

A new species and new record of the leafhopper genus *Seriana* Dworakowska (Hemiptera, Cicadellidae, Typhlocybinae) from China

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Abstract

Seriana menglaensis sp. n. (Hemiptera: Cicadellidae: Typhlocybinae: Erythroneurini) is described and illustrated from Southwest China. *S. equata* (Singh, 1969) is recorded for the first time from China.

Keywords

Hemiptera, morphology, taxonomy

Introduction

The leafhopper genus *Seriana* was established by Dworakowska (1971) in the tribe Erythroneurini of Typhlocybinae with *Seriana frater* Dworakowska, 1971 as the type species. *Seriana* consists of thirty-three species in the world distributed in Oriental and Palearctic regions. The genus can be distinguished by the body fuscous, the crown usually with median dark patch on anterior margin of vertex, the pronotum with five

oval grey impressed patches near anterior margin; the pygofer hind margin acutely produced, with oblique dorsolateral internal ridge and basolateral setae in distinct group and the pygofer dorsal appendage not movably articulated; the subgenital plate pocket-like apically, with 2–4 basal macrosetae and several short rigid setae on upper margin subbasally; the style apex truncate; the aedeagus usually with pair of processes and the connective nearly Y-shaped.

Only two species, *S. indefinita* Dworakowska, 1971 from Guangzhou and *S. ochrata* Dworakowska, 1971 from Taiwan were so far reported from China. We describe a new species from Yunnan Province, China and provide illustrations for both the new species and *S. equata* (Singh) recorded for the first time from China.

Methods and materials

The specimens were obtained by sweep net method and were studied under Olympus SZX7 and CX41 microscopes. Morphological techniques and terminology follow Dietrich and Dmitriev (2006). Measurements of the new species are given in millimeters; body length is measured from the apex of the head to the apex of the fore wing in repose. All specimens examined are deposited to the collection of the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Taxonomy

Key to species of *Seriana* from China

- | | | |
|---|--|--------------------------|
| 1 | Aedeagus with paired processes | 2 |
| – | Aedeagus with unpaired processes (Figs. 18, 19) ... <i>S. indefinita</i> Dworakowska | |
| 2 | The paired processes arising from the base of aedeagual shaft (Figs. 6, 7) | |
| | <i>S. menglaensis</i> sp. n. | |
| – | The paired processes arising from the midlength of aedeagual shaft..... | 3 |
| 3 | The paired processes shorter, hook-like (Figs. 16, 17)..... | <i>S. equata</i> (Singh) |
| – | The paired processes longer, finger-like (Figs. 20, 21)..... | |
| | <i>S. ochrata</i> Dworakowska | |

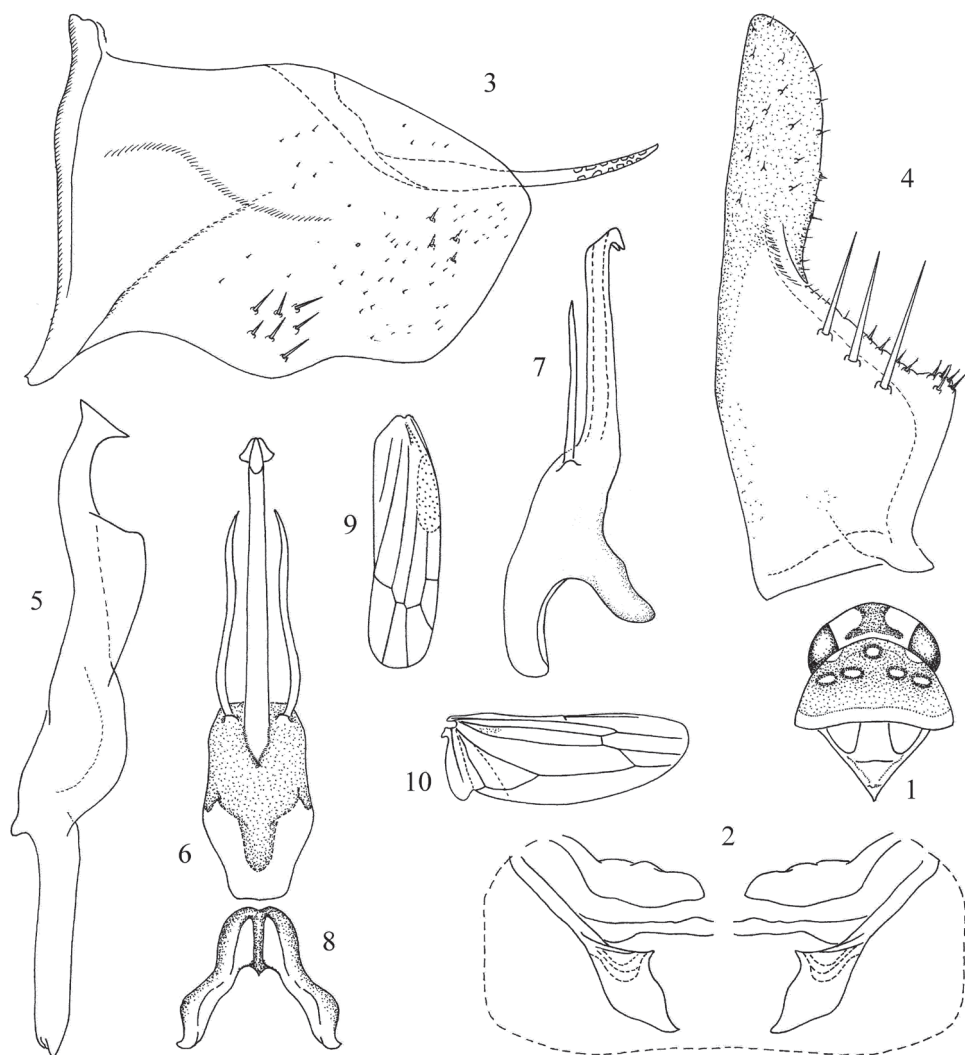
Seriana menglaensis Song & Li, sp. n.

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http://species-id.net/wiki/Seriana_menglaensis

Figures 1–10

Description. General color fuscous. Head (Fig. 1) with vertex dirty yellow, with an irregular brown spot at anterior margin medially; eyes black. Pronotum (Fig. 1) with



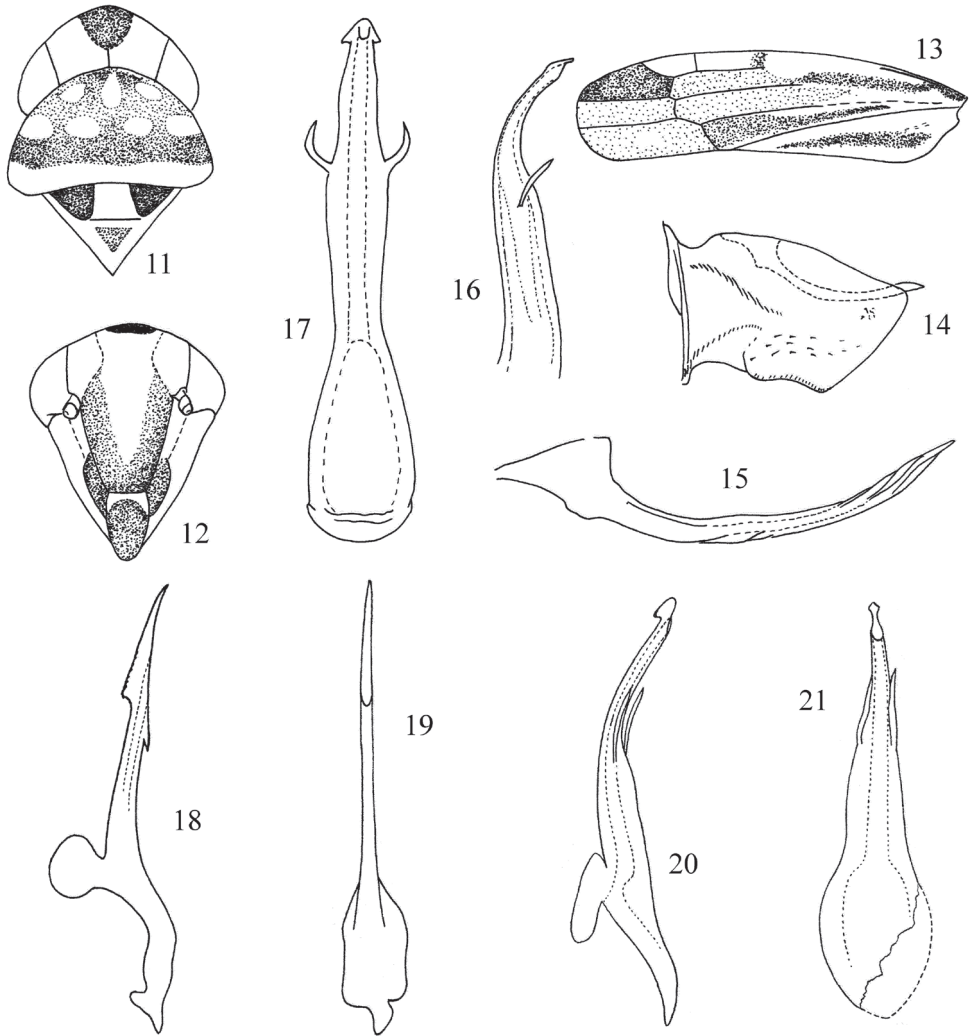
Figures 1–10. *Seriana menglaensis* Song & Li, sp. n. (♂) **1** Head and thorax, dorsal view **2** Abdominal apodemes **3** Pygofer lobe, lateral view **4** Subgenital plate **5** Style **6** Aedeagus, ventral view **7** Aedeagus, lateral view **8** Connective **9** Forewing **10** Hind wing.

five whitish oval impressed patches near anterior margin. Forewing light testaceous, without markings; brochosome field blackish brown.

Head (Fig. 1) distinctly narrower than pronotum; vertex bluntly rounded.

Abdominal apodemes (Fig. 2) small, acuminate apically, not extended beyond hind margin of 3rd sternite.

