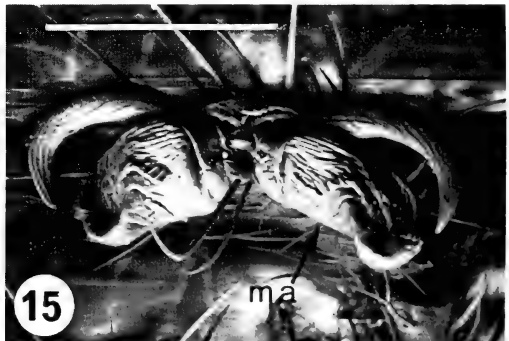
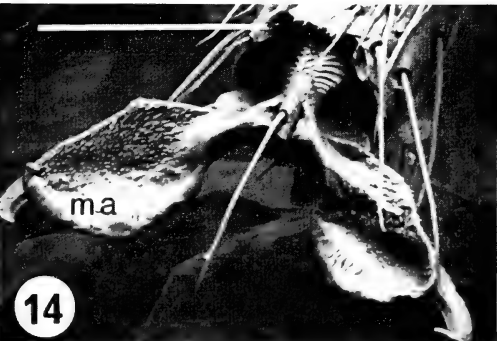
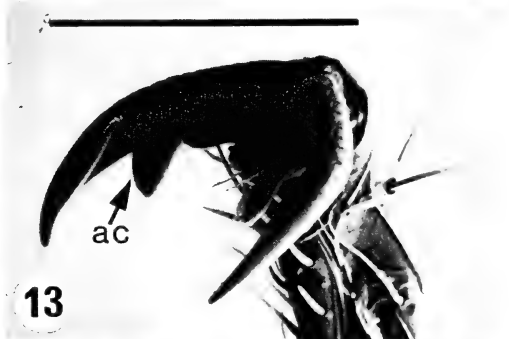
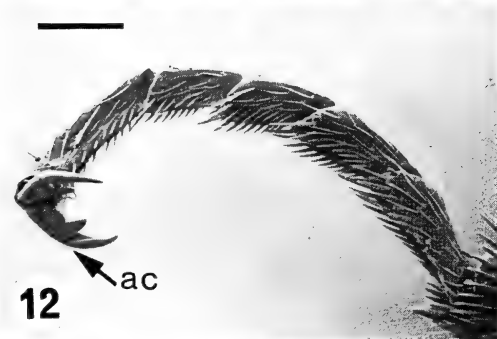
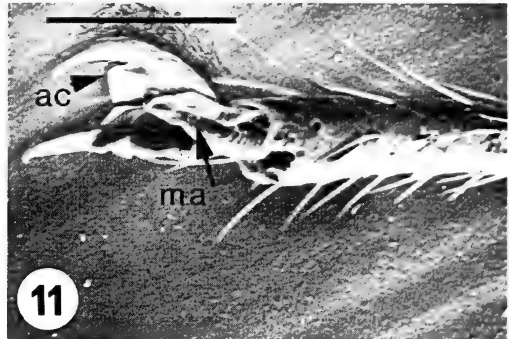
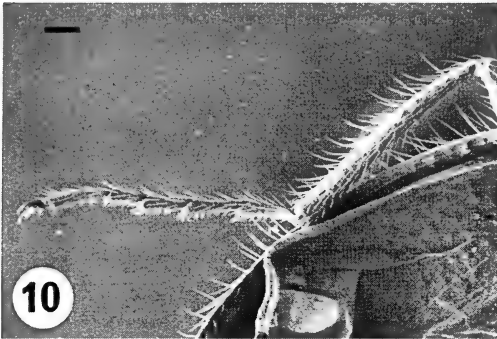
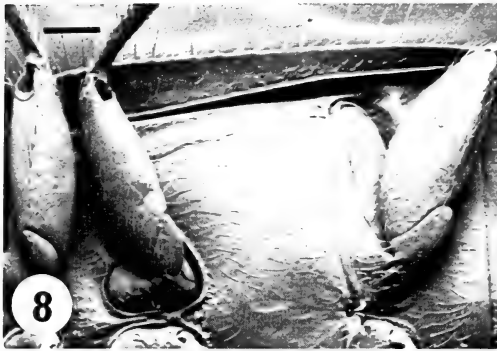
[*Note.* See *Acknowledgements* for full list of institutions from which material was borrowed.]

Key to adults of the world genera of the Rhadalinae

- 1 *Epipleura* very narrow, usually mat or granular, and deflecting laterad at, or before, level of hind coxae (Figs 3, 4), becoming subvertical. Pubescence of dorsum uniformly short and recumbent, sometimes scale-like (Figs 1, 2). Tarsi elongate and slender (Figs 3, 5), claws with small teeth, without membranous appendages. Antennae fairly short, sometimes with segments 7–10 enlarged, compactly serrate (Fig. 1). Length not more than 5 mm. 2
- *Epipleura* broader, usually shiny, deflecting dorsad either at about level of 2nd or 3rd visible abdominal sternite (Figs 8, 17, 35) or at or before base of 1st visible abdominal sternite (Fig. 9). Pubescence of dorsum not as above, nearly always with some erect or semi-erect setae. Tarsi variable. Antennae elongate, reaching base of pronotum or beyond and usually loosely serrate or pectinate from segments 4–10 (rarely 3–10) (Figs 40–44). Length 2–7 mm. 3
- 2 *Epipleura* evanescent anterior to 1st abdominal sternite (Fig. 4). Lateral pronotal margin smooth, or with a few small teeth near base. Pronotum mat, puncturation indistinct, with strong microsculpture, forming an irregular reticulum under pubescence (Fig. 2). Disc of metasternum flat, with distinct median longitudinal groove (Fig. 4). Females without unpunctured patch on apical third of elytron. Length less than 3 mm. (C. Europe & Asia, Africa, Arabia, Mediterranean). **MICROJULISTUS**(p. 161)
- *Epipleura* narrow and becoming subvertical from level of 1st abdominal sternite, visible in side view from just behind shoulder. Lateral pronotal margin strongly serrate. Pronotum with shallow, rimmed punctures (Fig. 1), sometimes obscured by pubescence. Disc of metasternum convex, without a distinct median longitudinal groove (Fig. 3). Females usually with shiny unpunctured patch on apical third of each elytron (Fig. 6). Length 3–5 mm. (C. & E. Europe, Asia, Japan, western U.S.A., Canada). **SEMIJULISTUS**(p. 159)
- 3 Tarsi elongate and claws appendiculate, membranous appendages either absent or minute. (Figs 10–13). 4

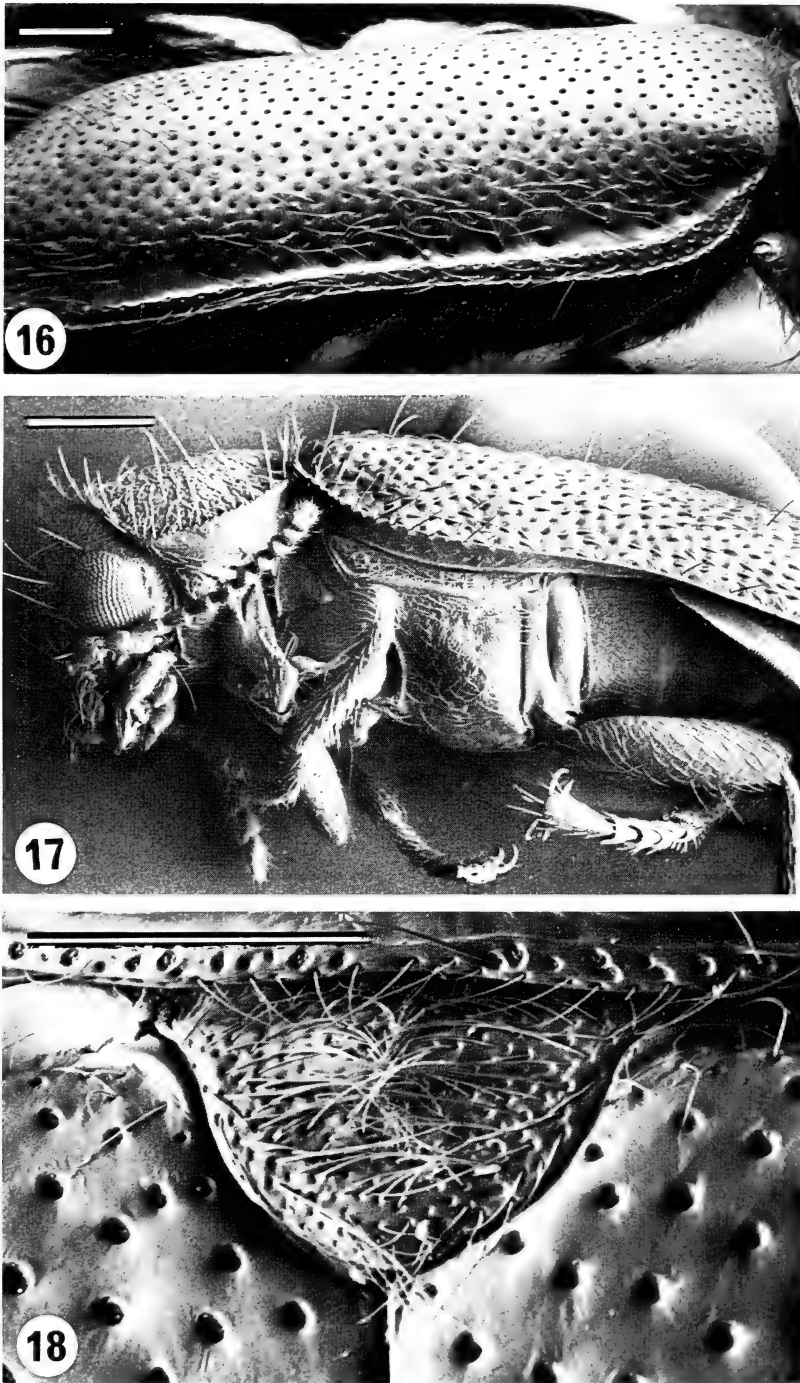


Figs 1-7 1, 6, 7, *Semijulustus ater* (Canada): (1) pronotum; (6) elytral apices of female; (7) aedeagus of male. 2, 4, *Microjulustus fulvus* (U.S.S.R., Kazakhstan): (2) pronotum; (4) metasternum. 3, 5, *Semijulustus spectabilis* (Japan): (3) metasternum; (5) hind tarsus. (Scale line = 0.3 mm.) da = dorsal appendage; ml = median lobe.)

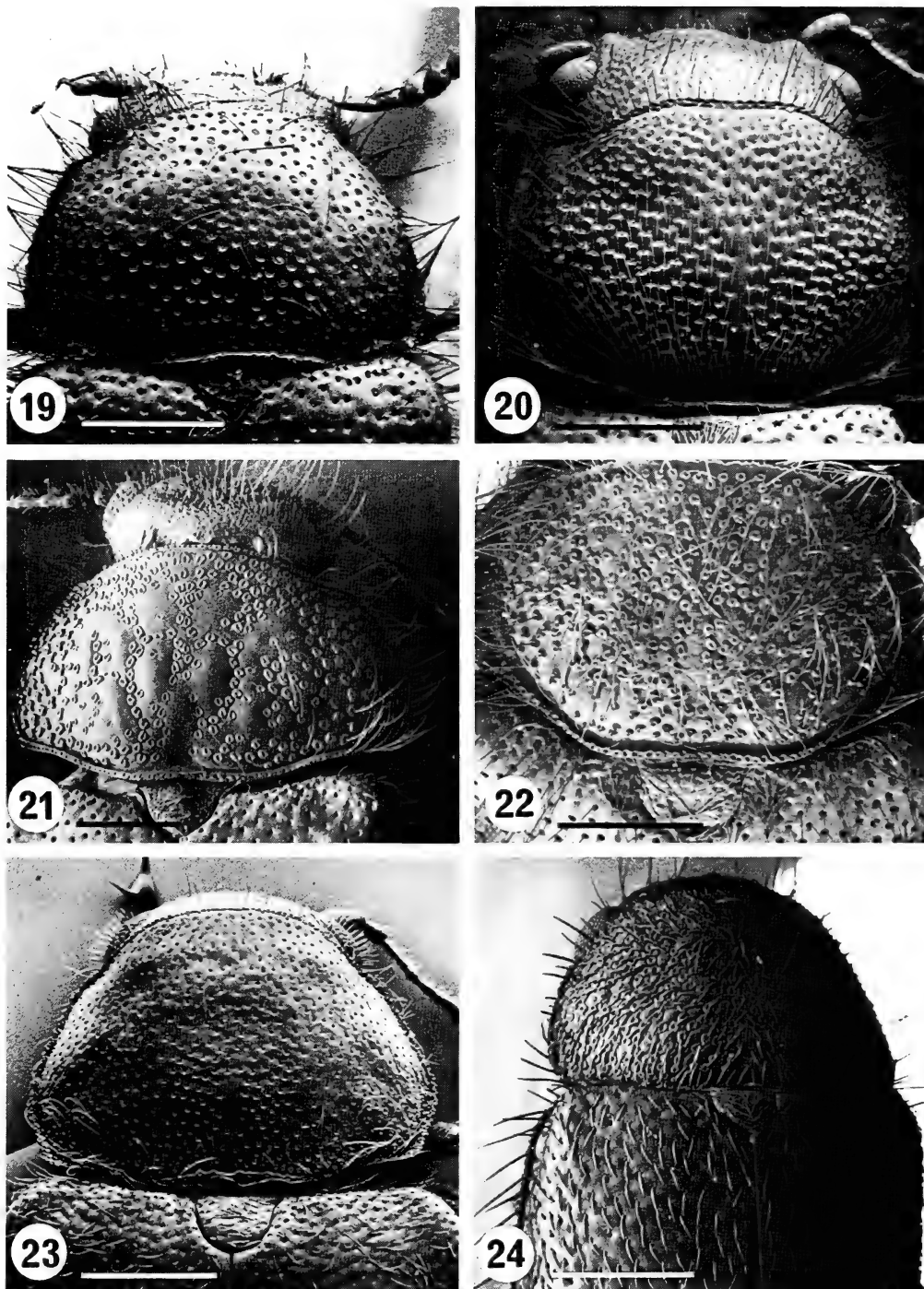


Figs 8–15 8, *Malthacodes pictus* (Rodriguez I.): epipleuron. 9, *Hemipleurus floriger* (Sarawak [paratype]): epipleuron. 10, 11, *Kubanius elegans* (U.S.S.R., Kazakhstan [paratype]): (10) hind tarsus; (11) hind claw. 12, 13, *Trichoceble floralis* (France): (12) hind tarsus; (13) claw. 14, *Aplocnemus impressus* (England): hind claw. 15, *Pelecophora illigeri*, (Mauritius): hind claw. (Scale line = 0.1 mm.) *ma* = membranous appendage; *ac* = appendiculate claw.

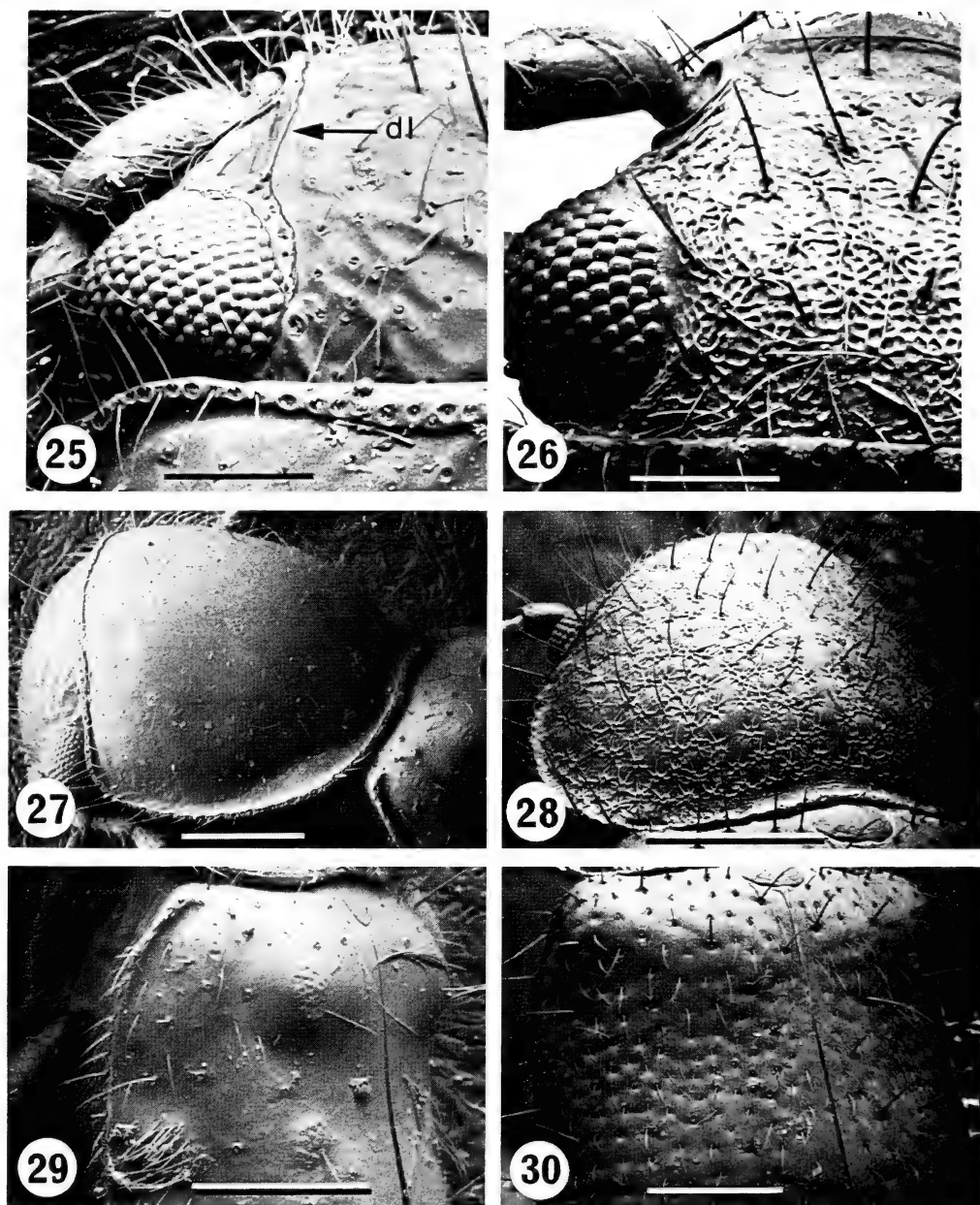
- Tarsi stout or delicate, claws not appendiculate, but with large free membranous appendages (Figs 14, 15, 45-47). 6
- 4 Eyes small, oval, not projecting beyond contour of head. Head weakly convex between eyes. Temples long, subparallel. Claws with minute teeth. Apterus, without humeral swellings. (N. Africa: Sahara.) **ANTINEA** (p. 159)
- Eyes large, reniform, prominent, projecting beyond contour of head when seen from above. Head sometimes with a short, longitudinal groove or depression at inner side of antenna and eye. Temples constricted behind eyes. Claws with strong teeth. Winged, elytra with distinct humeral swellings. 5
- 5 Dorsum without metallic sheen. Hard-bodied. Pronotum usually elliptical, broader than head (including eyes). Elytra and pronotum convex and densely punctured; epipleura long, extending to about 2nd visible abdominal sternite. Hind tarsus not quite as long as tibia. Claws with either pointed (Figs 12, 13) or blunt teeth. (C., S. & E. Europe, Asia, China.) **TRICHOCEBLE** (p. 158)
- Dorsum with slight metallic sheen. Soft-bodied, malacodermiform. Pronotum subquadrate or elliptical, sometimes flattened on disc, not always broader than head. Elytra flattened on disc, apices abruptly declivous, rather sparsely punctured; epipleura short, not reaching hind coxae. Hind tarsus about as long as tibia (Fig. 10). Claws with large, blunt teeth, sometimes also with small, obscure membranous appendages (Fig. 11). (U.S.S.R. (Kazakhstan), N. India.) **KUBANIUS** (p. 157)
- 6 Elytra with sublateral carina in basal half, forming a double elytral edge (Fig. 16). 7
- Elytra without sublateral carina in basal half (Fig. 17). 9
- 7 Pronotal punctures all simple. Apical segment of maxillary palps only weakly securiform (Fig. 31). Form elongate, elytra more than twice as long as wide. Dorsum usually black, sometimes with a metallic sheen. (Greece.) **APLOCNEMUS (DIPLAMBE)** (p. 151)
- Pronotal punctures tuberculate, at least near sides. Apical segment of maxillary palps triangular. Form elongate and dorsum usually unicolorous brown, or form very broad (length less than twice width), head brown, elytra and pronotum black. 8
- 8 Form elongate. Elytra and pronotum brown. Scutellum mat, densely and finely punctate and densely setose (Fig. 18). Sublateral elytral carina close and subparallel to costal margin, forming an abrupt, narrow, horizontal shelf, with a row of very large punctures along inner side (Fig. 16). Disc of pronotum with strongly rimmed or tuberculate punctures, sometimes with raised, shiny puncture-free patches (Figs 21, 22). (Southern U.S.A., C. & S. America.) **RHADALUS** (p. 144)
- Form very short and broad (see couplet 7). Elytra and pronotum bluish-black. Scutellum shiny, very sparsely punctate and setose. Sublateral carina oblique to costal margin and less prominent, so scarcely forming a shelf, without such large punctures along inner side. Pronotum with small simple punctures on disc and tuberculate punctures near sides. (C. America.) **EUCYMBOLUS** (p. 145)
- 9 Humeral swellings very prominent and elytra with a pronounced transverse depression across basal third (Figs 29, 30). 10
- Humeral swellings less prominent and elytra without a transverse depression across basal third. 11
- 10 Pronotum very large and quadrate, about half as long as elytra; shiny, with sparse setae, puncturation inconspicuous (Fig. 27). Head large, shiny and convex with faint diagonal ridges from base of antenna to eye (Fig. 25). Elytra with semi-erect shorter setae between the sparse, very long, erect setae; tufts of dense setae present on weak tubercles, just posterior to transverse elytral depression, and also on larger tubercles at inner side of humeral swellings (Fig. 29); epipleura extending to base of 2nd visible abdominal sternite. (Seychelles.) **ANTHRIBOCLERUS** (p. 145)
- Pronotum of moderate size, transverse, much less than half as long as elytra; with distinct puncturation (Fig. 28). Head mat, without diagonal ridges (Fig. 26). Elytra with recumbent setae between sparse, long, erect setae (Fig. 30); epipleura not extending further than base of 1st visible abdominal sternite (Fig. 9). (Borneo.) **HEMIPLEURUS** (p. 147)
- 11 Pronotal punctures simple (Fig. 19). Maxillary palps moderately securiform (Fig. 31) or spindle-shaped (Fig. 32). Dorsum usually brown or black, often with a metallic bluish or greenish tinge (some species from the Canary Is are light brown or yellow). Setae on elytra usually of fairly uniform length and colour. (Palearctic, N. & W. Africa (Angola? & Ivory Coast), Asia Minor, Philippines.) **APLOCNEMUS** (p. 151)



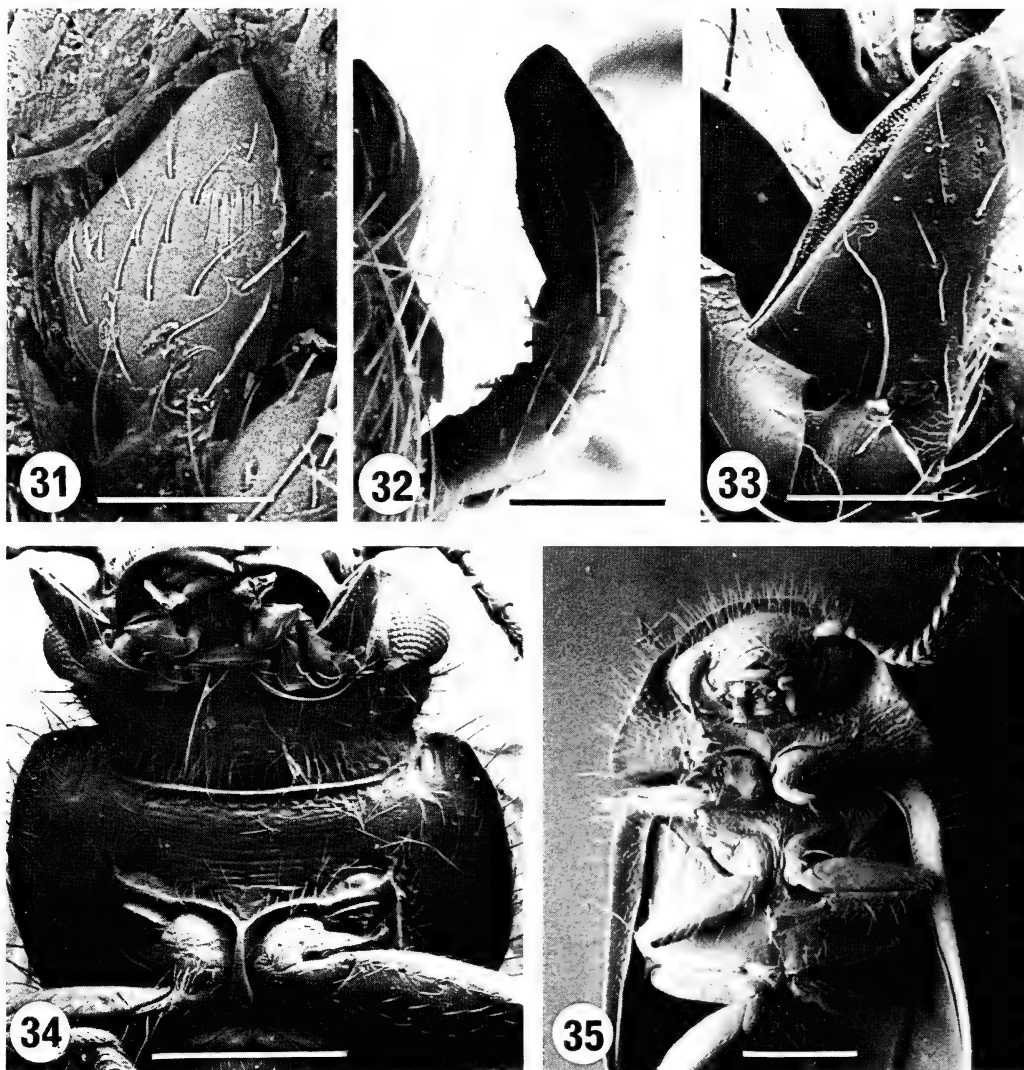
Figs 16–18 16, *Rhadalus rufopiceus* (Guatemala [syntype]): lateral view of elytron. 17, *Indiodasytes madurensis* (India [holotype]): lateral view of body. 18, *Rhadalus rufopiceus*: scutellum. (Scale line = 0.4 mm.)



Figs 19–24 Pronotum of: (19) *Aplocnemus impressus* (England); (20) *Pelecophora illigeri* (Mauritius); (21) *Rhadalus rufopiceus* (Guatemala [syntype]); (22) *Rhadalus testaceus* (U.S.A.); (23) *Trichoceble floralis* (France); (24) *Indiodasytes madurensis* (India [holotype]). (Scale line = 0.5 mm.)

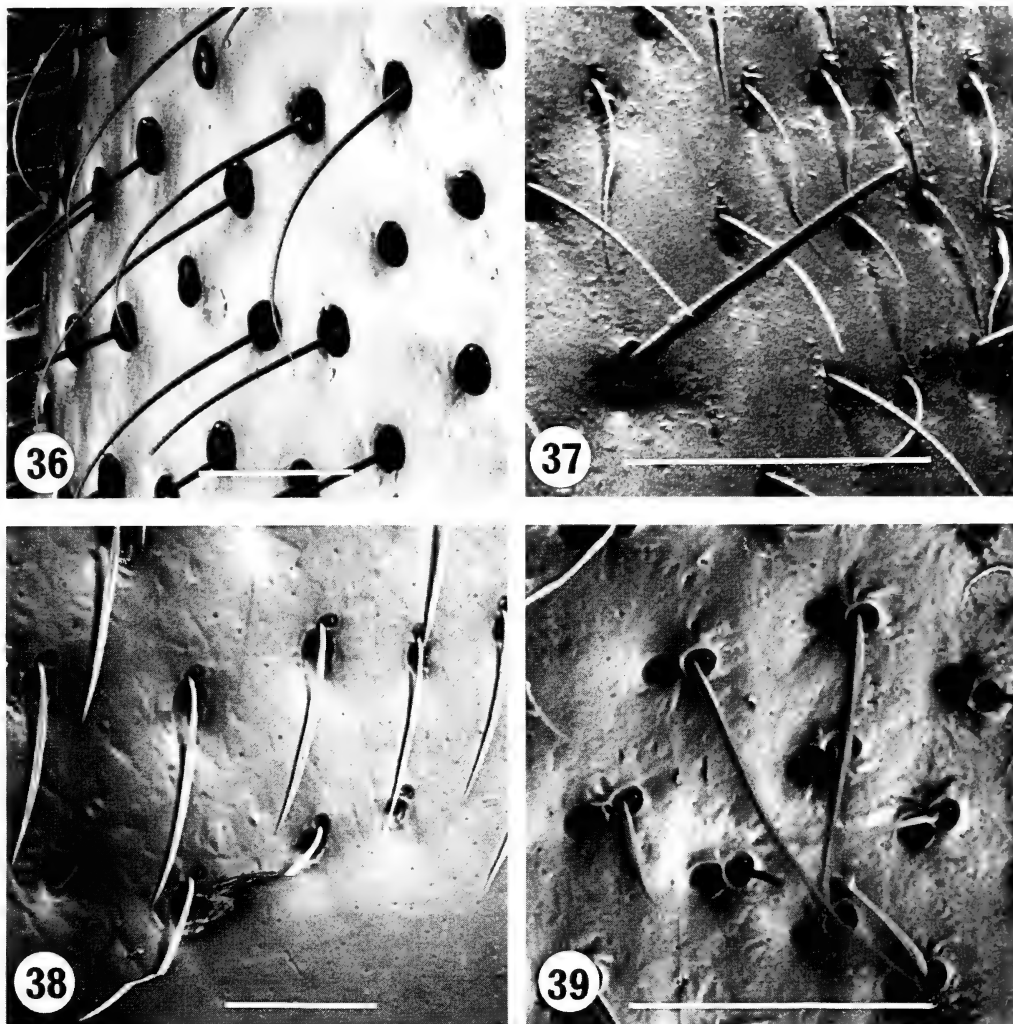


Figs 25–30 25, 27, 29, *Anthriboclerus scotti* (Seychelles [paratype]); (25) part of head; (27) pronotum; (29) basal half of elytra. 26, 28, 30, ditto, *Hemipleurus floriger* (Sarawak [paratype]). (Scale line = 0.1 mm in Figs 25, 26; = 0.3 mm in Figs 27–30.) dl = diagonal line.



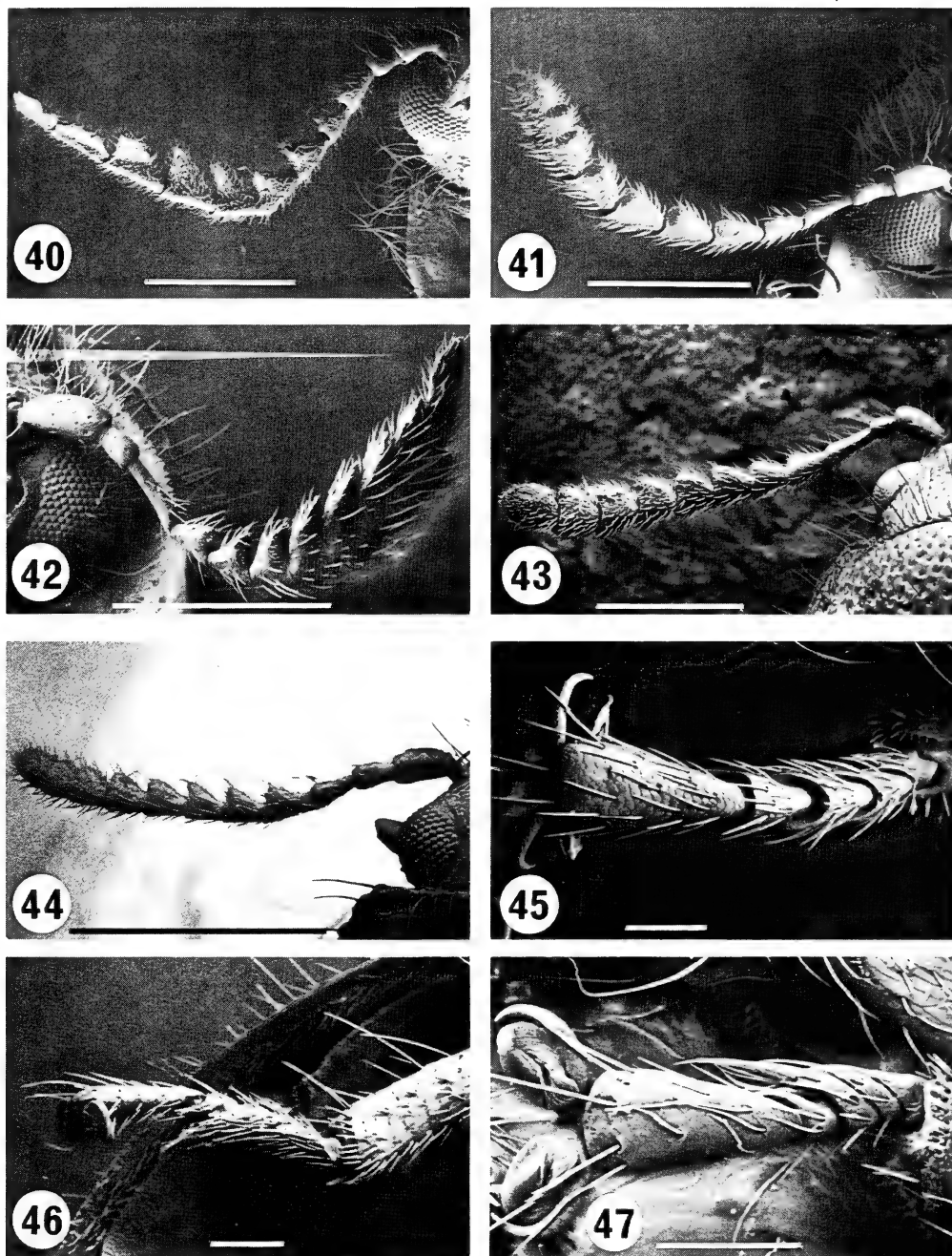
Figs 31–35 31–33, apical segment of maxillary palp of: (31) *Aplocnemus nigricornis* (England); (32) *Aplocnemus (Ischnopalpus) sanctus* (Palestine); (33) *Pelecophora illigeri* (Mauritius). 34, 35, ventral view of prosthernum of: (34) *Pelecophora illigeri*; (35) *Malthacodes vageguttatus* (Madagascar). (Scale line = 0.1 mm in Figs 31–33; = 0.5 mm in Figs 34–35.)

- Pronotal punctures tuberculate or rimmed at sides. Maxillary palps broadly triangular (Fig. 33). Dorsum brown or black or bicolorous and patterned. Elytral setae not usually uniform, sometimes both erect and semi-erect, or with patches of recumbent setae, often bicolorous. 12
 - 12 Head very large, not retractable under pronotum. Prosthernum long in front of coxae; prosternal process well developed (Fig. 34). Pronotal punctures usually simple on disc and tuberculate at sides, sometimes becoming weakly tuberculate on disc also, which then appears rugose (Fig. 20). Elytra usually with short and long, erect or suberect setae, often forming patches. Cuticle or setae bicolorous. (Mauritius, Réunion, E. Africa.)
- PELECOPHORA**(p. 146)
- Head smaller, somewhat vertical, partly retractable under pronotum. Prosthernum shorter in front of coxae; prosternal process small and pointed (Fig. 35). Pronotal punctures rimmed or tuberculate on disc, or not clearly defined, but never simple. Cuticle either bi- or unicolorous; setae variable in length, type and colour. 13

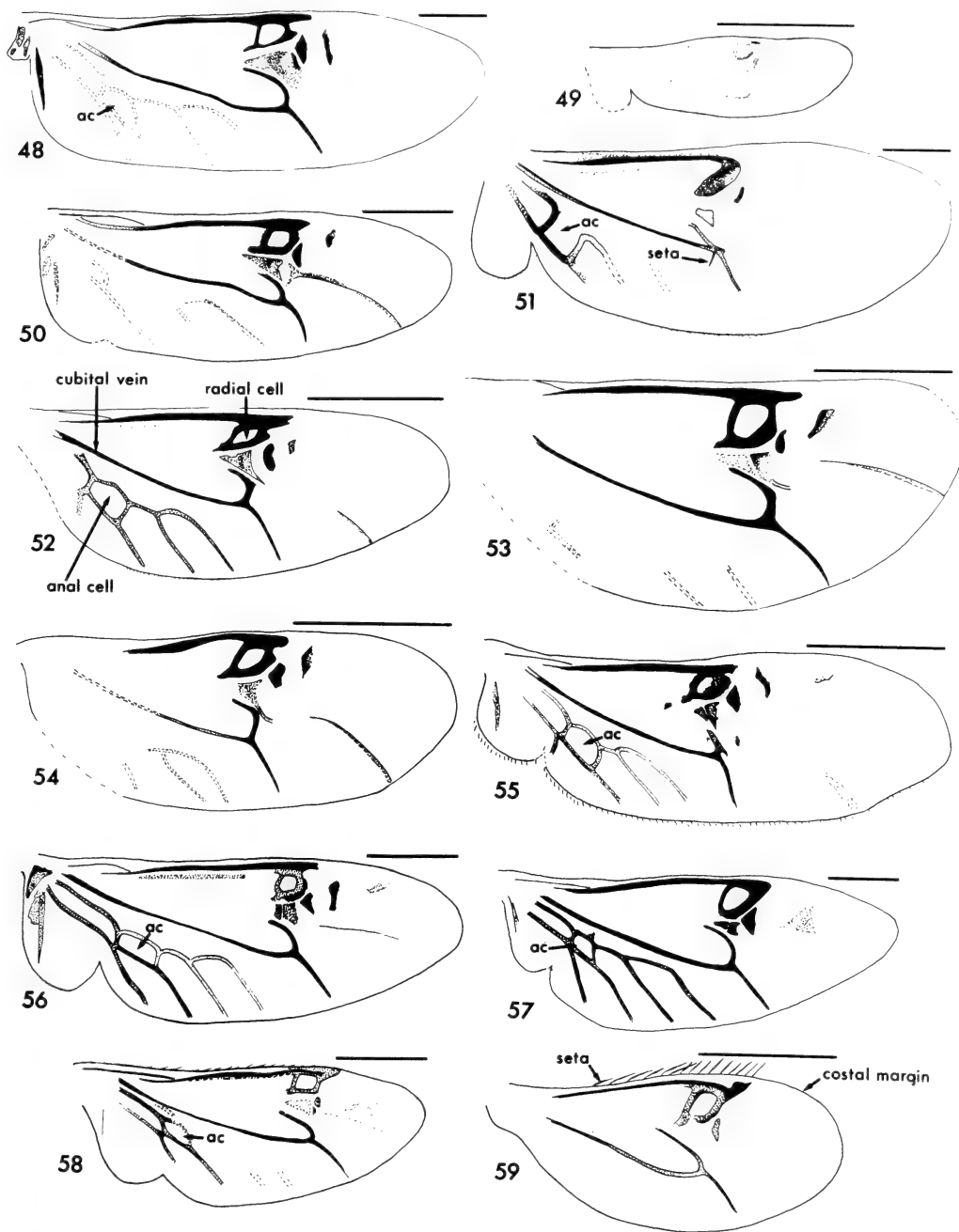


Figs 36–39 Elytral puncturation of: (36) *Rhadalus rufopiceus* (Guatemala); (37) *Hemipleurus floriger* (Sarawak); (38) *Semijulistus ater* (Canada); (39) *Trichoceble floralis* (France). (Scale line = 0.1 mm.)

- 13 Tarsi stout, hind ones longer than half a tibia, dark brown, without very long ventral setae, segments 1–4 subequal, penultimate segment apically truncate dorsally (Fig. 45). Form elongate. Dark brown and/or black. 14
- Tarsi delicate, hind ones usually about half tibial length or less, usually pale coloured, segments 1–3 subequal sometimes with very long ventral setae, segment 4 smaller, dorsally apically emarginate (Fig. 46). Form either broad and short or elongate. Unicolorous or bicolourous, often patterned. (Madagascar, Seychelles, Aldabra, Mauritius, Réunion, Rodriguez I., Africa, India, Sri Lanka.) **MALTHACODES** [in part] (p. 149)
- 14 Head and pronotum black, elytra dark brown. Pronotum very strongly punctured and with a distinct longitudinal unpunctured area (sometimes raised) in mid line near base. Dorsal pubescence recumbent or semi-erect, usually with a few erect setae laterally (Fig. 24). Wings with strong venation, anal cell either present or obsolete. Aedeagus without dorsal appendage. (India, Sri Lanka.) **INDIODASYTES** (p. 151)
- Dorsum entirely dark brown or black. Pronotum less strongly punctured and without longitudinal unpunctured area near base. Dorsal pubescence not recumbent. Wings with weak venation, anal cell lacking. Aedeagus with dorsal appendage. (India.)
MALTHACODES [in part] (p. 149)



Figs 40–47 40–44, antenna of: (40) *Kubanius elegans* (U.S.S.R.: Kazakhstan [paratype]); (41) *Malthacodes pictus* (Rodriguez I.); (42) *Malthacodes vageguttatus* (Madagascar); (43) *Pelecophora illigeri* (Mauritius); (44) *Hemipleurus floriger* (Sarawak [paratype]). 45–47, tarsus of: (45) *Indiodasytes madurensis* (India [holotype]) (hind); (46) *Malthacodes vageguttatus* (hind); (47) *Hemipleurus floriger* (front). (Scale line = 0.5 mm in Figs 40–44; = 0.1 mm in Figs 45–47.)



Figs 48–59 Hind wing of: (48) *Rhadasus elongatus* (Mexico); (49) *Anthriboclerus scotti* (Seychelles [paratype]); (50) *Pelecophora illigeri* (Mauritius); (51) *Hemipleurus floriger* (Sarawak [paratype]); (52) *Malthacodes pictus* (Rodríguez I.); (53) *Malthacodes vageguttatus* (Madagascar); (54) *Malthacodes elegans* (Mauritius); (55) *Indiodasytes* sp. (undescribed sp. from Sri Lanka); (56) *Aplocnemus nigricornis* (France); (57) *Trichocele floralis* (France); (58) *Semijulistus flavipes* (U.S.A., California); (59) *Microjulistus subconvexus* (South Africa). (Scale line = 1.0 mm.) ac = anal cell.

Generic diagnoses

RHADALUS LeConte

(Figs 16, 18, 21, 22, 36, 48)

Rhadalus LeConte, 1852: 212. Type species: *Rhadalus testaceus* LeConte, 1852: 212, by monotypy.

Cymbolus Gorham, 1886: 324. Type species: *Cymbolus rufopiceus* Gorham, 1886: 324, by subsequent designation (Blaisdell, 1938: 9). **Syn. n.**

Elongate, convex, light or dark brown, occasionally darker ventrally or legs, palps and antennae lighter. Dorsum and legs covered with long erect, semi-erect or strongly curved golden setae.

