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ANNOUNCEMENT

The Memoirs of the Kagoshima University Research Center for the South Pacific had been published twice a year since 1980 (Vol. 1, No. 1) up to 1987 (Vol. 8, No. 2) by the Kagoshima University Research Center for the South Pacific. The center was reorganized, and the Memoirs has been succeeded by the South Pacific Study since 1988. The first issue of the South Pacific Study was Vol. 9, Nos. 1/2.

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Genitalia of Thirty Four Genera of Bombyliidae (Diptera)

Ningwu LIU¹⁾, Akira NAGATOMI¹⁾ and Neal L. EVENHUIS²⁾

Abstract

This paper illustrates and describes the genitalia of 34 genera and 39 species of Bombyliidae listed in Table 1 and supplements THEODOR (1983), treating mostly those genera which he did not examine and the structure of many parts which he did not mention.

Key words: Morphology, Taxonomy, Genitalia, Bombyliidae, 34 genera.

Introduction

The present article illustrates and describes the genitalia of 34 genera and 39 species of Bombyliidae listed in Table 1.

THEODOR (1983) wrote, "The genitalia were little used by the early authors in the systematics of the family..... The female genitalia were completely disregarded by the earlier authors." He dealt with the genitalia of over 100 genera and some 400 species (of which 200 were from Israel).

Our study supplements THEODOR (1983), treating many of the genera he did not examine and the genitalic structures, many of which he did not mention. We have previously dealt with the genitalia of the following genera: *Systropus* – NAGATOMI, LIU, TAMAKI, EVENHUIS (1991) and LIU and NAGATOMI (1992); *Bombylius* – LIU and NAGATOMI (1994); *Anthrax* and *Brachyanax* – LIU, NAGATOMI and EVENHUIS (1995).

The arrangements of subfamilies and genera in the present paper follows EVENHUIS (1991) (see Table 1). Table 2 shows the subfamilies in which one or both sexes were not treated in this paper. For subfamilies whose extent or limit follows YEATES (1994), see Table 3 (on Page 111). In each species, the source of original description, type locality, and distributional record follow PAINTER and PAINTER (1965), BOWDEN (1975, 1980), PAINTER et al. (1978), EVENHUIS (1989, 1991) and ZAITZEV (1989).

The present study is not exhaustive one. Not all subfamilies were examined. Due to limits of availability, only one species was studied in most genera. No attention was paid to parts other than the genitalia. Because of these limitations, it is not possible to

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Table 1. List of 34 genera and 39 species of Bombyliidae studied in this paper

Subfamily	Genus and species	Locality	Specimen examined
Bombyliinae (S)	<i>Bombylius (Parabombylius) maculosus</i> (PAINTER)	Arizona, USA	1 ♂, 1 ♀
	<i>Euchariomyia dives</i> BIGOT	Sri Lanka	1 ♂, 1 ♀
	<i>Conophorina bicellaris</i> BECKER	South Africa	1 ♂, 1 ♀
	<i>Cacoplox griseata</i> HULL	Chile	1 ♂, 1 ♀
	<i>Euprepina bicincta</i> (WIEDEMANN)	Brazil	1 ♂, 1 ♀
	<i>Nothoschistus transatlanticus</i> (PHILIPPI)	Chile	1 ♂, 1 ♀
	<i>Paratoxophora cuthbertsoni</i> ENGEL	Rhodesia	1 ♂, 1 ♀
Desmatomyiinae (S)	<i>Desmatomyia anomala</i> WILLISTON	Mexico	1 ♂
Phthiriinae (NS)	<i>Acreophthiria americana</i> (COQUILLET)	California, USA	2 ♂, 2 ♀
	<i>Neacreotrichus cingulatus</i> (LOEW)	Mexico	1 ♂, 1 ♀
	<i>Neacreotrichus mixteca</i> PAINTER	Mexico	2 ♂, 2 ♀
	<i>Euryphthiria grandis</i> EVENHUIS	Arizona, USA	1 ♂, 1 ♀
	<i>Poecilognathus lowei</i> (PAINTER)	California, USA	1 ♂, 2 ♀
	<i>Poecilognathus thilipsomyzoides</i> JAENNICKE	Mexico	1 ♂, 2 ♀
	<i>Relictiphthiria psi</i> (CRESSON)	California, USA	1 ♂, 1 ♀
	<i>Tmemophlebia aldrichi</i> (JOHNSON)	Oregon, USA	1 ♂, 1 ♀
	<i>Tmemophlebia coquilletti</i> (JOHNSON)	Kansas, USA	1 ♂, 1 ♀
Usiinae (NS)	<i>Parageron</i> sp.	Tunisia	2 ♂, 1 ♀
Ecliminae (S)	<i>Tillyardomyia gracilis</i> TONNOIR	New Zealand	1 ♀

(continued on next page)

Table 1. (continued)

Oligodraninae (NS)	<i>Oligodranes</i> <i>sp.</i>	Palestine	1 ♀
Cythereinae (S)	<i>Cytherea (Chalcochiton)</i> <i>holosericea</i> FABRICIUS	Corsica	1 ♂, 1 ♀
	<i>Neosardus</i> <i>sp.</i>	Australia	1 ♂, 1 ♀
	<i>Sericosoma</i> <i>fascifrons</i> MACQUART	Chile	1 ♂
	<i>Sericosoma</i> <i>irwini</i> HALL	Chile	1 ♀
Oniromyiinae (S)	<i>Oniromyia</i> <i>pachycerata</i> (BIGOT)	South Africa	1 ♂, 1 ♀
Cylleniinae (S)	<i>Sphenoidoptera</i> <i>varipennis</i> WILLISTON	Mexico	1 ♂, 1 ♀
	<i>Nomalonia</i> <i>eremophila</i> HESSE	South Africa	2 ♂, 1 ♀
	<i>Peringueyimyia</i> <i>capensis</i> BIGOT	South Africa	1 ♂, 1 ♀
Tomomyzinae (S)	<i>Pantostomus</i> <i>gibbiventris</i> BEZZI	South Africa	1 ♂
	<i>Pantostomus</i> <i>fruticicola</i> HESSE	South Africa	1 ♀
	<i>Tomomyza</i> <i>pictipennis</i> BEZZI	South Africa	1 ♂, 1 ♀
Lomatiinae (S)	<i>Ylasoia</i> <i>pegasus</i> (WIEDEMANN)	Brazil	1 ♂, 1 ♀
	<i>Canariellum</i> <i>brunnipenne</i> (MACQUART)	Canary Is.	1 ♂
Anthracinae (S)	<i>Pteraulax</i> <i>flexicornis</i> BEZZI	South Africa	1 ♂, 1 ♀
	<i>Atrichochira</i> <i>pediformis</i> (BEZZI)	Burundi	1 ♂, 1 ♀
	<i>Diatropomma</i> <i>claudia</i> (FRANÇOIS)	Burundi	1 ♂, 1 ♀
	<i>Epacmoides</i> <i>biumbonatum</i> (BEZZI)	South Africa	1 ♂, 1 ♀
	<i>Stonyx</i> <i>clotho</i> (WIEDEMANN)	Panama	1 ♂
	<i>Oestrimyza</i> <i>fenestrata</i> HULL	Uruguay	1 ♀

Note: (S), with sand chamber; (NS), without sand chamber.

discuss phylogeny among Bombyliidae or to give clearly the subfamilial, generic and specific characters in the context of this study. However, we believe that the data presented are useful as basic morphological data for future workers.

Identifications of the species studied here have been verified by one of us (EVENHUIS).

In some figure plates, no scale is presented regrettably.

Table 2. Subfamilies (*sensu* EVENHUIS, 1991)
and sexes not studied in this paper

Mythicomyiinae (♂, ♀)
Gerontinae (♂, ♀)
Systropodinae (♂, ♀)
Toxophorinae (♂, ♀)
Desmatomyiinae (♀)
Ecliminae (♂)
Heterotropinae (♂, ♀)
Oligodraninae (♂)
Xenoprosopinae (♂, ♀)
Antoniinae (♂, ♀)

Term for each part and abbreviations used in figures.

The terms used here are listed below. Many of them follow YEATES (1994: table 2).

AA, Aedeagal apodeme: ejaculatory apodeme (SINCLAIR et al., 1994; YEATES, 1994); basal ejaculatory apodeme (HULL, 1973); basal keel (HALL, 1976); basal apodeme (HALL and EVENHUIS, 1980-1987); basal strut (HESSE, 1938); anterior bar of aedeagus (NAGATOMI, 1984).

AVP, Anterolateral ventral process: belongs to ventral plate of phallus; anterior arm of aedeagal sheath (YEATES, 1994).

C, Cercus.

DB, Dorsal bridge: point where aedeagal sheath joins gonocoxite (YEATES, 1994); rams (HESSE, 1983; HULL, 1973); lateral rami (HALL and EVENHUIS, 1980-1987); lateral strut (THEODOR, 1983).

DSG, Dorsal sclerite in fused gonocoxites: situated just before dorsal part of gonostyli.

DV, Dorsal vane: situated over phallus; epiphallus (YEATES, 1994).

EMB, Endophallic membranous body: basiphallus (YEATES, 1994); sperm sac

(SINCLAIR *et al.*, 1994).

ES, Endophallic sclerite: lateral aedeagal apodeme (YEATES, 1994); paraphysis (BOWDEN, 1964); lateral ejaculatory apodeme (HULL, 1973); lateral ejaculatory process (SINCLAIR *et al.*, 1994); lateral wing (HALL, 1976); basal plate (THEODOR, 1983); lateral strut (HESSE, 1938); aedeagal dorso-anterior plate (or sclerite) (NAGATOMI, 1984).

GA, Gonocoxal apodeme: basistylar dorso-inner anterior process (NAGATOMI, 1984).

GC, Gonocoxite: basistylus; basal part (HESSE, 1938); basimere (BOWDEN, 1964).

GF, Genital fork: furca.

GS, Gonostylus: dististylus; beaked apical point (HESSE, 1938); telomere (BOWDEN, 1964).

Phallus: Dorsal plate + ventral plate; sometimes dorsal vane (=DV) or ventral vane (=VV) is present over or below phallus.

S7-S10: sterna 7-10.

S9, Male sternum 9: hypandrium.

T7-T10: terga 7-10.

T9, Male tergum 9: epandrium.

VV, Ventral vane: situated below phallus.

Male genitalia

The characters given in this section are based on the subfamilies examined here. For the subfamilies (*sensu* EVENHUIS, 1991) not examined here, see Table 2.

For previous studies on male genitalia of Bombyliidae, see HULL (1973), THEODOR (1983), NAGATOMI *et al.* (1991), LIU and NAGATOMI (1992, 1994), YEATES (1994), LIU *et al.* (1995), etc.

Family diagnosis

(i) Fused gonocoxites with a ventral median longitudinal furrow which is often absent apparently secondarily.

(ii) Gonocoxal apodeme not arising from dorsomedian (or dorsal inner) part of gonocoxite but situated at anterolateral part (strictly speaking, gonocoxal apodeme passing through anterior dorsolateral point). Gonocoxal apodeme stout and short or rather thin and sometimes rather long, often absent or not demarcated.

(iii) Dorsal bridge, which is defined here as a connecting band between phallus (or rarely dorsal vane over phallus) and dorsal part of both gonocoxites, is present and its starting point on phallus is at dorsal part usually just behind endophallic membranous body.

(iv) Endophallic membranous body (=basiphallus or sperm sac) is well developed.

(v) Sternum 9 (= hypandrium) present or absent; when present, it is usually

triangular and less than 1/2 as long as gonocoxites. In *Heterotropus* (after YEATES, 1994), sternum 9 is markedly large.

(vi) Posterior part of phallus forms one tube or sometimes two tubes arranged vertically. Dorsal or ventral vane is sometimes present over or under the posterior part of phallus, and their shape varies with taxon. Phallus is composed of (a) dorsal and (b) ventral plates. Two tubes may correspond to (a) and (b), but it is uncertain whether or not dorsal or ventral vane above is identical with (a) or (b). Phallus has paired antero-ventral processes which are often very large or sometimes absent.

(vii) Paired endophallic sclerites (=lateral aedeagal apodeme; lateral ejaculatory process) are large.

(viii) Aedeagal apodeme (=ejaculatory apodeme) flattened laterally.

The following is quoted from YEATES (1994) who has examined the male genitalia of Bombyliidae more widely.

Epandrium consisting of one sclerite with posterior margin concave in some; epandrium loosely connected to anterodorsal region of gonocoxites except in Toxophorini which have a strongly sclerotized posterodorsal connection; surstyli lacking; hypandrium present as a separate sclerite or absent; gonocoxites fused ventrally except in Heterotropinae; if present, gonocoxal apodemes relatively short and often directed ventrally; aedeagal sheath may be produced into one or more epiphallic lobes around the phallus; distiphallus a simple tube in majority; divided into three apical prongs in the Heterotropinae, some Mythicomyiinae, and *Cyllenia*; lateral aedeagal apodemes present except in *Paraconsors*; ejaculatory apodeme laterally compressed in all except *Antonia* where it has an additional two dorsal vanes; basiphallus (sperm pump) well developed; gonostyli always present, moving in a dorsoventral plane; tergite 10 absent.

Notes on characters illustrated

Cercus: Wider apically (when the base is designated as anterior outer point); it is usually partly folded and its true shape is not always clear.

Sternum 10: Membranous; its true shape may not be clear and very often no description is given.

Tergum 9: Trapezoid, rectangular, quadrate, elliptical (except base), etc.; often with anterolateral process (which is markedly long in *Paratoxophra cuthbertsoni*); with posterior margin straight or so, sometimes rounded, or having a median concavity (which is conspicuously wide and deep in *Tomomyza pictipennis*) and rarely having a median short process (in *Relictiphthiria psi*); with posterior part folded ventrally in *Euryphthiria*, *Poecilognathus*, and *Tmenophlebia*.

Fused gonocoxities: Various in shape; usually widest around middle or before middle; in each gonocoxite, dorsal surface narrower than the ventral and often confined to the mid-lateral; besides the dorsal bridge, there is sometimes a dorsal connecting band (between lateral borders of gonocoxites) before gonostyli, and this band runs beneath phallus and is often produced posteriorly at middle.

Gonostylus: Generally narrowed apically; the shape varies with taxon but varies

markedly with different angles; no detailed description is given.

Endophallic sclerites: The shape and size varies with taxon but varies with different angles; usually no description is given.

Aedeagal apodeme: Various in shape.

Terga 7-8 and sterna 7-8: The shape is useful from the taxonomic point of view, but no attention is paid to these segments, regrettably.

Female genitalia

For subfamilies (*sensu* EVENHUIS, 1991) not examined here, see Table 2. For previous studies of female genitalia of Bombyliidae, see MÜHLENBERG (1970, 1971a, b), THEODOR (1983), YEATES (1994), LIU and NAGATOMI (1994), LIU *et al.* (1995), etc.

In the Bombyliidae, a 'sand chamber' formed by tergum 8 and sternum 8 in the female abdomen, may be present or absent. For definition of sand chamber, see Mühlenberg (1971b) and YEATES (1994) introduced later. There are two types of female genitalia in the Bombyliidae studied here, which are given below.

(i) Cercus usually long; tergum 10 (with a row of stout spines) paired and long; tergum 9 with anterolateral pointed projection folded ventrally; tergum 8 with a mid-anterior projection which is usually pointed or sometimes rectangular. The subfamilies studied here with sand chamber belong to type (i). They are as follows: Bombyliinae; Ecliminae; Cythereinae; Oniromyiinae; Cylleniinae; Tomomyzinae; Lomatiinae; Anthracinae.

(ii) Cercus comparatively short; tergum 10 (= acanthophorites) absent; tergum 9 without anterolateral projection folded ventrally or sometimes with stout or shorter projection not folded ventrally; tergum 8 without mid-anterior projection. The subfamilies studied here without sand chamber belong to type (ii). They are as follows: Phthiriinae; Usiinae; Oligodraninae.

In type (i), tergum 10 (with stout spines) and 9 are sometimes fused and unpaired; tergum 9 + 10 and sometimes tergum 9 without anterolateral projection directed anteriorly and folded ventrally; tergum 8 sometimes without mid-anterior projection. These changes apparently occurred secondarily.

Besides the characters representing by the types (i) and (ii), the common characters of Bombyliidae studied here are given below. Cercus: Usually wider or widened apically (when anterior outer point is taken as the base); long in type (i) and relatively short in type (ii). Tergum 10: Paired in type (i) and absent in type (ii); often unpaired and fused with tergum 9 in type (i).

Sternum 10: [Not always clearly differentiated in this study]; in some taxa sternum 10 is recognized as follows: membranous and triangular or with the haired part forming V-shape.

Tergum 9: Trapezoid or semicircular, rarely rectangular or pentagonal; with antero-

lateral projection directed anteriorly and folded ventrally in type (i) or without it in type (ii); in some taxa of type (i), tergum 9 is fused with unpaired tergum 10 and its shape in dorsal view is shown in Figs. 345, 576, 589 & 629.

Sternum 9 (?): Sometimes one (or paired) sclerite is present behind or over sternum 8. This may belong to sternum 9. See discussion chapter.

Tergum 8: Trapezoid or so, wider than long, and with lateral part folded ventrally (in *Oligodranes* sp. belonging to type (ii), the lateral part is not folded ventrally exceptionally); with mid-anterior projection which is usually pointed (or often rectangular) but is sometimes absent in type (i); without mid-anterior projection in type (ii).

Sternum 8: Various in shape; in many taxa with posterior part bilobed and having apical margin usually rounded; sometimes lateral or anterior part is folded ventrally and sternum 8 varies in shape with dorsal or ventral view. Arrangement of ventral pile varies with taxa.

Genital fork: U-shaped or consisting of paired lateral longitudinal sclerites; base of lateral bar very often with projection the shape of which varies with taxon; sometimes bases of lateral bars connected through a transverse thin sclerite.

Spermatheca: Three in number; capsule various in shape; duct usually with a granulate section or a section capped at both (or one) ends (= sperm pump in YEATES, 1994); basal common duct short (in *Paratoxophora* of Bombyliinae, it is exceptionally long).

Subfamily Bombyliinae

Male

Based on 7 genera and 7 species. Three types of genitalia are seen.

Bombylius, *Euchariomyia*, *Euprepina*, *Cacoplox* and *Nothoschistus*: Tergum 9 trapezoid, with or without anterolateral process; fused gonocoxites narrower posteriorly and widest before or around middle, with ventral median furrow, and with triangular sternum 9; gonocoxal apodeme usually thin and rather long; phallus forming one tube and with dorsal basal part (just behind endophallic membranous body) raised.

Conophorina : Differing from the above five genera in the following points: Tergum 9 (except base) elliptical, fused gonocoxites widest around middle but rather rectangular and without sternum 9; phallus divided into two tubes vertically and with dorsal basal part not raised.

Paratoxophora: Markedly different from the above two groups in the following points: Tergum 9 somewhat narrower posteriorly, with apical margin rounded, and with anterolateral process conspicuously long; fused gonocoxites distinctly longer than wide, gradually narrower posteriorly, with anterior and posterior margins each having a deep median concavity, and without sternum 9; gonocoxal apodeme stout and directed outwardly; phallus conspicuously long, thin and needle-like; endophallic mem-

branous body large and strongly curved; base of phallus, endophallic sclerites and aedeagal apodeme situated dorsally and directed posteriorly.

Female

Based on 7 genera and 7 species. Except for *Paratoxophora cuthbertsoni*, the female genitalia are described below.

Cercus long and longer than tergum 9. Tergum 10 paired, long and with posterior part having several stout spines. [Sternum 10 not clearly seen]. Tergum 9 semicircular, trapezoid or rather rectangular according to taxon and with anterolateral long process folded ventrally and pointed at apex. Tergum 8 trapezoid or so in dorsal view, with lateral part folded ventrally, and with mid-anterior large projection whose base is wide. In sternum 8 posterior part divided into two lobes whose posterior margins are usually rounded. Genital fork U-shaped; anterior bar usually shorter or not longer than the lateral bar which usually has a basal projection directed inward. Spermathecal capsule variable in shape according to taxon; each duct usually with a granulate section or a section capped at both ends; basal common duct short.

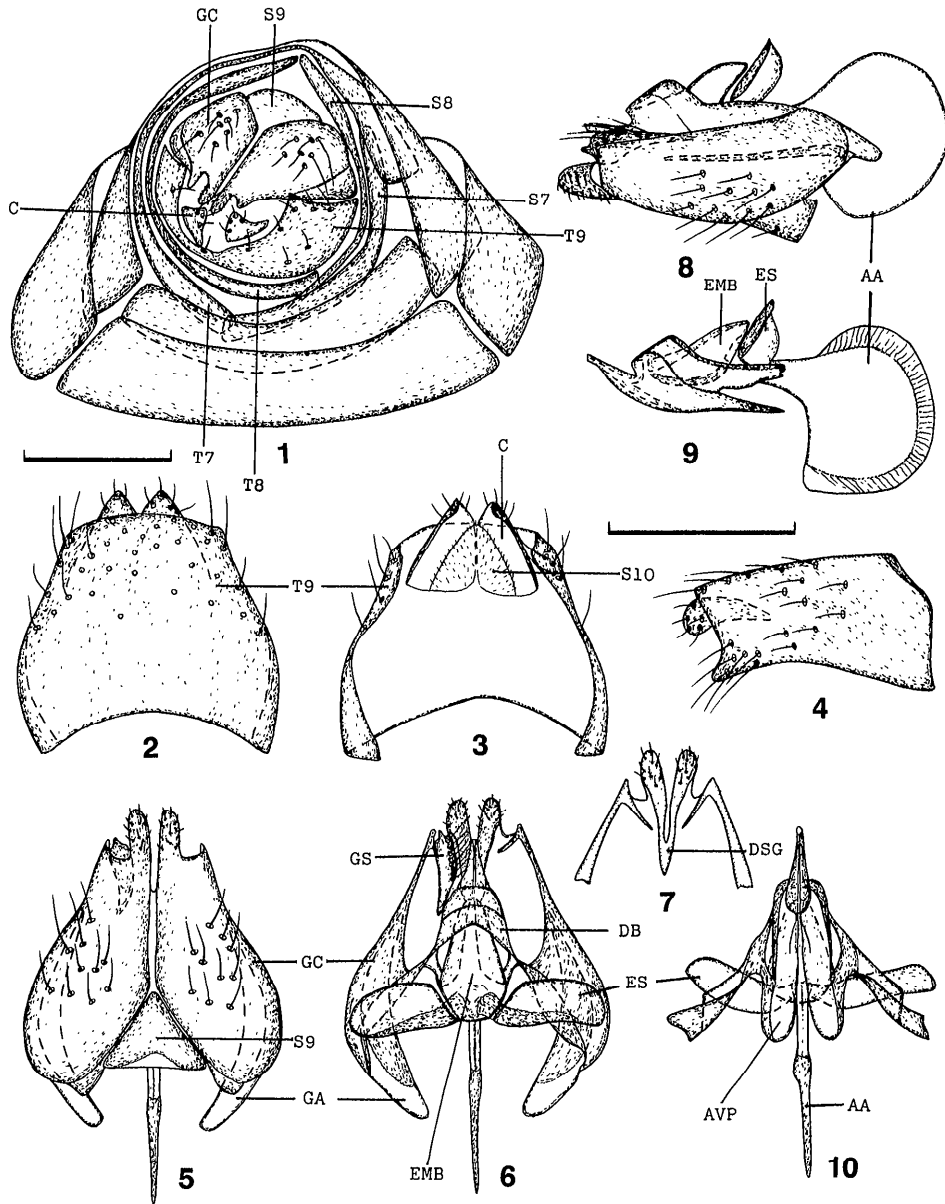
The female genitalia of *Paratoxophora cuthbertsoni* differ considerably from those of other Bombyliinae studied here in the following points: Sternum 9 (?) much longer than tergum 9 and sternum 8, longer than wide, with large ventrally folded part. Tergum 9 triangular, probably with two ventrally folded processes. Tergum 8 with a large anterior extension instead of mid-anterior projection. Sternum 8 with anterior sclerotized transverse bar having a row of long hairs directed posteriorly. Spermathecal common basal duct long.

Genus *Bombylius* LINNAEUS

Bombylius LINNAEUS, 1758, Syst. Nat. Ed. 10, 1: 606. Type species: *Bombylius major* LINNAEUS, 1758, by subsequent designation of LATREILLE (1810: 443).

Bombylius (Parabombylius) maculosus (PAINTER)

Parabombylius maculosus PAINTER, 1926, Ent. News 37: 78. Type locality: Arizona.



Figs. 1-10. *Bombylius (Parabombylius) maculosus* (PAINTER), male genitalia. 1, Apex of abdomen, posterior view; 2-4, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 5, gonocoxites and sternum 9, ventral view; 6 & 8, gonocoxites, gonostylus, sternum 9 and aedeagus, dorsal and lateral views; 7, posterior part of gonocoxites, dorsal view; 9-10, aedeagus, ventral and lateral views. [scale 0.5 mm for Fig. 1; 0.5 mm for Figs. 2-10]

Male (Figs. 1–10)

LIU and NAGATOMI (1994) described and illustrated the genitalia of *Bombylius major* LINNAEUS and *B. shibakawae* MATSUMURA. *B. maculosus* may differ from *B. major* by having the characters given below.

Cercus triangular. Sternum 10 triangular and not paired (if anterior part is not broken off). Gonocoxal apodeme may be longer than in *major*. Shape of mid-posterior dorsal part of fused gonocoxites as in Fig. 7. Widened part of aedeagal apodeme (in lateral view) may be longer than in *major*.

Female (Figs. 11–21)

Two species of *Bombylius* (namely, *major* LINNAEUS and *shibakawae* MATSUMURA) were described and illustrated by LIU and NAGATOMI (1994).

B. maculosus may differ from *major* in the following points: capsule of spermatheca without narrowed base; base of lateral bar in genital fork more widened; tergum 10 shorter and wider. However, some of the differences above may not be significant.

Specimens examined: 1 ♂, Deseant Center, California, 4. x. 1957, E. M. & R. H. PAINTER ; 1 ♀, Gilla Valley, Arizona, 13. ix. 1935, PARKER.

Distribution. Arizona and California.

Genus *Euchariomyia* BIGOT

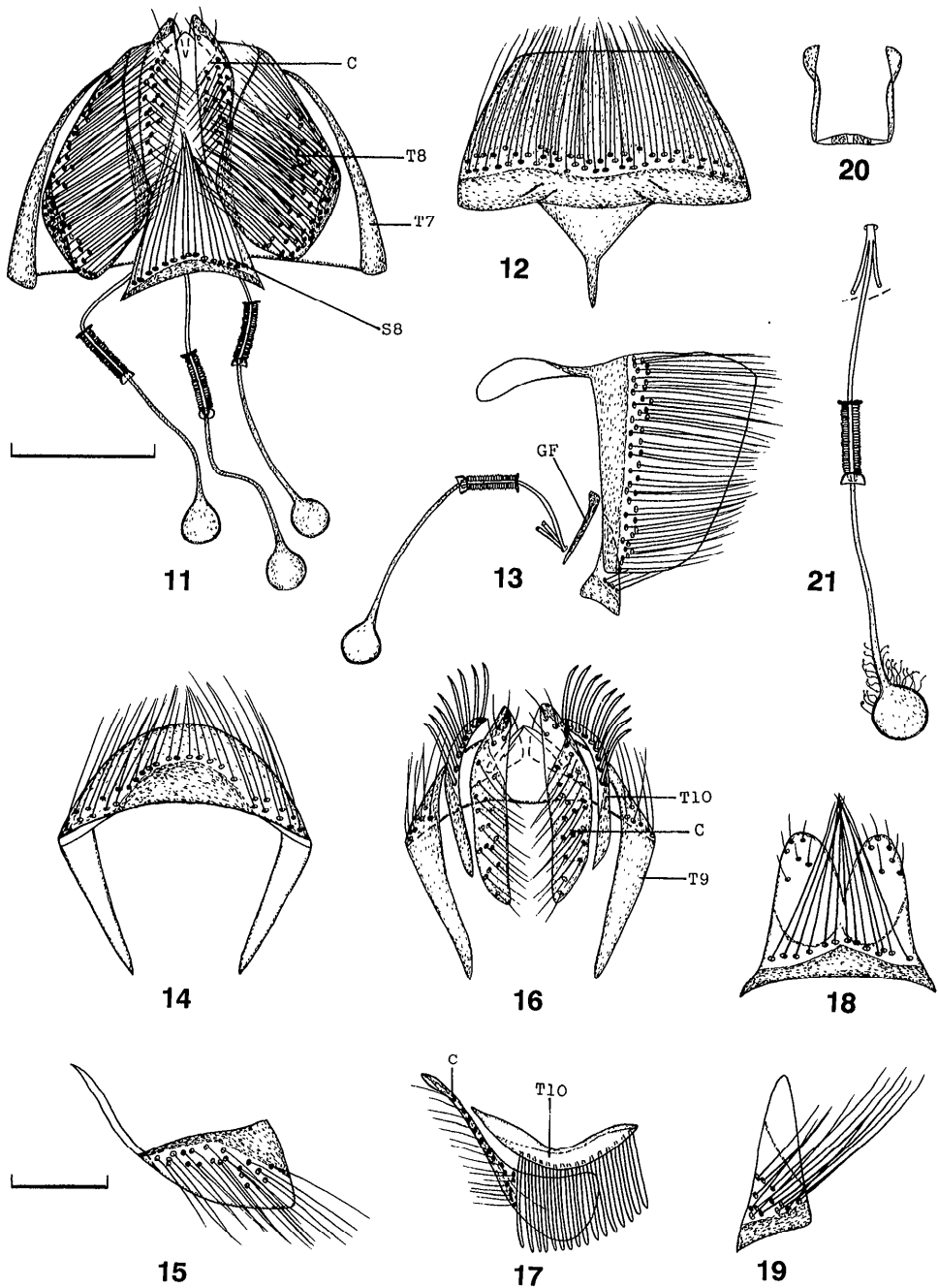
Euchariomyia BIGOT, 1888, Anns Soc. ent. Fr. (6) 8 (Bull.): cxl. Type species: *Euchariomyia dives* BIGOT, 1888, by monotypy.

Euchariomyia dives BIGOT

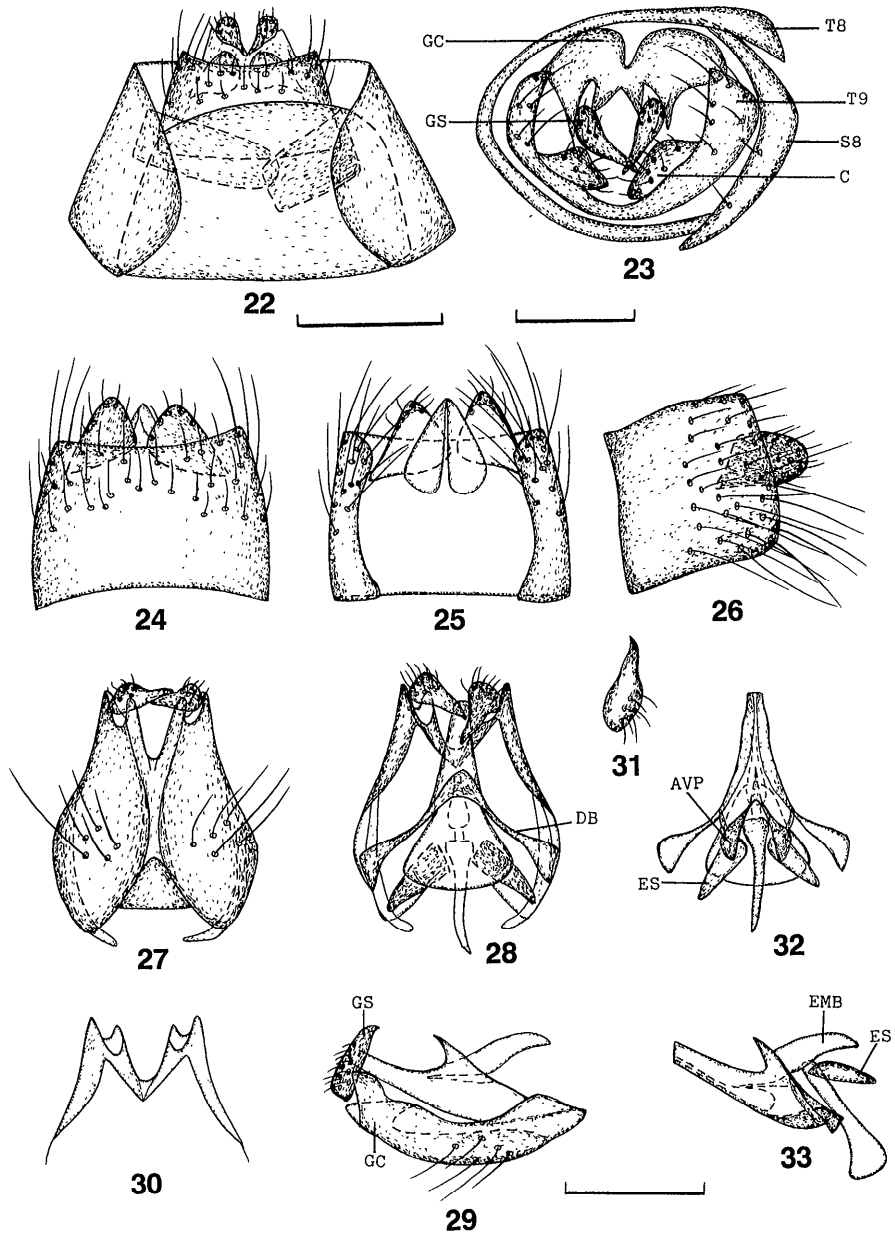
Euchariomyia dives BIGOT, 1888, Anns Soc. ent. Fr. (6) 8 (Bull.): cxl. Type locality: Ceylon.

Male (Figs. 22–33)

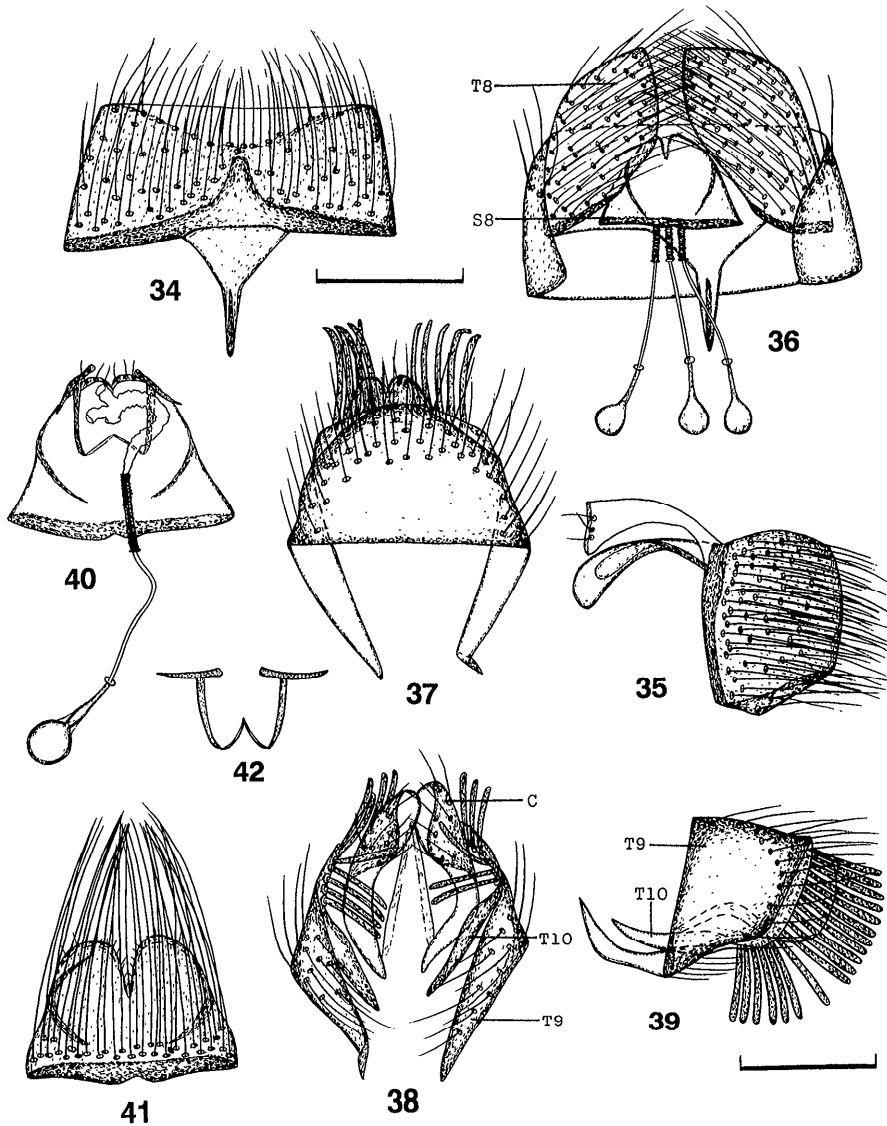
Cercus rather triangular. Sternum 10 rather triangular, longer than wide and with a mid desclerotized line. Tergum 9 rectangular in dorsal or lateral view and wider than long even in dorsal view. Fused gonocoxites + sternum 9 with Y-shaped suture, and the former longer than wide, widest around middle, and narrowed posteriorly; paired posterior inner ventral processes widely separated, convergent posteriorly and with outer margin rather short; shape of mid-posterior dorsal part of fused gonocoxites as in Fig. 30; gonocoxal apodeme beyond anterior end of gonocoxite rather short and thin. Sternum 9 triangular. Gonostylus narrowed at apical portion and pointed at apex. Phal-lus tapering apically and with apex truncate; dorsal plate with a rather triangular (in dorsal view) process at base; vertical plate largely membranous except lateral border; paired anterolateral ventral processes widely separated, stout and not long; aedeagal apodeme in lateral view parallel-sided and with apical part somewhat widened.



Figs. 11–21. *Bombylius (Parabombylius) maculosus* (PAINTER), female genitalia. 11, Terga 7–8, sternum 8, cerci and spermatheca, ventral view; 12, tergum 8, dorsal view; 13, tergum 8, genital fork and spermatheca, lateral view; 14–15, tergum 9, dorsal and lateral views; 16, terga 9–10 and cerci, ventral view; 17, tergum 10 and cercus, lateral view; 18–19, sternum 8, dorsal and lateral views; 20, genital fork; 21, spermatheca. [Scale 0.5mm for Figs. 11–13; 0.25 mm for Figs. 14–21]



Figs. 22–33. *Euchariomyia dives* BIGOR, male genitalia. 22–23, Apex of abdomen, ventral and posterior views; 24–26, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 27, gonocoxites, gonostyli and sternum 9, ventral view; 28–29, gonocoxites, gonostyli, and aedeagus, dorsal and lateral views; 30, posterior part of gonocoxites, dorsal view; 31, gonostylus, dorsal view; 32–33, aedeagus, ventral and lateral views. [Scale 0.5 mm for Fig. 22; 0.3 mm for Fig. 23; 0.3mm for Figs. 24–33]



Figs. 34–42. *Eucharatomyia dives* BIGOT, female genitalia. 34–35, Tergum 8, dorsal and lateral views; 36, terga 7–8, sternum 8 and spermatheca, ventral view; 37–39, terga 9–10, cerci and sternum 10, dorsal, ventral and lateral views; 40, sternum 8, genital fork and spermatheca, dorsal view; 41, sternum 8, ventral view; 42, genital fork, dorsal view. [Scale 0.5 mm for Figs. 34–36; 0.3 mm for Figs. 37–42]

Female (Figs. 34–42)

Cercus much longer than wide. Tergum 10 long, longer than cercus, with posterior part having 18 (or so) stout setae. Tergum 9 in dorsal view trapezoid or semicircular, and with anterolateral process pointed at apex. Tergum 8 in dorsal view trapezoid or rectangular, with mid-anterior process [there is a mid-anterior membranous projection whose anterior margin is sclerotized, but this may represent a broken piece]. Sternum 8

gradually narrower posteriorly, with anterior margin more sclerotized and straight, with posterior margin rounded and having median deep concavity. Genital fork with lateral sclerite T-shaped. Spermathecal branched duct consisting of (i) basal wider wrinkled duct, (ii) granulate darkened section, (iii) thin duct with apical cap and (iv) circular capsule with narrow tube.

Specimens examined: 1 ♂, Ceylon S. P., Yala, 22. x. 1953, F. KEISER; 1 ♀, Ceylon C. P., Peradeniya Exper. Stat., 14. vii. 1953, F. KEISER.

Distribution. Sri Lanka (=Ceylon), Myanmar (=Burma), India.

Genus *Conophorina* BECKER

Conophorina BECKER, 1920, Entomol. Mitt. 9: 181. Type species: *Conophorina bicellaris* BECKER, 1920, by monotypy.

Conophorina bicellaris BECKER

Conophorina bicellaris BECKER, 1920, Entomol. Mitt. 9 : 183. Type locality: South Africa.

Male (Figs. 43–54)

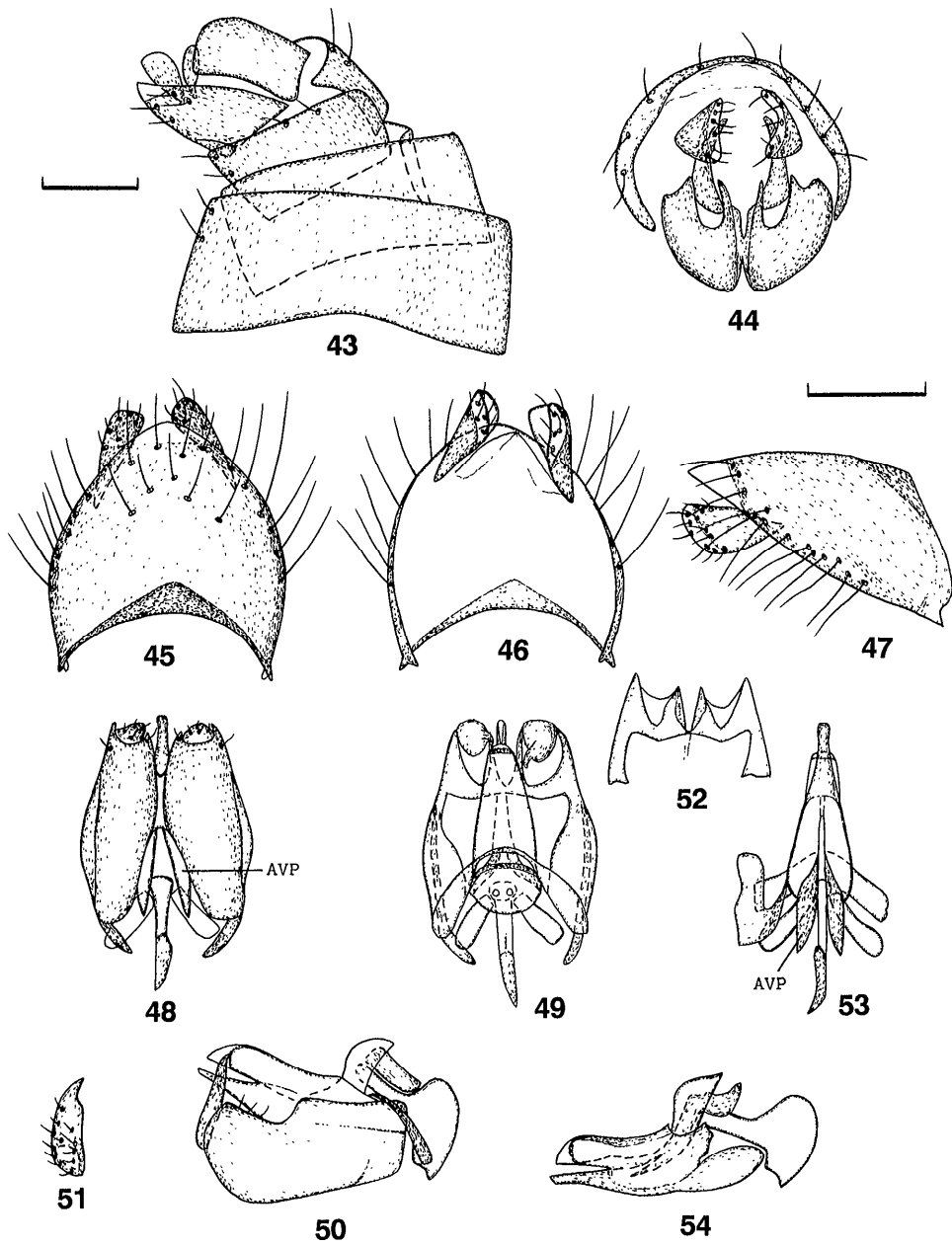
Tergum 9 (except anterior part) in dorsal view rather rounded, with anterior margin more or less concave and sclerotized. Fused gonocoxites rectangular, longer than wide, and with wide median ventral furrow; shape of mid-posterior dorsal part of fused gonocoxites as in Fig. 52; gonocoxal apodeme rather thin; sternum 9 absent. Gonostylus with apical process. Phallus gradually narrower apically; dorsal plate ending before ventral plate; in ventral plate, anterior part divided medially and posterior part darker; anterolateral ventral processes blade-like in ventral view. Aedeagal apodeme widened apically, with apical (=anterior) margin rather rounded.

Female (Figs. 55–62)

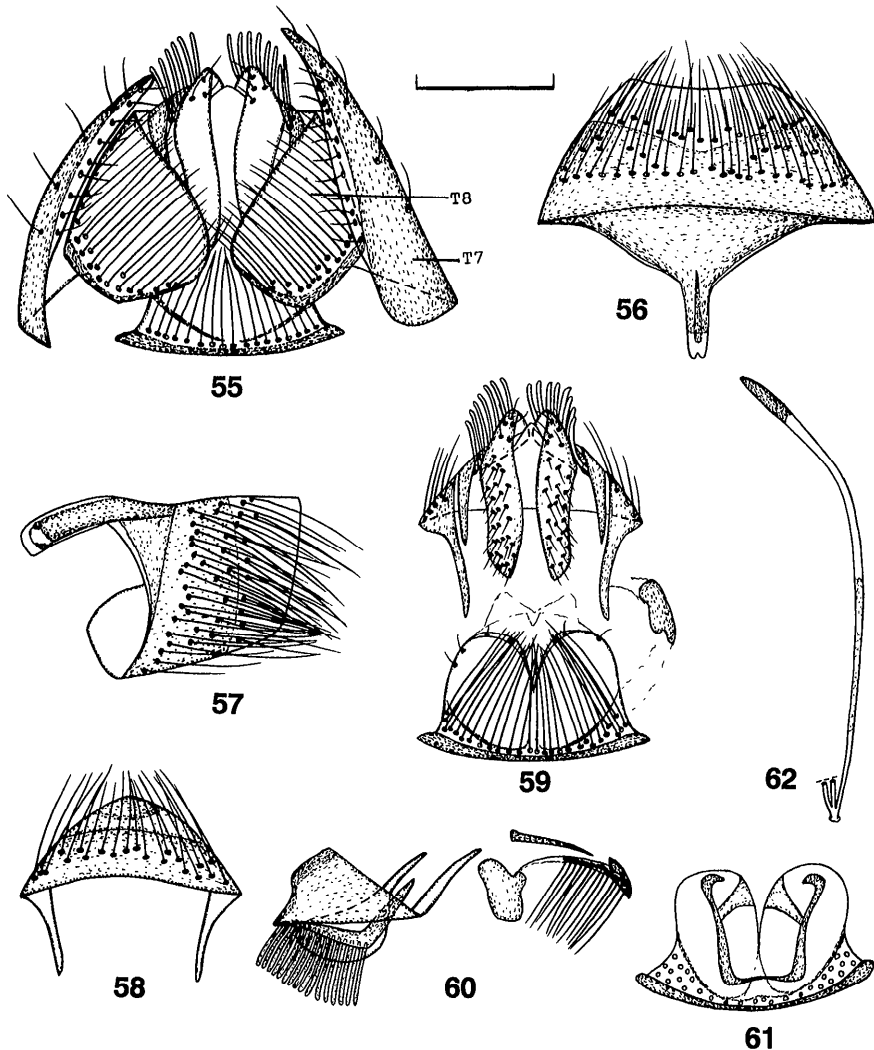
Cercus rather rectangular and much longer than wide. Tergum 10 with posterior part having 16 (or so) stout setae. Tergum 8 in dorsal view trapezoid and with mid-anterior process. Sternum 8 consisting of paired rounded transparent parts and with anterior darker border nearly straight. There is a lateral sclerite between the ventrally folded anterior part of tergum 9 and sternum 8. Genital fork U-shaped. Each branched spermatheca gradually wider apically, without any segmentation, but with darker parts shown in Fig. 62.