Pygofer lobe (Fig. 3) broad, with distinct oblique dorsolateral internal ridge, numerous macrosetae at lower basal angle. Pygofer dorsal appendage very long and fused with dorsal margin of pygofer. Subgenital plate (Fig. 4) with three long macrosetae and short rigid setae at upper margin subbasally; several microsetae scattered on apical



Figures 11–21. *Seriana equata* (Singh, 1969) rec. n. (after Dworakowska, Nagaich & Singh, 1978) **11** Head and thorax, dorsal view **12** Face **13** Fore wing **14** Pygofer lobe, lateral view **15** Pygofer dorsal appendage **16** Aedeagus, lateral view **17** Aedeagus, ventral view; *Seriana indefinita* Dworakowska, 1971 **18** Aedeagus, lateral view **19** Aedeagus, ventral view; *Seriana ochrata* Dworakowska, 1971 **20** Aedeagus, lateral view **21** Aedeagus, ventral view. (after Dworakowska, 1971)

portion. Style (Fig. 5) long, apex truncate; preapical lobe large. Connective (Fig. 8) Y-shaped, stem strong, central lobe absent. Aedeagus (Figs. 6, 7) with shaft long and straight, with two pairs processes, one pair very long, arising from basolateral part of shaft; another pair placed apically very short, lamellate; gonopore at apex, on ventral margin, dorsal apodeme short, weakly expanded.

Measurement. Body length males 3.2 mm.

Type material. *Holotype*, male, China: Yunnan Prov., Mengla County, at light, 23 July 2008, coll. Yuehua Song. *Paratype*: one male, same data as holotype.

Remarks. The new species is similar to *S. ochrata* Dworakowska (1971), but can be distinguished from the latter by the aedeagal shaft longer and straighter, similar in width throughout length in ventral view; the paired long processes arising from the base of aedeagal shaft, not at midlength and the dorsal apodeme small.

Etymology. The new species is named after its type locality: Mengla.

***Seriana equata* (Singh, 1969), rec. n.**

http://species-id.net/wiki/Seriana_equata

Figures 11–17

Zygina equata Singh, 1969: 344, figs 20–23

Empoascanara equata (Singh, 1969) (Sohi, 1976: 204)

Seriana equata (Singh, 1969) (Dworakowska and Viraktamath 1975: 529, no figures)

Seriana punjabensis Dworakowska, Nagaich & Singh, 1978: 246, figs 38–42 (Syn. by Sohi and Dworakowska 1983: 180)

Material examined. One male, China: Yunnan Prov., Xishuangbanna, Original Forest Park, 21 July 2008, coll. YUEHUA SONG; one male, China: Henan Prov., Luan-chuan, Heyu, 19 August 2008, coll. JIANDA LI.

Host plant. Grasses, potato, black gram, cowpea, Egyptian clover, groundnut, linseed, lucerne, musk melon, spinach, sweet potato, sunnhemp (Sohi and Dworakowska 1983).

Distribution. India; China (Henan, Yunnan).

Acknowledgements

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Review of Australasian spider flies (Diptera, Acroceridae) with a revision of *Panops* Lamarck

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Abstract

The Australasian spider flies (Diptera: Acroceridae) are reviewed, with all eight currently recognized genera diagnosed and figured. The panopine genus *Panops* Lamarck, 1804 from Australia and Indonesia is revised with four new species described, increasing the total number of species in the genus to nine: *P. aurum* **sp. n.**, *P. danieli* **sp. n.**, *P. jade* **sp. n.** and *P. schlingeri* **sp. n.** Five species of *Panops* are redescribed: *Panops austra*e Neboiss, 1971, *P. baudini* Lamarck, 1804, *P. boharti* (Schlinger, 1959), **comb. n.**, *P. conspicuus* (Brunetti, 1926) and *P. grossi* (Neboiss, 1971), **comb. n.** The monotypic genera *Neopanops* Schlinger, 1959 and *Panocalda* Neboiss, 1971 are synonymized with *Panops*. Keys to genera of Australasian Acroceridae and species of *Panops*, *Helle* Osten Sacken, 1896 and Australasian *Pterodontia* Gray, 1832 are included.

Keywords

cybertaxonomy, spider parasitoid

Introduction

Spider flies (also known as small-headed flies) (Diptera: Acroceridae) are a distinctive group of lower brachyceran flies characterized by unusual adult body shape and highly specialized larval biology as parasitoids of spiders. Adults are recognized as important pollinators of angiosperms (Fig. 1), frequently as strong fliers with greatly elongate mouthparts for feeding in long corolla flowers, although some species have reduced or



Figure 1. *Panops baudini* Lamarck feeding on *Daviesia croniniana* F.Muell. (Fabaceae), photographed during September in Boorabbin National Park, Western Australia. Photograph by Dan Schoknecht (Western Australian Museum).

even vestigial mouthparts (Schlinger 1981, 1987). Acroceridae comprise approximately 520 species in 53 genera (Pape and Thompson 2010; Gillung and Winterton 2011) occupying most biogeographic regions. The family is presently classified into three extant subfamilies: Acrocerinae, Panopinae and Philopotinae (Schlinger 1981), although recent phylogenetic analyses using DNA sequence data suggest that Acrocerinae are polyphyletic and membership of that subfamily should be re-examined (Winterton et al. 2007). Larvae of Acroceridae are internal parasitoids of juvenile spiders, living internally within the opithsoma of the spider where they attach to the book-lungs of the host via their posterior spiracles. Upon completing development the mature, third instar larva emerges from the dead host before pupating (Schlinger 1987). There are exceptions though, with a Chilean species recorded as ectoparasitic on spiders (i.e. *Sphaerops appendiculata* Philippi, 1865 (Acrocerinae)) (Schlinger 1987), whilst Kerr and Winterton (2008) recently questioned the exclusivity of parasitism of spiders, describing a putative acrocerid planidium on an anystinid mite in Baltic Amber.

The Australasian acrocerid fauna comprises all three subfamilies, although represented by relatively few genera. Two acrocerine genera (*Ogcodes* Latreille, 1797 and *Pterodontia* Gray, 1832) are found throughout the region, and are considered cosmopolitan throughout all major biogeographic regions. Philopotinae are represented by an endemic genus in New Zealand (*Helle* Osten Sacken, 1896) (Paramonov 1955) and a recently described genus endemic to New Caledonia (*Schlengeriella* Gillung & Winterton, 2011).

Panopinae are well represented in the Australasian region. Six genera are described previously from New Zealand (*Apsona* Westwood, 1876), Indonesia (*Neopanops* Schlinger, 1959) and Australia (*Panocalda* Neboiss, 1971, *Panops* Lamarck, 1804, *Mesophysa* Macquart, 1838 and *Leucopsina* Westwood, 1876) (Paramonov 1955, 1957; Schlinger 1959; Neboiss 1971). *Pterodontia* has been considered by some authors to be placed in Panopinae based on the presence of tibial spines (Schlinger 1981, 1987, 2009), but most authors place it in Acrocerinae based on wing venation and antennal characteristics (e.g. Neboiss 1971) and molecular data (Winterton et al. 2007). *Panops* is the most species rich genus in the region and is revised herein. Three species were described previously and treated in the most recent revision of the genus by Neboiss (1971): *Panops australae* Neboiss, 1971, *P. baudini* Lamarck, 1804, and *P. conspicuus* (Brunetti, 1926). An additional four species are described herein (*P. aurum* sp. n., *P. danieli* sp. n., *P. jade* sp. n. and *P. schlinger* sp. n.) whilst another two species are moved from other genera (*P. boharti* (Schlinger, 1959), comb. n. and *P. grossi* (Neboiss, 1971), comb. n.). Discovery of these new species of *Panops* has expanded the concept of the genus, with various species exhibiting combinations of characteristics previously used to differentiate *Panops* from *Panocalda* and *Neopanops*—specifically length of the mouthparts and presence and distribution of eye pilosity. Consequently, *Neopanops* and *Panocalda* are newly synonymized with *Panops*. All Australasian acrocerid genera are diagnosed and figured. Four genera of Panopinae are now recognized from the Australasian region, *Apsona* (1 sp.), *Mesophysa* (4 spp.), *Panops* (9 spp.) and *Leucopsina* (2 spp.). Keys to genera of Australasian Acroceridae and species of *Panops*, *Helle* and Australasian *Pterodontia* are included.

Material and methods

Terminology follows McAlpine (1981) and Schlinger (1981). In most acrocerids, two crossveins span the area between the radial and medial sectors. The proximal crossvein is r-m, while the distal crossvein bisecting cell r_{4+5} (between wing veins M_1 and R_{4+5} , or rarely R_5) is referred to here as 2r-m following Hardy (1946) and Gillung and Winterton (2011). Annotations of collection label data are included where appropriate in brackets. The following collection codens are cited in the text: Australian Museum (AMS), Australian National Insect Collection (ANIC), California Academy of Sciences (CAS), Canadian National Collection of Insects (CNC); Greg Daniels private collection [to be ultimately deposited in the Australian Museum] (GDCB/AMS), Museum

National d'Histoire Naturelle (MNHN), National Museum of Victoria (NMV), Oxford University Museum of Natural History (OUMNH), Queensland Museum (QM), Swedish Museum of Natural History (NHRS), South Australian Museum (SAM), The Natural History Museum (BMNH), Western Australian Museum (WAM). Descriptions were constructed using Lucid Builder 3.5, using a matrix database of character states, which were then exported using the natural language function into XML and a text document. Specimen images were taken at different focal points using a digital camera and subsequently combined into a serial montage image using Helicon Focus software. High-resolution digital images were deposited into Morphbank with embedded URL links within the document between descriptions and Morphbank images. All new nomenclatural acts and literature are registered in Zoobank (Pyle and Michel 2008).