Head subvertical, usually with a longitudinal groove or ridge at each side of frons, near inner side of eye; puncturation sparse, simple, rimmed or weakly tuberculate, surface shiny or microreticulate between punctures. Eyes large or small, varying in shape from entire to strongly emarginate, with short setae; facets very large and convex. Antennae long, extending well beyond base of pronotum, length from less than two-fifths of body length to more than half; serrate from 4th segment. Apical segment of maxillary palps triangular. **Pronotum** weakly to strongly transverse (Figs 21, 22); lateral margins explanate, curved and weakly crenulate; base strongly sinuate, bordered; all angles more or less rounded; either evenly elliptical or with anterior angles weakly produced anteriorly; disc sometimes with raised shiny patches between punctures; punctures usually rimmed or tuberculate on disc, rarely simple, sometimes tuberculate near sides; anterior margin of pronotum strongly anterior to that of prosternum, allowing head to fit in vertically. **Scutellum** broadly triangular, with rounded apex, mat (owing to dense puncturation), densely setose, cuticle obscured (Fig. 18). **Elytral** sides parallel or weakly diverging posteriorly, crenulate, with a carina running subparallel to lateral edge, becoming obsolete well before apex; above carina a narrow horizontal shelf with row of very large punctures in a concavity (Fig. 16); elsewhere with smaller, dense punctures, from which elytral setae emerge (Fig. 36); epipleura quite broad, transversely concave, with well-defined smooth inner edge, deflecting dorsad and becoming obsolete at about level of 3rd to 5th visible abdominal sternite. **Hind wing** as in Fig. 48. **Tarsi** moderately elongate with segments 1–4 weakly lobed and densely ventrally setose, segment 4 marginally smaller than 3; apical segment almost as long as the others together and much broader at apex. Claws with large, free, membranous appendages. Anterior tibiae with a few short, rather obscure external spines among long erect and semi-erect setae. **Prosternal process** on higher plane than front coxae, very narrow, just reaching their hind margin. **Length** 3.8–7.0 mm (width 1.7–3.0 mm).

DISTRIBUTION. Guatemala, Mexico, Brazil, southern U.S.A. (Arizona).

MATERIAL EXAMINED

8 species, including syntypes of type species of *Cymbolus* (BMNH) and holotype of type species of *Rhadalus* (MCZ).

REMARKS This genus is recognized by its colour, sublateral elytral carina, strongly setose scutellum, the form of the tarsi, the rimmed or tuberculate pronotal punctures and the raised puncture-free pronotal patches which are present on the disc of most species. It is also recognized by the fact that the elytral setae emerge from the large punctures (Fig. 36) instead of from a smaller adjacent puncture (Figs 37–39) as is usual in the Rhadalinae. This character only occurs in *Eucymbolus* and *Rhadalus* except for *Anthriboclerus* and *Hemipleurus* which have some sparse, erect elytral setae emerging from tuberculate punctures.

The type of *Rhadalus testaceus* LeConte differs from the species assigned to *Cymbolus* in its narrower, elliptical pronotum, without trace of angles, it denser, tuberculate pronotal punctures (without raised shiny, impunctate patches), the longer antennae with more elongate apical segments and its more elongate, less setose, tarsi. The epipleura are of a more even width throughout their length; in *Cymbolus* they are much broader at the base than at the level of the hind coxae. These characters are probably only of specific significance.

Crowson (1964) associated *Rhadalus* LeConte with the other genera of his Aplocneminae on the basis of a female specimen from California. The genus was originally placed in the family Melyridae, tribe Rhadalini, by LeConte, and was later raised to family rank by Pic (1926), together with the genus *Dasyrhadus* Fall. The latter genus is a dasytine, according to Crowson (1964), and certainly the example of *Dasyrhadus longior* Fall in the BMNH does not belong to the Rhadalinae. Both Hatch (1962) and Blackwelder (1975) place *Dasyrhadus* in the Rhadalinae, which they treat as a subfamily of the Melyridae.

Crowson also transferred *Cymbolus* [= *Rhadalus*] *rufopiceus* Gorham to the Rhadalinae from the Melyrinae.

Rhadalus is closely related to *Eucymbolus* (p. 145).

Checklist of species

- castaneus* (Gorham), 1886: 324 (from *Cymbolus*). Mexico. **Comb. n.**
elongatus (Champion), 1913: 128 (from *Cymbolus*). Mexico. **Comb. n.**
lecontei Casey, 1895: 605. U.S.A.
punctipennis (Gorham), 1886: 325 (from *Cymbolus*). Guatemala. **Comb. n.**
quadrituberculatus (Champion), 1913: 129 (from *Cymbolus*). Brazil. **Comb. n.**
rufopiceus (Gorham), 1886: 324 (from *Cymbolus*). Guatemala. **Comb. n.**
testaceus LeConte, 1852: 212. U.S.A.
wolcottii (Hinton), 1934: 21 (from *Cymbolus*). Mexico. **Comb. n.**

***EUCYMBOLUS* Champion**

Eucymbolus Champion, 1913: 129. Type species: *Eucymbolus cyaneus* Champion, 1913: 130, by original designation.

Broadly oval, elytra almost as broad as long, shiny. Body-length less than twice width. Pronotum, elytra and 1st visible abdominal sternites metallic blue-black, remainder reddish brown. Dorsum with erect or semi-erect long golden setae.

Head subvertical, frons without grooves or ridges, shiny, with sparse simple punctures. Eyes with sparse, short setae, strongly emarginate. Antennae not very long, scarcely reaching shoulder, serrate from 4th segment, segments about as long as broad except for apical which is elongate. Apical segment of maxillary palps hatchet-shaped, with curved sides. *Pronotum* subelliptical, strongly transverse, more than twice as broad as long; sides explanate and weakly crenulate, anterior edge straight, not bordered in middle, posterior edge evenly curved, strongly bordered, all angles rounded; punctures fine and simple on disc, tuberculate at sides. *Scutellum* broadly subtriangular, shiny, sparsely punctured and setose. *Elytral* sides smooth, not explanate, with a carina running from just beneath humeral swelling to about one-third of elytral length from apex, not parallel with edge, furthest from it beneath shoulder, scarcely prominent, so not forming a shelf; punctures near carina large; elytra strongly punctured, with setae emerging from centres of punctures; epipleura similar to *Rhadalus* but rather broader near base. *Tarsi* similar to *Rhadalus*, segments 1–4 weakly lobed. Anterior tibiae with short, but distinct, external spines. *Prosternal process* and *prosternum* similar to that of *Rhadalus*. *Length* 4.3 mm (width at broadest part 2.7 mm).

DISTRIBUTION. Guatemala.

MATERIAL EXAMINED

Holotype (unique) (BMNH).

REMARKS. The single specimen known of this genus is possibly merely an aberrant *Rhadalus*, from which it differs in its colour, its less elongate form, the shiny sparsely punctured scutellum, the puncturation of the pronotal disc and the oblique sublateral carina on the elytra.

Eucymbolus was transferred from the Melyrinae to the Rhadalinae by Crowson (1964).

Checklist of species

- cyaneus* Champion, 1913: 130. Guatemala.

***ANTHRIBOCLERUS* Schenkling**

(Figs 25, 27, 29, 49)

Anthriboclerus Schenkling, 1922: 328. Type species: *Anthriboclerus scotti* Schenkling, 1922: 328, by original designation.

Superficially clerid-like. Cuticle unicolorous brown or with indistinct lighter patches on elytral depression and lateral pronotal margin. Dorsum shiny, with dark brown, sparse, semi-erect setae interspersed with sparse, longer, erect setae. On the elytra these erect setae emerge from the centres of large, weakly tuberculate punctures. Elytral tubercles densely setose. Apical antennal segments darker than rest. Tarsi yellowish brown.

Head very large and broad, convex and shiny with a faint diagonal ridge on each side of frons from base of antenna to eye; sparsely and minutely punctured (Fig. 25). Eyes very prominent, setose, weakly emarginate. Antennae serrate from 4th segment, very long but segments 4–10 not elongate. Maxillary palps with apical segment broadly triangular. *Pronotum* very large and long, about half elytral length, very

strongly convex, shiny, outline from above quadrate, sides markedly explanate, smooth, subparallel; with strong posterior border; all angles rounded; punctures minute, simple, very sparse (Fig. 27). *Scutellum* smooth, shiny, unpunctured, shield-shaped. *Elytra* (Fig. 29) with very prominent humeral swellings and an even more prominent setose tubercle (with black setae) on each, near base midway between suture and humeral swelling; posterior to these tubercles is a transverse depression and just posterior to this 4 setose patches (with very dense white setae) (2 on each elytron); sides smooth; cuticle smooth, shiny, with very sparse punctures of two distinct sizes, the larger ones weakly tuberculate or rimmed, with an erect seta emerging from the centre of each; epipleura visible from side near base, with smooth inner edge deflecting dorsad at about level of 2nd visible abdominal sternite. *Hind wing* as in Fig. 49. *Tarsi* 4-segmented, segments 1–3 lobed, segment 1 very long, about as long as 4, and longer than 2 and 3 together, segment 3 slightly smaller than 2; segments 1 and 2 with long ventral setae; claws with large free membranous appendages. *Prosternal process* obsolete; anterior edge of prosternum emarginate to receive head, which is subvertical; prosternum long in front of coxae. *Length* about 2–3 mm.

DISTRIBUTION. Seychelles.

MATERIAL EXAMINED

Holotype and 2 paratypes (BMNH).

REMARKS. *Anthriboclerus* differs from all other genera in the subfamily by its 4, 4, 4 tarsal formula. It is allied to *Pelecophora* from which it differs mainly in its general appearance, its prominent humeral swellings, transverse depression and setose tubercles on the elytra, its sparse dorsal puncturation and pubescence, the type of puncturation on the pronotum and elytra, the lack of a prosternal process and the ability to fold the head down on to the prosternum.

Although *Anthriboclerus* was originally described in the Cleridae and was later listed under the Corynetinae (Cleridae) in Corporaal's revised catalogue (1950), Crowson (1964) transferred it to the Rhadalinae.

Checklist of species

scotti Schenkling, 1922: 328. Seychelles.

PELECOPHORA Dejean

(Figs 15, 20, 33, 34, 43, 50)

Pelecophora Dejean, 1821: 115. Type species: *Notoxus illigeri* Gyllenhal, 1808: 53, by monotypy. [Dejean lists a second species under *Pelecophora*, but it is a nomen nudum.]

Pelecophorus; Berthold, 1827: 589. Misspelling.

Diglobicerus Latreille in Cuvier, 1829: 475 – subgenus erected by Latreille for an unnamed species with 10-segmented antennae.

Form elongate, usually with bicolorous cuticle or setae, or both. Setae usually of at least two different types, suberect, erect, recumbent or scale-like, the erect and suberect ones usually of a dark colour, the recumbent ones usually paler. Pronotal setae directed anteriorly towards the head.

Head very large and broad, not retractable under pronotum; frons usually with strong subparallel grooves, running from above antennal base to eye; strongly and densely punctured with simple or tuberculate punctures. Eyes comparatively small, oval, glabrous and very prominent. Antennae moderately elongate, usually reaching back to base of pronotum, serrate from 4th segment (Fig. 43). Apical segment of maxillary palp forming an asymmetrical, elongate, almost right-angled triangle (Fig. 33). *Pronotum* broadest anteriorly or in middle, bordered anteriorly, not always posteriorly; anterior angles varying from acutely pointed or right-angled to obtuse-angled or rounded, posterior angles either well defined or rounded; disc shiny, punctures simple or, occasionally, weakly tuberculate; punctures tuberculate at sides, surface sometimes rugose near posterior angles (Fig. 20). *Scutellum* with sides subparallel, apex broadly obtuse to semicircular, surface usually with small, dense punctures and scale-like or recumbent hair-like pubescence obscuring cuticle. *Elytra* with sides smooth, weakly explanate; punctures large, with long suberect setae, sometimes with patches of very small punctures with scale- or hair-like adpressed setae; epipleura broad, visible from side, deflecting dorsad, inner edge becoming obsolete at about level of 1st or 2nd visible abdominal sternite. *Hind wing* as in Fig. 50. *Tarsi* with segments 1–4 weakly lobed, segment 5 almost as long as remainder together, much broader at apex; claws with large, free membranous appendages. *Prosternal process* well developed, narrow or stout, sometimes broadening posteriorly (Fig. 34), usually on a lower plane than prosternum (about level with ventral side of coxa) and completely dividing front coxae. Prosternum very long. *Length* 3–6 mm.

DISTRIBUTION. Réunion, Mauritius, E. Africa. [Vinson (1957) expresses doubt as to whether the two E. African species (*atricolor* and *jeanneli*) described and provisionally placed in *Pelecophora* by Pic, really belong there.]

MATERIAL EXAMINED

13 species, including the type species.

REMARKS. This genus may be recognized by its very large head, entire, prominent eyes, bicolorous cuticle or setae, large prosternal process and the tuberculate punctures near the sides of the pronotum. It differs from *Malthacodes* mainly in its large unretractable head, pronotal puncturation and complete prosternal process. Its relationship to *Anthriboclerus* is discussed under that genus.

Crowson (1964) transferred *Pelecophora interrupta* Alluaud from the Dasytinae to the Rhadalinae.

Checklist of species

- albonotata* Pic, 1935a: 12. Mauritius.
- albovillosa* Vinson, 1946: 259. Mauritius.
- angustata* Pic, 1935: 116. Mauritius.
- antelmei* Alluaud, 1898: 100. Mauritius, Réunion.
 borbonica Vinson, 1967: 330.
- atricolor* Pic, 1919: 4. East Africa.
- concinna* Vinson, 1946: 260. Mauritius.
- darutyi* Pic, 1932: 42. Mauritius.
- decorata* Pic, 1911: 151. Réunion.
- emmezezi* Pic, 1932: 42. Mauritius.
- hamoni* Vinson, 1953: 144. Réunion.
- illigeri* (Gyllenhal), 1808: 53. ?Réunion, Mauritius. (*Notoxus*)
 obscuricollis Pic, 1932: 43.
- illigeri illigeri* (Gyllenhal), 1808: 53. ?Réunion, Mauritius.
- illigeri cariei* Pic, 1932: 42; Vinson, 1957: 5. Mauritius.
- illigeri barklyi* Vinson, 1957: 5. Round I., Mauritius.
- jeanneli* Pic, 1919: 3. East Africa.
- marginalis* Fairmaire, 1880: 293. Réunion, Mauritius.
 obliquata Alluaud, 1898: 101, Vinson, 1946: 264.
- charmoyi* Alluaud, 1898: 102.
- nigrolineata* Guérin, 1834: 51. Mauritius.
- pikoi* Vinson, 1957: 2. Round I., Mauritius.
- subglabra* Alluaud, 1898: 99. Mauritius.
 multisignata Pic, 1935a: 12.
- subglabra subglabra* Alluaud, 1898: 99. Mauritius.
- subglabra vinsoni* Pic, 1935a: 12; Vinson, 1946: 269.
- vittata* Laporte de Castelnau, 1840: 283. Réunion, Mauritius.
 trimaculata Pic, 1932: 43.
- vittata vittata* Laporte de Castelnau, 1840: 283. Réunion.
- vittata interrupta* Alluaud, 1898: 101; Vinson, 1958: 119. Mauritius.

HEMIPLEURUS gen. n.

(Figs 9, 26, 28, 30, 37, 44, 47, 51)

Type species: *Hemipleurus floriger* sp. n.

Cuticle unicolorous dark brown to black. Head, pronotum and elytra clothed with sparse, semi-erect setae interspersed with longer, erect, very stout tuberculate setae, with some recumbent, sparse, whitish setae on transverse elytral depression. Ventrally very shiny and sparsely setose.

Head small, fairly flat, without diagonal lines, retractable against prosternum, anterior edge of which is strongly posterior to anterior margin of pronotum; punctures small, rimmed but scarcely visible amongst strong microsculpture. Eyes more or less oval, sparsely setose. Antennae moderately elongate, serrate from 4th segment (Fig. 44). Apical segment of maxillary palp forming a right-angled triangle. *Pronotum* transverse, all angles broadly rounded, posterior border distinct, sides weakly crenulate, each crenulation bearing a long stout seta; punctures rimmed but scarcely discernable. *Scutellum* broadly semicircular, scarcely punctate, more or less glabrous. *Elytra* more than twice as long as pronotum, shiny, strongly

punctured; with a distinct transverse depression at about one-third of elytral length from base; humeral swellings unusually prominent (Fig. 30); epipleura very broad at base and visible from side, shiny, almost glabrous, very short, starting to deflect dorsad and becoming obsolete anterior to level of hind coxae (Fig. 9). *Hind wing* with radial cell obsolete and anal cell incomplete (Fig. 51). *Tarsi* with segments 1–4 quite strongly lobed, segment 4 smaller than 3; segment 5 broad at apex; claws with large, free membranous appendages (Fig. 47). *Prosternal process* not extending more than half way between front coxae. *Length* 2.0–2.3 mm.

DISTRIBUTION. Borneo: Sarawak [Mulu].

MATERIAL EXAMINED

Holotype and paratypes (BMNH).

REMARKS. This genus differs from all other known members of the Rhadalinae except *Kubanius* by its very short inwardly deflecting epipleura. From this genus it is easily separated by the form of tarsal segments 1–4, which are broad and strongly lobed (Fig. 47) instead of finely elongate (Fig. 10). It resembles *Anthriboclerus* in its peculiarly depressed elytra with sparse erect elytral setae emerging from tuberculate punctures, and *Malthacodes* in its small, deflexed head. From the last genus it differs in not having diagonal lines (carinae or grooves) on the head.

Etymology and gender. *Hemipleurus* is derived from the Greek 'hemi', meaning 'half' and 'pleuron' = 'pleurus', meaning 'side', referring to the epipleura which are approximately half the body length. The name is masculine.

Checklist of species

floriger sp. n. Borneo.

***Hemipleurus floriger* sp. n.**

Sides of prosternum, epipleura and posterior part of metasternum very shiny, smooth and almost glabrous; femora and visible abdominal sternites also very shiny, with sparse semi-recumbent golden setae, with some longer dark erect setae near abdominal apex. Tibiae with faint longitudinal microsculpture; sides of mesosternum, metasternum and metepisternum with very strong reticulate microsculpture. Colour dark brown to black except for basal 3 segments of antennae which are yellowish brown.

Head transverse, mat due to strong microsculpture, punctures scarcely discernible (Fig. 26); setae sparse, very long, black, erect, stout, interspersed with shorter light brown fine semi-erect setae. Eyes moderately prominent. Antennae sparsely setose especially near base, weakly serrate from 4th segment, segments 4–10 only slightly longer than broad, segments 2–3 narrower, more elongate, subequal in length to segments 4–10, segments 1 and 11 longer than others; segments 1–3 light yellowish brown, becoming dark brown to black from segment 4 onwards. Labial palps large, apical segment cup-shaped. *Pronotum* mat, due to strong microsculpture (Fig. 28), sides with small setose tubercles, giving a crenulate appearance; sculpture unusual: a ring of about 7 small circles around each puncture, these thus resembling flowers; setae similar to those on head. *Scutellum* broad, shiny, semicircular, with fine reticulate microsculpture. *Elytra* with sides smoothly rounded except for a few small tubercles near base, giving crenulate appearance; humeral swellings very prominent, with transverse depression posterior to them; punctures large, simple, setae similar to those on head and pronotum except for patch of sparse white, recumbent setae on elytral depression, which forms a transverse band; clusters of very short erect setae emerge from punctures adjacent to most recumbent setae (Fig. 37).

MATERIAL EXAMINED

Holotype ♀, **Sarawak**: 4th Division Gn. Mulu NP, v–viii. 1978, on logs nr Base Camp, 50–100 m (*Hammond & Marshall*) (BMNH; B.M. No. 1978-49).

Paratypes. **Sarawak**: 5 ♀, 4th Division Gn. Mulu NP, v–viii. 1978. 2 – on logs nr Base Camp, 50–100 m; 1 – general sweeping, nr camp 4, c. 1800 m; 1 – nr camp 5; 1 – general sweeping, site L 2386 m, upper montane forest (*Hammond & Marshall*) (BMNH; B.M. no. 1978-49).

REMARKS. An unusual feature of this species, not seen on any other species in the subfamily, is the presence of clusters of short erect setae adjacent to the recumbent setae on the elytral depression (Fig. 37). These could be connected with pheromone glands.

Etymology. *floriger* = bearing flowers, referring to the strange pronotal sculpture.

MALTHACODES Waterhouse

(Figs 8, 35, 41, 42, 46, 52, 53, 54)

Malthacodes Waterhouse, 1876: 116. Type species: *Malthacodes pictus* Waterhouse, 1876: 116, by monotypy.

Xamerpus Fairmaire, 1886: 41. Type species: *Xamerpus vageguttatus* Fairmaire, 1886: 41, by monotypy.
Syn. n.

Donaldia Alluaud, 1898: 102. Type species: *Donaldia elegans* Alluaud, 1898: 103, by monotypy.
[Synonymized by Vinson, 1958: 123.]

Generally light-coloured, often with cuticle and/or setae bicolorous, often with erect setae among semi-erect or recumbent ones. Sometimes partially metallic. Wing venation varying from weak, without an anal cell, to strong, with anal cell distinct (Figs 52–54).

Head retractable against prosternum, frons with distinct diagonal groove or line on each side, running from inner side of antennal base to eye; surface shiny, punctures rimmed. Eyes sparsely setose, varying from being very weakly emarginate to entire, fairly prominent. Antennae long, reaching back beyond base of pronotum, serrate from 4th segment; varying from being covered with thick, long, black setae, with segments 6–10 much broader than long (compressed together and half-moon shaped in the type species (Fig. 42)), to sparsely setose and weakly elongate-serrate. Apical segment of maxillary palps triangular. *Pronotum* varying from being very convex in transverse and longitudinal section and at least twice as wide as long (in type species) to much less convex and transverse in other species; sides explanate, weakly crenulate or smooth, distinctly bordered posteriorly, angles usually rounded, punctures small, rimmed, sometimes forming chains, or each (rarely) with an encircling pattern. *Scutellum* broadly triangular or semicircular, shiny, with minute punctures and long fine setae, sometimes so densely punctured and setose that cuticle is obscured. *Elytra* strongly convex, weakly explanate beneath humeral swelling, lateral margin sometimes crenulate; punctures strong, becoming larger towards sides, almost forming a stria; epipleura broad, shiny, deflecting dorsad and becoming obsolete at level of about 2nd or 3rd abdominal sternite, concave and sloping inwards from base so not visible from the side in the broader species, but more horizontal and just visible from the side in the more elongate species. *Hind wing* venation usually weak, without anal cell, but occasionally strong with anal cell distinct (Figs 52–54). *Tarsi* with segments 1–4 weakly lobed (4 slightly smaller), apical segment broader than others; tarsi small, delicate, usually pale yellow or brown and segments 1–3 with very long setae beneath, segmentation often indistinct; [in the 2 Indian species, *M. indicus* (Champion) and *M. moestus* (Gorham), the tarsi are robust and more elongate, less strongly setose beneath, with the segments very distinct, the 4th not as small comparatively;] claws with large free membranous appendages. *Prosternal process* small and narrow but extending between front coxae and fitting into notch in mesosternum. *Length* 1.9–4.3 mm.

DISTRIBUTION. Madagascar, Seychelles, Aldabra, Mauritius, Réunion, Rodriguez I., Africa, India, Sri Lanka.

MATERIAL EXAMINED

25 species, including syntypes of type species (*pictus* Waterhouse (BMNH), *vageguttatus* (Fairmaire) (MNHN) and *elegans* (Alluaud) (BMNH)) and some unnamed species from Aldabra.

REMARKS. This genus contains species that are very variable in appearance and which form distinct species-groups. I believe that the species formerly assigned to *Donaldia* are only one such group. The differences between these and the type species of *Xamerpus* are no greater than the differences between some of the other species of *Xamerpus*. For example, *X. maindroni* (Pic) and *X. cioides* Champion differ markedly from the type species in possessing quite different antennae, a much longer prosternum, a less explanate pronotum, more nearly horizontal (less sloping) epipleura as well as a more elongate form. *Aplocnemus indicus* Champion and *A. moestus* Gorham fall into this group and are here transferred to *Malthacodes*. Apart from the above mentioned characters, these two species have larger, much more elongate tarsi than the type species and may prove to merit separate generic status. Vinson (1958) synonymized *Donaldia* with *Malthacodes* and the only differences found between these two genera is in the wing venation, which is strong in the two species originally assigned to *Malthacodes*, with a distinct anal cell (Fig. 52) and weaker in those assigned to *Donaldia*, with no anal cell (Fig. 54). Most species assigned to *Xamerpus* that I have examined (including the type species (Fig. 53)) have the weak wing venation with no anal cell, but one African species has strong venation with an anal cell so, as the other generic characters are constant, I am treating this as a variation. The only constant external difference between *Malthacodes*, *Donaldia* and *Xamerpus* is that the two former genera have a densely punctured, densely setose scutellum and the species of *Xamerpus* that I have seen have a shiny sparsely setose scutellum. I do not think that this

difference alone is enough to separate the two groups so *Xamerpus* Fairmaire is here synonymized with *Malthacodes* Waterhouse.

Malthacodes vageguttatus (*Xamerpus vageguttatus*) has very similar characters to *Malthacodes pictus* (types compared); with the same general broad, rounded, very convex form, and the head tucked under the pronotum. The main differences are the erect and semi-erect dorsal setae, the unusual antennae, the crenulate lateral margins of the pronotum and the fainter wing venation with no anal cell in *M. vageguttatus*.

Crowson (1964) transferred *Malthacodes pictus* Waterhouse, *Donaldia* (= *Xamerpus*) *maindroni* Pic and *X. maculatipennis* Pic to the Rhadalinae from the Dasytinae.

Checklist of species

- alluaudi* (Pic), 1903: 145 (from *Xamerpus*). Madagascar. **Comb. n.**
ambrensis (Pic), 1931d(445): 101 hors texte (from *Xamerpus*). Madagascar. **Comb. n.**
bequaerti (Pic), 1954a: 211 (from *Xamerpus*). Belgian Congo. **Comb. n.**
bourgeoisii (Fairmaire), 1898: 476 (from *Xamerpus*). Madagascar. **Comb. n.**
brevis (Pic), 1931d(445): 101 hors texte (from *Xamerpus*). Madagascar. **Comb. n.**
brunneus (Pic), 1903: 144 (from *Xamerpus*). Madagascar. **Comb. n.**
cinereovariegatus Blair, 1935: 272. Rodriguez I.
cioides Champion, 1923: 302 (from *Xamerpus*). Seychelles. **Comb. n.**
conradsi (Pic), 1939: 169 (from *Xamerpus*). Tanganyika. **Comb. n.**
disconotatus (Pic), 1931b: 442 (from *Xamerpus*). Madagascar. **Comb. n.**
distinctus (Fairmaire), 1901: 180 (from *Xamerpus*). Madagascar. **Comb. n.**
elegans (Alluaud), 1898: 103 (*Donaldia*; Vinson, 1958: 123). Mauritius, Réunion.
elegans elegans (Alluaud), 1898: 103. Mauritius.
elegans bourbonicus (Pic), 1948: 8 (*Donaldia*, Vinson, 1958: 123; 1967: 330). Réunion.
elongatus (Pic), 1903: 144 (from *Xamerpus*). Madagascar. **Comb. n.**
fairmairei (Alluaud), 1898: 103 (from *Xamerpus*). Madagascar. **Comb. n.**
fasciatus (Pic), 1931d(445): 101 hors texte (from *Xamerpus*). Madagascar. **Comb. n.**
gedyei (Pic), 1938: 300 (from *Xamerpus*). Kenya. **Comb. n.**
indicus (Champion), 1922: 127 (from *Aplocnemus*). India. **Comb. n.**
laterufus (Pic), 1931b: 442 (from *Xamerpus*). Madagascar. **Comb. n.**
latesuturalis (Pic), 1958: 205 (from *Xamerpus*). Guinea. **Comb. n.**
luteofasciatus (Pic), 1914a: 11 (from *Xamerpus*). Madagascar. **Comb. n.**
maculatipennis (Pic), 1937: 28 (from *Xamerpus*), replacement name for *maculatus* Pic, 1926(424): 27 hors texte. E. Africa. **Comb. n.**
maindroni (Pic), 1906: 7 (from *Xamerpus*). India. (*Donaldia*) **Comb. n.**
pallidithorax (Pic), 1906: 6 (*Xamerpus*).
bimaculatus (Pic), 1906: 8 (*Xamerpus*).
unimaculatus (Pic), 1906: 8 (*Xamerpus*).
immaculatus (Pic), 1938a: 158 hors texte (*Xamerpus*).
martini (Fairmaire), 1898: 476 (*Xamerpus*). Madagascar. **Comb. n.**
maculatus (Pic), 1906: 7 (*Xamerpus*).
rufithorax (Pic), 1938a: 158 hors texte (*Xamerpus*).
metallicus (Pic), 1913a: 15 (from *Xamerpus*). Madagascar. **Comb. n.**
minor (Pic), 1932: 46 (*Donaldia*; Vinson, 1958: 124). Mauritius, Réunion.
caroli (Pic), 1948: 8 (*Donaldia*). Mauritius.
minutus (Pic), 1906a: 11 (*Donaldia*, Vinson, 1958: 124). Mauritius, Réunion.
notaticeps (Pic), 1932: 46 (*Donaldia*). Réunion.
moestus (Gorham), 1895: 323 (from *Aplocnemus*). India. (*Dasytes*) **Comb. n.**
nigriceps (Pic), 1931b: 442 (from *Xamerpus*). Madagascar. **Comb. n.**
nigricolor (Pic), 1938a: 158 hors texte (from *Xamerpus*). Natal. **Comb. n.**
nigromaculatus (Pic), 1919: 4 (from *Xamerpus*). E. Africa. **Comb. n.**
obscurus (Pic), 1904a: 28 (from *Xamerpus*). S. Africa. **Comb. n.**
oxylepisiformis (Pic), 1931a: 107 (from *Xamerpus*). Madagascar. **Comb. n.**
parvus **nom. n.** for
minutus Pic, 1931d(443): 96 hors texte (nec Pic, 1906) (*Xamerpus*). Madagascar.
perforatus (Pic), 1917: 5 (from *Xamerpus*). Sri Lanka. **Comb. n.**
perrieri (Fairmaire), 1901: 180 (from *Xamerpus*). Madagascar. **Comb. n.**
pictus Waterhouse, 1876: 116. Rodriguez I.

rubronotatus (Pic), 1904: 11 (from *Xamerpus*). Madagascar. **Comb. n.**
ruficollis (Pic), 1931b: 443 (from *Xamerpus*). Madagascar. **Comb. n.**
sicardi (Pic), 1931c: 447 (from *Xamerpus*). Madagascar. **Comb. n.**
sinuatus (Pic), 1953a: 253. (*Donaldia*; Vinson, 1958: 123). Madagascar.
subapicalis (Pic), 1931d(445): 101 hors texte (from *Xamerpus*). Madagascar. **Comb. n.**
subdepressus (Pic), 1939: 169 (from *Xamerpus*). **Comb. n.** Madagascar.
subfasciatus (Pic), 1931a: 108 (from *Xamerpus*). Madagascar. **Comb. n.**
suturalis (Pic), 1931d(445): 101 hors texte (*Donaldia*, Vinson, 1958: 123). Madagascar.
trinotatus (Pic), 1938a: 158 hors texte (from *Xamerpus*). 'B. E. Africa.' **Comb. n.**
vageguttatus (Fairmaire), 1886: 41 (from *Xamerpus*). Madagascar. **Comb. n.**
variabilis (Pic), 1931d(445): 101 hors texte (*Donaldia*; Vinson, 1958: 123). Madagascar.
interrupta (Pic), 1931d(445): 101 hors texte (*Donaldia*).
vicinus (Pic), 1931d(443): 96 hors texte (from *Xamerpus*). Madagascar. **Comb. n.**

INDIODASYTES Pic

(Figs 17, 24, 45, 55)

Indiodasytes Pic, 1916: 14. Type species: *Dasytes* (*Indiodasytes*) *madurensis* Pic, by monotypy. Here transferred from the Dasytinae (Pic, 1937: 29) to the Rhadalinae.

Elongate, head and pronotum black, elytra dark brown. Setae paler, either recumbent or semi-recumbent and sparsely interspersed with much longer, erect setae, these sometimes occurring only along lateral elytral and pronotal margins; pronotal setae point towards centre of disc.

Head broader than long, subvertical, mat; frons with strong diagonal ridges at inner side of antennal insertions; with confused punctures. Eyes prominent, oval, almost glabrous. Antennae serrate from 4th segment, these segments not elongate; reaching beyond base of pronotum. Apical segment of maxillary palps triangular. Pronotum transverse, sides narrowly explanate and weakly crenulate, bordered posteriorly, strongly punctured with large, rimmed/tuberculate punctures except for a distinct unpunctured shiny longitudinal area in mid line at base; intervals between punctures sometimes raised and shiny; angles rounded (Fig. 24). Scutellum shield-shaped, mat or shiny, with minute punctures. Elytra with sides weakly explanate and crenulate only near base, sinuate when viewed laterally; epipleura deflecting dorsad at about level of 2nd visible abdominal sternite, visible from side near base (Fig. 17). Hind wing of undescribed species from Sri Lanka, as in Fig. 55. Tarsi quite stout; claws with large free membranous appendages (Fig. 45). Prosternal process narrow, but reaching mesosternum between front coxae. Length 2.0–3.7 mm.

DISTRIBUTION. India, Sri Lanka.

MATERIAL EXAMINED

Holotype of type species (MNHN) and 2 undescribed species from Sri Lanka (BMNH). *I. pubicornis* Wittmer from China, which was doubtfully placed in this genus by Wittmer (1940), does not belong to it and is not a rhadaline.

REMARKS. This genus strongly resembles *Aplocnemus* in general appearance but differs in its rimmed pronotal puncturation, its diagonal ridges on the head and from most species by its strongly triangular apical segment of the maxillary palps. It also resembles *Malthacodes* but differs from most species in its proportionally larger, less strongly setose tarsi and its stronger pronotal puncturation. It differs from all other genera in the Rhadalinae, that I have examined, by the lack of a dorsal appendage to the median lobe of the aedeagus. However, its other characters, e.g. first two visible abdominal sternites fused, triangular apical segment to the maxillary palps, free membranous appendages to the claws etc., show that it belongs to this group. *Indiodasytes* was listed in the Dasytinae by Pic (1937). It is here transferred to the Rhadalinae.

Checklist of species

madurensis (Pic), 1916: 14. (*Dasytes*.) India.

APLOCNEMUS Stephens

(Figs 14, 19, 31, 32, 56)

Elicopis Stephens, 1829: 136. Type species: *Crioceris impressa* Marsham, 1802: 226, designated by Stephens, 1830: 316 for the replacement name *Aplocnemus*. [See also Note below.]

Aplocnemus Stephens, 1830: 316. Type species: *Crioceris impressa* Marsham, 1802: 226, by original designation. [Replacement name for *Elicopis* – see Note below.]

Haplocnemus; Agassiz, 1846[7]: 29, 172. [Unjustified emendation of *Aplocnemus* Stephens.]

Helicopis; Agassiz, 1846[7]: 29, 175. [Unjustified emendation of *Elicopis* Stephens and junior homonym of *Helicopis* F. 1807 (Lepidoptera: Riodinidae).]

Diplambe Schilsky, 1894: 234 (s.g.). Type species: *Dasytes montivagus* Rosenhauer, 1856: 156, by PRESENT DESIGNATION.

Holcopleura Schilsky, 1894: 234 (s.g.). Type species: *Haplocnemus (Holcopleura) reitteri* Schilsky, 1894: 234, by monotypy.

Ischnopalpus Schilsky, 1894: 235 (s.g.). Type species: *Haplocnemus (Ischnopalpus) subcostatus* Schilsky, 1894: 235, by subsequent designation (Schilsky, 1894b: no. 62).

Pseudaphyctus Pic, 1896: 47 (s.g.). Type species: *Haplocnemus (Pseudaphyctus) tournieri* Pic, 1896: 47 [= *Haplocnemus tumidus* Kiesenwetter, 1863: 650], by monotypy.

Note. Thomson (1859: 109) designated *Lagria nigricornis* Fabricius (1792: 81) as type species of *Aplocnemus*. This was not only unnecessary but invalid, because it was not included in the original description of *Aplocnemus*.

The present genus was first recognized by Stephens under the name *Elicopis* (1829: 136), but later, he thought that the name was 'too closely allied to *Helicopis*' [= *Helicopis*] F. (1807), and he changed it to *Aplocnemus* (1830: 316). Since the latter name has been in use for over 150 years, I suggest that it is conserved on the grounds of long usage (1985, *International Code of Zoological Nomenclature*, Article 23(b)). In the interest of stability, a case should be made to the International Commission.

Unicolorous brown to black (mostly black), often with a metallic bluish or greenish tinge, legs and base of antennae often lighter. Dorsum usually covered with erect or semi-erect long fine setae, legs and abdominal sternites with similar but more recumbent setae; almost invariably with a few very long, erect setae on tibiae among the recumbent ones; setae usually black but sometimes grey, golden or white. Tibiae often with spines. Elytral setae sometimes alternately erect and semi-erect.

Head moderately small, shiny or mat with strong simple punctures; frons usually with two short parallel depressions at inner side of antennal insertions. Eyes prominent, sparsely setose, oval or weakly emarginate. Antennae serrate or pectinate from 3rd or 4th segment, apical segment elongate-oval, length varying from barely reaching base of pronotum to reaching well beyond it. Apical segment of maxillary palps varying from spindle-shaped (rarely) (Fig. 32) to hatchet-shaped (Fig. 31). *Pronotum* transverse; sides narrowly explanate, finely crenulate or smooth, usually bordered anteriorly and posteriorly; base sinuate; disc finely and sparsely or strongly and densely punctured with simple punctures (Fig. 19), only rarely punctures weakly rimmed on disc or at sides. *Scutellum* shiny, quite strongly punctured, broadly triangular or semicircular. *Elytra* with sides weakly explanate near base, crenulate or smooth (in subgenus *Diplambe* Schilsky the elytra are double-sided in basal half, i.e. a carina runs subparallel to elytral edge, as also in *Rhadalus*); epipleura deflecting dorsad at about level of 2nd, 3rd or 4th visible abdominal sternite, often visible from side near base. *Hind wing* venation variable, but usually distinct (Fig. 56). *Tarsi* moderately elongate, segments 1–4 weakly lobed; claws with large free membranous appendages which sometimes appear to be sclerotized along side nearest claw (Fig. 14). Legs moderately slender. *Prosternal process* apparently short, not separating front coxae, usually with fine process which extends for length of coxa but is hidden from below by contiguous coxae. *Length* 2.9–6.9 mm.

DISTRIBUTION. Palaearctic (including N. Africa), Asia Minor, W. Africa (Ivory Coast, Angola), Philippine Is (1 species).

MATERIAL EXAMINED

About 100 species (including syntypes of type species (BMNH)).

REMARKS. This genus is very large and variable, mostly with the general appearance of being black and hairy. Its most constant characters are the tarsi and claws, head and maxillary palp shape and the (almost constant) long suberect setae. Most species are readily recognized by their dark coloration, elongate form and hairy appearance. They are usually dark brown or black, sometimes metallic. One species from the Canary Is differs from the majority in its almost recumbent dorsal setae. Other Canarian species tend to be of a light yellowish brown colour wholly or in part. Most species resemble *Trichoceble* in general appearance but may be easily distinguished by the presence of membranous appendages and the lack of chitinated teeth on the claws, as well as by the less strongly emarginate eyes. They may be distinguished from all other genera except *Semijulistus* and *Microjulistus* by the only moderately securiform apical segment of the maxillary palps (spindle-shaped in some species). Most other genera have distinctly

triangular apical segments. They differ from *Malthacodes* in their simple (non-rimmed) pronotal punctures and the lack of diagonal ridges on the head. (The Indian species, *Aplocnemus indicus* Champion and *moestus* Gorham are here transferred to *Malthacodes*. They differ from *Aplocnemus* in their weaker wing venation, triangular apical segment of the maxillary palps, diagonal lines on head, pronotal puncturation and the form of the male genitalia).

Crowson (1964) verified that *Aplocnemus palaestinus* Baudi, A. (*Diplambe*) *abietum* Kiesenwetter and A. (*Ischnopalpus*) *subcostatus* Schilsky belong in the Rhadalinae. They were previously placed in the Dasytinae (Pic, 1937).

Checklist of species

- abietum*** Kiesenwetter, 1859: 171. Mediterranean Region.
acutangulus Schilsky, 1897a: no. 92. Algeria, Italy.
adanensis Pic, 1908a: 50. Turkey.
aerosus Schilsky, 1897a: no. 97. Spain.
aestivus Kiesenwetter, 1863: 654. Europe.
 subviolaceus Pic, 1922: 27. Austria.
afer Schilsky, 1897b: no. 33. Algeria.
akbesianus Pic, 1896: 48. Syria.
albipilis Kiesenwetter, 1863: 651. Spain.
algoricus Schilsky, 1894b: no. 73. Algeria.
alluaudi Pic, 1900: 165. Tunisia.
alpestris Kiesenwetter, 1861: 385. Europe.
 pectinicornis (Dufour), 1851: 329. (*Dasytes*)
 tarsalis; Schilsky, 1897b: no. 34LL; Lohse, 1977: 178; Majer, 1982: 435. S. Europe.
 theresae Pic, 1914: 57. France.
alternatus Peyerimhoff, 1931 (1932): 1. Morocco.
 cribripennis Pic, 1922: 27. Algeria.
 nigrescens Pic, 1949: 74.
anatolicus Schilsky, 1903: no. 97. Turkey.
 subelongatus Pic, 1910: 9.
andalusicus (Rosenhauer), 1856: 158. Spain. (*Dasytes*)
 laetus Schilsky, 1897b: no. 34HH.
angolanus Wittmer, 1953: 285. Angola.
atricornis Pic, 1921: 3. Greece.
aubei Kiesenwetter, 1867: 122. Pyrenees, Spain.
baborensis Pic, 1908: 200. Algeria.
baborensis Pic, 1922: 26. Algeria. [Homonym of *baborensis* Pic 1908.]
barnevillei Kiesenwetter, 1867: 121. Spain.
basalis (Küster), 1849: no. 19. S. Europe. (*Dasytes*)
 distinctipes Pic, 1908a: 50. Corfu.
beauprei Pic, 1909: 105. Tunisia.
berytensis Sahlberg, 1913: 45. Syria.
bicoloratus Pic, 1935b: 15. Morocco.
 theryi Pic, 1935b: 15.
biskraensis Schilsky, 1897a: no. 96. S. Algeria.
 biscrensis Schilsky, 1897b: no. 34QQ.
 biskrensis Schilsky, 1897b: no. 63.
 gridellii Pic, 1928: 103.
brevis (Rosenhauer), 1856: 161. Spain. (*Dasytes*)
brevissimus Pic, 1908a: 50. Greece.
 holtzi Pic, 1908a: 50.
breviusculus Schilsky, 1897b: nos 31 & 34CC.
caelatus Brullé, 1832: 151. Greece.
calidus Mulsant & Rey, 1868: 235. S. France, Italy.
capillicornis Abeille, 1907: XXI. S. France.
caramanicus Sahlberg, 1913: 46. Caramania.
caroli Pic, 1941: 1. Morocco.
castiliensis Schilsky, 1897b: nos 41 & 34FF. Spain.
causicus Schilsky, 1897a: no. 89. U.S.S.R.: Caucasus.