Specimens examined: 1 ♂, 1 ♀, Rust en Vrede, Oudtshoorn Disr., C. P.

Distribution. South Africa.



Figs. 43–54. *Conophorina bicellaris* BECKER, male genitalia. 43–44, Apex of abdomen, dorsal and posterior views; 45–47, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 48–50, gonocoxites, gonostyli and aedeagus, ventral, dorsal and lateral views; 51, gonostylus, dorsal view; 52, posterior part of gonocoxites, dorsal view; 53–54, aedeagus, ventral and lateral views. [Scale 0.25 mm for Fig. 43; 0.2 mm for Figs. 44–54]



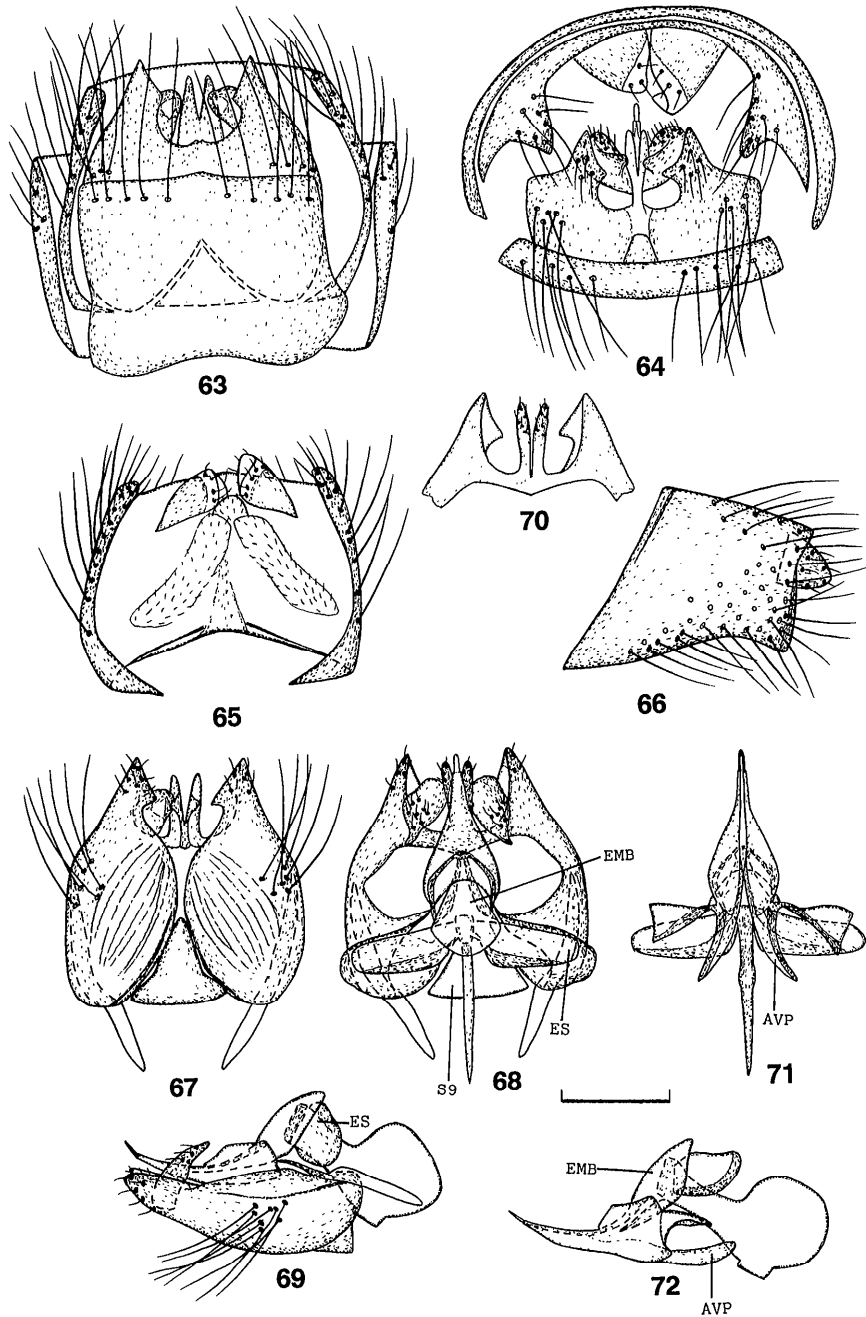
Figs. 55–62. *Conophorina bicellaris* BECKER, female genitalia. 55, Terga 7–8 & 10, sternum 8 and cerci, ventral view; 56–57, tergum 8, dorsal and lateral views; 58, tergum 9, dorsal view; 59–60, terga 9–10, sternum 8 and cerci, ventral and lateral views; 61, sternum 8 and genital fork, dorsal view; 62, spermatheca. [Scale 0.3 mm]

Genus *Cacoplox* HULL

Cacoplox HULL, 1970, J. Ga. Entomol. Soc. 5: 163. Type species : *Cacoplox griseata* HULL, 1970, by original designation.

Cacoplox griseata HULL

Cacoplox griseata HULL, 1970, J. Ga. Entomol. Soc. 5: 163. Type locality: Chile.



Figs. 63–72. *Cacoplox griseata* HULL, male genitalia. 63–64, Apex of abdomen, ventral and posterior views, 65–66, tergum 9, cerci and sternum 10, ventral and lateral views; 67–69, gonocoxites, sternum 9 and aedeagus, ventral, dorsal and lateral views; 70, posterior part of gonocoxites, dorsal view; 71–72, aedeagus, ventral and lateral views. [Scale 0.5 mm]

Male (Figs. 63–72)

Sternum 10 consisting of paired, band-like membranes, which are divergent anteriorly. Tergum 9 in dorsal view rectangular or trapezoid, and wider than long. Fused gonocoxites + sternum 9 with Y-shaped median ventral suture, and the former widest around middle; posterior inner ventral margin of gonocoxite with a concavity just before angled part; shape of mid-posterior dorsal part of fused gonocoxites as in Fig. 70; gonocoxal apodeme comparatively long and thin. Sternum 9 triangular. Gonostylus narrower at apical portion and pointed at apex. Phallus rounded basally, tapering apically, and with thin apical process; ventral plate divided along mid line; anterolateral ventral process tapering apically and pointed. Aedeagal apodeme with apical part in lateral view rounded and having a ventral flat swelling.

Female (Figs. 73–84)

Cercus longer than wide but not conspicuously long. Tergum 10 paired; each sclerite pointed at both ends and with 14 (or so) stout setae. Tergum 9 short, band like, with median anterior concavity. Sternum 8 rather rounded, abruptly widened at middle, and with mid-longitudinal line; sternum 8 in lateral view L-shaped. Genital fork with anterior sclerite thin, with lateral sclerite having posterior inner wide process truncate apically and an inner process pointed at apex. Each branched spermatheca consisting of (i) longer basal duct, (ii) shorter section capped at both ends, (iii) shorter apical duct, and (iv) elliptical capsule.

Specimens examined: 1 ♂, 1 ♀, Tumbre, Chile, 27. ii. 1960, L. E. PENA.

Distribution. Chile.

Genus *Euprepina* HULL

Euprepina Hull, 1971, Proc. Entomol. Soc. Wash. 73: 181. Type species: *Euprepina nuda* HULL, 1971, by original designation.

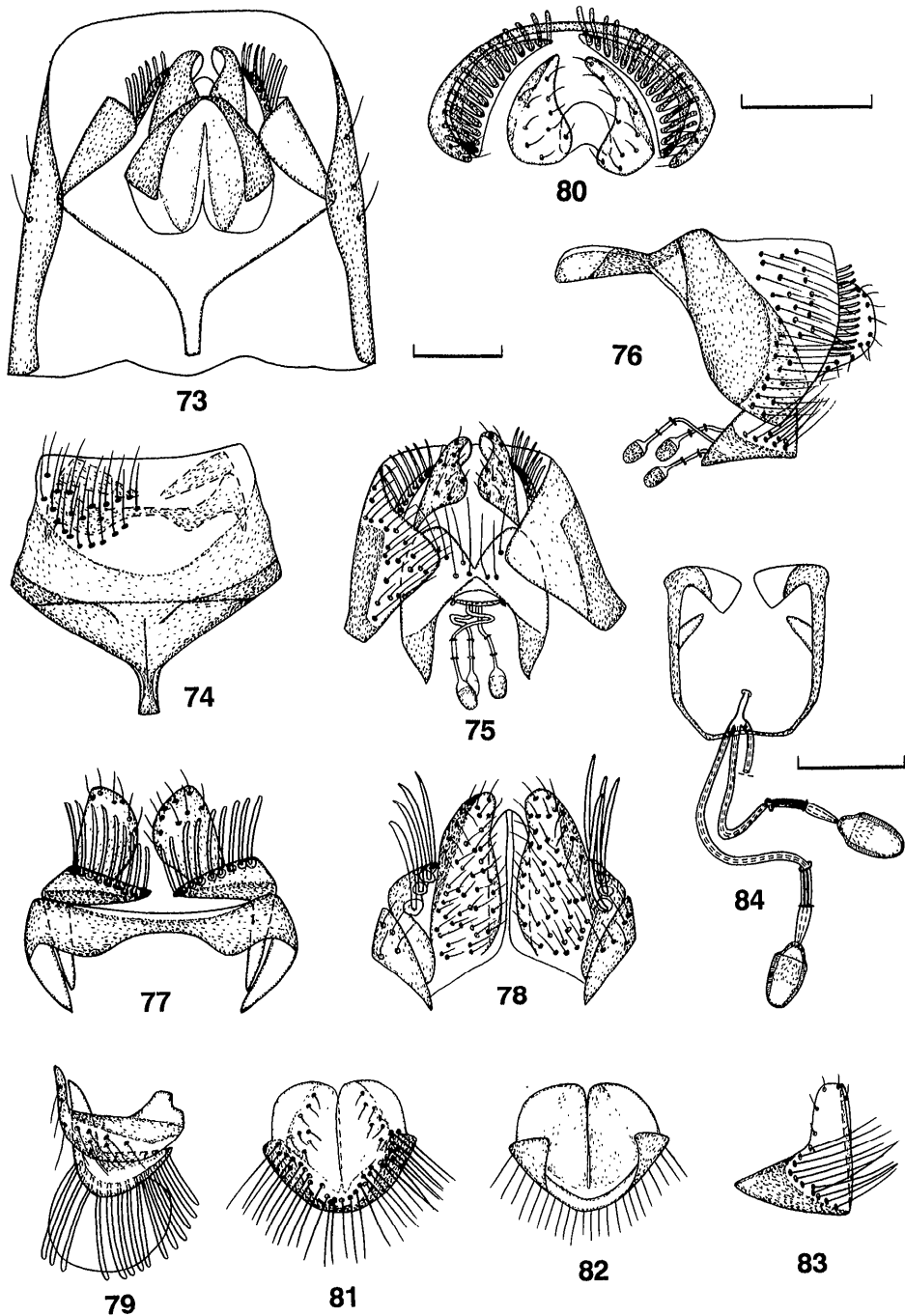
Euprepina bicincta (WIEDEMANN)

Bombylius bicincta WIEDEMANN, 1830, Aussereuropäische zweiflügelige Insekten 2: 641.

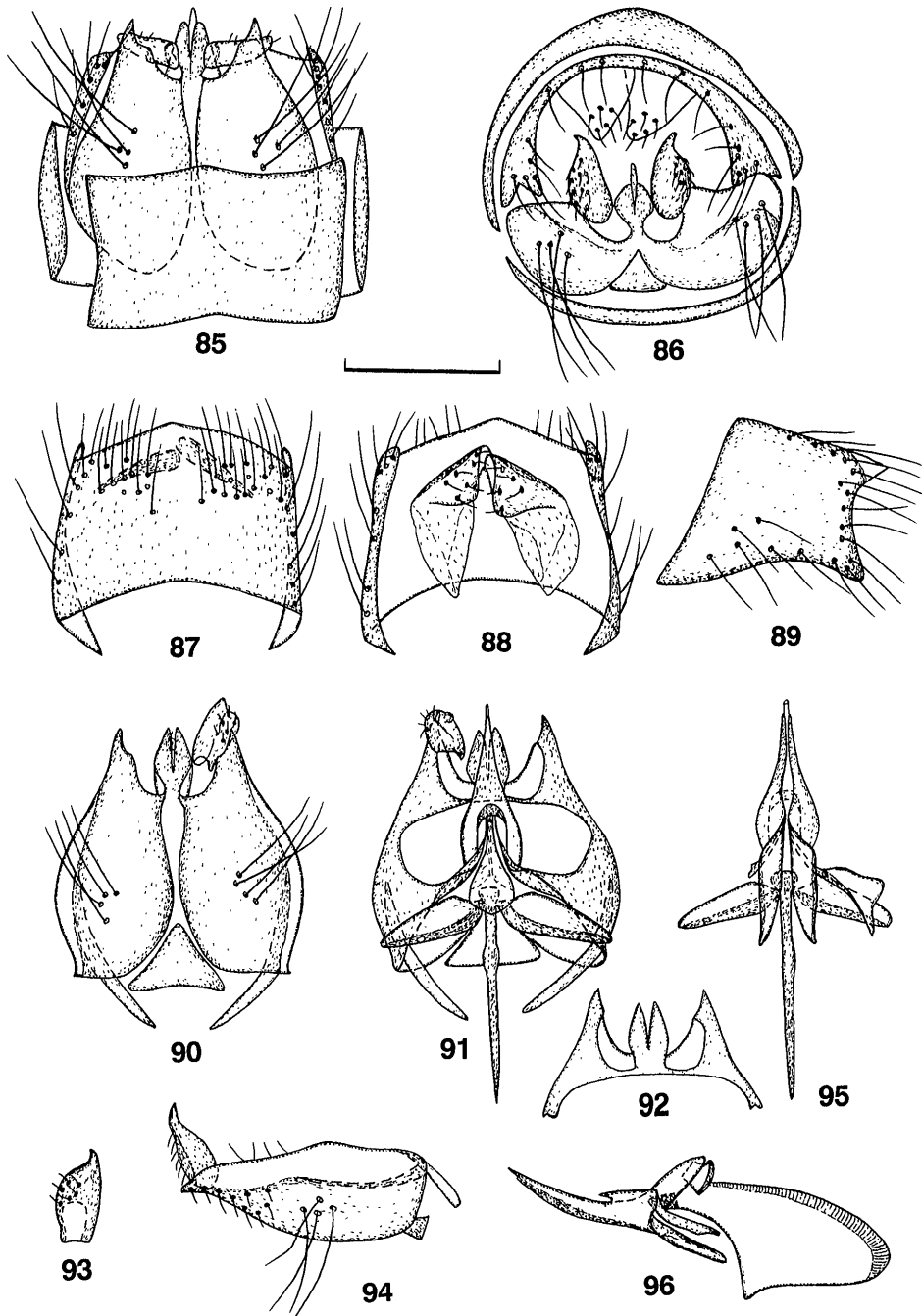
Type locality: Brazil (Rio Grande do Sul).

Male (Figs. 85–96)

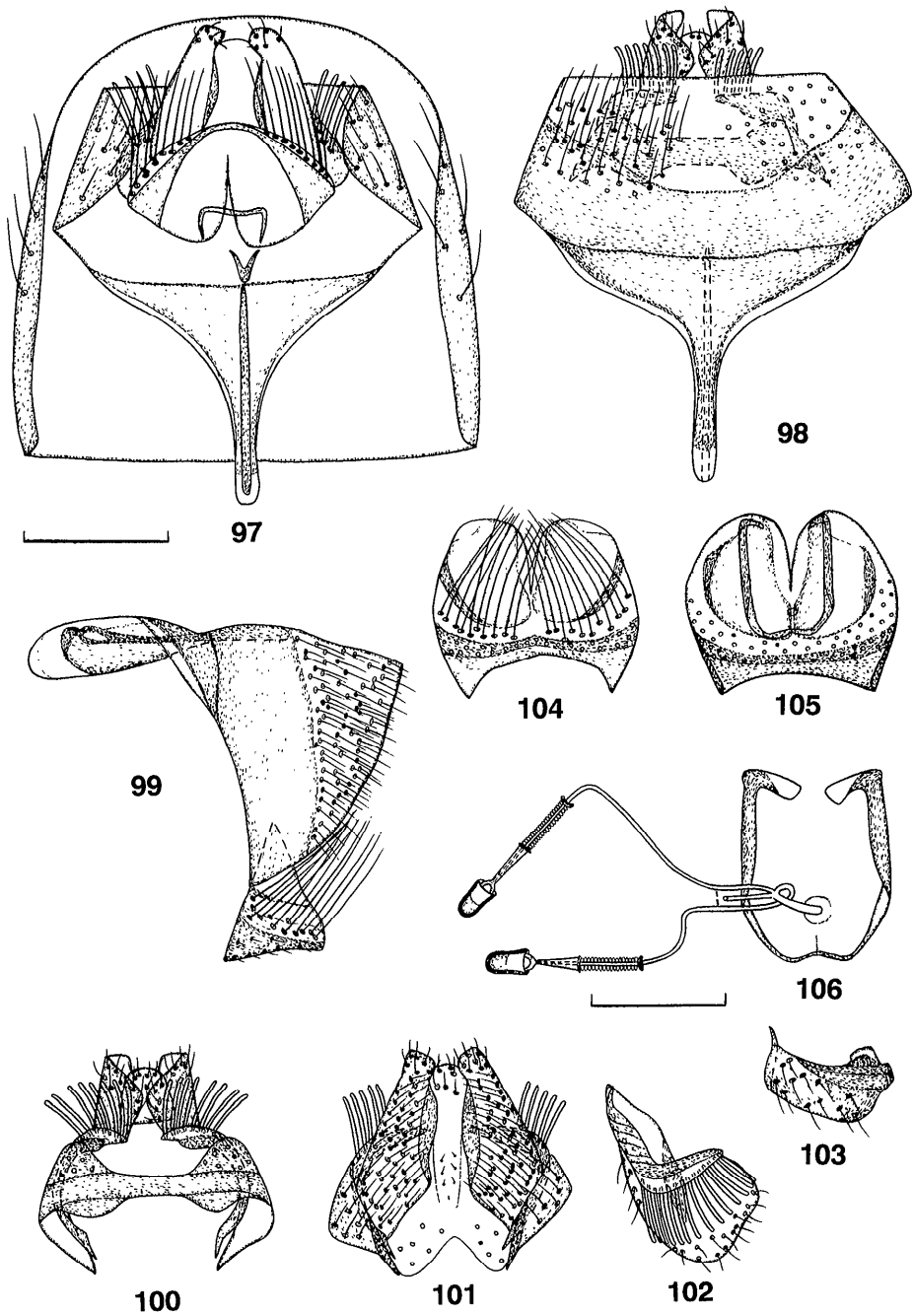
Tergum 9 in dorsal view rectangular or trapezoid and wider than long. Fused gonocoxites + sternum 9 with Y-shaped median ventral suture, and the former widest around middle; posterior inner ventral margin of gonocoxite with a gentle convexity; shape of mid-posterior dorsal part as in Fig. 92; gonocoxal apodeme long and thin; sternum 9 triangular. Gonostylus narrowed at apex and pointed. Phallus rounded basally, tapering apically, and with thin apical process; dorsal plate with a short wide rounded median extension at base; ventral plate divided along mid line; anterolateral ventral process blade-like in ventral view.



Figs. 73–84. *Cacoplox griseata* HULL, female genitalia. 73, Terga 7–8 & 10, sternum 8 and cerci, ventral view; 74, tergum 8, dorsal view; 75–76, terga 8 & 10, sternum 8, cerci and spermatheca, ventral and lateral views; 77–80, terga 9–10 and cerci, dorsal, ventral, lateral and posterior views; 81–83, sternum 8, dorsal, ventral and lateral views; 84, genital fork and spermatheca, dorsal view. [Scale 0.5 mm for Figs. 73–76; 0.5 mm for Figs. 77–83; 0.3 mm for Fig. 84]



Figs. 85–96. *Euprepina bicincta* (WIEDEMANN), male genitalia. 85–86, Apex of abdomen, ventral and posterior views; 87–89, tergum 9 and cerci, dorsal, ventral and lateral views; 90 & 94, gonocoxites, gonostylus and sternum 9, ventral and lateral views; 91, gonocoxites, gonostylus and aedeagus, dorsal view; 92, posterior part of gonocoxites, dorsal view; 93, gonostylus, dorsal view; 95–96, aedeagus, ventral and lateral views. [Scale 0.5mm]



Figs. 97–106. *Euprepina bicincta* (WIEDEMANN), female genitalia. 97, Terga 7–8, sternum 8, cerci and genital fork, ventral view; 98, tergum 8 and cerci, dorsal view; 99, tergum 8 and sternum 8, lateral view; 100–101, terga 9–10, cerci and sternum 10, dorsal and ventral views; 102, tergum 10 and cercus, lateral view; 103, tergum 9, lateral view; 104, sternum 8, ventral view; 105, sternum 8 and genital fork, dorsal view; 106, genital fork and spermatheca, dorsal view. [Scale 0.5 mm for Figs. 97–105; 0.3 mm for Fig. 106]

Female (Figs. 97–106)

Cercus longer than wide but not conspicuously long. Tergum 10 paired; each sclerite pointed at both ends and with 8 stout setae. Tergum 9 short at middle, longer at sides, and with a pair of anterolateral processes folded ventrally. Sternum 8 with lateral margin convex, with anterior margin gently concave and with posterior margin having a deep median concavity. Genital fork with anterior sclerite thin, with lateral sclerite having posterior inner process truncate apically. Each branched spermatheca consisting of (i) longer basal duct, (ii) shorter granulate section capped at both ends, (iii) shorter apical duct, and (iv) rather elliptical capsule.

Specimens examined: 1 ♂, 1 ♀, Nova Ieunia, 300–500 m, Brasilien, xii. 1952, Fritz PLAUMANN.

Distribution. Brazil (Rio Grande do Sul).

Genus *Nothoschistus* BOWDEN

Nothoschistus BOWDEN, 1985, Entomol. Mon. Mag. 121: 103. Type species: *Bombylius transatlanticus* PHILIPPI, 1865, by original designation.

Nothoschistus transatlanticus (PHILIPPI)

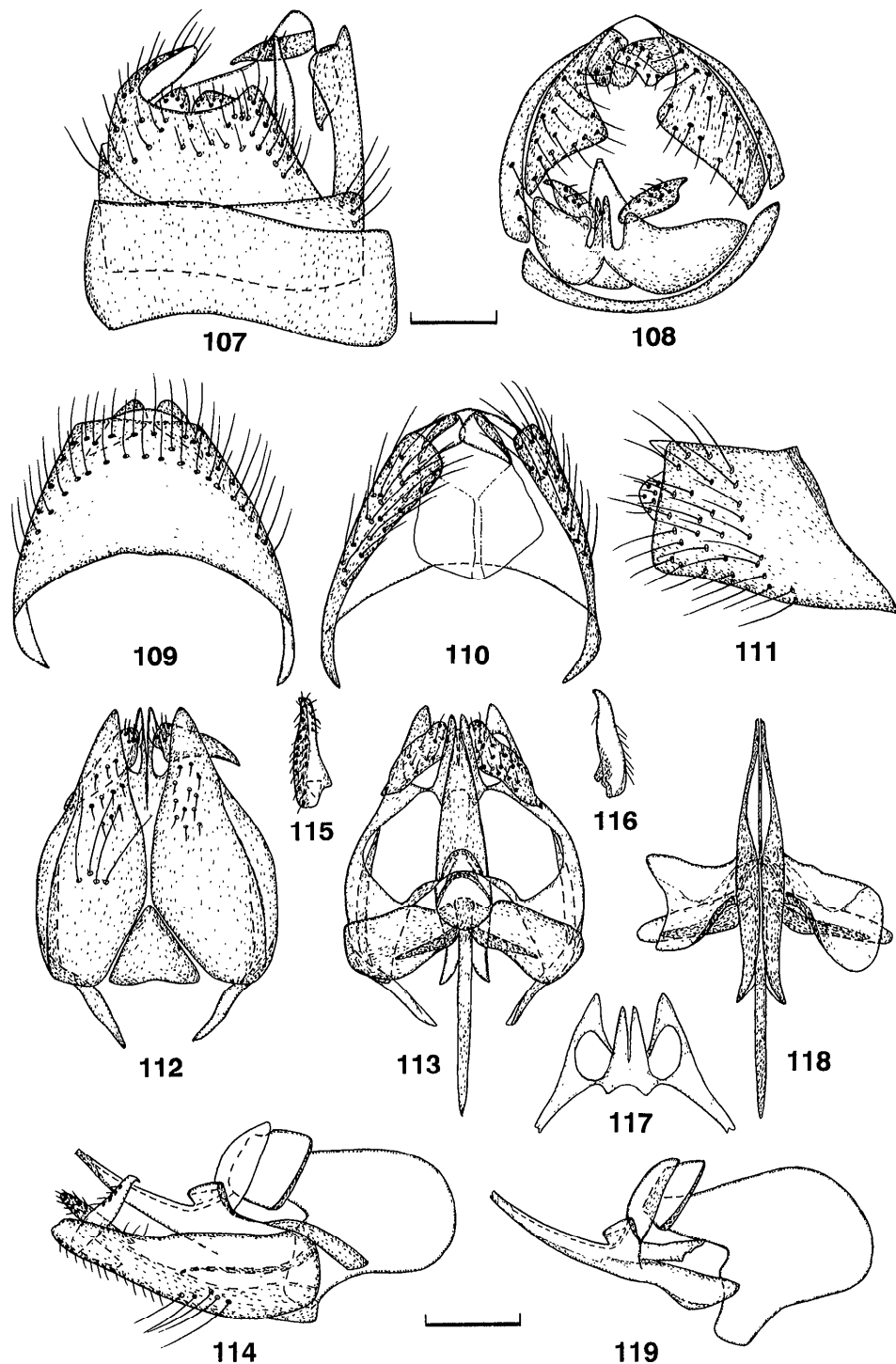
Bombylius transatlanticus PHILIPPI, 1865, Verh. zool.-bot. Ges. Wien 15: 649. Type locality: Chile (Santiago prov.).

Male (Figs 107–119)

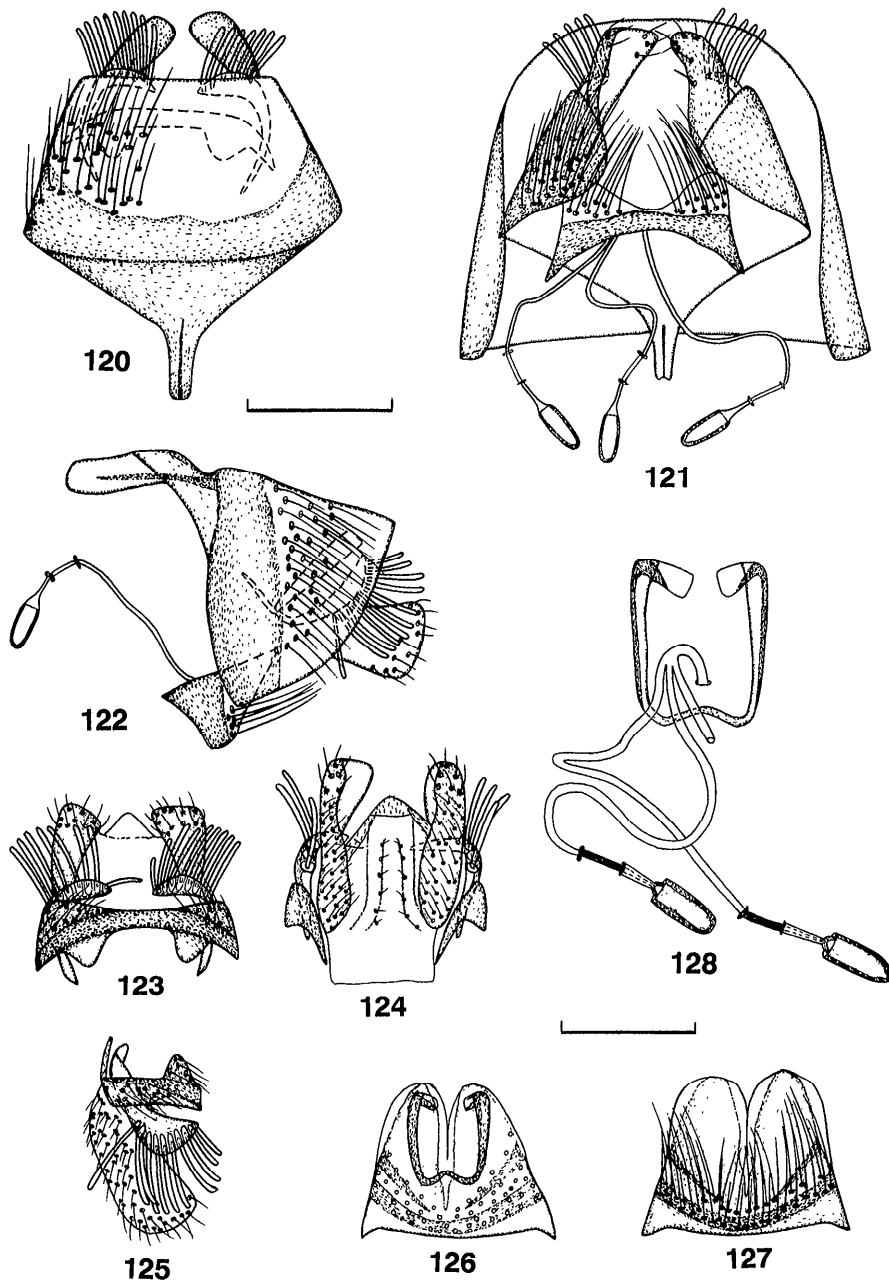
Sternum 10 membranous, rectangular or pentagonal. Tergum 9 in dorsal view rectangular or trapezoid and wider than long. Fused gonocoxites + sternum 9 with Y-shaped median ventral suture, and the former widest around middle; posterior inner ventral margin of gonocoxite nearly straight; shape of mid-posterior dorsal part of fused gonocoxites as in Fig. 117; gonocoxal apodeme comparatively long and thin; sternum 9 triangular. Gonostylus rather slender, and narrowed apically. Phallus slender, and tapering apically; dorsal plate with a semicircular median elevation at base; ventral plate divided along mid line; anterolateral ventral process pointed at apex. Aedeagal apodeme (in lateral view) large, with apical margin rather rounded, and with a large trapezoid ventral projection.

Female (Figs. 120–128)

Cercus rather rectangular and much longer than wide. Tergum 10 paired, long and each with posterior part having 11 (or so) stout setae. Tergum 9 thin at middle, longer at sides, with a pair of anterior convexities, with lateral process folded ventrally and pointed at apex. Sternum 8 gradually narrower posteriorly, with anterior margin nearly straight, and with posterior margin having a deep median concavity. Genital fork with anterior sclerite thin, with lateral sclerite gradually wider posteriorly and with posterior



Figs. 107–119. *Nothoschistus transatlanticus* (PHILIPPI), male genitalia. 107–108, Apex of abdomen, dorsal and posterior views; 109–111, tergum 9 and cerci, dorsal, ventral and lateral views; 112, gonocoxites, gonostyli and sternum 9, ventral view; 113–114, gonocoxites, gonostyli, sternum 9 and aedeagus, dorsal and lateral views; 115–116, gonostylus, dorsal and ventral views; 117, posterior part of gonocoxites, dorsal view; 118–119, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 107–108; 0.5 mm for Figs. 109–119]



Figs. 120–128. *Nothoschistus transatlanticus* (PHILIPPI), female genitalia. 120, Tergum 8 and cerci, dorsal view; 121, terga 7–8, sternum 8, cerci and spermatheca, ventral view; 122, tergum 8, sternum 8, cerci and spermatheca, lateral view; 123–125, terga 9–10, cerci and sternum 10, dorsal, ventral and lateral views; 126, sternum 8 and genital fork, dorsal view; 127, sternum 8, ventral view; 128, genital fork and spermatheca, dorsal view. [Scale 0.5 mm for Figs. 120–127; 0.3 mm for Fig. 128]

inner wide process truncate apically. Spermathecal branched duct consisting of (i) longer basal duct, (ii) short blackened section capped at both ends, (iii) short apical duct, and (iv) elliptical capsule.

Specimens examined: 1 ♂, Huintil, Chile, 19. x. 1956, L. E. PENA; 1 ♀, Quebrada de la Plata, 510 m, Santiago Prov., Chile, 21. ii. 1966, M. E. IRWIN.

Distribution. Chile.

Genus *Paratoxophora* ENGEL

Paratoxophora ENGEL, 1936, Occ. Pap. Rhod. Mus. 5: 39. Type species: *Paratoxophora cuthbertsoni* ENGEL, 1936, by monotypy.

Paratoxophora cuthbertsoni ENGEL

Paratoxophora cuthbertsoni ENGEL, 1936, Occ. Pap. Rhod. Mus. 5: 40. Type locality: Rhodesia.

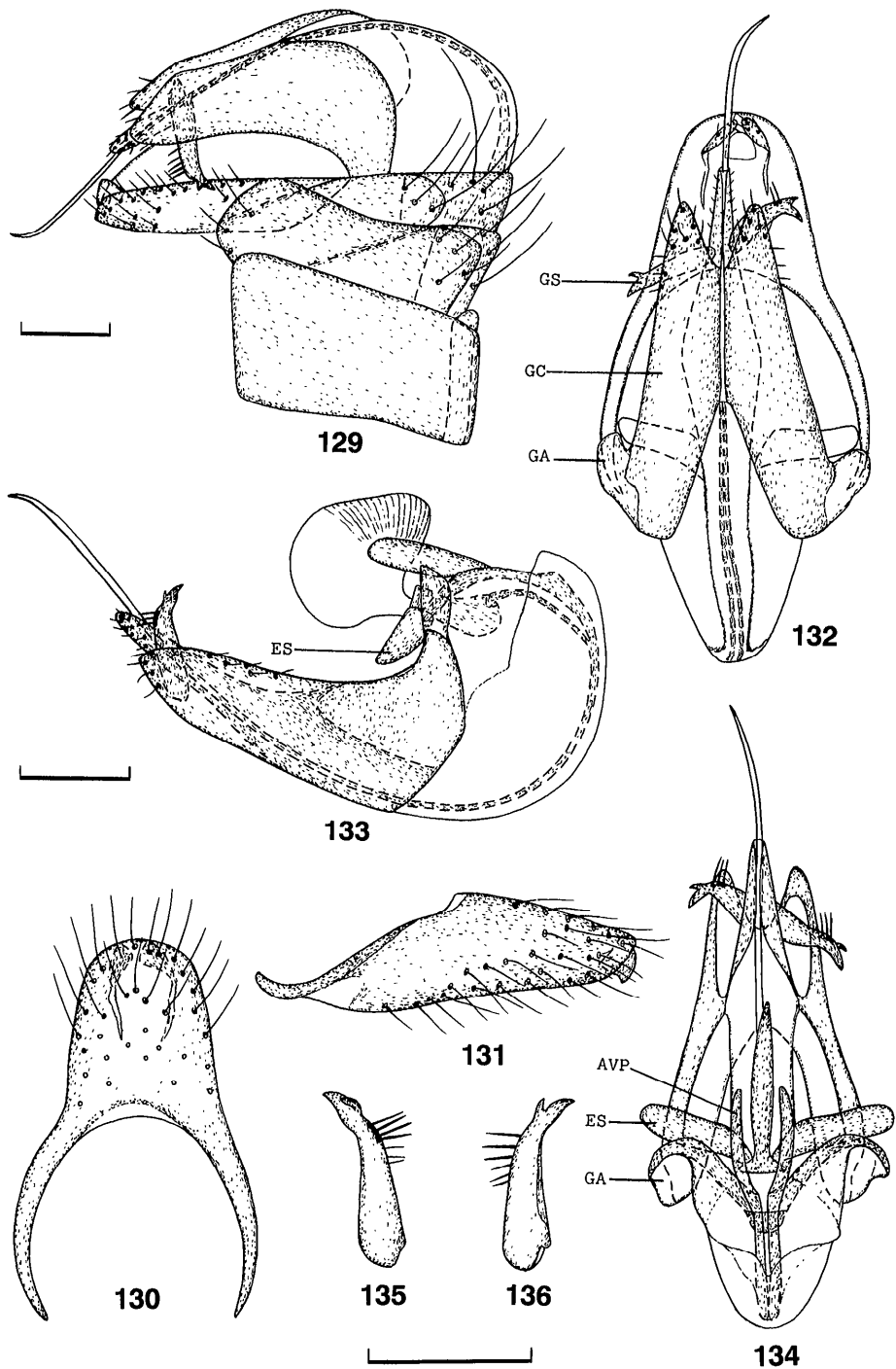
Male (Figs. 129–136)

Tergum 9 longer than wide, rather trapezoid but rounded posteriorly and with long anterolateral process. Fused gonocoxites much longer than wide, tapering apically, with outer margin and posterior inner ventral margin straight; fused gonocoxites with a median ventral suture; shape of mid-posterior dorsal part of fused gonocoxites as in Fig. 134; gonocoxal apodeme wide, short and directed outward; sternum 9 absent. Gonostylus much longer than wide, bilobate apically and with inner lobe smaller than the outer. Phallus curved and consisting of needle (DP + VP), bases of dorsal (=DP) and ventral (=VP) plates, paired anterolateral ventral processes (=AVP), and an elongate median sclerite (which may belong to VP) between endophallic sclerites (=ES); VP divided along mid line; AVP comparatively long, thin and rather parallel-sided. Aedeagal apodeme (except base) fan-like.

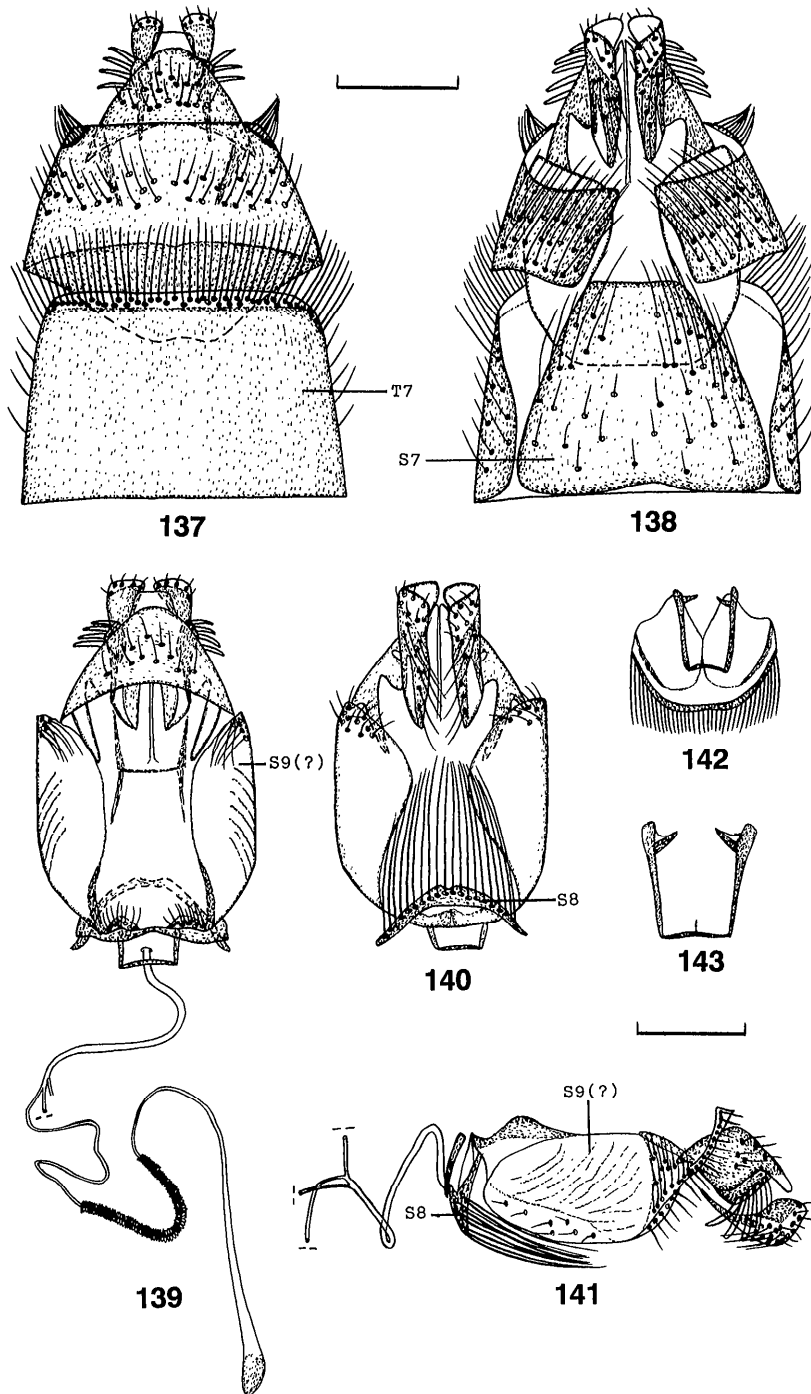
Female (Figs. 137–143)

Cercus much longer than wide. Tergum 10 paired; each sclerite much longer than wide and with posterior part having 5 stout setae. Tergum 9 in dorsal view rather triangular, and with ventrally folded lateral part having probably two processes, of which anterior one is longer and pointed. Sternum 9(?) as in Figs. 139-141. Tergum 8, tergum 7, and sternum 7 as in Figs. 137-138. Sternum 8 as in Figs 140-142; anterior sclerite with a transverse row of long hairs directed posteriorly. Anterior sclerite of genital fork thin; lateral sclerite thin but gradually somewhat wider posteriorly and with an inner stout process near posterior end. Spermathecal common basal duct long; each branched duct consisting of (i) basal thin duct, (ii) granulate section, and (iii) apical duct which is thin near (ii), gradually wider apically and having no demarcated capsule.

Specimens examined: 1 ♂, 1 ♀, 18 mi. NW. of Chipinga, 800 m, S. Rhodesia, 19. iii.



Figs. 129–136. *Paratoxophora cuthbertsoni* ENGEL, male genitalia. 129, Apex of abdomen, lateral view; 130–131, tergum 9 and cerci, dorsal and lateral views; 132, tergum 9, cerci, gonocoxites, gonostyli and aedeagus, ventral view; 133–134, gonocoxites, gonostyli and aedeagus, lateral and dorsal views; 135–136, gonostylus. [Scale 0.5 mm for Figs. 129; 0.5 mm for Figs. 130–134; 0.5 mm for Figs. 135–136]



Figs. 137–143. *Paratoxophora cuthbertsoni* ENGEL, female genitalia. 137–138, Apex of abdomen, dorsal and ventral views; 139–141, terga 9–10, cerci, sternum 8, sternum 9 (?), genital fork and spermatheca, dorsal, ventral and lateral views; 142, sternum 8 and genital fork, dorsal view; 143, genital fork, dorsal view. [Scale 0.5 mm for Figs. 137–142; 0.3 mm for Fig. 143]

1958, E. S. ROSS & R. E. REECH.

Distribution. Rhodesia, Botswana, South Africa, Tanzania.

Subfamily Desmatomyiinae

Male

Based on 1 genus and 1 species. *Desmatomyia anomala* is peculiar in having the following characters: Paired dorsal sclerites present over phallus; a ventral anterior sclerite present in phallus and this is rectangular except posterior portion which is bilobed and narrower posteriorly; a dorsal triangular sclerite present behind endophallic membranous body; anterolateral ventral process (in phallus) short and inconspicuous; anterolateral ventral part of gonocoxite stout and triangular; fused gonocoxites without median ventral furrow and without sternum 9.

Female

Not examined.

Genus *Desmatomyia* WILLISTON

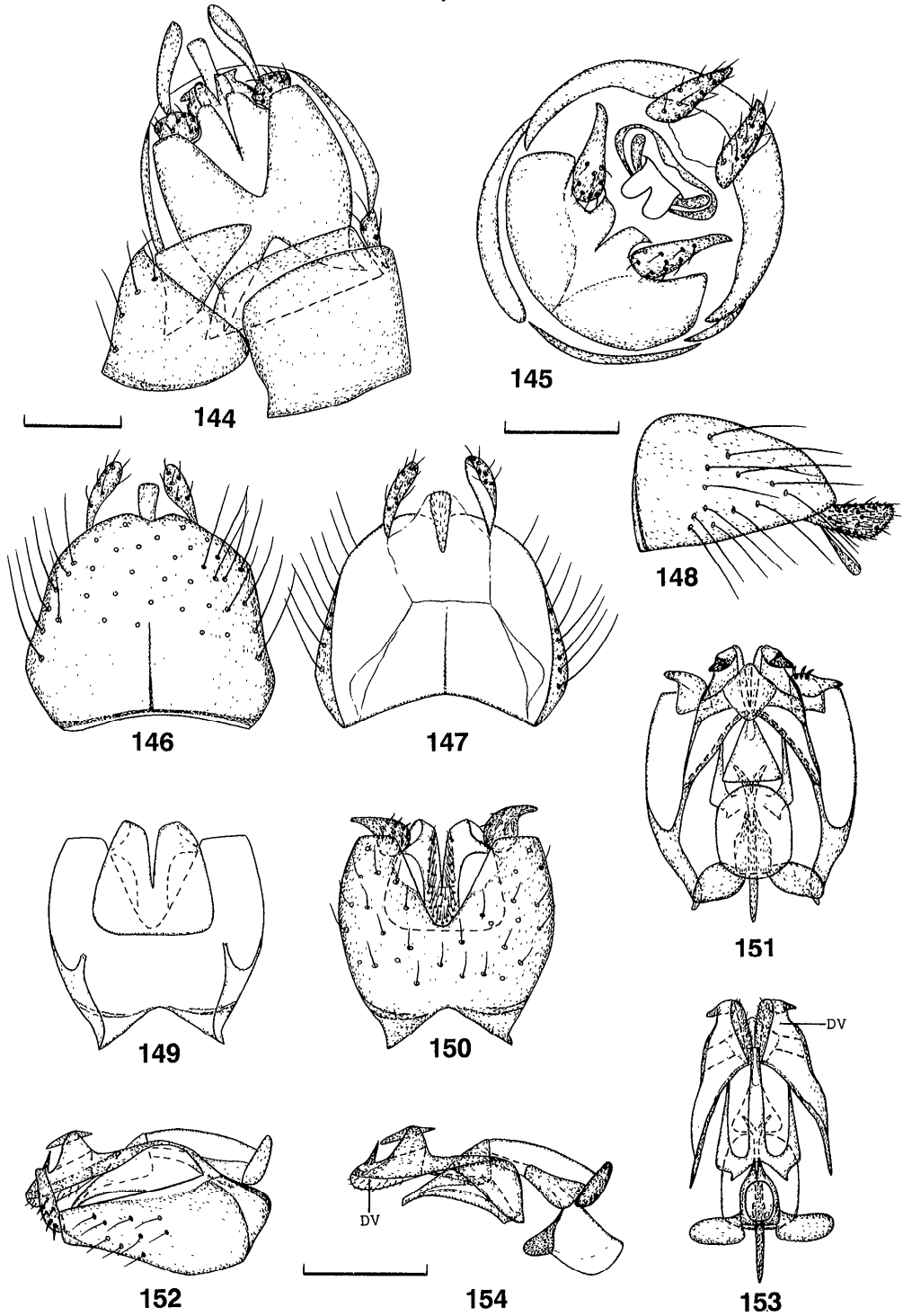
Desmatomyia WILLISTON, 1895, Kans. Univ. Q. 3: 268. Type species: *Desmatomyia anomala* WILLISTON, 1895, by monotypy.