Taxonomy

Key to genera of Australasian Acroceridae

- 1 Postpronotal lobes greatly enlarged, contiguous along midline to form collar for head **Philopotinae, 2**
- Postpronotal lobes not greatly enlarged, widely separate along midline **3**
- 2 Wing with cells d, br, bm, and cu-p present, venation relatively complete (Fig. 3A) ***Helle Osten Sacken, 1896 (New Zealand)***
- Wing with only cell br present, venation reduced (Fig. 3B)
..... ***Schlingeriella* Gillung & Winterton, 2011 (New Caledonia)**
- 3 Antenna usually styliform or rod-like with multiple terminal setae; wing venation reduced: at most three radial veins present, cells d and basal r_{4+5} merged or absent (Figs 3C, D); tibiae without spines (except *Pterodontia*)
..... **Acrocerinae, 4**
- Antenna with elongate flagellum, cylindrical or flattened, without terminal styliform seta; wing venation complete: four radial veins present, cells d and basal r_{4+5} separate (Figs 2A–D); at least some tibiae with an apical spine on outer margin (absent in *Apsona*) **Panopinae, 5**
- 4 Eye apilose, without setae; venation reduced with many veins absent or poorly defined, almost all cells weakly formed or absent; tibial spines absent (Figs 3C, 63–64) ***Ogcodes* Latreille, 1797 (Cosmopolitan)**
- Eye pilose; all wing veins well defined to wing margin, discal cell and basal portion of r_{4+5} merged into single closed cell; tibial spines present (Figs 3D, 65–66) ***Pterodontia* Gray, 1832 (Cosmopolitan)**
- 5 Eye strongly pilose; antennal flagellum slender and tapered to apex; tibial spines absent (Figs 2A, 4–6) ***Apsona* Westwood, 1876 (New Zealand)**
- Eye apilose or weakly pilose; antennal flagellum thickened to apex; tibial spines present (Australia) **6**

- 6 Eye apilose, or sparsely or partially pilose; wing hyaline; crossvein 2r-m joining to stem R_{4+5} (Fig. 2D) ***Panops* Lamarck, 1804**
- Eye always apilose; wing at least partially infusate, particularly along anterior margin; crossvein 2r-m joining to vein R_5 (Fig. 2B–C) 7
- 8 Dorsal profile of abdomen with swollen, rounded tergites; without transverse yellow band on tergite 3; not wasp-like in appearance (Figs 12–16) ***Mesophysa* Macquart, 1838**
- Dorsal profile of abdomen with truncated tergites raised along posterior margins; transverse yellow band on tergite 3; distinctly wasp-like in appearance (Figs 7–11) ***Leucopsina* Westwood, 1876**

Subfamily Panopinae Schiner, 1868

<http://species-id.net/wiki/Panopinae>

Type genus. *Panops* Lamarck, 1804: 263.

Diagnosis. Usually large and densely pilose, body shape never arched; antennal flagellum elongate cylindrical to paddle-shaped, sometimes tapered but never stylate, usually lacking terminal setae; postpronotal lobes never meeting medially; wing venation complete to wing margin (rarely reduced), cells m_3 , d, bm and basal r_{4+5} typically present, closed distally; tibial spines present (rarely absent); larvae exclusively parasitoids of mygalomorph spiders.

Australasian genera

Apsona Westwood, 1876; *Leucopsina* Westwood, 1876; *Mesophysa* Macquart, 1838; *Panops* Lamarck, 1804.

Apsona Westwood, 1876

<http://species-id.net/wiki/Apsona>

Figs 2A, 4–6

Apsona Westwood, 1876: 510 – Bigot 1890: 317; Hutton 1901: 27; Paramonov 1955: 19; Schlinger 1966: 112; Schlinger and Jefferies 1989: 375. Type species: *Apsona muscaria* Westwood, 1876 by monotypy.

Diagnosis. Body length: 7–9 mm. Colouration metallic green; head width slightly smaller than thorax width, hemispherical; postocular ridge and occiput rounded; three ocelli; posterior margin of eye rounded; eye pilose (dense); position of antenna on frons nearer to ocellar tubercle; eyes contiguous above and below antennal base; palpus present; proboscis longer than head length; flagellum shape elongate, tapered apically, apex lacking terminal setae; scapes separate; subscutellum not enlarged, barely visible;

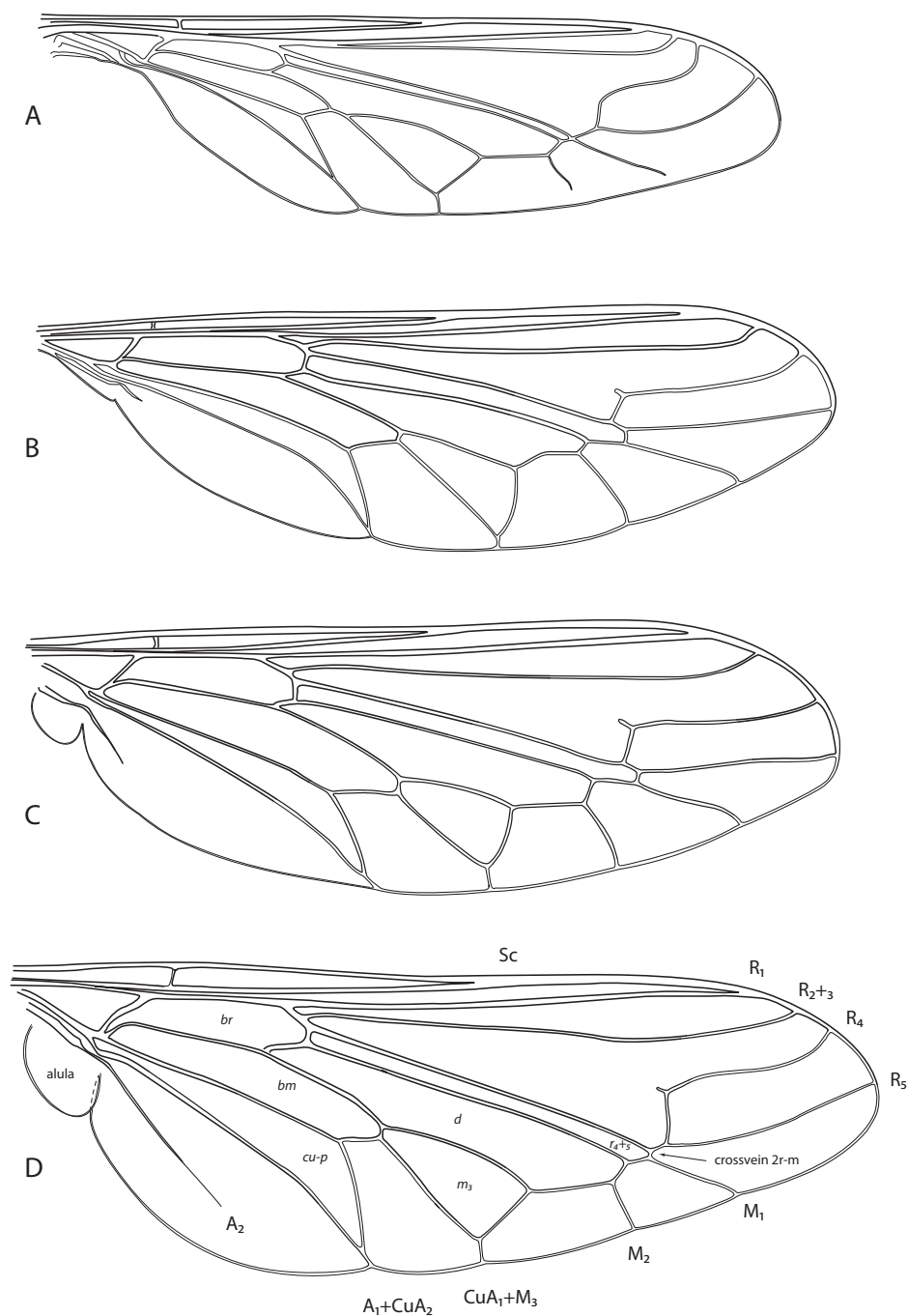


Figure 2. Acroceridae wings. Panopinae: **A** *Apsona muscaria* Westwood **B** *Leucopsina odyneroides* Westwood **C** *Mesophysa tenaria* Neboiss **D** *Panops jade* sp. n. Scale line = 0.2 mm.

tibial spines absent; pulvilli present; wing hyaline, markings absent; costa circumambient, costal margin straight apically in both sexes; humeral crossvein present; radial veins curved towards wing anterior margin; R_1 not inflated distally; pterostigma and cell r_1 membranous, not ribbed; R_{2+3} present; R_{4+5} present as forked petiolate veins; cell r_{4+5} bisected by 2r-m, basal cell narrow elongate, closed; 2r-m very short, joining M_1 to stem R_{4+5} ; R_4 without spur vein; medial vein complement with M_1 , M_2 and M_3 present (M_3 fused with CuA_1); discal cell closed completely; M_1 and M_2 usually not reaching wing margin; cell m_3 present; CuA_1 joining M_3 , petiolate to wing margin; CuA_2 fused to A_1 before wing margin, petiolate; wing microtrichia absent; anal lobe well developed; alula absent; abdominal tergites smooth, rounded; abdomen shape greatly rounded, inflated, conical posteriorly.

Included species. *Apsona muscaria* Westwood, 1876.

Comments. *Apsona* is a monotypic genus endemic to New Zealand and can be readily differentiated from all other Panopinae based on the lack of tibial spines. *Apsona* shows little relationship to the rest of the Australasian Panopinae and shows remarkable similarity to the New World genus *Eulonchus* Gerstaecker, 1856, sharing numerous characteristics such as metallic green colouration, antennal shape, dense eye pilosity, elongate mouthparts, eyes contiguous below antennal base and absence of an alula (Paramonov 1955).

***Leucopsina* Westwood, 1876**

<http://species-id.net/wiki/Leucopsina>

Figs 2B, 7–11

Leucopsina Westwood, 1876: 510 – Bigot 1890: 314, 315; Hardy 1921: 78; Paramonov 1957: 524; Neboiss 1971: 219; Schlinger and Jefferies 1989: 375. Type species: *Leucopsina odyneroides* Westwood, 1876 by monotypy.