- chalconatus** (Germar), 1817: 209. S. Europe. (*Dasytes*)
aestivus Kiesenwetter, 1863: 654 (partim); Majer, 1982: 442. Europe.
pinicola Kiesenwetter, 1863: 653 (partim females) nec *pinicola*: Lohse, 1977; Majer, 1982: 442. S. Europe.
- chlorosoma** (Lucas), 1849: 199. N. Africa, Italy, Sardinia. (*Dasytes*)
cuprea (Lucas), 1849: 199.
- cobosi** Pic, 1953: 144. Spain.
- coeruleatus** (Rosenhauer), 1856: 160. Spain. (*Dasytes*)
- consobrinus** (Rosenhauer), 1856: 157. Spain. (*Dasytes*)
- corcyricus** Miller, 1866: 818. Corfu, S. Italy.
- crenicollis** Kiesenwetter, 1863: 654. Italy, Sardinia.
duplicatus Kiesenwetter, 1871: 85.
- cribrarius** (Brullé), 1832: 151. Greece. (*Dasytes*)
- cribricollis** Mulsant & Rey, 1868: 234. Corsica, Sardinia.
- cribripennis** Pic, 1921: 3. Greece.
- cribrosus** Schilsky, 1897*b*: nos. 44 & 34GG. Algeria.
festai Pic, 1925: 2.
robustior Pic, 1928: 103.
- croceicornis** Kiesenwetter, 1863: 649. U.S.S.R.: Sarepta.
- cupreatus** Schilsky, 1897*a*: no. 88. U.S.S.R.: Caucasus.
- curticornis** Pic, 1910: 9. Morocco.
- curtipennis** Pic, 1908: 200. Algeria.
- curtus** Pic, 1921: 3. Algeria.
- cylindricus** Kiesenwetter, 1863: 651. S. Europe.
- cyrenaicus** Pic, 1955: 132. Libya.
- delagrangei** Pic, 1902: 32. Syria.
- dentatus** Schilsky, 1897*a*: no. 100. Algeria.
- depressicollis** Schilsky, 1897*b*: nos 52 & 34LL. Kurdistan.
- desertorum** Pic, 1896: 48. Algeria.
rufofemoratus Pic, 1908*a*: 49.
- diaphanus** Schilsky, 1897*a*: no. 94. Algeria.
- difficilis** Holdhaus, 1923: 137. Italy.
- escalerai** Pic, 1908*a*: 90. Spain.
escalerai escalerai Pic, 1908*a*: 90.
escalerai colasi Pic, 1954: 97.
- eumerus** Mulsant & Rey, 1868: 194. France.
marchali Pic, 1914: 57.
- fauconneti** Pic, 1914: 57. C. France.
- flavicornis** Schilsky, 1897*a*: no. 87. U.S.S.R.: Caucasus.
areschanus Pic, 1908*a*: 81.
- fortepunctatus** Pic, 1935*b*: 15. Morocco.
- geniculatus** Schilsky, 1903: no. 98. Turkey.
- gestroi** Schilsky, 1897*b*: nos 58 & 34NN. Algeria, Tunisia.
- gracilicornis** Schilsky, 1987*b*: nos 36 & 34DD. Spain.
- grancanariensis** Lindberg, 1953: 7. Canary Is.
- griseopubescens** Pic, 1899: 259. Palestine (sic).
- hebraicus** Schilsky, 1906: no. 13. Palestine (sic).
- heydeni** Schilsky, 1894*b*: no. 81. Algeria, Turkey.
- hickeri** Pic, 1935*c*: 256. Turkey.
- hierichunticus** Sahlberg, 1913: 42. Palestine (sic).
- hispanicus** Pic, 1953: 143. Spain.
- imperfatus** Pic, 1908*a*: 49. Tunisia.
- impressipennis** Pic, 1921: 5. Italy.
- impressus** (Marsham), 1802: 226. N. & C. Europe. (*Crioceris*)
pini (Redtenbacher), 1849: 335. (*Dasytes*)
serratus (Redtenbacher), 1849: 335. (*Dasytes*)
- incognitus** (Faldermann), 1836: 204. U.S.S.R.: Caucasus. (*Dasytes*)
- integer** Baudi, 1873: 302. Italy.
- jejunus** Kiesenwetter, 1863: 652. S. Europe, N. Africa.

- kaszabi** Majer, 1982: 431. C. Europe.
kiesenwetteri Schilsky, 1897*b*: nos 50 & 34KK. Greece, S. Europe.
korbi Schilsky, 1897*b*: nos 49 & 34HH. Spain.
diversus Schilsky, 1897*b*: nos 49 & 34HH.
kozirowiczii Desbrochers des Loges, 1870: 122. Corsica, Italy.
xanthopus Kiesenwetter, 1871: 85.
rufomarginatus Schilsky, 1894*b*: no. 85.
krugeri Pic, 1929: 94. Cyrenaica (sic).
kubanensis Pic, 1909: 99. U.S.S.R.: Caucasus.
laco Majer, 1985: 35. C. Europe.
lateralis Schilsky, 1894*b*: no. 71. U.S.S.R.: Caucasus.
latior Pic, 1908*a*: 50. Greece.
latipennis Pic, 1911: 146. Syria.
rechmayanus Pic, 1911: 169. Lebanon.
libanicus Pic, 1901: 9. Syria.
laetipes Abeille, 1907: XXII.
limbipennis Kiesenwetter, 1865: 383. Spain.
longicornis Kocher, 1962: 196. Morocco.
longulus Schilsky, 1897*a*: no. 91. N. Africa, Italy.
brunnescens Pic, 1922: 27.
macedonicus Pic, 1922: 17. Macedonia.
mancinii Pic, 1927: 14. Capri.
capraianus Pic, 1931: 159.
marginicollis Schilsky, 1897*b*: nos 39 & 34EE. Algeria.
maurus Schilsky, 1895: no. 18. Algeria.
melitensis Schilsky, 1897*b*: nos 60 & 34OO. Malta.
mirabilis Schilsky, 1897*a*: no. 99. Algeria.
mohamed Chobaut, 1898: 78. S. Algeria.
montivagus (Rosenhauer), 1856: 156. Spain, Sardinia. (*Dasytes*)
morio (Schönherr), 1817: 12. Morocco. (*Dasytes*)
nevadensis Pic, 1908*a*: 90. Spain.
nigricornis (Fabricius), 1792: 81. N. & C. Europe. (*Lagria*)
femoralis Illiger, 1807: 302.
punctatus (Germar), 1824: 77. (*Dasytes*)
chalybeus (Germar), 1824: 78. (*Dasytes*)
fuscitibia Mulsant & Rey, 1868: 247.
variolatus Costa, 1882: 35.
'femoralis' Schilsky, 1897 – incorrect subsequent spelling of *femoratus*.
femoratus Schilsky, 1897*b*: nos 46 & 34FF; Majer, 1982: 430. Hungary.
viertli Schilsky, 1897*b*: nos 46 & 34FF; Majer, 1982: 430.
rufolateralis Pic, 1914: 57.
testaceofemoralis Pic, 1917: 22.
nigripes Mulsant & Rey, 1868: 223. Algeria.
palaestinus Baudi, 1873*a*: 319 (Note 1). Israel, Syria.
parumpunctatus Schilsky, 1897*b*: nos 53 & 34LL. U.S.S.R.
pectinatus (Küster), 1849: no. 18. Sardinia, Corsica, Capri. (*Dasytes*)
erosus Mulsant & Rey, 1868: 233.
pectinicornis (Lucas), 1849: 200. Algeria. (*Dasytes*)
pellucens Kiesenwetter, 1865: 383. Spain.
perforatus Schilsky, 1897*b*: nos 35 & 34CC. Algeria.
persicus Schilsky, 1897*b*: nos 37 & 34DD. Iran.
pertusus Kiesenwetter, 1859: 172. Greece, Turkey, Cyprus.
elongatior Pic, 1902: 32.
adaliensis Pic, 1908*a*: 50.
pesruchesi Schilsky, 1897*a*: no. 90. Algeria.
peyroni Pic, 1899: 259. Syria.
philippinus Wittmer, 1941: 226. Luzon.
ponferradanus Pic, 1913: 105. Spain.
pristocerus Kiesenwetter, 1859: 170. Greece, Corfu.

- pulverulentus** (Küster), 1849: no. 17. Hungary, Turkey, Dalmatia, Italy. (*Dasytes*)
obscurus Germar, 1817: 209.
- puncticollis** Sahlberg, 1913: 40. Turkey.
- punctiger** Schilsky, 1897a: no. 98. U.S.S.R.: Caucasus.
- quercicola** Mulsant & Rey, 1868: 235. C. France.
- raffrayi** Pic, 1908: 51. Italy.
- ragusae** Schilsky, 1894b: no. 68. Italy.
- ramicornis** Kiesenwetter, 1863: 651. U.S.S.R.: Sarepta.
- raymondi** Deville, 1908: 218. Corsica.
xanthopus Schilsky, 1897b: nos 40 & 34EE.
- reitteri** Schilsky, 1894: 234. Turkey.
- rufipes** Miller, 1862: 345. Greece, Macedonia.
taygetanus Pic, 1908a: 50.
semicaeruleus Pic, 1922: 17.
- rufomarginatus** Perris, 1869: 18. N. Africa, Italy, Corsica, Sardinia, S. France.
marginatus Rottenberg, 1870: 243. Algeria.
edoughensis Pic, 1897: 41.
- rugicollis** Schilsky, 1897a: no. 95. Algeria.
- rugulosus** (Rosenhauer), 1856: 159. Spain. (*Dasytes*)
subcoeruleus Pic, 1908a: 90.
mateui Pic, 1954: 97.
- russicus** Reitter, 1890: 148. U.S.S.R.: Caucasus.
- sanctus** Pic, 1902: 32. Palestine (sic).
- sculpturatus** Wollaston, 1862: 447. Canary & Madeira Is.
tenerifensis Pic, 1922: 17.
- serbicus** Kiesenwetter, 1863: 653. Yugoslavia, Hungary, U.S.S.R.: Crimea.
tibiellus Schilsky, 1897b: no. 34MM. U.S.S.R.
- serratus** (Brullé), 1832: 152. Greece. (*Dasytes*)
- serrulatus** Schilsky, 1906: no. 100. Spain.
- siculus** Kiesenwetter, 1863: 654. Italy, Algeria, Tunisia.
fulvipes Schilsky, 1894: 230.
flavipes Schilsky, 1897b: no. 59.
obscuripes Schilsky, 1897b: no. 59.
- similis** Schilsky, 1906: no. 99. Turkey.
- smyrnensis** Pic, 1901: 18. Turkey.
- strandii** Marcu, 1936: 518. NE. Rumania.
- subcostatus** Schilsky, 1894b: no. 62. N. Africa.
bonnairei Pic, 1894a: 112.
viberti Pic, 1922: 27.
- subinteger** Pic, 1902a: 60. Mesopotamia.
- suggara** Peyerimhoff, 1929: 193. Algeria, Egypt.
suggara suggara Peyerimhoff, 1929. Algeria.
suggara alferii Wittmer, 1938: 169. Egypt.
- syriacus** Schilsky, 1894: 235. Syria, Israel.
caerulescens Schilsky, 1897b: no. 34DD.
- tarsalis** (Sahlberg), 1822: 113. N & C. Europe. (*Dasytes*)
rufitarsis (Sahlberg), 1822: 113. (*Dasytes*)
virens (Küster), 1849: no. 21; Lohse, 1977: 178. (*Dasytes*)
pinicola Kiesenwetter, 1863: 653; Lohse, 1977: 178; partim females (nec *pinicola*: Lohse, 1977); Majer, 1982: 442.
kuesteri Schilsky, 1894a: 331; Lohse, 1977; 178. Germany.
pandellei Pic: 1918: hors texte 7.
- tarsicola** Sahlberg, 1913: 43. Syria.
- testaceipes** Pic, 1932a: 27. Morocco.
- thalensis** Pic, 1930: 1. Tunisia.
- thessalicus** Pic, 1908a: 49. Greece.
- tingitanus** Baudi, 1873: 300. Morocco.
lixensis Bourgeois, 1911: 158.
subacuminatus Pic, 1934: 21.

- trinacriensis* Ragusa, 1872: 83. Italy, N. Africa.
tuberculifer Motschulsky, 1850: 364. Germany.
tumidus Kiesenwetter, 1863: 650. Morocco, Spain.
tournieri Pic, 1896: 47.
tuniseus Pic, 1908a: 50. Tunisia.
turcicus Schilsky, 1897b: nos 30 & 34CC. Turkey.
uhagoni Schilsky, 1897a: no. 86. Spain.
venustulus Schilsky, 1897a: no. 93. U.S.S.R.: Caucasus.
vestitus Wollaston, 1862: 447. Canary Is.
virens (Suffrian), 1843: 337. S. & C. Europe. (*Dasytes*)
ahenus Kiesenwetter, 1863: 652.
tibialis Schilsky, 1894a: 331.
virens virens (Suffrian), 1843: 337. S. & C. Europe.
virens orientalis Lohse, 1977: 178. W. Germany.
viridescens Pic, 1935b: 15. Morocco.

KUBANIUS Majer

(Figs 10, 11, 40)

Kubanius Majer, 1983: 385. Type species: *Kubanius elegans* Majer, 1983: 387, by original designation.

Body with a metallic sheen, sparsely punctured; of rather flattened, soft-bodied appearance, with fine, elongate legs and tarsi. Body, femora and tibiae sparsely clothed with long, fine suberect setae, tibiae with some fine spines among the setae; tarsi with shorter setae and some short spines. Abdominal sternites with fine, sparse, recumbent setae. [Of the 2 species seen, one, *K. elegans*, is unicolorous black, the other (undescribed) has a brown to black, metallic, head, pronotum and ventral side with yellowish brown elytra and antennae and light yellow legs.]

Head large, broader than or nearly as broad as anterior part of pronotum; punctures small, sparse, rimmed or simple; cuticle with microsculpture or smooth and shiny; short longitudinal groove present, on each side of frons at inner side of antennal insertion. Eyes weakly reniform, sparsely setose. Antennae very long or of moderate length, not markedly sexually dimorphic, reaching back well beyond base of elytra, segments 5–10 large and strongly serrate (Fig. 40). Apical segment of maxillary palps securiform. *Pronotum* small, subquadrate or elliptical, weakly transversely convex, almost flat on disc; sides weakly explanate, lateral margins smoothly rounded; anterior angles rounded, posterior angles either distinct or obsolete; posterior margin strongly bordered; punctures small, sparse, simple, rimmed or weakly tuberculate on disc; cuticle between punctures shiny, with or without microsculpture. *Scutellum* shiny, semicircular, sparsely punctured. *Elytra* flat on disc, broadening out at sides from shoulder in a weak curve and turned down sharply at apices, the widest part being at about one-third of elytral length from apex; punctures strong, cuticle transversely rugose; epipleura very short, deflecting dorsad well before level of hind coxae. *Hind wing* venation similar to that of *Trichoceble* (figured by Majer, 1983). *Tarsi* (hind) long, subequal in length to tibiae, with spiky ventral combs; claws with large blunt teeth and very small, inconspicuous membranous appendages (Figs 10, 11)). Tibiae with fine spines. *Prosternal process* not produced between front coxae, which are very strongly projecting and contiguous. (Metasternum with very strong median longitudinal groove.) *Length* 2.0–4.1 mm.

DISTRIBUTION. U.S.S.R. (Kazakhstan), N. India.

MATERIAL EXAMINED

1 paratype (BMNH) [the holotype is in the National Museum, Prague and there are more paratypes in Majer's collection], and 6 examples of an undescribed species from N. India (BMNH).

REMARKS. Majer used the sharply declining apices of the elytra to separate *Kubanius* from other genera, but as the elytra are rather soft it is possible their curvature may be due to the way the insects dried out after killing. However, the genus is a very distinctive member of the Rhadalinae, closely resembling *Trichoceble* in the form of the tarsi and subparallel grooves on the head. The antennae also are very similar to those of some species of *Trichoceble* but the pronotum is much less transverse and convex, the elytra less densely punctured, the prosternal process is obsolete and the epipleura much shorter. *Hemipleurus* gen. n. also has short, inwardly deflecting epipleura but is otherwise dissimilar.

Checklist of species

elegans Majer, 1983: 387. U.S.S.R. (Kazakhstan).

TRICHOCEBLE Thomson

(Figs 12, 13, 23, 39, 57)

Trichocele Thomson, 1859: 109. Type species: *Melyris floralis* Olivier, 1790: 11, by original designation.
Julistus Kiesenwetter, 1859: 174. Type species: *Julistus funera* Kiesenwetter, 1859: 175, by PRESENT DESIGNATION.

Unicolorous black or dark brown or with legs and antennal base lighter, clothed with fine erect or semi-erect unicolorous setae, ranging from golden or grey to black. Ventral pubescence recumbent. Tibiae with short setae.

Head smooth or with an insignificant, short longitudinal groove on each side of frons at inner side of eye and antennal insertion; punctures small, sparse, simple. Eyes emarginate, either strongly setose or glabrous. Antennae very long and strongly pectinate or serrate from 3rd to 5th segment (some females with shorter antennae than males but these still extend well back beyond shoulder). Apical segment of maxillary palps longitudinally triangular. *Pronotum* strongly transverse, convex, subelliptical, with very rounded smooth or finely crenulate sides; either all angles rounded or some obtuse; posterior border present; cuticle smooth, shiny, sometimes rugose near base, punctures small on disc (Fig. 23), becoming larger towards sides, usually simple but occasionally rimmed and becoming weakly tuberculate near sides. *Elytra* gradually broadening from shoulder so that broadest part is about one-third of elytral length from apex; of rather smooth appearance, densely punctured, punctures tending to be linked transversely by shallow grooves, forming transverse lines; lateral margins very narrowly explanate; humeral swellings moderately prominent; epipleura fairly long, weakly deflecting dorsad along their length, so not visible from side, evanescing at about level of 2nd abdominal sternite. *Hind wing* as in Fig. 57. *Tarsi* (hind) not as long as tibiae (cf. *Kubanius*); claws appendiculate, apices of teeth usually pointed (Figs 12, 13) but occasionally blunt. (Legs slender.) *Prosternal process* projecting about half way between front coxae and sloping to a lower plane than prosternum. *Length* 3.0–7.0 mm.

DISTRIBUTION. C., E. and S. Europe, Turkey, Armenia, Kurdistan, Caucasus, Turkestan, Tibet, India, China.

MATERIAL EXAMINED

12 species (including type species).

REMARKS. *Trichocele* is very closely related to *Kubanius* (q.v.) and *Antinea*. It differs from the latter in possessing membranous wings, larger reniform eyes and shorter temples. It differs from *Aplocnemus* in its lack of membranous appendages on the claws. *Trichocele cincta* Pic from Kurdistan could possibly be a different genus as its wing venation is much weaker and no anal cell is present. It also differs in having a narrower pronotum, strongly rimmed punctures with a pattern round each one (making them look flower-like). Also, it is light brown, except for the black head, which is not the usual coloration in *Trichocele*.

Seidlitz (1891) synonymized *Trichocele* and *Julistus*. Although they were both described in the same year, *Trichocele* was published first. Thomson's book (containing his description of *Trichocele*) is reviewed in the 'Neuere Literature' of the same part of *Berliner Entomologische Zeitschrift*, vol. 3 as that in which *Julistus* is described. Crowson (1964) transferred *Trichocele* to the Rhadalinae from the Dasytinae, on the basis of the examination of *T. floralis* (Olivier) and *Julistus* [= *T.*] *oertzeni* Schilsky. He also verified that the larval characters of *T. memnonia* (Kiesenwetter) were similar to those of *Aplocnemus*.

Checklist of species

araratica Yablokov-Khinzoryan, 1978: 243. Armenia.

arbustorum (Kiesenwetter), 1859: 176. Greece. (*Julistus*)

cincta Pic, 1929b: 1. Kurdistan.

convexa Pic, 1909: 113. Syria.

curta (Baudi), 1873: 297. Dalmatia, Turkey. (*Julistus*)

elongata Schilsky, 1897a: no. 85.

floralis (Olivier), 1790: 11. C. & S. Europe, U.S.S.R. (*Melyris*)

floricola (Kiesenwetter), 1861: 386. (*Julistus*)

fulvopilis (Reitter), 1889: 25. U.S.S.R.: Caucasus. (*Julistus*)

funera (Kiesenwetter), 1859: 175. SE. Europe, Greece, Italy. (*Julistus*)

grandis Schilsky, 1896: nos 90 & 32P. Syria.

griseohirta (Reitter), 1885: 380. Crete. (*Julistus*)

heydeni Schilsky, 1897: 155. China.

- immarginata* Reitter, 1902: 257. Turkey.
laeta Majer, 1986: 303. Mongolia.
lederi Schilsky, 1896: nos 92 & 32P. U.S.S.R.: Caucasus.
longicornis (Kiesenwetter), 1863: 647. Syria. (*Julistus*)
major Pic, 1922: 17. Greece.
mediocris Majer, 1986: 306. Mongolia.
memnonia (Kiesenwetter), 1861: 385. C. Europe, Germany, France, U.S.S.R.: Caucasus. (*Julistus*)
fulvohirta (Brisout de Barnville), [1862]: 601; Lohse, 1977: 182. (*Julistus*)
semirufescens (Pic), 1915: 22. (*Julistus*)
nigra Pic, 1921: 4. Greece.
oculata Schilsky, 1896, nos 98 & 32Q. Greece.
ocularis Reitter, 1902: 260.
oertzeni Schilsky, 1896: nos 91 & 32P. Crete.
pallidipes (Pic), 1944: 12. China. (*Julistus*)
ramicornis Schilsky, 1900: no. 4. Turkestan.
schatzmayeri Pic, 1909: 113. Macedonia.
schilskyi Reitter, 1902: 259. U.S.S.R.: Caucasus.
sparsepunctata Pic, 1921: 4. Turkey.
subcaerulea Pic, 1921: 4. Greece.
subcoriacea Reitter, 1902: 260. Greece.
testaceipes Pic, 1921: 4. Cyprus.
torretassoi Wittmer, 1935: 254. Rhodes.
unguicularis Reitter, 1902: 258. Turkey.
unicolor Pic, 1932b: 251. China.

ANTINEA Peyerimhoff

Antinea Peyerimhoff, 1929: 191. Type species: *Antinea saxicola* Peyerimhoff, 1929: 191, by monotypy.

Unicolorous dark brown. Dorsum covered with fairly short semi-erect setae; humeral swellings obsolete. Apterus.

Head large, nearly as long as broad, temples long, at least twice length of eye when seen from above; frons flat or with a weak depression at each side between eyes; shiny with small, simple punctures. Eyes small, flat, oval. Antennal segments 3–6 weakly and 7–10 strongly serrate, segment 11 elongate-oval. *Pronotum* strongly transverse, elliptical, all angles rounded, sides rounded, margins crenulate, strongly punctured with small simple punctures, without obvious borders. *Scutellum* subsemicircular, with strong puncturation. *Elytra* with sides curved, narrowly explanate and finely crenulate; humeral swellings obsolete; epipleura extending to about level of 2nd visible abdominal sternite. *Hind wings* absent. *Tarsi* elongate, segments 1–4 weakly lobed, claws fine, with minute teeth. Legs slender with long, stout tibial spurs; hind tibiae longer than front and middle tibiae. *Prosternal process* very short, not produced between front coxae. *Metasternum* unusually short, distance from middle coxa to hind coxa about as long as the longitudinal diameter of a hind coxa. *Length* 4 mm.

DISTRIBUTION. N. Africa (Sahara).

MATERIAL EXAMINED
 Syntype (BMNH).

REMARKS. *Antinea* is most closely related to *Trichocele* (q.v.). It was listed in the Dasytinae by Pic (1937) and is here transferred to the Rhadalinae.

Checklist of species

saxicola Peyerimhoff, 1929: 191. N. Africa (Sahara).

SEMIJULISTUS Schilsky

(Figs 1, 3, 5, 6, 7, 38, 58)

Semijulistus Schilsky, 1894: 227 (included in the rhadaline group by Majer, 1983: 387). Type species: *Dasytes callosus* Solsky, 1867: 32, by original designation.

Celsus Lewis, 1895: 118. (Here transferred from the Dasytinae (Pic, 1937: 56).) Type species: *Celsus spectabilis* Lewis, 1895: 119, by monotypy. **Syn. n.**

Eurelymis Casey, 1895: 600. (Here transferred from the Melyrinae (Pic, 1929: 17; Blackwelder, 1975: R67, 11.) Type species: *Eurelymis speculifer* Casey, 1895: 603, by PRESENT DESIGNATION. **Syn. n.**

Colour varying from black to dark, light, or reddish brown, often with elytra and pronotum different in colour or shade, legs sometimes lighter than body. Body clothed with very short, sparse, adpressed sometimes scale-like setae.

Head tending to be longer than broad, retractable under pronotum, frons without lines or depressions except for a faint short longitudinal groove mid way between eyes; punctures weakly rimmed, sometimes confused. Eyes slightly emarginate when seen from above, glabrous. Antennae short, not usually reaching beyond base of pronotum, serrate from segment 4, apical five or six segments often much more broadly serrate than the basal segments, giving an almost clubbed appearance (Fig. 1); sexually dimorphic. Apical segment of maxillary palps feebly securiform, sides subparallel, sensory surface diagonal. *Pronotum* broader than long, but not markedly so, sides serrate, evenly arcuate and visible from above; narrower than base of elytra, without anterior or posterior borders; all angles rounded; punctures rimmed, often very dense and confused and becoming tuberculate at sides making margin appear serrated, each tubercle with a forwardly directed curved seta; sublateral setae directed towards disc. *Scutellum* subquadrate. *Elytra* elongate, subparallel-sided, about twice as long as broad; strongly punctured; epipleura very narrow at level of hind coxae and continuing as a very narrow line which deflects laterad and evanesces altogether at about level of 2nd or 3rd visible abdominal sternite. The female is characterised by the presence of an oval, raised, shiny, unpunctured area on the apical third of each elytron (Fig. 6), except in one Japanese species, *S. elongatus* (Nakane). *Hind wing* with anal cell elliptical (Fig. 58). *Tarsi* simple, elongate; claws small with minute teeth near base (Fig. 5). (Legs very slender.) *Prosternal process* narrow but extending between front coxae to mesosternum when body is contracted. *Metasternum* convex (Fig. 3). *Length* 3.0–6.0 mm.

DISTRIBUTION. C. & E. Europe, Asia, Japan, NW. America (including Canada).

MATERIAL EXAMINED

7 species, including types of type species of *Celsus* (BMNH) and *Eurelymis* (MCZ) and 3 reliably identified specimens of the type species of *Semijulistus* (2 in MNHN). Also types of Pic's N. American species (MNHN).

REMARKS. This genus is included in the Rhadalinae by Majer (1983) although he regards the latter as a subgroup of the Dasytinae.

Although the distribution is so wide and the genus has been described three times, examination of the wing venation, mouthparts, genitalia etc. shows that the various elements are congeneric. The main difference between the Japanese species and the others is the shape of the apex of the last abdominal tergite in the female, but this is believed to be of only specific importance.

Semijulistus is closely related, and similar in appearance, to *Microjulistus* Reitter which is mainly from the Mediterranean region, Africa and western U.S.S.R. These genera have the basic characters of the Rhadalinae, but form a group apart from the other genera. They have a more slender, delicate appearance, are generally of smaller size with slender tarsi and recumbent pubescence and differ also in the form of the elytral epipleura. Most genera of the subfamily are generally larger and of stouter appearance and have longer, semi-erect or suberect setae.

Semijulistus differs from *Microjulistus* in its larger size, its unpunctured areas on the elytra of the female (in most species), its more strongly punctured pronotum, its lack of a linear lateral edge to the pronotum, its more convex metasternum, its apically divided tegmen, the fact that the pronotal sublateral setae point towards the disc and its distinct wing venation with an oval anal cell.

Checklist of species

ater (LeConte), 1878: 461 (from *Eurelymis*). N. America, Canada. **Comb. n.**

bicoloripes Pic, 1928a(431): 54 hors texte. N. America.

callosus (Solsky), 1867: 32 (*Dasytes*). U.S.S.R. (Turkestan).

elongatus (Nakane), 1981: 129 (from *Celsus*). Japan. **Comb. n.**

flavipes (LeConte), 1878: 461 (from *Eurelymis*). N. America. **Comb. n.**

rubrithorax Pic, 1928a(431): 54 hors texte. N. America.

spectabilis (Lewis), 1895: 119 (from *Celsus*). Japan. **Comb. n.**

speculifer (Casey), 1895: 603 (from *Eurelymis*). N. America. **Comb. n.**

MICROJULISTUS Reitter

(Figs 2, 4, 59)

Microjulistus Reitter, 1889a: 111. Type species: *Microjulistus fulvus* Reitter, 1889a: 112, by monotypy.
Ceralliscus Bourgeois, 1894: 121. Type species: *Ceralliscus raffrayi* Bourgeois, 1894: 122, by monotypy.

Similar to *Semijulistus*, but smaller. Form delicate, with slender legs and recumbent, often scale-like, usually light brown or greyish setae which obscure cuticle.

Head as in *Semijulistus* but clypeus rather longer and more parallel-sided, frons without depressions or grooves; cuticle rugose, often obscured by setae, punctures obscure. Eyes oval, glabrous. Antennae and palps similar to those of *Semijulistus*, sensory surface of latter more strongly diagonal. *Pronotum* only weakly transverse, about as broad as elytra at base; sides smooth, not or scarcely crenulate, lateral margin not visible from above due to strong lateral convexity, but visible from beneath as a fine line, not bordered; anterior angles rounded or obsolete, posterior either rounded or obtuse; punctures confused, sometimes rimmed, cuticle rugose, mat; sublateral setae directed towards base (Fig. 2). *Scutellum* subquadrate but rounded apically. *Elytra* elongate, subparallel; sides smoothly curved, not visible from above; puncturation weak, particularly near apex, usually microreticulate between punctures; epipleura very short and narrow, visible from side, deflecting laterad anterior to level of hind coxae. Elytra of female as in male. *Hind wing* with weak venation, no anal cell and very long setae along costal margin (Fig. 59). *Prosternal process* as in *Semijulistus*. *Metasternum* flattened, with distinct median longitudinal groove (Fig. 4). *Length* under 3 mm.

DISTRIBUTION. Mediterranean, Africa (widespread but localised), Arabia, C. Europe, C. Asia.

MATERIAL EXAMINED

8 named species, including reliably identified specimen of type species, and some material not determined at species level.

REMARKS. In Pic's catalogue (1937) this genus was regarded as a dasytine. Majer (1983) included it in the Rhadalinae although he regards the latter as a subgroup of the Dasytinae.

In the examples of *Microjulistus* examined, the tegmen is entire apically, not divided as it is in *Semijulistus*, and the dorsal appendage is less moveable.

Checklist of species

- chobauti** (Pic), 1895: 79. Algeria. (*Ceralliscus*)
- duboisii** Peyerimhoff, 1931a: 51. Algeria.
- fulvus** Reitter, 1889a: 112. U.S.S.R., Mongolia.
 obscurithorax Pic, 1905: 97. Turkestan.
- moreli** (Pic), 1927: 10. (*Ceralliscus*)
- pectoralis** (Pic), 1927: 10. (*Ceralliscus*)
- rufithorax** (Pic), 1927: 10. (*Ceralliscus*)
- gibbipennis** Chobaut, 1898: 80. S. Algeria.
- laticollis** (Pic), 1894: 95. Algeria. (*Ceralliscus*)
- lysholmi** Pic, 1898: 170, 171. Syria.
 abdominalis Pic, 1898: 170, 171.
- nigripennis* Pic, 1898: 170, 171.
- meynieri** Peyerimhoff, 1931a: 51. Algeria.
- minutus** Pic, 1927: 5. Corsica.
- nigricollis** (Pic), 1894: 95. Algeria. (*Ceralliscus*)
- olivaceus** Pic, 1931c: 446. Ethiopia.
- raffrayi** (Bourgeois), 1894: 122. Algeria. (*Ceralliscus*)
 nigrifrons (Pic), 1894: 95. (*Ceralliscus*)
- rubricollis** (Abeille), 1907: XXII [reference not seen]. Arabia. (*Ceralliscus*)
- subconvexus** Pic, 1903a: 179. S. Africa.
 nigricolor Pic, 1903a: 179.
- fulvithorax* Pic, 1904b: 33.
- wegeneri** Pic, 1898: 170. Egypt.
 obscurus Pic, 1898: 170, 171.

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P. R. Ackery & R. I. Vane-Wright

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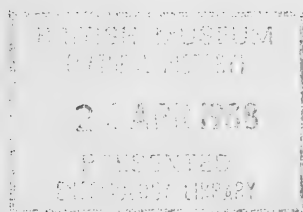
A review of the Rhadalinae (= Aplocneminae) (Coleoptera: Melyridae)

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Bulletin of the British Museum (Natural History)

A revision of some Afrotropical genera of
Eucoilidae (Hymenoptera)

J. Quinlan



Entomology series
Vol 56 No 4

28 April 1988

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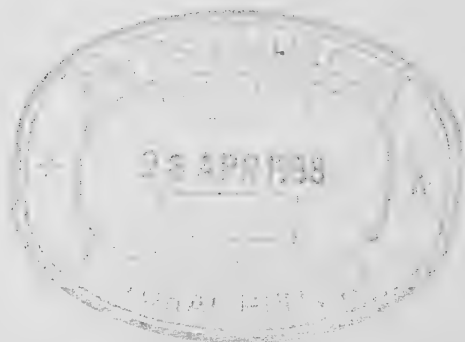
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A revision of some Afrotropical genera of Eucoilidae (Hymenoptera)

J. Quinlan

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

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Synopsis

Eight genera comprising 50 Afrotropical species are revised. Two genera (*Angustacarpa* and *Sirenes*) and 40 species are newly described; the primary types of 14 nominal species have been examined. Amendments to the key to genera (Quinlan, 1986) and a checklist are included.

Introduction

In this second part of a revision of the Afrotropical Eucoilidae a further 8 genera and 50 species are dealt with, including 2 new genera and 40 new species. My key to genera (Quinlan, 1986) has been amended to include the newly described *Angustacarpa* and *Sirenes*, and *Emargo* Weld, here transferred from the Figitinae. During the preparation of this paper all accessible type specimens have been examined and redescribed. When type material was not available the position of the nominal species concerned is discussed in relation to other taxa.

Weld (1960) originally placed *Emargo* in the subfamily Figitinae and stated that it differed from all other figitines in having the fore wing deeply emarginate. This character was otherwise known to occur only in the eucoilid genus *Kleidotoma*. Examination of the type species *Emargo eciton* shows it to possess a scutellar cup, although this is not of the usual form (Fig. 51). Weld's placement of the genus was influenced by the relative lengths of the gastral tergites (i.e. tergite 2 shorter than 3, see discussion p. 181).

Apart from the eight genera dealt with here and the ten dealt with in my earlier paper (Quinlan, 1986) there are at least three further genera of Eucoilidae (*Trybliographa*, *Daruna* and *Ganaspis*) in the Afrotropical region.

Material examined and terminology

The material on which this paper is based has come from the same sources as that included in my two previous papers on the Afrotropical Cynipoidea (Quinlan, 1979, 1986). Terminology is as indicated in those papers.

Depositories

Type depositories are abbreviated in the text as follows.

AM	Albany Museum, Grahamstown
BMNH	British Museum (Natural History), London
MA	Musée d'Amiens, Amiens
MNHN	Muséum National d'Histoire Naturelle, Paris
MNHU	Museum für Naturkunde der Humboldt Universität, Berlin
MRAC	Musée Royale de l'Afrique Centrale, Tervuren
SAM	South African Museum, Cape Town
USNM	United States National Museum of Natural History, Washington, D.C.
ZI	Zoologiska Institution, Lund
ZSBS	Zoologische Sammlung des Bayerischen Staates, Munich

Classification

Reference to my earlier paper (Quinlan, 1986) will aid appreciation of taxonomy, classification and relationships of the genera dealt with here. The affinities of *Bothrochacis* and *Eucoila* are also treated by Nordlander (1981, 1982). *Diglyphosema* is placed by Nordlander (1982) in the *Gronotoma*-group of genera (*Nordlanderia* etc). Excepting *Zaeucoila*, a Neotropical genus not examined by me, I agree that *Diglyphosema* is related to this group. All five genera have a plesiomorphic form of pronotal plate (i.e. it does not project forward) which is similar to that found in the Figitinae and the cynipine genera *Aulacidea* and *Aylax*. I have examined *Amphiglyphosema*, a genus erected by Benoit in 1956, and consider it to be congeneric with *Diglyphosema*, thus making it the first record of a *Diglyphosema* from the Afrotropical region. *Glauraspidia* is placed by Nordlander (1982) in the *Chrestosema*-group, comprising *Chrestosema*, *Glauraspidia*, *Pseudopsichacra*, *Odonteucoila*, *Dieucoila*, and *Leptopilina*. At present two species of *Glauraspidia*, newly described here, are known from the Afrotropical region. The new genus *Sirenes* is very closely related to *Glauraspidia* but differs in the sculpture of the head, mesoscutum and mesopleuron, the radial cell of the fore wing and the form of the antenna in both sexes. The characters common to both are the absence of a complete mesopleural suture, the dense pubescence on either side of the pronotal plate and entire metapleuron, the density of the pubescence on the propodeal area and the dense ring of felt-like pubescence at the base of segment one of the gaster.

Angustacarpa, newly erected, has a projecting pronotal plate with the lateral foveae between the anterior and posterior parts fused or closed (Fig. 11) as in *Stentoriceps*, *Rhoptromeris* and *Trichoplata*. It is distinguished, however, on the strongly compressed head and thorax (Fig. 4) and the position of the antennal sockets (Fig. 1). The genus *Leptopilina* has been the subject of a cladistic analysis by Nordlander (1980). He considers it to belong to the *Rhoptromeris*-group of genera comprising *Rhoptromeris*, *Cothonaspis*, *Trichoplata* and *Leptopilina*. *Leptopilina* and *Cothonaspis* have very similar pronotal plates (i.e. the foveae on either side of the medial bridge are open on the lateral margins and not fused laterally as in *Trichoplata* and *Rhoptromeris*). *Leptopilina* has a short thorax, the compound eyes large and the head constricted behind the eyes. *Cothonaspis* has an elongate slender thorax and the compound eyes are small. *Emargo*, as stated above, is considered for the first time to be a eucoilid and is transferred from the Figitinae (see p. 181).

Checklist of Afrotropical Eucolidae included in this paper

EUCOILIDAE Thomson, 1862

ANGUSTACORPA gen. n.

- apsus* sp. n.
- persa* sp. n.
- prodicus* sp. n.
- triton* sp. n.

BOTHROCHACIS Cameron, 1904

- Stirenocoela* Cameron, 1910
- Ditrupaspis* Kieffer, 1910
- Salpictes* Kieffer, 1913

erythropoda Cameron, 1904

- striaticollis* (Cameron, 1910)
- semirufa* (Kieffer, 1910) **syn. n.**
- stercoraria* Bridwell, 1919 **syn. n.**

rufiventris (Kieffer, 1913)

serratepilosa Benoit, 1956

DIGLYPHOSEMA Foerster, 1869

- Amphiglyphosema* Benoit, 1956 **syn. n.**

latesulcatum (Benoit, 1956) **comb. n.**

utica sp. n.

EMARGO Weld, 1960

- ascia* sp. n.
- cantus* sp. n.
- capito* sp. n.
- laverna* sp. n.
- matius* sp. n.
- micipsa* sp. n.
- numa* sp. n.
- palloris* sp. n.
- peleus* sp. n.
- pexus* sp. n.
- themis* sp. n.
- vacuna* sp. n.

EUCOILA Westwood, 1833

- Psilodora* Foerster, 1869
- Lytosema* Kieffer, 1910
- Psilodoropsis* Hedicke, 1913
- bantia* sp. n.

camerounensis Risbec, 1956

erinna sp. n.

marina sp. n.

veleda sp. n.

GLAURASPIDIA Thomson, 1862

Aglaotoma Foerster, 1862

Apistophyza Foerster, 1869

Diranchis Foerster, 1869

casca sp. n.

scyphus sp. n.

LEPTOPILINA Foerster, 1869

apella sp. n.

atraticeps (Kieffer, 1911)

boulardi (Barbotin, Carton &

Kelner-Pillault, 1979)

mahensis (Kieffer, 1911) (*Charips*)

secondary homonym

fannius sp. n.

faunus sp. n.

heterotoma (Thomson, 1862)

itys sp. n.

mahensis (Kieffer, 1911) (*Erisphagia*)

misensus sp. n.

pisonis sp. n.

syphax sp. n.

thetus sp. n.

vesta sp. n.

victoriae Nordlander, 1980

SIRENES gen. n.

floccus sp. n.

orbilus sp. n.

silenus sp. n.

sinis sp. n.

spio sp. n.

steropes sp. n.

syrinx sp. n.

syrtes sp. n.

Amendments to key to genera of Afrotropical Eucolidae

The three genera here added to the Afrotropical fauna can be accommodated in the key to genera (Quinlan, 1986) as follows.

At couplet 8:

- 8 Pronotal plate viewed frontally with narrow or obsolete medial bridge, foveae closed laterally (Fig. 11).

Scutellar disc sharply conical, sometimes almost spine- or beak-shaped, overhanging propodeum (Fig. 10); ♀ antenna clavate-subclavate or with segment 4 longer than 3, weakly curved on inner margin, sometimes swollen distally; ♂ antenna with segment 3 shorter than 4, 4 longer than each of the following segments; radial cell of fore wing open or closed (Figs 13, 14)

- Pronotal plate viewed frontally with a wide medial bridge, lateral foveae open, not fused externally (e.g. Fig. 27).

- 8A Head and thorax viewed dorsally strongly compressed laterally; head in lateral view wedge-shaped, in front view with antennae set at the middle (Fig. 1).

ANGUSTACORPA gen. n.

8A

9

- Head and thorax viewed dorsally not laterally compressed; head not wedge-shaped in lateral view, antennae set above the middle (between the upper margins of the eyes) (Fig. 2).

TRICHOPLASTA Benoit

At couplet 16:

- 16 Fully winged or brachypterous, apex of wings either incised, arcuate or truncate, not rounded, cubitus (*M*) not distinct, radial cell open on wing margin; tergite 2 of gaster either shorter or longer than tergite 3 in lateral view (Figs 22, 52) 16A
- Fully winged, never brachypterous, apex of wing rounded, rarely truncate, never incised, radial cell of fore wing open or closed; tergite 2 of gaster longer than 3 in lateral view (e.g. Fig. 193) 17
- 16A Tergite 2 of gaster shorter than tergite 3 (Fig. 52); fore wings strongly incised, radial cell open on wing margin, veins thick (cf. Figs 65, 67); scutellar cup weakly defined (cf. Fig. 60); mesopleural furrow absent. **EMARGO** Weld
- Tergite 2 of gaster the largest in lateral view (Fig. 22); fore wings either incised, arcuate or truncate, radial cell distinctive, vein *R*₁ only thickened at apex, near margin of wing, *Rs*+*M* usually absent (Fig. 20) or wings short not extending to apex of gaster; scutellar cup distinct but small, not extending to apex of longitudinally striate disc which is either rounded or conical, spine- or beak-shaped; mesopleural suture percurrent.
- KLEIDOTOMA** Westwood
- 17 Mesopleural suture either absent or indistinct (Fig. 182); frons prominent in ♂, less so in ♀; wings in ♂ of normal length (generally shortened in British specimens); scutellar cup raised above level of scutellar disc which is striate to reticulate-rugose; sides of pronotal plate and propodeum with dense tufts of pubescence (usually white); tergite 2 of gaster with dense felt-like ring of pubescence; antenna of ♀ filiform or subclavate 17A
- Without the above combination of characters; mesopleural suture generally present; pronotum and propodeum without dense felt-like tufts; tergite 2 of gaster with hairy ring variable in density of pubescence; ♀ antenna usually clavate, ♂ filiform, 3rd and 4th segments sometimes modified 18
- 17A Head, mesoscutum and mesopleuron finely sculptured; radial cell of fore wing completely closed on margin (Fig. 188); pronotal plate viewed dorsally, rectangular (Fig. 191).
- SIRENES** gen. n.
- Head, mesoscutum and mesopleuron smooth and polished; radial cell of fore wing generally open on margin (Fig. 96); pronotal plate rounded on margins (Fig. 95).