Desmatomyia anomala WILLISTON

Desmatomyia anomala WILLISTON, 1895, Kans. Univ. Q. 3: 268. Type locality: Colorado.

Male (Figs. 144–154)

Sternum 10 with haired part which is elongate, much longer than wide and truncate apically. Tergum 9 rather trapezoid, roughly as long as wide, and with a median anterior suture. Fused gonocoxites roughly as long as wide, widest around middle, without a mid ventral furrow, without sternum 9, and with an anterolateral triangular process (which may represent gonocoxal apodeme); shape of mid-posterior part of fused gonocoxites as in Figs. 149–150. Gonostylus from some angle appearing narrowed apically and pointed at apex. Dorsal plate (= or dorsal vane) (in phallus s. lat.) consisting of (i) paired sclerites tapering anteriorly and fused with gonocoxite (as dorsal bridge) and with an acute posterior process directed upward, (ii) a rhombic sclerite fused with (i) through paired bands, and (iii) triangular sclerite just behind endophallic membranous body. Ventral plate (= phallus or dorsal plate + ventral plate) fork-like, with median branch larger than the lateral which has a short process at base. Endophallic sclerite comparatively short. Aedeagal apodeme short, with anterior margin rounded and



Figs. 144–154. *Desmatomyia anomala* WILLISTON, male genitalia. 144–145, Apex of abdomen, ventral and posterior views; 146–148, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 149, gonocoxites, dorsal view; 150, gonocoxites and gonostyli, ventral view; 151–152, gonocoxites, gonostyli and aedeagus, dorsal and lateral views; 153–154, aedeagus, ventral and lateral views. [Scale 0.25 mm for Fig. 144; 0.25 mm for Fig. 145; 0.3 mm for Figs. 146–154]

with darkened ventral sclerite (the apex of which is rounded) near base.

Female

Not examined.

Specimen examined : 1 ♂, 17 mi. S. Nava joa, Son. Mexico, 18. viii. 1964, R. PICKSON.

Distribution. Colorado, Arizona, Mexico.

Subfamily Phthiriinae

Male

Based on 6 genera and 9 species. They are characterized as follows: Fused gonocoxites with anterior margin deeply concave, without sternum 9, without gonocoxal apodeme, and very often with mid-posterior protruded dorsal part which is bilobed or partly so and varies markedly in shape with genus or species; aedeagal apodeme with ventral wing near base. They are divided into two types given below.

Acreophthiria and *Neacreotrichus*: Tergum 9 rather semicircular, with posterior margin having a median concavity and with anterior margin straight. Fused gonocoxites with lateral margin convex outward and with ventral median furrow. Phallus without dorsal or ventral vane.

Euryphthiria, *Poecilognathus*, *Relictiphthiria* and *Tmemophlebia*: Tergum 9 rather quadrate, with anterior margin straight or gently concave, with posterior part folded ventrally (except for *Relictiphthiria*), and often with anterolateral stout process. Fused gonocoxites with lateral margin more or less concave and very often without ventral median furrow. Phallus with dorsal or ventral vane.

Female

Based on 6 genera and 9 species. This subfamily is peculiar in having sternum 8 with paired median stout spines near posterior margin. The common characters are given below. Cercus relatively short. Tergum 10 absent, and therefore acanthophorite stout spines lacking. Sternum 10 triangular and often with lateral borders more distinct and V-shaped. Tergum 9 rather rectangular or trapezoid, short, much wider than long, and with or without anterolateral process. Tergum 8 larger but similar in form to tergum 9, with lateral part folded ventrally, and without a mid-anterior projection.

Genus *Acreophthiria* EVENHUIS

Acreophthiria EVENHUIS, 1986, The genera of the Phthiriinae of Australia and the New World (Diptera: Bombyliidae). Honolulu, p. 6. Type species: *Acreotrichus americanus* COQUILLET, 1895, by original designation.

Acroepthiria americana (COQUILLET)

Acroepthiria americana COQUILLET, 1895, Psyche 7: 273. Type locality: Washington.

Male (Figs. 155–163)

Tergum 9 rather triangular, convex at lateral margin, roughly as long as wide, and with a small mid-posterior concavity. Fused gonocoxites with deep mid-posterior concavity, and with posterodorsal part wide; shape of mid-posterior dorsal part as in Fig. 160; anterolateral part scalene triangular and less than 1/2 as long as gonocoxite. Gonostylus elliptical or somewhat rectangular, with apex pointed. Dorsal plate + ventral plate (in phallus) forming a tube which is bottle-like, with apical portion thin and with paired blade-like anteroventral processes. Endophallic sclerite slender. Aedeagal apodeme rather scalene triangular (in lateral view) and with paired acute ventral processes at base.

Female (Figs. 164–171)

Tergum 9 without anterolateral process. Tergum 8 much wider than long and than tergum 9. Sternum 8 quadrate, longer and much narrower than tergum 9, with anterior triangular extension often folded ventrally and with paired, median, long spines near posterior margin. Sternum 7 wider than long and wider than sternum 8. Genital fork with anterior sclerite thin, concave, and not shorter than lateral sclerite. Each branched spermatheca consisting of (i) longer basal duct, (ii) wider duct with two sections each having inner tube and numerous transverse lines, (iii) shorter apical duct which is narrower at basal part, and (iv) nipple-like capsule with widened elliptical membranous base and with tip pointed.

Specimens examined: 2 ♂♂, California, 2. v. 1937, TIMBERLAKE; 1 ♀, Mt. Diablo, C. Costa Co., California, 4. iii. 1959, G. I. STAGE; 1 ♀, Upstaana Riv., California, 4. x. 1946, J. L. SPERRY.

Distribution. Washington, Oregon, California.

Genus *Neacroepthiria* COCKERELL

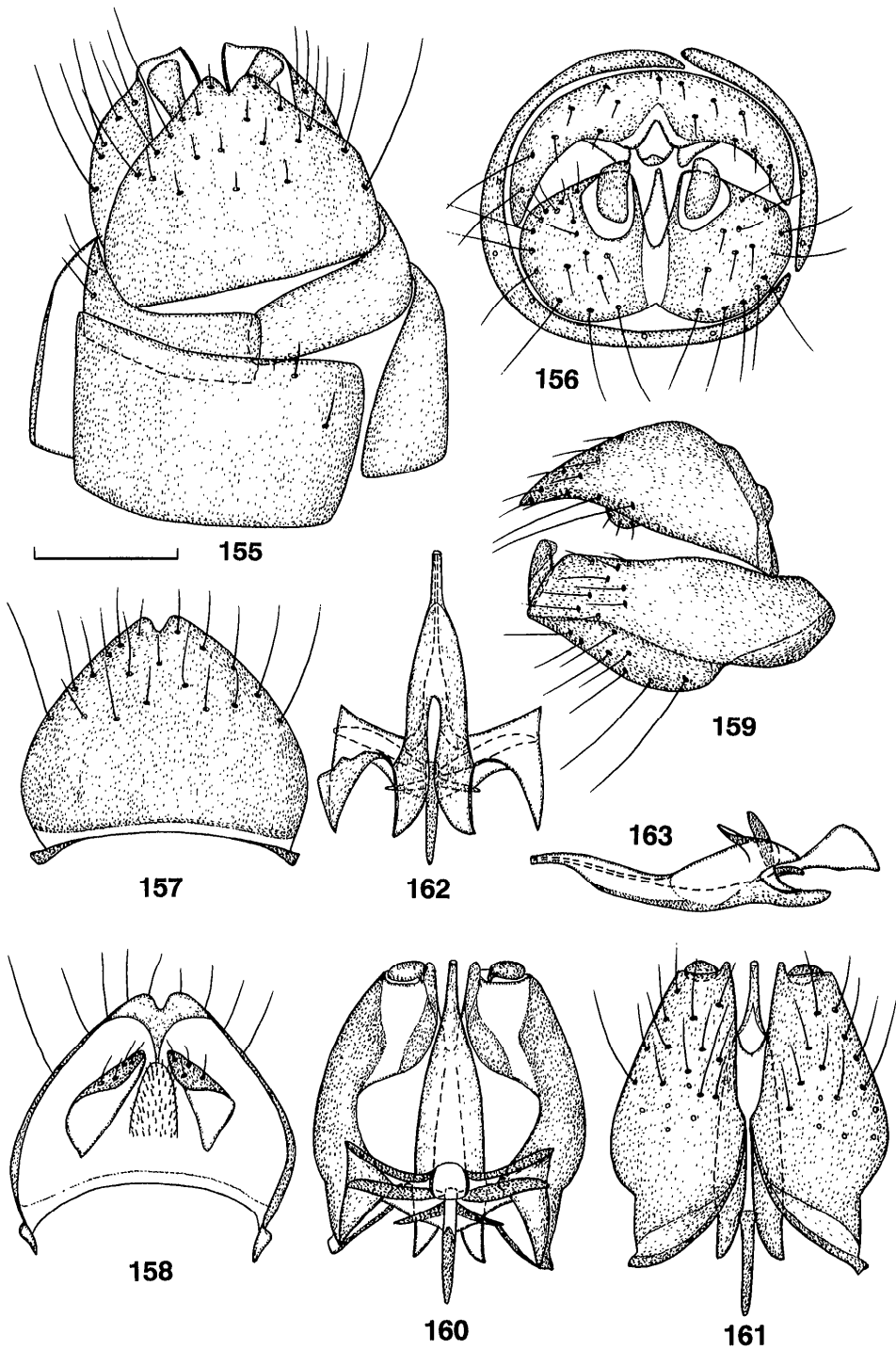
Neacroepthiria COCKERELL, 1917, Proc. U. S. Natl. Mus. 52: 377. Type species : *Acroepthiria atratus* COQUILLET, 1904 [= *Phthiria cingulata* LOEW, 1846], by original designation.

Neacroepthiria cingulatus (LOEW)

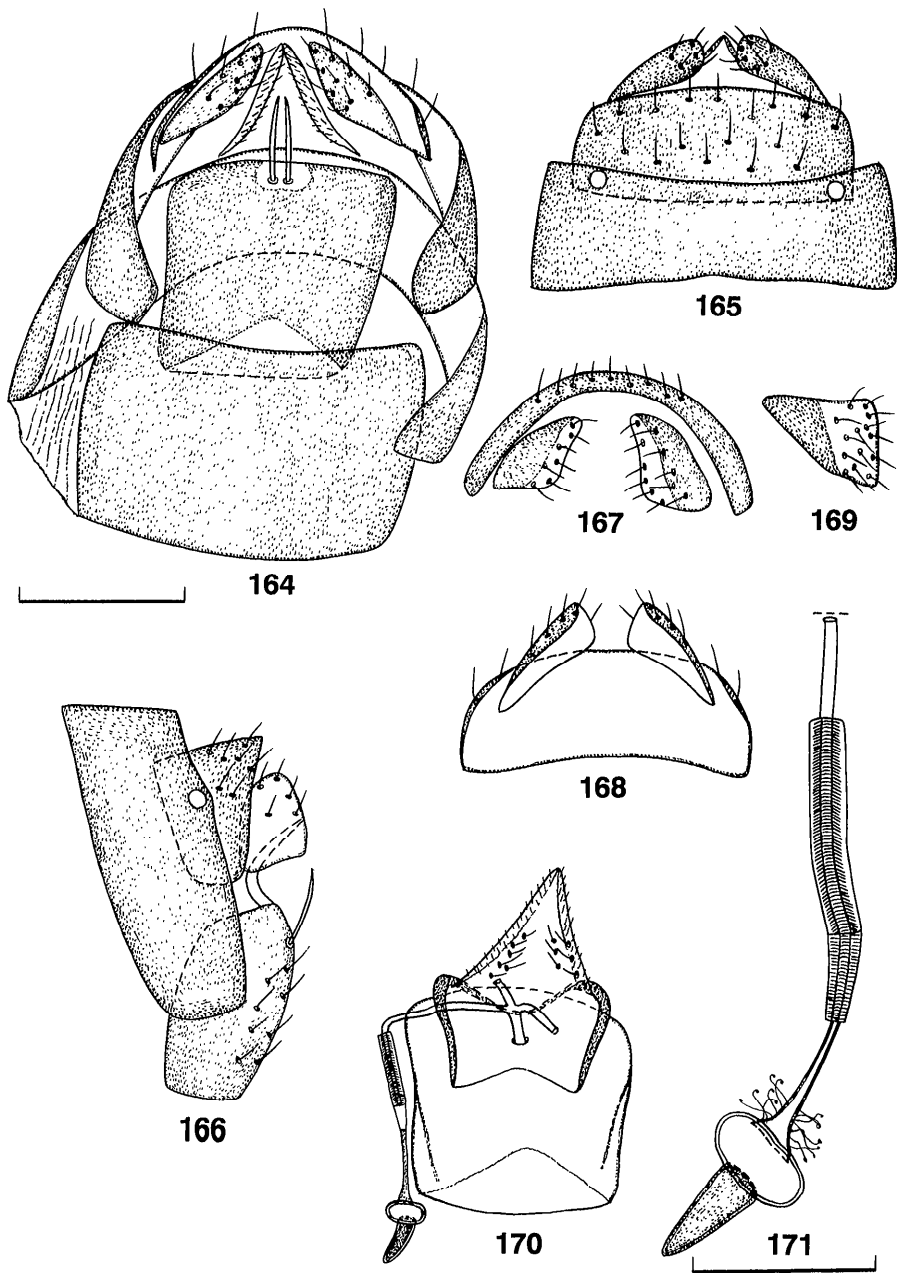
Phthiria cingulata LOEW, 1846, Linnaea Ent. 1: 383. Type locality: Mexico.

Male (Figs. 172–180)

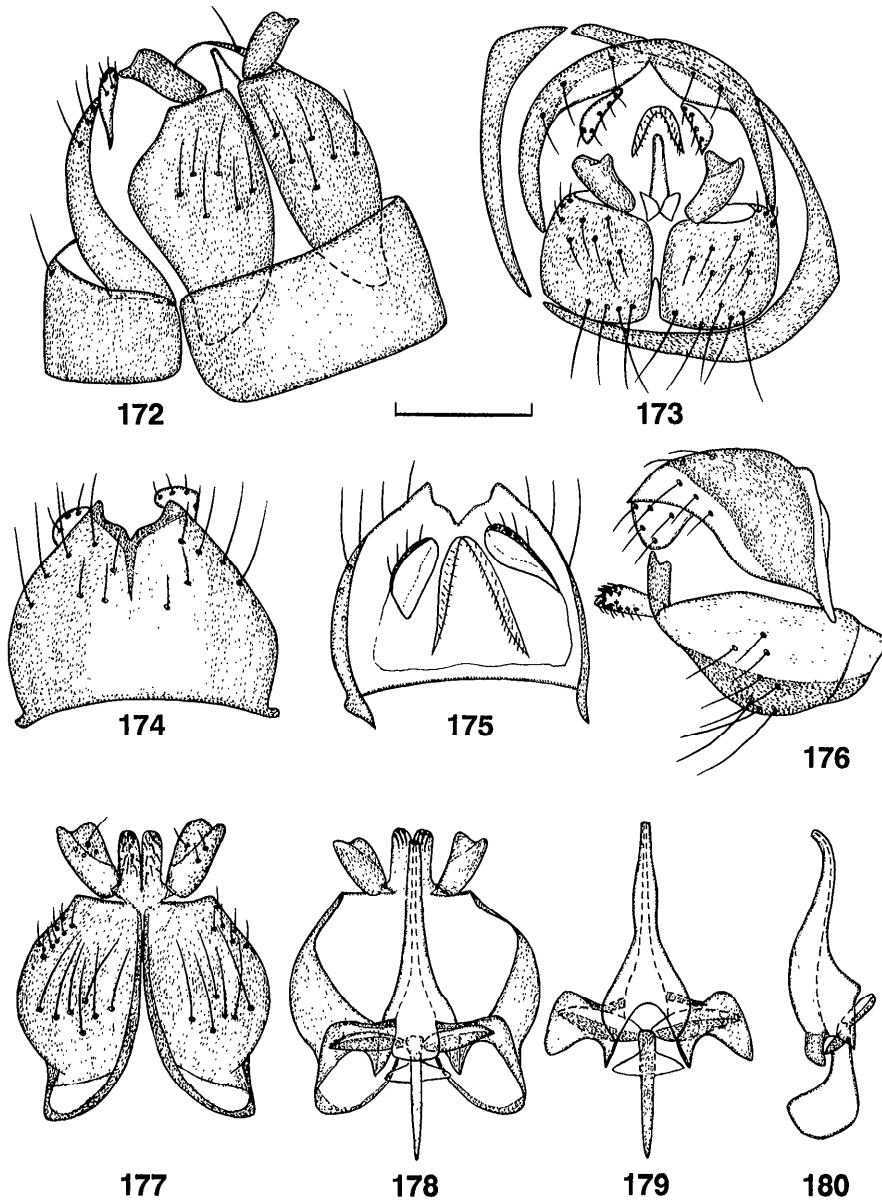
V-shaped membrane is present beneath tergum 9 and this is probably sternum 10. Tergum 9 roughly as long as wide, rather semicircular, with short anterolateral pro-



Figs. 155–163. *Acreopthiria americana* (COQUILLET), male genitalia. 155–156, Apex of abdomen, ventral and posterior views; 157–158, tergum 9, cerci and sternum 10, dorsal and ventral views; 159, tergum 9, gonocoxite and gonostylus, lateral view; 160–161, gonocoxites, gonostyli and aedeagus, dorsal and ventral views; 162–163, aedeagus, ventral and lateral views. [Scale 0.2 mm]



Figs. 164–171. *Acreophthiria americana* (COQUILLET), female genitalia. 164, Apex of abdomen, ventral view; 165, terga 8–9 and cerci, dorsal view; 166, terga 8–9, sternum 8 and cercus, lateral view; 167–168, tergum 9 and cerci, posterior and ventral views; 169, cercus, lateral view; 170, sternum 8 & 10, genital fork and spermatheca, dorsal view; 171, spermatheca (basal portion is cut off). [Scale 0.2 mm for Figs. 164–170; 0.1 mm for Fig. 171]



Figs. 172–180. *Neacreotrichus cingulatus* (Loew), male genitalia. 172–173, Apex of abdomen, ventral and posterior views; 174–175, tergum 9, cerci and sternum 10, dorsal and ventral views; 176, tergum 9, cerci, gonocoxites, and gonostylus, lateral view; 177–178, gonocoxites, gonostyli and aedeagus, ventral and dorsal views; 179–180, aedeagus, ventral and lateral views. [Scale 0.2 mm]

truded part, and with mid-posterior part widely concave. Fused gonocoxites roughly as long as wide, widest around middle, widely divided medially except for the point behind middle; shape of mid-posterior dorsal protruded part as in Fig. 177; anterolateral part scalene triangular and less than 1/2 as long as gonocoxite. Gonostylus in dorsal or ventral view rather rectangular and with posterior margin concave. Dorsal plate + ventral plate forming a tube, narrower in posterior half, and with rather short paired anterolateral ventral processes. Aedeagal apodeme in lateral view rather quadrate in anterior half and with a pair of triangular ventral extension near base.

Female (Figs. 181–187)

Sternum 10 membranous, triangular, haired at lateral margin. Tergum 9 rather trapezoid and without anterolateral process. Tergum 8 much wider than long and wider than tergum 9. Sternum 8 rather rectangular, with anterior protruded triangular membrane, with paired median stout spines near posterior margin, and with paired pale spots near anterolateral corners. Sternum 7 much wider than long and than sternum 8. Genital fork with anterior sclerite thin, concave and shorter than lateral sclerite. Each branched spermatheca consisting of (i) longer basal duct, (ii) two sectioned duct with inner tube having numerous transverse lines [the apical one is shorter and narrower than the basal one capped at both ends], (iii) shorter apical duct, and (iv) nipple-like capsule with widened elliptical membranous base and with tip rounded.

Specimens examined: 1 ♂, 11 mi. E. Pachuca, Hidalgo, Mexico, 24. viii. 1962, N. MARSTON; 1 ♀, 2 mi. NW. Zacatecas, 8,000 ft., Mexico, 18. ix. 1959, R. H. & E. M. PAINTER.

Distribution. Mexico (Zacatecas, Puebla).

Neacreotrichus mixteca (PAINTER)

Phthiria mixteca PAINTER, 1962, Jour. Kansas Ent. Soc. 35: 37. Type locality: Mexico, Puebla, 6 mi. n. Tehuacan.

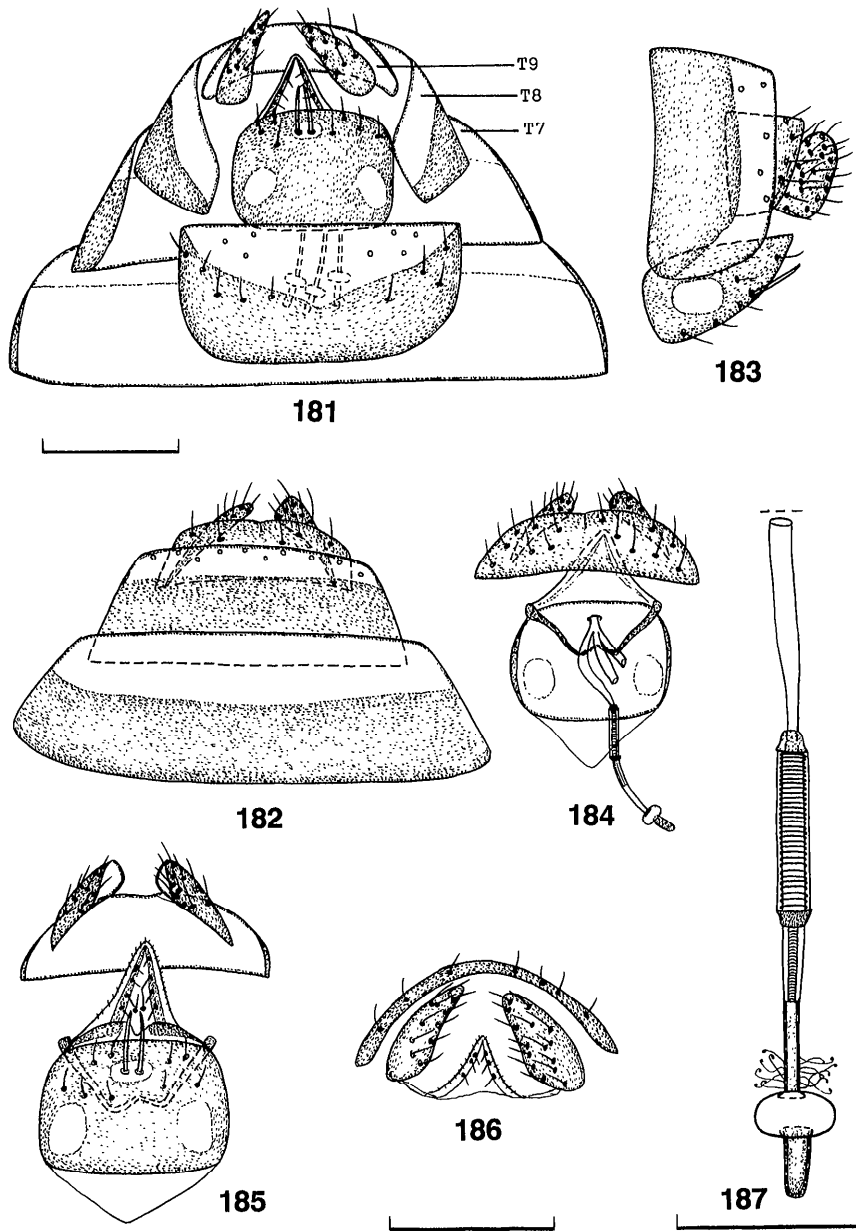
Male (Figs. 188–197)

Similar to *cingulatus* except as follows. Sternum 10 not V-shaped, but finger-like. Tergum 9 without anterolateral projection, with posterior part pale, and without Y-shaped posterior darker stripe. Shape of mid-posterior dorsal protruded part in fused gonocoxites as in Fig. 195. Lateral margin of fused gonocoxites more gently convex outward. Anterolateral ventral process (in phallus) longer. Anterior part of aedeagal apodeme larger, with anteroventral margin more or less concave and with ventral extension straight at apical margin.

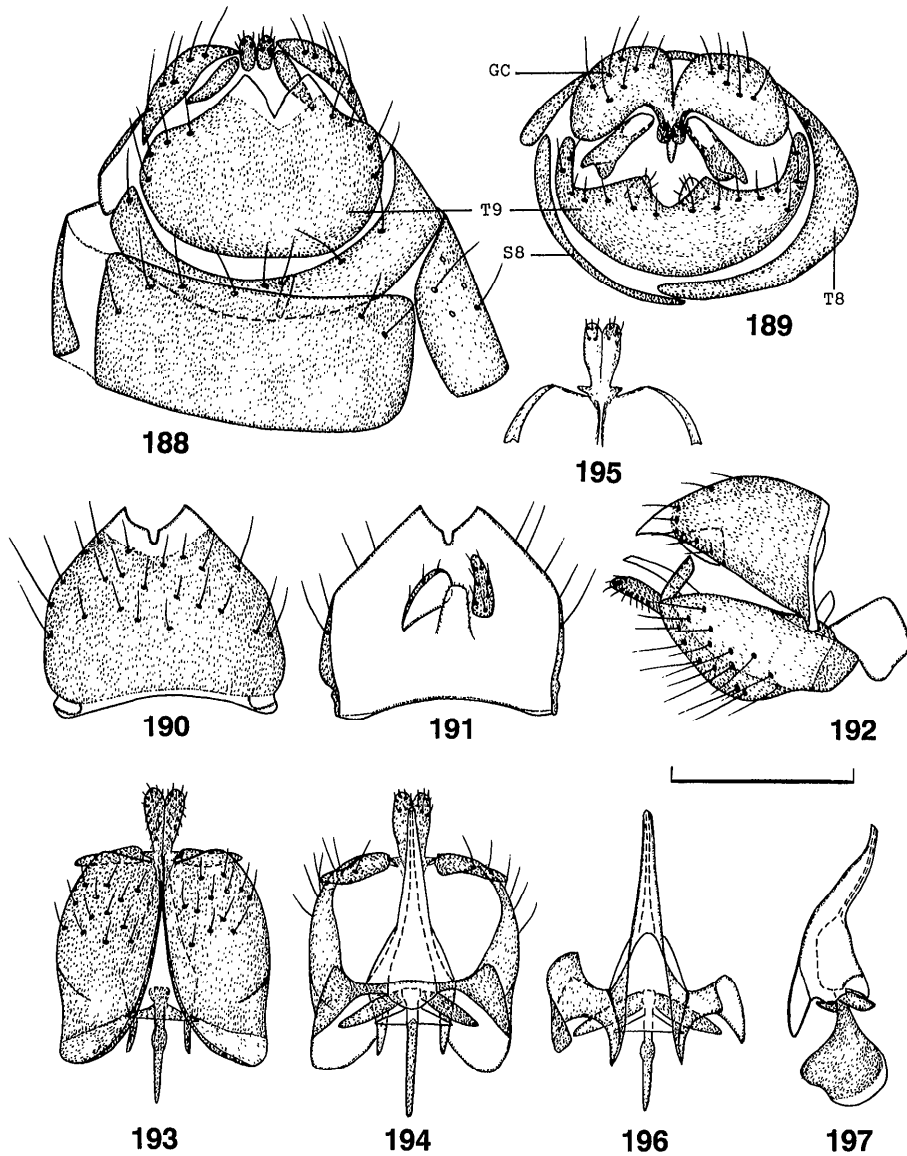
Female (Figs. 198–205)

Similar to *cingulatus* except as follows. Sternum 8 without paired pale spots near anterolateral corners.

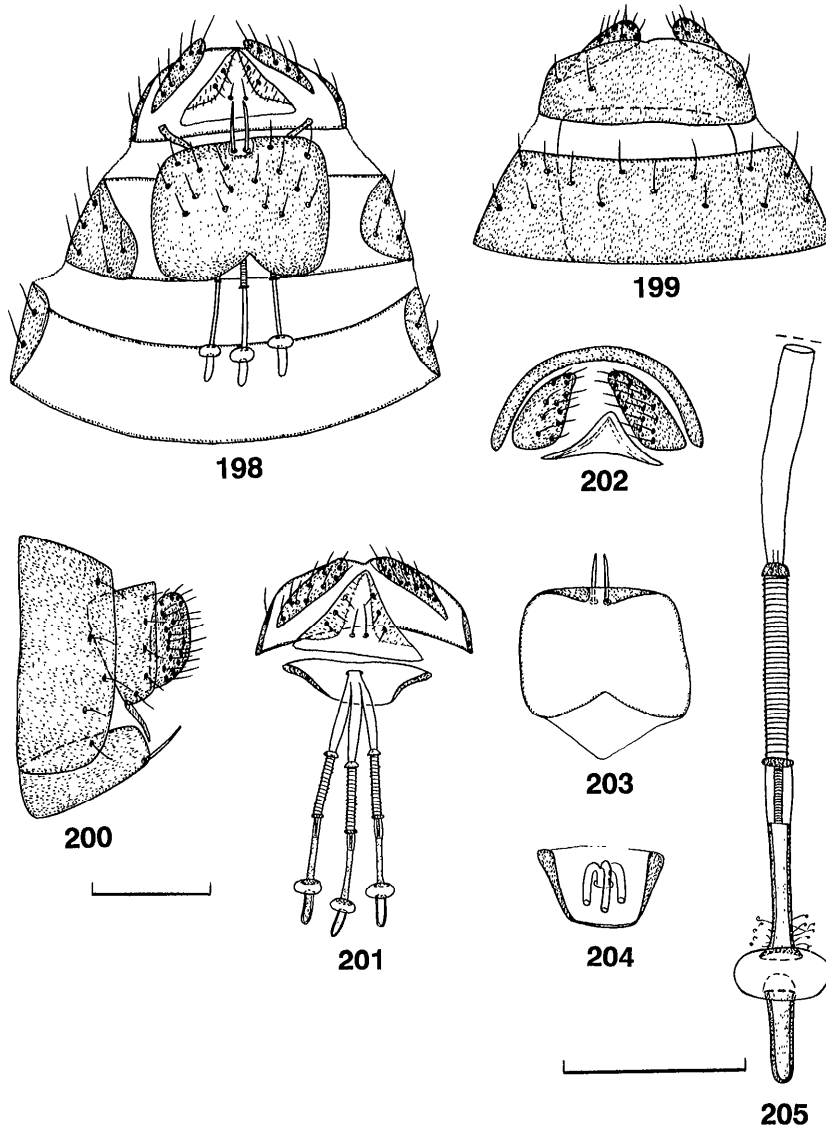
Specimens examined: 1 ♂, 4.4 mi. SE. Actopan, Hidalgo, Mexico, 27. viii. 1962, N. MARSTON; 1 ♂, 1 ♀, 6 mi. N. Tehuacan, 6,000 ft., Pue., Mexico, 10. ix. 1959, R. H. &



Figs. 181–187. *Neacreotrichus cingulatus* (LOEW), female genitalia. 181–183, Apex of abdomen, ventral, dorsal and lateral views; 184–185, tergum 9, cerci, sternum 8 & 10, genital fork and spermatheca, dorsal and ventral views; 186, tergum 9, cerci and sternum 10, posterior view; 187, spermatheca (basal portion is cut off). [Scale 0.3 mm for Figs. 181–182; 0.3 mm for Figs. 183–186; 0.1 mm for Fig. 187]



Figs. 188–197. *Neacreotrichus mixteca* (PAINTER), male genitalia. 188–189, Apex of abdomen, ventral and posterior views; 190–191, tergum 9, cerci and sternum 10, dorsal and ventral views; 192, tergum 9, gonocoxite, gonostylus and aedeagus, lateral view; 193–194, gonocoxites, gonostyli and aedeagus, ventral and dorsal views; 195, posterior part of fused gonocoxites, dorsal view; 196–197, aedeagus, ventral and lateral views. [Scale 0.25 mm]



Figs. 198–205. *Neacreotrichus mixteca* (PAINTER), female genitalia. 198–200, Apex of abdomen, ventral, dorsal and lateral views; 201, tergum 9, cerci, sternum 10, genital fork and spermatheca, ventral view; 202, tergum 9, cerci and sternum 10, posterior view; 203, sternum 8, dorsal view; 204, genital fork; 205, spermatheca (basal portion is cut off). [Scale 0.2 mm for Figs. 198–204; 0.4 mm for Fig. 205]

E. M. PAINTER.

Distribution. Mexico (Guanajuato, Puebla).

Genus *Euryphthiria* EVENHUIS

Euryphthiria EVENHUIS, 1986, The genera of the Phthiriinae of Australia and the New World (Diptera: Bombyliidae). p. 9. Type species: *Euryphthiria grandis* EVENHUIS, 1986, by original designation.

Euryphthiria grandis EVENHUIS

Euryphthiria grandis EVENHUIS, 1986, The genera of the Phthiriinae of Australia and the New World (Diptera: Bombyliidae). p. 9. Type locality: Arizona.

Male (Figs. 206–216)

Tergum 9 wider than long, with lateral margin concave before middle, with posterior margin having a mid concavity, and with anterior margin gently concave. Fused gonocoxites roughly as long as wide, with anterior margin widely and deeply concave; dorsally folded lateral part and mid-posterior protruded dorsal sclerite as in Fig. 212; anterolateral part over 1/2 as long as gonocoxite. Gonostylus long and rather rectangular. Dorsal plate + ventral plate (in phallus) forming a tube; H-shaped ventral sclerite present at apical portion; a stout spine-like dorsal process present behind dorsal bridge; anterolateral ventral process long and with anterior end rounded. Endophallic sclerite slender. Aedeagal apodeme (except base) rather quadrate and with a ventral extension which is triangular and much wider than long.

Female (Figs. 217–223)

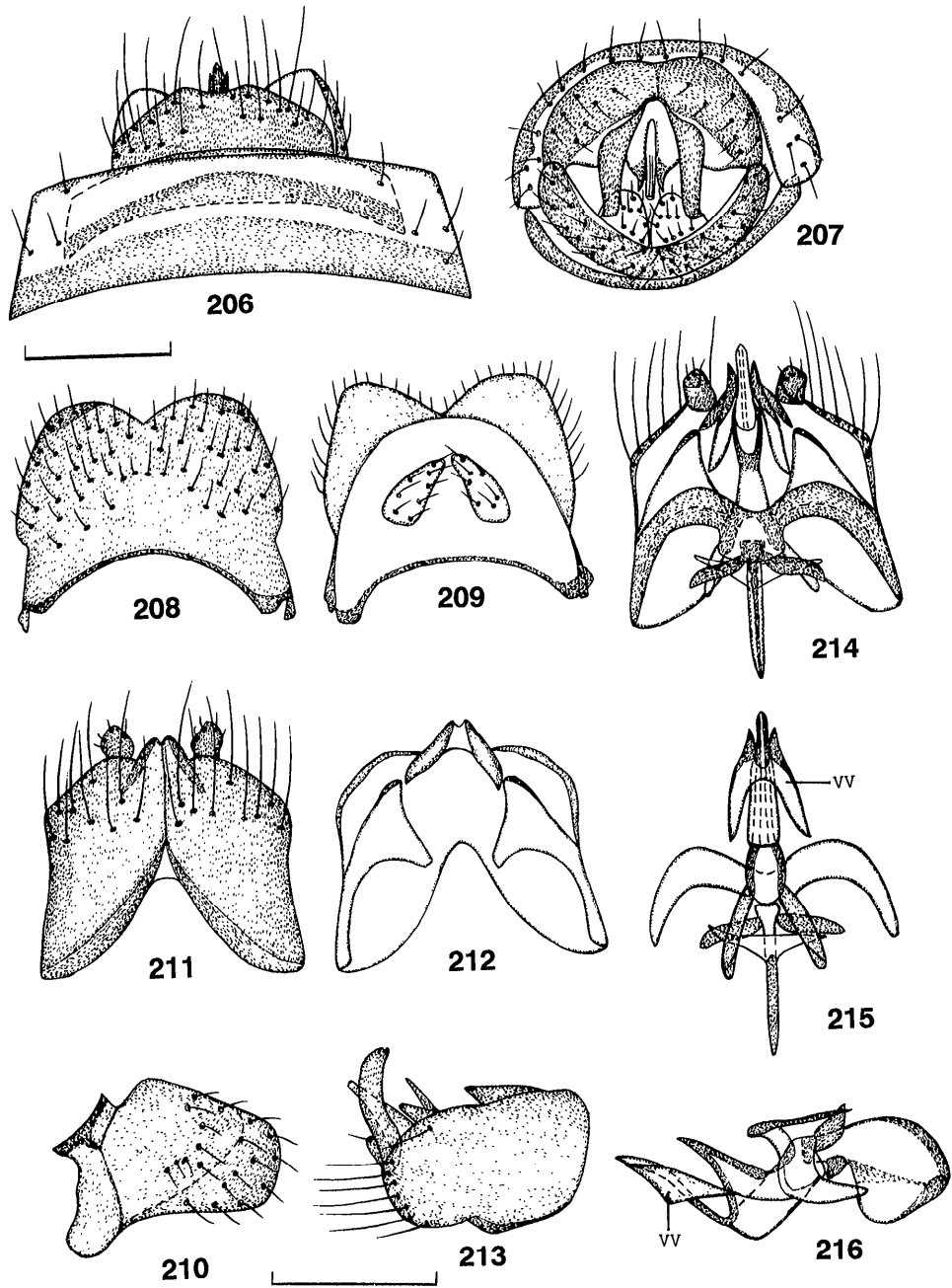
Tergum 9 trapezoid, much wider than long, and with stout anterolateral process rounded at apex. Sternum 9 (?) as in Figs. 222–223. Sternum 8 rather trapezoid, much wider than long, narrower posteriorly, with anterior margin convex, and with paired median stout spines near posterior margin. Genital fork consisting of two lateral bars, each of which is V-shaped except for anterior part. Each branched spermatheca consisting of (i) longer basal duct, (ii) granulate duct, (iii) shorter apical duct and (iv) elongate capsule with shorter pale part and longer darker part.

Specimens examined : 1 ♂, Santa Rita Mts., 6,-7,000 ft., Madera Canyon, Santa Cruz Co., Arizona, 8. ix. 1962, C. H. Martin; 1 ♀, 29. viii. 1958, H. V. Weems, Jr..

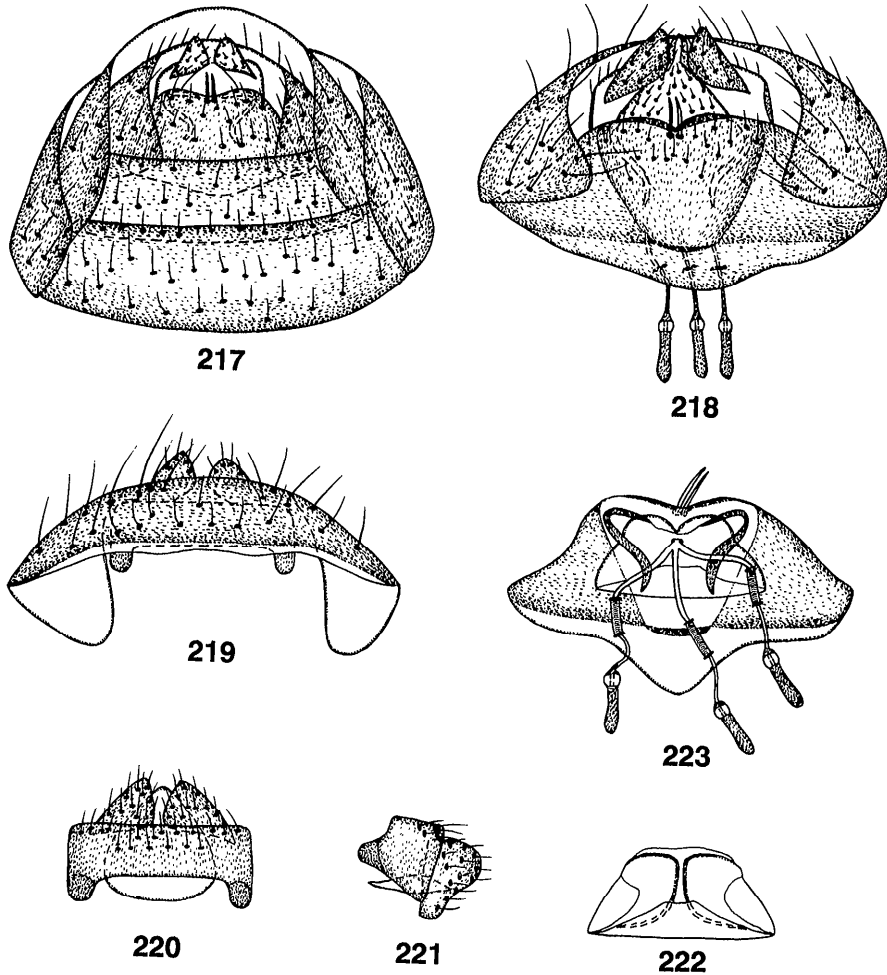
Distribution. Arizona.

Genus *Poecilognathus* JAENNICKE

Poecilognathus JAENNICKE, 1867, Abh. Senckenberg. Naturforsch. Ges. 6: 350. Type species: *Poecilognathus thlipsomyzoides* JAENNICKE, 1867, by monotypy.



Figs. 206–216. *Euryphthiria grandis* EVENHUIS, male genitalia. 206–207, Apex of abdomen, dorsal and posterior views; 208–210, tergum 9 and cerci, dorsal, ventral and lateral views; 211, gonocoxites and gonostyli, ventral view; 212, gonocoxites, dorsal view; 213–214, gonocoxites, gonostyli and aedeagus, lateral and dorsal views. 215–216, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 206–207; 0.5 mm for Figs. 208–216]



Figs. 217–223. *Euryphthiria grandis* EVENHUIS, female genitalia. 217, Apex of abdomen, ventral view; 218, cerci, sternum 10, tergum 8, sternum 8 and spermatheca, ventral view; 219, tergum 8 and cerci, dorsal view; 220–221, tergum 9, cerci and sternum 10, dorsal and lateral views; 222, sternum 9 (?), ventral view; 223, sternum 8, sternum 9 (?), genital fork and spermatheca, dorsal view.

Poecilognathus loewi (PAINTER)

Poecilognathus loewi PAINTER, 1965, A catalog of the Diptera of America north of Mexico, p. 420. (New replacement name for *notata* Loew, 1863). Type locality: California.

Male (Figs. 224–236)

Sternum 10 (at least in haired part) V-shaped. Tergum 9 roughly as long as wide,

rather trapezoid, with posterior margin widely concave, with posterolateral corner darker and with anterolateral stout demarcated process. Fused gonocoxites roughly as long as wide, with anterior margin deeply concave, with posterior margin having paired acute convexities at middle and without ventral median furrow; shape of mid-posterior dorsal sclerite as in Fig. 233; anterolateral part roughly 1/2 as long as gonocoxite. Gonostylus much longer than wide, wider basally and with apex curved dorsally. Dorsal plate + ventral plate (in phallus) forming a tube strongly curved; H-shaped ventral sclerite present at apical portion; two spine-like dorsal processes are present behind dorsal bridge and they have some teeth; anterolateral ventral process tapering anteriorly and pointed at end. Aedeagal apodeme large, rather rectangular, longer than wide, with ventral margin gently concave and with a large band-like extension near base.

Female (Figs 237–245)

Sternum 10 rather triangular. Tergum 9 rectangular, much wider than long, and with anterolateral process pointed at apex. Sternum 8 rather quadrate, with posterior margin having median concavity, and with paired median stout spines near posterior margin. Genital fork consisting of paired lateral bars, each of which is U-shaped in basal part. Each branched spermatheca consisting of (i) basal duct, (ii) granulate duct capped at both ends, (iii) apical duct, and (iv) elongate capsule much longer than wide and with pale part near base.

Specimens examined: 1 ♂, 15 mi. W. Tonopah, Nue Co., Nevada, 7. vii. 1980, J. C. & E. M. HALL; 2 ♀ ♀, Mazourka Canyon, Inyo Co., California, 2. vii. 1953, J. W. MACSWAIN.

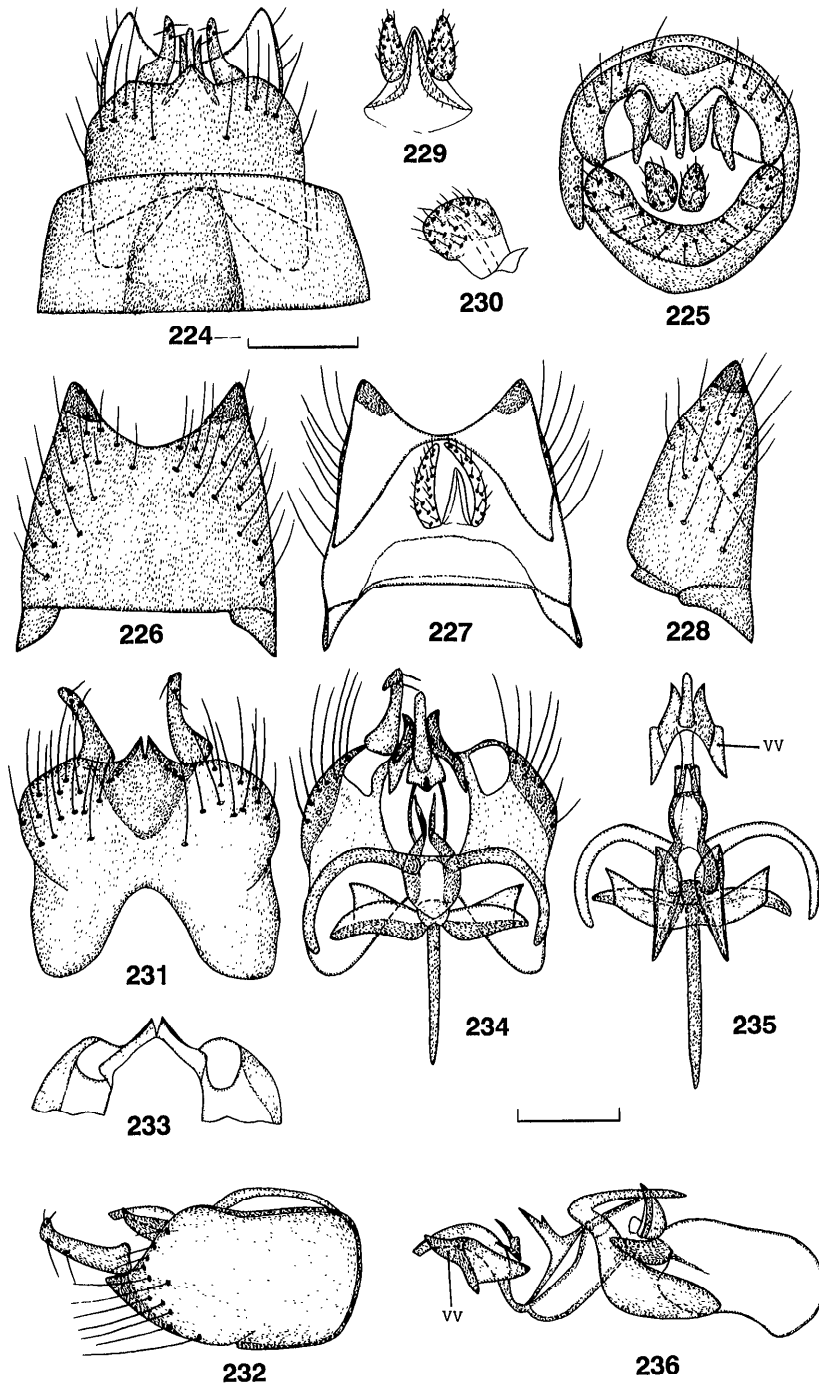
Distribution. California to Utah, s. to Texas.