Diagnosis. Body length: 9.0 mm [male], 12.0 mm [female]. Colouration black and yellow [wasp mimic]; head slightly smaller than thorax width, shape hemispherical; postocular ridge and occiput rounded; three ocelli, anterior ocellus reduced in size (female) or absent (male); posterior margin of eye emarginate; eye apilose; position of antennae on head adjacent to ocellar tubercle; male frons width above antennal base not contiguous, eyes contiguous below antennal base; palpus present; proboscis greater than head length; flagellum shape elongate, cylindrical; apex lacking terminal setae; scapes separate; subscutellum enlarged; tibial spines present; pulvilli present; wing markings present (infusate anteriorly); costa circumambient (weaker along anal margin); costal margin straight; humeral crossvein present; radial veins straight; R_1 not inflated distally; pterostigma and cell r_1 membranous, not ribbed; R_{2+3} present; R_{4+5} originating separately from cell r_{4+5} (or at same point); cell r_{4+5} bisected by 2r-m, basal cell narrow elongate, closed; 2r-m joining M_1 to R_5 ; R_4 with spur vein; medial

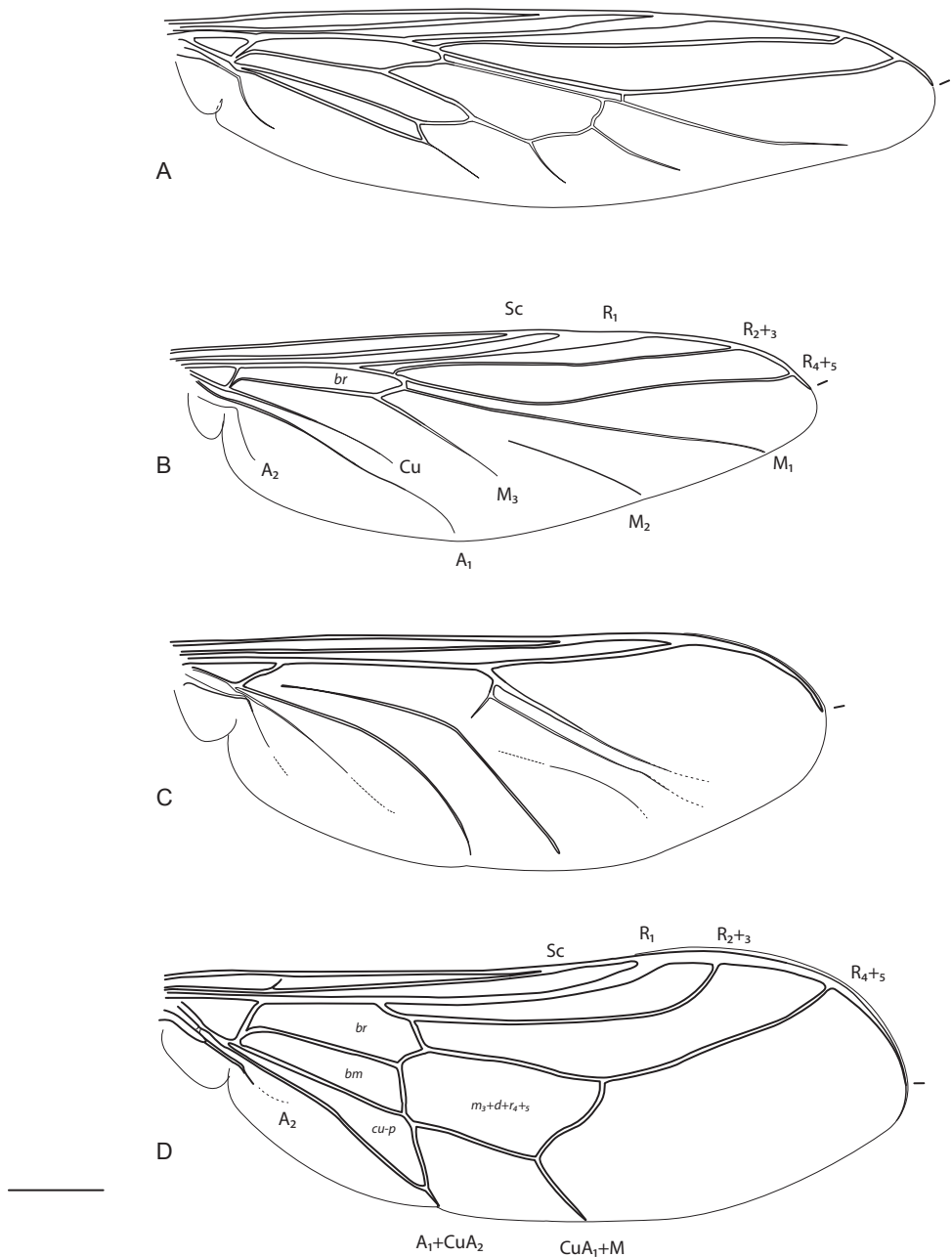


Figure 3. Acroceridae wings. Philopotinae: **A** *Helle rufescens* Brunetti **B** *Schlingeriella irwini* Gillung & Winterton. Acrocerinae **C** *Ogcodes basalis* Walker **D** *Pterodontia davisii* Paramonov (female). Scale line = 0.2 mm.

vein complement: M_1 , M_2 and M_3 present (M_3 fused with CuA_1); discal cell closed completely; medial veins reaching wing margin; cell m_3 present; CuA_1 joining M_3 , petiolate to margin; CuA_2 fused to A_1 before wing margin, petiolate; wing microtrichia

absent; anal lobe well-developed; alula weakly developed; abdominal tergites smooth, rounded, tergites raised along posterior margins; abdomen constricted anteriorly.

Included species. *Leucopsina burnsi* (Paramonov, 1957); *L. odyneroides* Westwood, 1876.

Comments. *Leucopsina* is an endemic Australian genus of contrastingly coloured yellow and black flies, with distinct sexual dimorphism between males and females; male having more pronounced constriction of the abdomen anteriorly. The body colouration, darkening of the costal wing margin and abdominal waist allows members of this genus to be convincing wasp mimics (Neboiss 1971). *Leucopsina* can be differentiated from all other acrocerid genera by the wasp mimicking habitus, elongate cylindrical flagellum, apilose eyes and elongate mouthparts. Neboiss (1971) provides a key to species of this genus. *Leucopsina burnsi* was originally described as a variety of *Panops flavipes* (= *Mesophysa flavipes* Latreille, 1811) but subsequently transferred to *Leucopsina* and thoroughly differentiated from *L. odyneroides* by Neboiss (1971).

***Mesophysa* Macquart**

<http://species-id.net/wiki/Mesophysa>

Figs 2C, 12–16

Mesophysa Macquart, 1838: 166 – Blanchard 1840: 584; Westwood 1876: 517; Brunetti 1926: 580; Edwards 1930: 193; Neboiss 1971: 214; Schlinger and Jefferies 1989: 376. Type species: *Mesophysa scapularis* Macquart, 1838 by subsequent designation of Brunetti 1926: 580 [= *Panops flavipes* Latreille, 1811].

Diagnosis. Body length: 8.0–10.0 mm [male], 9.0–11 mm [female]. Colouration non-metallic, usually matte greenish hue; head size slightly smaller than thorax width; shape hemispherical; postocular ridge and occiput rounded; three ocelli; posterior margin of eye emarginate; eye apilose; antennae positioned on head adjacent to ocellar tubercle; eyes not contiguous above antennal base, contiguous below antennal base; palpus present; proboscis greater than head length; flagellum shape elongate, cylindrical (flattened), truncated apically [more pronounced in male]; scapes separate; flagellum apex lacking terminal setae; subscutellum not enlarged, barely visible; tibial spines present; pulvilli present; wing infusate, markings present; costa circumambient (weaker along anal margin); costal margin straight apically; humeral crossvein present; radial veins straight; R_1 not inflated distally; pterostigma and cell r_1 membranous, not ribbed; R_{2+3} present; R_{4+5} originating separately from cell r_{4+5} ; cell r_{4+5} bisected by 2r-m, basal cell narrow elongate, closed; 2r-m, joining M_1 to R_5 ; R_4 with spur vein; medial vein complement with M_1 , M_2 and M_3 present (M_3 fused with CuA_1); discal cell closed completely; medial veins reaching wing margin; cell m_3 present; CuA_1 joining M_3 , petiolate to margin; CuA_2 fused to A_1 before wing margin, petiolate to margin; wing microtrichia absent; anal lobe well developed; alula well developed; abdominal tergites

smooth, rounded; abdomen shape rounded, cylindrical, similar width to thorax or constricted anteriorly (male), tergites raised along posterior margins.

Included species. *Mesophysa flavipes* (Latreille, 1811); *M. ilzei* Neboiss, 1971; *M. tenaria* Neboiss, 1971; *M. ultima* Neboiss, 1971.

Comments. *Mesophysa* is an endemic eastern Australian genus closely related to *Leucopsina*. They share a similar habitus with narrowing of the abdomen anteriorly (more pronounced in *Leucopsina*), apilose eyes, infusate wings and flagellum shape, as well as the crossvein 2r-m joining to R_5 rather than to the stem R_{4+5} . This genus can be differentiated from *Leucopsina* by the lack of black and yellow markings. *Mesophysa* has been considered a synonym of *Panops* by some authors (Erichson 1840; Kertész 1909; Edwards 1930; Hardy 1946; Paramonov 1957) and treated as separate genera by others (e.g. Brunetti 1926; Neboiss 1971). This was complicated by an incorrect synonymy of *Panops* with the distantly related South American genus *Lasia* Wiedemann, 1824 by Kertész (1909) (see discussion in Neboiss 1971). Neboiss (1971) provides a key to species of this genus.

***Panops* Lamarck, 1804**

<http://species-id.net/wiki/Panops>

Figs 1, 2D, 17–55

Panops Lamarck, 1804: 263 – Latreille 1804: 191, 1809: 316, 1810: 392, 443, 1811: 707, 1816: 608, 1825: 492, 1829: 461; Lamarck 1812: 56; Wiedemann 1830: 18; Macquart 1838: 166; Blanchard 1840: 583; Erichson 1840: 140; Walker 1855: 332; Schiner, 1868: 140; Westwood 1876: 509; Bigot 1890: 314; Hardy 1921: 76, 1946: 66; Brunetti 1926: 580; Paramonov 1957: 525; Neboiss 1971: 208; Schlinger and Jefferies 1989: 376. Type species: *Panops baudini* Lamarck, 1804 by monotypy.

Epicerina Macquart, 1850: 97 – Bigot 1890: 316. Synonymy in: Hardy 1921: 79; Hardy 1946: 66; Paramonov 1957: 521. Type species: *Epicerina nigricornis* Macquart, 1850 by original designation.

Neopanops Schlinger, 1959: 157 – Schlinger and Jefferies 1989: 376. Type species: *Neopanops boharti*, Schlinger, 1959 by original designation. syn. n.

Panocalda Neboiss, 1971: 212 – Schlinger and Jefferies 1989: 376. Type species: *Panocalda grossi*, Neboiss, 1971 by original designation. syn. n.