GLAURASPIDIA Thomson**ANGUSTACORPA** gen. n.

Type species: *Angustacorpa apsu* sp. n.

DIAGNOSIS. ♀ antenna 13-segmented, clavate and set medially between the eyes; ♂ antenna 15-segmented, filiform with a modified third segment (Fig. 3). Head viewed laterally wedge-shaped, viewed dorsally strongly compressed; face long and narrow, eyes closer together than the height of an eye measured medially, face smooth and polished; malar groove distinct; ocellar region with long scattered hairs (Fig. 1). Pronotal plate with enclosed lateral foveae, one on either side of the medial bridge. Mesoscutum smooth and polished without trace of notauli, strongly compressed laterally; scutellar foveae polished, round, lateral bars smooth; scutellar disc long, conical, apically rounded, surface reticulate-rugose, overhanging propodeum; scutellar cup elliptical, not extending to apex of disc, apical margin of cup with a fovea, outer rim of cup with a number of small pits or foveae (Fig. 4). Mesopleuron smooth and polished, mesopleural suture complete; metapleuron weakly ridged, anteroventral cavity pubescent; propodeum coarsely sculptured on dorsal and lateral surfaces. Segment 1 of gaster short and crenulate, obscured by a ring of dense pubescence at base of tergite 2; segments 2–5 of gaster visible in lateral view, tergite 2 the largest (Fig. 5). Legs slender, fore and mid coxae hairy. Wings long and narrow, surfaces pubescent, margins with a fringe of hairs, radial cell of fore wing long and narrow, completely closed on wing margin (Fig. 14).

DISTRIBUTION. Kenya, Zaire.

Key to species of *Angustacorpa* gen. n.**Females**

- 1 Antennal club 6-segmented (Fig. 6) (distinct, rhinaria pronounced).
Apex of tergite 2 sparsely punctate, tergites 3–5 finely punctate (Fig. 5). ***apsus* sp. n.** (p. 175)
- Antennal club 7–8 segmented (Figs 7, 8). 2
- 2 Antennal club 7-segmented (distinct, rhinaria weakly indicated); radial cell of fore wing open (Fig. 13).
Apex of tergite 2 and tergites 3–5 strongly and densely punctate (Fig. 12). ... ***triton* sp. n.** (p. 176)
- Antennal club 8-segmented; radial cell of fore wing closed (cf. Fig. 14). 3
- 3 Antennal segment 3 longer than 4+5, 4 twice length of 5, club segments 3 times as long as wide, club very sharply delimited (Fig. 8), apical segments pale yellow. ***prodicus* sp. n.** (p. 175)
- Antennal segment 3 shorter than 4+5, 4 longer than 5, club weakly delimited (Fig. 9), apical segments of antenna dark, basal segments yellow. ***persa* sp. n.** (p. 175)

***Angustacorpa apsus* sp. n.**

(Figs 4–6, 14)

DESCRIPTION. ♀ antenna with segment 3 subequal to 4+5, segments 8–13 with rhinaria, forming a club (Fig. 6). Head with long scattered setae; malar grooves percurrent; mandibles tridentate, produced forward in lateral view (cf. Fig. 1); occipital carina distinct on lower margins; ocelli widely spaced in dorsal view. Pronotal plate viewed dorsally with a broad medial bridge (cf. Fig. 11). Scutellar disc tapering apically, not spine-shaped; rim of scutellar cup with six foveae (Fig. 4). Gaster polished, apex of segments 2–5 punctate (Fig. 5). Wing (Fig. 14). Colour: antenna yellow, club segments slightly darker; head and thorax dark chestnut brown; gaster dark dorsally, orange-yellow laterally; legs orange-yellow.

♂ unknown.

MATERIAL EXAMINEDHolotype ♀, **Kenya**: 15 mls NE. Kisumu, nr Lake Victoria, xi.1979 (*Croft*) (BMNH).Paratypes. **Zaire**: 2 ♀ (MRAC).

REMARKS. Separated from the three other species by the sharply delineated 6-segmented antennal club (Fig. 6).

***Angustacorpa persa* sp. n.**

(Figs 9–11)

DESCRIPTION. ♀ antenna with segment 3 shorter than 4+5, 4 longer than 5, segments 6–13 with rhinaria, forming a weak club (Fig. 9). Head with long lateral setae; malar grooves percurrent; mandibles tridentate, produced forward in lateral view (cf. Fig. 1); occipital carina distinct on lower margins; ocelli widely spaced in dorsal view. Pronotal plate viewed fronto-dorsally with a broad medial bridge (Fig. 11). Scutellar fovea kidney-shaped; scutellar disc beak-shaped, extending past propodeum; scutellar cup long and broad medially, rim of scutellar cup with a few small pits or foveae (Fig. 10). Metapleuron strongly ridged. Gaster segment 1 as broad as long; tergite 2 with a sparse basal hairy ring; tergites 2–4 visible in lateral view; apex of segment 2 and visible parts of 3 and 4 punctate (cf. Fig. 5). Wing (cf. Fig. 14). Coxa and femur with scattered long hairs. Colour: antenna yellow basally, apical segments darker; head, thorax and gaster chestnut-brown; legs orange-yellow.

♂ unknown.

MATERIAL EXAMINEDHolotype ♀, **Zaire**: Massif Ruwenzori, Kalonge, 2010 m, Riv. Kamashoro aff. Butahu, 10.ii.1953 (*Vanschuytbroeck*) (MRAC).Paratypes. **Zaire**: 2 ♀ (BMNH).

REMARKS. Distinguished from *prodicus* by the relative lengths and shape of the antennal segments. The colour pattern is also different.

***Angustacorpa prodicus* sp. n.**

(Fig. 8)

DESCRIPTION. ♀ antenna short, with segment 3 longer than 4+5, 4 longer than 5, segments 6–13 with rhinaria, forming a distinct club (Fig. 8). Head viewed laterally weakly wedge-shaped, with long scattered

setae; malar grooves percurrent; mandibles tridentate (cf. Fig. 1); occipital carina distinct on lower margins; ocelli widely spaced in dorsal view (cf. Fig. 1). Pronotal plate viewed dorsally with a broad medial bridge (cf. Fig. 11). [Mesoscutum of holotype damaged by pin.] Scutellar fovea kidney-shaped; scutellar disc finely rugose, conical apically, extending past propodeum; scutellar cup long and broad, lateral margins with small pits or foveae (cf. Fig. 4). Mesopleural suture fine; metapleural anteroventral cavity weakly pubescent; propodeal sculpture with long hairs intermingled. Gaster segment 1 not visible in dorsal or lateral views, obscured by ring of pubescence at base of tergite 2, polished; apical third of segment 2 and visible parts of 3–5 finely punctate (cf. Fig. 5). Radial cell of fore wing appearing closed. Legs short and stout; coxa and femur without conspicuous pubescence. Colour: antenna brownish yellow basally, apical segments pale yellow; head and thorax dark chestnut brown; gaster orange-brown; legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Rutshuru (riv. Fuku), 1250 m, 5.vii.1935 (*de Witte*) (MRAC).

REMARKS. Closely related to *persa* (q.v.).

***Angustacorpa triton* sp. n.**

(Figs 7, 12, 13)

DESCRIPTION. ♀ antenna with segment 3 shorter than 4+5, 4–6 subequal in length, segments 7–13 with rhinaria, forming a club (Fig. 7). Head laterally with long scattered setae; malar grooves percurrent; mandibles tridentate, produced forward in lateral view (cf. Fig. 1); occipital carina distinct on lower margins; ocelli widely spaced in dorsal view. Pronotal plate viewed dorsally with a broad medial bridge (cf. Fig. 11); scutellar fovea kidney-shaped; scutellar disc conical apically, extending past propodeum; surface of scutellar cup with broken striae. Mesopleural suture weak; metapleuron with aberrant ridges indicated, anteroventral cavity without pubescence. Gaster segment 1 short, as broad as long, ridged; tergite 2 with a basal hairy ring; segments 2–5 visible in lateral view; apical third of segment 2 and visible parts of 3–5 with strong punctures (Fig. 12). Fore wing with radial cell open on margin (Fig. 13). Legs stout; coxa and femur without conspicuous pubescence. Colour: antenna brownish yellow; head blackish; thorax and gaster dark chestnut brown; legs brownish yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Mont Hoyo, 1280 m, 7–15.vii.1955 (*Vanschuytbroeck*) (MRAC).

REMARKS. Distinguished from other species by the 7-segmented antennal club and the strongly punctate gaster.

***BOTHROCHACIS* Cameron**

Bothrochacis Cameron, 1904: 164. Type species: *Bothrochacis erythropoda* Cameron, by original designation.

Stirengoela Cameron, 1910: 180. Type species: *Stirengoela striaticollis* Cameron, by monotypy. [Synonymised by Weld, 1930: 139.]

Ditrupaspis Kieffer, 1910a: 18. Type species: *Ditrupaspis semirufa* Kieffer, by monotypy. [Synonymised by Weld, 1930: 139.]

Salpictes Kieffer, 1913: 31. Type species *Salpictes rufiventris* Kieffer, by monotypy. [Synonymised by Weld, 1931: 223.]

DIAGNOSIS. ♀ antenna 13-segmented, clavate, segments 7–13 with rhinaria, forming a distinct club (Fig. 15). ♂ antenna 15-segmented, filiform, segments 3–14 with rhinaria. Head viewed frontally with eyes, measured medially, further apart than the height of an eye, frontal area with radiating striae, weakly pubescent; malar grooves percurrent, striated on either side; back of head strongly sculptured. Pronotal plate strongly produced forwards, posterior and anterior parts separated by a medial bridge with an open fovea on each side, lateral margins densely pubescent. Pronotum on either side of pronotal plate crenulate or striate. Mesoscutum smooth and polished with a few sparse hairs; lateral bars of scutellum with longitudinal striations; scutellar fovea large, smooth and polished, separated by a narrow septum extending from the scutellar cup; scutellar cup pear-shaped, apical fovea declined, not visible in dorsal view; scutellar disc reticulate-rugose, rounded apically (in some males it can be bicuspid) (Fig. 16). Mesopleuron smooth and polished, mesopleural suture complete; metapleuron weakly ridged, anteroventral

tral cavity pubescent; propodeal carinae parallel sided though U-shaped. Segment 1 of gaster obscured by dense hairy ring (complete on dorsal surface): segment 2 the largest in lateral view, segments 3 and 4 partially visible; gaster partially or wholly impunctate; hypopygium weakly protruding (Fig. 18). Legs with coxae bulbous; femora, tibiae and tarsi pubescent. Fore wing with radial cell open or closed on margin but only weakly pigmented; R_1 thinner than either Rs_1 or Rs_2 ; surface of wing dotted with hair bases (Fig. 19), apical margins of hind wing with a weak hair fringe; wings strongly infusate basally. Colour: head and thorax blackish; gaster bright orange-yellow to black; legs brown-yellow.

DISTRIBUTION. A small genus at present known only from Africa.

DISCUSSION. *Bothrochacis* is separated from the closely related genus *Eucoila* on the unusual declined apical fovea on the scutellar cup. Nordlander (1982) places *Bothrochacis* in his *Trybliographa* group of genera. Five nominal species have been covered in my examination of the genus and three of these I consider to be synonymous with the type species *B. erythropoda*, confirming some of Weld's synonymy.

Key to species of *Bothrochacis* Cameron

Females

- 1 Segment 3 of antenna longer than 4+5 (Fig. 31); scutellar disc rugose.
Antennal segment 5 longer and broader than 4, 6 broader than 5; gaster punctate, black (Fig. 35). *rufiventris* (Kieffer) (p. 178)
- Segment 3 of antenna subequal to or shorter than 4+5; scutellar disc reticulate-rugose. 2
- 2 Segment 3 of antenna shorter than 4+5 (Fig. 26); gaster reddish brown; hind tibia with a longitudinal ridge (Fig. 28). *serratepilosa* Benoit (p. 178)
- Segment 3 of antenna as long as 4+5 (Fig. 15); gaster bright orange-red; hind tibia without a longitudinal ridge. *erythropoda* Cameron (p. 177)

Males

B. erythropoda is the only species in which the male is known.

Bothrochacis erythropoda Cameron

(Figs 15–17, 19)

Bothrochacis erythropoda Cameron, 1904: 164. LECTOTYPE ♂, SOUTH AFRICA (BMNH), here designated [examined] [Type no. 7–34].

Stirenoceola striaticollis Cameron, 1910: 180. Holotype ♂, SOUTH AFRICA (BMNH) [examined]. [Synonymised by Weld 1930: 139.]

Ditrapaspis semirufa Kieffer, 1910a: 18. Holotype ♂, MALAWI (MNHU) [examined]. **Syn. n.**

Bothrochacis stercoraria Bridwell, 1919: 178. Holotype ♀, SOUTH AFRICA: Capetown vicinity, iv.1915 (Bridwell) (SAM) [not examined]. **Syn. n.**

DESCRIPTION. ♀ antenna with segments 7–13 forming a distinct club, each segment slightly longer than wide, segment 3 as long as 4+5, 4–6 subquadrate; ♂ antenna with segments 3 and 4 swollen, segment 3 shorter than 4, 4 shorter than 5, 5 and 6 subequal in length, 6–9 subequal but tapering, 9–13 each shorter and slender (in lectotype segment 14 and whole of right antenna missing). Face smooth and polished medially with weak radiating striae on inner orbits; occiput finely and closely striated. Pronotal plate (Fig. 17); pronotum on either side of pronotal plate striate. Mesoscutum without trace of notauli; lateral bars of scutellum very finely sculptured dorsally. Metapleuron polished in upper region, sculptured on lower margin; lateral margins of propodeum obscured by pubescence; propodeal carinae bowed. Segment 1 of gaster in form of a narrow ring, weakly crenulate; apex of tergite 2 and whole of visible part of segment 3 punctate. Wings without pubescence, margins (except lower margin of hind wing (Fig. 19)) without a fringe of hairs; radial cell of fore wing appears partially open on wing margin due to a lack of pigmentation; cubitus (vein *M*) indicated, weakly pigmented basally; *Rs* + *M* indicated; basal infuscation of wing brownish. Legs robust; fore tibia with sharply curved bifid spur; mid and hind tibiae with two single spurs. Colour: antenna segment 1 black, remainder reddish brown; gaster orange-brown.

MATERIAL EXAMINED

Bothrochacis erythropoda Cameron, lectotype ♂, **South Africa**: Cape Colony, Grahamstown, ?xi (*Daly & Sale*) (BMNH). *Stirenoceola striaticollis* Cameron, holotype ♂, **South Africa**: Cape Colony (BMNH). *Ditrapaspis semirufa* Kieffer, holotype ♂, **Malawi**: 'N. Nyasa' (MNHU).

Kenya: 2 ♀ (BMNH). **South Africa**: 26 ♂, 9 ♀ (BMNH); 6 ♀ (AM). **Zaire**: 6 ♀ (MRAC).

REMARKS. One of two male syntypes of *B. erythropoda* in the BMNH collection is designated as lectotype. It bears Cameron's data label 'Cape Colony'. Both specimens, however, bear the name *erythropus* and not *erythropoda* as published. Weld (1930) found that *Stirenocoela striaticollis* is synonymous with *erythropoda* and this has been confirmed. I have examined what remains (the antenna, gaster and parts of the legs are missing) of the holotype of *Ditrapaspis semirufa*. It bears labels 'N. Nyasa, Lamgenburg . . . 98, Fulleborn, S', 'Co type' [printed], and determination and syntype labels of G. Nordlander. Like Weld (1952) I consider it to be conspecific with *B. erythropoda*. Bridwell (1919) based his description of *B. stercoraria* on 10 ♀ and 2 ♂ from cow dung or bred from the puparia of *Musca lusuria* and *Lasiopyrellia cyanea* (Bridwell). He stated that he had been inclined to identify his material as *erythropoda* except that species was said to have the second abscissa of the radius roundly curved. I have not seen specimens of *B. stercoraria* but regard the distinguishing character as too variable to reliably separate species. On the basis of the description I therefore synonymise it with *B. erythropoda*.

***Bothrochacis rufiventris* (Kieffer)**

(Figs 31, 34, 35)

Salpictes rufiventris Kieffer, 1913: 31. Holotype ♀, KENYA (MNHN) [examined].

DESCRIPTION. ♀ antenna with segment 3 longer than 4+5, 5 longer and broader than 4, 6 broader than 5 (Fig. 31), 7–13 with rhinaria, each progressively broader and longer than the preceding segment, forming a distinct club. Face smooth and polished with radiating striae on inner margins of eyes; occiput with strong vertical striations. Mesoscutum with weak anterior parallel lines present, notauli weakly indicated; scutellum (Fig. 34); scutellar disc coarsely rugose. Propodeal carinae obscured by dense pubescence on lateral margins. Segment 1 of gaster in form of a crenulate ring; parts of segments 3 and 4 punctate (Fig. 35). Fore wing with radial cell open on margin; cubitus (R_1) indicated; vein $Rs + M$ extending to base of Rs and M ; hind wing with a fringe of hairs on lower margin. Legs robust, pubescent; fore tibia with sharply curved bifid spur; mid and hind tibiae with two single spurs. Colour: antenna reddish brown; gaster black.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Kenya**: British East Africa, 'Afrique Orientale Anglaise', Kajabe, 2100 m, St. no. 27, xii.1911 (MNHN).

REMARKS. I have seen only the holotype of this species. It is separated from *erythropoda* by antennal and colour characters.

***Bothrochacis serratepilosa* Benoit**

(Figs 26–30, 32, 33)

Bothrochacis serratepilosa Benoit, 1956: 534. Holotype ♀, RWANDA (MRAC) [examined].

DESCRIPTION. ♀ antenna subclavate, segments 7–13 with rhinaria, segment 3 shorter than 4+5, 4 and 5 subequal in length, 6 and 7 subequal, 7–13 swollen medially, 13 longer than 12 (Fig. 26). Head in lateral view wedge-shaped; frontal radiating striae weak, occiput with weak vertical striations. Pronotum on either side of pronotal plate strongly striate; pronotal plate with lateral foveae elongate, medial bridge narrow (Fig. 27). Scutellar disc truncate apically. Propodeal carinae bowed medially, pubescent on the outer margins. Gaster with apex of segment 2 and visible parts of 3–5 punctate; hypopygium pronounced. Hind tibia with a distinctive longitudinal ridge (Fig. 28). Fore wing with radial cell open on wing margin (Fig. 29), margin weakly pigmented; cubitus (M) not extending to apex of wing; apical and hind margins of hind wing with a hair fringe; vein $Rs + M$ not visible but outlined by a brownish hue extending across the basal half of the wing; vein $Sc + R_1$ with a distinct break (Fig. 29). Colour: entirely reddish brown.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Rwanda**: Terr. Ruhengeri, Kagogo, 1900 m, 29.i.1953 (*Basilewsky*) (MRAC).

REMARKS. Distinguished by antennal and colour characters.

DIGLYPHOSEMA Foerster

Diglyphosema Foerster, 1869: 342. Type species: *Diglyphosema eupatorii* Foerster, by original designation and monotypy.

Amphiglyphosema Benoit, 1956: 546. Type species *Amphiglyphosema latesulcatum* Benoit, by original designation and monotypy. **Syn. n.**

DIAGNOSIS. ♀ antenna 13-segmented, weakly subclavate; ♂ antenna 15-segmented with modified third segment (Fig. 36). Head viewed frontally with malar grooves present with weak striations on either side; eyes as far or slightly further apart than the height of an eye. Pronotum with crenulate sculpture viewed dorsally; pubescent on either side of pronotal plate which is broad (Fig. 44). Mesoscutum with distinct but broken notauli with sparse hairs on apical half of each notaulus which is widened; scutellum with a large cup overhanging scutellar disc which is rugose to punctate; scutellar cup with a large central fovea or depression with a ring of smaller foveae close to border of cup. Mesopleural suture distinct with weak striations on dorsal margin. Gaster with segment 1 in form of a collar with weak crenulations, this segment sometimes obscured by segment 2 which occupies whole of remaining visible part of gaster; segment 2 of gaster smooth and shining, sometimes with a trace of punctures. Radial cell of fore wing open or closed (this is difficult to ascertain because the pigmentation is weak); wing surfaces ciliate, margin of wings with a hair fringe; cubitus distinct, not always pigmented. Legs generally clear yellow.

DISTRIBUTION. Europe, Africa, the New World.

DISCUSSION. Nordlander (1976) considers the Foerster genera *Disorygma*, *Microstilba*, *Gronotoma* and *Diglyphosema* to constitute a distinct genus-group. These genera with *Zaeucoila* constitute the *Gronotoma*-group of Nordlander (1982). Benoit (1956) described a further genus *Amphiglyphosema* which he indicated was similar to *Diglyphosema*. Weld (unpublished notes) suggested that the two genera differed in the radial cell. However, I find nothing to justify retaining *Amphiglyphosema* as a distinct genus at the present time. I also consider *Eucoilidea* Ashmead to belong to the *Gronotoma*-group. Weld (1952) referred to Hedicke's opinion (1930) that *Eucoilidea* was a synonym of *Gronotoma*. I have not seen the type species of *Gronotoma* but regard *Eucoilidea* as distinct (Quinlan, 1986). More extensive study of the *Gronotoma*-group is needed before the generic classification can be further refined.

Little is known of the host associations of *Diglyphosema*. Quinlan (1978) cites *Melanagromyza aeniventris* (Fallén), *M. nibletti* Spencer, *M. dettmeri* Hering, *M. eriolepidus* Spencer and *M. tripolii* Spencer as hosts of the European species *D. conjungens* Kieffer. The only host data for African species relate to *D. latesulcatum* (Benoit), from *Melanagromyza phascoli* Tryon and *Anthomyia centrosematrix* de Meijere. Both of these Diptera are stem borers recorded throughout the Old World tropics.

Key to the type species and Afrotropical species of *Diglyphosema* Foerster**Females**

- 1 Radial cell of fore wing open on wing margin (Fig. 38); antennal segments 3–9 subequal in length; gaster punctate (cf. Fig. 33). *eupatorii* Foerster (p. 179)
- Radial cell closed (Fig. 41); antennal segments 3–12 each progressively shorter (Fig. 43); gaster punctate or impunctate. 2
- 2 Antennal segment 3 shorter than 4; radial cell of fore wing 2.5 times as long as wide; scutellar cup as broad apically as basally (Fig. 40); notauli narrowly separated apically (Fig. 40); gaster punctate apically (Fig. 39). *utica* sp. n. (p. 180)
- Antennal segment 3 subequal to 4; radial cell of fore wing 2.0 times as long as wide (Fig. 42); scutellar cup as long as wide, dew-drop shaped (Fig. 48); notauli as far apart apically as basal width of a notaulus (Fig. 48); gaster impunctate. *latesulcatum* (Benoit) (p. 180)

Males

No males of the Afrotropical species are known.

***Diglyphosema eupatorii* Foerster**

(Figs 38, 44–46)

Diglyphosema eupatorii Foerster, 1869: 345. Holotype ♀, GERMANY (MNHU) [examined].

DESCRIPTION. ♀ antenna very weakly subclavate, segments 3–9 subequal, segments 10–12 subequal, each fractionally broader than preceding one. Head viewed frontally with inner margins of eyes almost parallel; malar grooves obscured by striations on either side; face with scattered pubescence. Pronotum either side

of pronotal plate canaliculate. Mesoscutum with deep notauli converging, but not merging, posteriorly, where they are broader and sculptured; base of scutellum with two deep foveae; disc on lateral margins punctate; cup large and extending past apex of scutellum, with a large central fovea. Carinae of propodeum parallel; mesopleural suture complete, area below suture smooth and shining. Segment 1 of gaster short, broader than long, crenulate; segment 2 the only segment visible in lateral view; apical third of gaster punctate. Legs orange-yellow. Wings with hair fringe entire; radial cell of fore wing longer than wide, open on margin; cubitus not visible (Fig. 38).

MATERIAL EXAMINED

Holotype ♀, **Germany**: Aachen (MNHU).

REMARKS. This, the type species of the genus, does not occur in Africa; it is included to facilitate comparison with the Afrotropical species.

Diglyphosema latesulcatum (Benoit) comb. n.

(Figs 36, 37, 42, 47–49)

Amphiglyphosema latesulcatum Benoit, 1956: 546. Holotype ♀, RWANDA (MRAC) [examined].

DESCRIPTION. ♀ antenna subclavate, segments 3 and 4 equal in length; ♂ antenna (Fig. 36) with segments 4–15 moniliform. Face with long scattered pubescence; malar space with distinct striations; frontal line raised. Pronotal plate large, not protruded, with two foveae medially. Mesoscutum with notauli converging strongly half way towards scutellum, the apical third broad and sculptured, in the form of a series of linked foveae (Fig. 48); scutellar disc viewed dorsally visible only on the lateral margins, surface of disc reticulate-rugose with long scattered hairs forming a fringe apically; scutellum with two foveae at base. Carinae of propodeum converging basally, parallel medially; mesopleuron smooth and polished. Segment 1 of gaster usually obscured by segment 2; segment 1 short, broader than long, crenulate; segment 2 with a few scattered hairs at base; gaster impunctate. Radial cell of fore wing closed; base of wings fumate; *Rs* + *M* and *M* not pigmented or indicated. Colour: antenna light brown basally, becoming darker towards apex; head and thorax black; gaster chestnut brown; legs orange-yellow.

MATERIAL EXAMINED

Holotype ♀, **Rwanda**: Ruhengerri, Kagogo, 1900 m, 29.i.1953 (*Basilewsky*) (MRAC).

REMARKS. Differs from the European species of *Diglyphosema* mainly in having the radial cell closed and the gaster not densely punctate and by the shape of the scutellar cup. A long series of males, possibly of this species, has been examined but there is not sufficient evidence to justify a positive association.

Diglyphosema utica sp. n.

(Figs 39, 40, 41, 43)

DESCRIPTION. ♀ antenna subclavate, segment 3 shorter than 4, 4 longer than 5, 5 and 6 subequal in length, 7–13 each slightly, progressively shorter (Fig. 43). Inner margins of eyes with long scattered pubescence; malar space with distinct striations on either side; frontal line raised. Pronotal plate, not protruded, viewed frontally posterior part longer than anterior part, foveae either side of medial bridge open (Fig. 44). Mesoscutum smooth and polished, with notauli converging sharply two-thirds towards scutellum, separated basally by a narrow stem, wine glass-shaped (Fig. 40); lateral bars of scutellum smooth and polished, short and broad; scutellar foveae shallow, polished; scutellar disc reticulate-rugose on lateral margins, its apex obscured by scutellar cup; scutellar cup longer than broad, as broad apically as basally, the ring of foveae extending from apex of rim to two-thirds of way towards scutellar fovea. (Fig. 40); apex of disc with long hairs forming a fringe. Propodeum obscured by dense pubescence; mesopleuron smooth and polished; mesopleural suture arched; metapleuron and side of propodeum densely pubescent. Segment 1 of gaster in form of a crenulate ring; segment 2 finely punctate apically. Radial cell of fore wing closed on margin (Fig. 41); base of wings fumate; *Rs* + *M* and *M* not indicated. Colour: antenna yellowish basally, becoming darker towards apex; head and thorax black; gaster chestnut brown; legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Nigeria**: W. State, Ile-Ife, v.1973 (*Medler*) (BMNH).

Paratypes. **Ivory Coast**: 2 ♀ (BMNH).

REMARKS. Very closely related to *latesulcatum* but distinguished by antennal, wing and scutellar cup characters.

EMARGO Weld

Emargo Weld, 1960: 195. Type species: *Emargo eciton* Weld, by original designation and monotypy.

DIAGNOSIS. ♀ antenna 13-segmented (rarely 12), segment 1 longer than 2, swollen apically, segment 2 subquadrate, very broad, segments 7–13 in type species forming an indistinct club. Head broader than thorax. Pronotal plate protruding, lateral fovea open. Mesoscutum smooth and polished, notauli fine, complete; scutellar fovea weakly indicated; lateral bars of scutellum broad basally, short and polished; scutellar disc reticulate-coriaceous, rounded apically; scutellar cup large, occupying almost entire dorsal surface of scutellum (Fig. 51). Mesopleural suture absent, surface of mesopleuron smooth and polished; metapleuron polished, anteroventral cavity hairless; propodeum with dense woolly pubescence laterally. Segment 1 of gaster obscured by propodeal pubescence and pubescence at base of tergite 2; tergites 2–6 visible in lateral view, 2 shorter than 3 (Fig. 23). Wing surfaces pubescent, fore wing incised at apex, distal margins with fringe of hairs; radial cell of fore wing very small, open on margin (Fig. 21); hind wings narrow. Legs with hind coxa swollen with pubescence basally.

DISTRIBUTION. Mexico, Marianas Is, Africa, Madagascar, Sulawesi, Australia.

DISCUSSION. *Emargo* was described and placed by Weld in the Figitinae. He stated that it differed from all other Figitinae in having the fore wings emarginate. After studying the genus I conclude that it belongs to the Eucolidae, to which it is transferred. Contrary to Weld's description of the scutellum, the cup is exceptionally large and occupies the whole of the dorsal surface. Also it has a typical eucoloid pronotal plate, dense pubescence on the lateral margins of the propodeum and a hairy ring at the base of tergite 2. However, unlike the majority of eucolids, segment 2 of the gaster is not the largest. I consider the relatively small size of segment 2 to be a primitive character. Apart from the type species and the Afrotropical species dealt with here I have seen specimens of *Emargo* from Sulawesi and Australia. The scutellar cup in this latter material is weakly represented on a polished scutellar disc. Two males and one female from Australia belong to a species very close to one of the Afrotropical species.

It is not possible to run this genus to a family in Weld's key (1952). In my key to families and subfamilies (Quinlan, 1979) it would run to Eucolidae but for the relative sizes of gastral segments 2 and 3. Couplet 5 (Quinlan, 1979: 90) should be amended to read 'Segments 2 and 3 of gaster *generally* fused, without visible suture, *exceptionally with segment 2 differentiated*.' The differentiation of segment 2 in *Emargo* is similar to the condition found in Figitinae. The weakly delineated scutellar cup (cf. Fig. 59) can also appear very similar to the smooth scutellum of figitines.

The only two males known from Africa have 14-segmented antennae. *Emargo* has in common with *Glauraspida*, *Pseudopsichacra* and the new genus *Sirenes* a densely woolly pronotal plate, densely pubescent propodeal and basal gastral segments, and no mesopleural suture.

Weld (1960) stated that *Emargo eciton* was taken by Berlese funnel extraction from refuse deposits of the army ant *Eciton burchelli* (Westwood) and presumed its host to be one or more flies of the families Phoridae, Muscidae or Sarcophagidae.

Key to the Afrotropical species of *Emargo* Weld**Females**

- 1 Antenna with 7-segmented club, each segment a little longer than broad (Fig. 53).
Legs very pale yellow. *laverna* sp. n. (p. 183)
- Antennal club 8–10 segmented, each with rhinaria. 2
- 2 Antennal club 8-segmented (Figs 54, 56). 3
- Antennal club 9–10-segmented (Figs 55, 57). 4
- 3 Antennal club with conspicuous rhinaria, each segment 3 times as long as broad (Fig. 54); apex of wing broad, weakly incised. *pexus* sp. n. (p. 185)
- Antennal club with inconspicuous rhinaria, each segment less than 3 times as long as broad (Fig. 56); apex of wing narrow, strongly incised. *cantus* sp. n. (p. 182)
- Antennal club 9-segmented. 5
- Antennal club 10-segmented. 9
- 5 Antenna 12-segmented, segment 3 minute (Fig. 55), shorter than segment 4.
Antennal club segments sharply indicated, each with strong rhinaria and conspicuous setae (Fig. 55); apex of wing sharply incised, broad. *capito* sp. n. (p. 183)
- Antenna 13-segmented, segment 3 equal in length to 4 or longer. 6
- 6 Antennal segments 3 and 4 equal in length, club segments 3 times as long as broad (indicated by strong rhinaria) (Fig. 57).
Apex of wings strongly incised. *ascia* sp. n. (p. 182)

- Antennal segment 3 longer than 4, apical segments variable in proportions. 7
- 7 Antennal club segments 2 times as long as broad (blackish apically, rhinaria present) (Fig. 58).
Wings narrow apically, sharply incised. *matius* sp. n. (p. 183)
- Antennal club segments not less than 3 times as long as broad. 8
- 8 Apical segments of antenna very pale; lateral bars of scutellum polished, notauli indistinct.
Scutellar cup long and narrow (Fig. 59). *palloris* sp. n. (p. 185)
- Apical segments of antenna brownish black; lateral bars of scutellum sculptured, notauli
distinct (Fig. 60). *numa* sp. n. (p. 184)
- 9 Antennal segment 3 shorter than 4.
Antennal club segments 3 times as long as broad (Fig. 61). *themis* sp. n. (p. 186)
- Antennal segment 3 as long as or longer than 4. 10
- 10 Antennal segment 3 distinctly longer than 4.
Antennal club segments 3 times as long as broad, with rhinaria (Fig. 62). *vacuna* sp. n. (p. 186)
- Antennal segments 3 and 4 equal in length. 11
- 11 Club segments of antenna 3 times as long as broad (Fig. 63), rhinaria inconspicuous.
micipsa sp. n. (p. 184)
- Club segments of antenna slightly longer than broad, rhinaria conspicuous (Fig. 64).
peleus sp. n. (p. 185)

Males

The only two male specimens from Africa cannot be associated with any particular species.

Emargo ascia sp. n.

(Figs 51, 52, 57, 65)

DESCRIPTION. ♀ antenna with segments 3 and 4 subequal in length, 2 wider than 3 or 4, 5–13 with rhinaria forming a club (Fig. 57). Face smooth and polished with scattered hairs; malar grooves not indicated; anterior tentorial pits distinct; eyes large. Pronotal plate projected forward, medial bridge broader than the open lateral fovea; pronotum with long scattered setae. Notauli not percurrent, with a few scattered setae in their place; lateral bars of scutellum small triangular; scutellar fovea shallow; scutellar disc smooth and polished; scutellar cup long and narrow, weakly defined; apex of scutellar disc round, surface weakly sculptured (Fig. 51). Propodeum obscured laterally and dorsally by dense woolly pubescence; area below ventral region of mesopleuron pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (Fig. 52); hypopygium small. Wing surfaces densely pubescent, margins with a long apical hair fringe; veins thick (Fig. 65). Colour: antenna yellowish brown; head brownish; thorax and gaster brownish; legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Madagascar**: Beresty 12 km, NW. Ambossary, 5–15.v.1983 (Noyes & Day) (BMNH).

Paratypes. **Madagascar**: 2 ♀ (BMNH). **Zambia**: 1 ♀ (BMNH).

REMARKS. Distinguished from closely related species with a 9-segmented antennal club by the proportions of the antennal segments.

Emargo cantus sp. n.

(Figs 56, 66, 67)

DESCRIPTION. ♀ antenna weakly subclavate, segment 2 subequal in length to 3 but thicker, 3 longer than 4, 4 and 5 subequal in length, 6–13 forming a weak club, rhinaria weakly indicated (Fig. 56). Face smooth and shining with sparse scattered hairs medially; malar grooves not indicated; anterior tentorial pits pronounced. Pronotal plate projected forward, medial bridge narrow between the open lateral fovea. Notauli percurrent, with 2 or 3 long setae present; scutellar fovea polished, semi-circular; scutellar disc smooth and polished; scutellar cup aberrant, faint in dorsal view, long and narrow, declined (Fig. 66). Propodeum obscured laterally and dorsally by dense woolly pubescence; ventral margin of mesopleuron pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (cf. Fig. 52); hypopygium not prominent. Wing surfaces densely pubescent, margins with a long apical hair fringe; veins thick (Fig. 67). Colour: antenna, head, thorax and gaster orangy-brown; legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, i.1979 (*Watsham*) (BMNH).

Paratypes. **Zimbabwe**: 3 ♀ (BMNH). **Zaire**: 1 ♀ (MRAC).

REMARKS. This species is most closely related to *pexus* (q.v.).

***Emargo capito* sp. n.**

(Figs 55, 68)

DESCRIPTION. ♀ antenna 12-segmented, segment 3 minute, 4–12 with faint rhinaria, forming a distinct club (Fig. 55). Face smooth and shining, with scattered hairs; malar space small, grooves not indicated; eyes large, further apart than the height of an eye; head viewed dorsally large, almost square, as wide as thorax. Pronotal plate projected forward, medial bridge broad, the lateral foveae small, with dense pubescence; pronotum with a few sparse hairs. Notauli aberrant, with a few long setae in their place; lateral bars of scutellum triangular; scutellar fovea shallow; scutellar disc smooth and polished; scutellar cup weakly indicated, a weak apical fovea indicated (Fig. 68). Propodeum obscured laterally and dorsally by dense woolly pubescence. Gaster with tergite 3 the largest, tergites 4–7 partially visible (cf. Fig. 52); hypopygium pronounced. Apical margins of wings with a long hair fringe; radial cell of fore wing minute; apex of fore wings excised (cf. Fig. 21). Colour: antenna light brown; head dark brown; thorax orange-yellow; gaster light brown; legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Madagascar**: Tam Perinet, 27.iv.1983 (*Noyes & Day*) (BMNH).

REMARKS. This species is exceptional among the Afrotropical species of the genus in having 12-segmented antennae with the third segment very reduced. Two males and one female from Australia are very close to this species but until further material is seen or the Australian cynipoid fauna is examined no decision can be made on their status.

***Emargo laverna* sp. n.**

(Fig. 53)

DESCRIPTION. ♀ antenna with segment 2 longer and wider than 3, 3 longer than 4, 4 and 5 subequal in length, 6 shorter than 5, 7–13 as wide as long forming a distinct club (Fig. 53). Face smooth and polished with scattered hairs; malar grooves aberrant; eyes small, almost round. Pronotal plate projected forward, medial bridge as wide as the open lateral fovea; pronotum polished, without hairs. Notauli weakly indicated, with a few scattered hairs in their place; lateral bars of scutellum small triangular; scutellar fovea shallow; scutellar disc smooth and polished; scutellar cup long and narrow, very weakly defined (cf. Fig. 66). Propodeum obscured laterally and dorsally by dense woolly pubescence. Gaster with tergite 3 the largest, tergites 4–7 partially visible; hypopygium small. Wing surfaces densely pubescent, margins with a long apical hair fringe; apex of fore wing strongly incised; veins thick (cf. Fig. 67). Colour: antenna yellowish brown; head brownish; thorax and gaster yellowish brown; legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, ii.1979 (*Watsham*) (BMNH).

Paratype. **Kenya**: 1 ♀ (BMNH).

REMARKS. This is the only species of the genus with a 7-segmented antennal club.

***Emargo matius* sp. n.**

(Figs 58, 69)

DESCRIPTION. ♀ antenna with segment 2 subequal in length to 3 but wider, 4 shorter than 3, 5–13 with rhinaria forming a distinct club (Fig. 58). Face smooth and polished with scattered hairs medially around clypeal region; malar grooves weakly indicated; head viewed dorsally almost as wide as long. Pronotal plate projected forward, medial bridge wide, the lateral foveae open; pronotum with long scattered setae. Notauli percurrent, with long setae obscuring them; lateral bars of scutellum small; scutellar fovea small and shallow; scutellar disc smooth and polished with long setae; scutellar cup long and narrow, weakly indicated (Fig. 69). Propodeum obscured laterally and dorsally by dense woolly pubescence; area below

ventral region of mesopleuron densely pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (cf. Fig. 23); hypopygium small. Wing surfaces densely pubescent, margins with a long apical hair fringe; apex of fore wing strongly incised; veins thick (cf. Fig. 67). Colour: antenna yellowish brown; head, thorax and gaster brownish; legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Chishawasha, i.1979 (*Watsham*) (BMNH).

Paratypes. **Zimbabwe**: 3 ♀ (BMNH). **Cameroun**: 1 ♀ (BMNH). **Kenya**: 1 ♀ (BMNH). **Zaire**: 1 ♀ (BMNH).

REMARKS. Distinguished from *ascia*, *palloris* and *numa* on the shape and proportions of the antennal segments, these four species are otherwise but little distinct.

Emargo micipsa sp. n.

(Figs 23, 63)

DESCRIPTION. ♀ antenna clavate, with segments 2 and 3 subequal in length, 2 wider than 3, 4–13 subequal in length, swollen medially, rhinaria distinct (Fig. 63). Face smooth and polished; malar grooves not indicated; anterior tentorial pits distinct; eyes further apart measured medially than the height of an eye. Pronotal plate projected forward, medial bridge broad, the lateral foveae open; pronotum with sparse long setae. Notauli very weakly indicated in part with long scattered hairs in their place; lateral bars of scutellum triangular; scutellar fovea large semi-circular shallow; scutellar disc smooth and polished; scutellar cup long and narrow (cf. Fig. 51). Propodeum obscured laterally and dorsally by dense woolly pubescence; area below ventral margin of mesopleuron pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (Fig. 23); hypopygium not prominent. Wing surfaces densely pubescent, margins with a long apical hair fringe; apex of fore wing strongly incised; veins thick (cf. Fig. 21). Colour: antenna yellowish; head brownish; thorax and gaster brownish yellow; legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, 13.vii.–24.viii.1980 (*Jackson*) (BMNH).

Paratypes. **Cameroun**: 3 ♀ (BMNH). **Madagascar**: 2 ♀ (BMNH). **Zaire**: 3 ♀ (MRAC).

REMARKS. One of a group of four species with a 10-segmented antennal club, *micipsa* can be distinguished from the others (*peleus*, *themis* and *vacuna*) by the proportions of the antennal segments and, in common with *vacuna*, *micipsa* has obsolete notauli.

Emargo numa sp. n.

(Figs 60, 70, 71)

DESCRIPTION. ♀ antenna weakly subclavate, with segment 2 shorter than 3 but thicker, 3 longer than 4, 4 shorter than 5, 5–13 with rhinaria forming a club (Fig. 70). Face smooth and polished with scattered hairs; malar grooves absent. Pronotal plate small, projected forward, the lateral foveae open, weakly pubescent; pronotum with a few long sparse setae. Notauli distinct, percurrent, a few sparse hairs present; lateral bars of scutellum sculptured; scutellar fovea shallow; scutellar disc smooth and polished; scutellar fovea shallow; scutellar disc smooth and polished; scutellar cup long and narrow, weakly defined; apex with small pit or fovea, surface of scutellum with long sparse setae (Fig. 60). Propodeum obscured laterally and dorsally by dense woolly pubescence; ventral margin of mesopleuron pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (cf. Fig. 52); hypopygium not prominent. Wing surfaces densely pubescent, margins with a long apical hair fringe; veins thick (cf. Fig. 21). Colour: antenna brownish; head, thorax and gaster orange-brown; legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, i.1979 (*Watsham*) (BMNH).

Paratype. **Zimbabwe**: 1 ♀ (BMNH).

REMARKS. Differs from *palloris* in the lateral bars of the scutellum and shape of the scutellar cup.