Poecilognathus thlipsomyzoides JAENNICKE

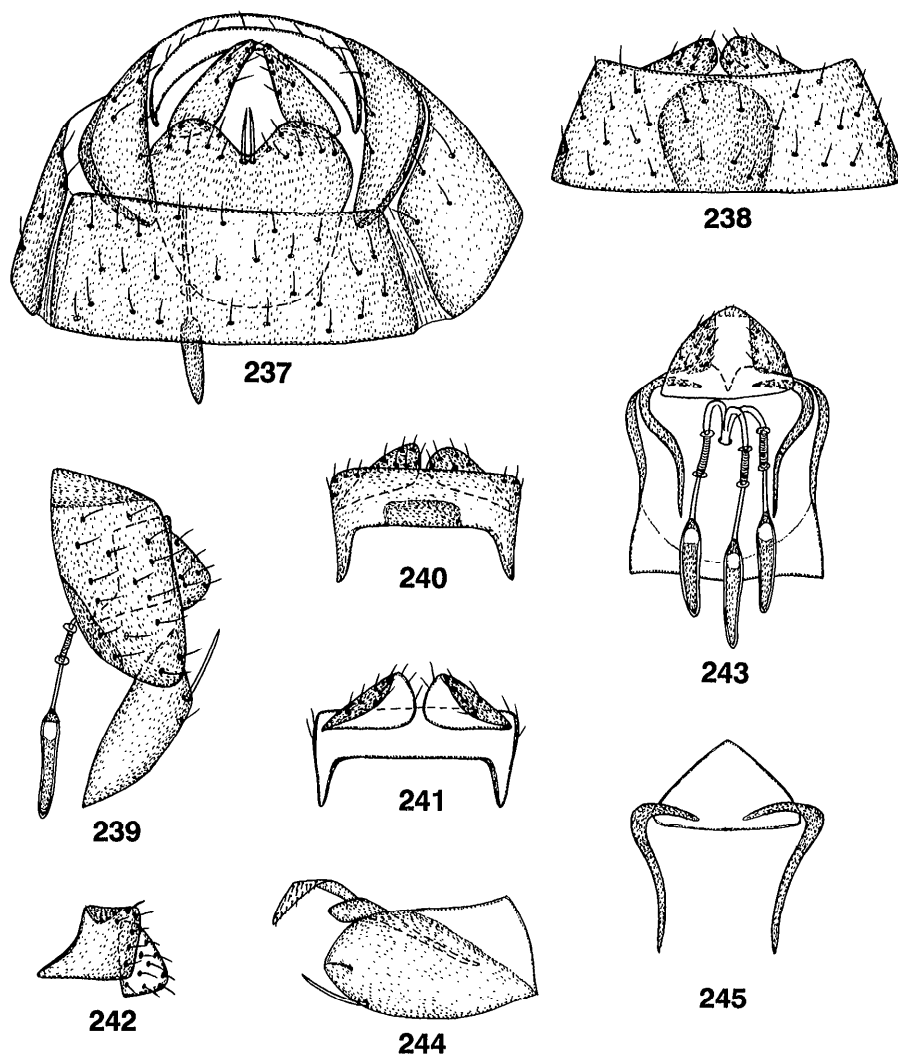
Poecilognathus thlipsomyzoides JAENNICKE, 1867, Abb. Senckenberg. Naturforsch. Ges. 6: 351. Type locality: Mexico.

Male (Figs. 246–256)

Sternum 10 at haired part V-shaped. Tergum 9 quadrate, and with anterolateral demarcated stout projection. Fused gonocoxites wider than long, rather quadrate, with anterior margin widely and deeply concave, with lateral margin having a median slight concavity, and without median ventral furrow; shape of mid-posterior dorsal part as in Fig. 254; anterolateral part over 1/2 as long as gonocoxite. Gonostylus much longer than wide and narrower posteriorly. Dorsal and ventral plates (in phallus) forming a tube; H-shaped ventral sclerite present at apical portion; between distiphallus and dorsal bridge, there are posterior paired dorsal processes and an anterior longer dorsal process (which is bilobed apically); anterolateral ventral process long and pointed at apex. Aedeagal apodeme (except base) circular, with an angle at ventral posterior part, and with a long transverse ventral band near base.



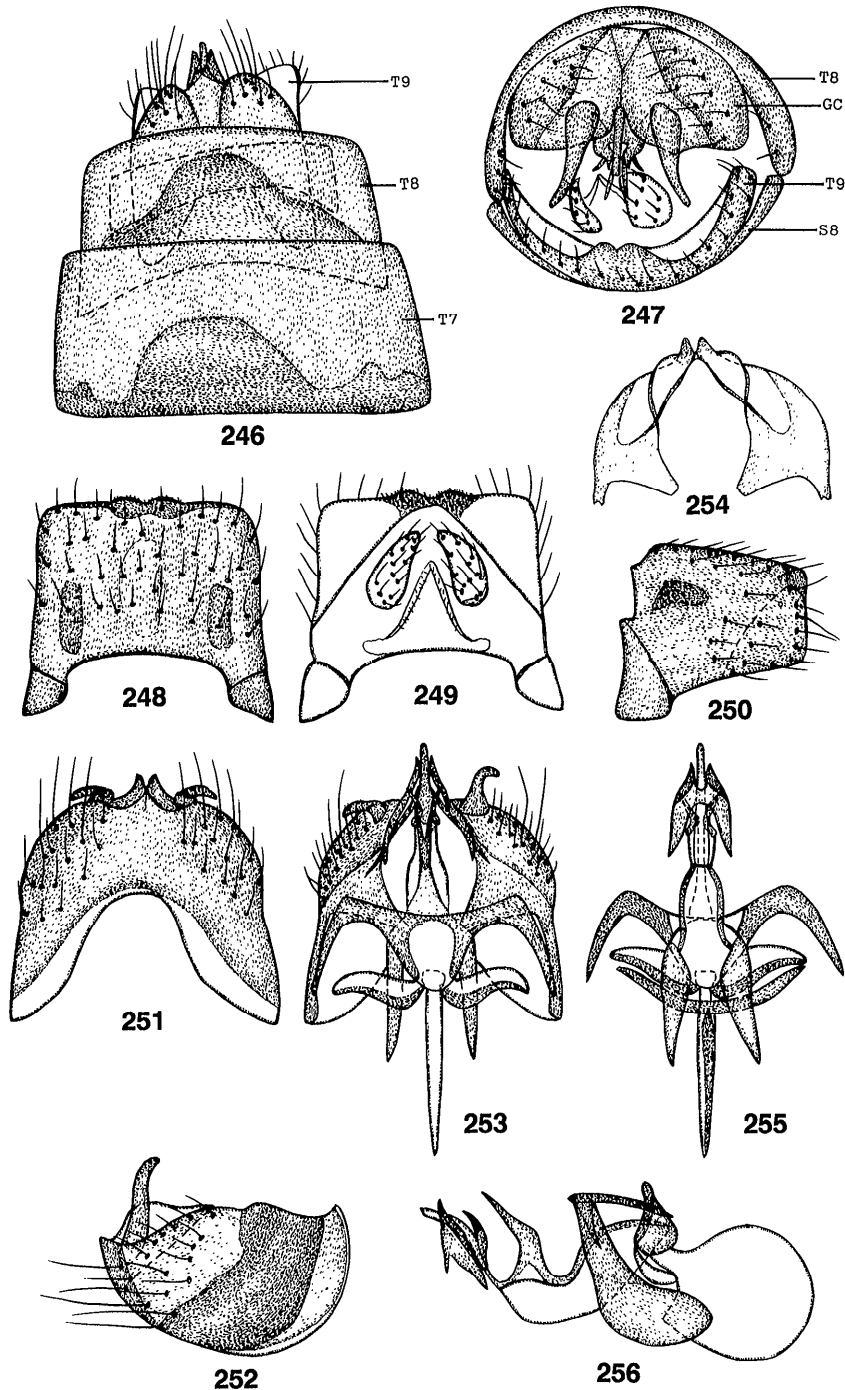
Figs. 224–236. *Poecilognathus loewi* (Painter), male genitalia. 224–225, Apex of abdomen, dorsal and posterior views; 226–228, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 229, cerci and sternum 10, ventral view; 230, cercus, lateral view; 231–232, gonocoxites and gonostyli, ventral and lateral views; 233, posterior part of gonocoxites, dorsal view; 234, gonocoxites, gonostylus and aedeagus, dorsal view; 235–236, aedeagus, ventral and lateral views. [Scale 0.25 mm for Figs. 224–225; 0.2 mm for Figs. 226–236]



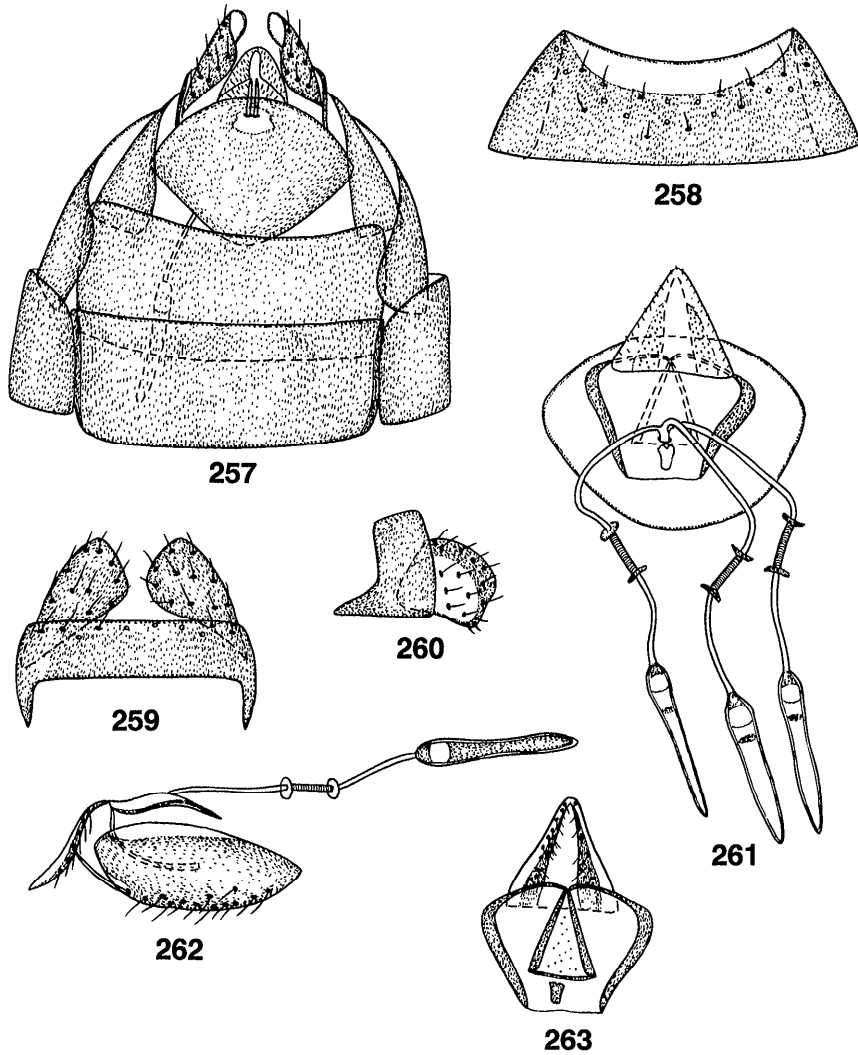
Figs. 237–245. *Poecilognathus loewi* (PAINTER), female genitalia. 237, Apex of abdomen, ventral view; 238, tergum 8 and cerci, dorsal view; 239, tergum 8, cercus, sternum 8 and spermatheca, lateral view; 240–242, tergum 9 and cerci, dorsal, ventral and lateral views; 243, sternum 8, sternum 10 (?), genital fork and spermatheca, dorsal view; 244, sternum 8, etc., lateral view; 245, genital fork and sternum 10 (?), ventral view.

Female (Figs. 257–263)

Similar to *loewi* except as follows: sternum 8 more rounded and with posterior margin having no median concavity; larger triangular plate (which is membranous except borders) and small sclerite present among genital fork (it is unknown whether they belong to genital fork or sternum 9); spermatheca longer.



Figs. 246–256. *Poecilognathus thilipsomyzoides* JAENNICKE, male genitalia. 246–247, Apex of abdomen, dorsal and posterior views; 248–250, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 251–253, gonocoxites, gonostyli and aedeagus, dorsal, lateral and ventral views; 254, posterior part of gonocoxites, dorsal view; 255–256, aedeagus, ventral and lateral views.



Figs. 257–263. *Poecilognathus thlipsomyzoides* JAENNICKE, female genitalia. 257, Apex of abdomen, ventral view; 258, tergum 8, dorsal view; 259–260, tergum 9 and cerci, dorsal and lateral views; 261–262, sternum 8, sternum 10 (?), genital fork and spermatheca, dorsal and lateral views; 263, genital fork and sternum 10 (?), ventral view.

Specimens examined: 1 ♂, 2 ♀♀, 7 mi. E. Puebla, Mexico, 18. viii. 1963, R. H. & E. M. PAINTER.

Distribution. Mexico, Arizona, New Mexico, Colorado, Texas.

Genus *Relictiphthiria* EVENHUIS

Relictiphthiria EVENHUIS, 1986, The genera of the Phthiriinae of Australia and the New

World (Diptera: Bombyliidae). p. 17. Type species: *Relictiphthiria primogenita* EVENHUIS, 1986, by original designation.

Relictiphthiria psi (CRESSON)

Poecilognathus psi CRESSON, 1919, Acad. Nat. Sci. Phila. Proc. 71: 186. Type locality: California.

Male (Figs. 264–274)

Tergum 9 wider than long, rectangular, with anterior margin concave, and with mid-posterior small process. Fused gonocoxites wider than long, rather quadrate, with anterior and posterior margins each having mid concavity, with lateral margin slightly concave; paler wide mid-ventral stripe may be present; shape of mid-posterior dorsal sclerite as in Fig. 272; anterolateral part roughly 1/2 as long as gonocoxite. Gonostylus much longer than wide and narrower posteriorly. Dorsal and ventral plates (in phallus) forming a tube; before distiphallus, there are U-shaped dorsal and triangular ventral vanes; anterolateral ventral process rather large and rounded at apex. Aedeagal apodeme small, elliptical, and with a long transverse ventral basal band which may be crescent-shaped.

Female (Figs. 275–279)

[Tergum 9 and tergum 8 each was not clearly identified]. Sternum 8 widest near base, narrower posteriorly, pointed at apex, and with paired median stout spines far before apex. Genital fork thread-like, with each half U-shaped, connected at mid-posterior part but separated at mid-anterior part. Each branched spermatheca consisting of (i) longer basal duct, (ii) granulate part capped at both ends, (iii) shorter apical duct, and (iv) elongate capsule much longer than wide and without pale part at or near base.

Specimens examined: 1 ♂, 1 ♀, Inyokern, Kern Co., California, 9. vii. 1987, J. C. HALL & N. L. EVENHUIS.

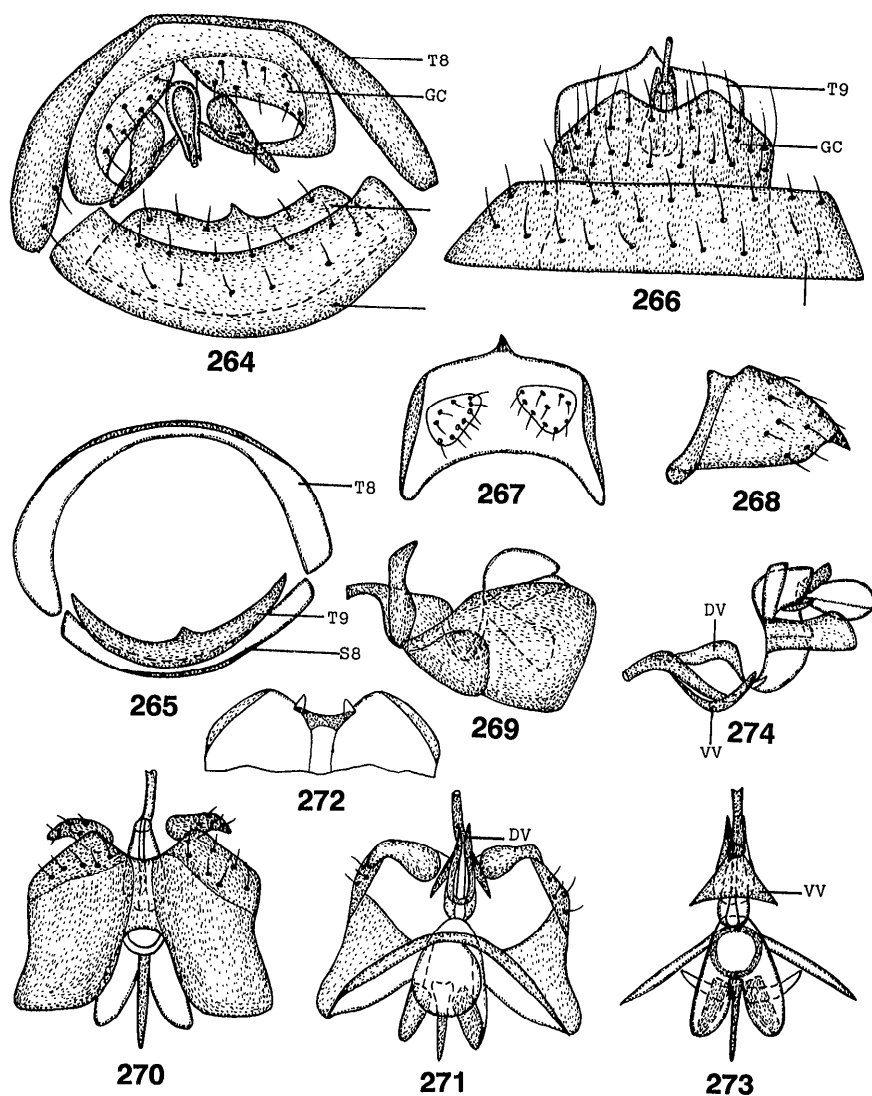
Distribution. California.

Genus *Tmemophlebia* EVENHUIS

Tmemophlebia EVENHUIS, 1986, The genera of the Phthiriinae of Australia and the New World (Diptera: Bombyliidae). p. 19. (New replacement name for *Cyclorhynchus* MACQUART). Type species: *Cyclorhynchus testaceus* MACQUART, 1840, automatic.

Tmemophlebia aldrichi (JOHNSON)

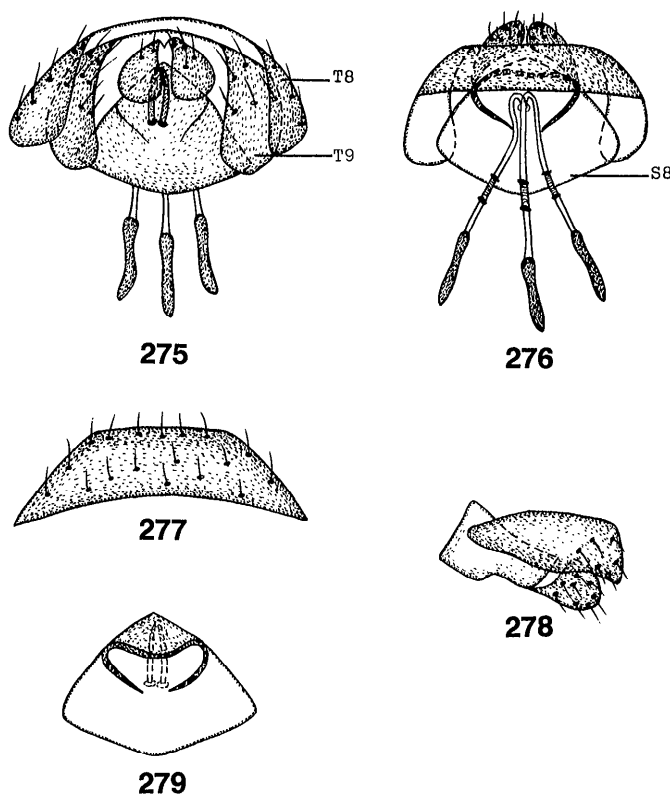
Phthiria aldrichi JOHNSON, 1903, Psyche 10: 184. Type locality: Idaho.



Figs. 264–274. *Relictiphthiria psi* (CRESSON), male genitalia. 264, Apex of abdomen, posterior view; 265, terga 8–9 and sternum 8, posterior view; 266, apex of abdomen, dorsal view; 267–268, tergum 9 and cerci, ventral and lateral views; 269–271, gonocoxites, gonostyli and aedeagus, lateral, ventral and dorsal views; 272, posterior part of gonocoxites, dorsal view; 273–274, aedeagus, ventral and lateral views.

Male (Figs. 280–290)

Cercus elliptical, narrower posteriorly. Tergum 9 roughly as long as wide, rather trapezoid, with posterior margin deeply concave, with posterior inner border darker, and with anterolateral large demarcated process. Fused gonocoxites rather quadrate, with anterior margin deeply concave, with posterior margin concave, with lateral margin having a median shallow concavity, and without median ventral furrow; shape of



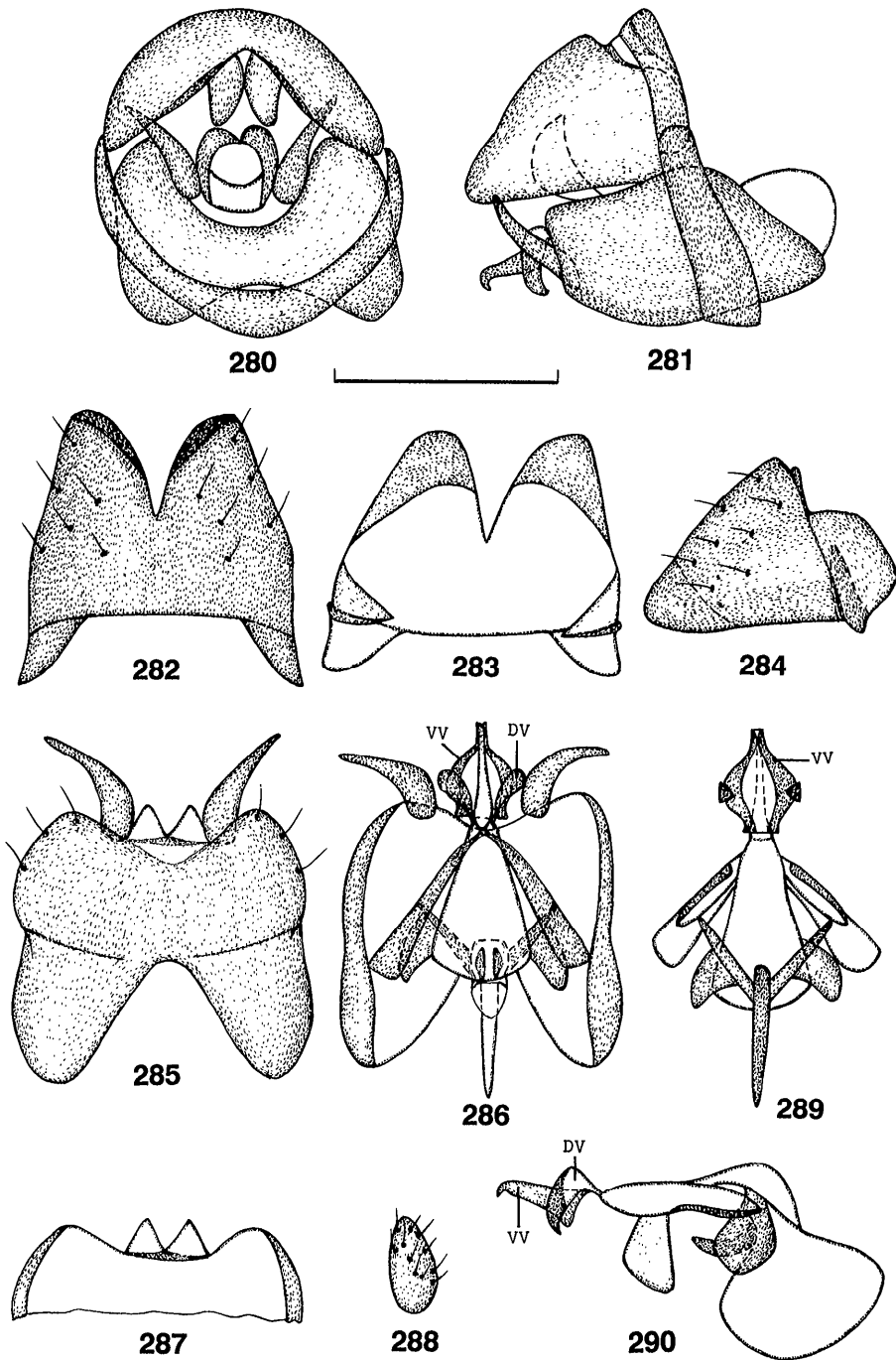
Figs. 275–279. *Relictiphthiria psi* (CRESSON), female genitalia. 275–276, Terga 8–9, cerci, sternum 8, genital fork and spermatheca, ventral and dorsal views; 277, [tergum 8 or tergum 9], dorsal view; 278, tergum 9, sternum 8 and cercus, lateral view; 279, genital fork and sternum 8, dorsal view.

mid-posterior protruded part as in Fig. 287; anterolateral part somewhat over 1/2 as long as gonocoxite. Gonostylus long and narrower posteriorly. Dorsal and ventral plates (in phallus) forming a tube which is tapering apically; V-shaped dorsal sclerite (=DV) present behind dorsal bridge; O-shaped ventral sclerite (=VV) present at apical portion; anterolateral ventral process may be absent; paired dorsal bridges V-shaped and arising from the phallus behind middle. Aedeagal apodeme (except base) rather rounded and with paired long processes running posteriorly.

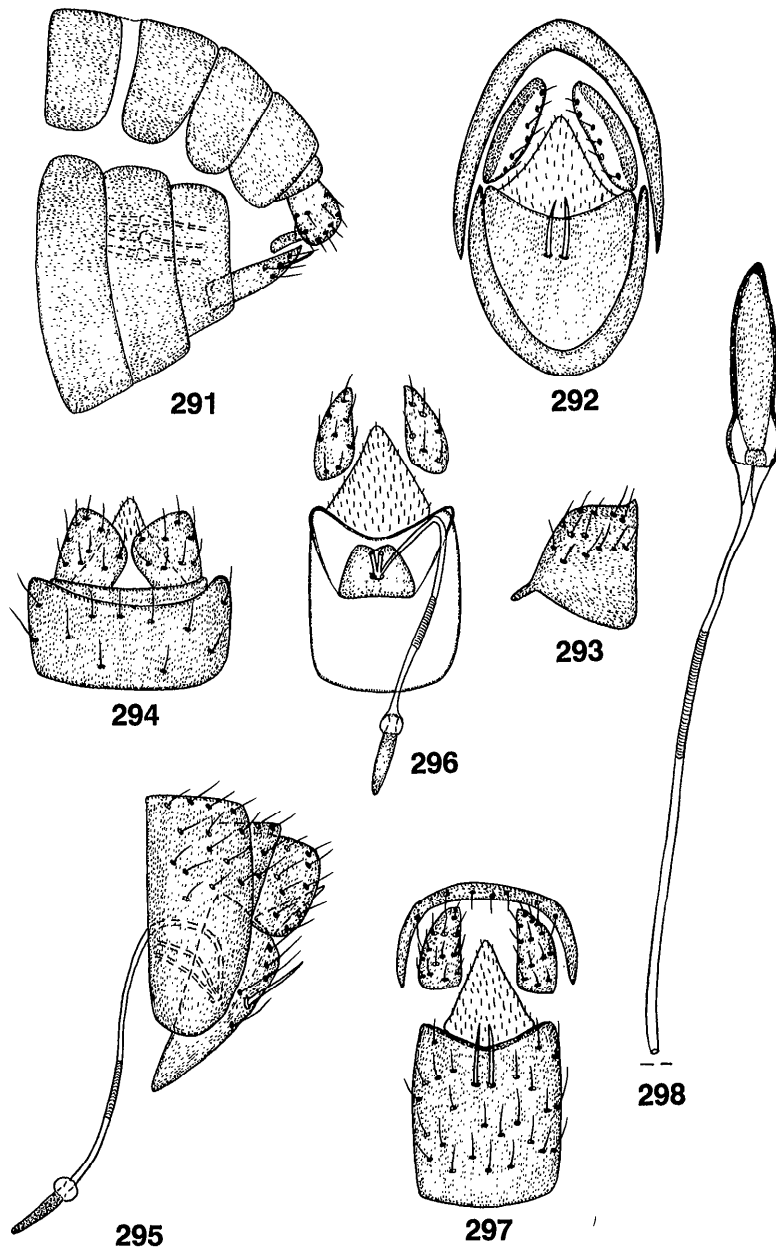
Female (Figs. 291–298)

Sternum 10 triangular and membranous. [Tergum 9 not seen in whole outline]. Sternum 8 quadrate, and with paired median stout spines far before apex. Genital fork thread-like with each half U-shaped, and with large mid-anterior rather trapezoid sclerite. Each branched spermatheca consisting of (i) longer basal duct, (ii) granulate part not capped at both ends, (iii) shorter apical duct, and (iv) nipple-like capsule, of which apical darker part much longer than wide.

Specimens examined: 1 ♂, 21 mi. E. Villa Union, Sin., Mexico, 1. ii. 1964, E. I.



Figs. 280–290. *Tmemophlebia aldrichi* (JOHNSON), male genitalia. 280–281, Apex of abdomen, posterior and lateral views; 282–284, tergum 9, dorsal, ventral and lateral views; 285, gonocoxites and gonostyli, ventral view; 286, gonocoxites, gonostyli and aedeagus, dorsal view; 287, posterior part of gonocoxites, dorsal view; 288, cercus; 289–290, aedeagus, ventral and lateral views. [Scale 0.2 mm]



Figs. 291–298. *Tmemophlebia aldrichi* (JOHNSON), female genitalia. 291–292, Apex of abdomen, lateral and posterior views; 293, tergum 8, lateral view; 294, terga 8–9, cerci and sternum 10, dorsal view; 295, terga 8–9, cercus, sternum 8 and spermatheca, lateral view; 296–297, tergum 9, sternum 8, cerci, sternum 10, genital fork and spermatheca, dorsal and ventral views; 298, spermatheca (basal part is cut off).

SCHLINGER; 1 ♀, 5 mi. N. La Pine, Deschutes Co., Oregon, 15. vii. 1980, J. C. & E. M. HALL.

Distribution. Idaho, Oregon, South Dakota, New Mexico, Texas, Mexico.

Tmemophlebia coquilletti (JOHNSON)

Phthiria coquilletti JOHNSON, 1902, *Canad. Ent.* 34: 240. Type locality: New Jersey.

Male (Figs. 299–309)

Tergum 9 with anterior margin having wide concavity, with posterior margin having deep concavity. Fused gonocoxites rather quadrate, with anterior margin having deep concavity, and with paler mid-ventral stripe; [shape of mid-posterior dorsal sclerite uncertain; see Fig. 307]; anterolateral part less than 1/2 as long as gonocoxite. Gonostylus much longer than wide and narrower posteriorly. Dorsal and ventral plates forming a tube which is tapering posteriorly; U-shaped dorsal sclerite (=DV) present before distiphallus; endophallic sclerite may be small; anterolateral ventral process may be absent. Aedeagal apodeme (except base) rather rectangular and with a transverse band near base.

Female (Figs. 310–316)

Similar to *aldrichi* except as follows: tergum 9 with paired ventral processes directed anteriorly [tergum 9 of *aldrichi* not examined]; mid-anterior sclerite of genital fork smaller, rather triangular, and with mid-anterior concavity; each spermatheca shorter and without granulate part.

Specimens examined: 1 ♂, Medora, Kansas, 4. vii., R. H. PAINTER; 1 ♀, Medora, Kansas, 23. ix., R. H. PAINTER.

Distribution. New Jersey, Kansas, Illinois, Michigan, Massachusetts.

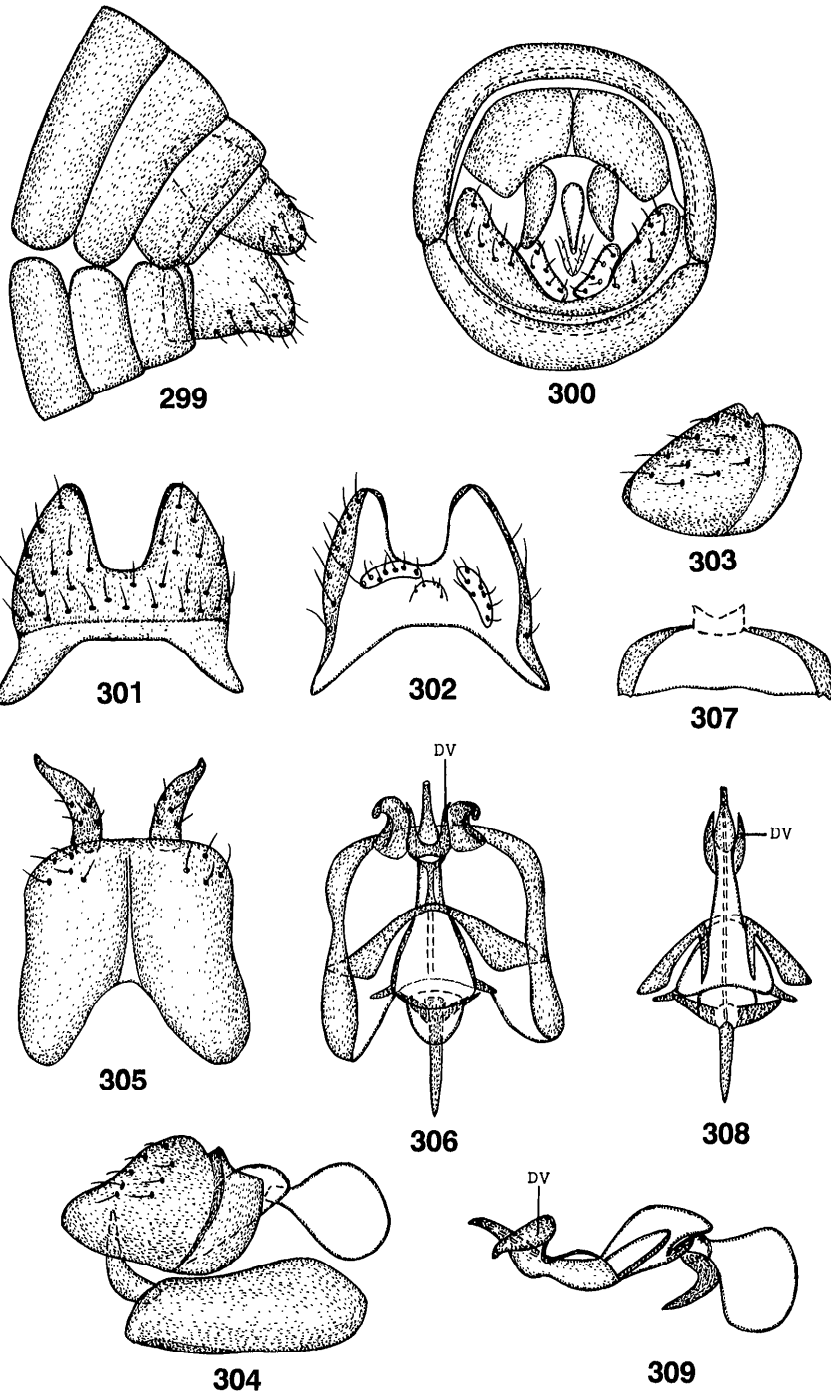
Subfamily Usiinae

Male

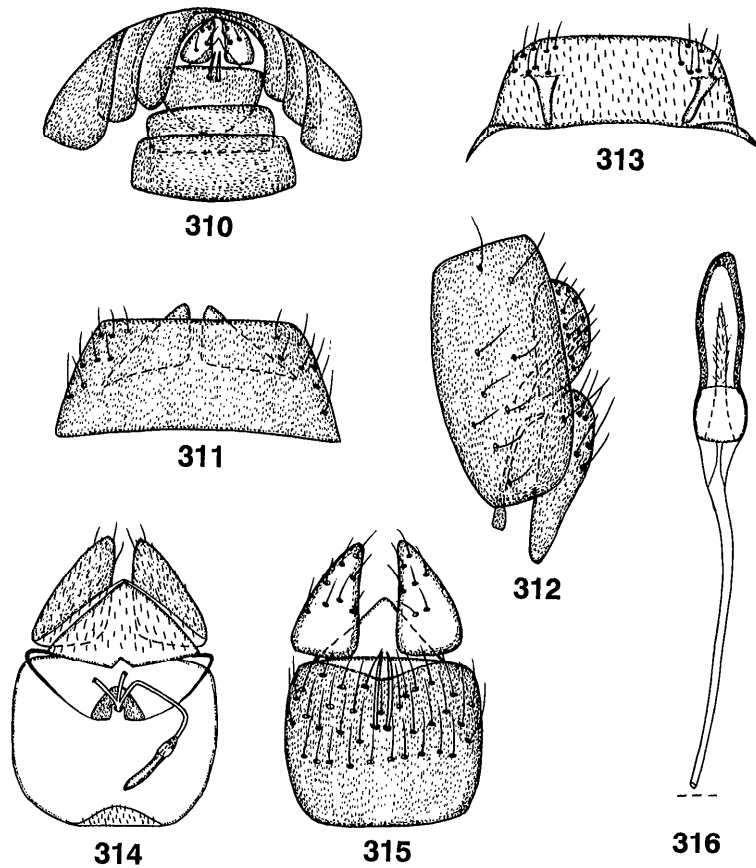
Based on 1 genus and 1 species. *Parageron* sp. may be characterized as follows: Anterolateral part of fused gonocoxites demarcated and rounded; the protruded gonocoxal apodeme is situated beneath this part and is rather thin. Fused gonocoxites widely separated. Sternum 9 absent. Aedeagal apodeme in lateral view rather thin and curved vertically at apex. Paired anterolateral ventral processes (in phallus) markedly diverging anteriorly.

Female

Based on 1 genus and 1 species. See description of *Parageron* sp.



Figs. 299–309. *Tmemophlebia coquilletti* (JOHNSON), male genitalia. 299–300, Apex of abdomen, lateral and posterior views; 301–303, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 304, tergum 9, gonocoxite, gonostylus and aedeagus, lateral view; 305–306, gonocoxites, gonostyli and aedagus, ventral and dorsal views; 307, posterior part of gonocoxites, dorsal view; 308–309, aedeagus, ventral and lateral views.



Figs. 310–316. *Tmemophlebia coquilletti* (JOHNSON), female genitalia. 310, Apex of abdomen, ventral view; 311–312, tergum 8, cerci and sternum 8, dorsal and lateral views; 313, tergum 9, ventral view; 314–315, sternum 8, cerci, sternum 10, genital fork and spermatheca, dorsal and ventral views; 316, spermatheca (basal part is cut off).

Genus *Parageron* PARAMONOV

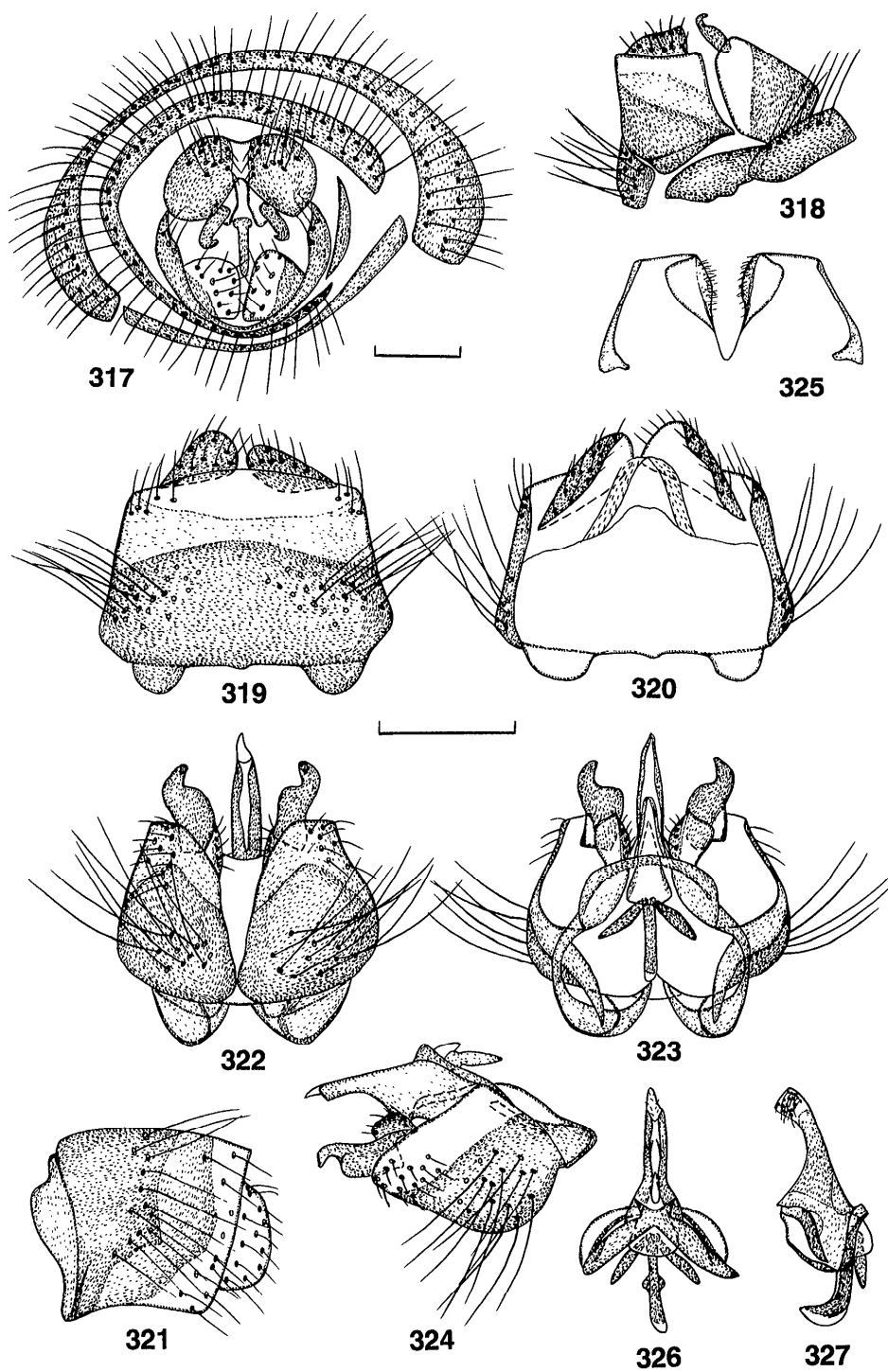
Parageron PARAMONOV, 1929, Trudy phys.-nath. Vidd. Ukr. Akad. Nauk 11(2): 189.

Type species: *Parageron orientalis* PARAMONOV, 1929 [= *Usia lutescens* BEZZI, 1925], by monotypy.

Parageron sp.

Male (Figs. 317–327)

Cercus narrower anteriorly and pointed at end. Sternum 10, U or V-shaped. Tergum 9 rectangular or trapezoid, wider than long, and with anterolateral rounded process near corner. Paired gonocoxites (except near base) widely separated and each



Figs. 317–327. *Parageron* sp., male genitalia. 317–318, Apex of abdomen, posterior and lateral views; 319–321, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 322–324, gonocoxites, gonostyli and aedeagus, ventral, dorsal and lateral views; 325, posterior part of gonocoxites, dorsal view; 326–327, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 317–318; 0.5 mm for Figs. 319–327]

gonocoxite narrower posteriorly; sternum 9 absent; gonocoxal apodeme large and rounded (anterolateral dorsal process, which is slender and pointed at end, may represent true gonocoxal apodeme). Gonostylus abruptly narrower posteriorly. Dorsal and ventral plates (in phallus) forming a tube and Y-shaped in ventral view; paired anterolateral ventral processes diverging anteriorly and with posterior paired teeth; paired dorsal bridges shallowly U-shaped. Endophallic sclerite slender. Aedeagal apodeme in lateral view stick-like and curved ventrally at anterior portion which is pale apically.

Female (Figs. 328–340)

Cercus relatively short and irregular quadrilateral. Tergum 10 (= acanthophorites) absent. Tergum 9 rather rectangular, wider than long, and without anterolateral process. Tergum 8 rather rectangular, much wider than long, with lateral part folded ventrally and without mid-anterior projection. Sternum 8 in dorsal view with anterior margin V-shaped, with posterior margin convex and having a median incision. Genital fork with a mid-anterior part rectangular, longer than wide, having anterior part folded dorsally, and with lateral bar more or less convex outward. Spermatheca short; each branched spermatheca with granulate section; capsule elongate, wider apically, and with apex rounded.

Specimens examined: 1 ♂, Tunisia Bulla Regia, 29. iv. 1981, E. S. Ross; 1 ♂, Tunisia Thuburbo Majus, near Pont du Fabs, S. of Tunis, 26. iv. 1981, E. S. Ross; 1 ♀, Tunisia Béja Region, 30. iv. 1981, E. S. Ross.

Distribution. Tunisia.

Subfamily Ecliminae

Male

Not examined.

Female

Based on 1 genus and 1 species.