Diagnosis. Body length: 8.0–12.5 mm [male], 9.5–14.5 mm [female]. Colouration non-metallic or metallic; head slightly smaller than thorax width, shape hemispherical; postocular ridge and occiput rounded; three ocelli, anterior ocellus reduced in size or absent; posterior margin of eye emarginate; eye apilose or pilose (sparse) (sometimes localized dorsally); position of antennae on head adjacent to ocellar tubercle; eyes not contiguous above antennal base, contiguous below antennal base; palpus present; proboscis length variable, less than or greater than head length; flagellum



Figure 4. *Apsona muscaria* Westwood, male, lateral view [700415]. Body length = 8.0 mm.

shape elongate, slightly tapered (female) or elongate, cylindrical (male); flagellum apex lacking terminal setae; scapes separate; subscutellum not enlarged, barely visible; tibial spines present; pulvilli present; wing hyaline, markings absent; costa circumambient (weaker along anal margin); costal margin at pterostigma straight; humeral crossvein present; R_1 not inflated distally; pterostigma and cell r_1 membranous, not ribbed; vein R_{2+3} present; R_4 and R_5 present as forked petiolate veins; radial veins straight towards wing apex, slightly angled anteriorly; cell r_{4+5} bisected by 2r-m, basal cell narrow elongate, closed; 2r-m joining M_1 to stem R_{4+5} ; R_4 with or without spur vein; medial vein complement with M_1 , M_2 and M_3 present; discal cell closed completely; medial veins reaching wing margin; cell m_3 present; CuA_1 joining M_3 , petiolate to wing margin; CuA_2 fused to A_1 before wing margin, petiolate to margin; wing microtrichia absent; anal lobe well developed; alula well developed; abdominal tergites smooth, rounded; abdomen shape greatly rounded, inflated (larger in female). Male genitalia (Fig. 17) typical for Panopinae and varying little between species: gonostylus fused with gonocoxite and non-articulated, but with lightly sclerotized areas ventrally indicating flexion of gonostylus with gonocoxite; gonostylus as ventrally curved process with cup-like ventromedial surface; aedeagus consisting of flattened quadrangular, or cylindrical, parameral sheath with ventral rod-like structure with apical gonopore; ejaculatory apodeme poorly developed.



Figure 5. *Apsona muscaria* Westwood, male, oblique view [700418]. Body length = 8.0 mm.

Included species. *Panops aurum* sp. n.; *P. australae* Neboiss, 1971; *P. baudini* Lamarck, 1804; *P. boharti* (Schlinger, 1959) comb. n.; *P. conspicuus* (Brunetti, 1926); *P. danielsi* sp. n.; *P. grossi* (Neboiss 1971) comb. n.; *P. jade* sp. n.; *P. schlingeri* sp. n.

Comments. *Panops* is the type genus for the subfamily Panopinae and includes some large metallic coloured species. The genus is endemic to Australia and neighbouring Papua region of Indonesia. The original concept of the genus was expanded to include species from the New World by some authors, but these have subsequently been placed in the separate and distantly related genus *Lasia* Wiedemann, 1824 (e.g. *Lasia metallica* Rondani, 1863; *Lasia ocelliger* (Wiedemann, 1830)). Bequaert (1931) and later Neboiss (1971), discuss the historically confused and intertwined generic concepts of *Lasia* and *Panops* (sometimes including *Mesophysa*) in previous treatments of the group by various authors. Based on a series of characters, it is clear that those Australasian species are placed in *Panops* or *Mesophysa*, while the New World species are placed in *Lasia*. In his description of *Neopanops*, Schlinger (1959) suggested that the genus was closely related to *Panops* and provided an extensive list of characters distinguishing the two. Similarly, Neboiss (1971) provided a list of characteristics to differentiate *Panocalda* from the closely related *Panops* and *Neopanops*. Both Schlinger (1959) and Neboiss (1971) distinguished their respective genera based on characters such as eye pilosity, length of proboscis, shape of ocellar tubercle, palpi length, head



Figure 6. *Apsona muscaria* Westwood, male, anterior view [700419]. Body length = 8.0 mm.

width, parafacial pilosity and wing length. With the inclusion of the four new species described here, and a critical re-examination of the characters used to differentiate *Neopanops* and *Panocalda* from *Panops*, it is clear that all of these characters are variable and that only one genus is warranted. Some species of *Panops* have pilose eyes, either uniformly sparse and minute (i.e. *P. danielsi* sp. n., *P. boharti* comb. n., *P. baudini*) or localized (*P. grossi* comb. n.), with the other species being apilose. In no species of *Panops* are the eyes uniformly dense pilose, as is found in most other panopine genera (e.g. *Apsona*, *Lasia*). This paucity of eye pilosity is shared with only a few other genera, including the Australian *Leucopsina* and *Mesophysa*, as well as the highly derived genus *Corononcodes* Speiser, 1920 from the Palaearctic and Afrotropical regions. Proboscis length is a frequently used character in acrocerid taxonomy, but in *Panops* the length is dramatically variable, with a proboscis much shorter than the head height in some species (e.g. *P. jade* sp. n., *P. schlingeri* sp. n., *P. boharti* comb. n.) while the rest have a proboscis longer than the head height. *Panops* is a variable genus, but can be differentiated from all other Panopinae based on the diagnosis above, and specifically from all other genera in the Australasian region based on tibial spines being present (cf. *Apsona*) and wing crossvein 2r-m joining to R_{4+5} (cf. *Leucopsina*, *Mesophysa*). Like most acrocerids, species of *Panops* display distinct sexual dimorphism with males often have slightly



Figure 7. *Leucopsina odyneroides* Westwood, male, lateral view [700421]. Body length = 9.0 mm.

smaller body size and larger antennae than females. Many Old World panopine genera (e.g. *Apsona*, *Panops*, *Rhysogaster* Aldrich, 1927) have a distinctive unidirectional arrangement of the pile on the head and thorax, giving the individual a dramatic change in appearance when viewed head on (e.g. Figs 20, 23, 40); the biological significance of this is unknown.

Key to *Panops* species

Panops baudini keys to two couplets as the eye pilosity is extremely minute in some individuals and may be overlooked. Females are unknown for *P. boharti* comb. n. and *P. aurum* sp. n., whilst males are unknown for *P. schlingeri* sp. n.

- | | | |
|---|--|--|
| 1 | Eye sparsely pilose (Fig. 39) or pilosity localized dorsally (Fig. 44)..... | 2 |
| – | Eye completely apilose (Fig. 18) | 5 |
| 2 | Proboscis elongate, length greater than head height (Fig. 18)..... | 3 |
| – | Proboscis very short, hardly projecting from oral cavity, shorter than head height (Figs 44, 50) | 4 |
| 3 | Postpronotal lobe dark, concolourous with rest of pleuron (widely distributed in Australia) (Figs 25–30) | <i>P. baudini</i> Lamarck, 1804 |



Figure 8. *Leucopsina odyneroides* Westwood, male, dorsal view [700423]. Body length = 9.0 mm.

- Postpronotal lobe yellow, pleuron greenish (Queensland) (Figs 39–43)
.....*P. danielsi* sp. n.
- 4 Eye extending posteriorly beyond widest part of head; eye with sparse, minute
pile of uniform length across eye (length subequal to width of lateral ocellus);
ocellar tubercle not touching margin of eye; palpus as long or longer than
proboscis (Papua) (Figs 31–33).....*P. boharti* (Schlinger, 1959), comb. n.
- Eye not extending posteriorly beyond widest part of head; eye pilose on dor-
sal-lateral region only, pile denser and more elongate (length much greater
than width of lateral ocellus); ocellar tubercle touching margin of eye; palpus



Figure 9. *Leucopsina odyneroides* Westwood, male, anterior view [700426]. Body length = 9.0 mm.

- half as long as proboscis (South Australia) (Figs 44–47)
 *P. grossi* (Neboiss, 1971), **comb. n.**
 5 Proboscis short, hardly projecting from oral cavity **6**
 – Proboscis elongate, length equal to, or greater than head height **7**
 6 Postpronotal lobes dark yellow; femora dark brown, rest of legs cream (North-
 ern Territory) (Figs 53–55) *P. schlingeri* **sp. n.**
 – Postpronotal lobes and legs dark, concolourous with rest of body (Queens-
 land) (Figs 48–52) *P. jade* **sp. n.**
 7 Postpronotal lobes pale, contrasting with rest of thorax (Figs 34–38)
 *P. conspicuus* (Brunetti, 1926)



Figure 10. *Leucopsina odyneroides* Westwood, female, lateral view [700436]. Body length = 12.0 mm.

- Postpronotal lobes dark, concolourous with rest of thorax (Figs 21, 28)**8**
- 8** Body metallic, thorax green, abdomen violet; margin of lower calypter relatively dark (Figs 21–24) (Western Australia)..... *P. austra*e Neboiss, 1971
- Thorax mostly glossy black, abdomen often with extensive red-brown to purple laterally; margin of lower calypter relatively pale (Figs 19, 26).....**9**
- 9** Face above clypeus apilose; body covered with white setal pile; male distiphallus broad, spatulate (widely distributed in Australia) (Figs 25–30)
.....*P. baudini* Lamarck, 1804
- Face above clypeus with gold setal fringe; body covered with yellow-gold setal pile; male distiphallus narrow (Figs 18–20) (Western Australia)
.....*P. aurum* sp. n.



Figure 11. *Leucopsina odyneroides* Westwood, female, dorsal view [700447]. Body length = 12.0 mm.

***Panops aurum* sp. n.**

urn:lsid:zoobank.org:act:3864CACB-368C-4770-88E8-8346544EBED7

http://species-id.net/wiki/Panops_aurum

Figs 18–20

Type material. **Holotype** male, AUSTRALIA: **Western Australia:** Darlington, 450 ft., E.S. Ross, D.Q. Cavagnaro, 5.ix.1962 [-31.901, 116.081] (CAS).

Diagnosis. Eye apilose; proboscis longer than head height; body non-metallic; antennae red-brown; parafacial with yellow marginal pile; postpronotal lobe concoloured with rest of thorax; legs dark yellow, femora brown-black.



Figure 12. *Mesophysa tenaria* Neboiss, male, lateral view [700448]. Body length = 10.0 mm.

Description. Body length: 11.0 mm (male). Head with eye apilose; ocellar tubercle raised laterally; medial ocellus absent; occiput brown-black, occipital pile yellow, postocular ridge and gena overlain with grey pubescence; clypeus length equal to oral cavity, brown-black; palpus yellow; margin of oral cavity (parafacial) densely pilose (yellow); proboscis longer than head height; flagellum apex of uniform width, truncated apically, flagellum red-brown; scape and pedicel brown. Thorax with postpronotal lobe brown-black; scutum black, scutal vestiture dense yellow-gold pile; scutellum black; pleuron black; coxae black; femora brown-black, apices dark yellow; tibiae dark yellow; tarsi dark yellow; lower calypter white with dark yellow margin; wing hyaline, venation dark; vein R_4 without spur vein. Abdomen shape rounded globose, much larger than thorax, colour orange-red to yellow, dark markings anteriorly and medially, vestiture dense elongate pile, yellow anteriorly, brown posteriorly on tergites 2–5.