***Emargo palloris* sp. n.**

(Figs 59, 72)

DESCRIPTION. ♀ antenna filiform, with segment 2 shorter than 3, 3 longer than 4, 4 and 5 subequal in length, 5–13 with rhinaria forming a very weak club (Fig. 72). Face smooth and polished with scattered hairs; malar grooves weakly indicated; head as broad as thorax. Pronotal plate projected forward, medial bridge wide; pronotum with long scattered setae. Notauli aberrant, not percurrent, a line of scattered hairs in their place; lateral bars of scutellum small triangular; scutellar fovea shallow; scutellar disc hardly visible; scutellar cup long and narrow, only weakly indicated, smooth and polished with a few long scattered setae; apex of scutellar disc not visible in dorsal view (Fig. 59). Propodeum obscured laterally and dorsally by dense woolly pubescence; area below ventral margin of mesopleuron pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (cf. Fig. 23); hypopygium pronounced. Wing surfaces densely pubescent, margins with a long apical hair fringe; apex of fore wing strongly incised; radial cell short and thick (cf. Fig. 67). Colour: antenna yellow with apical segments pale, almost white; head, thorax and gaster yellowish brown; legs yellowish.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Massif Ruwenzori, riv. Kamusmge, 1700 m, a.f. Ndama, 3.xi.1953 (*Vanschuytbroeck & Hendrickx*) 6143-45 (MRAC).

Paratypes. **Zaire**: 3 ♀ (MRAC, BMNH).

REMARKS. Separated from *numa* by the lateral bars of scutellum and the scutellar cup.

***Emargo peleus* sp. n.**

(Figs 64, 73)

DESCRIPTION. ♀ antenna clavate, with segment 2 longer and wider than 3, 3 and 4 subequal in length but thinner, 4–13 a little longer than wide with rhinaria, forming a club (Fig. 64). Face smooth and polished with sparse scattered hairs; malar grooves absent; head as broad as thorax. Pronotal plate projected forward, the open lateral foveae small, densely pubescent; pronotum with long scattered setae. Notauli distinct, percurrent, a few long hairs present; lateral bars of scutellum small triangular; scutellar fovea shallow; scutellar disc smooth and polished, square apically; scutellar cup long and narrow, extending past apex of scutellum (cf. Fig. 66). Propodeum obscured laterally and dorsally by dense woolly pubescence; ventral margin of mesopleuron densely pubescent. Gaster with tergite 3 the largest, remaining tergites partially visible; hypopygium short and broad (Fig. 73). Wing surfaces densely pubescent, margins with a long apical hair fringe; radial cell small; veins thick (cf. Fig. 65). Colour: antenna yellow; head, thorax and gaster orange-brown; legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, vii.–viii. (*Jackson*) (BMNH).

Paratypes. **Cameroun**: 3 ♀ (BMNH). **Madagascar**: 1 ♀ (BMNH).

REMARKS. Most closely related to *micipsa* (q.v.).

***Emargo pexus* sp. n.**

(Figs 54, 74)

DESCRIPTION. ♀ antenna filiform, with segment 2 subequal in length to 3 but thicker, 3 longer than 4, shorter than 5, 6–13 with pronounced rhinaria forming a club (Fig. 54). Face smooth and polished; malar grooves not indicated; anterior tentorial pits distinct; eyes measured medially further apart than the height of an eye. Pronotal plate projected forward, medial bridge broad. Notauli percurrent; lateral bars of scutellum elongate with weak sculpture on lateral margins; scutellum large, scutellar disc smooth and polished, narrow apically; scutellar cup weakly indicated, apex with a fovea (Fig. 74). Propodeum obscured laterally and dorsally by dense woolly pubescence; ventral margin of mesopleuron pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (cf. Fig. 23); hypopygium prominent. Wing surfaces densely pubescent, margins with a long apical hair fringe; apex of fore wing weakly incised; veins thick (cf. Fig. 21). Colour: antenna brownish yellow head, thorax and gaster blackish; legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Madagascar**: Tam Perinet, 27.iv.–3.v.1983 (*Noyes & Day*) (BMNH).

Paratype. **Madagascar**: 1 ♀ (BMNH).

REMARKS. This species and *cantus* are the only Afrotropical species in the genus with an 8-segmented antennal club. They can be distinguished by differences in the shape of the wings and in the proportions of the antennal segments. Also their distributions are disjunct, though this could be merely a reflection of the paucity of collections of microhymenoptera from the Afrotropical region.

***Emargo themis* sp. n.**

(Fig. 61)

DESCRIPTION. ♀ antenna filiform, with segment 2 subequal in length to 3 but wider, 3 thinner and shorter than 4, 4–13 with rhinaria indicated, weakly swollen medially (Fig. 61). Face smooth and polished with scattered hairs; malar grooves not indicated; anterior tentorial pits distinct; eyes large, further apart measured medially than the height of an eye. Pronotal plate projected forward, medial bridge narrow. Notauli percurrent, a few sparse hairs present; lateral bars of scutellum triangular; scutellar fovea large, shallow; scutellar disc with aberrant sculpture; scutellar cup long and narrow (cf. Fig. 51). Propodeum obscured laterally and dorsally by dense woolly pubescence; area below ventral margin of mesopleuron densely pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (cf. Fig. 52); hypopygium small. Wing surfaces densely pubescent, margins with a long apical hair fringe; apex of fore wing strongly incised; veins thick (Fig. 65). Colour: antenna yellowish brown; head, thorax and gaster dark brown; legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, 13.vii.–24.viii.1980 (*Jackson*) (BMNH).

Paratypes. **Cameroun**: 4 ♀ (BMNH). **Madagascar**: 2 ♀ (BMNH).

REMARKS. This apparently widespread species belongs to the group having a 10-segmented antennal club (see remarks on *micipsa*).

***Emargo vacuna* sp. n.**

(Fig. 62)

DESCRIPTION. ♀ antenna clavate, segment 2 shorter but wider than 3, longer than 4, 4–13 more than twice as long as wide, with rhinaria weakly indicated (Fig. 62). Face smooth and polished with scattered setae; malar grooves not indicated; anterior tentorial pits distinct; eyes measured medially further apart than the height of an eye. Pronotal plate projected forward, posterior part of plate angular, medial bridge broad, the lateral foveae with tufts of pubescence; pronotum with sparse hairs. Notauli not percurrent, with a few long hairs in their place; lateral bars of scutellum triangular; scutellar fovea large, shallow and polished; scutellar disc smooth and polished; scutellar cup long and narrow, weakly outlined with a few long setae (cf. Fig. 69). Propodeum obscured laterally and dorsally by dense woolly pubescence; area below ventral margin of mesopleuron densely pubescent. Gaster with tergite 3 the largest, tergites 4–7 partially visible (cf. Fig. 52); hypopygium small. Wing surfaces densely pubescent, margins with a long apical hair fringe; veins thick (Fig. 65). Colour: antenna light brown; head, thorax and gaster orange-brown; legs pale yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Pondoland, Port St John, 6–25.ii.1924 (*Turner*) (BMNH).

REMARKS. Distinguished from other species by antennal characters (see remarks on *micipsa*).

***EUCOILA* Westwood**

Eucoila Westwood, 1833: 494. Type species: *Eucoila crassinervis* Westwood, by original designation.

Psilodora Foerster, 1869: 354. Type species: *Cothonaspis boyenii* Hartig, by original designation.

[Synonymised by Weld, 1952: 212.]

Lytosema Kieffer, 1901: 159. Type species: *Eucoela guerini* Dahlbom, by subsequent designation of Ashmead, 1903: 67. [Synonymised by Weld, 1931: 222.]

Psilodoropsis Hedicke, 1913: 413. Type species: *Psilodoropsis conradti* Hedicke, by original designation and monotypy. [Synonymised by Nordlander, 1981: 398.]

DIAGNOSIS. ♀ antenna 13-segmented, clavate, segments 6–13 with rhinaria and forming a distinct club in the type species; ♂ antenna 14-segmented, filiform, segments 3–14 with rhinaria, subequal in length (Fig. 78). Head viewed frontally almost square (Fig. 77); inner margins of eyes subparallel, further apart measured medially than height of an eye; malar grooves percurrent, striated either side of groove near clypeus; clypeus and mandibles with long setae; head polished on occiput and vertex. Pronotal plate strongly produced in form of a collar viewed dorsally, medial bridge with a lateral fovea on either side, open, with dense pubescence. Mesoscutum smooth and polished, with sparse scattered hairs, notauli not present; scutellum with strongly striated lateral bars, scutellar foveae window-like (Nordlander, 1982), large deep; scutellar plate (cup) oval, weakly excavate, with a fovea on the apex, visible in dorsal view; scutellar disc reticulate-rugose, rounded apically (Fig. 79). Mesopleuron smooth and polished, mesopleural suture (carina) complete; sides of pronotum and precoxal area striated; metapleuron strongly ridged, anteroventral cavity striated; propodeal carinae angular. Segment 1 of gaster obscured by a dense woolly ring of pubescence (complete on dorsal surface); segments 2–4 visible in lateral view, apical quarter of segment 2 not visible; parts of 3 and 4 densely punctate; hypopygium with long subapical setae. Coxae bulbous, smooth; femora, tibiae and tarsi weakly pubescent. Fore wing with a distinctly closed radial cell in type species; vein R_1 thinner than either Rs_1 or Rs_2 ; surfaces of wings with dotted hair bases, apical margins of wings with weak hair fringe (cf. Fig. 81); wings weakly infuscated. Colour: antenna black basally, club yellowish brown; head, thorax and gaster blackish brown; legs brownish yellow.

DISTRIBUTION. Europe, Africa, the New World.

DISCUSSION. Nordlander (1982) regards *Eucoila* as the sister-group of *Trybliographa* and *Bothrochacis* and he divides the genus into two species-groups: the *nudipennis*-group and the *crassinerva*-group. *Eucoila* differs primarily from *Bothrochacis* by the form of the scutellum, the apical fovea on the scutellar cup being sharply declined in *Bothrochacis* (Fig. 30) and not visible in dorsal view. *Trybliographa* always has the surface of the wings pubescent and the marginal fringe of hair present (Fig. 81). Both species-groups of *Eucoila* lack pubescence on the surface of the wings, while the *nudipennis*-group has a reduced subalar pit. *Trybliographa* and the *crassinerva*-group of *Eucoila*, together with *Leptopilina*, have an area behind the posteroventral edge of the metapleuron completely free of pubescence.

Five Afrotropical species have been described in *Eucoila*, namely, *E. cavernicola* Kieffer and *E. kilimandjaroi* Kieffer transferred to *Pseudeucoila* by Weld (1952), *E. flagellicornis* Kieffer transferred to *Psichacra* by Weld (1952), and *E. camerounensis* Risbec which cannot be satisfactorily identified (see below). Four new species are described and keyed here.

Key to Afrotropical species of *Eucoila* Westwood

Females

- | | | |
|---|--|-------------------------------|
| 1 | Antennal club 7-segmented (Fig. 82). | 2 |
| – | Antennal club 8–9 segmented. | |
| | Radial cell of fore wing distinctly open (Fig. 92); mesopleural suture distinct. | 3 |
| 2 | Mesopleural suture indistinct, obscured by microsculpture (Fig. 88); radial cell of fore wing elongate, almost closed on wing margin (Fig. 90); pronotal plate (Fig. 89); antennal segment 3 shorter than 4+5 (Fig. 82). | <i>marina</i> sp. n. (p. 188) |
| – | Mesopleural suture distinct, not obscured by sculpture; radial cell of fore wing squarish (cf. Fig. 80); pronotal plate (Fig. 86); antennal segment 3 subequal to 4+5 (Fig. 84). | <i>bantia</i> sp. n. (p. 187) |
| 3 | Antennal club 8-segmented; scutellar disc rounded apically (cf. Fig. 87). | <i>veleda</i> sp. n. (p. 189) |
| – | Antennal club 9-segmented (Fig. 85); scutellar disc bicuspid apically (Fig. 91). | <i>erinna</i> sp. n. (p. 188) |

Males

Only the male of *E. marina* sp. n. is known.

Eucoila bantia sp. n.

(Figs 84, 86, 87)

DESCRIPTION. ♀ antenna with segments 7–13 with rhinaria and forming a club (Fig. 84), segment 3 longer than 4, 4–6 subequal in length, club segments 2 times as long as wide. Head viewed frontally with eyes as far apart as the height of an eye measured medially; face smooth and polished with sparse scattered pubescence. Pronotal plate (Fig. 86); pronotum either side of pronotal plate pubescent. Scutellar fovea smooth and polished, shallow; scutellar cup with medial area transversely striated; scutellar disc Fig. 87. Metapleuron polished; anteroventral cavity pubescent; propodeal carinae weakly bowed, pubescent on

outer margins; nucha obscured by pubescence. Segment 1 of gaster in form of a narrow ring; segment 2 the largest, occupying most of the lateral area; segment 3 partially visible; gaster impunctate; hypopygium broad apically. Radial cell of fore wing partially open on wing margin (cf. Fig. 92); lateral and medial area of wings infusate. Coxae longer than wide; hind coxa with distinct comb of hairs on upper posterior margin; femora and tibiae long and narrow, femora swollen medially, tibiae swollen basally; metatarsus as long as remaining tarsal segments. Colour: antenna brownish yellow; head and thorax black, gaster chestnut brown; legs dark orange-brown.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, Chishawasha, ii.1978 (*Watsham*) (BMNH).

Paratypes. **Zimbabwe**: 4 ♀ (BMNH). **Botswana**: 2 ♀ (BMNH). **Zaire**: 7 ♀ (MRAC).

Eucoila camerounensis Risbec

Eucoila camerounensis Risbec, 1956: 160. Syntypes 2 ♂, 5 ♀, CAMEROUN: Mil. Garoua, vii.1954 (*Decamps*) (?lost).

I have not been able to locate the type material of this species and on the basis of the description and figure cannot reach any conclusions about its identity.

Eucoila erinna sp. n.

(Figs 83, 85, 91, 92)

DESCRIPTION. ♀ antenna with segments 5–13 with rhinaria and forming a club (Fig. 83), segment 3 longer than 4, 4 shorter than 5. Head viewed frontally with eyes slightly further apart than the height of an eye measured medially; inner orbits of face with reticulate-rugose sculpture converging towards clypeus, extending to malar grooves, face and clypeus with scattered setae; occiput strigose. Pronotal plate cf. Fig. 86; outer parts angular. Lateral bars of scutellum very weakly striated; scutellar fovea deep, polished; scutellar cup almost circular with transverse sculpture; scutellar disc with apex weakly bicuspid (Fig. 91). Metapleuron weakly ridged basally; anteroventral cavity pubescent; propodeal carinae weakly bowed basally, outer margins of carina and of nucha densely pubescent. Segment 2 of gaster the largest, apical quarter finely punctate; segments 3 and 4 partially visible; hypopygium broad apically, with sub-basal hairs. Fore wing of female bare, apical half with dotted hair bases; radial cell open; posterior angle of wing with a weak fringe of hairs (more prominent on hind wing); medial area of wings infusate. Coxae longer than wide, bulbous, pubescent; trochanters longer than wide; femora swollen basally, long; tibiae long and narrow basally; tarsi narrow, metatarsus as long as remaining tarsal segments combined. Colour: antenna orange-brown; head and thorax black; gaster and legs orange.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Mabanga, 29.ix.1952 (*De Saeger*) (MRAC).

Paratypes. **Zaire**: 13 ♀ (MRAC).

Eucoila marina sp. n.

(Figs 82, 88–90)

DESCRIPTION. ♀ antenna with segments 7–13 with rhinaria and forming a club (Fig. 82), segment 3 longer than 4, 4–6 subequal in length, club segments more than 2 times as long as wide; ♂ antenna 15-segmented, filiform, segment 3 shorter than 4, 4 shorter than 5, 5–15 subequal in length. Head viewed frontally with eyes further apart than the height of an eye measured medially; inner orbits of face reticulate-rugose, the sculpture extending to and obscuring the malar grooves; occiput reticulate-rugose. Pronotal plate (Fig. 89); medial bridge broad; outer margins of pronotal plate angular; pronotum either side of pronotal plate pubescent. Scutellar fovea polished, shallow; scutellar cup sculptured, apex with a small fovea; scutellar disc with appearance of radiating sculpture, apex square. Mesopleuron finely colliculate above mesopleural suture, strigose below (Fig. 88); metapleuron weakly sculptured, polished, ridged on lower margins adjacent to front coxae; anteroventral cavity small, pubescent; propodeal carinae weakly bowed medially, densely pubescent on outer margins; nucha obscured by pubescence. Segment 2 of gaster the largest, occupying most of lateral area, apical half and whole of visible parts of segments 3 and 4 finely punctate; hypopygium broad apically, with sub-basal hairs or setae. Fore wing of female with a few hairs on

veins, apical half bare, dotted with hair bases on under surface with a fringe of hairs on posterior angle, more pronounced on hind wing; radial cell of fore wing closed on wing margin though sometimes weakly pigmented; vein R_1 becoming thinner at junction with Rs_2 ; vein M distinct, $Rs + M$ not apparent (Fig. 90); fore wing of male as in female except for apical fringes of hairs on margin. Coxae slightly longer than wide, swollen medially, weakly sculptured; trochanters longer than wide; femora long, weakly swollen medially, weakly sculptured; tibiae sculptured, pubescent; tarsi narrower than tibiae, weakly sculptured, metatarsus as long as remaining tarsal segments combined. Colour: antenna light brown; head and thorax black, except metapleuron, base of gaster and coxae chestnut brown; base and medial area of wings infuscated.

MATERIAL EXAMINED

Holotype ♀, **Kenya**: Nairobi, Karura, Furect, 13.xii.1970 (*Stubbs*) (BMNH).

Paratypes. **Kenya**: 1 ♂ (BMNH). **Zaire**: 25 ♀, 12 ♂ (MRAC). **Zimbabwe**: 2 ♀ (BMNH). **South Africa**: 1 ♀ (BMNH). **Uganda**: 1 ♀ (BMNH).

Eucoila valeda sp. n.

DESCRIPTION. ♀ antenna with segments 6–13 with rhinaria and forming a club, segment 3 longer than 4, 4 and 5 subequal in length, club segments 2 times as long as wide medially. Head viewed frontally with eyes further apart than the height of an eye measured medially; inner orbits of face with a trace of strigose sculpture, not extending to malar grooves; face with sparse scattered setae; occiput weakly strigose. Pronotal plate cf. Fig. 89; medial bridge narrow; outer parts of plate angulate (cf. Fig. 86); pronotum either side of pronotal plate pubescent. Scutellar fovea polished, deep; scutellar cup with a few transverse striae; scutellar disc cf. Fig. 87. Mesopleural suture with broken sculpture below (cf. Fig. 88); metapleuron ridged apically; anteroventral cavity large, pubescent; propodeal carinae bowed, densely pubescent on outer margins; nucha obscured by pubescence. Segment 2 of gaster the largest, occupying most of lateral area; tergites 3–4 partially visible; apical third of 2 and visible parts of 3 and 4 finely punctate; hypopygium, when visible, broad apically with sub-basal setae. Fore wing with a few scattered hairs on veins, apical half bare, dotted with hair bases, with a small fringe of hairs on posterior angle, prominent on hind wings; radial cell of fore wing open on wing margin; medial area of wing infuscate. Coxae slightly longer than wide, swollen medially, polished; trochanters a little longer than wide; femora long, weakly swollen basally, polished; tibiae narrow basally, widest apically with scattered setae; tarsi thinner than tibiae, metatarsus as long as remaining tarsal segments combined. Colour: antenna reddish brown; head and thorax black (except metapleuron reddish brown); gaster and legs orange-red.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe**: Salisbury, i.1976 (*Watsham*) (BMNH).

Paratypes. **Zimbabwe**: 1 ♀ (BMNH). **Zaire**: 3 ♀ (MRAC). **Nigeria**: 1 ♀ (BMNH).

GLAURASPIDIA Thomson

Glauraspidia Thomson, 1862: 307. Type species: *Eucoela subtilis* Dahlbom [= *Cothonaspis microptera* Hartig], by subsequent designation of Foerster, 1869: 351.

Aglaothoma Foerster, 1869: 334. Type species: *Cothonaspis codrina* Hartig, by original designation. [Synonymised by Hellén, 1960: 9.]

Apistophyza Foerster, 1869: 351. Type species: *Cothonaspis microptera* Hartig, by original designation. [Synonymised by Cameron, 1890: 24.]

Diranchis Foerster, 1869: 360. Type species: *Diranchis copulata* Foerster, by original designation and monotypy. [Synonymised by Weld, 1952: 20.]

DIAGNOSIS. ♀ antenna 13-segmented, filiform-clavate, segments 9–13 usually with rhinaria, forming a weak club (Fig. 93); ♂ antenna filiform-flagelliform. Head viewed frontally longer than wide, frons viewed laterally protruding to form an angular shape, more so in males; occiput smooth and shining. Pronotal plate viewed frontodorsally with large fovea either side, open on lateral margins (Fig. 95), with dense woolly pubescence on either side. Mesopleuron smooth and polished, rarely finely coriaceous; mesopleural suture either absent or indistinct; scutellar cup raised above level of scutellar disc, disc reticulate-rugose to finely coriaceous, sometimes dull; propodeum viewed dorsally and laterally with dense woolly pubescence. Base of tergite 2 of gaster either with dense woolly pubescence or felt-like ring obscuring view of tergite 1 (cf. Fig. 105). Wings pubescent with apical hair fringe; radial cell open in European species, closed in the Afrotropical ones.

DISTRIBUTION. Europe, Africa, Seychelles.

DISCUSSION. Nordlander (1982) treats *Glauraspidia* as belonging to his *Chrestosema*-group of genera, comprising *Chrestosema*, *Glauraspidia*, *Pseudopsichacra*, *Odonteucoila*, *Dieucoila* and *Leptolamina*. The relationships of the group are poorly understood because of the paucity of material. Nordlander recognizes three species of *Glauraspidia* in Europe. Two new species are here recorded from the Afrotropical region. For purposes of comparison the type species of the genus is also included in the key and is redescribed.

Key to the type species and the Afrotropical species of *Glauraspidia* Thomson

- 1 Radial cell of fore wing open on wing margin (Fig. 96).
Wing of female short, not extending past apex of gaster, of normal length in male; hair fringe short; scutellar cup large, oval, disc reticulate-rugose. *microptera* (Hartig) (p. 190)
- Radial cell of fore wing closed on wing margin (Fig. 97). 2
- 2 Face and occipital region smooth and shining; mesoscutum smooth and polished; scutellar cup elliptical, pitted, lateral margins almost impunctate, apex reticulate. *scyphus* sp. n. (p. 191)
- Inner orbits of face and occiput finely sculptured; mesoscutum polished, very finely coriaceous in upper medial and lateral regions; scutellar cup long and narrow, disc rounded apically, finely sculptured (Fig. 101). *casca* sp. n. (p. 190)

Glauraspidia casca sp. n.

(Figs 98–102)

DESCRIPTION. ♀ antenna weakly subclavate, segment 3 subequal in length to 4+5, 4–8 each progressively shorter, 11–13 with pronounced rhinaria (Fig. 98); ♂ antenna 15-segmented, filiform, segments 3–13 subequal in length, tapering apically (Fig. 99). Head viewed frontally with eyes further apart measured medially than the height of an eye; inner orbits with fine sculpturing extending from antennal sockets to about half way down eye margins; malar grooves obscured by broken striate sculpture; occiput finely sculptured, dense woolly pubescence on lateral margins. Pronotal plate with medial bridge narrow, foveae long and narrow (Fig. 100). Mesoscutum polished, finely coriaceous on upper medial and lateral surfaces, notauli absent; lateral bars of scutellum sculptured; scutellar foveae small, shallow; scutellar cup long and narrow, almost extending to apex of scutellar disc; disc rounded apically, surface almost smooth with fine broken sculpture (Fig. 101). Mesopleural suture absent; lower part of mesopleuron densely pubescent; anteroventral cavity obscure. Gaster with segment 2 the largest in lateral view, segments 3 and 4 partially visible in lateral view; apex of segment 2 and visible part of 3 coriaceous-punctate (Fig. 102); hypopygium pronounced. Wing surfaces densely pubescent, apical margins with a long hair fringe; radial cell of fore wing closed on wing margin; veins *Rs* + *M* and *M* weakly indicated. Colour: antenna yellow basally, apical segments darker; head, thorax and gaster chestnut brown; legs dark yellow.

MATERIAL EXAMINED

Holotype ♀, **Seychelles** (*David*) (BMNH).

Paratypes. **Seychelles**: 8 ♀, 6 ♂ (BMNH).

Glauraspidia microptera (Hartig)

(Figs 93–96)

Cothonaspis microptera Hartig, 1840: 201. Holotype ♀, GERMANY (ZSBS) [examined].

Eucoela subtilis Dahlbom, 1842: 307. Holotype ♀, SWEDEN (ZI) [examined].

DESCRIPTION. ♀ antenna with segments 1–8 filiform, 9–13 swollen medially with rhinaria, forming a club (Fig. 93), segment 3 very weakly curved, as long as 4+5, 5 and 6 subequal in length, 7 and 8 subequal, each shorter than 6; ♂ antenna 15-segmented, flagelliform, segment 3 curved, longer than 4+5 (Fig. 94), apical segments tapering. Head viewed laterally, particularly in female, wedge-shaped; eyes further apart measured medially than the height of an eye; malar grooves percurrent; face with scattered setae; occipital carina pronounced. Pronotal plate (Fig. 95). Mesoscutum smooth and polished, notauli absent, upper surface with scattered pubescence; lateral bars of scutellum weakly sculptured; scutellar foveae large, deep, smooth and polished; scutellar cup oval (but variable), almost extending to apex of scutellar disc, with a large median fovea; disc rounded apically, surface with reticulate-rugose-coriaceous sculpture, viewed dorsally appearing radiate in some specimens. Mesopleural suture absent. Carinae of propodeum sub-parallel, obscured by dense woolly pubescence on either side. Gaster with segment 1 obscured by dense woolly pubescence at base of tergite 2 (cf. Fig. 102); tergite 2 the largest in lateral view, remaining

segments not visible; ventral spine of gaster with sub-basal hairs. Wings with short apical hair fringe; radial cell of fore wing open on wing margin; wings narrow. Colour: antenna orange-yellow; head, thorax and gaster blackish; legs orange-yellow.

DISTRIBUTION. Europe, not recorded from the Afrotropical region.

Glauraspidia scyphus sp. n.

(Figs 97, 103–105)

DESCRIPTION. ♀ antenna moniliform, segment 3 as long as 4+5, 5–8 each shorter than 4, subequal to each other, apical 4 segments with rhinaria, forming a distinct club (Fig. 103); ♂ antenna 15-segmented, filiform, segment 3 weakly curved (Fig. 104), segment 5 swollen. Head viewed frontally with eyes slightly further apart measured medially than the height of an eye; cheeks converging; face with scattered hairs; mandibles tridentate; face smooth and polished; malar grooves percurrent; back of head smooth and polished. Mesoscutum smooth and polished, notauli absent, a row of scattered hairs in their place; lateral bars of scutellum weakly sculptured (cf. Fig. 101); scutellar cup elliptical; scutellar disc rounded apically, lateral surface almost impunctate, apex reticulate. Mesopleural suture absent; precoxal area of mesopleuron densely pubescent; anteroventral cavity obscure, not hairy. Segment 1 of gaster short, wider than long, crenulate, partially obscured by the dense woolly pubescence on the propodeum and at base of tergite 2; segment 2 the largest in lateral view, segments 3–5 visible in lateral view; apex of segment 2 and visible part of 3–5 punctate-coriaceous; hypopygium not pronounced (Fig. 105). Wing with apex broad; radial cell of fore wing closed on wing margin (Fig. 97); cubitus indicated, not pigmented. Colour: antenna yellow basally, apical segments darker; head brownish red, thorax and gaster light chestnut red; legs bright.

MATERIAL EXAMINED

Holotype ♀, **Ivory Coast**: Bouake, Bo'Pri, 10–13.iii.1984 (Matthews) (BMNH).

Paratypes. **Ivory Coast**: 1 ♀, 1 ♂ (BMNH). **Zaire**: 10 ♀, 18 ♂ (MRAC). **Zambia**: 2 ♀ (BMNH). **Zimbabwe**: 2 ♀ (BMNH).

REMARKS. Distinguished from the European species *microptera* by the closed radial cell, the moniliform antenna of the female and the filiform antenna of the male.

LEPTOPILINA Foerster

Leptopilina Foerster, 1869: 348. Type species: *Cothonaspis longipes* Hartig, by original designation and monotypy.

DIAGNOSIS. ♀ antenna 13-segmented with variable number of club segments, each with rhinaria, generally clavate although sometimes slender and filiform; ♂ antenna 15-segmented, segment 3 shorter than following segments, flattened on outer margins (Fig. 106). Head narrow, eyes protruding; face viewed frontally smooth and polished with sparse hairs; malar grooves percurrent; mandibles tridentate; eyes further apart measured medially than height of an eye; viewed dorsally ocelli equally spaced, weakly raised. Pronotal plate weakly protruding, lateral foveae either side of pronotal plate broad, open on lateral margins. Mesoscutum smooth and polished, without trace of notauli, a line of hairs in their place; lateral bars of scutellum smooth and polished; scutellar fovea smooth and shallow (deep under lateral bars); scutellar disc variable in sculpture from punctate-reticulate to reticulate-rugose to nearly smooth with a few sparse rugae, sometimes more longitudinally directed (Fig. 107), apex rounded; scutellar cup (plate of Nordlander, 1982) variable in both size and shape, usually raised (cf. Figs 151, 159) smooth and shining to pitted with a large apical fovea. Mesopleuron smooth and polished; ventral border of pronotum sculptured; mesopleural suture distinct, straight or curved; metapleuron often with ridges extending from posterior margin; area below ventral margin of mesopleuron pubescent, anteroventral cavity bare; propodeal carinae distinct; propodeum not elongate, pubescence on either side dense, sculptured. Segment 1 of gaster short, wider than long, sculptured, crescent-shaped; base of segment 2 (petiole of Nordlander, 1982) widened posteriorly (Fig. 108), with a ring of hairs sometimes dense but broken on dorsal surface with a few long hairs on lateral margins behind ring of hairs (Fig. 108); tergite 2 the largest, occupying most of the area in lateral view; tergites 3–5 generally visible. Wings generally broad, rounded apically, surface pubescent, apical margins with fringe of hairs, radial cell of fore wing open or closed on wing margin. Legs of normal shape, variable between species; hind coxa with hairs on posterodorsal surface, sometimes tufted (cf. Fig. 109). Colour: antenna yellowish brown-black; head and thorax generally darker than gaster which is yellow to brown to blackish; legs yellowish.

DISCUSSION. *Leptopilina* received little attention (Weld, 1952) until Nordlander's (1980) major contribution, which has considerably improved our understanding of the genus. Nordlander recorded *Leptopilina* from the Holarctic, Afrotropical and Oriental regions and gave a key to the five European species. In this study 14 species, 9 of them new, are recognised from the Afrotropical region.

Key to the European and Afrotropical species of *Leptopilina* Foerster

Females (the female of *mahensis* is unknown)

- 1 Metapleuron without ridges in upper region; scutellar cup oval (Fig. 136), surface excavate or smooth, sometimes smooth with punctures. 2
- Metapleuron with or without ridges in upper region; scutellar cup elongate, surface convex to smooth, if oval, ridges present in upper region of metapleuron (Fig. 167). 4
- 2 Mesoscutum with hairs present in place of the notauli; scutellar disc without a distinct rim (Fig. 136). *clavipes* (Hartig) (p. 195)
- Mesoscutum smooth and polished without notauli or hairs in the same positions; scutellar disc with a distinct rim (Fig. 135). 3
- 3 Antenna long and slender, segment 3 shorter than 4, club 8-segmented (Fig. 116), club segments 2 times as long as broad (Fig. 116).
Pronotal plate with narrow medial bridge (cf. Fig. 159). *fimbriata* (Kieffer) (p. 196)
- Antenna short, segment 3 longer than 4, club 7-segmented (Fig. 113), club segments broader than long. *longipes* (Hartig) (p. 197)
- 4 Antennal segment 3 clearly shorter than 4 (Figs 114, 117); metapleuron with ridges in upper region (Fig. 167). 5
- Antennal segment 3 subequal to or longer than 4 (cf. Fig. 115); metapleuron with or without ridges in upper region. 9
- 5 Radial cell of fore wing open on wing margin (Fig. 141); antennal club 7-segmented. *misensus* sp. n. (p. 198)
- Radial cell of fore wing closed on wing margin (cf. Fig. 150); antennal club 7–9-segmented, with rhinaria. 6
- 6 Antennal club 7-segmented (Figs 117, 118). 7
- Antennal club 8–9-segmented (Figs 119, 120). 8
- 7 Club segments of antenna at least 2 times as long as broad; scutellar cup broadest medially, tapering apically, not extending to apex of disc, with radiating reticulate-rugose sculpture (Fig. 169). *thetus* sp. n. (p. 199)
- Club segments of antenna at least 3 times as long as broad; scutellar cup elongate, almost oval, not extending to apex of disc, with fine reticulate-coriaceous sculpture (Fig. 162) *itys* sp. n. (p. 197)
- 8 Antennal club 8-segmented (Fig. 119), apical segments of antenna dark; scutellar cup semi-oval, scutellar disc reticulate-rugose (Fig. 148); radial cell of fore wing closed on wing margin (Fig. 150). *apella* sp. n. (p. 194)
- Antennal club 9-segmented (Fig. 120), apical segments of antenna pale; scutellar cup widest medially, converging apically, scutellar disc with radiating striae (Fig. 143); radial cell of fore wing open on wing margin. *fannius* sp. n. (p. 195)
- 9 Metapleuron without ridges in upper area (Fig. 121), a single ridge sometimes present posteriorly; antenna short, 0.5 times body length, segment 3 longer than 4, apical 4–5 segments forming a club.
Scutellar cup long and narrow; radial cell of fore wing closed, with a short radius. *boulardi* (Barbotin, Carton & Kelner-Pillault) (p. 195)
- Metapleuron with 2 or more ridges in upper area (Fig. 157); antenna variable in proportions. ... 10
- 10 Radial cell of fore wing open on wing margin (Fig. 122). 11
- Radial cell of fore wing distinctly closed on wing margin (Fig. 140). 12
- 11 Scutellar cup with pronounced rim, margins not converging apically (Fig. 123). *atraticeps* (Kieffer) (p. 194)
- Scutellar cup without distinct rim, margins converging towards apex of disc.
Radial cell (Fig. 158). *faunus* sp. n. (p. 196)
- 12 Scutellar cup very broad medially, narrowing basally, converging towards apex of disc (e.g. Fig. 124). 13
- Scutellar cup longer than wide, not converging towards apex of disc (Fig. 125). 15
- 13 Metapleural ridges converging towards propodeum.
Propodeal carinae parallel (cf. Fig. 149); radial cell (Fig. 140). *heterotoma* (Thomson) (p. 196)

- Metapleural ridges parallel. 14
- 14 Scutellar cup viewed dorsally not extending to apex of disc; antenna, head and thorax pale yellow; radial cell of fore wing as broad as long (Fig. 129), open on wing margin. *pisonis* sp. n. (p. 198)
- Scutellar cup viewed dorsally extending to apex of disc (Fig. 127); antenna orange basally and apically, dark medially, thorax and gaster dark brownish orange; radial cell of fore wing elongate, 2 times as long as broad medially (Fig. 128), closed on wing margin. *syphax* sp. n. (p. 199)
- 15 Antennal club 7-segmented, sharply defined.
Scutellar cup without conspicuous rim, almost oval, disc finely reticulate-rugose (Fig. 125); propodeal carinae widely separated, almost parallel; scutellar disc reticulate-rugose; metapleural carinae subparallel (Fig. 131); apical segments of gaster finely punctate. *victoriae* Nordlander (p. 200)
- Antennal club 8-segmented (filiform, club segments defined by presence of rhinaria) (Fig. 132). *vesta* sp. n. (p. 200)

Males (the males of *atraticeps*, *itys* and *thetus* are unknown)

- 1 Metapleuron without ridges in upper region; scutellar cup oval, surface excavate or smooth, sometimes with punctures. 2
- Metapleuron with or without ridges in upper region; scutellar cup elongate, surface convex to smooth, if oval, ridges present in upper region of metapleuron (cf. Fig. 154). 4
- 2 Mesoscutum smooth and polished without notauli or hairs in the same position; scutellar disc with a distinct rim (Fig. 135). 3
- Mesoscutum with hairs in place of notauli (Fig. 110); scutellar disc without a rim (Fig. 110). *clavipes* (Hartig) (p. 195)
- 3 Antennal segment 3 distinctly shorter than 4; cubitus distinctly pigmented. *fimbriata* (Kieffer) (p. 196)
- Antennal segments 3 and 4 subequal in length (Fig. 113); cubitus absent. *longipes* (Hartig) (p. 197)
- 4 Scutellar cup tapering sharply apically, broadest medially (Fig. 124). 5
- Scutellar cup oval or if longer than broad not tapering apically, generally as broad apically as medially (Figs 125, 148). 8
- 5 Radial cell of fore wing open or closed (Figs 112, 129); metapleural ridges not converging towards propodeum, almost parallel (Fig. 130). 6
- Radial cell of fore wing closed (Fig. 140); metapleural ridges converging towards propodeum (Fig. 126). *heterotoma* (Thomson) (p. 196)
- 6 Antennal segment 3 shorter than 4 (Fig. 144). 7
- Antennal segments 3 and 4 subequal in length (Fig. 168).
Scutellar cup extending to apex of scutellar disc (Fig. 127). *syphax* sp. n. (p. 199)
- 7 Scutellar cup viewed dorsally not extending to apex of scutellar disc, disc reticulate-rugose (Fig. 143); pronotal plate (cf. Fig. 152). *fannius* sp. n. (p. 195)
- Scutellar cup viewed dorsally not extending to apex of disc, with radiating striae; pronotal plate (Fig. 166).
Propodeal carinae converging; radial cell of fore wing open. *misensus* sp. n. (p. 198)
- 8 Metapleuron without ridges in upper region; propodeal carinae closer together apically (Fig. 153); radial cell of fore wing closed on wing margin. *boulardi* (Barbotin, Carton & Kelner-Pillault) (p. 195)
- Metapleuron with ridges in upper region; propodeal carinae variable; radial cell of fore wing open or closed on wing margin. 9
- 9 Scutellar cup oval (cf. Fig. 148); segment 3 of antenna shorter than 4.
Vein *Rs* + *M* of radial cell not indicated (Fig. 158). 10
- Scutellar cup elongate; segment 3 of antenna shorter than or subequal to 4. 11
- 10 Antennal segments 3 and 4 slender, curved (cf. Fig. 133); scutellar disc reticulate-rugose, scutellar cup large (cf. Fig. 123). *faunus* sp. n. (p. 196)
- Antennal segments 3 and 4 robust and swollen (Fig. 133); scutellar disc with radiating strigose sculpture, scutellar cup small (cf. Fig. 148). *mahensis* (Kieffer) (p. 198)
- 11 Antennal segments 3 and 4 subequal in length (Fig. 132) (4 weakly swollen). *vesta* sp. n. (p. 200)
- Antennal segment 3 distinctly shorter than 4 (Fig. 147). 12
- 12 Radial cell of fore wing with vein *Rs* + *M* in form of a distinctive spur (Fig. 146); antennal segment 4 swollen medially and curved, outer side flattened (Fig. 147). *victoriae* Nordlander (p. 200)

- Radial cell of fore wing without a distinctive spur (Fig. 150); antennal segment 4 weakly swollen medially and curved, outer side flattened.
Pronotal plate (Fig. 159). 13
- 13 Scutellar disc reticulate-rugose (Fig. 148), rim of scutellar cup thick, not converging apically; metapleural ridges parallel. *apella* sp. n. (p. 194)
- Scutellar disc coarsely rugose-reticulate, scutellar cup converging apically (cf. Fig. 124); metapleural ridges weakly converging towards propodeum. *pisonis* sp. n. (p. 198)

***Leptopilina apella* sp. n.**

(Figs 119, 148–150, 159)

DESCRIPTION. ♀ antenna weakly clavate, segments 6–13 with rhinaria, segment 3 shorter than 4 (Fig. 119); ♂ antenna with segments 3–4 curved (cf. Fig. 147). Eyes large, converging towards clypeal area, closer together than the height of an eye where they converge; malar grooves fine. Pronotal plate with medial bridge narrow, as wide as a fovea (Fig. 159). Lateral bars of scutellum broad-based, triangular; scutellar fovea smooth and shining, shallow, lenticular; scutellar cup small, oval, not extending to apex of disc; scutellar disc reticulate-rugose, apex rounded (Fig. 148). Mesopleural suture converging towards metapleuron with two ridges in upper region (cf. Fig. 167); anteroventral cavity pubescent; lateral margins of propodeum densely pubescent on under margins of carinae, weakly sculptured; propodeal carinae parallel (Fig. 149). Segment 1 of gaster in form of short crenulate ring; segment 2 with tuft of pubescence basally on lateral margins; segment 3 partially visible; gaster impunctate. Radial cell of fore wing closed on wing margin, broad apically; vein *3r-m* produced; vein *M* indicated basally, weakly pigmented (Fig. 150). Legs long and slender; hind coxa with tuft of hairs on posterodorsal margin. Colour: antenna yellow basally, segments 6–13 blackish; head blackish; thorax chestnut brown; gaster brownish yellow; legs yellow.

MATERIAL EXAMINED

Holotype ♀, **Madagascar**: Tam, Perinet, 27.iv.–3.v.1983 (Noyes & Day) (BMNH).

Paratypes. **Madagascar**: 1 ♀, 3 ♂ (BMNH). **Zaire**: 8 ♀ (MRAC).

***Leptopilina atraticeps* (Kieffer)**

(Figs 122, 123, 151)

Ectolyta atraticeps Kieffer, 1911: 312. Holotype ♀, SEYCHELLES (BMNH) [examined].

DESCRIPTION. ♀ antenna clavate, segments 7–13 forming a club, rhinaria weakly indicated, each segment more than 2 times as long as broad, segment 3 slightly longer than 4, less than 4+5, 4 longer than 5. Eyes oval, as far apart measured medially as the height of an eye; subantennal sutures absent. Pronotal plate projected forward; anterior part finely sculptured; lateral foveae open on either side of medial bridge, wide (Fig. 151). Mesoscutum smooth and polished, variable surface sculpture indicated through the chitin (Fig. 123); lateral bars of scutellum smooth and polished; scutellar foveae deep, polished; scutellar cup elliptical, widest medially, with a wide rim, with a large apical fovea; scutellar disc reticulate-rugose, rounded apically. Mesopleuron smooth and polished; mesopleural suture distinct, curved; metapleuron smooth and polished with 2 conspicuous ridges; anteroventral cavity obscured; sides of propodeum with dense short pubescence; propodeum almost parallel, very weakly bowed medially. Segment 1 of gaster in form of crenulate ring, wider than long; segment 2 with a dense ring of short hairs basally not completed on dorsal surface; tergites 3 and 4 partially visible. Wings not conspicuously narrow; pubescent with long apical hair fringe; radial cell of fore wing partially open on wing margin; veins *Rs + M* and *M* weakly indicated (Fig. 122). Legs slender; hind coxa with a tuft of pubescence postero-dorsally. Colour: antenna yellowish orange, some median segments light brown; head reddish brown; thorax and gaster orange-yellow; legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Seychelles**: Mahe I., Mare au Cochons (BMNH).

Paratype. **Nigeria**: 1 ♀ (BMNH).

REMARKS. Similar in many respects to *faunus*, but differs in the shape of the radial cell and the scutellar cup.

***Leptopilina boulandi* (Barbotin, Carton & Kelner-Pillault)**

(Figs 115, 121, 152, 153)

Charips mahensis Kieffer, 1911: 313. Holotype ♂, SEYCHELLES (BMNH) [examined]. [Junior secondary homonym in *Leptopilina* of *Erisphagia mahensis* Kieffer (see p. 198).] [Synonymised by Nordlander, 1980: 432.]