Genus *Tillyardomyia* TONNOIR

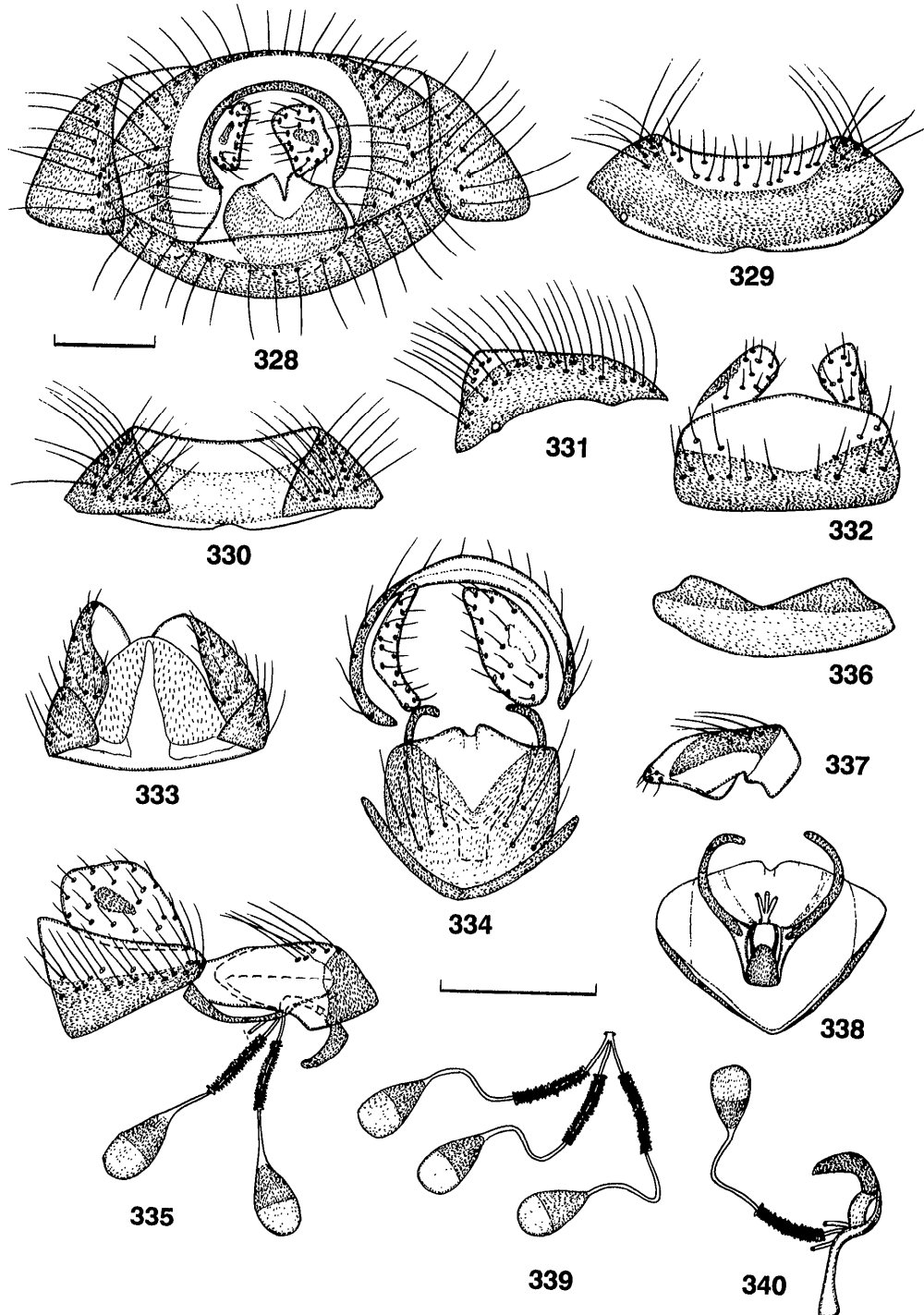
Tillyardomyia TONNOIR, 1927, Rec. Canterbury Mus. 3: 101. Type species: *Tillyardomyia gracilis* TONNOIR, 1927, by monotypy.

Tillyardomyia gracilis TONNOIR

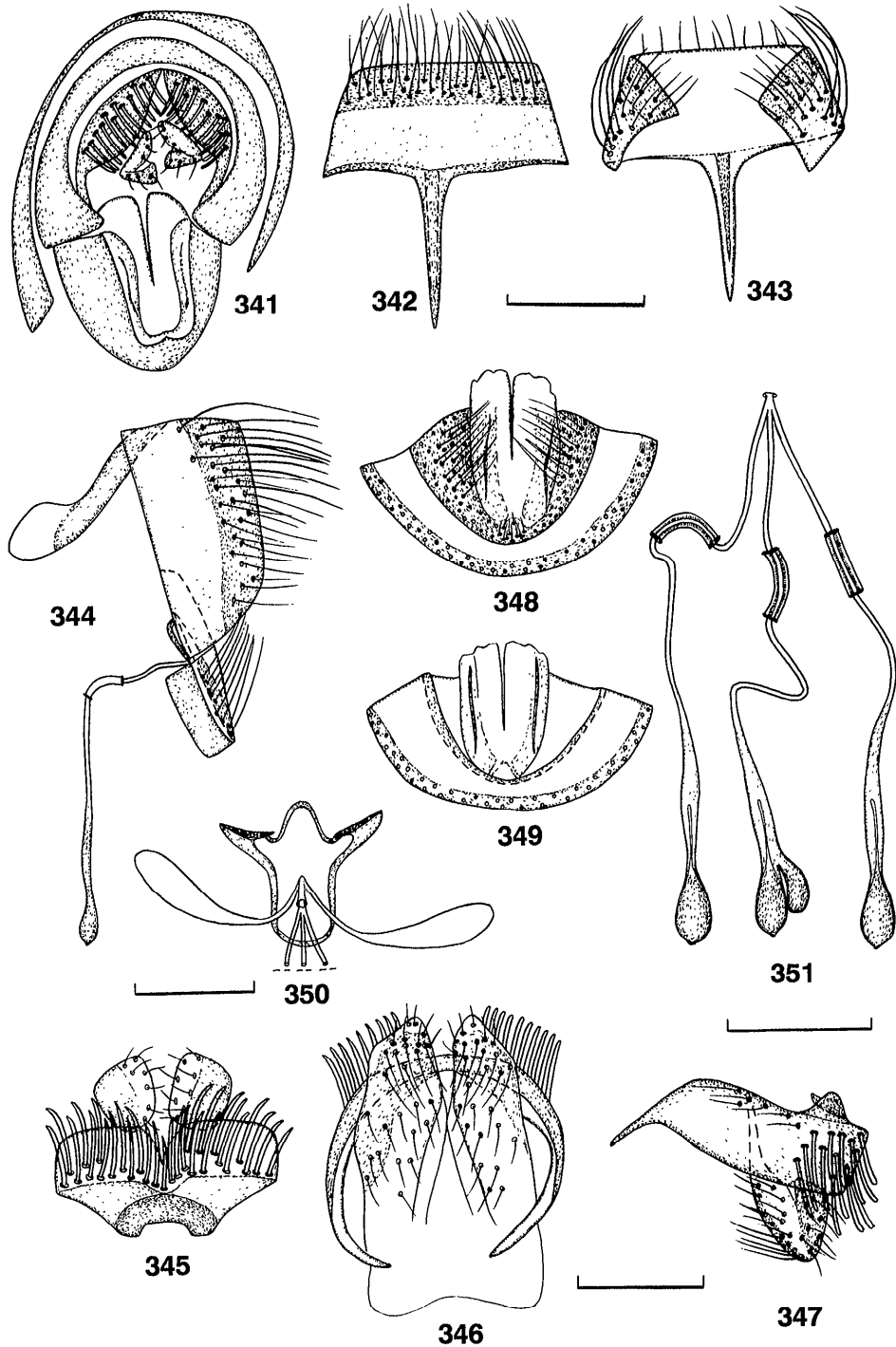
Tillyardomyia gracilis TONNOIR, 1927, Rec. Canterbury Mus. 3: 103. Type locality: New Zealand.

Male

Not examined.



Figs. 328–340. *Parageron* sp., female genitalia. 328, apex of abdomen, posterior view; 329–331, tergum 8, dorsal, ventral and lateral views; 332–333, tergum 9, cerci and sternum 10, dorsal and ventral views; 334–335, tergum 9, cerci, sternum 8, genital fork and spermatheca, ventral and lateral views; 336–337, sternum 8, anterior and lateral views; 338, sternum 8 and genital fork, dorsal view; 339, spermatheca; 340, genital fork and spermatheca, lateral view. [Scale 0.5 mm for Figs. 328–331; 0.5 mm for Figs. 332–340]



Figs. 341–351. *Tillyardomyia gracilis* TONNOIR, female genitalia. 341, Apex of abdomen, posterior view; 342–343, tergum 8, dorsal and ventral views; 344, tergum 8, sternum 8 and spermatheca, lateral view; 345–347, terga 9 + 10 and cerci, anterior, ventral and lateral views; 348–349, sternum 8, dorsal and ventral views; 350, genital fork and accessory gland, dorsal view; 351, spermatheca. [Scale 0.5 mm for Figs. 341–344; 0.3 mm for Figs. 345–349; 0.3 mm for Fig. 351]

Female (Figs. 341–351)

Cercus long and large. Tergum 9+10 not divided but fused; with posterior part having 28 (or so) stout spines irregularly arranged; see Figs. 341, 345–346. Tergum 8 trapezoid, wider than long, with lateral part folded ventrally and with mid-anterior projection. Sternum 8 with anterior margin semicircular, with mid-posterior part bilobed and surrounded by U-shaped band having dorsal hairs. Genital fork U-shaped; thin band present between bases of lateral bars which are protruded outward; anterior bar shorter than lateral bar. Spermathecal median capsule with two heads, of which one is smaller than the other; each branched spermatheca with a median longitudinal incision before capsule and with a widened section having inner tube.

Specimen examined: 1 ♀, Lake Rotoiti, Nelson Lakes, New Zealand, 18–23. xii. 1983, L. MASNER.

Distribution. New Zealand.

Subfamily Oligodraninae

Male

Not examined.

Female

Based on 1 genus and 1 species.

Genus *Oligodranes* LOEW

Oligodranes LOEW, 1844, Stett. Entomol. Ztg. 5: 160. Type species: *Oligodranes obscuripennis* LOEW, 1844, by subsequent designation of BECKER (1913).

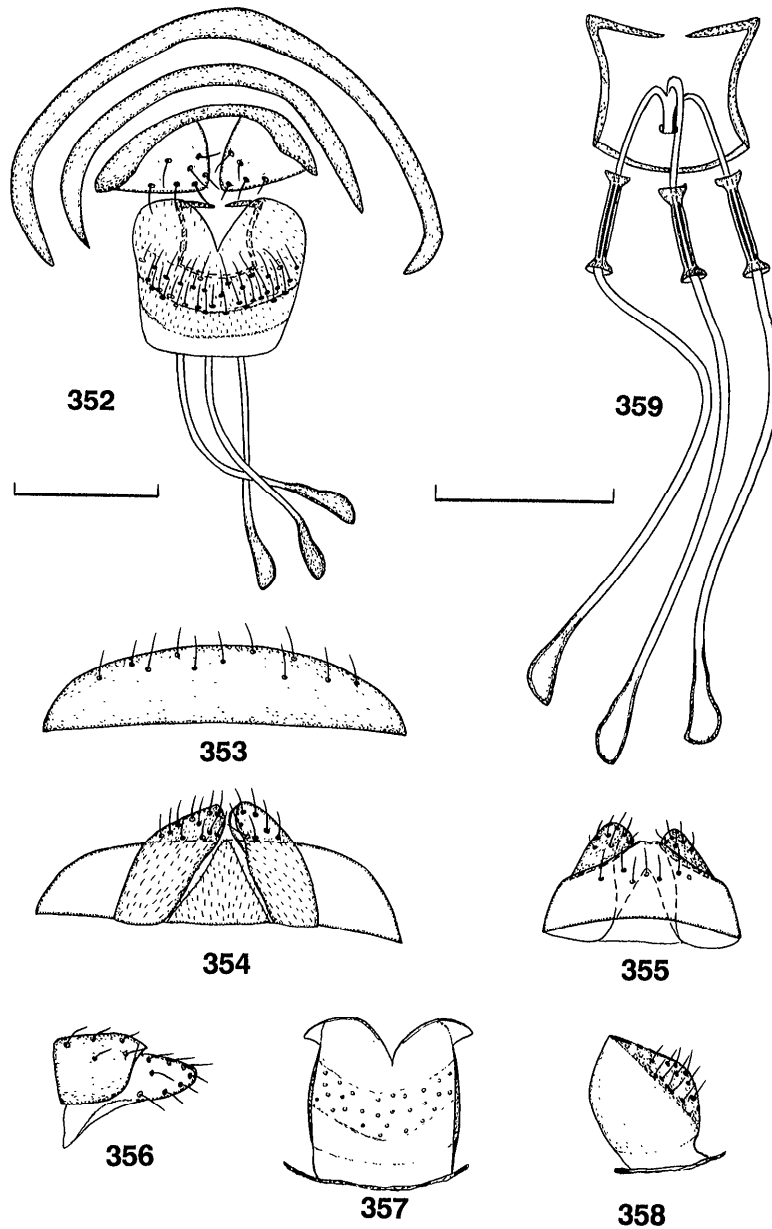
Oligodranes sp.

Male

Not examined.

Female (Figs. 352–359)

Cercus relatively short. Tergum 10 (=acanthophorites) absent. Sternum 10 membranous and triangular. Tergum 9 in dorsal view much wider than long, narrower posteriorly, rather pentagonal, with posterior margin short and straight. Tergum 8 much wider than long, wider than tergum 9, not longer than tergum 9, semicircular, short, and without mid-anterior projection. Sternum 8 rather quadrate, with posterior part bilobed, and with a band having dorsal hairs. Genital fork with anterior bar about as long as the lateral whose base has a long process directed inward. Each branched spermatheca consisting of (i) shorter basal duct, (ii) a section capped at both ends, (iii) long apical duct, and (iv) capsule gradually wider apically and with apex bluntly pointed or rounded.



Figs. 352–359. *Oligodranes* sp., female genitalia. 352, Terga 7–9, cerci, sternum 8 and spermatheca, ventral view; 353, tergum 8, dorsal view; 354, tergum 8, cerci and sternum 10, ventral view; 355–356, tergum 9 and cerci, dorsal and lateral views; 357–358, sternum 8, ventral and lateral views; 359, genital fork and spermatheca. [Scale 0.25 mm for Figs. 352–358; 0.2 mm for Figs. 359]

Specimen examined: 1 ♀, Palestine, 23. iv. 1955, O. THEODOR.
Distribution. Palestine.

Subfamily Cythereinae

Male

Based on 3 genera and 3 species. The male genitalia of *Sericosoma* are conspicuously different from those of *Cytherea* and *Neosardus*. YEATES (1994) separated *Sericosoma* from the remaining subfamilies of Bombyliidae saying (p. 152), "*Sericosoma* falls between the Crociidiinae and Mariobezziinae on the cladogram (fig. 7), and I am unsure of its correct subfamily placement so leave the genus *incertae sedis* at present and (p. 141) I expect that further analysis of it and related genera will prove that they belong in the Mariobezziinae."

Cytherea and *Neosardus* : Phallus with two tubes, of which the dorsal one is wide and thick. Fused gonocoxites widest around middle or at base, with sternum 9, with median ventral furrow, with or without gonocoxal apodeme. Tergum 9 trapezoid or so and with or without anterolateral process.

Sericosoma: Phallus with one tube; aedeagal apodeme thin in lateral view; anterolateral ventral process (in phallus) thin in ventral view; endophallic sclerite appears to be absent. Fused gonocoxites much longer than wide, somewhat narrower anteriorly, with posterior margin having paired lateral concavities and a median distinct concavity, with transverse anterior ventral band (which is perhaps not sternum 9), without ventral median furrow, and with gonocoxal apodeme thick. Tergum 9 rather trapezoid or roughly rectangular and with a long anterolateral process.

Female

Based on 3 genera and 3 species. Cercus long. Tergum 10 present. Tergum 8 with a large mid-anterior projection. Each spermathecal duct without a section capped at both ends and with capsule having narrow basal part and apex or without capsule demarcated.

Genus *Cytherea* FABRICIUS

Cytherea FABRICIUS, 1794, Entom. Syst. 4: 413. Type species: *Cytherea obscura* FABRICIUS, 1794, automatic.

Cytherea (Chalcochiton) holosericea (FABRICIUS)

Anthrax holosericea FABRICIUS, 1794, Entom. Syst. 4: 258. Type locality: "Barbaria" (Algeria).

Male (Figs. 360–370)

[There are two pairs of elongate membranes or sclerites, both of which may belong to sternum 10]. Tergum 9 rather trapezoid and with anterior and posterior margins each having no concavity. Fused gonocoxites wider than long, with basal half widened, with gonocoxal apodeme rather long, with wide median ventral furrow, and with sternum 9 triangular and much wider than long; shape of mid-posterior dorsal parts as in Fig. 368. Gonostylus much longer than wide and with posterior part narrowed and pointed at apex. Phallus (except apical part) divided into dorsal and ventral plates; dorsal plate composed of paired long bars; ventral plate with an acute process far before apex of phallus which is widened and rounded in dorsal or ventral view; anterolateral ventral process rather long. Aedeagal apodeme in lateral view composed of rather rounded widened apical part and rectangular narrower basal part.

Female (Figs. 371–378)

Cercus long. Tergum 10 paired, long, with each posterior part having 7 (or so) stout spines. Tergum 9 trapezoid, much longer than wide, and with ventrally folded anterolateral part pointed at apex. Tergum 8 trapezoid, longer and wider than tergum 9, with lateral part folded ventrally and with mid-anterior projection. Sternum 8 wider than long, widest at base, rounded and bilobed posteriorly. Sternum 8 has a large trapezoid membrane folded dorsally and with haired posterior border, but this membrane may easily be broken off and missing in some individuals. Genital fork U-shaped, with base T-shaped. Each branched spermatheca long, with median darker section, and with apical part (=capsule) somewhat widened, longer than wide, and rounded at apex.

Specimens examined: 1 ♂, 1 ♀, Corse-Col de Barella, 1,250 m, Corsica, vi. 1966, P. du MERLE.

Distribution. Europe, Asia (Iran, Afghanistan), North Africa (Algeria, Tunisia, Morocco).

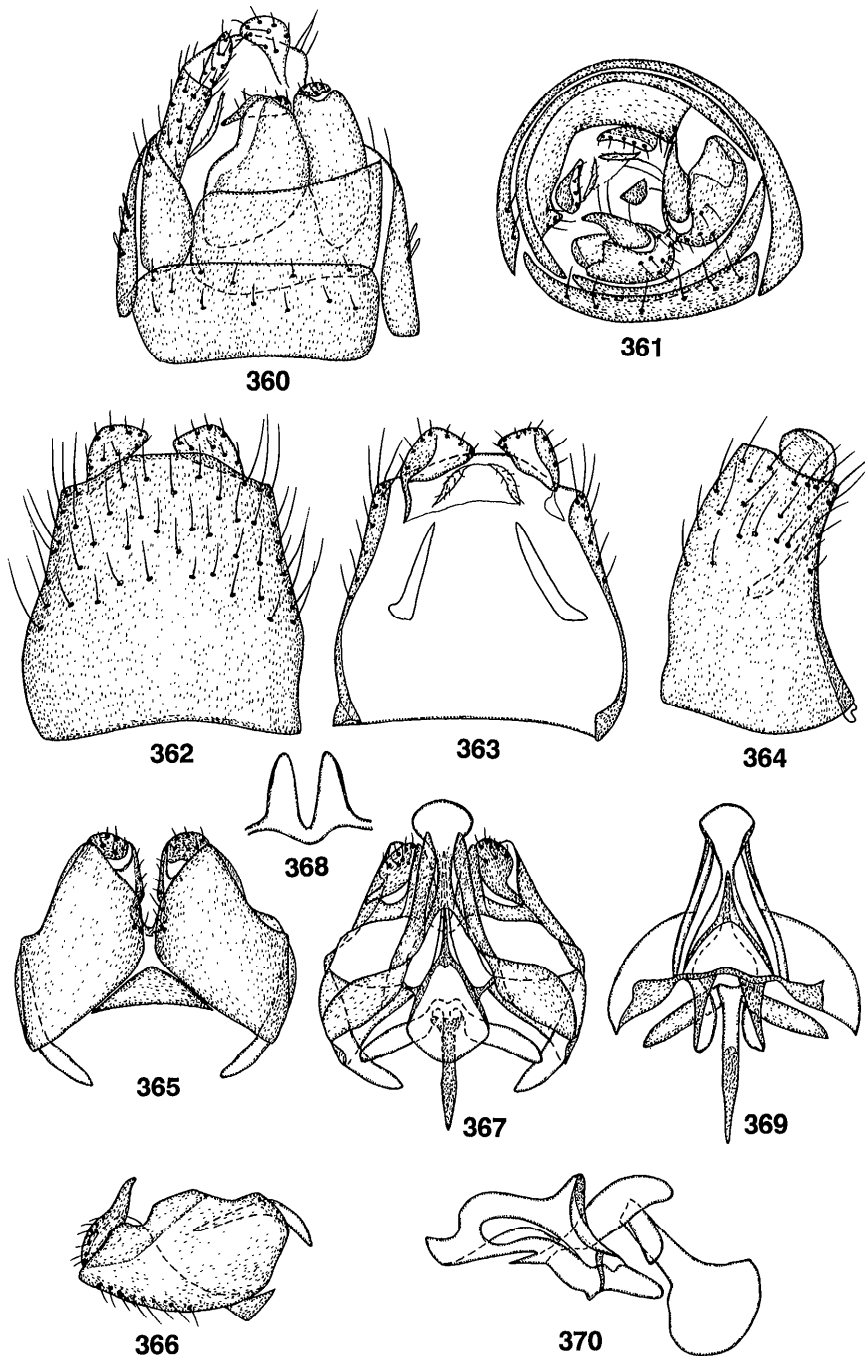
Genus *Neosardus* ROBERTS

Neosardus ROBERTS, 1929, Proc. Linn. Soc. N. S. W. 54: 560. Type species: *Neosardus principius* ROBERTS, 1929, by original designation.

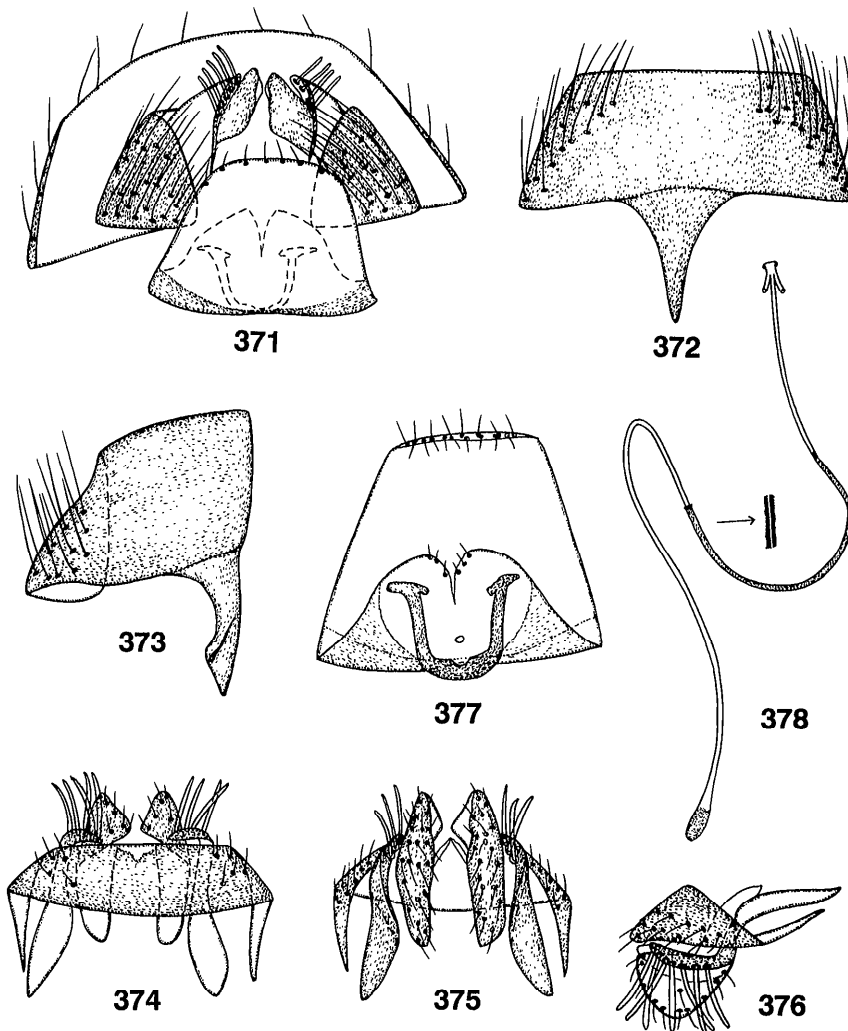
Neosardus sp.

Male (Figs. 379–388)

[There are paired elongated membranes which may belong to sternum 10]. Tergum 9 rather trapezoid, and with rather long anterolateral extension. Fused gonocoxites rather trapezoid, with lateral margin convex, with wide median ventral furrow, and with sternum 9 short and rather triangular; shape of mid-posterior dorsal part as in Fig. 386. Gonostylus rather large and with apical part narrowed. Dorsal sclerite (= dorsal vane) wide and rounded at apical part and bilobed at basal (or anterior) part; ventral sclerite (= dorsal + ventral plates) narrowed at apical part having median process;



Figs. 360–370. *Cytherea (Chalcochiton) holosericea* FABRICIUS, male genitalia. 360–361. Apex of abdomen, ventral and posterior views; 362–364, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 365–366, gonocoxites, gonostyli and sternum 9, ventral and lateral views; 367, gonocoxites, gonostyli and aedeagus, dorsal view; 368, mid-posterior part of gonocoxites, dorsal view; 369–370, aedeagus, ventral and lateral views.

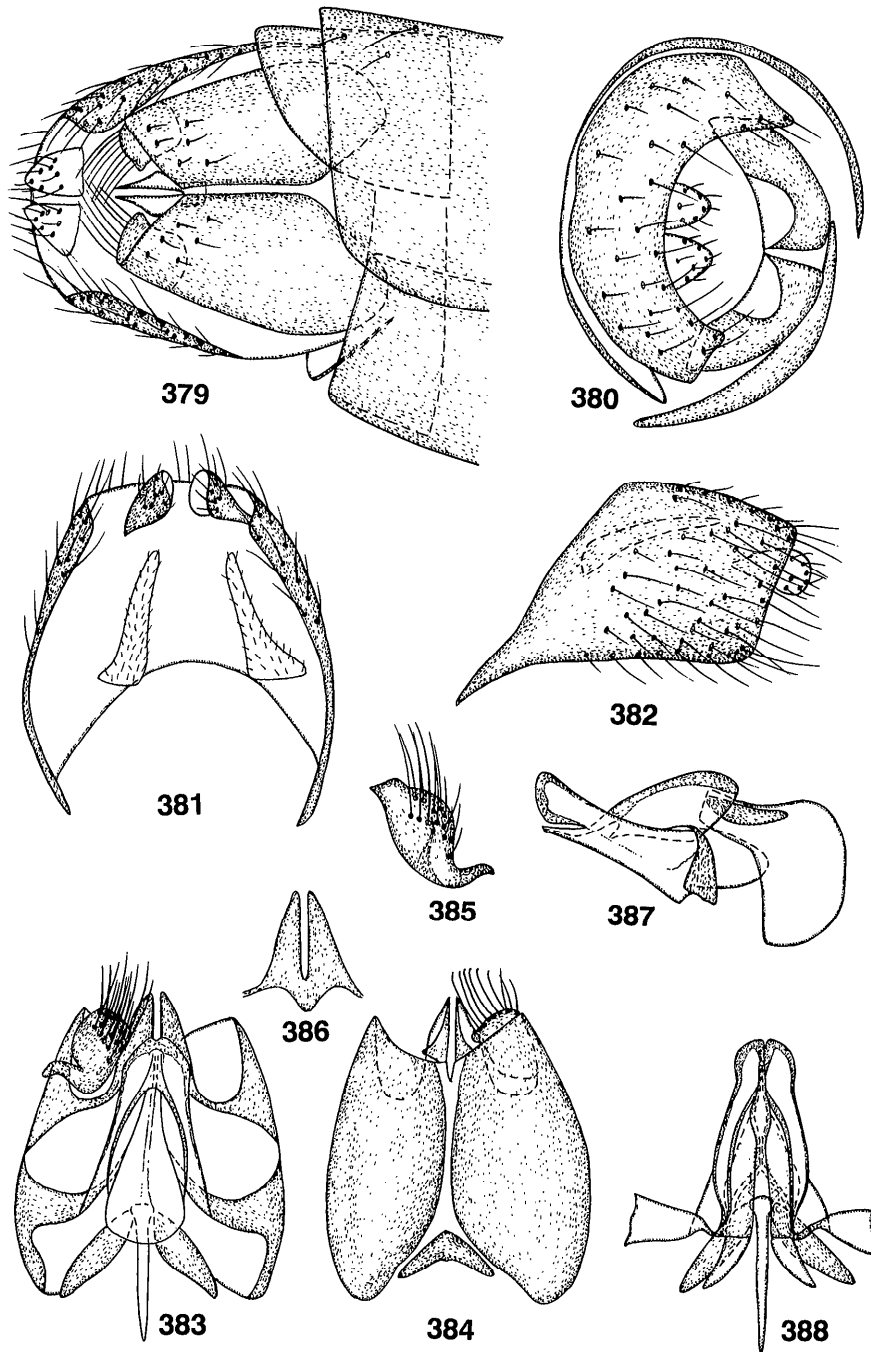


Figs. 371–378. *Cythera (Chalcochiton) holosericea* FABRICIUS, female genitalia. 371, Apex of abdomen, ventral views; 372–373, tergum 8, dorsal and lateral views; 374–376, terga 9–10, cerci and sternum 10, dorsal, ventral and lateral views; 377, sternum 8 and genital fork, ventral view; 378, spermatheca.

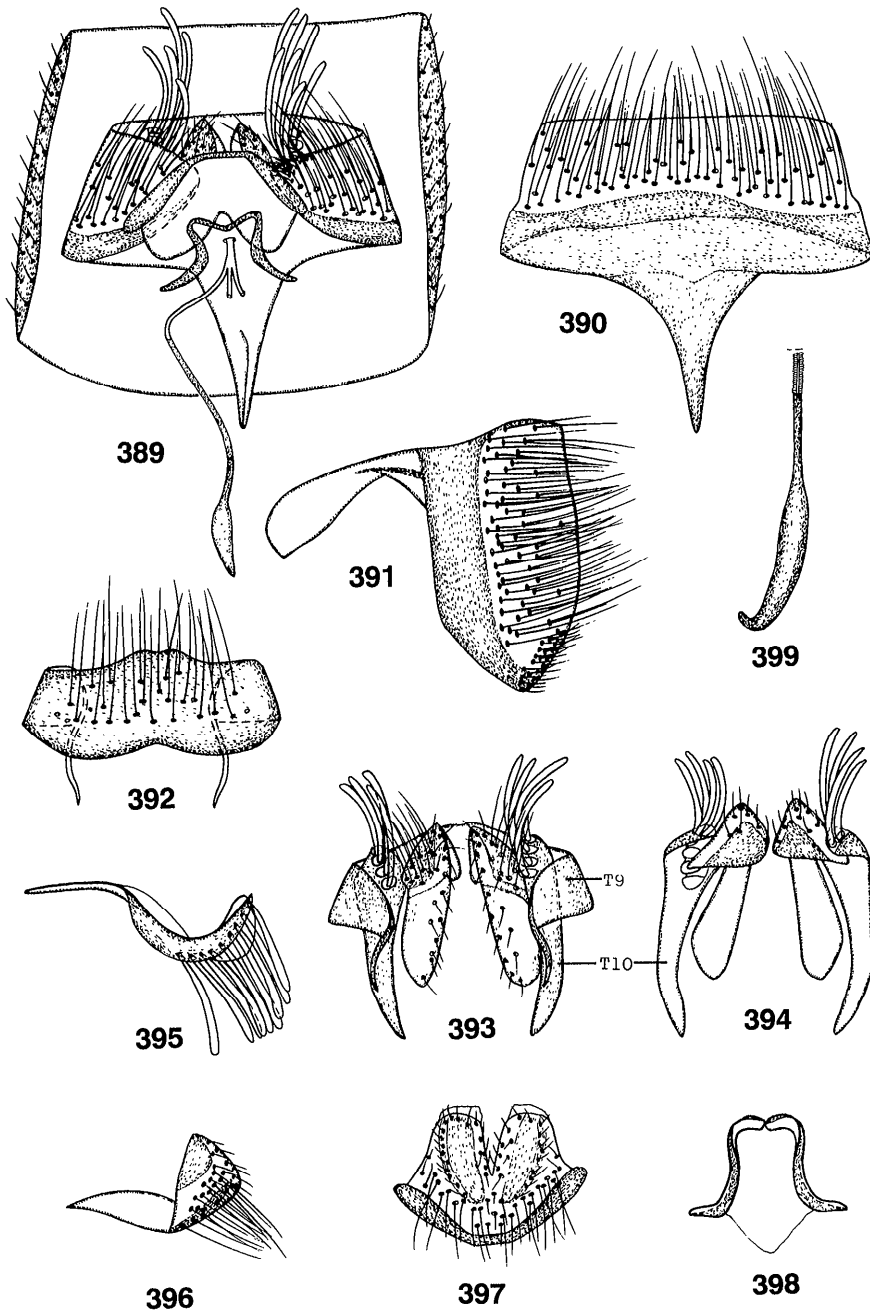
anterolateral ventral process (in ventral view) elongate and pointed at apex. Aedeagal apodeme (except base) rather rectangular.

Female (Figs. 389–399)

Cercus long. Tergum 10 long, and with posterior part having 9 (or so) stout spines. Tergum 9 rather rectangular, much wider than long, and with lateral part folded ventrally and becoming thin and pointed apically. Tergum 8 much larger than tergum 9, with lateral part folded ventrally, and with large mid-anterior projection. Sternum 8 bilobed posteriorly, with anterior border more sclerotized and convex, haired ventrally except paired elongate spots. Genital fork U-shaped (upside-down in Figs. 389 & 398).



Figs. 379–388. *Neosardus* sp., male genitalia. 379–380, Apex of abdomen, ventral and posterior views; 381–382, tergum 9, cerci and sternum 10, ventral and lateral views; 383–384, gonocoxites, gonostylus and aedeagus, dorsal and ventral views; 385, gonostylus; 386, mid-posterior part of gonocoxites, dorsal view; 387–388, aedeagus, lateral and ventral views.



Figs. 389–399. *Neosardus* sp., female genitalia. 389, Apex of abdomen, ventral view; 390–391, tergum 8, dorsal and lateral views; 392, tergum 9, dorsal view; 393–394, terga 9–10 and cercus, ventral and dorsal views; 395, cerci and tergum 10, lateral view; 396, tergum 9, lateral view; 397, sternum 8, ventral view; 398, genital fork, dorsal view; 399, spermatheca (basal part is cut off).

Spermathecal capsule long and with basal part and apex narrower than rest.

Specimens examined: 1 ♂, 1 ♀, Dedari, W. Australia, 21. xi. 1979, R. M. BOHART.

Distribution. Australia.

Genus *Sericosoma* MACQUART

Sericosoma MACQUART, 1850, Mém. Soc. Sci. Agric. Arts, Lille 1849: 419 (115). Type species: *Sericosoma fascifrons* MACQUART, 1850, by original designation.

Sericosoma fascifrons MACQUART

Sericosoma fascifrons MACQUART, 1850, Mém. Soc. Sci. Agric. Arts, Lille 1849: 419 (115). Type locality: Chile.

Male (Figs. 400–409)

[There are a pair of small elongate sclerites which may belong to sternum 10]. Tergum 9 much wider than long, with anterior and posterior margins each having no concavity, and with long anterolateral extension. Fused gonocoxites much longer than wide, with posterolateral part protruded and pointed, with gonocoxal apodeme stout, and without mid-ventral furrow; shape of mid-posterior dorsal part as in Fig. 404; Sternum 9 (if it is so) thin and transverse. Gonostylus situated distinctly before apex of gonocoxite and with apex narrowed and pointed. Phallus (in dorsal or ventral view) narrowed at base and apex; ventral palte may be divided into two lateral sclerites; anterolateral ventral plate (if so) thin. Aedeagal apodeme small and thin (even in lateral view).

Female

Not examined.

Specimen examined: 1 ♂, Buchen, Chile, iii. 1956, L. E. PENA.

Distribution. Chile (Maule, Valparaiso).

Sericosoma irwini HALL

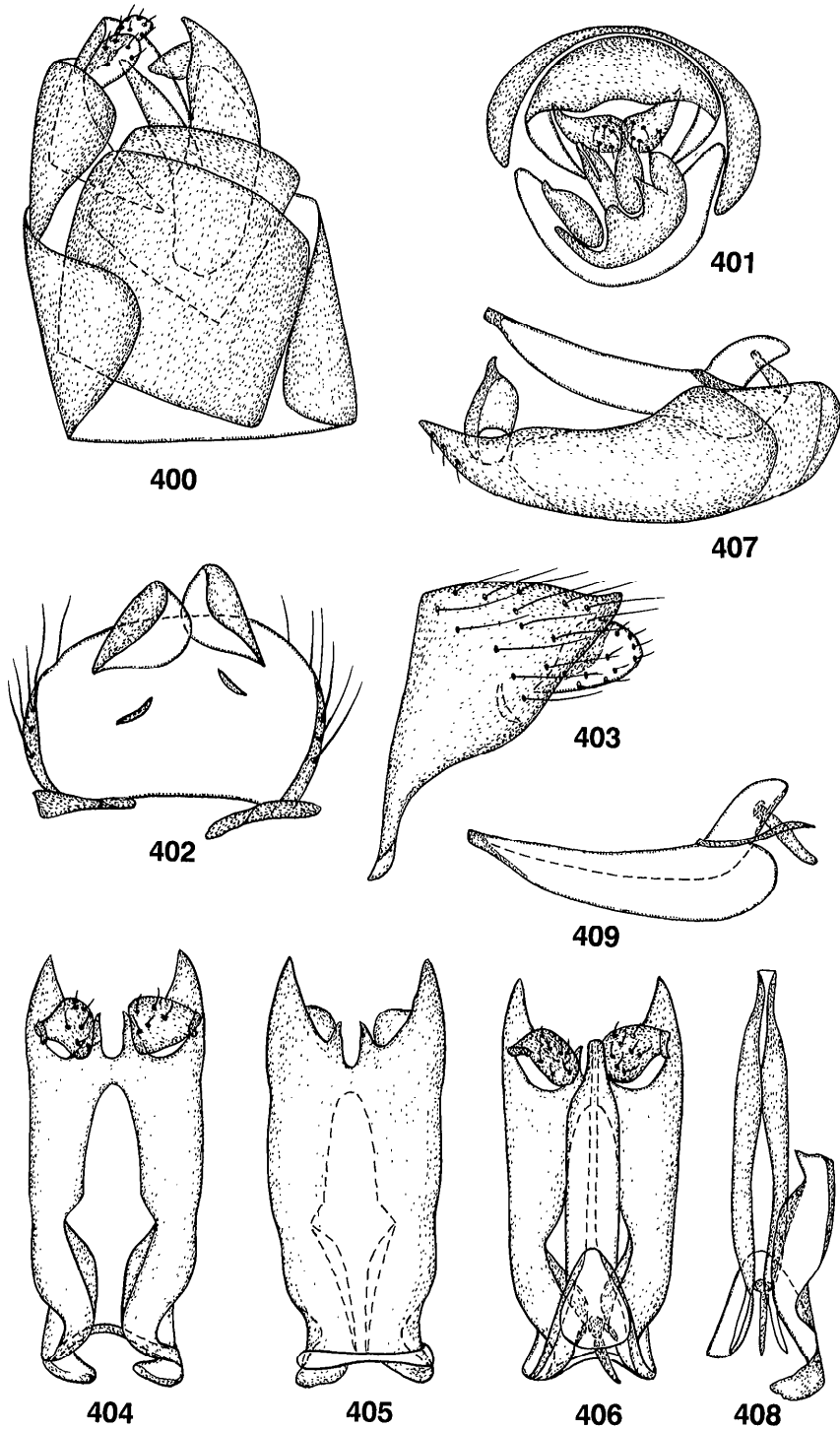
Sericosoma irwini HALL, 1976, Univ. Calif. Publ. Ent. 76: 70. Type locality: Chile, Atacama, Bahia Copaiipo.

Male

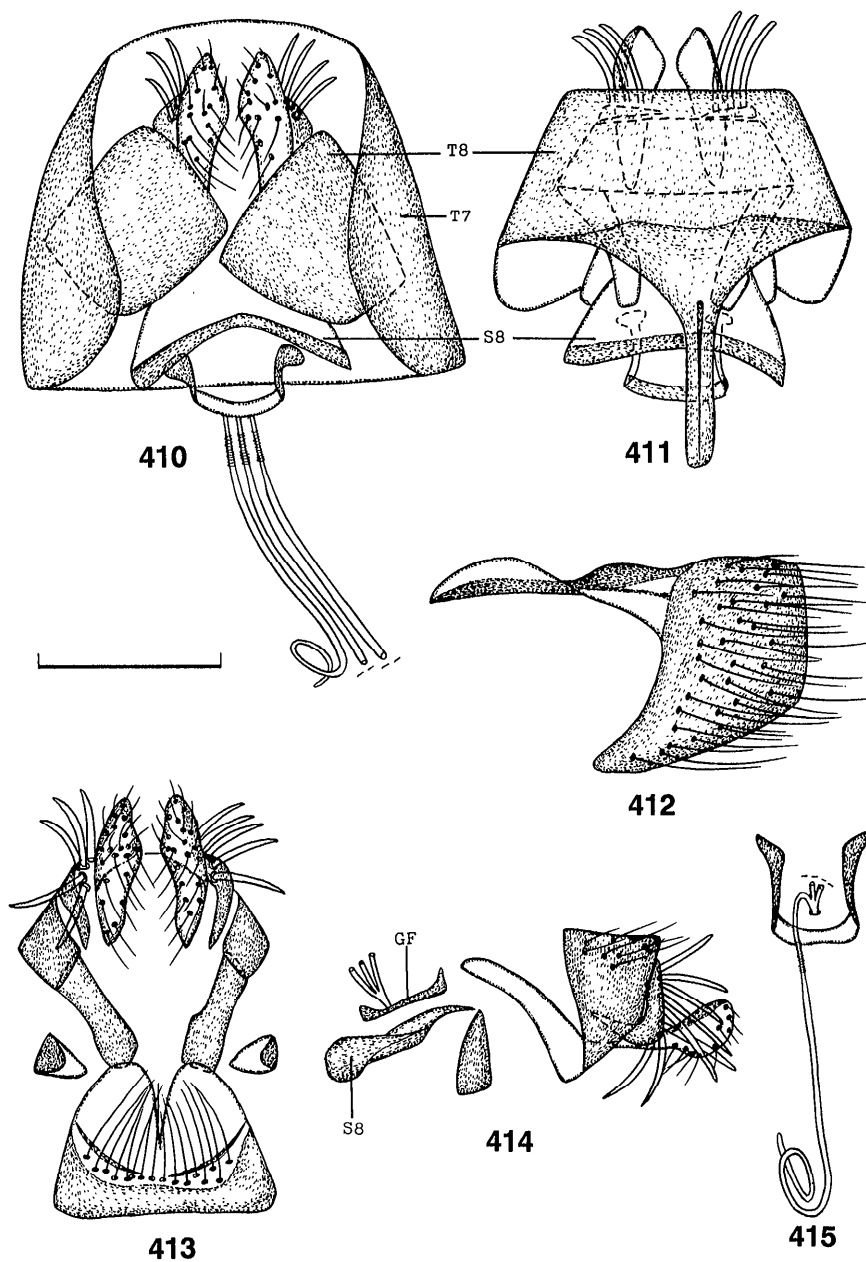
Not examined.

Female (Figs. 410–415)

Cercus rather long. Tergum 10 L-shaped in lateral view, with posterior part having 8 (or so) stout spines. Tergum 9 trapezoid, and with long anterolateral process truncate at end. As sternum 9(?), paired sclerites present opposite apex of sternum 8. Tergum 8 much longer than tergum 9, with lateral part folded ventrally and with large mid-



Figs. 400–409. *Sericosoma fascifrons* MACQUART, male genitalia. 400–401, Apex of abdomen, ventral and posterior views; 402–403, tergum 9, cerci and sternum 10, ventral and lateral views; 404–405, gonocoxites and gonostyli, dorsal and ventral views; 406–407, gonocoxites, gonostyli and aedeagus, dorsal and lateral views; 408–409, aedeagus, ventral and lateral views.



Figs. 410–415. *Sericosoma irwini* HALL, female genitalia. 410–411, Apex of abdomen, ventral and dorsal views; 412, tergum 8, lateral view; 413–414, sternum 8, tergum 9, sternum 9 (?), tergum 10 and cerci, ventral and lateral views; 415, genital fork and spermatheca, dorsal view. [scale 0.5 mm]

anterior projection. Sternum 8 narrowed, rounded, and bilobed posteriorly, and with a row of ventral hairs around middle or rather near base. Genital fork U-shaped, with lateral bar widened near posterior end. Each branched spermatheca with short striate section near basal part and without any widened apical part.

Specimen examined: 1 ♀, Chile, 1907.

Distribution. Chile (Atacama, Valparaiso).

Subfamily Oniromyiinae

Male

Based on 1 genus and 1 species. *Oniromyia pachycerata* is characterized as follows: Lateral margin of gonocoxite with a swelling at middle. Gonostylus complicated in shape. Anterolateral parts of fused gonocoxites connected with each other through thin sclerite. Apex of phallus abruptly becomes thin and runs vertically and ventrally.

Female

Based on 1 genus and 1 species.

Genus *Oniromyia* BEZZI

Oniromyia BEZZI, 1921, Ann. S. Afr. Mus. 18: 71. Type species: *Eurycarenum pachyceratum* BIGOT, 1892, by original designation.

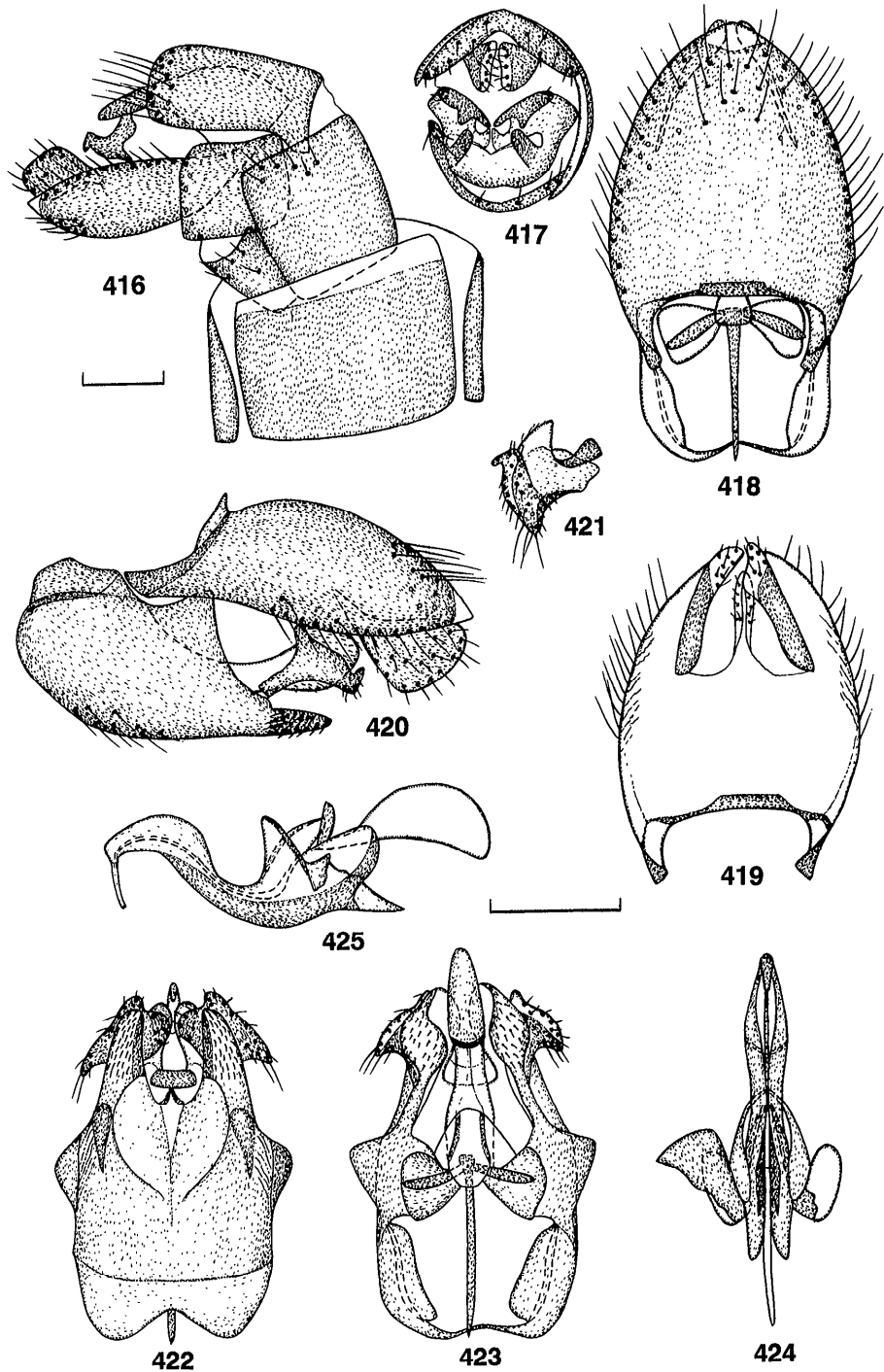
Oniromyia pachycerata (BIGOT)

Eurycarenum pachycerata BIGOT, 1892, Anns Soc. ent. Fr. 61: 371. Type locality: South Africa.