Etymology. The specific epithet is derived from the Latin, *aurum* – gold; referring to the distinctive golden setal pile on the head and thorax.

Comments. *Panops aurum* sp. n. is known only from a single male specimen from Western Australia. The fringing yellow setae around the oral cavity and yellow pile on the thorax are distinctive for the species.



Figure 13. *Mesophysa tenaria* Neboiss, male, oblique view [700450]. Body length = 10.0 mm.

***Panops australae* Neboiss, 1971**

http://species-id.net/wiki/Panops_austrae

Figs 21–24

Panops australae Neboiss, 1971: 209 – Schlinger and Jefferies 1989: 376.

Type material examined. **Holotype** female, AUSTRALIA: **Northern Territory:** nr. Mount Olga [-25.3, 130.73], C.A., Paul Genery, ix.1960, picked up dead in sand (Type- T.4177) (NMV).

Other material examined. AUSTRALIA: **Western Australia:** male, Wialki [-30.483, 118.117], R. P. McMillan, 12.x.1983 (WAM); male, W of Norseman, *Eucalyptus* woodland, dry gully to salt lake, Malaise trap, C. Lambkin et al., ANIC bulk sample 2184, 1-17.xi.2003 271m [-32.186, 121.721] (ANIC).

Diagnosis. Eye apilose; proboscis equal to head height; body metallic green-blue; antennae yellow-brown; parafacial without marginal pile; postpronotal lobe concolourous with rest of thorax; legs black.

Redescription. Body length: 8.0–10.0 mm (male), 14.5 mm (female). Head with eye apilose; ocellar tubercle relatively flat, medial ocellus present; occiput metallic green-blue, occipital pile dense, white; postocular ridge and gena overlain with grey



Figure 14. *Mesophysa tenaria* Neboiss, male, anterior view [700452]. Body length = 10.0 mm.

pubescence; clypeus length equal to oral cavity, brown-black; palpus white or black; margin of oral cavity (parafacial) glabrous; proboscis equal or slightly longer than head height; flagellum dark yellow-orange, suffused with brown, apex in male tapered, narrow apically; scape and pedicel brown or dark yellow. Thorax postpronotal lobe green; scutum metallic green or metallic blue, scutal vestiture dense white pile; scutellum metallic blue-green; pleuron metallic green or metallic blue; coxae black with metallic blue iridescence; femora black; tibiae black or brown; tarsi black; lower calypter white, with brown margin; wing hyaline (male) or slightly infuscate (female), venation dark; vein R_4 with spur vein. Abdomen shape rounded globose, much larger than thorax (female) or rounded to conical, not larger than thorax (male), colour metallic green or metallic blue violet, vestiture as minute setae, dense white-silver elongate setae along anterior margin of tergites 2–5.

Comments. *Panops austra*e is a large, metallic coloured species similar to *P. jade* sp. n. and *P. schlingeri* sp. n. It is easily distinguished from these species by the longer proboscis and dense white thoracic pile. This species is known from remote, arid regions of the Northern Territory and Western Australia.



Figure 15. *Mesophysa tenaria* Neboiss, female, lateral view [700453]. Body length = 11.0 mm.

***Panops baudini* Lamarck, 1804**

http://species-id.net/wiki/Panops_baudini

Figs 1, 17, 25–30

Panops baudini Lamarck, 1804: 265 – Latreille 1809: 316, 1810: 443, 1811: 710; Wiedemann 1830: 19; Erichson 1840: 141; Walker 1855: 333; Kertész 1909: 9; Hardy 1946: 66; Edwards 1930: 193; Paramonov 1957: 526; Neboiss 1971: 208; Schlinger and Jefferies 1989: 376.

Mesophysa marginata Macquart, 1838: 168 – Blanchard 1840: 584.

Epicerina nigricornis Macquart, 1850: 98 – Kertész 1909: 8; Hardy 1918: 61, 1921: 79, 1946: 66; Brunetti 1926: 578.

Panops lamarckianus Westwood, 1876: 508 – Kertész 1909: 9; Paramonov 1957: 526.

Mesophysa australiae Thomson, 1869: 475 – Westwood 1876: 517.

Panops australiae. Kertész, 1909: 8.

Mesophysa baudini Brunetti, 1926: 581.

Panops nigricornis. Hardy, 1946: 66.

Type material. *Panops baudini* Lamarck. **Neotype** female, AUSTRALIA: **New South Wales:** Asquith (nr, Sydney), 10.x.1962, A.L. Dyce (ANIC) (designated by Neboiss



Figure 16. *Mesophysa tenaria* Neboiss, female, oblique view [700454]. Body length = 11.0 mm.

1971). Neboiss (1971) discussed the identity of this species based on the original species description and justification for designating the neotype [examined].

Mesophysa marginata Macquart. **Type** female, [no label data] (MHN). See discussion by Neboiss (1971).

Epicerina nigricornis Macquart. **Type** male, AUSTRALIA: “2/47 Tasmanie J. Verreaux 1847” (MNHN). See discussion by Paramonov (1957) and Neboiss (1971) regarding synonymy and possible erroneous locality recording.

Panops lamarckianus Westwood. **Type** male, AUSTRALIA: **Queensland:** Moreton Bay, 1859 (OUMNH).

Mesophysa australasiae Thomson. **Type** male, AUSTRALIA: **New South Wales:** Sydney, Kinb. (NHRS). See discussion by Hardy (1921) and Neboiss (1971) regarding synonymy.

Other material examined. AUSTRALIA: **Queensland:** male, female, Isla Gorge National Park, [-25.183, 149.966] 12.ix.1992, 320m, G. Daniels (GDCB); male, Isla Gorge National Park, [-25.183, 149.966] 11.ix.1992, 320m, R. Eastwood (GDCB); 32 km S Theodore, [-25.166, 150.000], 13.ix.1992, 300m, G. Daniels (GDCB); 2 males, female, 43 km WSW Millmerran, [-27.983, 150.933],

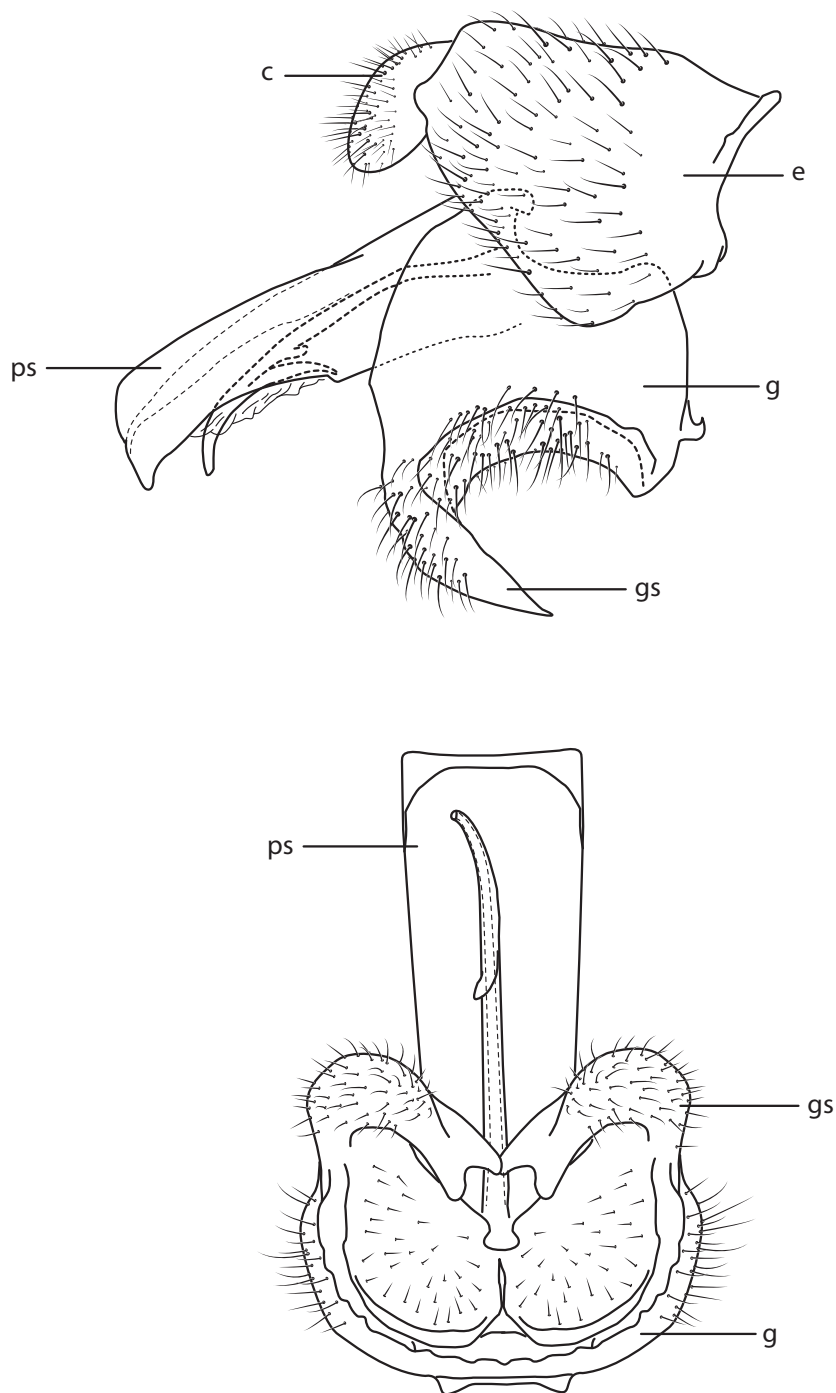


Figure 17. *Panops baudini* Lamarck. **A** male genitalia, lateral view **B** same, ventral view. Scale line = 0.2 mm. Abbreviations: **c** cercus; **e** epandrium; **g** gonocoxite; **gs** gonostylus; **ps** parameral sheath of aedeagus.



Figure 18. *Panops aurum* sp. n., male, lateral view [700495]. Body length = 11.0 mm.