Cothonaspis (*Cothonaspis*) *Boulandi* Barbotin, Carton & Kelner-Pillault, 1979: 20. Holotype ♀, GUADELOUPE (MNHN) [not examined].

DESCRIPTION. ♀ antenna clavate, the 4 or 5 apical segments forming a club, each of club segments with rhinaria, each a little longer than broad, generally darker than the yellow basal segments, segment 3 as long as 4+5, 4 longer than 5, 5 and 6 subequal in length, 7 longer than 6 (Fig. 115); ♂ antenna 15-segmented, filiform, segment 3 shorter than 4, 4 curved, swollen, longer than 5. Eyes almost round, further apart than the height of an eye measured medially; subantennal sutures prominent on lower face, sparse hairs present; malar grooves percurrent. Pronotal plate projected forward; lateral foveae long and narrow (Fig. 152). Mesoscutum smooth and polished, notauli absent; lateral bars of scutellum smooth and polished; scutellar foveae shallow; scutellar cup long and narrow, widest medially, apex weakly converging, apex with a large fovea, area in front weakly convex, sculptured; scutellar disc with radiating ridges, apex of disc rounded. Mesopleuron smooth and polished; mesopleural suture distinct, curved; metapleuron with one or two incomplete ridges (Fig. 121); nucha short, weakly pubescent; propodeal carinae closer together in upper half, bowed medially. Segment 1 of gaster crenulate, in form of a crescent; segment 2 widened dorsally, hairy ring at base very thin, only a few hairs present laterally; visible parts of segments 3–5 punctate. Fore wings not conspicuously narrow, pubescent, apical hair fringe long; radial cell of fore wing closed on margin; *2r-m* distinct; *Rs + M* and *M* weakly indicated. Legs robust; hind coxa without a tuft of hairs postero-dorsally. Colour: apical segments of antenna brownish black, basal segments yellow; head, thorax and gaster brownish black-chestnut; legs yellow.

MATERIAL EXAMINED

Charips mahensis Kieffer, holotype ♂, **Seychelles** (*Percy Sladen Trust Expedition*) (BMNH).

Aldabra: 1 ♀ (BMNH). **Guadeloupe:** 1 ♀, 1 ♂ (BMNH). **Madagascar:** 4 ♀ (BMNH). **South Africa:** 10 ♀ (BMNH). **Zaire:** 32 ♀, 33 ♂ (MRAC). **Zambia:** 4 ♀ (BMNH). **Zimbabwe:** 2 ♀, 1 ♂ (BMNH).

REMARKS. Separated from all other species in the genus by the absence of metapleural ridges, form of antenna and scutellar cup. It is a solitary primary internal parasite of *Drosophila melanogaster* Meigen (see Nordlander, 1980).

***Leptopilina clavipes* (Hartig)**

(Figs 110, 136)

Cothonaspis clavipes Hartig, 1841: 357.

REMARKS. This species is included in the key for comparative purposes. Nordlander (1980) gives a description and synonymy. At present *clavipes* is known to occur in Europe and North America but it has not been found in the Afrotropical region.

***Leptopilina fannius* sp. n.**

(Figs 120, 143, 144, 154, 155, 156)

DESCRIPTION. ♀ antenna filiform, segments 5–13 with rhinaria, segment 3 shorter than 4, subequal to 5, apical two segments pale (Fig. 120); ♂ antenna 15-segmented, filiform, segment 3 shorter than 4, weakly curved (Fig. 144). Eyes oval, as far apart measured medially as the height of an eye; face smooth and polished; malar grooves percurrent. Pronotal plate weakly protruding; medial bridge broad (cf. Fig. 159). Mesoscutum smooth and polished; lateral bars of scutellum broad basally, short; scutellar cup longer than wide, not extending to apex of disc, widest medially, converging apically (Fig. 143); scutellar disc reticulate-rugose laterally, rounded apically (sometimes the margins are striated). Mesopleuron smooth and polished; mesopleural suture almost straight; metapleuron with three distinct ridges, the upper ridge branched (Fig. 154); anteroventral cavity large, hairless; lateral margins of propodeum crenulate, sparsely pubescent; propodeal carinae bowed (cf. Fig. 161). Segment 1 of gaster in form of crenulate ring, wider than long; tergite 2 with a few sparse hairs on lateral margins of base, apical half densely punctate; visible parts of segments 3 and 4 punctate. Fore wing relatively broad, rounded apically, surfaces pubescent, apical margins with a fringe of hairs; radial cell of fore wing closed on margin, weakly pigmented, broad

apically; vein *2r-m* not projecting, merging into vein *M*; vein *Rs + M* not indicated (Fig. 155). Legs robust; hind coxa stout, a few hairs present on postero-dorsal margin. Colour: antenna yellow basally, dark medially, apical two segments pale yellow; head and thorax black, except metapleuron orange-brown; legs orange-yellow.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Massif Ruwenzori, Kyandolire, 1700 m, Camp des Gardes, 7–15.x.1952 (*Vanschuytbroeck & Kekenbosch*) (MRAC).

Paratypes. **Zaire**: 1 ♀, 6 ♂ (MRAC).

REMARKS. Separated from *vesta* by the relative proportions of the antennal segments and the form of the scutellar cup.

Leptopilina faunus sp. n.

(Figs 157, 158)

DESCRIPTION. ♀ antenna clavate, segments 7–13 with rhinaria, segment 3 longer than 4, 5 and 6 subequal, each shorter than 4 (cf. Fig. 156); ♂ antenna 15-segmented, segment 3 shorter than 4, both slender and curved (cf. Fig. 137). Eyes almost round, further apart measured medially than the height of an eye; malar grooves percurrent; face smooth and polished, a few sparse hairs present in clypeal region. Pronotal plate weakly protruding; lateral foveae open (but not readily appreciated); medial bridge broad (cf. Fig. 151). Mesoscutum smooth and polished; lateral bars of scutellum broad basally, longer than wide; scutellar foveae lenticular, smooth and shallow; scutellar cup elongated, not extending to apex of disc, widest medially, tapering apically, apical fovea large; scutellar disc reticulate-rugose, rounded apically. Mesopleuron smooth and polished; mesopleural suture weakly curved; metapleuron with two strong ridges in upper quarter converging towards margins of propodeum (Fig. 157); anteroventral cavity pubescent; lateral margins of propodeum sculptured, partially covered with pubescence; propodeal carinae widely spaced, weakly bowed. Segment 1 of gaster in form of crenulate ring; tergite 2 with a few hairs at lateral margins of base, apical margins sparsely punctate; segments 3 and 4 partially visible, punctate. Fore wing broad, wing surfaces pubescent with apical hair fringe; radial cell of fore wing partially open on wing margin; vein *2r-m* weakly projecting; veins *M* and *Rs + M* weakly indicated by pigmentation (Fig. 158). Legs slender; hind coxa with a few hairs on posterodorsal margin. Colour: antenna orange-yellow basally, brownish yellow apically, apical segment lighter than rest; head and thorax brown, metapleuron orange-brown; gaster chestnut brown; legs orange-yellow.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Nyasheke (Volc. Nyamuragira), 1820 m, 14–26.vi.1935 (*de Witte*) (MRAC).

Paratypes. **Zaire**: 3 ♀, 5 ♂ (MRAC).

REMARKS. Distinguished from *atraceps* by the shape of the scutellar cup and radial cell.

Leptopilina fimbriata (Kieffer)

(Figs 111, 116, 135, 137, 138)

Eucoela fimbriata Kieffer, 1901: 175.

REMARKS. This species is included in the key for comparative purposes. Nordlander (1980) gives a full synonymy, description and bionomic information. It has not been found outside Europe.

Leptopilina heterotoma (Thomson)

(Figs 124, 126, 140, 160)

Eucoila heterotoma Thomson, 1862: 403. Holotype ♀, SWEDEN (ZI) [examined].

Ganaspis monilicornis Kieffer, 1904: 622. Lectotype ♀, FRANCE (MA) [not examined]. [Synonymised by Nordlander, 1980: 430.]

Ganaspis subnuda Kieffer, 1904: 64. Holotype ♂, CANARY IS (not located). [Synonymised by Nordlander, 1980: 430.]

Erisphagia philippinensis Kieffer, 1916: 282. Lectotype ♀, LOS BANOS (MNHN) [not examined]. [Synonymised by Nordlander, 1980: 430.]

Pseudeucoila bochei Weld, 1944: 65. Holotype ♀, U.S.A. (USNM) [examined]. [Synonymised by Nordlander, 1980: 461.]

DESCRIPTION. ♀ antenna weakly clavate, segments 3 and 4 subequal in length, 5 shorter than 4, apical 7 segments with rhinaria forming a club (Fig. 160); ♂ antenna 15-segmented, filiform, segment 3 shorter than 4, 4 twisted and swollen medially (Fig. 137). Face smooth and polished with sparse hairs; anterior tentorial pits minute; malar grooves finely indicated; head viewed dorsally as wide as thorax; eyes large; occipital carinae distinct. Pronotal plate projected forward; medial bridge broad; anterior plate sculptured; pronotum either side of plate pubescent. Mesoscutum smooth and polished without trace of notauli; lateral bars of scutellum smooth and polished; scutellar fovea deep, lenticular; scutellar disc smooth to reticulate-rugose with scattered hairs, rounded apically; scutellar cup smooth and polished, convex in front of apical pit, long, widest above medial area, converging apically and narrow (Fig. 124). Mesopleuron smooth and polished; mesopleural suture distinct, weakly curved; metapleuron depressed above ridges 1 and 3, ridges 1, 2 and 3 entire (Fig. 126); lateral margins of propodeum below metanotal plate pubescent; propodeal carinae sub-parallel, wide (cf. Fig. 150). Segment 1 of gaster in form of a narrow ring, sculptured, weakly inclined posteriorly; tergite 2 with ring of dense pubescence ventrally, not complete on dorsal surface; tergite 3 partially visible; apical margins of tergite 2 and whole of visible parts of 3 punctate (cf. Fig. 108). Wing surfaces pubescent, apical margins with fringe of hairs; radial cell of fore wing closed on margin; vein *Rs* as long as vein *2r*; vein *M* indicated, not pigmented (Fig. 140). Legs slender; hind coxa with distinct tuft of hairs on posterodorsal surface. Colour: antenna yellow basally, darker apically; head black; thorax and gaster dark brown-black.

MATERIAL EXAMINED

Eucoila heterotoma Thomson, holotype ♀, Sweden: Skåne, Baggeboda (ZI).

Madagascar: 1 ♀ (MRAC). **Palestine:** 1 ♀, 1 ♂ (BMNH). **Zaire:** 1 ♀ (MRAC).

REMARKS. The specimens from Madagascar and Palestine are only tentatively placed as this species because the apical segments of the antenna are white. *L. heterotoma* is world-wide in distribution (Nordlander, 1980). The species is a solitary primary internal parasitoid of *Drosophila* larvae and it has been widely studied in Europe and the U.S.A.

Leptopilina itys sp. n.

(Figs 118, 161, 162)

DESCRIPTION. ♀ antenna weakly clavate, segments 7–13 with rhinaria, 4 times as long as broad, segment 3 shorter than 4, 4–6 subequal in length (Fig. 118). Eyes large, almost round, further apart measured medially than the height of an eye; face smooth and polished with sparse scattered hairs; malar grooves very fine, percurrent. Pronotal plate protruding; medial bridge as wide as a lateral fovea. Mesoscutum smooth and polished; lateral bars of scutellum broad-based, triangular; scutellar fovea wider than long, shallow; scutellar cup elongate, not extending to apex of disc, with a large apical fovea; scutellar disc finely reticulate-rugose, apex rounded (Fig. 162). Mesopleuron smooth and polished; mesopleural suture almost straight; metapleuron with two ridges in upper region, parallel, widely spaced (cf. Fig. 131); anteroventral cavity large, pubescent; lateral margins of propodeum sculptured, partially concealed by pubescence; propodeal carinae closer together anteriorly (Fig. 161). Segment 1 of gaster in form of a crescent-shaped crenulate ring, partially visible; lateral margins of base of tergite 2 with a ring of hairs, thin dorsally, thicker ventrally; tergites 3–5 partially visible in lateral view, sparsely punctate. Fore wing relatively narrow compared with other species in the genus, wing surfaces pubescent with apical hair fringe; radial cell of fore wing closed on wing margin; vein *2r-m* weakly protruding; veins *M* and *Rs* + *M* not indicated. Legs long and slender; hind coxa with a few short hairs on posterior dorsal margin. Colour: antenna yellow basally, apical 5–6 darker; head, thorax and gaster dark brownish black; legs yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zimbabwe:** Salisbury, Chishawasha, iii. 1980 (*Watsham*) (BMNH).

Paratype. **Zaire:** 1 ♀ (MRAC).

REMARKS. The length of the antennal segments, shape of the scutellar cup and the sculpture of the scutellar disc separate this species from *thetus*.

Leptopilina longipes (Hartig)

(Figs 106–109, 113, 139)

Cothonaspis longipes Hartig, 1841: 356.

REMARKS. This European species is included in the key for comparative purposes. It is the type species of the genus. Nordlander (1980) gives a description.

Leptopilina mahensis (Kieffer)

(Figs 133, 163, 164)

Erisphagia mahensis Kieffer, 1911: 312. Holotype ♂, SEYCHELLES (BMNH) [examined].

DESCRIPTION. ♀ unknown.

♂ antenna 15-segmented, filiform, segment 3 shorter than 4, weakly swollen apically, 4 curved and swollen medially (Fig. 133). Face smooth and polished; eyes large, protruding; anterior tentorial pits distinct; malar grooves percurrent but finely indicated; a few sparse hairs present; head viewed dorsally as wide as thorax; occipital carinae pronounced. Pronotal plate projected forward: posterior plate angled; medial bridge narrow; lateral foveae partially open (cf. Fig. 149). Mesoscutum smooth and polished, without trace of notauli or hairs in their place; lateral bars of scutellum polished; scutellar foveae large, deep and smooth; scutellar disc rounded apically, surface reticulate-rugose; scutellar cup almost round apically, narrower basally with a pronounced rim, apical third with a large pit or fovea (cf. Fig. 148). Mesopleuron smooth and polished; mesopleural suture percurrent, almost straight; metapleuron polished and strongly ridged in anterodorsal corner; anteroventral cavity sculptured; propodeum not elongated in lateral view; nucha distinct; viewed dorsally propodeal carinae almost parallel, weakly bowed medially (Fig. 163). Segment 1 of gaster in form of ring or collar, crenulate, widened posteriorly; tergite 2 occupying the whole area of gaster in lateral view with a few hairs basally on lateral margins. Wing surfaces pubescent with apical hair fringe long; radial cell of fore wing closed, longer than wide; veins *Rs* + *M* and *M* absent (Fig. 164). Legs of normal shape and proportions; coxae with sparse hairs, hind coxa without a tuft of hairs. Colour: antenna orange-yellow; head and thorax light brown; gaster chestnut red; legs yellow.

MATERIAL EXAMINED

Holotype ♂, **Seychelles**: Mahe I., Mare Cochons district, 1000–2000 ft, 26.i.–2.ii.1909 (BMNH).

REMARKS. Because the female is unknown the affinities of this species are uncertain. The male is separated from *faunus* by antennal, scutellar disc and radial cell characters.

Leptopilina misensus sp. n.

(Figs 114, 141, 165–167)

DESCRIPTION. ♀ antenna filiform, segments 5–13 with weak rhinaria, segment 3 shorter than 4, 4 subequal to 5, 6–13 subequal, apical segments lighter than rest of antenna (Fig. 114); ♂ antenna 15-segmented, filiform, segment 3 shorter than 4, 4 weakly swollen medially, longer than 5 (Fig. 165). Eyes almost round, further apart than the height of an eye measured medially; face smooth and polished; malar grooves percurrent. Pronotal plate weakly projecting; lateral foveae long and narrow (Fig. 166). Mesoscutum smooth and polished, without trace of notauli; lateral bars of scutellum smooth and polished; scutellar foveae broad basally; scutellar cup longer than wide with apical fovea widest medially, tapering or converging apically; scutellar disc with aberrant reticulate-rugose sculpture, rounded apically. Mesopleuron smooth and polished; mesopleural suture distinct, weakly curved; metapleuron with 2 ridges, almost parallel; anteroventral cavity large, hairless (Fig. 167); lateral margins of propodeum crenulate; propodeal carinae parallel (cf. Fig. 163). Segment 1 of gaster in form of crescent-shaped crenulate ring; tergite 2 occupying almost the whole visible area in lateral view, with a few hairs on the lateral margins basally; tergites 3 and 4 partially visible; apex of tergite 2 and visible parts of 3 and 4 punctate. Fore wing relatively broad, apical margins rounded, with a fringe of hairs, wing surfaces pubescent; radial cell of fore wing open on wing margin, broad apically; vein *2r-m* weakly projecting; *Rs* + *M* not indicated (Fig. 141). Legs slender; hind coxa without a tuft of hairs posterodorsally. Colour: antenna dark yellow basally, brownish medially, apical segments sometimes lighter; head, thorax and gaster brownish yellow.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Nyasheke (volc. Nyamuragira), 1820 m, 14–26.[?month].1935 (*de Witte*) (MRAC).Paratypes. **Zaire**: 3 ♀, 18 ♂ (MRAC). **Uganda**: 2 ♂ (BMNH).

REMARKS. This species has characters in common with *heterotoma* in the scutellar cup, but the antennal characters and open radial cell enable it to be recognised easily.

Leptopilina pisonis sp. n.

(Figs 129, 130)

DESCRIPTION. ♀ antenna clavate, segments 7–13 with rhinaria, swollen medially, segment 3 longer than 4, 4 longer than 5, 5 and 6 subequal (cf. Fig. 156); ♂ antenna filiform, segment 3 shorter than 4, 4 swollen

medially (cf. 137). Eyes oval, further apart measured medially than the height of an eye; face smooth and polished; malar grooves percurrent. Pronotal plate weakly protruding; medial bridge as wide as a lateral fovea (cf. Fig. 159). Mesoscutum smooth and polished, without trace of notauli; lateral bars broad, short and triangular; scutellar foveae lenticular, shallow; scutellar cup elongate, broadest medially, weakly converging apically, not extending to apex of disc; scutellar disc with large reticulate-rugose sculpturing, apex rounded (cf. Fig. 124). Mesopleuron smooth and polished; mesopleural suture weakly curved; metapleuron weakly ridged in upper quarter (Fig. 130); anteroventral cavity pubescent; lateral margins of propodeum partially obscured by dense pubescence, visible part crenulate; propodeal carinae weakly bowed (cf. Fig. 163). Segment 1 of gaster in form of crescent-shaped crenulate ring; lateral margins of base of tergite 2 with dense pubescence ventrally, thin dorsally; tergites 3–6 partially visible in lateral view; apical margin of tergite 2 and whole of visible parts of 3–6 punctate. Fore wing moderately broad, wing surfaces pubescent with apical hair fringe; radial cell of fore wing partially open on wing margin; vein $2r-m$ not projecting; veins M and $Rs + M$ not indicated (Fig. 129). Legs long and slender; hind coxa with a tuft of hairs on posterodorsal margin. Colour: antenna pale yellow basally, darkish medially, pale yellow apically; head, thorax and gaster orange-brown; legs pale yellow.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Eala, v.1935 (*Ghesquiere*) (MRAC).

Paratypes. **Zaire**: 30 ♀, 8 ♂ (MRAC).

REMARKS. Similar to *syphax* but differing in the shape and size of the scutellar cup, the radial cell and the colour pattern.

Leptopilina syphax sp. n.

(Figs 127, 128, 134, 142, 168)

DESCRIPTION. ♀ antenna clavate, segments 7–13 subequal in length with rhinaria, 3 and 4 subequal in length, 5 shorter than 4, 6 shorter than 5, apical three segments lighter than median segments (Fig. 168); ♂ antenna 15-segmented, filiform, 3–5 subequal in length (Fig. 142). Eyes oval, as far apart as the height of an eye measured medially; face smooth and polished; malar grooves percurrent. Pronotal plate projecting; medial bridge broad. Mesoscutum smooth and polished, without trace of notauli; lateral bars of scutellum long, broad basally; scutellar cup longer than wide, extending to apex of disc, widest medially, converging apically (Fig. 127), apical fovea large; scutellar disc areolate-reticulate-rugose, rounded apically (Fig. 127). Mesopleuron smooth and polished; mesopleural suture almost straight; metapleuron with two ridges, weakly converging towards the propodeum; anteroventral cavity large, hairless (Fig. 134); lateral margins of propodeum canaliculate, weakly pubescent; propodeal carinae obscured by pubescence. Segment 1 of gaster in form of a crenulate ring, wider than long; tergite 2 with a few hairs on lateral margins basally; tergites 3–5 partially visible; apex of tergite 2 and visible parts of 3–5 punctate. Fore wing relatively broad, rounded apically, wing surfaces pubescent with apical hair fringe; radial cell of fore wing closed on wing margin; vein $2r-m$ weakly projecting; vein M complete but faintly represented; vein $Rs + M$ not indicated. Legs slender; hind coxa without a tuft of hairs posterodorsally. Colour: basal segments of antenna orange-yellow, medial segments brownish, apical three segments light yellow; head and thorax blackish; metapleuron and gaster orange-brown; legs orange-yellow.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: R. Kilalamatambo (affl. Lusinga), 17.vii.1945 (*de Witte*) (MRAC).

Paratypes. **Zaire**: 12 ♀, 24 ♂ (MRAC).

REMARKS. This species is closely related to *pissonis* but characteristics in the radial cell, scutellar cup and colour pattern enable them to be separated.

Leptopilina thetus sp. n.

(Figs 112, 117, 169)

DESCRIPTION. ♀ antenna weakly clavate, segment 3 shorter than 4, longer than 5, 5 and 6 subequal in length, 7–13 three times as long as broad, with rhinaria (Fig. 117). Eyes large, round, as far apart as the height of an eye measured medially; face smooth and polished; malar groove not visible; a few hairs present in clypeal area. Pronotal plate weakly projecting; medial bridge narrow, not as wide as a lateral fovea (cf. Fig. 159). Mesoscutum smooth and polished; lateral bars of scutellum broad basally, wide apically; scutellar foveae lenticular, smooth and shallow; scutellar cup extending almost to apex of scutellar disc, longer than wide, widest medially, converging apically (Fig. 169), apical fovea large, rim of scutellar cup

thick; scutellar disc with radiating reticulate-rugose sculpture, apex rounded. Mesopleuron smooth and polished; mesopleural suture weakly curved; metapleuron with two widely spaced parallel ridges in upper region; anteroventral cavity large, a few setae present; lateral margins of propodeum obscured by dense pubescence; propodeal carinae parallel. Segment 1 of gaster in form of crenulate ring, wider than long; tergite 2 with a tuft of hairs on lateral margins, thinner on dorsal surface; tergites 3–5 partially visible; apex of segment 2 and visible parts of 3–5 with sparse punctures. Fore wing moderately broad, wing surfaces pubescent with apical hair fringe; radial cell of fore wing closed on wing margin; vein *2r-m* weakly projecting; veins *M* and *Rs + M* not indicated (Fig. 112). Legs short; hind coxa with a few hairs on posterodorsal surface. Colour: antenna pale yellow; head, thorax and gaster pale chestnut brown; legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **South Africa**: Port St John, Pondoland, 10–31.vii.1923 (*Turner*) (BMNH).

Paratypes. **South Africa**: 2 ♀ (BMNH). **Zaire**: 3 ♀ (MRAC).

REMARKS. This species is separated from closely related species by the form of the antenna and the elongated scutellar cup.

Leptopilina vesta sp. n.

(Figs 132, 145, 170)

DESCRIPTION. ♀ antenna filiform, segments 3–13 with rhinaria, segment 3 shorter than 4, 4 and 5 subequal in length (Fig. 132); ♂ antenna 15-segmented, filiform, segments 3 and 4 subequal in length, 4 weakly swollen (Fig. 145). Eyes large, round, as far apart measured medially as height of an eye; face smooth and polished; malar grooves finely indicated. Pronotal plate protruding; medial bridge as broad as a lateral fovea (cf. Fig. 159). Mesoscutum smooth and polished; lateral bars of scutellum triangular, short; scutellar foveae lenticular; scutellar cup longer than wide, not extending to apex of disc; scutellar disc reticulate-rugose, apex rounded (cf. Fig. 169). Mesopleuron smooth and polished; mesopleural suture converging towards metapleuron; metapleuron with three distinct ridges in upper region (cf. Fig. 134); anteroventral cavity pubescent (cf. Fig. 134); lateral margins of propodeum partially obscured by dense pubescence; propodeal carinae bowed (cf. Fig. 163). Segment 1 of gaster in form of narrow ring, weakly crenulate; tergite 2 with a tuft of pubescence basally on lateral margins; apex of tergite 2 and visible part of tergite 3 finely punctate. Fore wing broad, apex rounded, wing surfaces pubescent with apical fringe of hairs; radial cell of fore wing closed on wing margin, narrow apically; vein *2r-m* protruding; veins *M* and *Rs + M* weakly indicated, not pigmented (Fig. 170). Legs long and slender; hind coxa without tuft of hairs on posterodorsal margin. Colour: antenna yellowish basally, merging to brownish yellow apically; head and thorax dorsally blackish; mesopleuron and gaster brownish orange; legs yellow.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, 1980 (*Jackson*) (BMNH).

Paratypes. **Cameroun**: 1 ♂ (BMNH). **Zaire**: 2 ♀, 8 ♂ (MRAC).

REMARKS. The filiform antenna separates this species from all others in this genus.

Leptopilina victoriae Nordlander

(Figs 125, 131, 146, 147)

Leptopilina victoriae Nordlander, 1980: 447. Holotype ♀, SEYCHELLES (Nordlander coll.) [not examined].

DESCRIPTION. ♀ antenna clavate, segments 7–13 with rhinaria forming a club, segment 3 longer than 4, 5 and 6 subequal, each shorter than 4 (cf. Fig. 156); ♂ antenna 15-segmented, segment 3 shorter than 4, 4 swollen medially, bent, outer surface flattened (Fig. 147). Eyes large, almost round, further apart measured medially than the height of an eye; face smooth and polished with sparse hairs around clypeal area; malar grooves fine, percurrent. Pronotal plate protruding; lateral foveae round, narrow; medial bridge slightly broader than a fovea. Mesoscutum smooth and polished; lateral bars of scutellum short, broad based; scutellar cup elongate, weakly converging apically with a large apical fovea; scutellar disc rounded apically, surface reticulate-rugose (Fig. 125). Mesopleural suture directed strongly down towards margin of anteroventral cavity; metapleuron with three ridges (Fig. 131); anteroventral cavity hairless; lateral margins of propodeum crenulate, partially obscured by dense pubescence; propodeal carinae very weakly bowed, almost parallel (cf. Fig. 149). Segment 1 of gaster in form of a crescent, crenulate; lateral

margins of base of tergite 2 with a thin ring of hairs and a few longer hairs behind them; tergites 3–5 partially visible, impunctate. Fore wing moderately broad apically, wing surfaces pubescent, apical margins with a hair fringe; radial cell of fore wing closed on wing margin, broad apically; vein *2r-m* projected; vein *Rs + M* not indicated; vein *M* weakly indicated by pigmentation (Fig. 146). Legs slender; hind coxa swollen, with a tuft of hairs on posterodorsal margin. Colour: antenna yellow basally, apical segments darker; head, thorax and gaster dark chestnut brown; legs orange-yellow.

MATERIAL EXAMINED

Seychelles: 14 ♀, 46 ♂ (including 1 ♀, 1 ♂ paratypes of *L. victoriae* Nordlander, labelled ES 551 and 552) (BMNH). **Uganda:** 2 ♀ (BMNH). **Zaire:** 32 ♀, 18 ♂ (MRAC). **South Africa:** 1 ♀ (BMNH).

REMARKS. Separated from *vesta* by antennal, pronotal plate and scutellar cup characters. Nordlander (1980) considers *victoriae* probably to be a parasitoid of *Drosophila malerkotliana* Parshad & Paika. Some of the specimens from Zaire are paler and a few have pale apical antennal segments.

SIRENES gen. n.

Type species: *Sirenes sinis* sp. n.

DIAGNOSIS. ♀ antenna 13-segmented, filiform-subclavate with from 3–8 segments with rhinaria, basal segments finely granulate; ♂ antenna 15-segmented, filiform-flagellate apically, segment 3 shorter or subequal to 4. Head viewed frontally longer than broad, eyes measured medially as far or further apart as height of an eye; weakly coriaceous in region of antennal sockets and eye margins; supra-clypeal area raised; face with sparse hairs; malar grooves weakly indicated with weak striations on either side; viewed dorsally ocellar area weakly coriaceous (Fig. 172), extending to occipital carina. Pronotal plate viewed dorsally rectangular (cf. Fig. 191), lateral fovea on either side weak and open; pronotum either side of pronotal plate densely pubescent. Mesoscutum polished medially, sometimes strongly coriaceous on lateral margins; notauli not indicated, parapsidal furrows or lateral lines present apically (Fig. 189). Mesopleuron polished, sometimes very weakly coriaceous, mesopleural suture or carina absent; subpleural area densely pubescent, antero-ventral cavity obscured by dense woolly pubescence enveloping the lateral margins of propodeum; metapleuron smooth and polished. Lateral bars of scutellum strongly striate; scutellar fovea large; scutellar disc coriaceous to weakly broken striate, almost square apically; scutellar cup (scutellar plate) long and narrow, rarely oval, not reaching apical margin of scutellar disc, apical fovea long and narrow. Propodeum completely covered dorsally and laterally with dense woolly pubescence. Segment 1 of gaster almost completely obscured by ring of dense woolly pubescence at base of tergite 2; tergites 2–5 (or less often 2–4) visible in lateral view, tergite 2 occupying most of visible area; apex of tergite 2 and visible parts of tergites 3–4 sculptured. Wing surfaces pubescent, margins ciliate, longest apically; fore wing with radial cell open or closed. Legs long, with scattered pubescence.

DISTRIBUTION. Afrotropical Region.

DISCUSSION. *Sirenes* is most closely related to *Glauraspidia* but the sculpture of the head, mesoscutum and mesopleuron together with the usually closed radial cell of the fore wing and the form of antenna in both male and female distinguish it.

Key to the species of *Sirenes* gen. n.

Females

- 1 Antenna filiform, rhinaria present on the 8–9 apical segments, segment 3 shorter than 4 (4–13 subequal in length) (Fig. 174); scutellar cup sharply declined apically (Fig. 175). *spio* sp. n. (p. 204)
- Antenna weakly clavate, rhinaria present on a lesser number of apical segments, segments 3 and 4 subequal in length; scutellar cup either weakly or sharply declined (Fig. 175, 176). 2
- 2 Strong rhinaria present on the 3 apical segments of antenna, segment 10 with weak rhinaria (Fig. 177); scutellar cup tear-shaped, sharply declined (Fig. 176); gaster finely punctate apically (Fig. 193); mesopleuron weakly coriaceous; radial cell of fore wing open on margin (Fig. 194). *silenus* sp. n. (p. 203)
- Strong rhinaria present on 4 or more apical segments of antenna; scutellar cup long and narrow or weakly oval apically; gaster either punctate or sculptured; mesopleuron sculptured or polished; radial cell of fore wing closed. 3
- 3 Rhinaria present on the 4 apical segments of antenna, forming a weak but distinct club (Fig. 178); eye margins smooth and polished.
Mesopleuron smooth and polished; gaster finely coriaceous apically (cf. Fig. 195).

steropes sp. n. (p. 204)

- Rhinaria present on 5 or more apical segments; outer lateral margins of eyes polished or sculptured. 4
- 4 Rhinaria present on 5 apical segments of antenna (Fig. 179). 5
- Rhinaria present on more than 5 apical segments of antenna (Figs 171, 180). 7
- 5 Antenna moniliform, segment 3 as long as 4+5, 4–8 a little longer than broad (Fig. 179).
Scutellar disc coriaceous to longitudinally striate (Fig. 189). *orbilus* sp. n. (p. 202)
- Antenna weakly sub-clavate, segment 3 shorter than 4+5, 4–8 at least twice as long as broad (Fig. 181). 6
- 6 Mesopleuron finely and densely coriaceous (Fig. 182); outer lateral margins of eyes coriaceous.
syrtes sp. n. (p. 205)
- Mesopleuron smooth and polished; outer lateral margins of eyes smooth and polished.
flocus sp. n. (p. 202)
- 7 Rhinaria present on the 6 apical segments of antenna (Fig. 180); mesopleuron smooth and polished; gaster densely but finely coriaceous on apical half; scutellar cup declined (cf. Fig. 189); outer lateral margins of eyes smooth and polished. *syrinx* sp. n. (p. 205)
- Rhinaria present on the 7 apical segments of antenna; mesopleuron finely coriaceous (cf. Fig. 182); gaster coriaceous on apical half; scutellar cup weakly declined; outer lateral margins of eyes reticulate. *sinis* sp. n. (p. 203)

Males

At present males cannot be distinguished reliably. Although most species have males listed under material examined they have been associated mainly on the basis of collection data. The males tend to have differences in antennal lengths and shape as well as sculpture differences on the mesoscutum and mesopleuron.

Sirenes floccus sp. n.

(Figs 186–188)

DESCRIPTION. ♀ antenna weakly subclavate, segment 3 shorter than 4+5, 4–13 subequal in length, segments 9–13 weakly swollen medially, with rhinaria, forming a weak club (Fig. 186). Head viewed frontally with eyes further apart, measured medially, than the height of an eye; frons and lateral areas of face smooth and polished; face and mandibular area with a few scattered hairs; occiput and vertex finely coriaceous; lateral margins of occipital carina with a line of dense pubescence. Pronotal plate with lateral fovea very small (cf. Fig. 191). Mesoscutum finely reticulate-coriaceous; lateral bars of scutellum coriaceous; scutellar cup almost reaching apex of scutellar disc, weakly rounded apically. Mesopleuron smooth and polished; anteroventral cavity hairless. Gaster with apex of tergite 2 reticulate; visible parts of 3–5 finely sculptured (Fig. 187). Fore wing with radial cell closed, longer than wide, veins *Rs* + *M* and *M* indicated, weakly pigmented (Fig. 188). Colour: antenna dark brown; head, thorax and gaster chestnut brown; legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Massif Ruwenzori, Mont Ngulingo pres. Nyamgaleke, 2500 m, ex I.N.A., 3.vi.1954 (*Vanschuytbroeck & Synave*) (MRAC).

Paratypes. **Zaire**: 5 ♀ (MRAC).

REMARKS. Separated from *syrtes* by mesopleural and eye margin differences.

Sirenes orbilus sp. n.

(Figs 179, 189, 190)

DESCRIPTION. ♀ antenna moniliform, segment 3 subequal to 4+5, 4 longer than 5, 5–8 subequal, each slightly longer than wide, segments 9–13 forming a club, with rhinaria (Fig. 179); ♂ antenna with segment 3 shorter than 4, 4 longer than 5, 5–15 subequal, becoming thinner apically. Head viewed frontally with eyes further apart, measured medially, than the height of an eye; frons and lateral areas of face smooth and polished; mandibular area with a few scattered hairs; occiput and vertex with fine reticulate-coriaceous sculpture; lateral margins of occipital carina with a line of dense pubescence. Pronotal plate with lateral fovea very small and open (this is difficult to appreciate) (cf. Fig. 191). Mesoscutum finely sculptured on lateral margins, polished medially (Fig. 189); lateral bars of scutellum striated, scutellar fovea smooth and polished; scutellar disc with coriaceous-reticulate-striate sculpture; scutellar cup narrow, tear drop-

shaped, weakly declined apically (Fig. 189); apex of scutellar disc weakly rounded. Mesopleuron smooth and polished; lower margin of metapleuron densely pubescent, anteroventral cavity obscured by dense pubescence extending to lateral margin of propodeum. Segment 1 of gaster obscured from view by propodeal pubescence and base of tergite 2; apex of tergite 2 reticulate, visible parts of tergites 3–5 reticulate (cf. Fig. 187); hypopygium inconspicuous. Wings narrow, rounded apically; radial cell of fore wing completely closed, almost triangular (Fig. 190); veins *Rs* + *M* and *M* not visible either as folds or pigmentation. Legs with femora and tibiae very weakly sculptured. Colour: antenna orange-yellow, apical segments dark; head, thorax and gaster chestnut brown; legs orange-yellow.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Rutshuru, 1285 m, 11.vii.1935 (*de Witte*) (MRAC).

Paratypes. **Zaire**: 2 ♂ (MRAC).

REMARKS. Distinguished from other species in the genus by the moniliform antenna of the female (Fig. 179) and almost triangular radial cell of the fore wing.

Sirenes silenus sp. n.

(Figs 176, 177, 191–194)

DESCRIPTION. ♀ antenna weakly subclavate apically, segments 3–10 subequal in length, apical three segments with pronounced rhinaria, segment 10 with weak rhinaria, forming a weak club (Fig. 177). Head viewed frontally with eyes as far apart measured medially as the height of an eye; face smooth and polished, reticulate on inner margins of eye, with a few scattered hairs; malar grooves percurrent; vertex and occiput reticulate-coriaceous; lateral margins of occipital carina with a line of dense pubescence. Pronotal plate rectangular, lateral fovea indistinct, appearing open (Fig. 191). Mesoscutum reticulate-coriaceous, impressions in place of notauli; lateral bars of scutellum coriaceous-striate; scutellar fovea deep, smooth and polished; scutellar cup long and narrow, dew drop-shaped, apical half oval and declined; scutellar disc squarish apically, surface dull, with trace of sculpture (Fig. 176). Mesopleuron finely reticulate-coriaceous; metapleural anteroventral cavity obscured by dense pubescence on lower margins of mesopleuron and lateral margins of propodeum. Segment 1 of gaster in form of narrow ring, obscured by presence on propodeum and the dense narrow ring of woolly pubescence at base of tergite 2 of gaster; tergite 2 occupying whole of visible area of gaster in lateral view; apex of gaster punctate; hypopygium inconspicuous (Fig. 193). Wing rounded apically; radial cell of fore wing partially open on wing margin; veins *Rs* + *M* and *M* indicated but not pigmented (Fig. 194). Legs with femora and tibiae finely coriaceous; trochanters of normal proportions. Colour: antenna orange-yellow basally, club segments darker; head and dorsal surface of mesoscutum blackish; mesopleuron and gaster orange-brown; legs orange-yellow.

♂ unknown.

MATERIAL EXAMINED

Holotype ♀, **Kenya**: Nairobi, Karen, 1982 (*Dewhurst*) (BMNH).

Paratype. **Zaire**: 1 ♀ (MRAC).

REMARKS. The antennal and scutellar cup characters separate *silenus* from all other species in the genus.

Sirenes sinis sp. n.

(Figs 171–173, 195)

DESCRIPTION. ♀ antenna subclavate, segment 3 longer than 4, 4–6 subequal in length, segments 7–13 with rhinaria, forming a weak 7-segmented club (Fig. 171); ♂ antenna flagelliform, segments 3–5 subequal in length, segment 3 weakly curved, 4 weakly swollen medially. Head viewed frontally with eyes as far apart measured medially as the height of an eye; frons and lateral areas finely reticulate-coriaceous; mandibular area with a few scattered hairs; occiput and vertex with dense fine reticulate-coriaceous sculpture; lateral margins of occipital carina pubescent. Pronotal plate viewed frontodorsally rectangular, surface coriaceous, lateral foveae very small and open (this is difficult to appreciate). Mesoscutum polished medially, laterally margins densely and finely reticulate-coriaceous (Fig. 173); lateral bars of scutellum striate; scutellar fovea smooth and polished; scutellar cup long and narrow, apical half weakly declined; scutellar disc weakly strigose, apex squarish. Mesopleuron finely coraceous; anteroventral cavity bare; lower margins of mesopleuron (mesosternum) densely pubescent. Segment 1 of gaster in form of a narrow ring, longer than wide, completely obscured by propodeal pubescence and a dense ring of pubescence at base of tergite 2; apical third of segment 2 and visible parts of 3–5 finely reticulate-coriaceous (Fig. 195); hypopygium broad apically (Fig. 195). Wings broad apically; radial cell of fore wing completely closed;

Rs + *M* and *M* indicated, not pigmented. Legs with trochanters clearly longer than broad. Colour: antenna dark brown-black; head and thorax blackish brown; gaster chestnut-red; legs orange.

MATERIAL EXAMINED

Holotype ♀, **Cameroun**: Nkoemvon, viii.–ix.1980 (*Jackson*) (BMNH).

Paratypes. **Cameroun**: 4 ♀, 1 ♂ (BMNH). **Zaire**: 8 ♀ (MRAC).

REMARKS. Apart from antennal differences the female is distinguished from other species on gastral characters. The males of *spio* and *sinis* cannot be separated and their identification has been by association with females.

Sirenes spio sp. n.

(Figs 174, 175, 185, 196)

DESCRIPTION. ♀ antenna with the apical 8 or 9 segments with rhinaria, segment 3 shorter than 4, filiform, 4–9 subequal in length, 10–13 with more strongly pronounced rhinaria (Fig. 174). ♂ antenna flagelliform. Head viewed frontally finely coriaceous; eyes further apart measured medially than the height of an eye; malar grooves percurrent, obscured by striae on either side; mandibular area with scattered hairs; vertex and occiput reticulate-coriaceous; lateral margins of occipital carina with a line of dense pubescence. Pronotal plate rectangular, broad based, lateral foveae open (Fig. 196). Mesoscutum finely and densely reticulate-coriaceous, lateral lines present apically; lateral bars of scutellum striate; scutellar foveae smooth and polished, deep; scutellar cup elliptical, apical third with a declined fovea; scutellar disc reticulate-coriaceous, dull, apex squarish (Fig. 175). Mesopleuron finely reticulate-coriaceous-striate; lower margins of mesopleuron (mesosternum) densely pubescent; anteroventral cavity obscured by dense pubescence extending from lateral margins of propodeum. Segment 1 of gaster in form of a crenulate ring as wide as long (longer than wide in male), obscured by thin ring of dense woolly pubescence at base of tergite 2; tergites 2–4 of gaster visible in lateral view; apical quarter of tergite 2 reticulate, segments 3 and 4 punctate (cf. Fig. 187); hypopygium short, broad apically. Wings broad; radial cell of fore wing completely closed; veins *Rs* + *M* and *M* weakly pigmented. Legs with coxae, femora and tibiae coriaceous. Colour: antenna dark brownish yellow; head and thorax dark chestnut-brown; gaster orange-brown; legs orange-brown.

MATERIAL EXAMINED

Holotype ♀, **Zaire**: Kivu, Rutshuru, 1285 m, 12.vii.1935 (*de Witte*) (MRAC).

Paratypes. **Zaire**: 1 ♀, 3 ♂ (MRAC).

REMARKS. The female is separated on gastral characters from *sinis*, although the males cannot be distinguished other than by association with females.

Sirenes steropes sp. n.