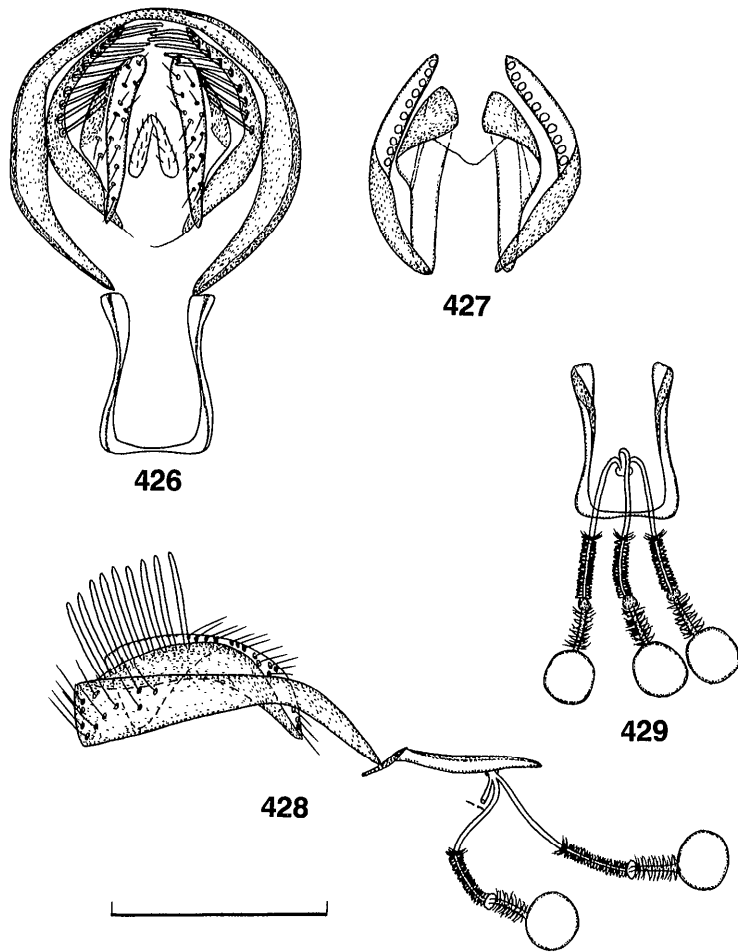
Male (Figs. 416–425)

Sternum 10 (at least in haired part) U- or V-shaped. Tergum 9 (except base) elliptical and much longer than wide; tergum 9 with anterolateral process. Fused gonocoxites much longer than wide, somewhat narrowed posteriorly, with posterior part bilobed, with anterior margin concave, and with lateral margin having a swelling around middle; anterior waved part may possibly represent paired gonocoxal apodemes; sternum 9 absent. Gonostylus complicated in form (Fig. 421). Phallus (dorsal + ventral plates) (in lateral view) strongly curved and with apical thin part running downward vertically; dorsal apical part of phallus darker; anterolateral ventral process tapering anteriorly; dorsal bridge U-shaped. Endophallic sclerite slender. Aedeagal apodeme (except base) with dorsal margin rounded, and with ventral margin nearly straight; aedeagal apodeme (in lateral view) longer than wide.

Female (Figs. 426–429)



Figs. 416–425. *Oniromyia pachycerata* (BIGOT), male genitalia. 416–417, Apex of abdomen, ventral and posterior views; 418, tergum 9, anterior part of gonocoxites and aedeagus, dorsal view; 419, tergum 9, cerci and sternum 10, ventral view; 420, tergum 9, cerci, gonocoxite and gonostylus, lateral view; 421, gonostylus, lateral view; 422–423, gonocoxites, gonostyli and aedeagus, ventral and dorsal views; 424–425, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 416–417; 0.5 mm for Figs. 418–425]



Figs. 426–429. *Oniromyia pachycerata* (BIGOT), female genitalia. 426, Terga 9–10, cerci, sternum 10 and genital fork, ventral view; 427, tergum 10 and cerci, dorsal view; 428, terga 9–10, cerci, genital fork and spermatheca, lateral view; 429, genital fork and spermatheca, dorsal view. [Scale 0.5 mm]

Cercus long. Tergum 10 long and with posterior part having 9 (or so) stout spines. Tergum 9 short, narrowed laterally and pointed at both sides (Fig. 428). [Tergum 8 and sternum 8 not examined]. Genital fork U-shaped and with base of lateral bar having thin inner process. Each branched spermatheca consisting of (i) basal smooth duct, (ii) granulate duct capped at apical end, (iii) pilose duct, and (iv) large rounded capsule.

Specimens examined: 1 ♂, 1 ♀, Worcester, Cape Pr., South Africa, 25–29. ix. 1975, R. M. BOHART.

Distribution. South Africa.

Subfamily Cylleniinae

Male

Based on 3 genera and 3 species. Each genus is distinct. No common peculiar character is evident.

Female

Based on 3 genera and 3 species. No peculiar subfamilial character is evident. Cercus long or rather so. Tergum 10 paired, long or so, and with posterior part having a row of stout spines. Tergum 9 trapezoid, wider than long, often short, and with long anterolateral process. There are paired thin sclerites or a median sclerite between cercus and sternum 8 in some genera and species. Tergum 8 trapezoid, wider than long, with lateral part folded ventrally and with mid-anterior pointed projection which is short in *Sphenoidoptera varipennis*. Sternum 8 various in shape and often with posterior part bilobed. There is often a membrane (which is various in shape) over sternum 8. Genital fork U-shaped; anterior bar shorter than the lateral. Spermathecal capsule various in shape and often not widened; duct with or without granulate part.

Genus *Sphenoidoptera* WILLISTON

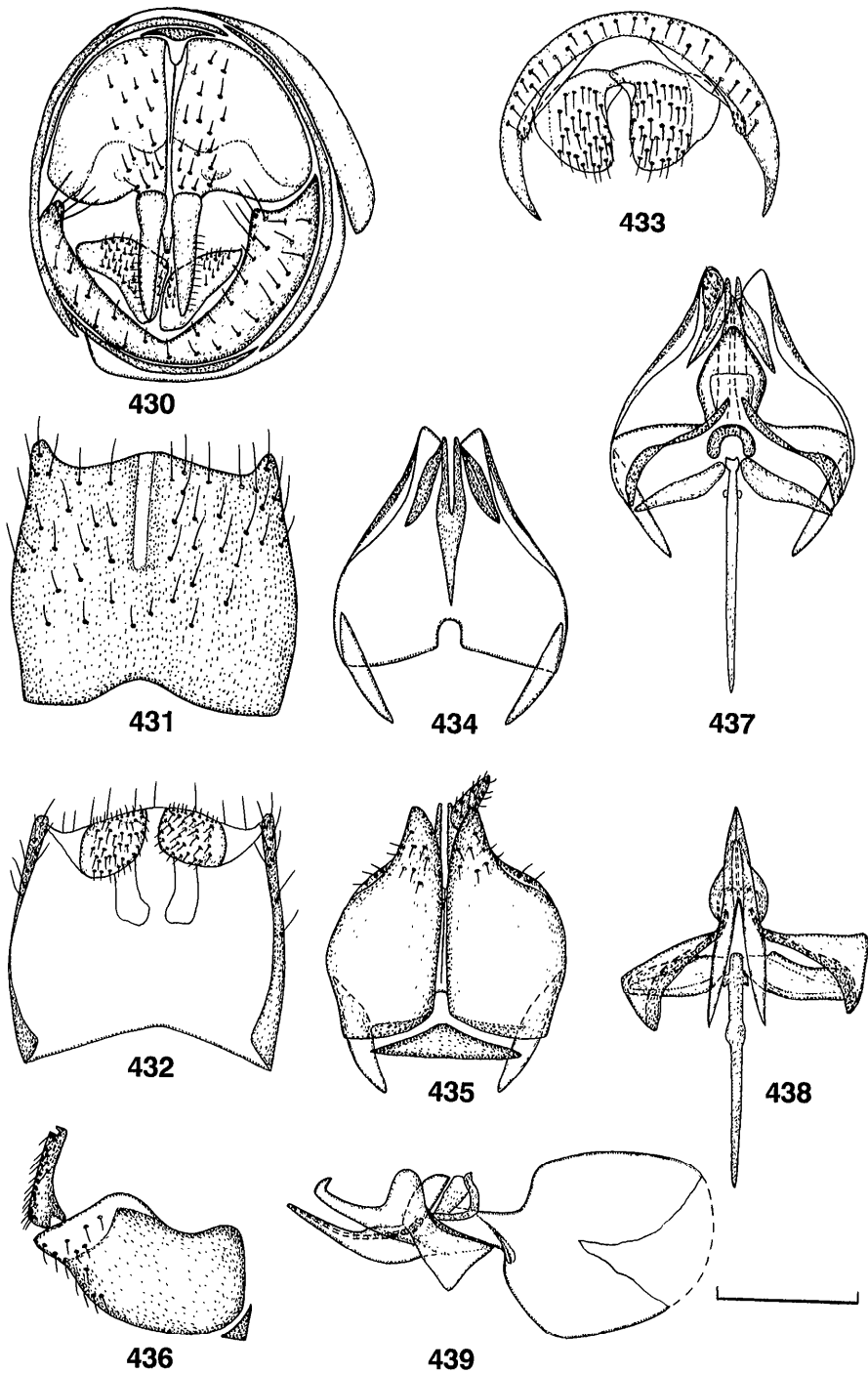
Sphenoidoptera WILLISTON, 1901, Supplement. In: GODMAN, F. D. and SALVIN, O. eds., *Biologia Centrali-Americana*, p. 295. *Zoologia. Insecta. Diptera*. Vol. 1. Taylor and Francis, London. Type species: *Sphenoidoptera varipennis* WILLISTON, 1901, by monotypy.

Sphenoidoptera varipennis WILLISTON

Sphenoidoptera varipennis WILLISTON, 1901, Supplement. In: GODMAN, F. D. and SALVIN, O., eds., *Biologia Centrali-Americana*, p. 296. *Zoologia. Insecta. Diptera*. Vol. 1. Taylor and Francis, London. Type locality: Mexico, Guerrero, Chilpancingo.

Male (Figs. 430–439)

Tergum 9 quadrate. Fused gonocoxites widest around middle, narrowed posteriorly, with posterior part bilobed, and with a median ventral furrow; gonocoxal apodeme slender, and with both ends pointed; sternum 9 triangular and much wider than long; shape of mid-posterior dorsal sclerite as in Fig. 434. Gonostylus elongate, wider at base and with apex having a small tooth directed ventrally. Dorsal sclerite (=correctly dorsal vane ?) swollen laterally and dorsally, abruptly narrower at apical portion, and with apex curved upward; a sclerite present behind endophallic sclerite, and this sclerite U-shaped in dorsal view; ventral sclerite (=correctly dorsal + ventral plates ?) tapering apically and pointed at end; anterolateral ventral process about as long as rest of ventral plate and pointed at anterior end. Paired dorsal bridges shallowly U-shaped. Aedeagal apodeme large, [but its shape uncertain].



Figs. 430–439. *Sphenoidoptera varipennis* WILLISTON, male genitalia. 430, Apex of abdomen, posterior view; 431–433, tergum 9 and cerci, dorsal, ventral and lateral views; 434–436, gonocoxites, gonostyli and sternum 9, dorsal, ventral and lateral views; 437, gonocoxites and aedeagus, dorsal view; 438–439, aedeagus, ventral and lateral views. [Scale 0.5 mm]

Female (Figs. 440–447)

Cercus rather long. Tergum 10 paired, rather long but not longer than cercus; with posterior part having 4 stout spines. Tergum 9 much wider than long, short, and with long anterolateral process folded ventrally and pointed at apex. Tergum 8 much wider than long, rather rectangular, with lateral part folded ventrally, and with a mid-anterior rather short process. Sternum 8 wider than long, with lateral and posterior margins W-shaped. Genital fork U-shaped, with anterior bar shorter and thicker than lateral bar pointed at posterior end. Spermatheca long; each branched spermatheca consisting of (i) basal duct , (ii) longer granulate section having inner tube, (iii) short bare part, (iv) apical duct with pile at base, and (v) capsule which is very long and gradually wider apically.

Specimens examined: 1 ♂, Guerrero, Mexico, 18. x. 1986, E. FISHER; 1 ♀, Morelos, Mexico, 15. x. 1986, E. FISHER.

Distribution. Mexico.

Genus *Nomalonia* RONDANI

Nomalonia RONDANI, 1863, *Diptera exotica revisa et annotata*. p. 71. Type species: *Cyllenia afla* WIEDEMANN, 1828 [misidentification, = *Nomalonia eremophila* HESSE, 1975], by original designation.

Nomalonia eremophila HESSE

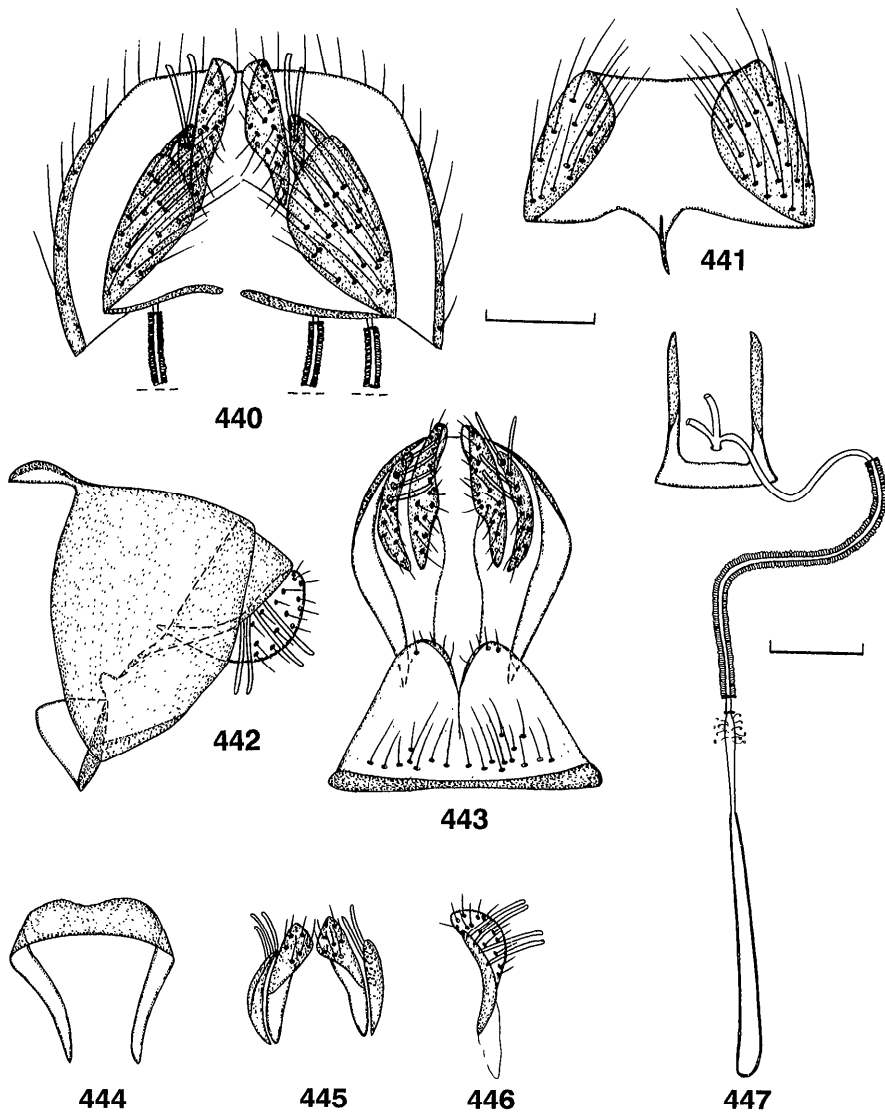
Nomalonia eremophila HESSE, 1975, *J. ent. Soc. sth. Afr.* 38: 123. Type locality: South Africa.

Male (Figs. 448–454)

Cercus wider apically and rounded at apex. [Sternum 10 not clearly seen]. Tergum 9 rectangular, much longer than wide, and with long anterolateral process. Fused gonocoxites rather trapezoid, much longer than wide, and without median ventral furrow; sternum 9 (if it is so) thin and transverse; gonocoxal apodeme in lateral view rectangular and longer than wide. Gonostylus as in Fig. 454. Dorsal and ventral plates forming a tube which is slender and tapering apically; anterolateral ventral plate in lateral view wide and rounded at anterior margin. Aedeagal apodeme (except base) rounded in lateral view.

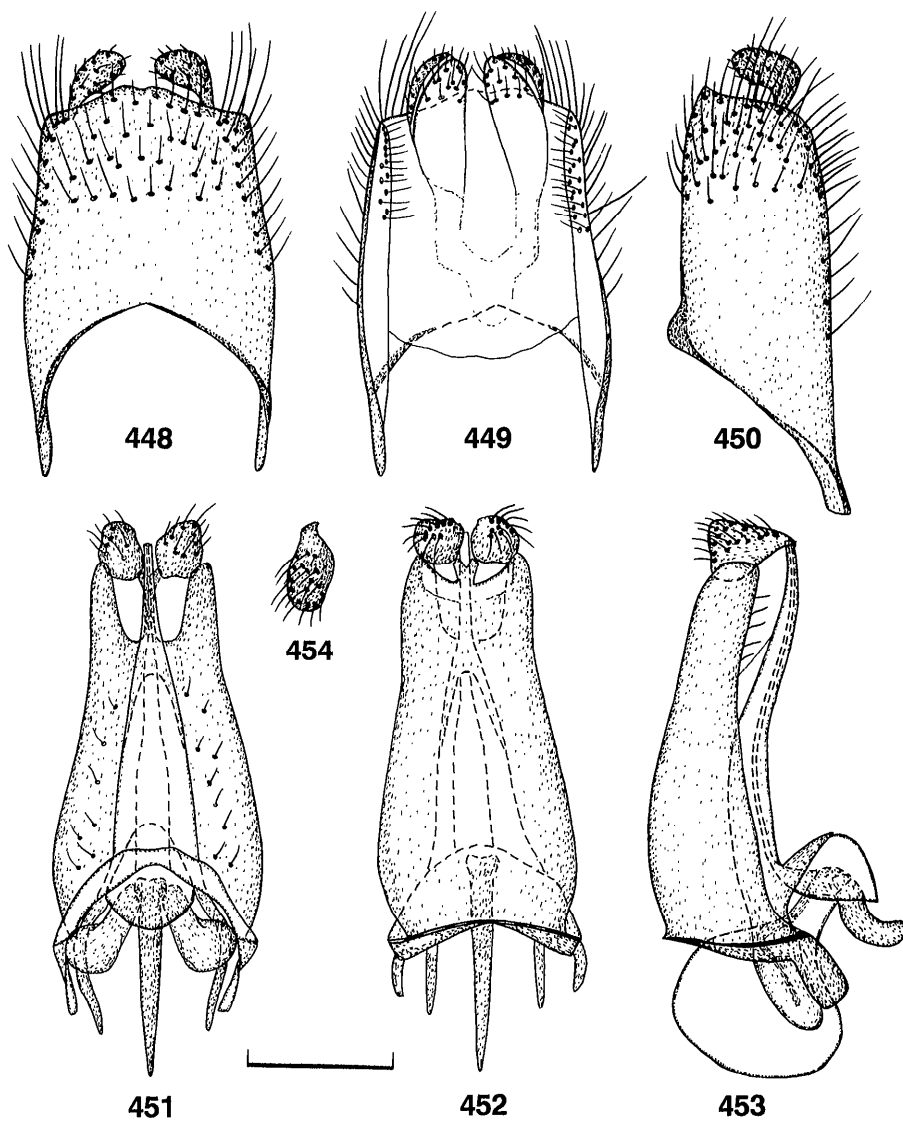
Female (Figs. 455–462)

Cercus long. Tergum 10 long and with posterior part having 10 stout spines. There are two pairs of ventral membranes (Fig. 459) which may represent sternum 10. Tergum 9 triangular (or rectangular) and with long anterolateral process. As with sternum 9 (?), there is a median elongate ventral sclerite wider posteriorly behind sternum 8. Tergum 8 much wider than long, with a mid-anterior process. Sternum 8 longer than wide, bilobed except base, with each posterior part elongate and rounded apically, and



Figs. 440–447, *Sphenoidoptera varipennis* WILLISTON, female genitalia. 440, Terga 7–8 & 10 and cerci, ventral view; 441, tegum 8, ventral view; 442, terga 8–9, cercus and sternum 8, lateral view; 443, terga 9–10, cerci and sternum 8, ventral view; 444, tergum 9, dorsal view; 445–446, tergum 10 and cerci, ventral and lateral views; 447, genital fork and spermatheca. [Scale 0.2 mm for Figs. 440–443; 0.2 mm for Figs. 444–447]

with an anterior W-shaped membrane having a triangular anterior sclerite. Dorsal part of sternun 8 (?) longer than wide, rectangular, and somewhat narrower posteriorly. Genital fork U-shaped and with anterior bar much shorter than the lateral. Spermatheca long; each branched spermatheca consisting of (i) longer basal duct, (ii) shorter thin duct, (iii) shorter thin pilose duct, and (iv) longer apical duct having no widened

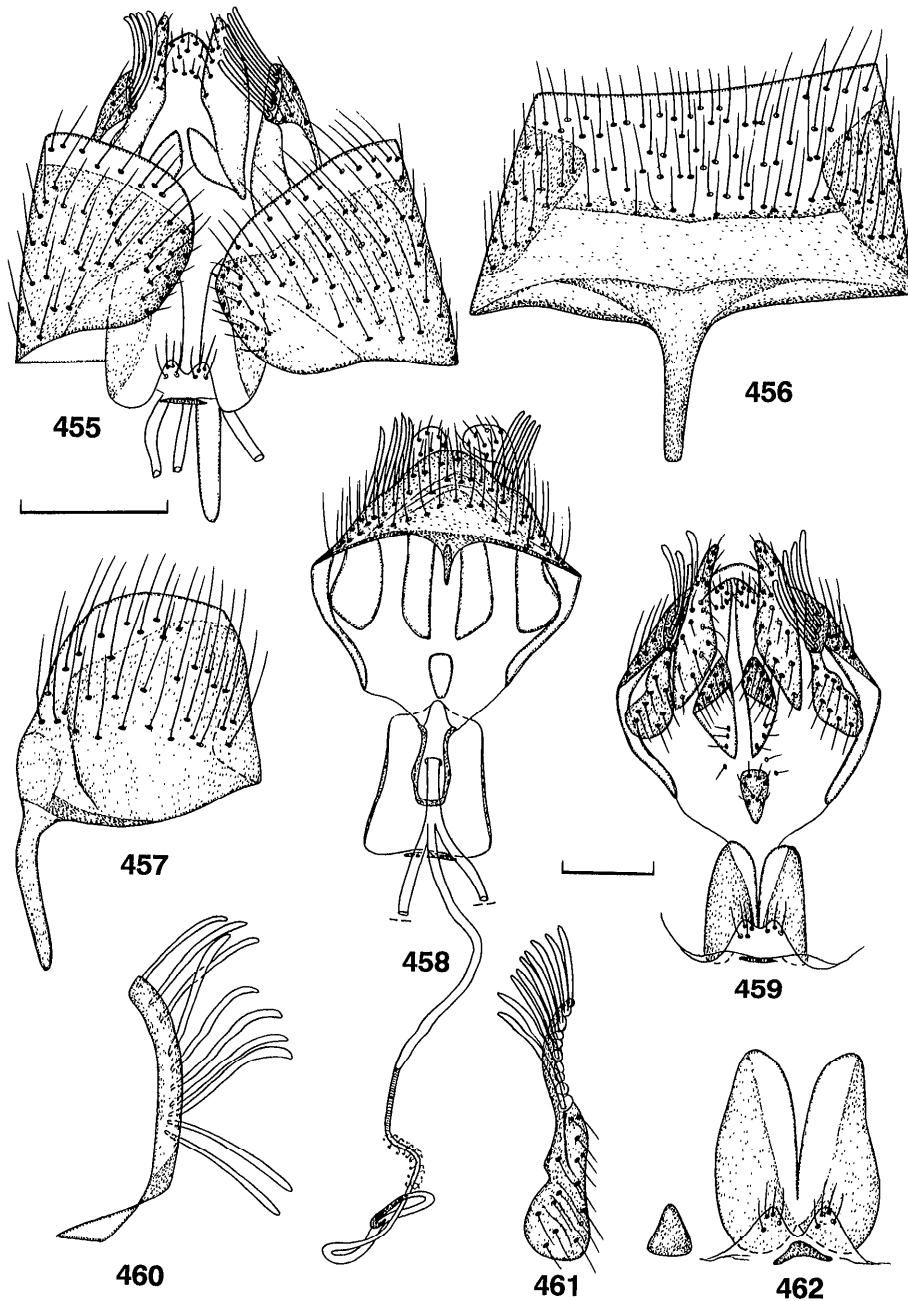


Figs. 448–454. *Nomalonia eremophila* HESSE, male genitalia. 448–450, Tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 451–453, gonocoxites, gonostyli and aedeagus, dorsal, ventral and lateral views; 454, gonostylus, dorsal view. [Scale 0.5 mm]

capsule.

Specimens examined: 1 ♂, Oudtshoorn, Zebra, C. P., x. 1951; 1 ♂, 1 ♀, Tankwa Karoo, Waterval, C. P., xi. 1952.

Distribution. South Africa.



Figs. 455–462. *Nomalonia eremophila* HESSE, female genitalia. 455, Apex of abdomen, ventral view; 456–467, tergum 8, dorsal and lateral views; 458–459, terga 9–10, cerci, sternum 8, genital fork and spermatheca, dorsal and ventral views; 460–461, tergum 10, lateral and ventral views; 462, sternum 8, ventral view. [Scale 0.5 mm for Figs. 455–457; 0.2 mm for Figs. 458–462]

Genus *Peringueyimyia* BIGOT

Peringueyimyia BIGOT, 1856, Bull. Bimens. Soc. Entomol. Fr. 1886 (13): cx. Type species: *Peringueyimyia capensis* BIGOT, 1886, by monotypy.

Peringueyimyia capensis BIGOT

Peringueyimyia capensis BIGOT, 1886, Bull. Bimens. Soc. Entomol. Fr. 1866 (13): cx. Type locality: South Africa.

Male (Figs. 463–471)

Tergum 9 wider than long, rather rectangular, with posterolateral margin rounded, with anterior margin gently concave, with posterior margin having a mid concavity and with anterolateral process. Fused gonocoxites Y-shaped, and with a median ventral furrow; dorsal sclerite before gonostylus U-shaped and with a trapezoid posterior part (Fig. 469); sternum 9 absent. Gonostylus wider apically and with posterior margin concave. Dorsal and ventral plates (in phallus) forming a slender tube whose apex is widened. [Presence of anterolateral ventral process not confirmed]. Aedeagal apodeme (except base) large, longer than wide, rather rectangular, but with anterior dorsal margin rounded.

Female (Figs. 472–481)

Cercus long. Tergum 10 paired, long and with posterior part having 5 stout spines. Tergum 9 short, much wider than long and with ventrally folded anterolateral long process. There are paired thin sclerites which may belong to sternum 9 (Fig. 477). Tergum 8 in dorsal view rather trapezoid and with mid-anterior process whose base is wide. Sternum 8 quadrate and with posterior margin concave. There is a dorsal membrane over sternum 8 and genital fork and this membrane is much longer than wide, narrowest behind middle and then wider anteriorly, and with anterior and posterior margins truncate. Genital fork U-shaped and with anterior bar shorter than the lateral. In spermatheca [whose middle portion is broken off], there is a section having inner tube; capsule longer than wide, with lateral margin waved, and with apex bluntly pointed.

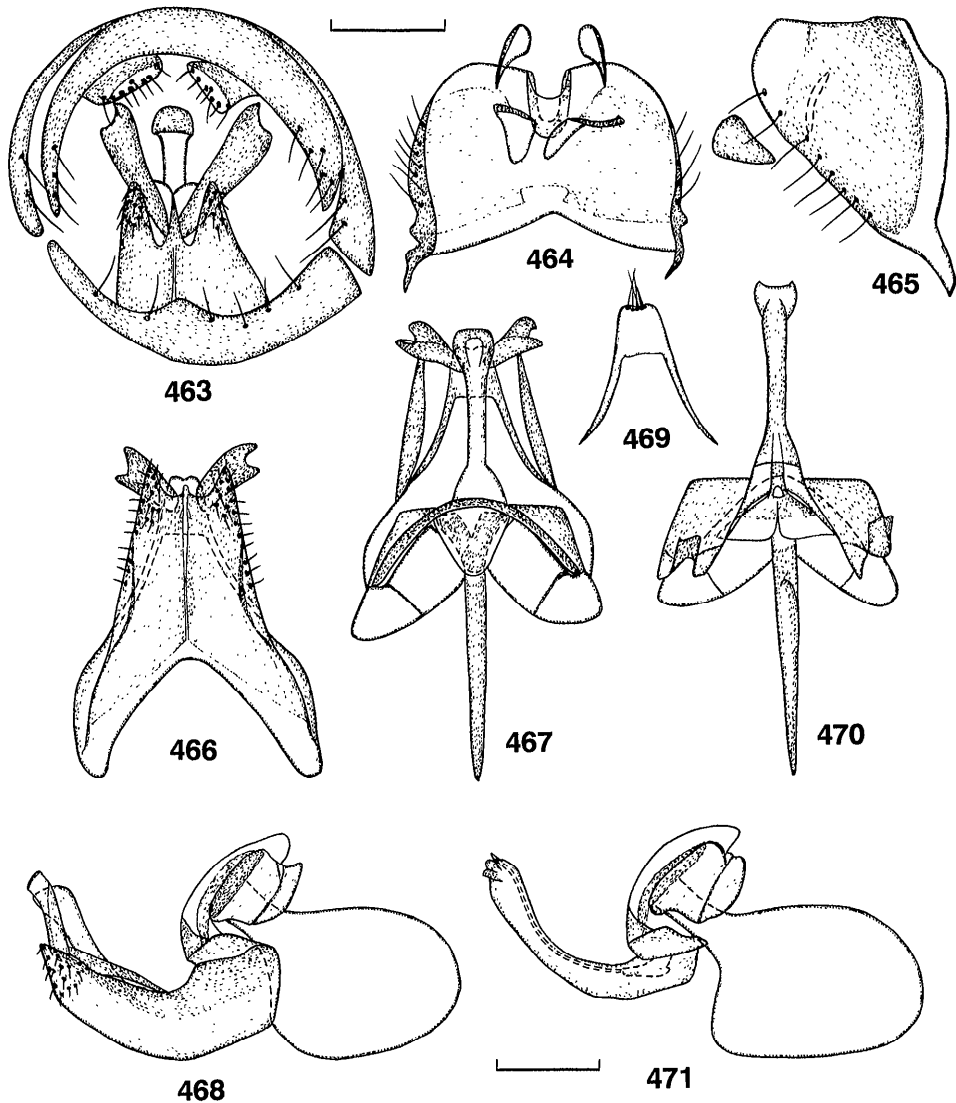
Specimens examined: 1 ♂, 1 ♀, Olifants River, bet. Citrusdal and Clanwilliam, South Africa, x-xi, 1931.

Distribution. South Africa.

Subfamily Tomomyziinae

Male

Based on 2 genera and 2 species. Mid-posterior dorsal sclerite of fused gonocoxites as in Figs. 489 & 508. Phallus simple. In *Tomomyza pictipennis*, tergum 9 with a deep

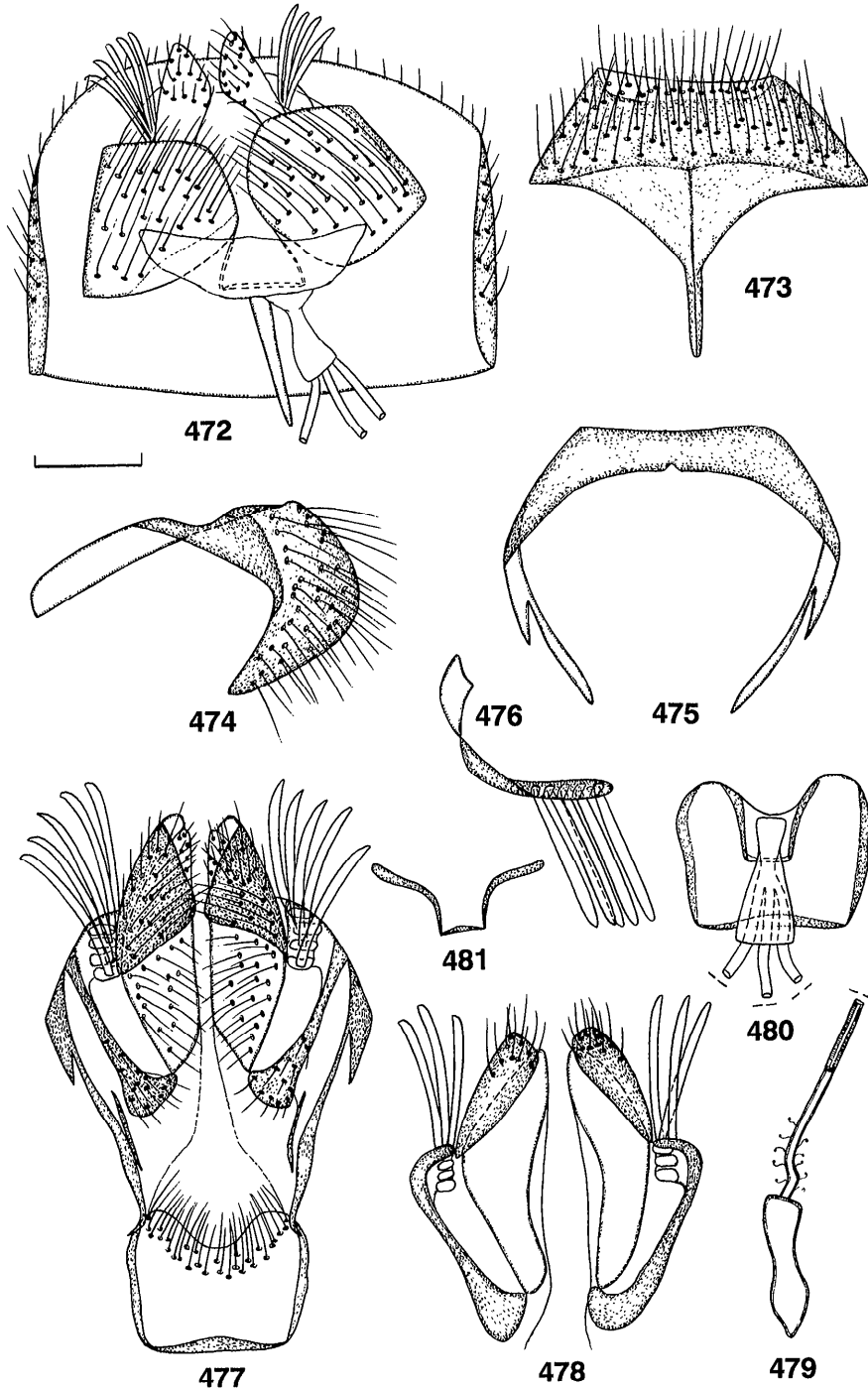


Figs. 463–471. *Peringueyimyia capensis* BIGOT, male genitalia. 463, Apex of abdomen, posterior view; 464–465, tergum 9, cerci and sternum 10, ventral and lateral views; 466, gonocoxites and gonostyli, ventral view; 467–468, gonocoxites, gonostyli and aedeagus, dorsal and lateral views; 469, mid-posterior part of gonocoxites, dorsal view; 470–471, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 463–467 & 470; 0.5 mm for Figs. 468 & 471]

W-shaped concavity at posterior margin.

Female

Based on 2 genera and 2 species. [Cercus not clearly seen, but its apical part circular in lateral view]. Tergum 10 paired, thin, not longer than cercus, and with posterior part



Figs. 472–481. *Peringueyimyia capensis* BIGOR, female genitalia. 472, Apex of abdomen, ventral view; 473–474, tergum 8, dorsal and lateral views; 475, tergum 9, dorsal view; 476, tergum 10, lateral view; 477, terga 9–10, cerci and sternum 8, ventral view; 478, tergum 10 and cerci, dorsal view; 479, spermatheca (basal portion is cut off); 480, sternum 8 and genital fork, dorsal view; 481, genital fork, dorsal view. [Scale 0.3 mm]

having 2 stout spines. Tergum 9 semicircular or trapezoid, with anterolateral process. Tergum 8 rectangular, much wider than long, with lateral part folded ventrally, and with mid-anterior pointed projection. Sternum 8 with lateral part folded ventrally or dorsally; sternum 8 various in shape according to genus and species. Genital fork U-shaped. Spermathecal capsule elongate, wider apically and with apex rounded; duct long and with a section capped at both ends.

Genus *Pantostomus* BEZZI

Pantostomus BEZZI, 1921, Ann. S. Afr. Mus. 18: 474 [1922: 79]. Type species: *Pantostomus gibbiventris* BEZZI, 1921, by monotypy.

Pantostomus gibbiventris BEZZI

Pantostomus gibbiventris BEZZI, 1921, Ann. S. Afr. Mus. 18: 474. Type locality: South Africa.

Male (Figs. 482–491)

Sternum 10 apparently paired, thin and long. Tergum 9 wider than long, with anterior and posterior margins gently concave, and with anterolateral process. Fused gonocoxites longer than wide, narrowed posteriorly, with posterior part bilobed, and without median ventral furrow; sternum 9 absent; gonocoxal apodeme T-shaped. Gonostylus much longer than wide, narrower posteriorly and pointed at apex. Dorsal and ventral plates (in phallus) forming a tube which is slender and gradually tapering apically; ventral part with a deep anterior concavity. Aedeagal apodeme longer than wide and widest before middle.

Female

Not examined.

Specimen examined: 1 ♂, Dikbome Merweville Koup, C. P.

Distribution. South Africa.

Pantostomus fruticicola HESSE

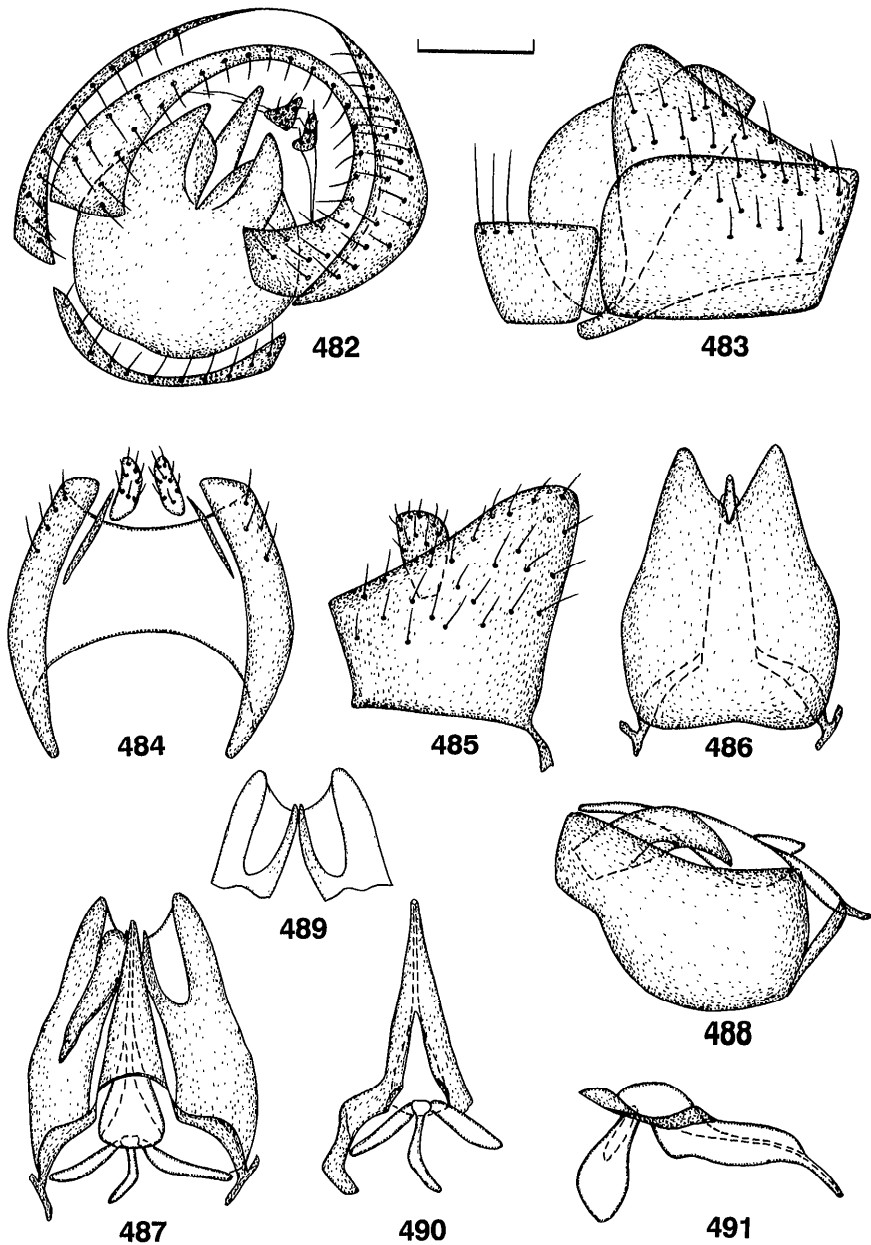
Pantostomus fruticicola HESSE, 1956, Ann. S. Afr. Mus. 35: 61. Type locality: South Africa.

Male

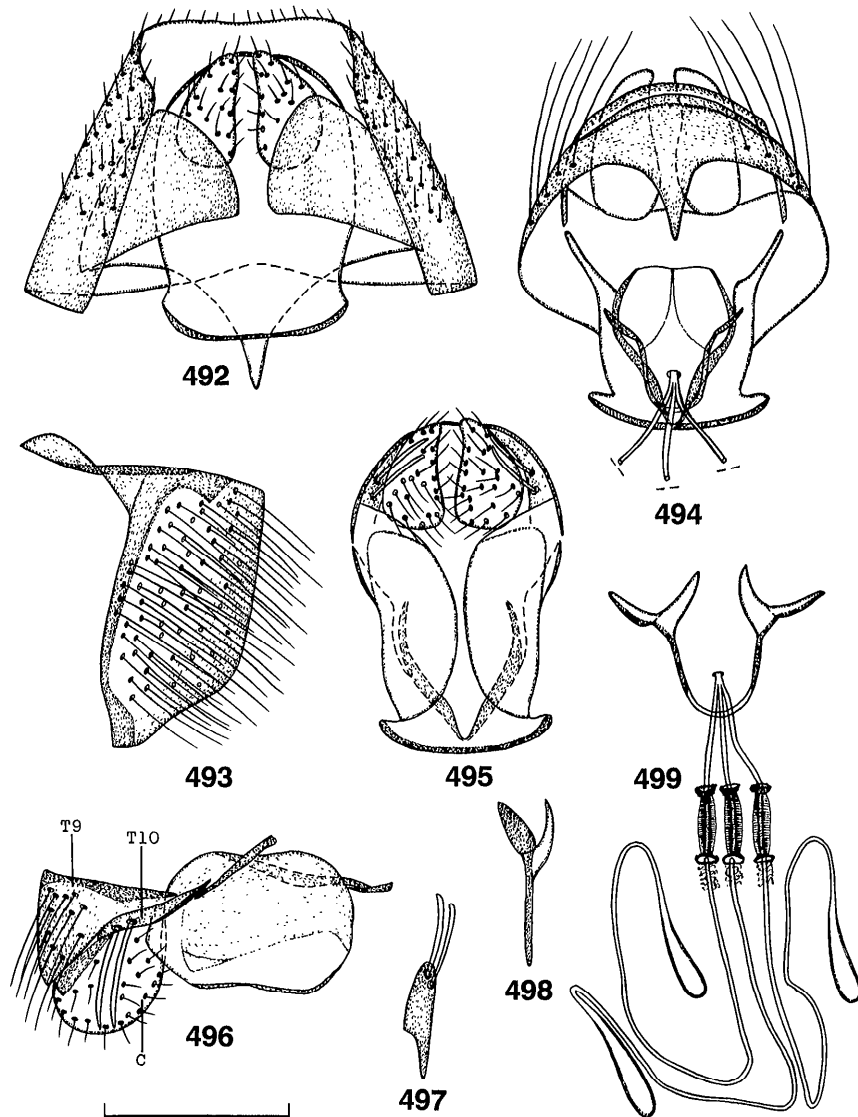
Not examined.

Female (Figs. 492–499)

Cercus wide and posteriorly rounded in lateral view. Tergum 10 rather thin, not longer than cercus, and with posterior part having 2 stout spines. Tergum 9 short and with anterolateral process. Tergum 8 rather trapezoid and with mid-anterior process. Sternum 8 as in Figs. 494–496; largely membranous; lateral part apparently folded



Figs. 482–491. *Pantostomus gibbiventris* BEZZI, male genitalia. 482–483, Apex of abdomen, posterior and lateral views; 484–485, tergum 9, cerci and sternum 10, ventral and lateral views; 486, gonocoxites, ventral view; 487–488, gonocoxites, gonostylus and aedeagus, dorsal and lateral views; 489, posterior part of gonocoxites, dorsal view; 490–491, aedeagus, ventral and lateral views. [Scale 0.2 mm]



Figs. 492–499. *Pantostomus fruticicola* HESSE, female genitalia. 492, Apex of abdomen, ventral view; 493, tergum 8, lateral view; 494, terga 8–9, cerci, sternum 8 and genital fork, dorsal view; 495, tergum 10, cerci and sternum 8, ventral view; 496, terga 9–10, sternum 8, cerci and genital fork, lateral view; 497, tergum 10, ventral view; 498, genital fork, lateral view; 499, genital fork and spermatheca, dorsal view. [Scale 0.5 mm]

ventrally; with V-shaped dorsal sclerite. Genital fork U-shaped, and with base of lateral bar Y-shaped. Spermatheca long; each branched spermatheca consisting of (i) basal duct, (ii) granulate section capped at both ends and with inner tube, (iii) long apical duct, and (iv) widened capsule elongate and gradually wider apically.