21.ix.1986, G. & A. Daniels (GDCB); 2 females, Lake Broadwater, nr. Dalby, [-27.361, 151.102], site 8, 27.ix.1986, G. & A. Daniels (GDCB); male, Gayndah, Masters (NMV). **New South Wales:** female, Sydney swamps (NMV); male, Sydney, 17.x.1932, G.M. Goldfinch (ANIC); female, Ku-ring-gai Chase National Park [-33.651, 151.201], 2.x.1972, A. & G. Daniels (GDCB); 2 males, Goondera Ridge, Royal National Park [-34.122, 151.063], 24.x.1976, G. & A. Daniels (GDCB). **Victoria:** female, Mitta Mitta River, 8km NW of Dartmouth Dam [-36.566, 147.55], 30.x.1976, A. A. Calder (NMV). **Western Australia:** 3 males, W of Norseman, Eucalyptus woodland, dry gully to salt lake, Malaise trap, C. Lambkin et al., ANIC bulk sample 2184, 1-17.xi.2003 271m [-32.186, 121.721] (ANIC); male, Wongan Hills area [-30.871, 116.771], Greg Guérin, on flowers of *Microcorys* (CAS); female, East Yuna Nature Reserve, 34 km WNW Mullewa [-28.42, 115.42], 23-24.ix.1983, C. & T. Houston, 559-17, on flowers of ?*Helipterum* (WAM); female Australia, Boorabbin Rock National Park [-31.23, 120.16], W Coolgardie, 26.ix.2005, L. Packer (CNC) [not examined but identity confirmed by B. Sinclair].

Diagnosis. Eye minutely pilose; proboscis longer than head height; body black (with faint blue iridescence in western population); antennae red-brown to black; parafacial with marginal pile; postpronotal lobe concolourous with rest of thorax; femora black with pale apices, rest of leg dark yellow to white with black on tibiae; abdomen red or yellow laterally; distiphallus broad apically.

Redescription. Body length: 9.5–12.5 mm (male), 11.0–14.0 mm (female). Head with eye sparsely pilose with minute setae (appears apilose); ocellar tubercle



Figure 19. *Panops aurum* sp. n., male, dorsal view [700496]. Body length = 11.0 mm.

raised laterally or relatively flat; medial ocellus reduced; occiput brown-black, occipital pile white, sparse; postocular ridge and gena overlain with grey pubescence; clypeus length equal to oral cavity, brown-black; palpus white or yellow; margin



Figure 20. *Panops aurum* sp. n., male, anterior view [700497]. Body length = 11.0 mm.

of oral cavity (parafacial) pilose; proboscis longer than head height; flagellum red-brown to black; scape and pedicel brown. Thorax with postpronotal lobe brown-black; scutum black, scutal vestiture dense white pile; scutellum black; pleuron black (thorax with slight bluish iridescence in western populations); coxae black; femora black or brown-black, apices dark yellow; tibiae predominantly black with dark yellow to white (apically); tarsi dark yellow to white; lower calypter white, with yellow margin; wing hyaline (male) or slightly infusate (female); venation dark; vein R_4 with spur vein, rarely without. Abdomen shape rounded globose, much larger than thorax, colour highly variable, orange-red to yellow, dark markings anteriorly and medially, or dark yellow, brown anteriorly on tergites 2–6, vestiture as extensive short white-silver pile, longer laterally.



Figure 21. *Panops australis* Neboiss, male, lateral view (partially denuded) [700499]. Body length = 8.0 mm.

Comments. The type for the genus, *Panops baudini* is the most commonly represented species in collections. This species is distributed in Queensland, New South Wales, Victoria and Western Australia. The apex of the aedeagus is broad and quadrangular in this species (Fig. 17) while in all other species it is much narrower. The record from Tasmania is apparently erroneous (Neboiss 1971). Western Australian individuals have more reddish colouration laterally on the abdomen, particularly in males, and the body has a bluish iridescence (Fig. 1). This bluish iridescence is not seen in specimens from eastern states.

***Panops boharti* (Schlinger, 1959), comb. n.**

http://species-id.net/wiki/Panops_boharti

Figs 31–33

Neopanops boharti Schlinger, 1959: 157 – Neboiss 1971: 212; Schlinger and Jefferies 1989: 376.

Type material examined. Holotype male, INDONESIA: **Papua:** Cyclops Mountains, Sabron, 930 ft. [-2.509, 140.523], iv.1936, L. E. Cheesman, B. M. 1936-271 (BMNH).

Diagnosis. Eye pilose; eye extends posteriorly beyond maximum head width; proboscis very short, not extending beyond oral cavity; body brown and yellow; antennae



Figure 22. *Panops australae* Neboiss, male, dorsal view [700502]. Body length = 8.0 mm.

yellow; parafacial without marginal pile; postpronotal lobe cream with brown spot; legs yellow, femora brown with yellow apices; lower calypter cream with brown margin.

Redescription. Body length: 9.0 mm (male). Head with eye sparsely pilose, slightly denser and elongate laterally; eye extends posteriorly beyond maximum head width; ocellar tubercle relatively flat; medial ocellus present; occiput cream, brown suffusion laterally; occipital pile white, sparse; flagellum yellow, apex uniform width, truncated apically; scape and pedicel dark yellow; clypeus minute, yellow-brown; palpus yellow; margin of oral cavity (parafacial) glabrous; proboscis not extending beyond oral cavity. Thorax with postpronotal lobe cream, brown suffusion dorsally; scutum brown, cream posterolaterally; scutal vestiture dense brown and white, matching respective scutal



Figure 23. *Panops australis* Neboiss, male, anterior view [700498]. Body length = 8.0 mm.

markings; scutellum brown with bluish iridescence, cream laterally; pleuron cream with brown markings; coxae cream with brown markings; femora cream with brown on middle half; tibiae dark yellow; tarsi dark yellow; lower calypter white, brown marginally on membrane; wing hyaline, venation brownish, pale yellow distally along costa and radial veins; vein R_4 with spur vein. Abdomen rounded globose, slightly larger than thorax, colour dark yellow, brown on tergites 3–6, vestiture minute setae, dense white-silver elongate setae along anterior margin of tergites 2–5.

Comments. *Panops boharti* comb. n. was described by Schlinger (1959) as the sole species in the genus *Neopanops* but is transferred herein to *Panops*. This Indonesian species is the only non-Australian representative of the genus, and is distinctive based on body colouration and markings, very short mouthparts, eye pilosity and eye shape. Only the male is known.



Figure 24. *Panops austrae* Neboiss, female, dorsal view [700508]. Body length = 14.5 mm.



Figure 25. *Panops baudini* Lamarck (western form), male, lateral view [700505]. Body length = 9.5 mm.



Figure 26. *Panops baudini* Lamarck (western form), male, oblique view [700509]. Body length = 9.5 mm.

***Panops conspicuus* (Brunetti, 1926)**

http://species-id.net/wiki/Panops_conspicuus

Figs 34–38

Epicerina conspicua Brunetti, 1926: 579.

Panops conspicuus (Brunetti, 1926) – Edwards 1930: 193; Paramonov 1957: 529; Neboiss 1971: 210; Schlinger and Jefferies 1989: 376.

Type material examined. Holotype female, AUSTRALIA: **Western Australia:** Kalamunda [-31.974, 116.058], 14.iii–14.iv.1914, R.E. Turner, 1914-349 (BMNH).

Other material examined. AUSTRALIA: **Victoria:** male, female, Kiata [-36.366, 141.791], R. Oldfield, X 4172, captured as copulating pair (NMV). **Western Australia:** female, Boulder Rock [-32.133, 116.166], 15.iii.1981, M.J. Smart, Jarrah Forest, 300m, hovering 2–3 m above ground, taken at rest on leaf (WAM); 4.5 km E Lake Monger on Wanarra Road [-29.544, 116.775], 7.v.2008, T.F. Houston and E. G. Cunningham, 1266-1 (WAM).



Figure 27. *Panops baudini* Lamarck (western form), male, anterior view [700510]. Body length = 9.5 mm.

Diagnosis. Eye apilose; proboscis longer than head height; body colour and shape sexually dimorphic: male black with slender body, female yellow and brown with globose abdomen; antennae yellow-brown to red-brown with black suffusion; parafacial without marginal pile; postpronotal lobe yellow; legs yellow with brown medially on femora and tibiae.

Redescription. Body length: 11.0 mm (male), 12.0–13.0 mm (female). Head with eye apilose; ocellar tubercle raised laterally; medial ocellus present; occiput colour brown-black (male) or brown with dark yellow spot laterally (female); occipital pile yellow; postocular ridge and gena glabrous; clypeus shorter than oral cavity; yellow-brown; palpus yellow; margin of oral cavity (parafacial) glabrous; proboscis longer than head height; flagellum dark yellow, suffused with brown (female) or red with black suffusion (male), apex in male tapered, narrow apically; scape and pedicel brown. Thorax with postpronotal lobe yellow; scutum black (male) or yellow and brown (markings variable) (female); scutal vestiture dense white pile or dense yellow-gold pile; scutellum black or brown; pleuron brown; coxae brown; femora brown-black, apices dark yellow; tibiae dark yellow or dark yellow, suffused with brown; tarsi dark yellow; lower calypter white, with dark yellow margin; wing hyaline (male) or slightly infusate (female), venation dark; vein R_4 with spur vein. Abdomen shape rounded globose, much



Figure 28. *Panops baudini* Lamarck (eastern form), female, lateral view [700512]. Body length = 12.0 mm.

larger than thorax (female) or cylindrical along length (male), colour orange-yellow or brown-black, vestiture elongate yellow pile (whitish in male).

Comments. *Panops conspicuus* is recorded from arid regions of southwest Western Australia and Western Victoria. There is dramatic sexual dimorphism in both body colouration and shape in this species, with males very similar to species of *Mesophysa*. *Panops conspicuus* can be differentiated from other *Panops* species by the bright yellow postpronotal lobes, elongate mouthparts, yellow and brown colouration (female), and apilose eyes. Females of this species are similarly coloured to females of *P. grossi* comb. n., a species which also displays dramatic sexual dimorphism.

***Panops danielsi* sp. n.**

urn:lsid:zoobank.org:act:3FAB3406-C6A4-42CC-9ABC-B82BCB22FDE8

http://species-id.net/wiki/Panops_danielsi

Figs 39–43

Type material. **Holotype** male, AUSTRALIA: **Queensland:** 3km SW Fox Ck. x-ing [crossing], ‘Wolverton’ [-13.104, 142.970], 13.iv.1989, G. and A. Daniels (AMS).



Figure 29. *Panops baudini* Lamarck (eastern form), female, oblique view [700513]. Body length = 12.0 mm.