(Figs 178, 199)

DESCRIPTION. ♀ antenna weakly subclavate, segment 3 shorter than 4+5, 4 longer than 5, 5–9 subequal in length, 10–13 with rhinaria forming a weak 4-segmented club (Fig. 178); ♂ antenna flagelliform, segment 3 weakly curved (cf. Fig. 183). Head viewed frontally with eyes further apart than the height of an eye measured medially; face smooth and polished; malar grooves obscured by striations on either side; mandibular area with few scattered hairs; occiput and vertex strongly coriaceous-strigose (Fig. 199). Pronotal plate viewed frontodorsally with lateral foveae open (cf. Fig. 191). Mesoscutum polished, notauli absent, finely coriaceous on lateral margins; lateral bars of scutellum striated; scutellar fovea large, smooth and polished; scutellar cup long and narrow with apical fovea weakly declined (cf. Fig. 189); scutellar disc striate, squarish apically. Mesopleuron smooth and polished; lower margins of mesopleuron densely pubescent; anteroventral cavity obscured by pubescence. Segment 1 of gaster completely obscured by pubescence of propodeum and hairy ring at base of tergite 2 of gaster; tergites 2–4 of gaster visible in lateral view; apex of tergite 2 and visible parts of 3 and 4 punctate (cf. Fig. 187); hypopygium not pronounced. Wings broad apically, with short widely spaced hairs on surface, apical margins with fringe of hairs long; radial cell of fore wing closed; veins *Rs* + *M* and *M* indicated, not pigmented (cf. Fig. 188). Legs with trochanters longer than broad, distinctive. Colour: antenna yellowish basally, apical segments darker; head and thorax dark brown; gaster orange-yellow; legs orange-brown.

MATERIAL EXAMINED

Holotype ♀, **Kenya**: 15 mls NE. Kisumu nr Lake Victoria, xi.1979 (*Croft*) (BMNH).

Paratypes. **Kenya**: 1 ♀ (BMNH). **South Africa**: 1 ♀ (BMNH). **Zaire**: 38 ♀, 8 ♂ (BMNH and MRAC).

REMARKS. Separated from other species by the antennal characters.

***Sirenes syrinx* sp. n.**

(Figs 180, 183, 197)

DESCRIPTION. ♀ antenna filiform, weakly subclavate, segment 3 shorter than 4+5, 4–7 subequal in length, 8–13 with rhinaria forming a weak 6-segmented club (Fig. 180); ♂ antenna flagelliform, segment 3 weakly curved, longer than 4 (Fig. 183). Head viewed frontally with eyes slightly further apart than the height of an eye measured medially; inner orbits of face finely coriaceous; malar grooves obscured by striations on either side; mandibular area of face with scattered hairs; occiput strongly coriaceous, lateral margins of occipital area pubescent. Pronotal plate viewed frontodorsally with lateral fovea open (cf. Fig. 191). Mesoscutum polished, finely coriaceous on lateral margins, notauli absent; lateral bars of scutellum striate; scutellar fovea large, smooth and polished; scutellar cup long and narrow with apical fovea weakly declined; scutellar disc squarish apically, surface striated and partially coriaceous (cf. Fig. 175). Mesopleuron finely and densely coriaceous; lower margins of mesopleuron densely pubescent, anteroventral cavity without pubescence. Segment 1 of gaster petiolate, narrow, a little longer than wide, partially obscured by a ring of dense pubescence at base of tergite 2; apical third and visible parts of 3–5 reticulate-coriaceous; hypopygium not pronounced (cf. Fig. 187). Wings broad apically, rounded; veins *Rs* + *M* and *M* weakly indicated; radial cell of fore wing completely closed (Fig. 197). Legs with trochanters longer than broad, distinctive. Colour: antenna dark brownish yellow; head, thorax and gaster chestnut red; legs orange-yellow.

MATERIAL EXAMINED

Holotype ♀, **Zaire:** Rutshuru, riv. Kanzarue, 1200 m, 16.vii.1935 (*de Witte*) (MRAC).

Paratypes. **Zaire:** 23 ♀, 6 ♂ (MRAC). **South Africa:** 1 ♀ [this specimen is particularly pale] (BMNH).

REMARKS. In some specimens the colour is very much paler and the sculpture of the mesoscutum is very weak. Separated from other species by the antennal and mesopleural characters.

***Sirenes syrtes* sp. n.**

(Figs 181, 182, 184)

DESCRIPTION. ♀ antenna subclavate, segment 3 weakly curved and subequal in length to 4, 4–8 equal in length, 9–13 forming a weak club (Fig. 181); ♂ antenna with segment 3 strongly curved, rhinaria pronounced (Fig. 184). Head viewed frontally with eyes further apart than the height of an eye measured medially; face reticulate-coriaceous; malar grooves percurrent; occiput and vertex with reticulate-coriaceous sculpture; lateral margins of occipital carina with a line of dense pubescence. Pronotal plate with lateral fovea appearing closed (cf. Fig. 191). Mesoscutum reticulate-coriaceous; lateral bars of scutellum striate; scutellar fovea smooth and polished, deep; scutellar cup long and narrow, apical half of cup and disc weakly declined; surface of scutellar disc weakly striated, apex squarish (cf. Fig. 189). Mesopleuron with fine coriaceous sculpture; anteroventral cavity obscured by dense pubescence. Segment 1 of gaster in form of a ring as wide as long, partially obscured by ring of pubescence at base of tergite 2; apex of tergite 2 with reticulate-coriaceous sculpture extending to visible parts of 3–5; hypopygium not pronounced (cf. Fig. 193). Wings rounded apically, broad; radial cell of fore wing completely closed; veins *Rs* + *M* and *M* weakly pigmented (cf. Fig. 197). Legs with hind femur and tibia finely reticulate-coriaceous; trochanters not pronounced. Colour: antenna brownish basally, apical segments darker; head and thorax blackish; gaster chestnut red; legs dull orange-yellow.

MATERIAL EXAMINED

Holotype ♀, **Zaire:** Nyasheke (volc. Nyamuragira), 182 m, 14–26.vi.1935 (*de Witte*) (MRAC).

Paratypes. **Zaire:** 1 ♀, 1 ♂ (MRAC).

REMARKS. The mesopleural characters separate *syrtes* from *floccus*.