Specimen examined: 1 ♀, Papendrop, South Africa, xi. 1956.

Distribution. South Africa.

Genus *Tomomyza* WIEDEMANN

Tomomyza WIEDEMANN, 1820, *Munus rectoris in Academia Christiano-Albertina iterum aditurus nova dipterorum genera.* p. 9. Type species: *Tomomyza anthracoides* WIEDEMANN, 1820, by original designation.

Tomomyza pictipennis BEZZI

Tomomyza pictipennis BEZZI, 1921, *Ann. S. Afr. Mus.* 18: 474. Type locality: South Africa.

Male (Figs. 500–510)

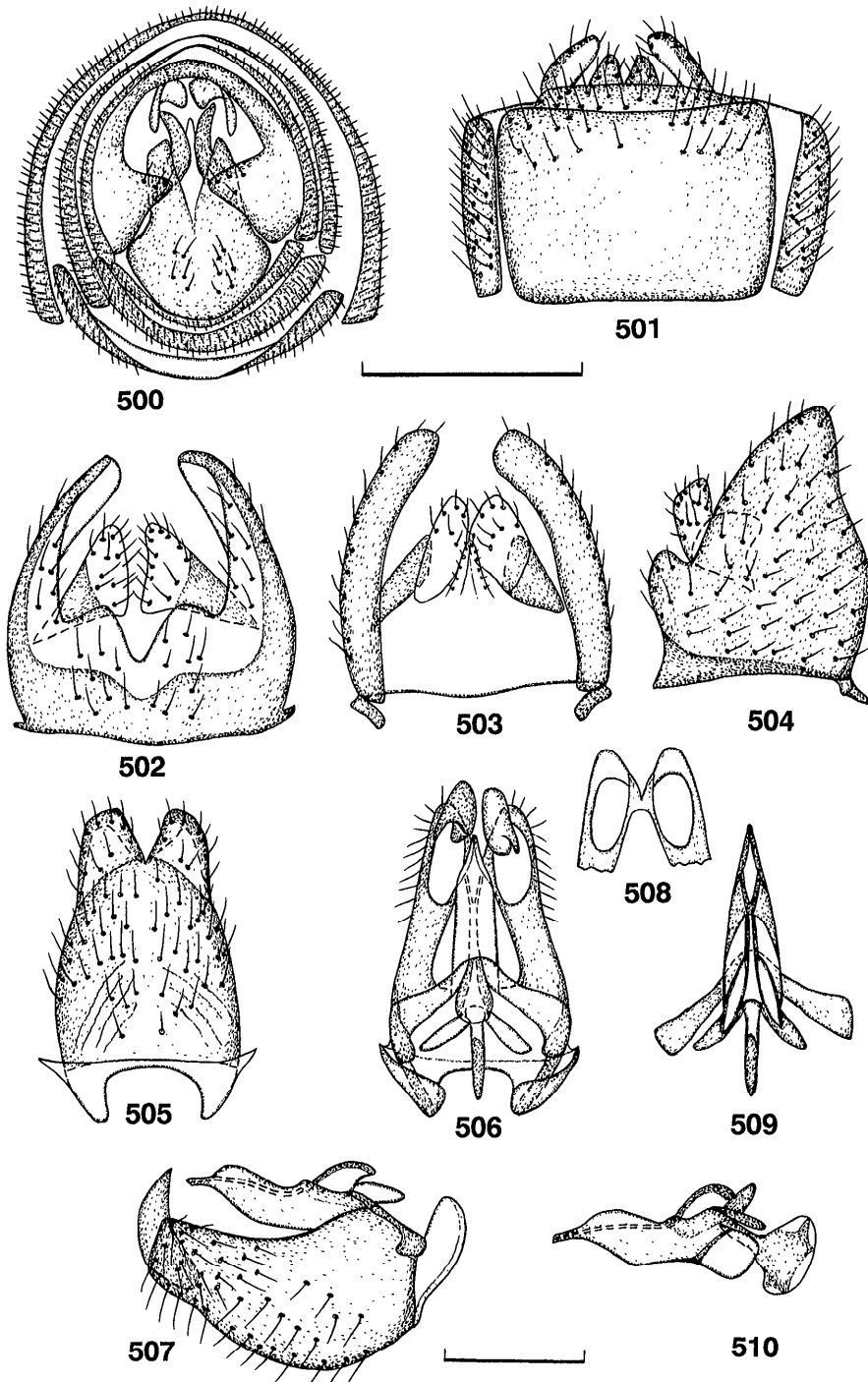
Tergum 9 with lateral margin convex, with anterior margin nearly straight, with posterior margin having a large concavity which is rather W-shaped, and with a small anterolateral attachment. Fused gonocoxites much longer than wide, somewhat narrower posteriorly, with posterior margin having a median concavity, and without median ventral furrow; sternum 9 absent; shape of mid-posterior dorsal part as in Fig. 508; gonocoxal apodeme stout; dorsal bridge U-shaped. Gonostylus narrowed posteriorly and pointed at apex. Dorsal and ventral plates forming a tube which is narrowed posteriorly and pointed at apex; anterolateral ventral process rather rectangular in lateral view. Aedeagal apodeme short, with anterior part rounded but wider than long.

Female (Figs. 511–519)

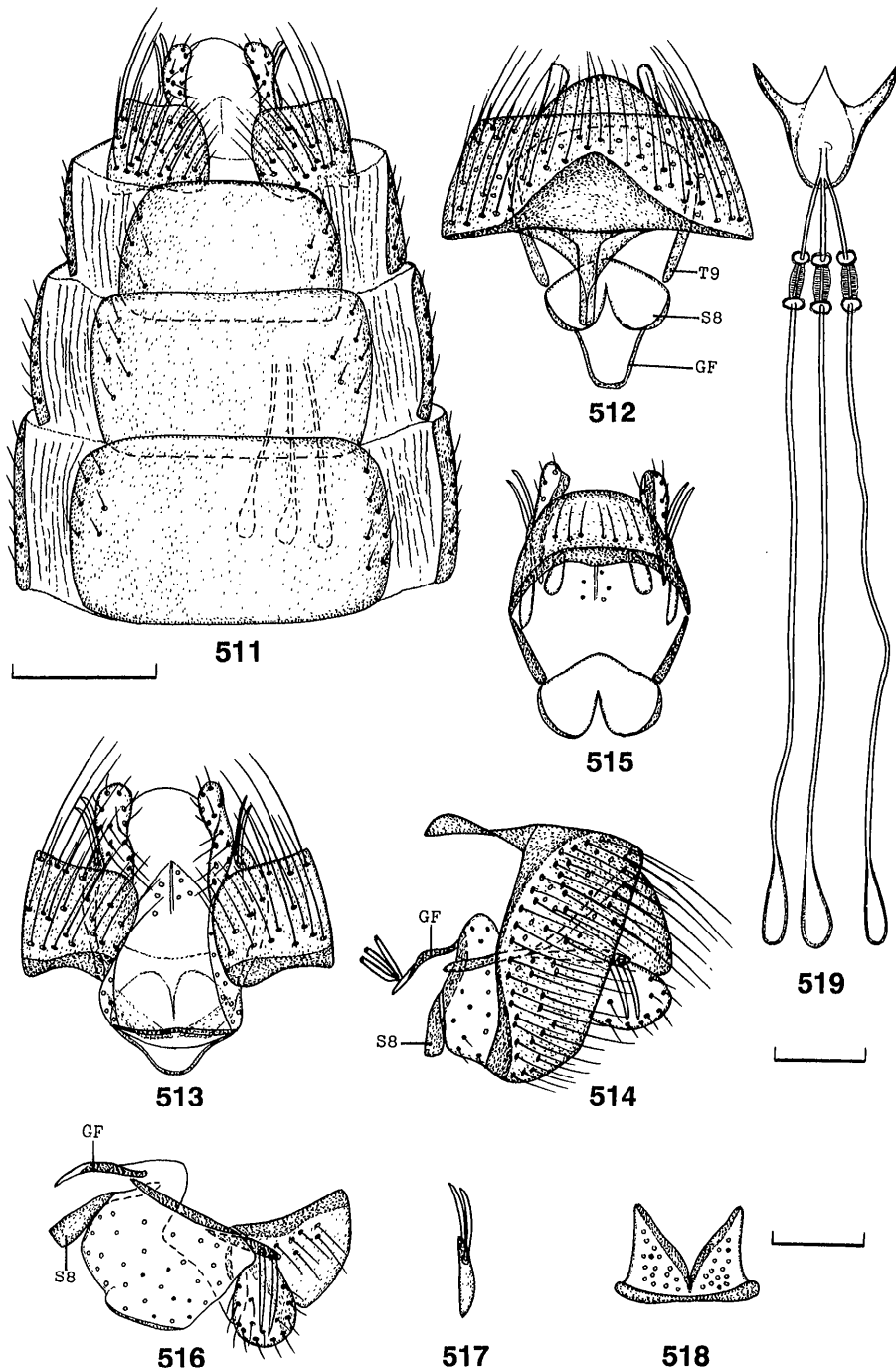
Cercus wide and partially rounded in lateral view. Tergum 10 paired, thin, shorter than cercus, and with posterior part having 2 stout spines. Sternum 10 triangular and with a median desclerotized line. Tergum 9 semicircular (or trapezoid) and with long anterolateral process. Tergum 8 in dorsal view trapezoid and with mid-anterior process whose base is wide. Sternum 8 as in Figs. 512–516 & 518. There is a large ventral membrane between sternum 8 and cerci. It appears that genital fork is U-shaped. Spermatheca long, each branched spermatheca consisting of (i) basal duct, (ii) granulate section capped at both ends, (iii) long apical duct, and (iv) elongate capsule wider apically, which is distinctly shorter than in *Pantostomus fruticicola*.

Specimens examined: 1 ♂, Beaufort W. Dist., C. P., xi. 1935; 1 ♀, Olifants River, bet. Citrusdal and Clanwilliam, C. P., x-xi. 1931.

Distribution. South Africa, Tanzania.



Figs. 500–510. *Tomomyza pictipennis* BEZZI, male genitalia. 500–501, Apex of abdomen, posterior and ventral views; 502–504, tergum 9 and cerci, dorsal, ventral and lateral views; 505, gonocoxites, ventral view; 506–507, gonocoxites, gonostyli and aedeagus, dorsal and lateral views; 508, posterior part of gonocoxites, dorsal view; 509–510, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 500–501; 0.3 mm for Figs. 502–510]



Figs. 511–519. *Tomomyza pictipennis* BEZZI, female genitalia. 511, Apex of abdomen, ventral view; 512–514, terga 8–10, cerci, sternum 8 & 10 and genital fork, dorsal, ventral and lateral views; 515, tergum 9, cerci and sternum 8, dorsal view; 516, terga 9–10, cerci, sternum 8 and genital fork, lateral view; 517, tergum 10, ventral view; 518, sternum 8; 519, genital fork and spermatheca, dorsal view. [Scale 0.5 mm for Figs. 511; 0.25 mm for Figs. 512–518; 0.2 mm for Fig. 519]

Subfamily Lomatiinae

Male

Based on 2 genera and 2 species. Fused gonocoxites much longer than wide and roughly parallel-sided, except widened base. Gonocoxal apodeme is absent in *Canariellum brunnipenne*, but anterolateral corner of gonocoxite is demarcated in *Ylasoia pegasus*. Sternum 9 absent. Phallus simple. Paired anterolateral ventral processes are distant from each other and are demarcated from phallus.

Female

Based on only 1 genus and 1 species.

Genus *Ylasoia* SPEISER

Ylasoia SPEISER, 1920, Zool. Jahrb. (Syst.) 43: 213. Type species: *Anthrax pegasus* WIEDEMANN, 1828, by original designation.

Ylasoia pegasus (WIEDEMANN)

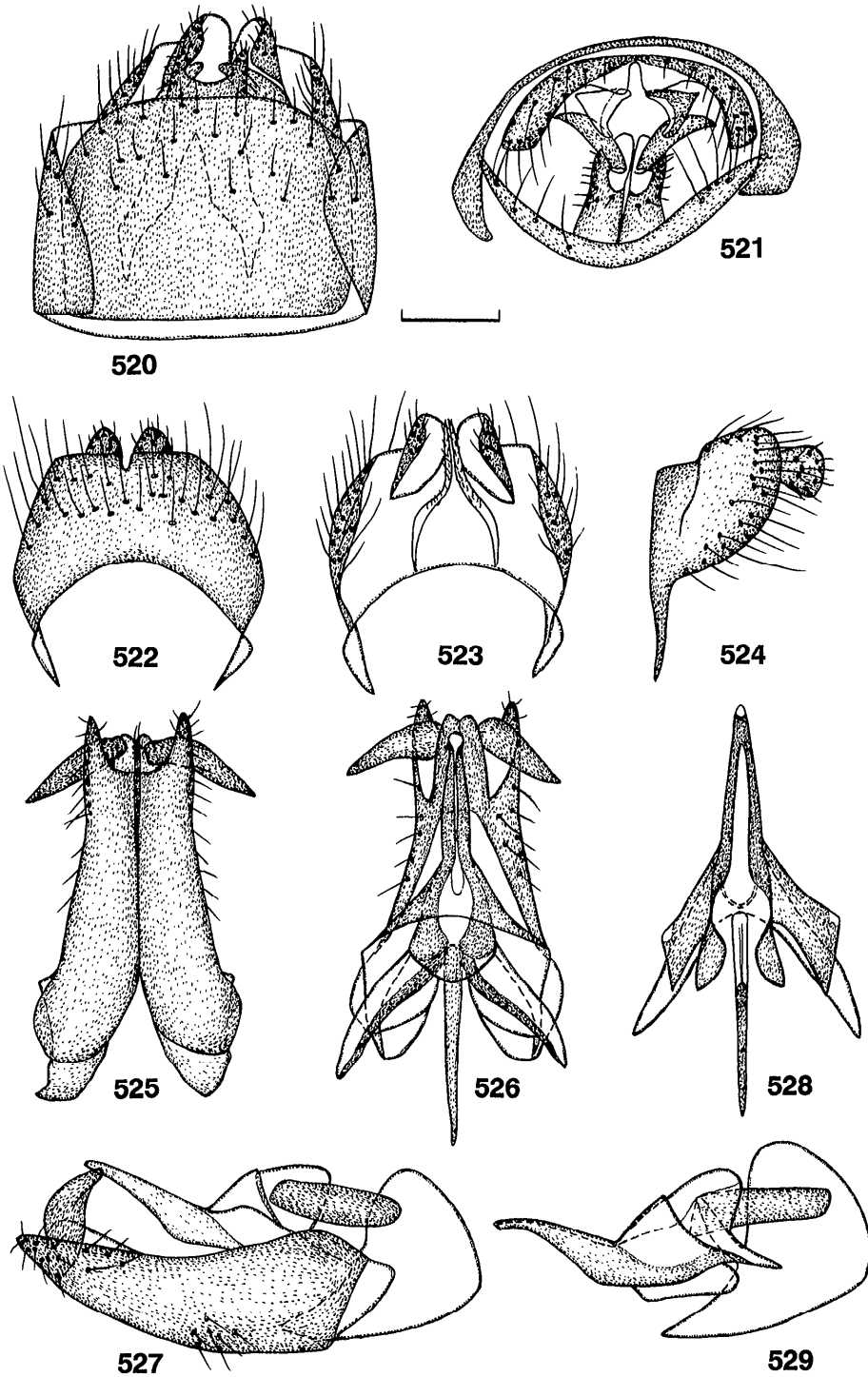
Anthrax pegasus WIEDEMANN, 1828, Aussereuropäische zweiflügelige Insekten 1: 298. Type locality: Brazil.

Male (Figs. 520–529)

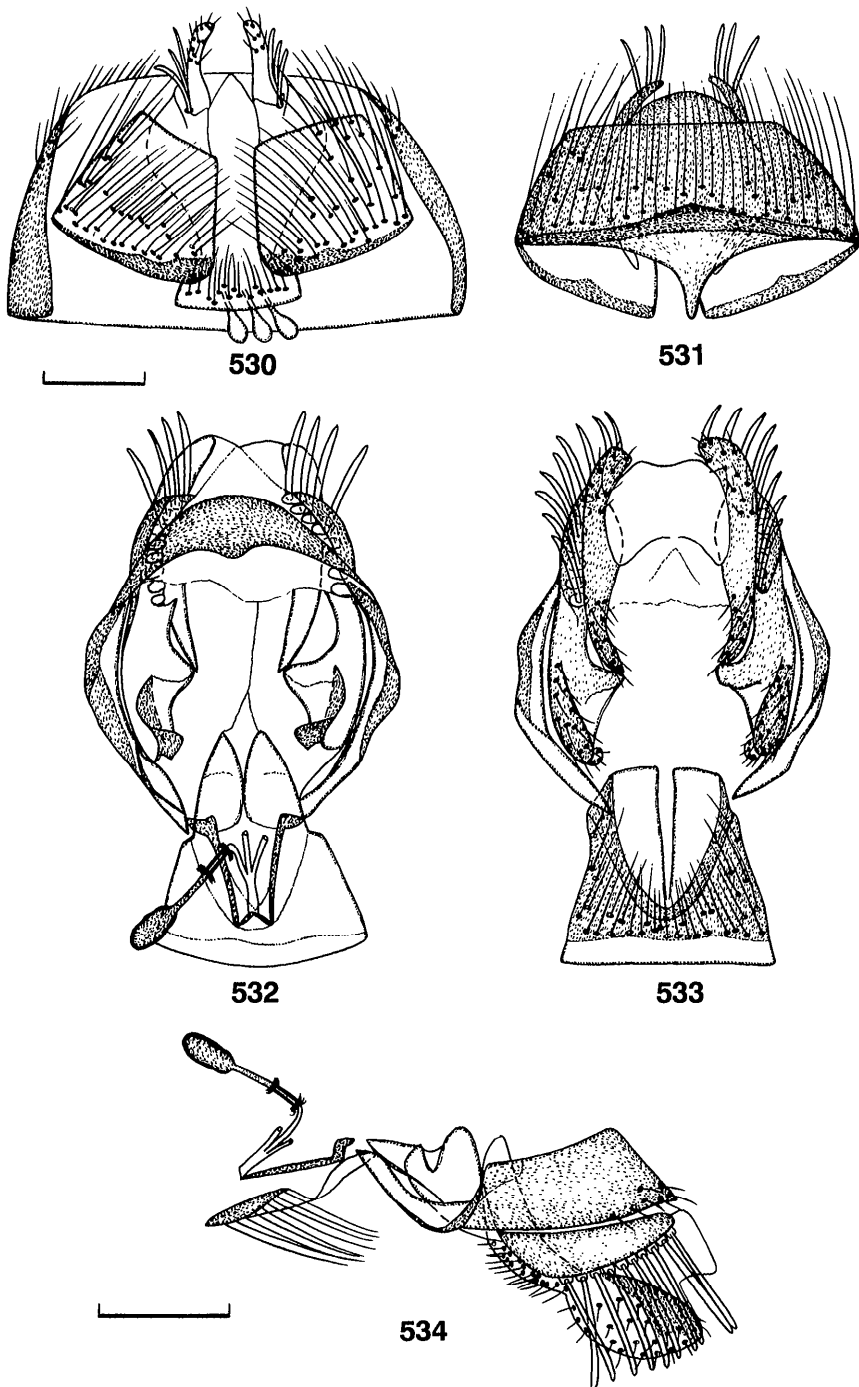
Sternum 10 apparently paired and long. Tergum 9 wider than long, widest before middle, with posterior margin straight and having a small mid concavity, and with an anterolateral long process. Fused gonocoxites much longer than wide, widened at base, with anterolateral and posterolateral protruded parts, and with median ventral sutures; sternum 9 absent; gonocoxal apodeme stout. Gonostylus narrowed apically and pointed at apex. Dorsal and ventral plates (in phallus) forming a tube; dorsal plate widened at base together with dorsal bridge, with a paler median line and mid-anterior widened space; ventral plate slender and tapering apically; anterolateral ventral process rather short, longer than wide, and pointed at apex. Aedeagal apodeme (except base) large, much wider than long, rounded at anterior margin, and with ventral posterior corner pointed.

Female (Figs. 530–534)

Tergum 10 paired, longer than cercus and each with posterior part having 10 stout setae. Tergum 9 semicircular or trapezoid, with long anterolateral process folded ventrally. Tergum 8 in dorsal view trapezoid and with a mid-anterior process whose base is wide. Sternum 8 in ventral view as in Fig. 533. Genital fork U-shaped, with base of lateral bar having stout projection directed outward, and with anterior bar concave and much shorter than the lateral. Spermatheca short; each branched spermatheca consisting of (i) basal duct, (ii) section with a cluster of pile at both ends, (iii) apical duct,



Figs. 520–529. *Ylasoia pegasus* (WIEDEMANN), male genitalia. 520–521, Apex of abdomen, ventral and posterior views; 522–524, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 525–527, gonocoxites, gonostyli and aedeagus, ventral, dorsal and lateral views; 528–529, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 520–521; 0.5 mm for Figs. 522–529]



Figs. 530–534. *Ylasoia pegasus* (WIEDEMANN), female genitalia. 530, Apex of abdomen, ventral view; 531, terga 8–10, dorsal view; 532–534, terga 9–10, cerci, sternum 8, genital fork and spermatheca, dorsal, ventral and lateral views. [Scale 0.5 mm for Figs. 530–531; 0.5 mm for Figs. 532–534]

and (iv) widened elongate capsule which is about as long as (iii).

Specimens examined: 1 ♂, 1 ♀, Campinas, Brazil, iii. 1924, F. X. WILLIAMS.

Distribution. Brazil, Argentina (Tucumán, Jujuy).

Genus *Canariellum* STRAND

Canariellum STRAND, 1928, Arch. Naturgesch. (A) 92(8): 48 (new replacement name for *Canaria* BECKER). Type species: *Lomatia brunnipennis* MACQUART, 1839, automatic.

Canariellum brunnipenne (MACQUART)

Anthrax brunnipennis MACQUART, 1839, Diptères, Hist. nat. Iles canaries 2(2): 105.

Type locality: Canary Is.

Male (Figs. 535–545)

Sternum 10 apparently V-shaped. Tergum 9 wider than long, with lateral margin convex, with anterior margin widely concave, with posterior margin straight and having a small mid concavity, and with anterolateral short projection wider apically. Fused gonocoxites much longer than wide, widened at base, with anterior margin shallowly concave, with posterolateral projection, with a mid-posterior ventral elongate sclerite, and with a median ventral suture; shape of mid-posterior dorsal part of fused gonocoxites as in Fig. 541; sternum 9 absent; gonocoxal apodeme absent (or inconspicuous). Gonostylus narrower apically and pointed at apex. Dorsal and ventral plates forming a tube which is tapering apically; ventral plate with a paler mid line and with anterior margin deeply concave; anterolateral ventral process rather rectangular in lateral view. Aedeagal apodeme comparatively small, longer than wide, and wider apically.

Female

Not examined.

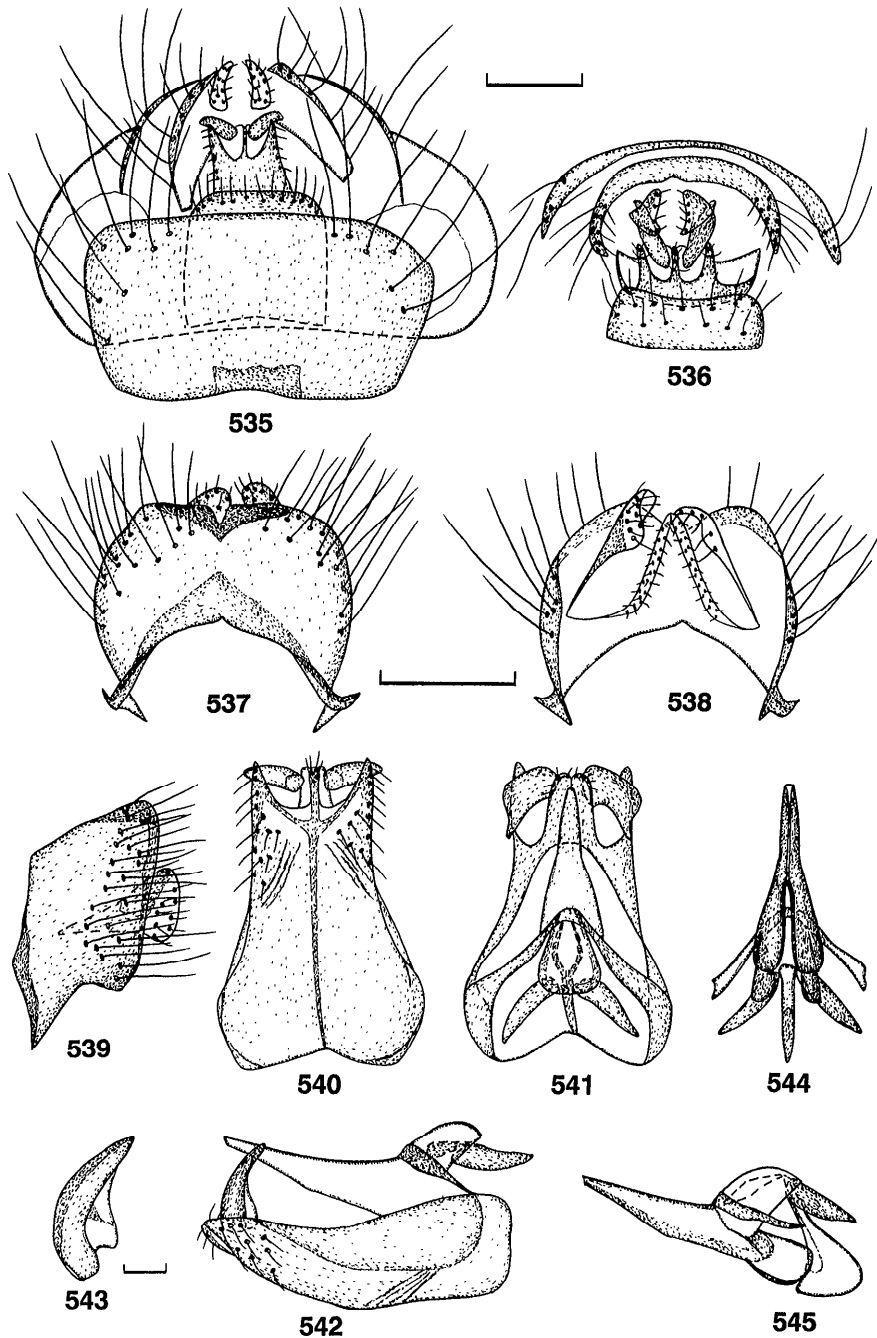
Specimen examined: 1 ♂, Tenerife, Las galletas, 0-50 m, Canaryis, x. 1969, F. FRANÇOIS.

Distribution. Canary Is.

Subfamily Anthracinae

Male

Based on 5 genera and 5 species. They have the following common peculiar characters: Phallus with a ventral hole on the top of smaller tube far before the apex of phallus (except for *Epacmoides biumbonatum*). There are 4 types of male genitalia given below.



Figs. 535–545. *Canariellum brunnipenne* (MACQUART), male genitalia. 535–536, Apex of abdomen, ventral and posterior views; 537–539, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 540, gonocoxites and gonostyli, ventral view; 541–542, gonocoxites, gonostyli and aedeagus, dorsal and lateral views; 543, gonostylus, lateral view. 544–545, aedeagus, ventral and lateral views. [Scale 0.5mm for Figs. 535–536; 0.5 mm for Figs. 537–542 & 544–545; 0.1 mm for Fig. 543]

Epacmoides and *Pteraulax* : Tergum 9 trapezoid and with anterior margin nearly straight or concave. Fused gonocoxites widest at base, with posterior margin having wide concavity, with median ventral furrow, with sternum 9, and with gonocoxal apodeme rather long. Posterior part of phallus not divided into dorsal and ventral tubes and ventral hole present on minute tube (which is absent in *Epacmoides biumbonatum*).

Diatropomma : Similar to the above 2 genera except as follows: Tergum 9 and fused gonocoxites longer than in the above 2 genera. Phallus divided into dorsal and ventral tubes and the former much wider than the latter.

Stonyx : Similar to *Diatropomma* except as follows : Fused gonocoxites without ventral median furrow. Gonocoxal apodeme thicker and shorter. Ventral tube in phallus distinctly longer than in *Diatropomma*.

Atrichochira : Fused gonocoxites rectangular, parallel-sided, with anterolateral ventral corner protruding somewhat, with posterior margin having a median deep concavity, without median ventral furrow and without sternum 9. Gonocoxal apodeme directed inward and not seen in ventral view. Phallus with dorsal vane which is rectangular and has anterolateral longitudinal part; phallus (besides dorsal vane) divided into two tubes of which the ventral is small.

Female

Based on 5 genera and 5 species. *Atrichochira*, *Diatropomma* and *Oestrimyza* differ markedly from *Epacmoides* and *Pteraulax* as follows: Tergum 10 fused with tergum 9; anterior part of sternum 8 folded ventrally and with apical (=posterior) margin having a row of hairs directed posteriorly. In *Atrichochira* and *Diatropomma*, tergum 8 without mid-anterior extension. In *Pteraulax* and *Oestrimyza*, tergum 8 with rectangular mid-anterior extension. In *Atrichochira*, each spermatheca without widened capsule.

Genus *Pteraulax* BEZZI

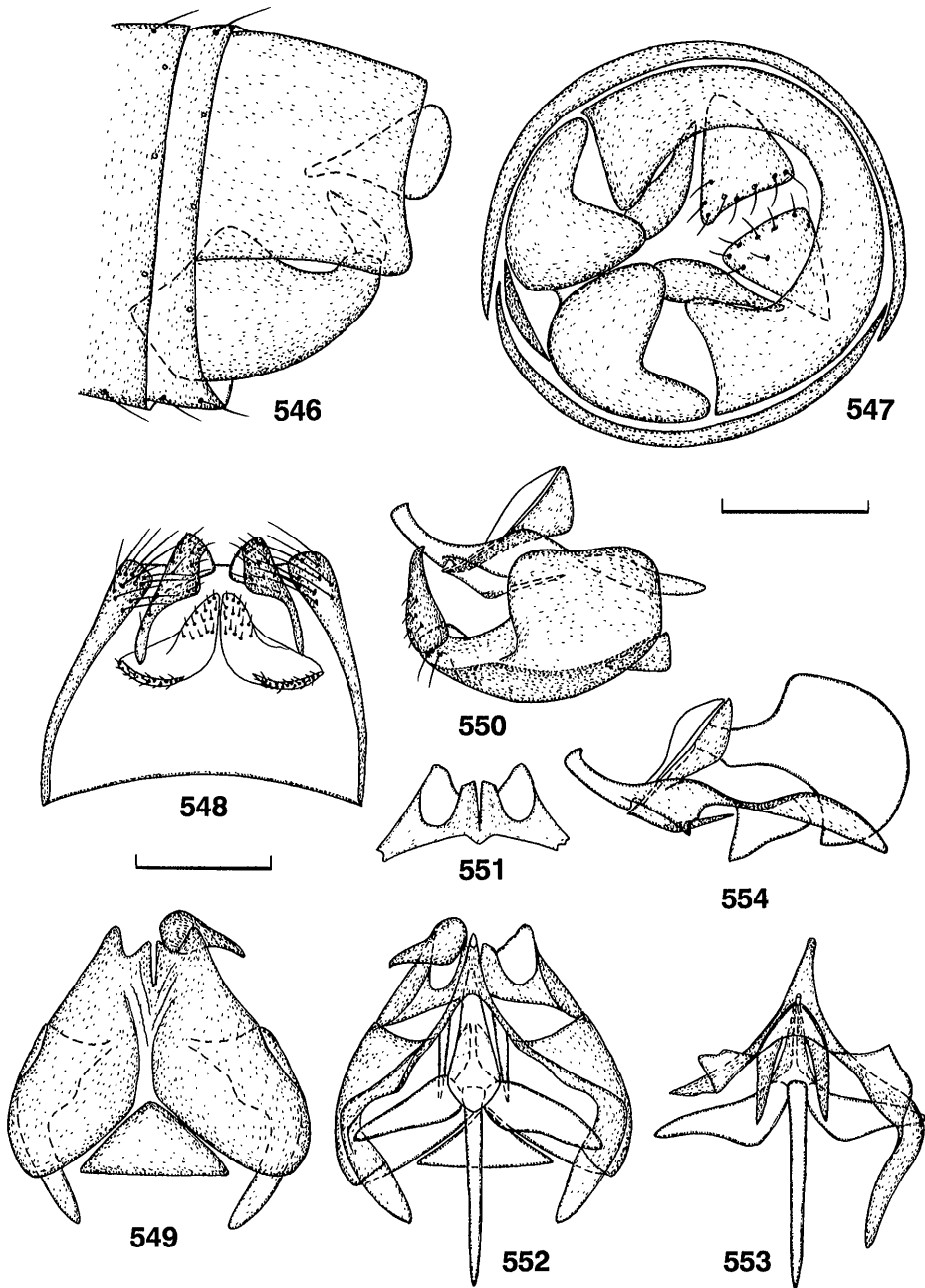
Pteraulax BEZZI, 1921, Ann. S. Afr. Mus. 18: 117. Type species: *Pteraulax flexicornis* BEZZI, 1921, by original designation.

Pteraulax flexicornis BEZZI

Pteraulax flexicornis BEZZI, 1921, Ann. S. Afr. Mus. 18: 118. Type locality: South Africa.

Male (Figs. 546–554)

Sternum 10 apparently paired, and each with basal border sclerotized. Tergum 9 rectangular or trapezoid and wider than long. Fused gonocoxites rather triangular, with posterior margin having paired lateral concavities and median deep concavity, and with a wide median ventral furrow; shape of mid-posterior dorsal part as in Fig. 551; sternum 9 triangular and wider than long; gonocoxal apodeme slender and rather pointed



Figs. 546–554. *Pteraulax flexicornis* BEZZI, male genitalia. 546–547, Apex of abdomen, lateral and posterior views; 548, tergum 9, cerci and sternum 10, ventral view; 549, gonocoxites, gonostylus and sternum 9, ventral view; 550 & 552, gonocoxites, gonostylus and aedeagus, lateral and dorsal views; 551, posterior part of gonocoxites, dorsal view; 553–554, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 546–547; 0.5 mm for Figs. 548–554]

at apex; dorsal bridge V-shaped. Gonostylus much longer than wide, narrower apically and pointed at apex. Dorsal and ventral plates forming a tube with apex curved upwards; ventral surface with a small hole well before apex; anterolateral ventral process slender and pointed at apex. Aedeagal apodeme large, with anterior margin rounded, with dorsal and ventral margins concave, of which the latter is longer than the former.

Female (Figs. 555–561)

Cercus long. Tergum 10 paired, long, roughly as long as cercus, and with posterior part having 6 stout setae. Tergum 9 trapezoid, and with anterolateral process folded ventrally. Tergum 8 in dorsal view trapezoid, relatively long, with a mid-anterior rectangular elevation which is wider than long. Sternum 8 longer than wide, gradually narrower posteriorly, and with posterior part bilobed. Genital fork U-shaped and with anterior bar not longer than the lateral. Each branched spermatheca consisting of (i) basal duct, (ii) granulate section with a cap at apical end, (iii) longer apical duct, and (iv) widened capsule much longer than wide and with apex rounded or bluntly pointed.

Specimens examined: 1 ♂, 1 ♀, Kamieskroom, Namaqualand, South Africa, xi. 1936.

Distribution. South Africa.

Genus *Atrichochira* HESSE

Atrichochira HESSE, 1956, Ann. S. Afr. Mus. 35: 911. Type species: *Exoprosopa pediformis* BEZZI, 1921, by original designation.

Atrichochira pediformis (BEZZI)

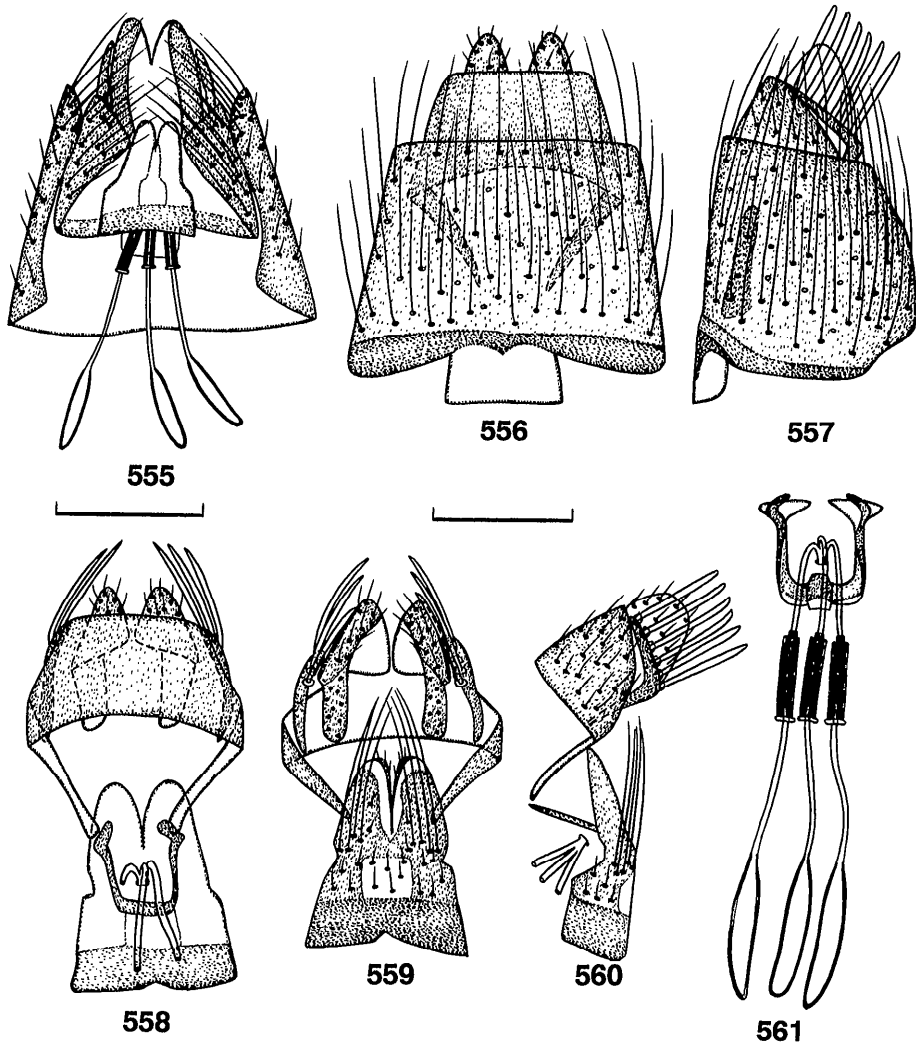
Exoprosopa pediformis BEZZI, 1921, Ann. S. Afr. Mus. 18: 160. Type locality: Malawi.

Male (Figs. 562–572)

Sternum 10 (at least in sclerotized part) paired, thin and short. Tergum 9 narrowed at posterior part. Fused gonocoxites rectangular, longer than wide, with anterior margin having a rectangular concavity, with posterior margin having a deep median concavity, and with gonocoxal apodeme directed inward; sternum 9 and median ventral furrow absent; dorsal bridge shallowly U-shaped. Gonostylus widened at base, tapering apically and pointed. Dorsal vane rather quadrate, somewhat wider apically and with anterolateral lobe; phallus in ventral view with (i) a posterior thin part (which may belong to dorsal plate), (ii) a widened anterior part, and with a hole near the apex of (ii); anterolateral ventral process in lateral view widest around middle and then tapering apically. Aedeagal apodeme (except base) with dorsal and anterior margins rounded and with ventral margin straight; aedeagal apodeme longer than wide.

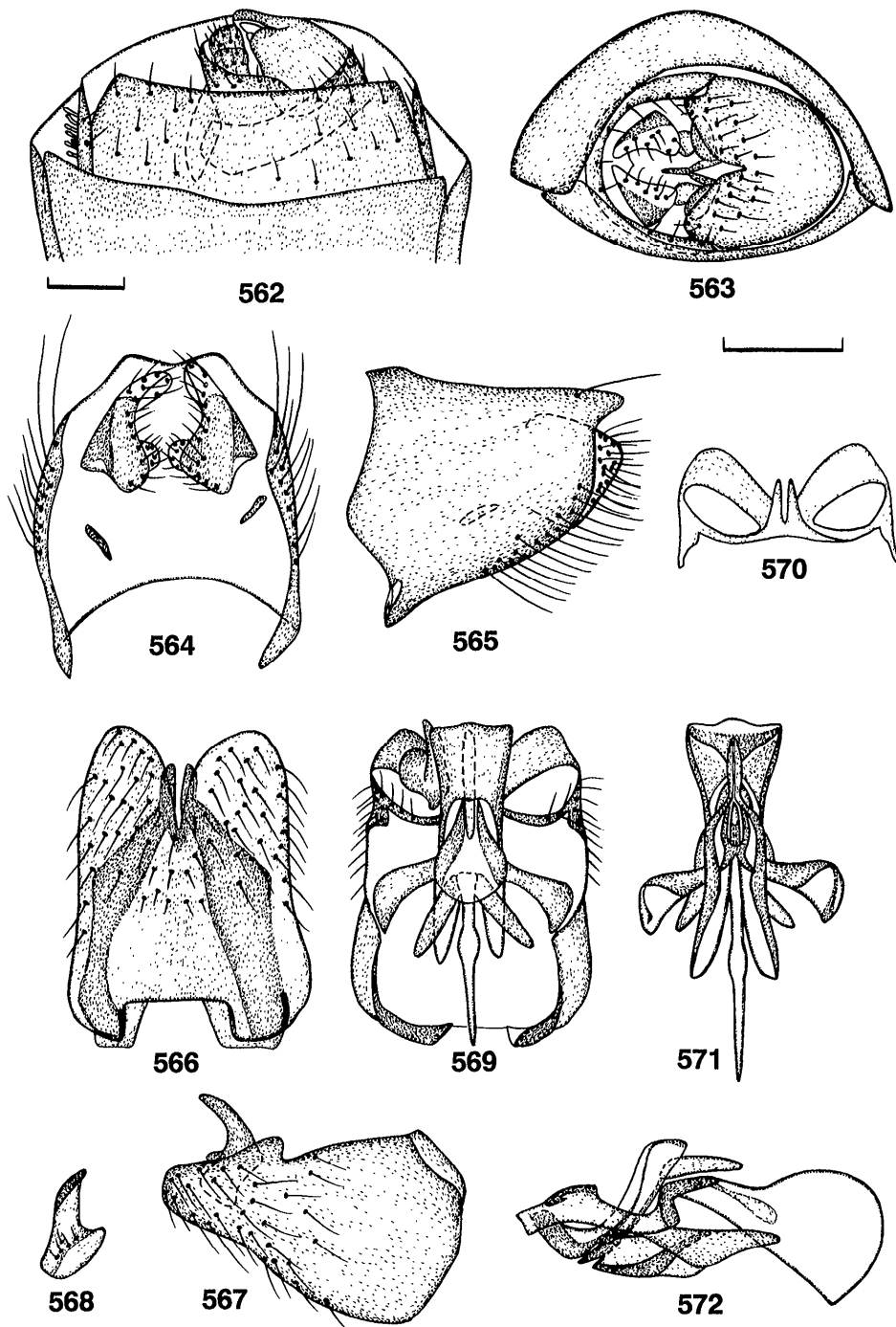
Female (Figs. 573–577)

Cercus long. Tergum 9 fused with tergum 10. Tergum 9 + 10 in dorsal view trapezoid, with each posterolateral part having 5 stout setae, with each anterolateral

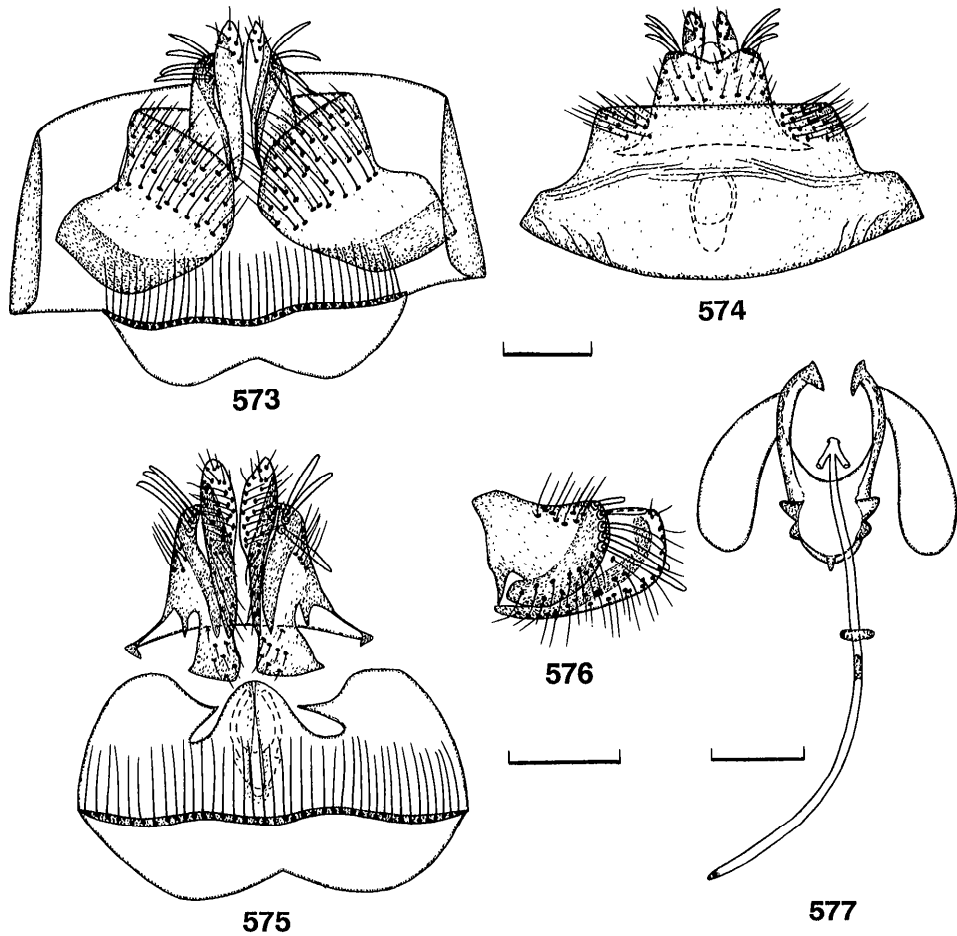


Figs. 555–561. *Pteraulax flexicornis* BEEZI, female genitalia. 555, Terga 7–8, cerci, sternum 8 and spermatheca, ventral view; 556–557, terga 8–10 and cerci, dorsal and lateral views; 558–560, terga 9–10, cerci, sternum 8 and genital fork, dorsal, ventral and lateral views; 561, genital fork and spermatheca, dorsal view. [Scale 0.5 mm for Fig. 555; 0.3 mm for Figs. 556–561]

part somewhat projected outward; in ventral view tergum 10 protrudes anteriorly as paired bands. Tergum 8 is roughly trapezoid; lateral margin may have a concavity and anterior margin may be gently convex; mid-anterior process is absent. Sternum 8 membranous, large, wider than long, with posterior margin having paired concavities, and with anterior part having a shallow median concavity; anterior part apparently folded ventrally and with apical (=posterior) transverse sclerite having a row of hairs directed posteriorly. Genital fork U-shaped, with anterior part having 5 teeth, and with base of



Figs. 562–572. *Atrichochira pediformis* (Bezzi), male genitalia. 562–563, Apex of abdomen, ventral and posterior views; 564–565, tergum 9, cerci and sternum 10, ventral and lateral views; 566–567, gonocoxites and gonostylus, ventral and lateral views; 568, gonostylus, ventral view; 569, gonocoxites, gonostylus and aedeagus, dorsal view; 570, posterior part of gonocoxites, dorsal view, 571–572, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 562–563; 0.3 mm for Figs. 564–572]



Figs. 573–577. *Atrichochira pediformis* (BEZZI), female genitalia. 573, terga 7–10, cerci and sternum 8, ventral view; 574, terga 8–10 and cerci, dorsal view; 575, tergum 9+10, cerci and sternum 8, ventral view; 576, tergum 9+10 and crepus, lateral view; 577, genital fork and spermatheca, dorsal view. [Scale 0.5 mm for Figs. 573–574; 0.5 mm for Figs. 575–576; 0.2 mm for Fig. 577]

lateral bar having short process directed antero-inwardly. Each branched spermatheca with widened cap behind middle and without widened capsule.