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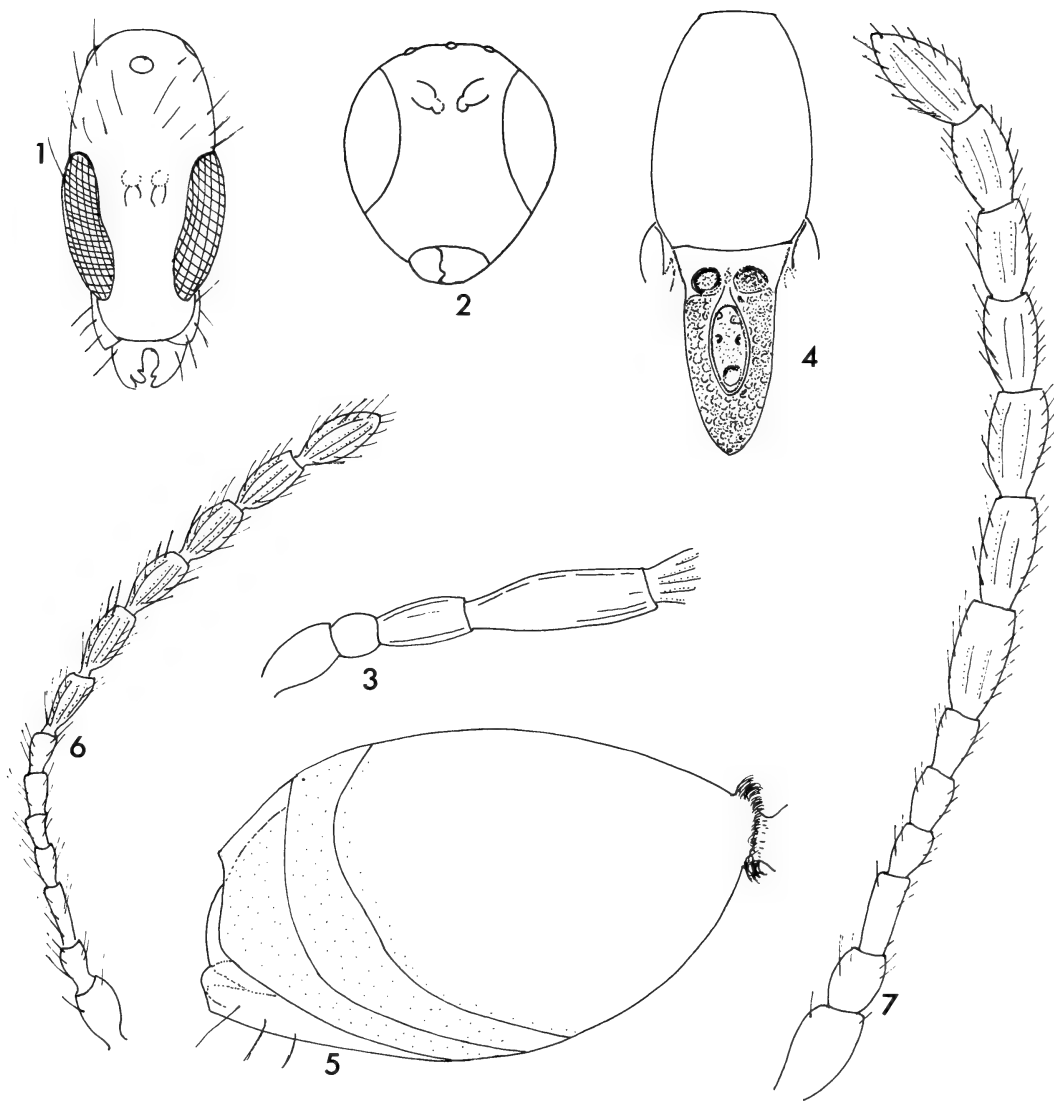
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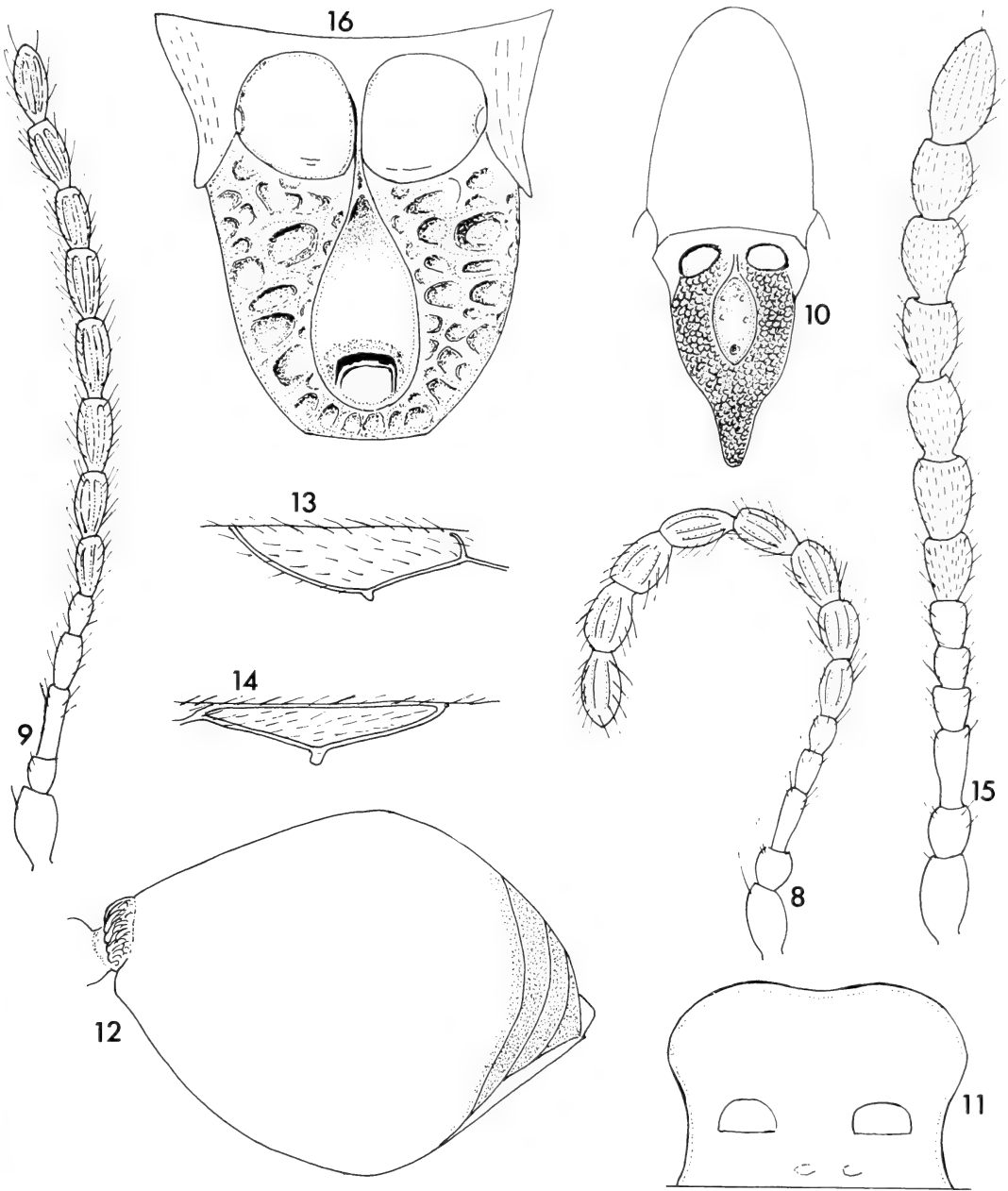
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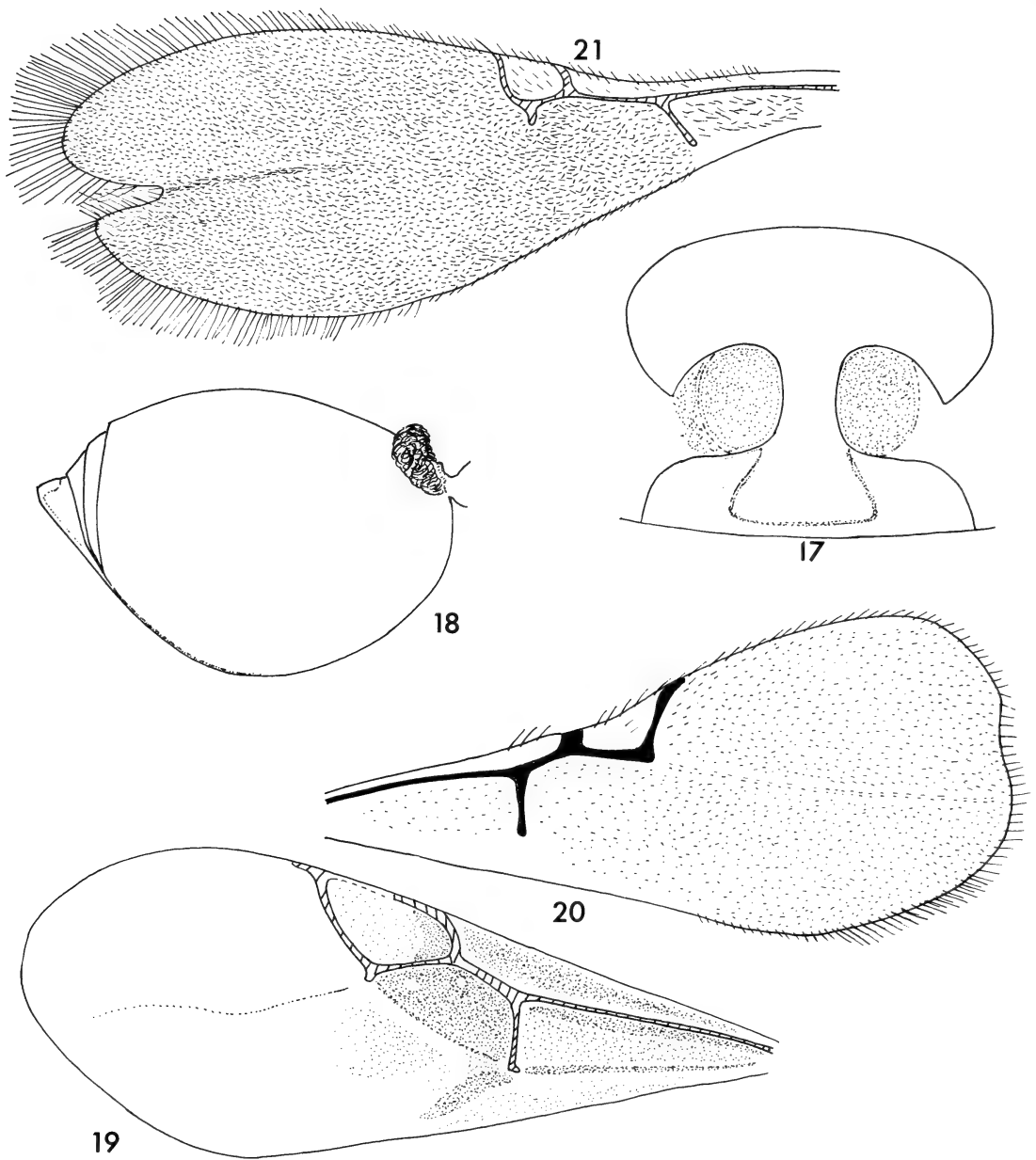
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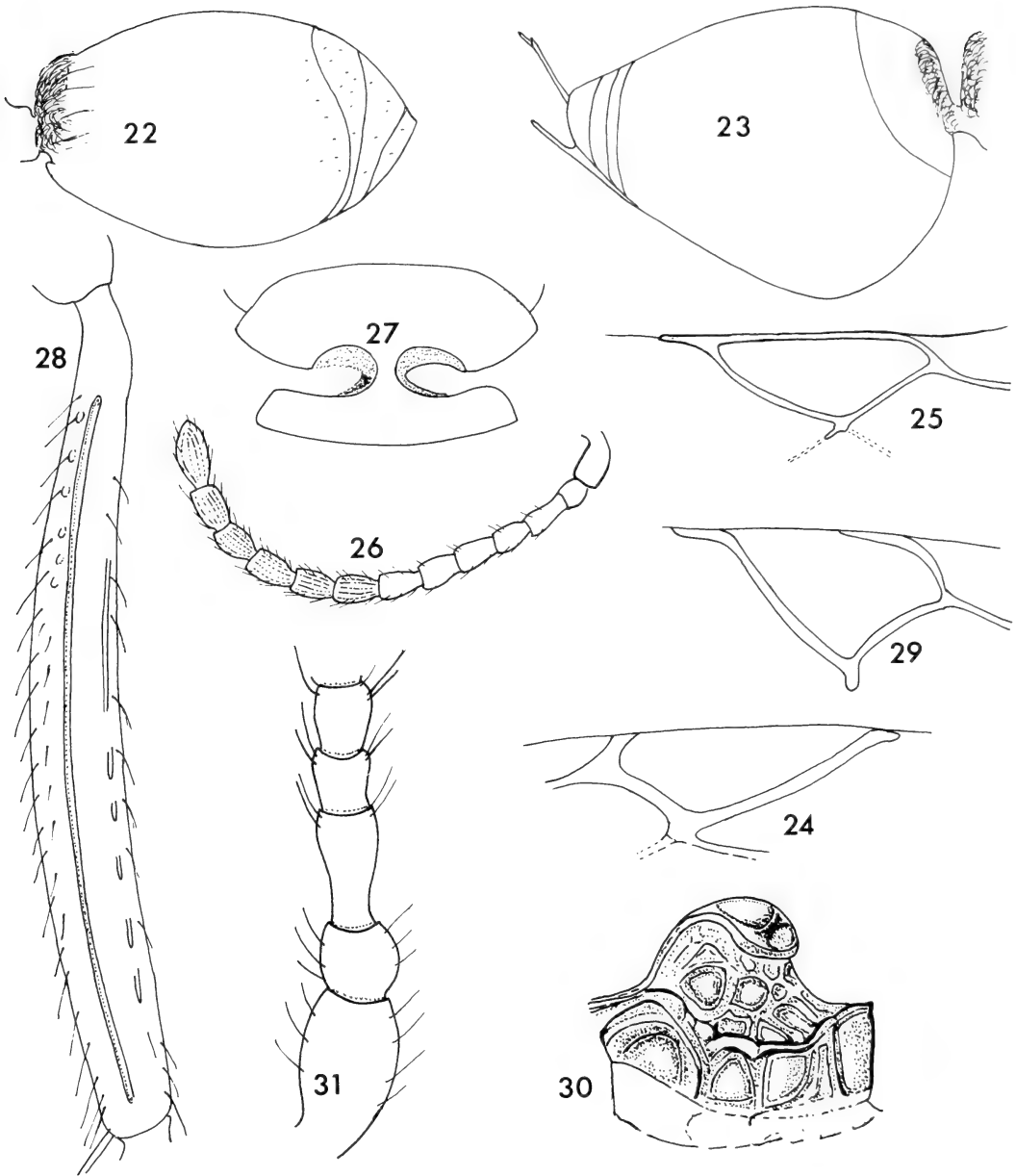
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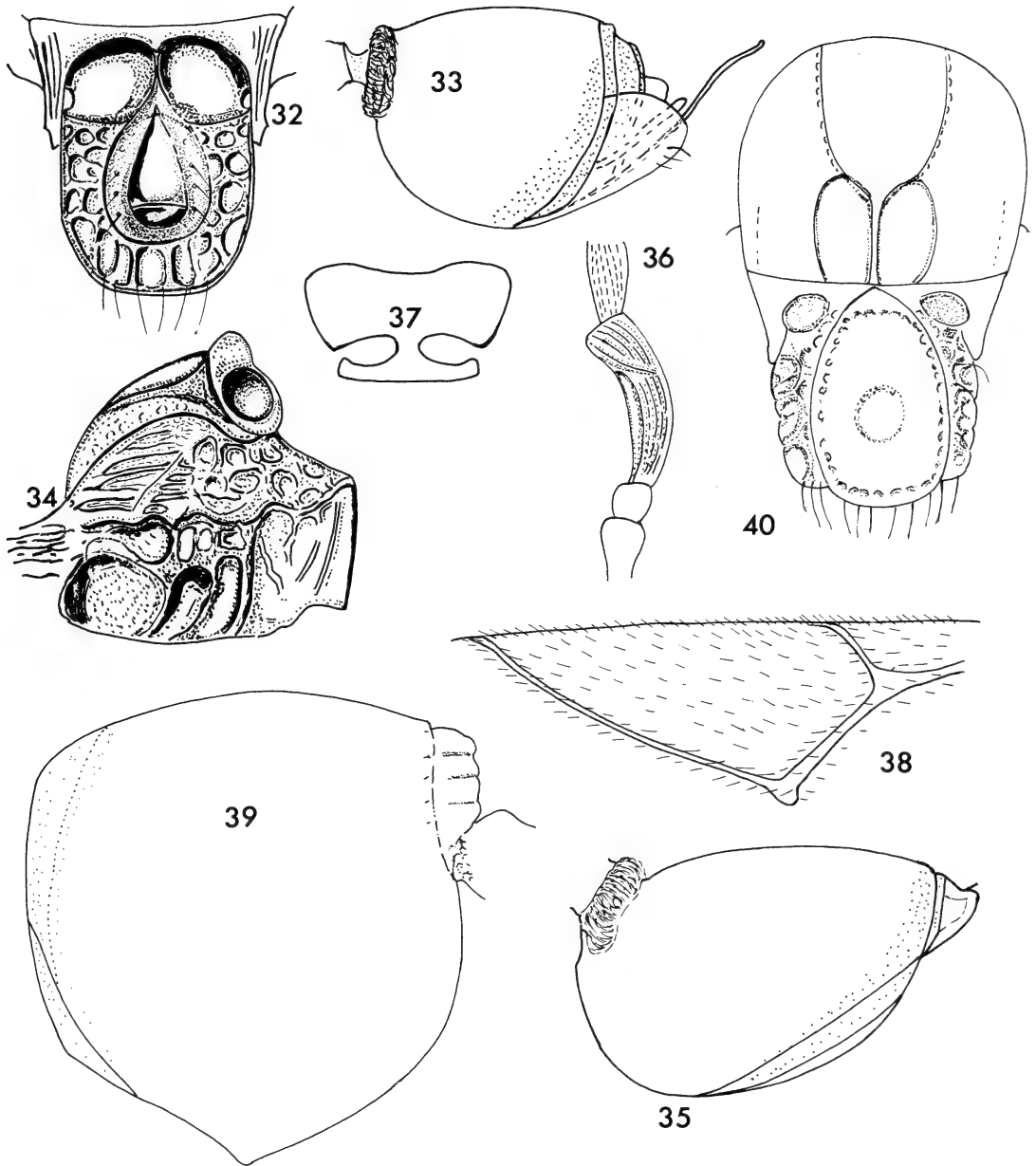
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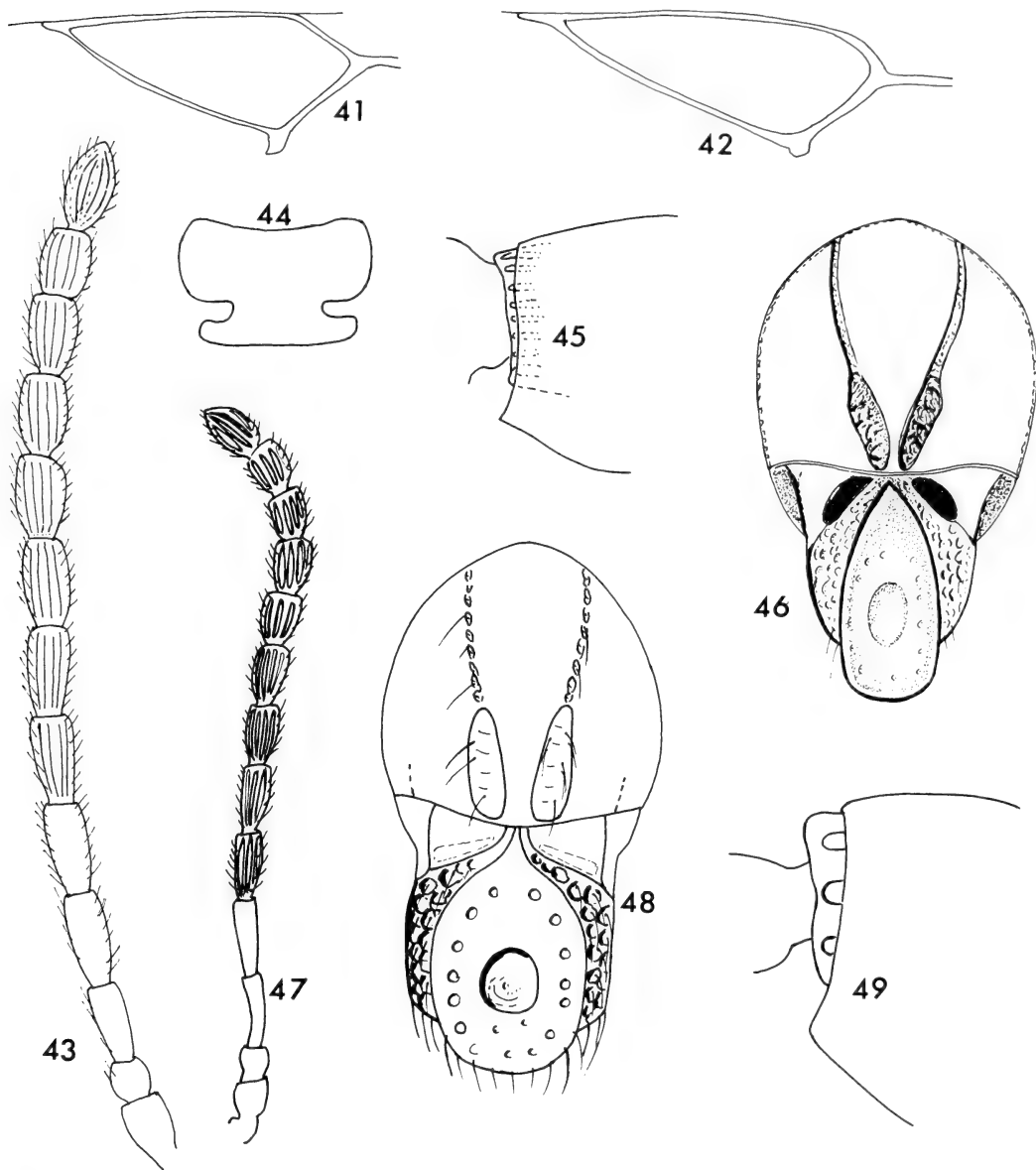
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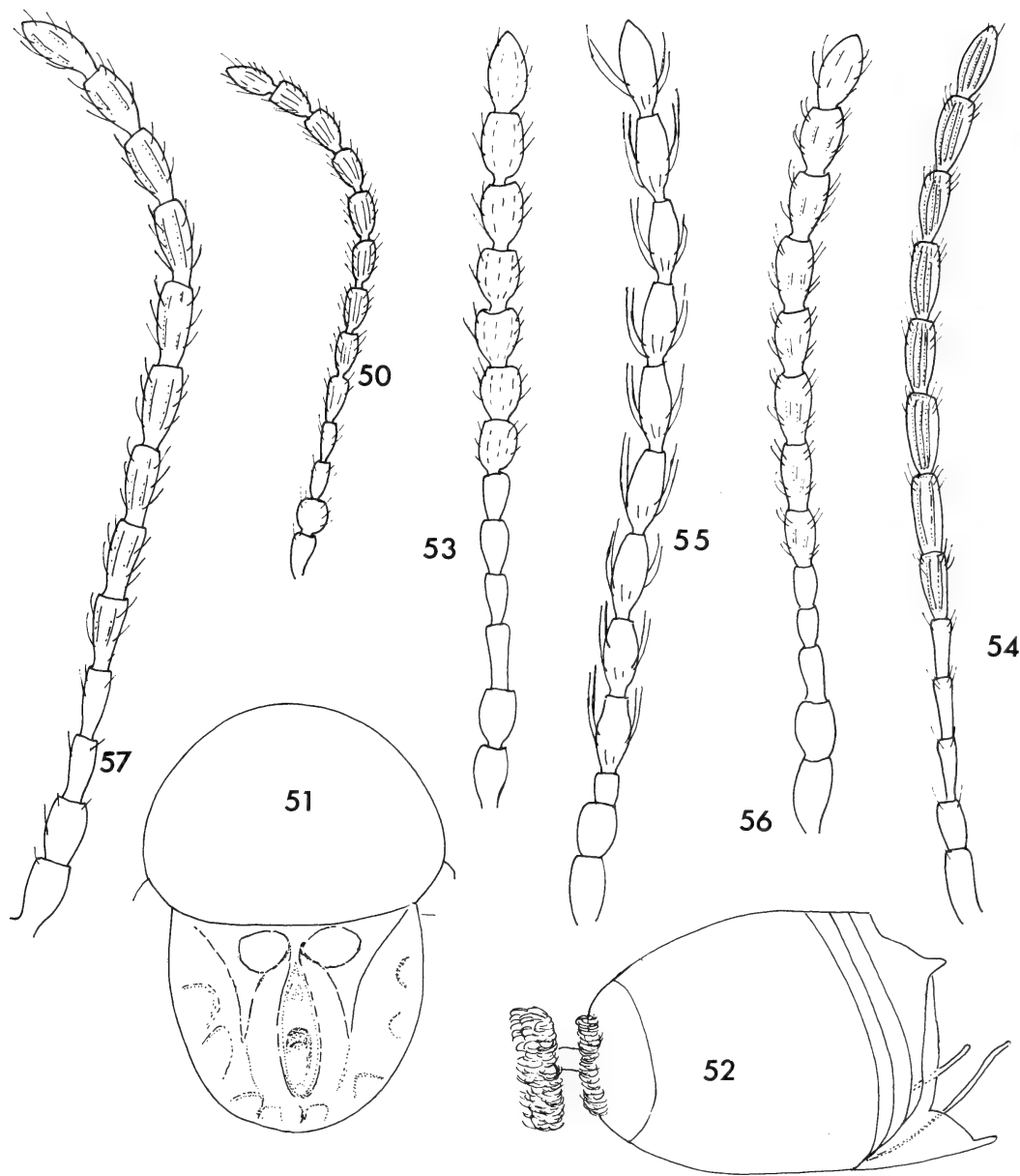
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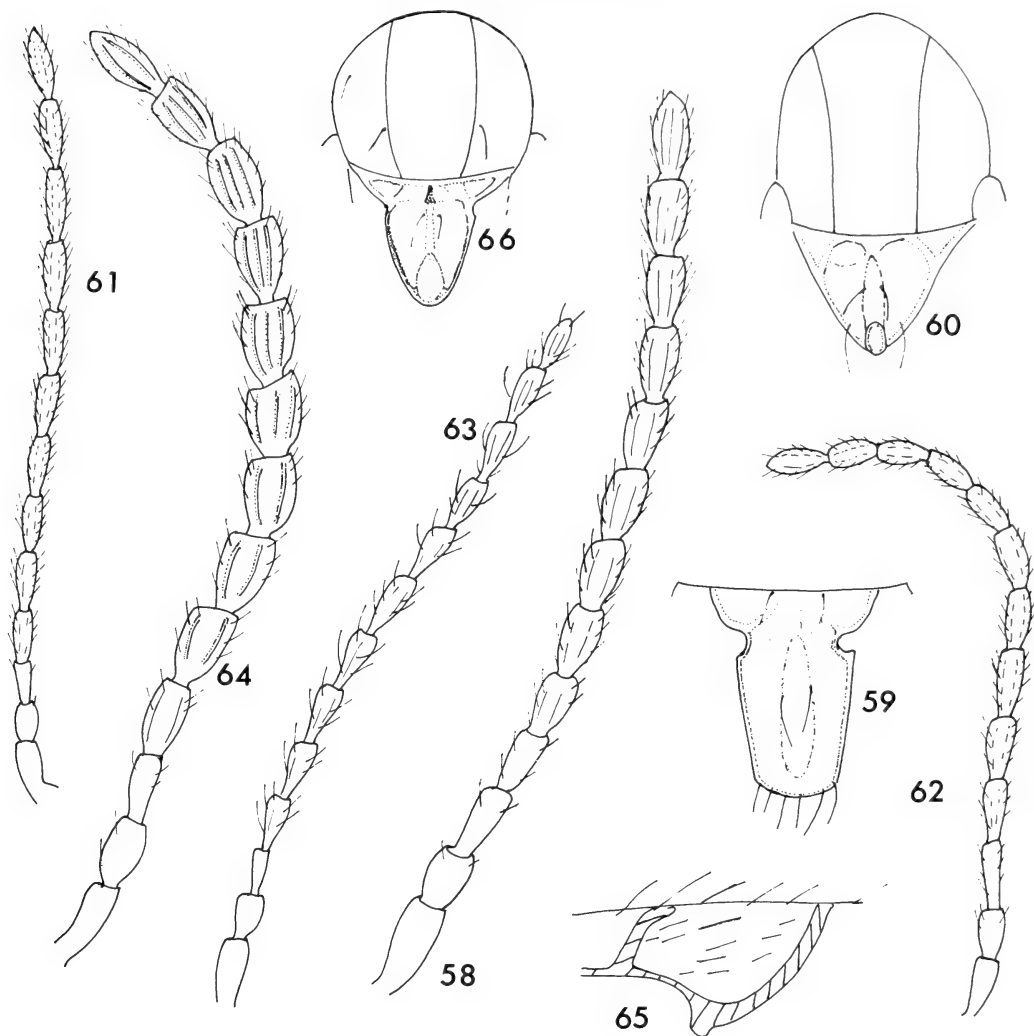
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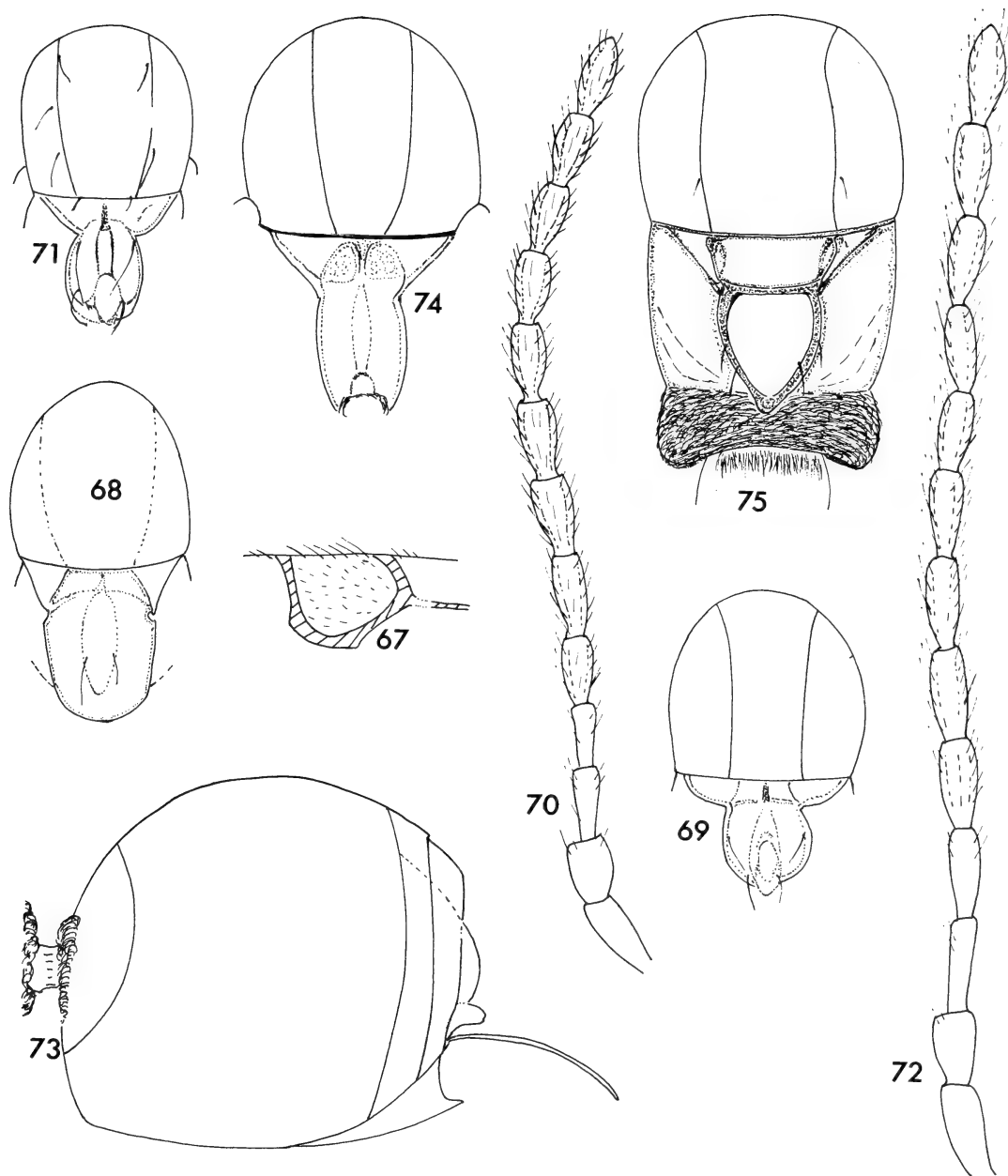
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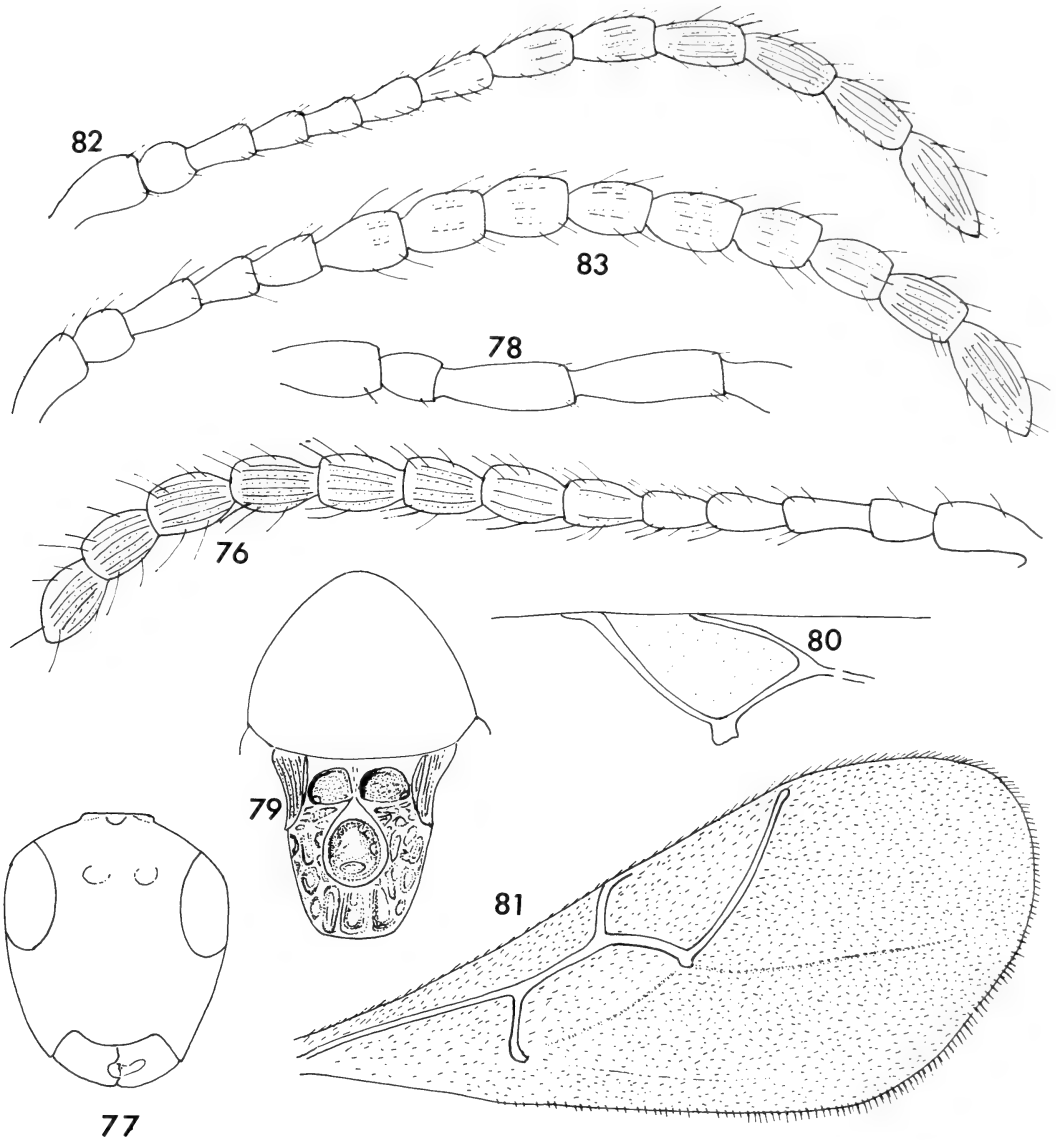
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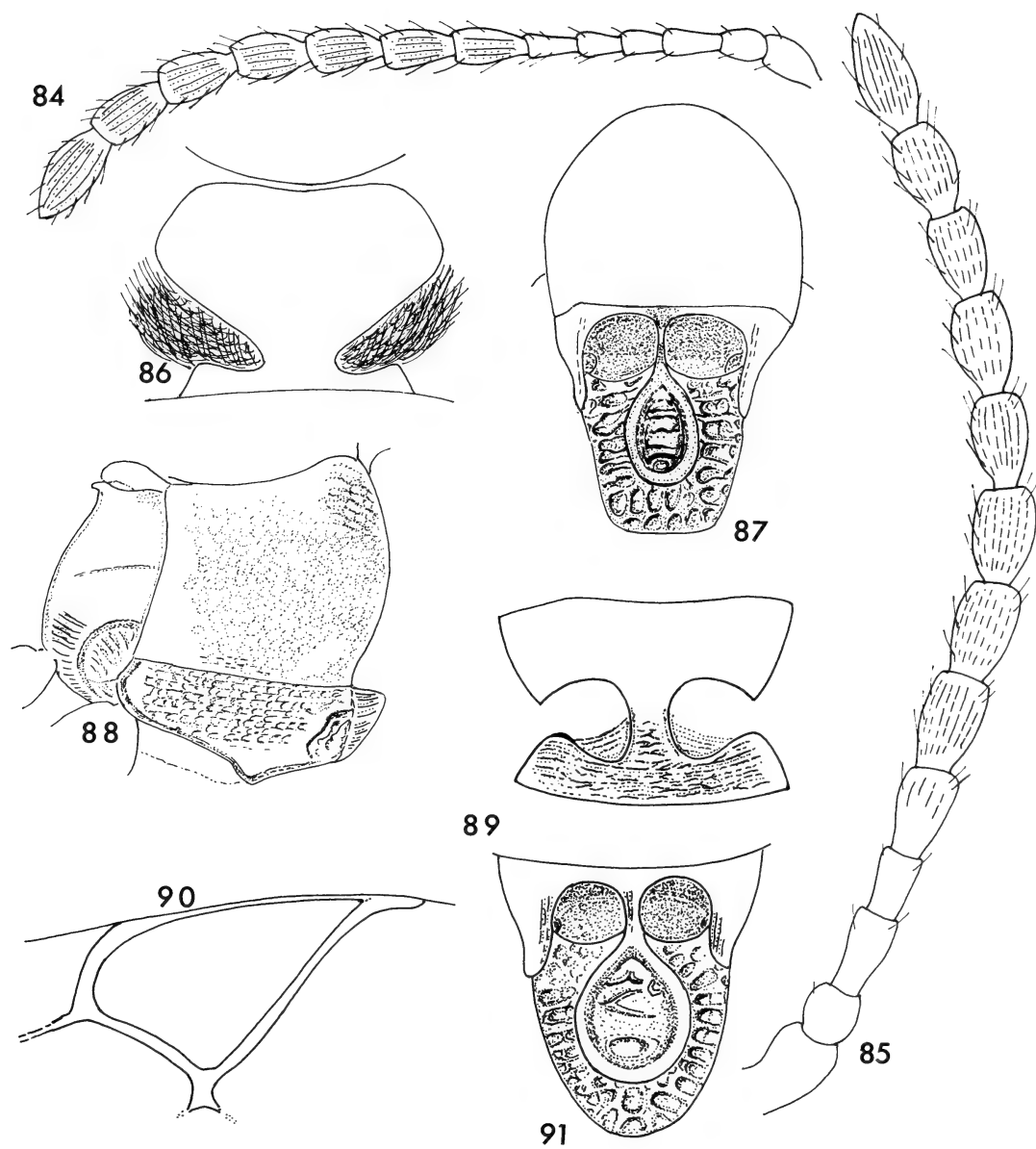
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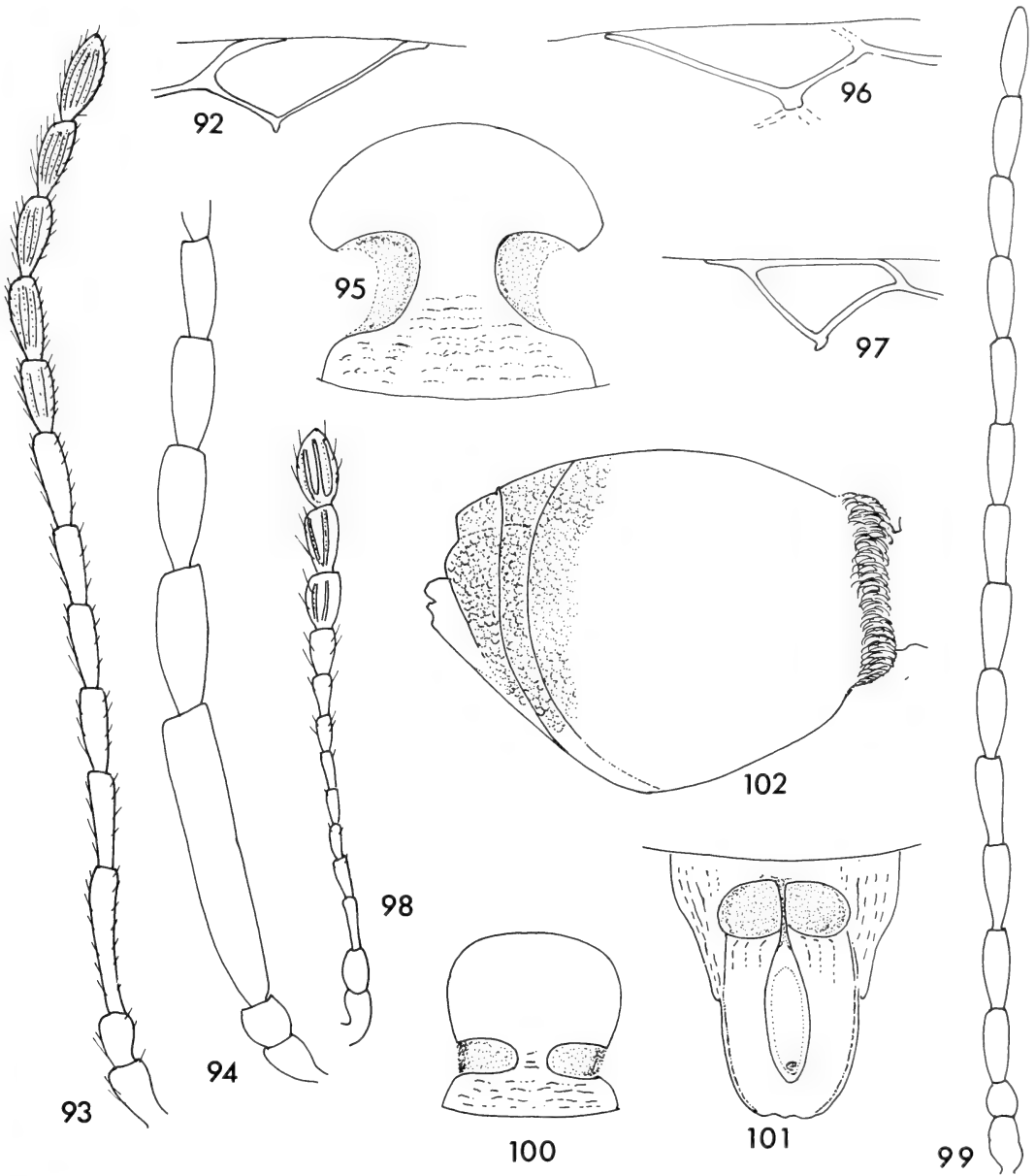
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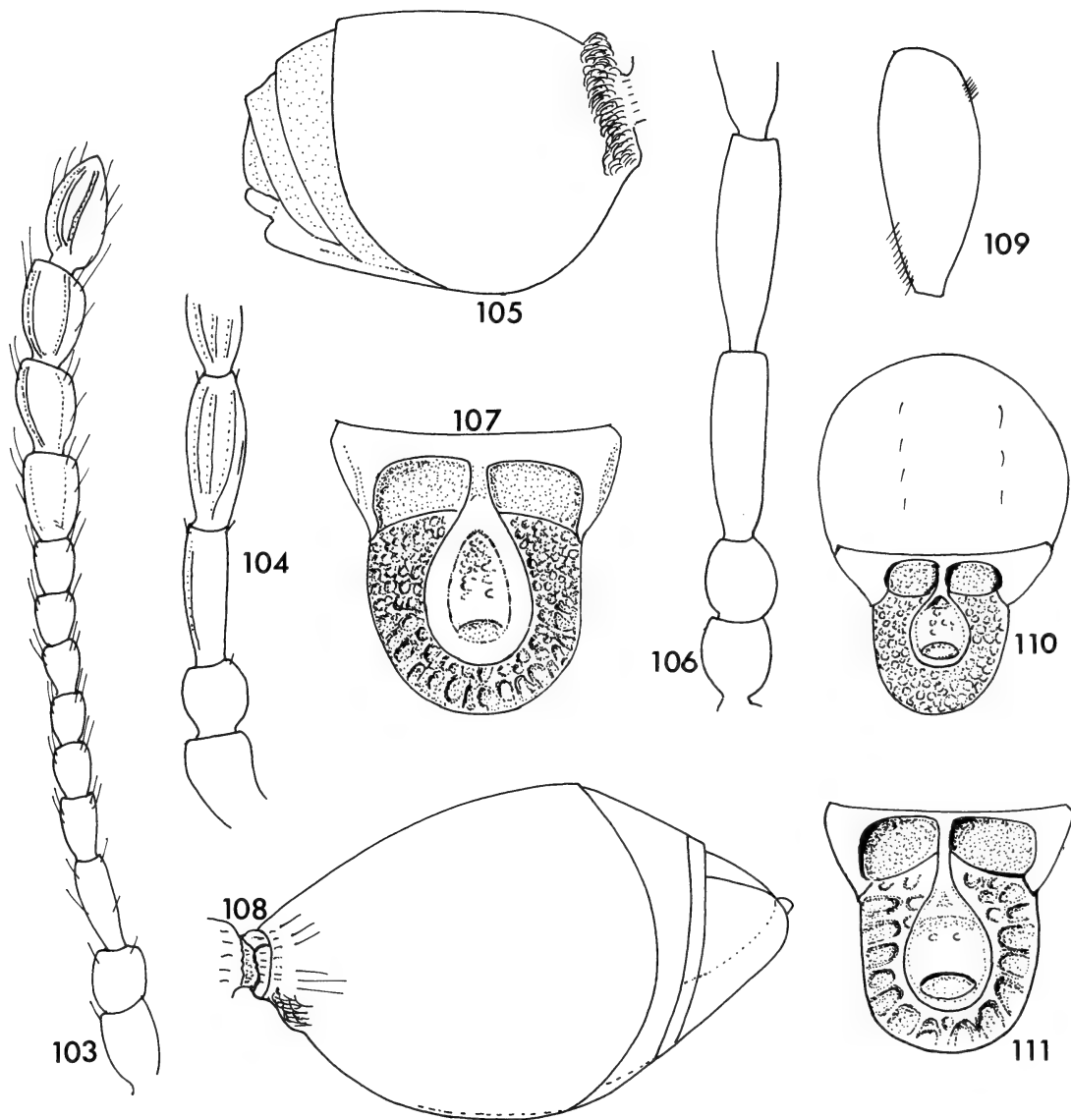
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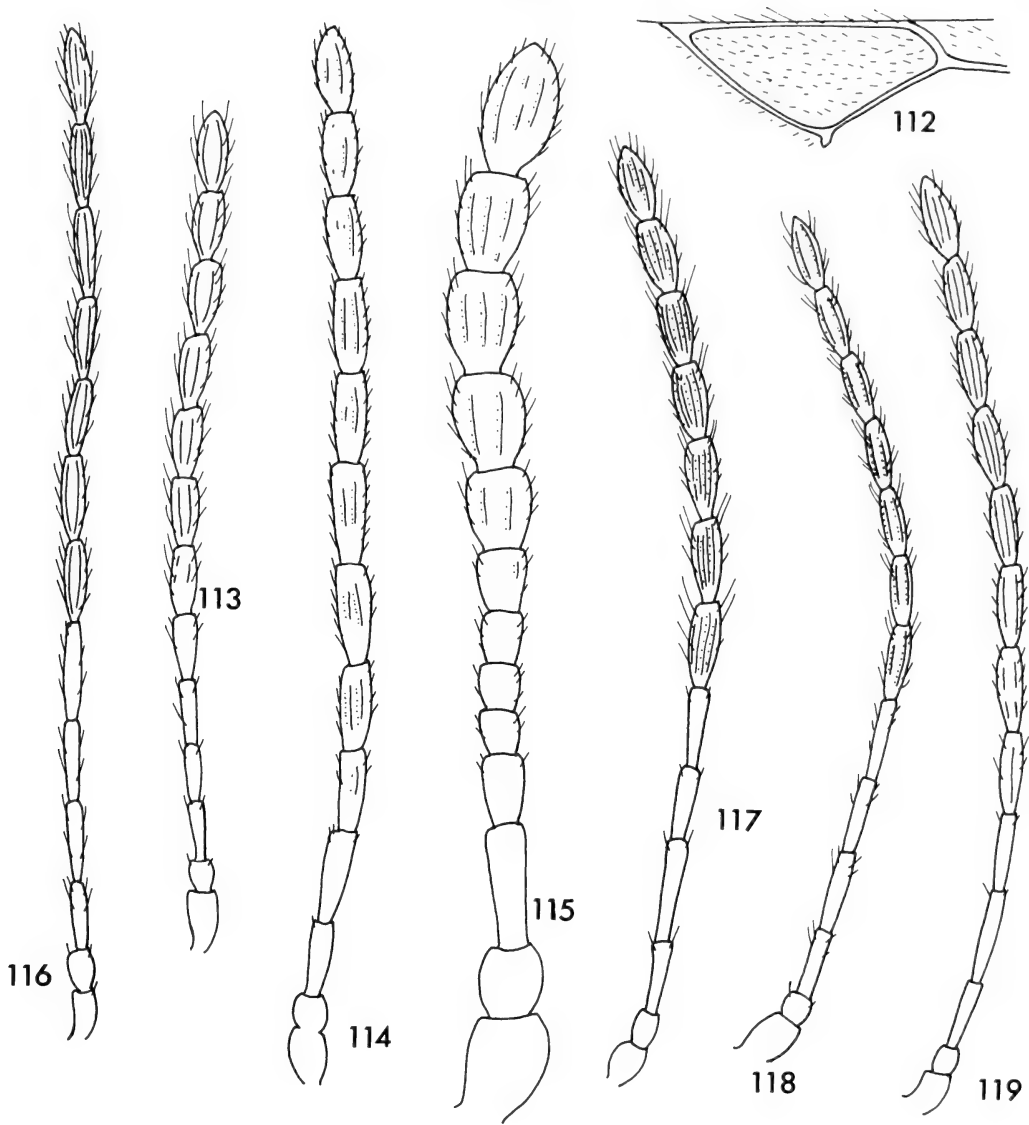
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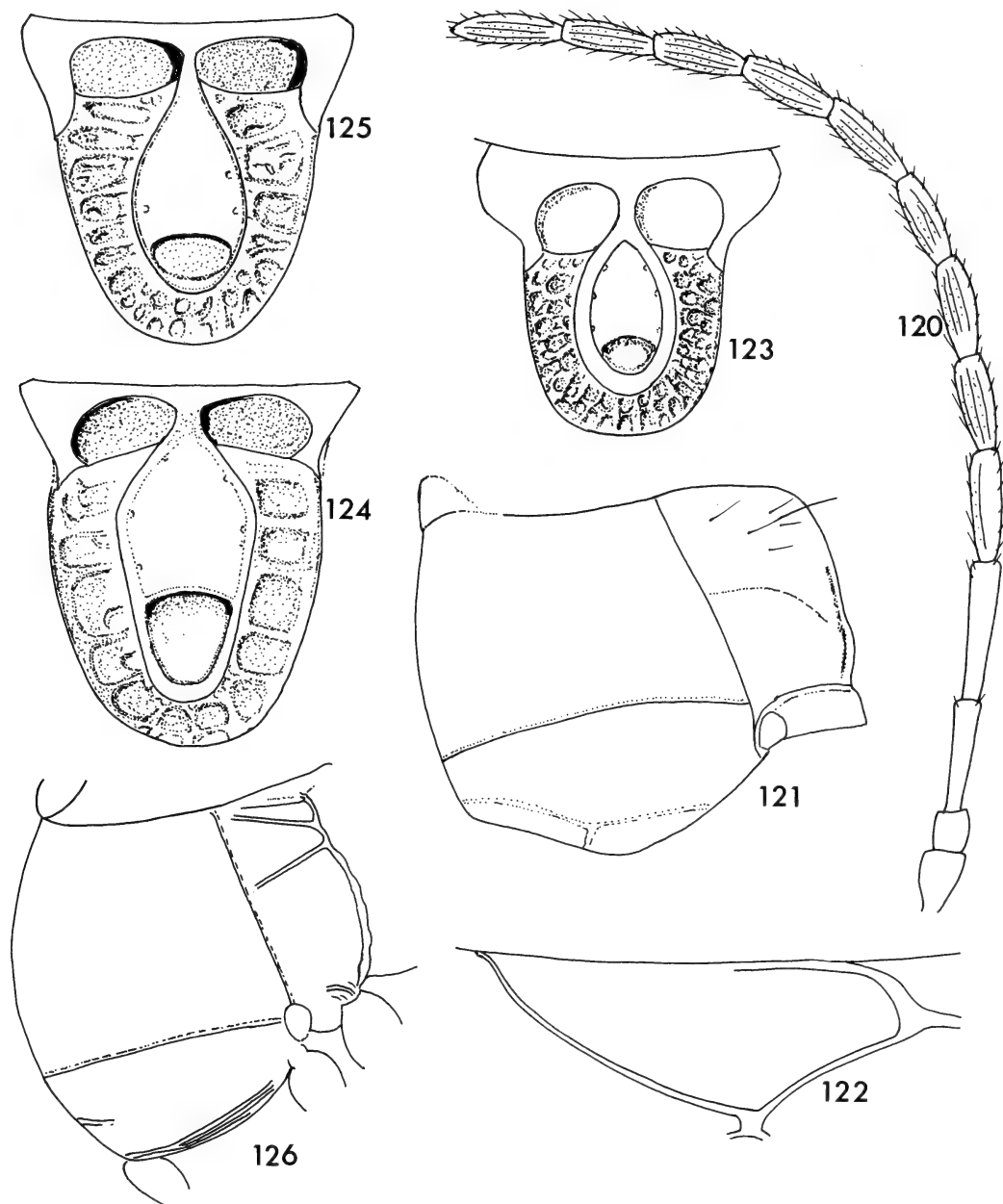
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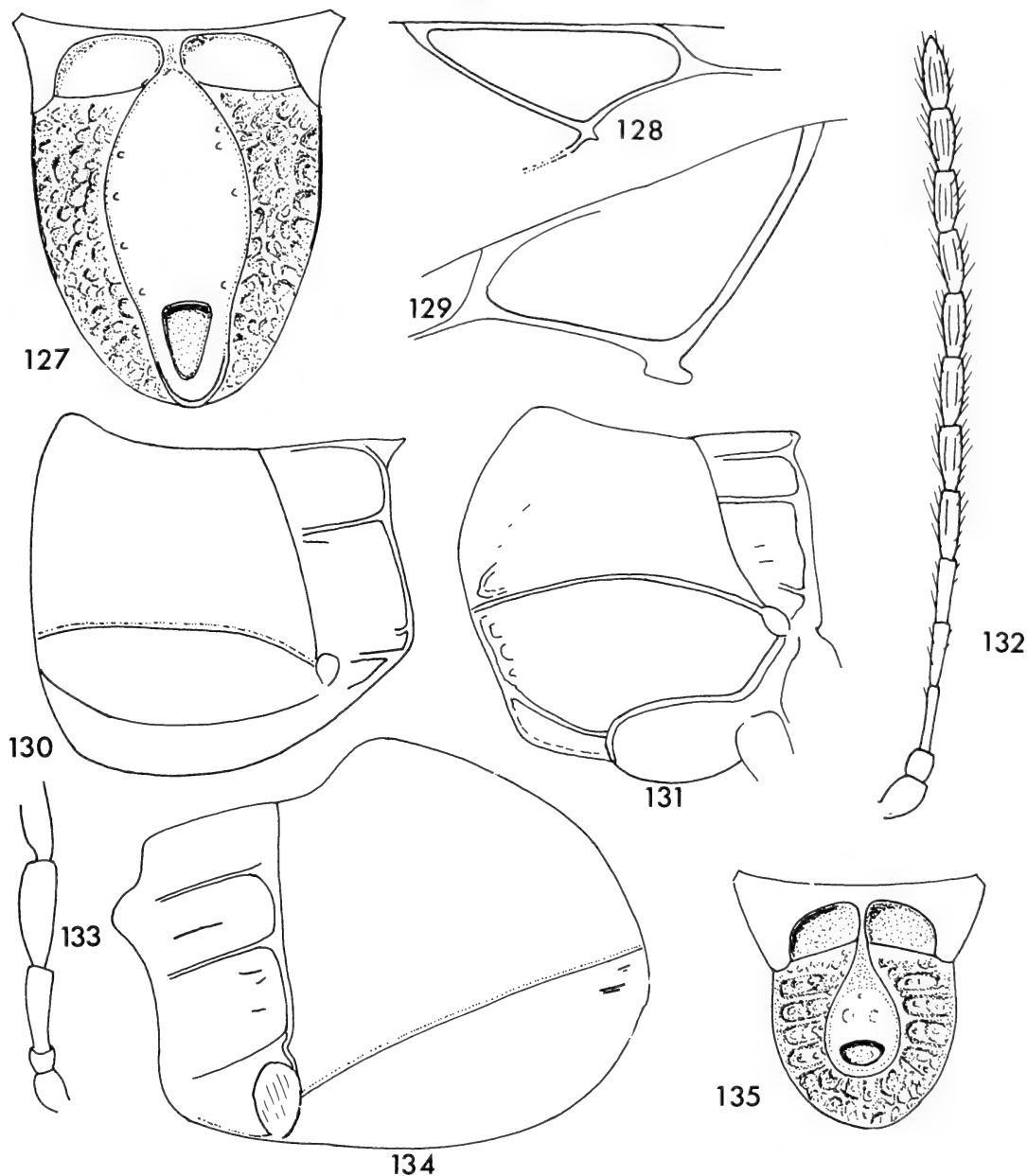
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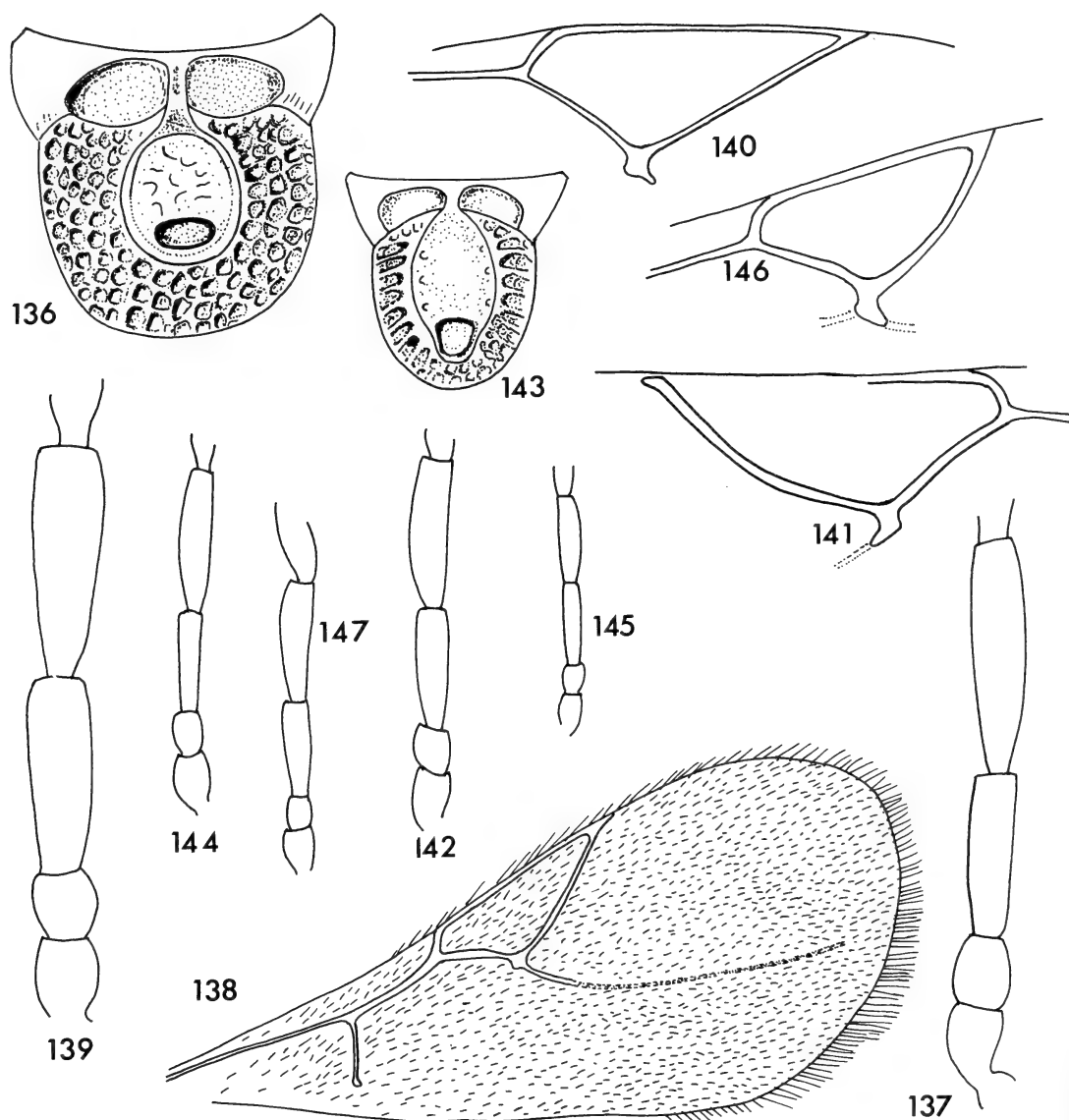
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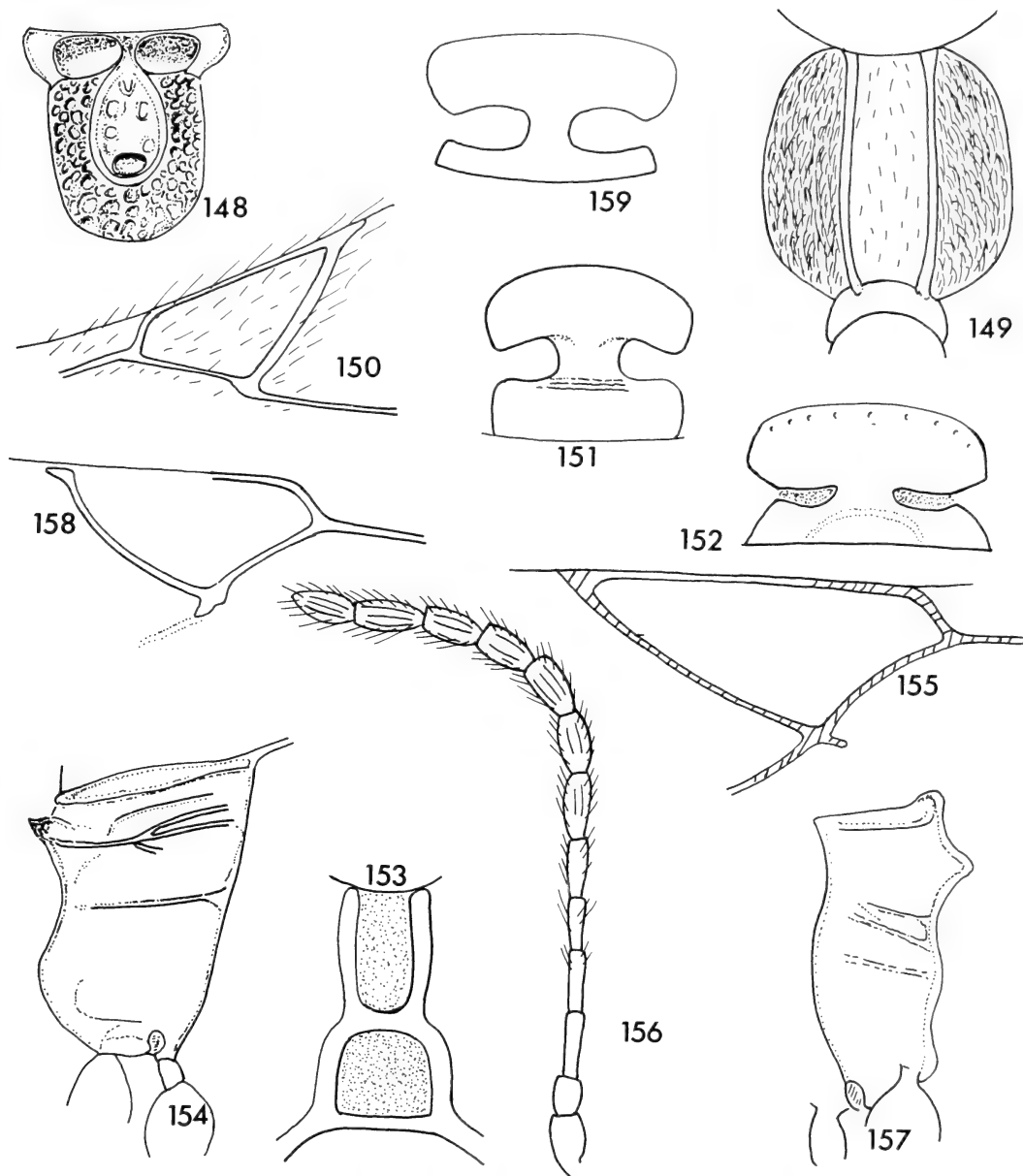
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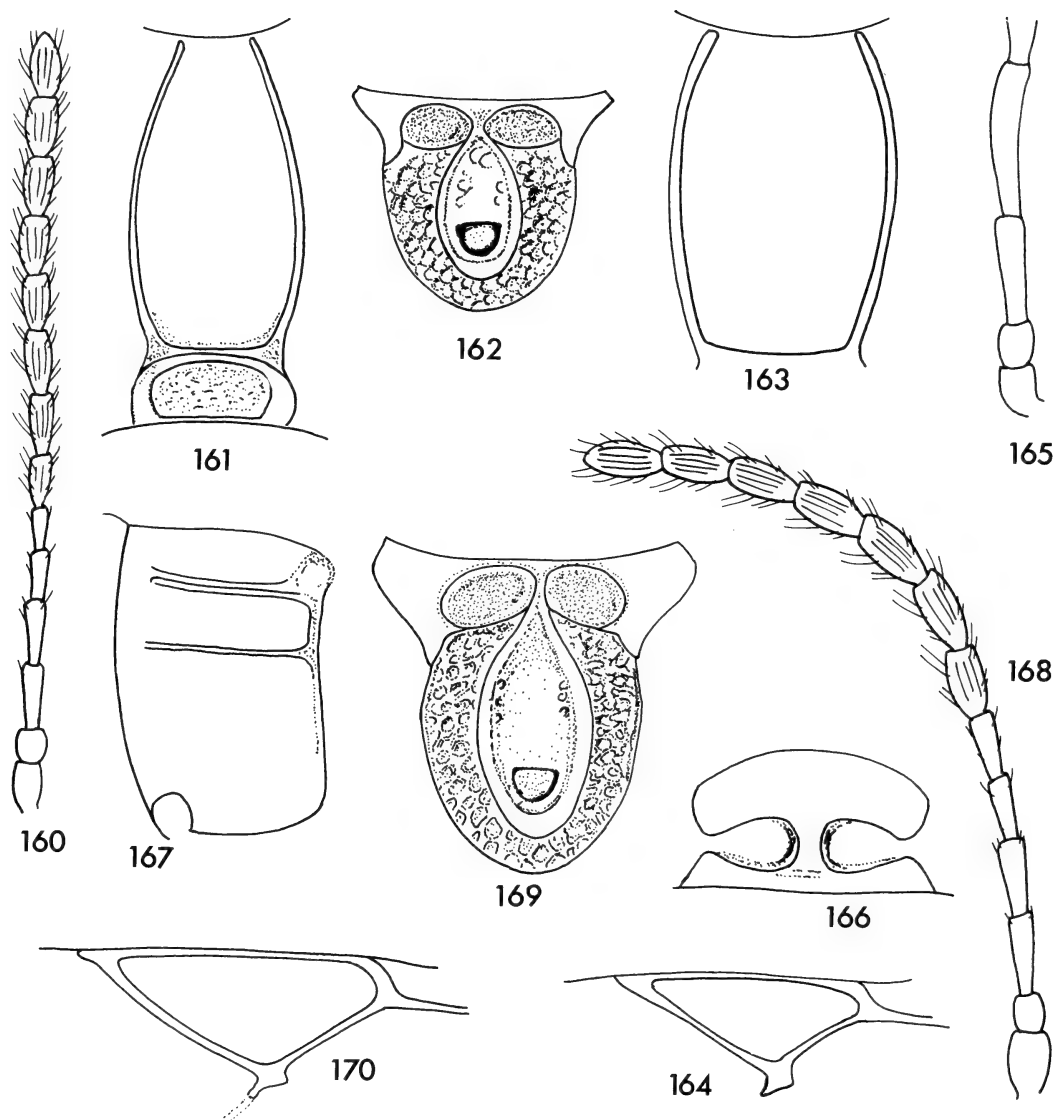
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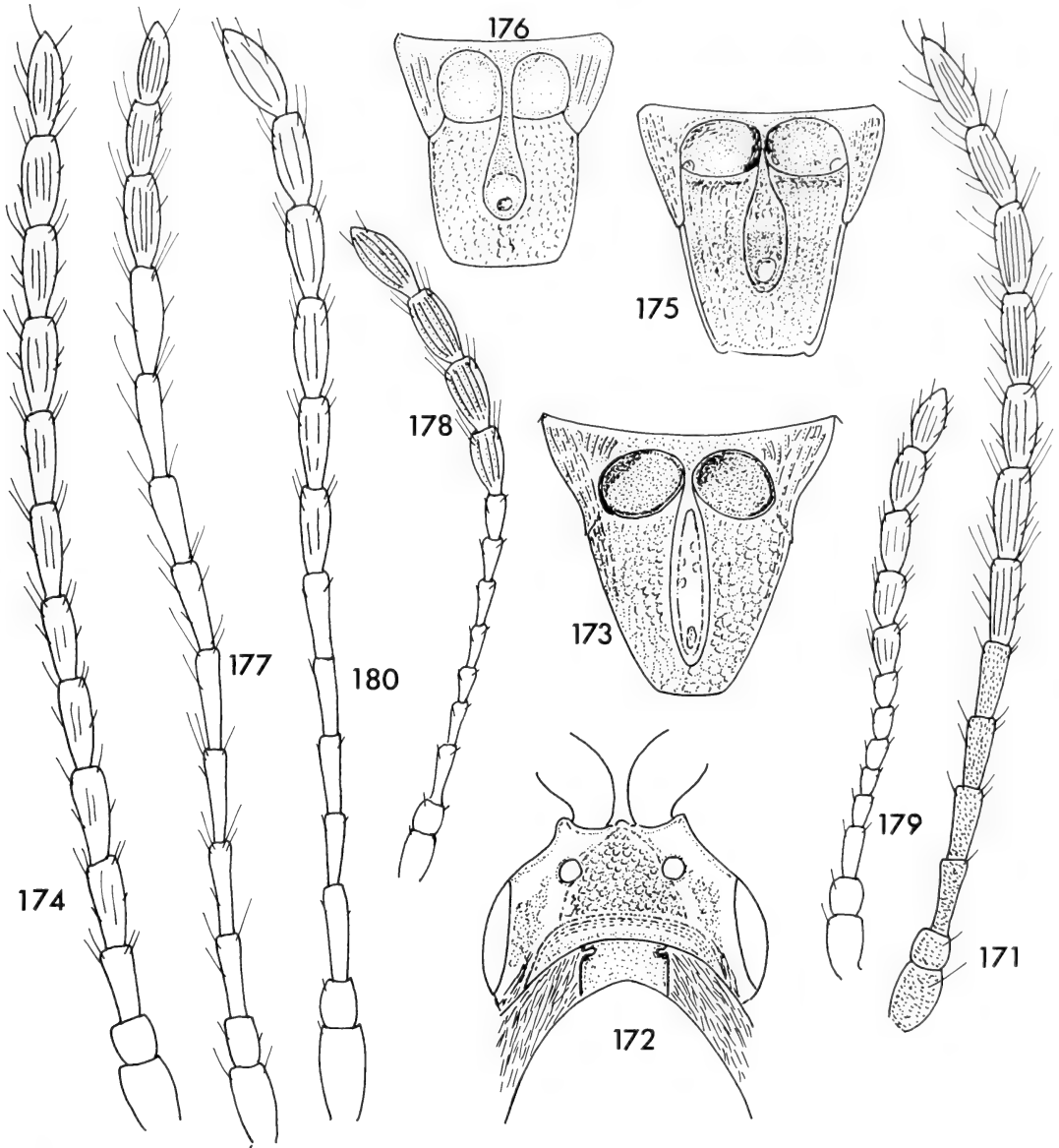
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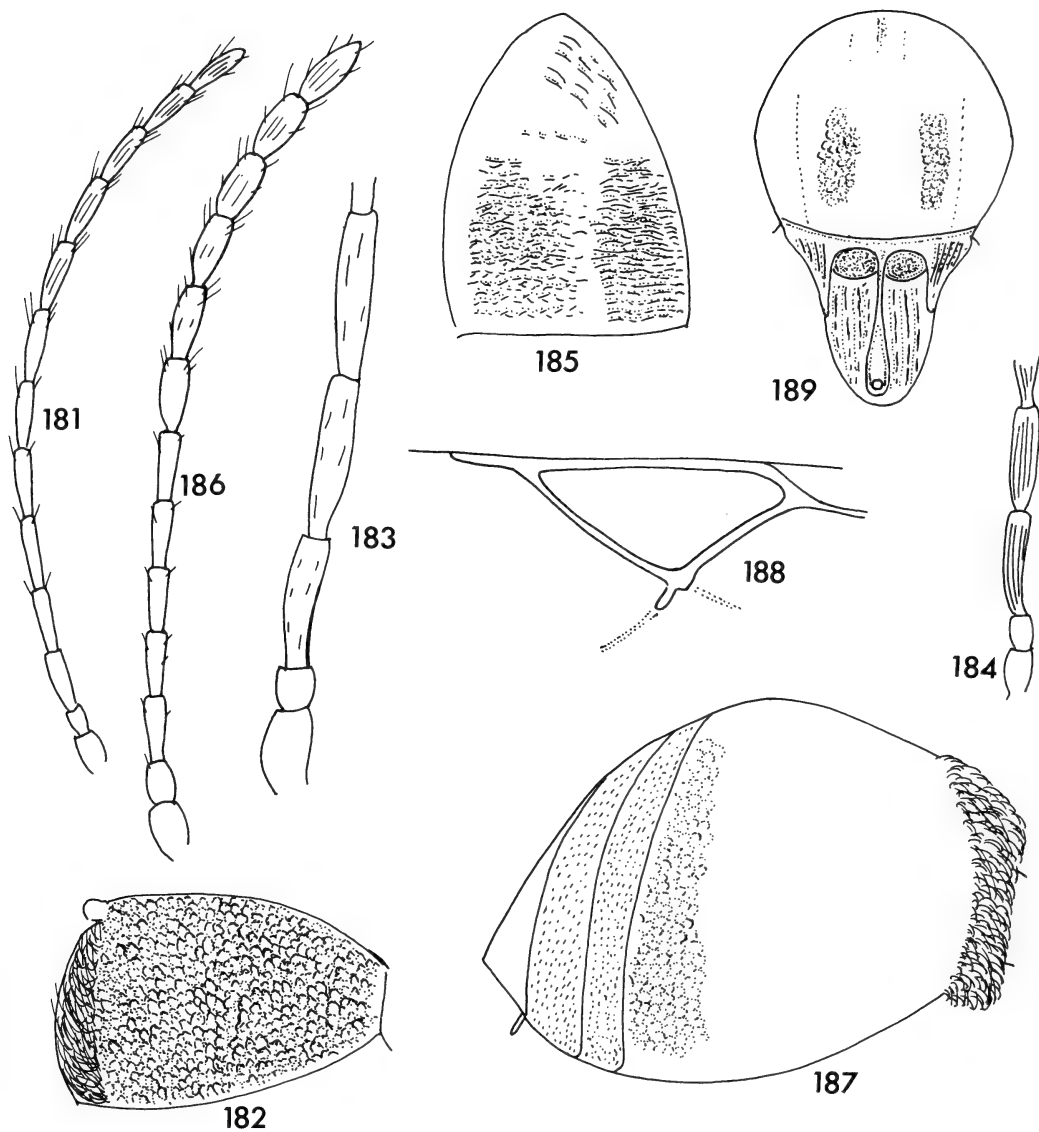
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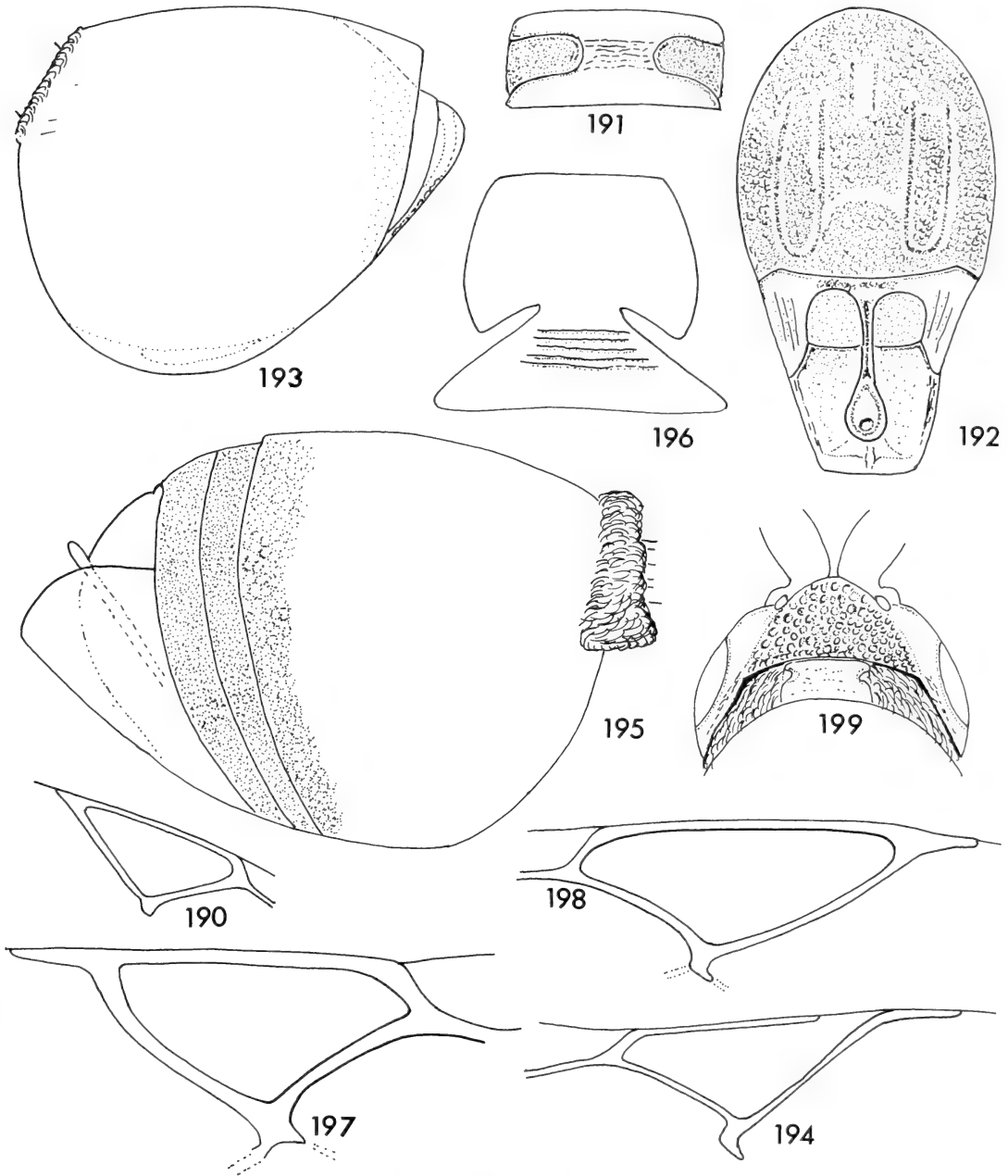
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P. R. Ackery & R. I. Vane-Wright

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