Specimens examined: 1 ♂, 1 ♀, Rumonge, 780 m, Urundi, 28. vi. & 27. viii. 1949, F. FRANÇOIS.

Distribution. Malawi, Burundi, South Africa.

Genus *Diatropomma* BOWDEN

Diatropomma BOWDEN, 1962, J. Entomol. Soc. South Afr. 25: 116. Type species: *Diatropomma carcasoni* BOWDEN, 1962, by original designation.

Diatropomma claudia (FRANÇOIS)

Exprosopa claudia FRANÇOIS, 1960, Bull. Annl. Soc. r. ent. Belg. 96: 284. Type locality: Burundi.

Male (Figs. 578–587)

Sternum 10 (at sclerotized part) paired, thin and short. Tergum 9 rather trapezoid, longer than wide and with anterolateral part protruded. Fused gonocoxites longer than wide, narrower at posterior half, with posterior part bilobed and with a median ventral furrow; shape of mid-posterior dorsal sclerites as in Fig. 585. Sternum 9 triangular and wider than long; gonocoxal apodeme slender; dorsal bridge U-shaped. Gonostylus gradually narrower apically and pointed at apex. Dorsal plate with widened posterior, rather lozenge-shaped part, with anterolateral longer part, and with more sclerotized parts, that is, apical band and rather Y-shaped smaller stripe; ventral plate parallel-sided, with thin median posterior part and with hole just before apex; anterolateral ventral process slender and pointed at anterior end. Aedeagal apodeme large, longer than wide, with ventral margin rounded, and with dorsal margin (except base) straight.

Female (Figs. 588–594)

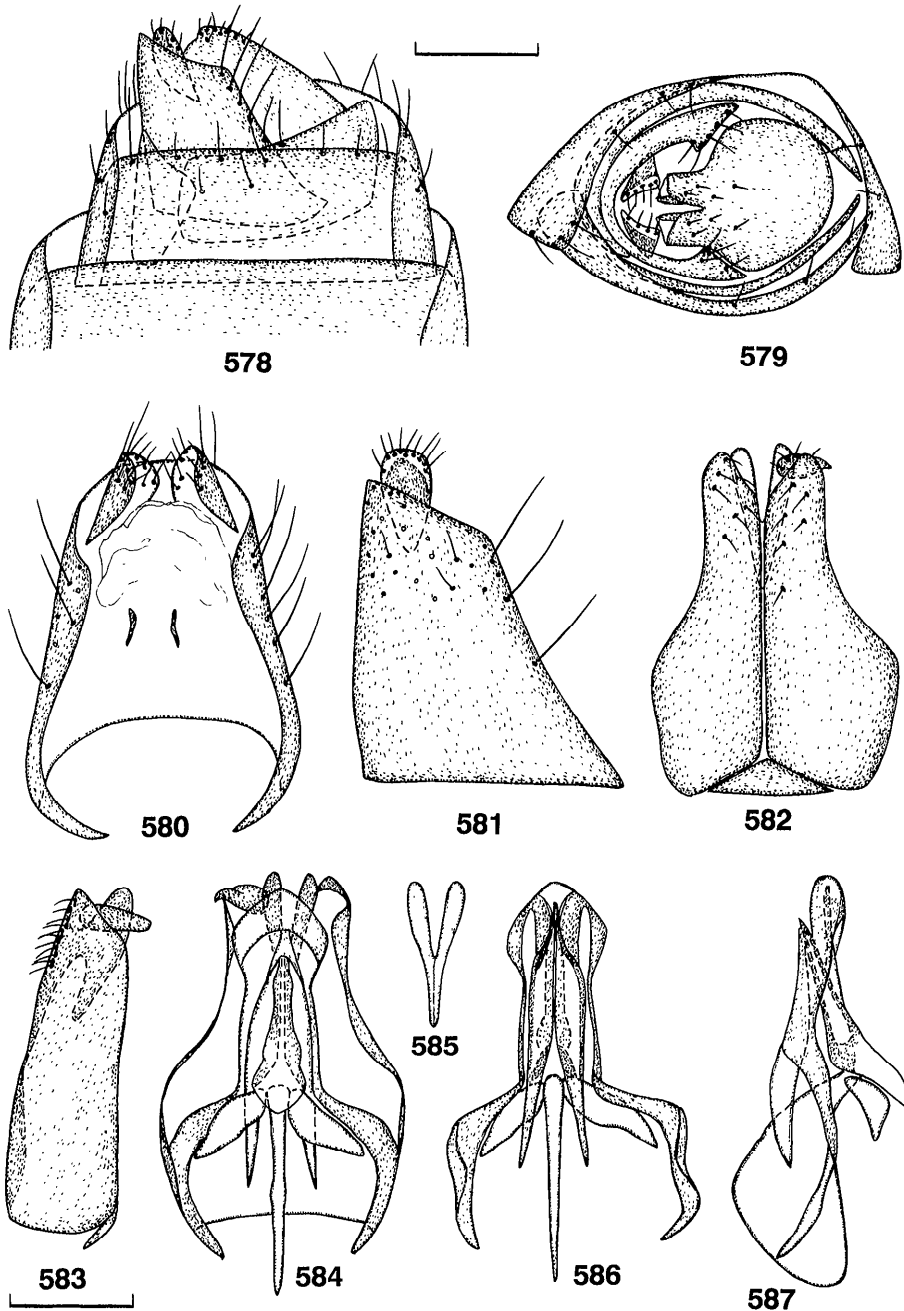
Cercus long. Tergum 9 fused with tergum 10. Tergum 9 + 10 in dorsal view with anterior part trapezoid, with posterolateral part having 5 stout spines, and with mid-posterior part membranous; tergum 9 + 10 with paired rectangular long bands folded ventrally. [Sternum 10 may be V-shaped.] Tergum 8 in dorsal view rather trapezoid, with lateral margin having a shallow concavity, with anterior margin convex, and with posterior margin having a transverse row of hairs. Sternum 8 (which is membranous) in dorsal view large, wider than long, rather trapezoid, with posterior margin having shallow lateral and wide median concavities; sternum 8 with anterior part folded ventrally which is much wider than long and has a row of hairs at posterior margin; sternum 8 with rather O-shaped large spot at middle. Genital fork U-shaped, with lateral bar wider posteriorly and with anterior sclerite narrow, longer than wide and narrower posteriorly. Each branched spermatheca consists of (i) longer basal duct, (ii) short section capped at both ends, and (iii) capsule roughly as wide as (i) and as long as (ii).

Specimens examined: 1 ♂, Kisenyz Busoni, Urundi, 6. vi. 1955, F. J. FRANÇOIS; 1 ♀, Terr. de Muhinga, 1,250 m, Urundi, F. J. FRANÇOIS.

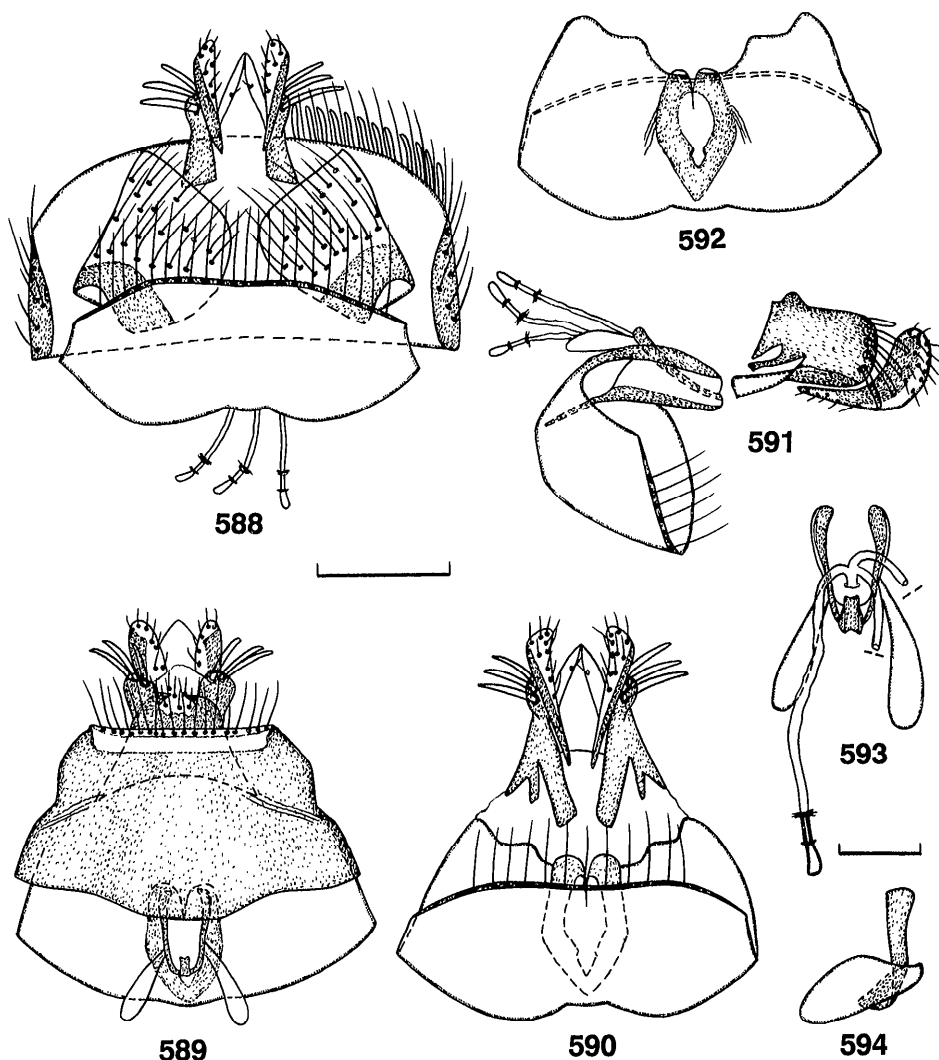
Distribution. Burundi.

Genus *Epacmoides* HESSE

Epacmoides HESSE, 1956, Ann. S. Afr. Mus. 35: 125. Type species: *Plesiocera biumbonata* BEZZI, 1922, by original designation.



Figs. 578–587. *Diatropomma claudia* (FRANÇOIS), male genitalia. 578–579, Apex of abdomen, ventral and posterior views; 580–581, tergum 9, cerci and sternum 10, ventral and lateral views; 582–583, gonocoxites and gonostylus, ventral and lateral views; 584, gonocoxites, gonostylus and aedeagus, dorsal view; 585, mid - posterior part of gonocoxites, dorsal view; 586–587, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 578–579; 0.3 mm for Figs. 580–587]



Figs. 588–594. *Diatropomma claudia* (FRANÇOIS), female genitalia. 588, terga 7–10, cerci, sternum 8 & 10 and spermatheca, ventral view; 589, terga 8 & 9+10, cerci, sternum 8, genital fork and accessory gland, dorsal view; 590, tergum 9+10, cerci and sternum 8 & 10, ventral view; 591, tergum 9+10, cerci, sternum 8, genital fork, accessory gland and spermatheca, lateral view; 592, sternum 8, dorsal view; 593, genital fork, accessory gland and spermatheca, dorsal view; 594, genital fork, accessory gland, lateral view. [Scale 0.5 mm for Figs. 588–592; 0.2 mm for Figs. 593–594]

Epacmoides biumbonatum (BEZZI)

Plesiocera biumbonata BEZZI, 1922, Brotéria (Zool.) 20: 81. Type locality: South Africa.

Male (Figs. 595–605)

Sternum 10 (at sclerotized part) paired and reduced to small dots. Tergum 9 trapezoid, with anterior margin widely concave and with posterior margin straight. Fused gonocoxites rather triangular, with posterior margin with a U-shaped concavity, and with a median ventral furrow; shape of mid-posterior dorsal part of fused gonocoxites as in Fig. 603. Sternum 9 triangular and wider than long; gonocoxal apodeme slender. Gonostylus widened around middle and then tapering apically. Dorsal bridge U-shaped. Dorsal plate short, widened at base and thin at posterior part; ventral plate thin at apex and with a median paler line; anterolateral ventral process large and much longer than rest of ventral plate. Aedeagal apodeme much longer than wide, with ventral margin convex and with dorsal margin nearly straight.

Female (Figs. 606–613)

Cercus long. Tergum 10 paired, thin, shorter than cercus, and with posterior part having 2 stout spines. Tergum 9 trapezoid, short, and with anterolateral process folded ventrally. Tergum 8 in dorsal view trapezoid and with mid-anterior process. Sternum 8 rather trapezoid but with posterior part bilobed. Genital fork U-shaped, with anterior bar shorter than the lateral, and with base of lateral bar having a short process directed inward. Each branched spermatheca consisting of (i) short basal duct, (ii) granulate section having inner tube, and short narrower section and with transverse lines, (iii) longer apical duct, and (iv) widened capsule narrowed at middle and longer than (iii).

Specimens examined: 1 ♂, Kamieskroom, Namaqualand, xi. 1936; 1 ♀, Wallekraal, Namaqualand, x. 1950.

Distribution. South Africa.

Genus *Stonyx* OSTEN SACKEN

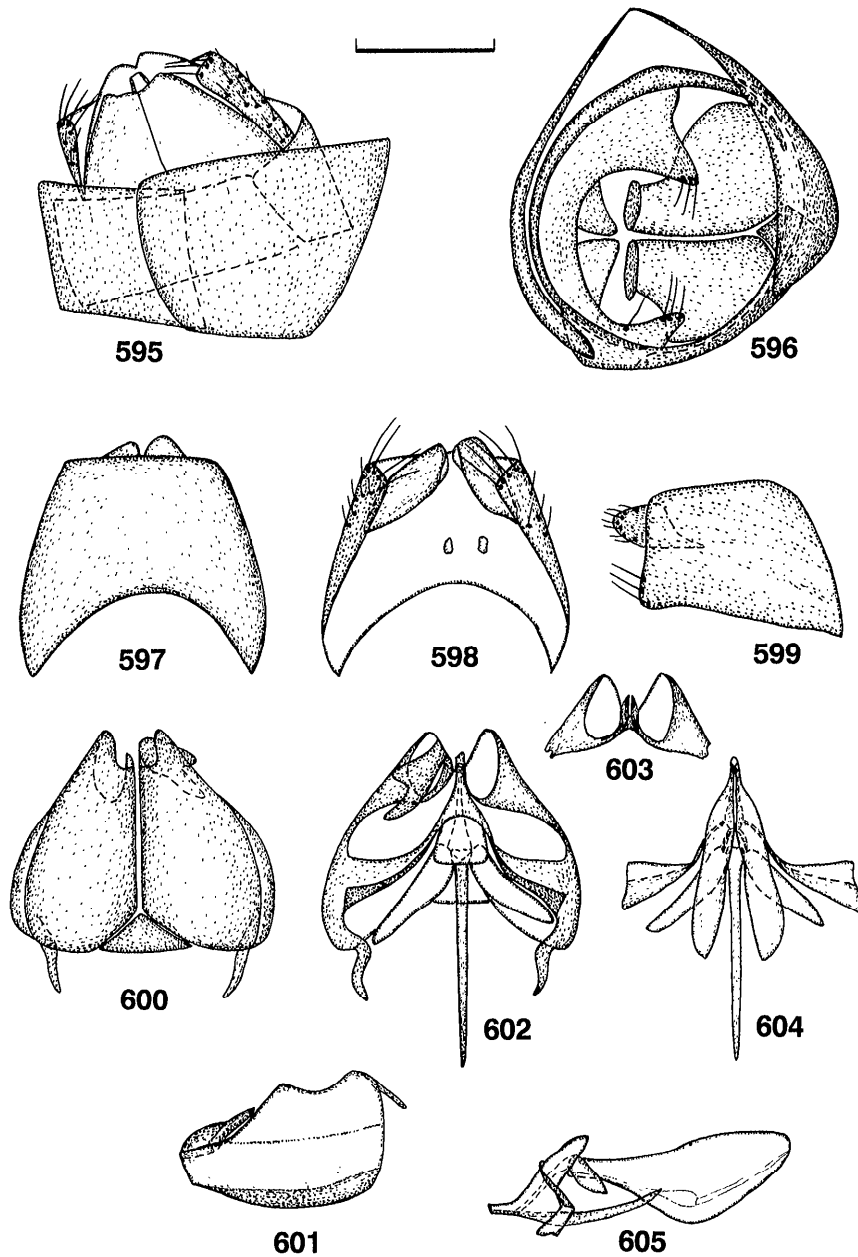
Stonyx OSTEN SACKEN, 1886, Diptera [part]. In: GODHAM, F. D. and SALVIN, O., eds., *Biologia Centrali-Americana*. pp. 80, 94. Type species: *Stonyx clelia* OSTEN SACKEN, 1886, by subsequent designation of COQUILLET (1910: 609).

Stonyx clotho (WIEDEMANN)

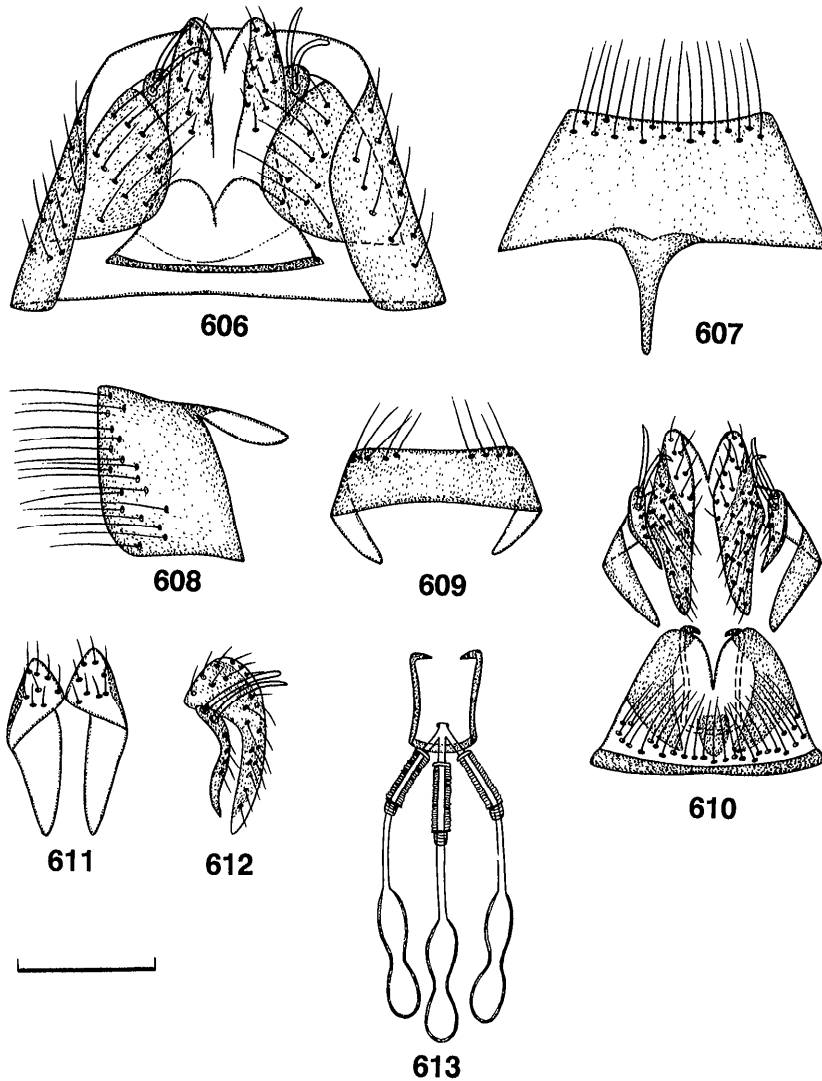
Anthrax clotho WIEDEMANN, 1830, *Aussereuropäische zweiflügelige Insekten* 2 : 635.
Type locality: Mexico.

Male (Figs. 614–624)

Tergum 9 rather trapezoid, with anterior margin gently concave and with posterolateral projection. Fused gonocoxites narrowed posteriorly and widened anteriorly, with posterior part bilobed, with anterior margin having a median concavity; shape of mid-posterior dorsal sclerite of fused gonocoxites as in Fig. 622; median ventral furrow and sternum 9 absent; gonocoxal apodeme rather stout and rather triangular. Gonostylus with apical margin concave. Dorsal plate rectangular and much longer than



Figs. 595–605. *Epacmoides biumbonatum* (BEZZI), male genitalia. 595–596, Apex of abdomen, ventral and posterior views; 597–599, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 600–601, gonocoxites, gonostylus and sternum 9, ventral and lateral views; 602, gonocoxites, gonostylus and aedeagus, dorsal view; 603, posterior part of gonocoxites, dorsal view; 604–605, aedeagus, ventral and lateral views. [Scale 0.3 mm]



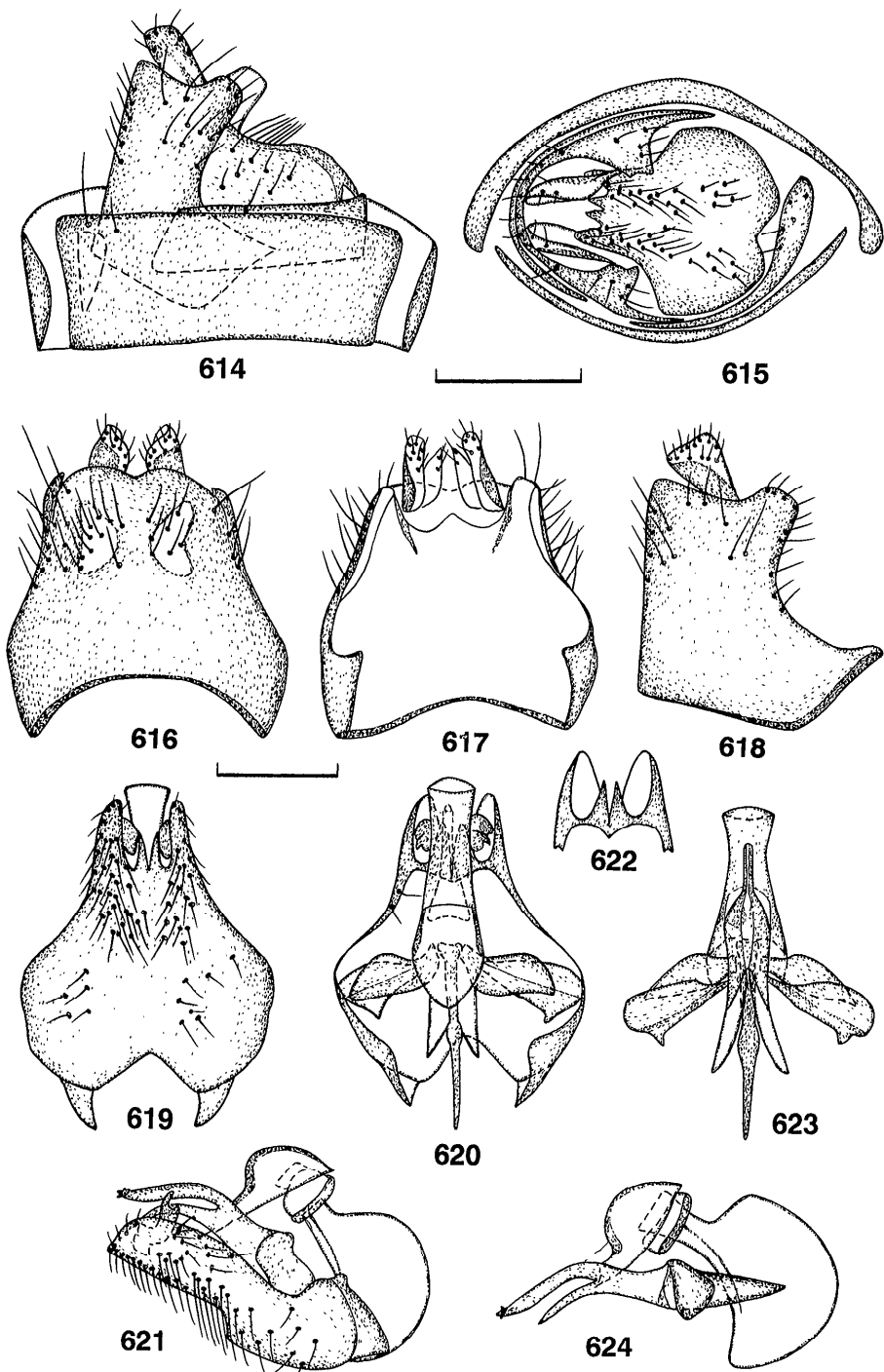
Figs. 606–613. *Epacmoides biumbonatum* (BEZZI), female genitalia. 606, Terga 7–8 & 10, cerci and sternum 8, ventral view; 607–608, tergum 8, dorsal and lateral views; 609, tergum 9, dorsal view; 610, terga 9–10, cerci and sternum 8, ventral view; 611, cerci, dorsal view; 612, tergum 10 and cercus, lateral view; 613, genital fork and spermatheca, dorsal view. [Scale 0.3 mm]

wide; ventral plate narrower than dorsal plate, with posterior part thin, and with a paler median line; anterolateral ventral process long and pointed at anterior end. Aedeagal apodeme large, and with anterior margin rounded.

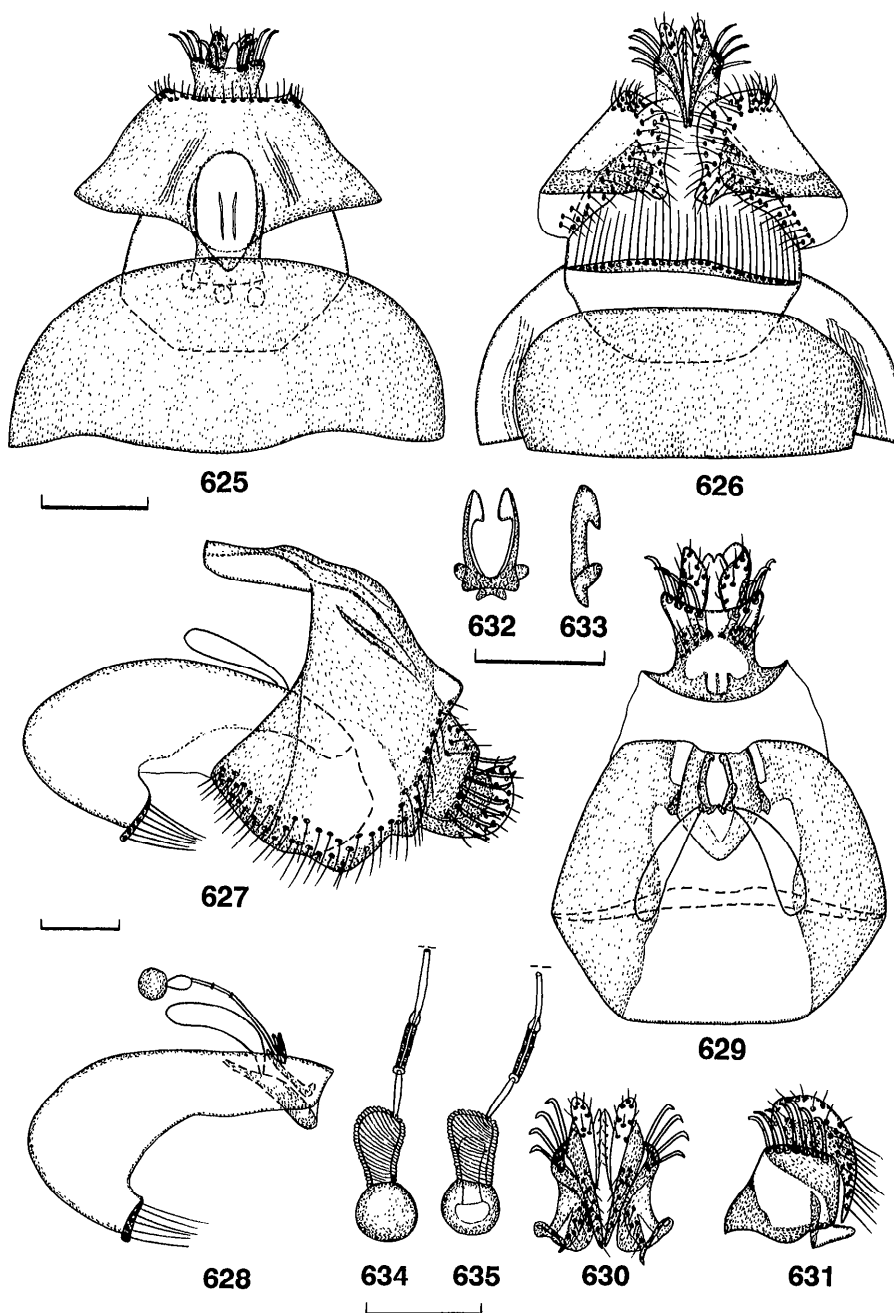
Female

Not examined.

Specimen examined: 1 ♂, Gamboa, Panama, 3. i. 1992, J A. BISHOP.



Figs. 614–624. *Stonyx clotho* (WIEDEMANN), male genitalia. 614–615, Apex of abdomen, ventral and posterior views; 616–618, tergum 9, cerci and sternum 10, dorsal, ventral and lateral views; 619, gonocoxites and gonostyli, ventral view; 620–621, gonocoxites, gonostyli and aedeagus, dorsal and lateral views; 622, posterior part of gonocoxites, dorsal view; 623–624, aedeagus, ventral and lateral views. [Scale 0.5 mm for Figs. 614–615; 0.5 mm for Figs. 616–624]



Figs. 625–635. *Oestrimyza fenestrata* HULL, female genitalia. 625–626, Apex of abdomen, dorsal and ventral views; 627, terga 8 & 9+10, cercus, sternum 8 and accessory gland, lateral view; 628, sternum 8, genital fork, accessory gland and spermatheca, lateral view; 629, tergum 9+10, cerci, sternum 8, genital fork and accessory gland, dorsal view; 630–631, tergum 9+10, cerci and sternum 10, ventral and lateral views; 632–633, genital fork, dorsal and lateral views; 634–635, lateral and median spermatheca (basal portion is cut off). [Scale 1 mm for Figs. 625–626; 0.5 mm for Figs. 627–631; 0.5 mm for Figs. 632–633; 0.3 mm for Figs. 634–635]

Distribution. Mexico (México, Michoacán, Oaxaca, Morelos), Panama (Canal Zone).

Genus *Oestrimyza* HULL

Oestrimyza HULL, 1973, Bull. U. S. Natl. Mus. 286: 411. Type species: *Oestrimyza fenestrata* HULL, 1973, by original designation.

Oestrimyza fenestrata HULL

Oestrimyza fenestrata HULL, 1973, Bull. U. S. Natl. Mus. 286: 411. Type locality: Brazil.

Male

Not examined.

Female (Figs. 625–635)

Cercus rather long. Tergum 10 is fused with tergum 9. Tergum 9 + 10 rather rectangular, with each posterolateral part having 7 (or so) stout spines, with lateral part folded ventrally. Tergum 8 trapezoid, with lateral part folded ventrally, and with a mid-anterior rectangular extension; tergum 8 with a large mid-anterior paler spot. Sternum 8 large, membranous, with posterior part trapezoid, and with anterior part which is trapezoid, folded ventrally, and has posterior sclerotized margin having a row of hairs. Genital fork as in Figs. 632–633. Spermathecal capsule mushroom-shaped; duct short and with a granulate section.

Specimen examined; 1 ♀, San Jose, 'Arazati', Uruguay, xi. 1949, A. MONTORO.

Distribution. Brazil, Uruguay.

Discussin

Synapomorphic character for Bombyliidae and Bombyliidae + Hilarimorphidae in male genitalia

The character (ii) on Page 5 may be synapomorphic for the Bombyliidae (including Mythicomyiinae and Heterotropinae) (see also SINCLAIR et al., 1994) and the character (i) may be for the Bombyliidae + Hilarimorphidae.

Differences between Bombyliidae and some other families in male genitalia

Some of us (NAGATOMI, 1982; NAGATOMI *et al.*, 1991a, b; NAGATOMI and LIU, 1994) were able to examine the male genitalia of some families related to the Bombyliidae. The difference in male genitalia between these families and Bombyliidae is noted below.

Hilarimorphidae (NAGATOMI, 1982: figs. 1–4; NAGATOMI *et al.*, 1991a: figs. 47–51): In phallus (except posterior part), dorsal and ventral plates are widely separated, and a long lateral connecting band is present between them; aedeagal apodeme and aedeagal posterior sclerite are not differentiated; endophallic membranous body (= basiphallus or sperm sac) and endophallic sclerite (= lateral aedeagal apodeme) are absent; sternum 9 is absent (this is so in many taxa of Bombyliidae).

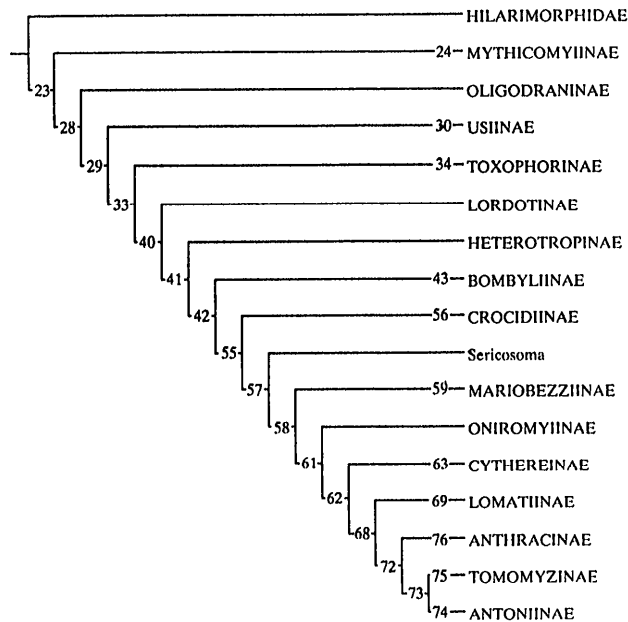
Proratinae (= a subfamily of Scenopinidae) (NAGATOMI *et al.*, 1994: figs. 64–151): Genera other than *Caenotus* (= *Acaenotus*, *Alloxytropus*, *Caenotoides*, *Jackhallia* and *Prorates*): It is needless to say the difference which is so large. *Caenotus* COLE, 1923: Tergum 9 divided along mid line, except for middle portion; endophallic sclerite absent; aedeagal apodeme not flattened laterally and widest before middle either in dorsal (or ventral) or in lateral view; sternum 9 large and with apex extending to mid-posterior margin of fused gonocoxites; gonocoxites without mid-ventral furrow (in some Bombyliidae, it is so secondarily).

Apystomyiidae (WIEGMANN *et al.*, 1993: fig. 2; YEATES, 1994: figs. 344–347; NAGATOMI and LIU, 1994: figs. 16–25): Tergum 9 bifurcate, except large basal part and median transverse band behind cerci and sternum 10; dorsal bridge U-shaped [the lateral bar is possibly identical with gonocoxal apodeme derived from the dorsal inner point of gonocoxite]; gonocoxal apodeme stick-like (not flattened laterally); endophallic sclerite (= lateral aedeagal apodeme) absent.

Apsilocephalidae (NAGATOMI *et al.*, 1991b: figs. 1–6, 12–19; SINCLAIR *et al.*, 1994: fig. 16; YEATES, 1994: figs. 322–325): Aedeagal apodeme stick-like (not flattened laterally); tergum 9 with a large posterolateral process (= surstylus) directed ventrally; subepandrial sclerite (which is U-shaped ventral endoskeleton arising from surstyli) is present in *Apsilocephala* but absent in *Clesthertia*; gonocoxal apodeme is absent in *Apsilocephala* (as in some taxa of Bombyliidae) but present at dorsal inner point of gonocoxite in *Clesthertia*.

Phylogenetic tree of subfamilies in Bombyliidae

YEATES (1994) published his work on the cladistics and classification of the Bombyliidae and his fig. 510 is copied here as Fig. 636. Regrettably, we cannot add anything to the content shown in Fig. 636, because a number of subfamilies and genera and the characters other than genitalia have not been considered in the present paper. For the



Figs. 636. Possible relationships between subfamilies of Bombyliidae. From YEATES, 1994.

subfamilies (the extent or limit of which follows YEATES, 1994) not studied by us, see Table 3.

Relationships among Mythicomyiinae, Heterotropinae and remaining Bombyliidae

The subfamilies Mythicomyiinae and Heterotropinae are peculiar in many respects. It is hoped that the relationship between them and the remaining subfamilies will be discussed in the future. Some of us (LIU and NAGATOMI) have had no chance to study them personally at present.

YEATES (1994: 147) wrote:

Because of these [larval] features and some plesiomorphic aspects of adult morphology, YEATES and IRWIN (1992) entertained the notion that *Heterotropus* may be the sister group to the remaining Asiloidea. The present study does not support that interpretation, and the larval habits and morphology appear as reversals to plesiomorphic character states within the Bombyliidae. Nevertheless, *Heterotropus* adult and larval morphology presents us with an intriguing juxtaposition of character states and the adult morphology of the genus is conservative for the Asiloidea. The

Table 3 Subfamilies (*sensu* YEATES, 1994) studied or unstudied in this paper

-
1. Mythicomyiinae (=Platypyginae, Cyrtosiinae, Glabellulinae) [♂, ♀ not studied in the present paper]
 2. Oligodraninae [♂not studied]
 3. Usiinae (=Phthiriinae)
 4. Toxophorinae (=Systropodinae, Gerontinae) [♂, ♀ not studied]
 5. Lordotinae YEATES, 1994 [♂, ♀ not studied]
 6. Heterotropinae [♂, ♀ not studied]
 7. Bombyliinae (=Conophorinae, Ecliminae)
 8. Crociidiinae (=Desmatomyiinae) [♀ not studied]
 9. Mariobezziinae (=Corsomyzinae) [♂, ♀ not studied]
 10. Oniromyiinae
 11. Cythereinae (=Cylleniinae, Enicinae)
 12. Lomatiinae
 13. Antoniinae [♂, ♀ not studied]
 14. Tomomyzinae
 15. Anthracinae (=Spogostylinae, Exoprosopinae, Aphoebantinae)
-

Note: Nos. 1–6 without sand chamber, and nos. 7–15 with sand chamber.

hypandrium is better developed than in any other bombyliid, being a large, curved sclerite. It dominates the ventral plane of the genitalia to such an extent that the gonocoxites are separated, arising from the two posterior corners of the hypandrium. The gonocoxites are fused medially in all other Bombyliidae. The female genitalia lack a sand chamber, or any evidence that it has had one in the past. Segment 8 is unmodified, and the acanthophorites are separate and possess large spines. In fact, the female genitalia are similar to what we might expect from the stem asiloid.

YEATES (1994: 164–165) concluded as follows:

It is essential that we learn as much as we can about the most plesiomorphic Mythicomyiinae, which will probably be found among the Psiloderini, as these are the most plesiomorphic Bombyliidae. Most mythicomyiines are highly modified, at least partly due to their small size, however the most primitive ones may provide further insights about the relationship of the entire subfamily to the other Bombyliidae. The curious larvae, larval habit, and male genitalia of the Heterotropinae are puzzling to me, and their relationship to the remaining Bombyliidae would benefit from additional scrutiny.

Highly modified female genital parts.

Some taxa have highly modified female genitalia introduced below.

1. Tergum 10 (with a row of stout spines) fused with tergum 9 and tergum 9+10 unpaired: *Tillyardomyia gracilis* (Ecliminae); *Atrichochira pediformis* (Anthracinae); *Diatropomma claudia* (Anthracinae); *Oestrimyza fenestrata* (Anthracinae). Figs. 345, 575, 589–591, 629–631.

2. Paired tergum 10 each with only two stout spines: *Pantostomus fruticicola* (Tomomyziinae); *Tomomyza pictipennis* (Tomomyziinae); *Epacmoides biumbonatum* (Anthracinae). Figs. 497, 517, 612.

3. Tergum 9 distinctly short at middle: *Cacoplox griseata* (Bombyliinae); *Euprepina bicincta* (Bombyliinae); *Nothoschistus transatlanticus* (Bombyliinae). Figs. 77, 100, 123.

4. Tergum 9 with stout or shorter anterolateral process not folded ventrally: *Euryphthiria grandis* (Phthiriinae); *Poecilognathus thilipsomyzoides* (Phthiriinae). Figs. 220–221, 259–260.

5. Tergum 9 with a mid-anterior process: *Nomalonia eremophila* (Cylleniinae). Fig. 458.

6. Tergum 9 with paired ventral processes directed anteriorly: *Tmemophlebia coquilleti* (Phthiriinae). Fig. 313.

7. Large sternum 9 (?) (with lateral part folded ventrally) present behind sternum 8: *Paratoxophora cuthbertsoni* (Bombyliinae). Figs. 139–141.

8. Trapezoid sclerite (= sternum 9 ?) present over large sternum 8: *Euryphthiria grandis* (Phthiriinae). Figs. 222–223.

9. Trapezoid sclerite (= sternum 9 ? or dorsally folded sternum 8 ?) and a median smaller ventral sclerite (= sternum 9 ?) present over and behind sternum 8: *Nomalonia eremophila* (Cylleniinae). Figs. 459, 462.

10. Paired sclerites (= sternum 9 ?) present between tergum 9 and sternum 8: *Sericosoma irwini* (Cythereinae). Figs. 413–414.

11. Large ventral membrane (= sternum 9 ?) present between sternum 8 and cerci: *Tomomyza pictipennis* (Tomomyzinae). Figs. 514, 516.

12. Tergum 8 without mid-anterior process but with anterior margin widely convex: *Paratoxophora cuthbertsoni* (Bombyliinae) [having sand chamber]. Fig. 137.

13. Tergum 8 widened in anterior part, with anterior margin gently convex, and without mid-anterior projection: *Atrichochira pediformis* (Anthracinae); *Diatropomma claudia* (Anthracinae). The taxa above have sand chamber. Figs. 574, 589.

14. Tergum 8 with mid-anterior projection which is not tapering apically but rectangular: *Pteraulax flexicornis* (Anthracinae); *Oestrimyza fenestrata* (Anthracinae). Figs. 556–557, 625.

15. Sternum 8 with paired median stout spines near posterior margin; Phthiriinae (*Acreophthiria*, *Neacreotrichus*, *Euryphthiria*, *Poecilognathus*, *Relictiphthiria*, and *Tmemophlebia*).

16. Sternum 8 large, widened anteriorly, with anterior margin convex: *Euryphthiria*

grandis (Phthiriinae). Fig. 223.

17. Sternum 8 large, membranous, with anterior part folded ventrally and having posterior (= apical) transverse sclerite with a row of hairs directed posteriorly: *Atrichochira pediformis* (Anthracinae); *Diatropomma claudia* (Anthracinae); *Oestrimyza fenestrata* (Anthracinae). Figs. 575, 590, 627–628.

18. Sternum 8 with lateral part folded ventrally: *Pantostomus fruticicola* (Tomomyziinae). Figs. 495–496.

19. Common basal duct of spermathecae long: *Paratoxophora cuthbertsoni* (Bombyliinae). Figs. 139, 141.

20. Spermathecal duct without granulate section or section capped with one or both ends (= sperm pump): *Conophorina bicellaris* (Bombyliinae); *Tmemophlebia coquilletti* (Phthiriinae). Figs. 62, 314, 316.

21. Spermathecal duct without any widened capsule: *Sericosoma irwini* (Cythereinae); *Nomalonia eremophila* (Cylleniinae); *Atrichochira pediformis* (Anthracinae). Figs. 415, 458, 577.

22. Spermathecal capsule nipple-like or with basal part abruptly widened and pale: *Acreophthiria americana* (Phthiriinae); *Neacreotrichus cingulatus* (Phthiriinae); *N. mixteca* (Phthiriinae). Figs. 171, 187, 205.

23. Median spermatheca with two capsules of which one is smaller: *Tillyadomyia gracilis* (Ecliminae). Fig. 351

Sand chamber

YEATES (1994: 115–116) wrote:

The female sand chamber (SCHREMMER, 1964) functions as a receptacle where the eggs can be coated in sand (MÜHLENBERG, 1971a; THEODOR, 1983). It is a large pouch formed ventrally by the invagination of sternite 8 (character 130) and dorsally by tergite 8 and the long hairs extending from its margin (character 127). In addition, the segments posterior to 7 become invaginated inside segment 7, providing additional support for the sand chamber. Plesiomorphically sternite 8 is external and oriented similarly to the more anterior abdominal sternites. Among the sand chamber subfamilies sternite 8 is invaginated and its posterior margin becomes elevated so that it effectively forms the anterior wall of the sand chamber (figs. 479, 483). I found sternite 8 to be invaginated in *Geron* and all the sand chamber subfamilies except *Antonia*. MÜHLENBERG (1971b) considered that *Geron* represented an intermediate stage in the development of a sand chamber because of the invagination of sternite 8. The invagination seen in *Geron* is at least partially caused by the large lateral expansions of tergite 8 (fig. 475) and the posterior margin of the sternite does not become elevated, as in the sand chamber subfamilies. On the cladogram the advanced state of this character in *Geron* has been reached independently of the advanced state found in the sand chamber subfamilies. *Antonia* has lost the sand chamber and sternite 8 has re-

versed to an external position. [MÜHLENBERG (1971b), character 16].

The following comments are also after YEATES (1994). The subfamilies without sand chamber have no acanthophorite spines except for the Heterotropinae. Lordotinae without sand chamber has large, well differentiated paired tergum 10 lacking acanthophorite spines "(figs. 430–431) which are dorsoventrally flattened and appear to act as blades during oviposition [MÜHLENBERG 1971b, character 20b] (on p. 119)." *Cyllenina* spp. and *Bombylius androgynus*, each with sand chamber, have small paired tergum 10 without acanthophorite spines.

Types (i) and (ii) in female genitalia

Of the material studied in this paper, the female genitalia are divided into two types mentioned already. Type (i) occurs in Bombyliinae, Ecliminae, Cythereinae, Oniromyiinae, Cylleniinae, Tomomyzinae, Lomatiinae, and Anthracinae. Type (ii) occurs in Phthiriinae, Usiinae and Oligodraninae. It is not certain whether some or all of the characters of type (ii) are plesiomorphic or derived secondarily from type (i).

It is debatable whether type (i) is directly transformed from type (ii) or *vice versa*. It is more probable that there is an ancestral intermediate form between type (i) and (ii) from which both types are derived. This intermediate form may be similar to the female genitalia of *Heterotropus* (figs. 432–433 in YEATES, 1994), having acanthophorite spines.

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