Paratypes. AUSTRALIA: **Queensland:** female, male, same data as holotype (GDCB) (CAS); female, 7 km NNW Coen, [-13.844, 143.163], 17.iv.1989, G. and A. Daniels (GDCB); female, 26 km W 'Fairview', [-15.535, 144.154], 20.iv.1989, G. and A. Daniels (GDCB).

Diagnosis. Eye uniformly sparse pilose; proboscis longer than head height; body dark yellow and brown, with metallic green-blue iridescence; antennae red-brown or black; parafacial with marginal pile; postpronotal lobe dark yellow; legs dark yellow and brown.

Description. Body length: 11.0 mm (male), 10.5–12.0 mm (female). Head with eye sparsely pilose, uniformly distributed, setae minute; ocellar tubercle raised laterally; medial ocellus absent; occiput metallic green-blue; occipital pile yellow; postocular ridge and gena overlain with grey pubescence; flagellum apex in male uniform width, truncated apically, narrower in female, red-brown (male) or black (female); scape and pedicel dark yellow; clypeus length equal to oral cavity, brown-black; palpus yellow; margin of oral cavity (parafacial) pilose; proboscis longer than head height. Thorax with postpronotal lobe yellow; scutum glossy black (with metallic iridescence), dark yellow marginally; scutal vestiture dense yellow-gold pile; scutellum brown, dark yellow medially; pleuron brown with metallic iridescence; coxae black or brown; femora brown-black, apices dark yellow; tibiae dark yellow, suffused with brown; tarsi dark



Figure 30. *Panops baudini* Lamarck (eastern form), female, anterior view [700514]. Body length = 12.0 mm.

yellow; lower calypter white, with yellow margin; wing hyaline, venation dark; vein R_4 with spur vein. Abdomen shape rounded globose, much larger than thorax (female) or rounded to conical, not larger than thorax (male), colour black with metallic green iridescence (female) or dark yellow, brown anteriorly on tergites 2–6 (male), vestiture extensive white-silver elongate setae, brown posteromedially on tergites 3–5 (female) or erect dark pile (male).

Etymology. This species is named in honour of the collector of this species, Greg Daniels.

Comments. *Panops danielsi* sp.n. is known only from Far Northern Queensland. This species is closely related to *P. baudini* as both species have similar shaped mouth-parts and pilose eyes. *Panops danielsi* sp. n. can be distinguished by the more evident eye pilosity, yellow postpronotal lobes and body colouration.



Figure 31. *Panops bobarti* (Schlinger) comb. n., male, lateral view [700515]. Body length = 9.0 mm.

***Panops grossi* (Neboiss, 1971), comb. n.**

http://species-id.net/wiki/Panops_grossi

Figs 44–47

Panocalda grossi Neboiss, 1971: 214 – Schlinger and Jefferies 1989: 376.

Type material examined. **Holotype** female, AUSTRALIA: **Northern Territory:** Koolpinyah, 21.iv.1916 [-12.331, 131.148] G. F. Hill, (in copula) (SAM).

‘Allotype’. AUSTRALIA: **Northern Territory:** same data as holotype (SAM).

Diagnosis. Eye pilose dorsally only, relatively dense and elongate; proboscis shorter than head height; body colour and shape sexually dimorphic: male metallic olive green, female yellow and brown, globose; antennae yellow; parafacial without marginal pile; postpronotal lobe and legs concolourous with rest of body.

Redescription. Body length: 9.0 mm (male), 12.0 mm (female). Head eye pilose dorsally only, dense and relatively elongate; occiput olive green, occipital pile dense white (male) or yellow (female); postocular ridge and gena overlain with grey pubescence; ocellar tubercle raised laterally or relatively flat; medial ocellus absent; clypeus shorter than oral cavity, yellow-brown; palpus black; margin of oral cavity (parafacial) glabrous; proboscis not extending beyond oral cavity; flagellum yellow, apex in male uniform width, truncated apically; scape and pedicel brown. Thorax with postpronotal lobe yellow (female) or green (male); scutum metallic olive green or yellow-orange; scutal vestiture dense white or yellow-gold pile; scutellum metallic olive green or orange-yellow with brown suffusion; pleuron orange or metallic olive green; coxae brown; femora brown-black, apices dark yellow; tibiae brown; tarsi brown; lower



Figure 32. *Panops boharti* (Schlinger) comb. n., male, dorsal view [700517]. Body length = 9.0 mm.

calypter white, brown marginally on membrane or white, with dark yellow margin; wing hyaline or slightly infuscate, venation dark; vein R_4 without spur vein. Abdomen shape with male rounded, not larger than thorax, metallic olive green, vestiture dense short pile, longer laterally; female rounded globose, much larger than thorax (female), orange-yellow (female), vestiture elongate yellow pile.

Comments. *Panops grossi* comb. n. was described by Neboiss (1971) as the sole species in the genus *Panocalda* but is transferred herein to *Panops*. This species is apparently closely related to *P. boharti* comb. n. based on eye pilosity, and *P. schlingeri* sp. n. and *P. jade* sp. n. based on the short mouthparts. All of these species are northern



Figure 33. *Panops boharti* (Schlinger) comb. n., male, anterior view [700522]. Body length = 9.0 mm.

Australian or Indonesian species. *Panops grossi* comb. n. can be distinguished from all other *Panops* based on the dense patch of relatively elongate pile on the dorsal part of the eye. This species displays a dramatic sexual dimorphism similar to that found in *P. conspicuus*, with females being orange-yellow in colour.

***Panops jade* sp. n.**

urn:lsid:zoobank.org:act:96D0BD2A-0C81-4BCE-BB32-671D1C2D901C

http://species-id.net/wiki/Panops_jade

Figs 2D, 48–52

Type material. **Holotype** male, AUSTRALIA: **Queensland:** Isla Gorge National Park [-25.183, 149.966], 3.x.1991, 320 m, G. Daniels (AMS).

Paratypes. AUSTRALIA: **Queensland:** female, Isla Gorge National Park [-25.183, 149.966], 3.x.1991, 320 m, G. Daniels (CAS); female, Isla Gorge National Park [-25.183, 149.966], 14.ix.1992, 320 m, G. Daniels (AMS).



Figure 34. *Panops conspicuus* (Brunetti), male, lateral view [700525]. Body length = 11.0 mm.



Figure 35. *Panops conspicuus* (Brunetti), male, oblique view [700527]. Body length = 11.0 mm.

Diagnosis. Eye apilose; proboscis shorter than head height; body metallic green-blue to violet iridescence; antennae red-brown; parafacial with marginal pile; postpronotal lobe concolourous with rest of thorax; legs black with metallic blue-violet iridescence.



Figure 36. *Panops conspicuus* (Brunetti), male, anterior view [700528]. Body length = 11.0 mm.

Description. Body length: 11.5 mm (male), 11.5–12.0 mm (female). Head with eye apilose; ocellar tubercle relatively flat; medial ocellus present; occiput metallic green-blue, occipital pile white, sparse; postocular ridge and gena overlain with grey pubescence; clypeus length equal to oral cavity, black with blue-green suffusion; palpus black; margin of oral cavity (parafacial) pilose; proboscis extending beyond oral cavity, but shorter than head height; flagellum apex in male tapered, slightly rounded apically, red-brown; scape and pedicel red-brown. Thorax with postpronotal lobe blue-violet; scutum metallic blue-violet, green posteromedially; scutellum metallic blue-violet; coxae and femora with metallic blue-violet iridescence; tibiae black; tarsi black; lower



Figure 37. *Panops conspicuus* (Brunetti), female, lateral view [700529]. Body length = 13.0 mm.

calypter white with brown margin; wing hyaline, venation dark; vein R_4 with spur vein. Abdomen shape rounded globose, much larger than thorax, colour metallic green or blue-violet iridescent, vestiture extensive white-silver short pile, longer laterally.

Etymology. This beautifully coloured species is named after my daughter, Jade Tanya Winterton, whose name also describes the deep green colouration found in this species.

Comments. *Panops jade* sp. n. is a distinctive species with extensive green to blue-violet iridescence, particularly in the female. It is similar to the western Australian species, *P. austrae*, but is distinguished by the length of the mouthparts, leg colour and different vestiture pattern on the abdomen. *Panops jade* sp. n. is known only from Isla Gorge National Park in southern Queensland. Both males and females are recorded from Spinifex grass (*Triodia* sp.), presumably at rest.

***Panops schlingeri* sp. n.**

urn:lsid:zoobank.org:act:03D163A1-D1DA-4810-8D88-77F76D5CC490

http://species-id.net/wiki/Panops_schlingeri

Figs 53–55

Type material. **Holotype** female, AUSTRALIA: **Northern Territory:** 9 km NE of Mudginbarry H.S. (on scarp), 10.vi.1973, D. H. Colless [-12.310, 132.579] (ANIC).



Figure 38. *Panops conspicuus* (Brunetti), female, oblique view [700530]. Body length = 13.0 mm.



Figure 39. *Panops danielsi* sp. n., male, lateral view [700531]. Body length = 11.0 mm.



Figure 40. *Panops danielsi* sp. n., male, anterior view [700532]. Body length = 11.0 mm.

Paratype. AUSTRALIA: **Northern Territory:** female, 8 km SSW of Oenpelli Mission 7.vi.1973, J. Cardale [-12.381, 133.024] (ANIC).

Diagnosis. Eye apilose; proboscis shorter than head height; body metallic green-blue iridescence; antennae orange; parafacial without marginal pile; postpronotal lobe dark yellow; legs dark yellow, femora brown-black with yellow apices.

Description. Body length: 9.5–11.0 mm (female only). Head with eye apilose; ocellar tubercle relatively flat; medial ocellus present; occiput metallic green-blue, occipital pile white, dense; postocular ridge and gena overlain with grey pubescence; clypeus shorter than oral cavity, brown-black; palpus black; margin of oral cavity (parafacial) glabrous; proboscis not extending beyond oral cavity; flagellum orange; scape and pedicel dark red-yellow. Thorax with postpronotal lobe yellow; scutum metallic green to blue iridescent; scutal vestiture dense white pile; scutellum metallic



Figure 41. *Panops danielsi* sp. n., female, lateral view [700533]. Body length = 12.0 mm.



Figure 42. *Panops danielsi* sp. n., female, oblique view [700534]. Body length = 12.0 mm.

blue-green; pleuron metallic green to blue iridescent; coxae brown-black with metallic blue iridescence; femora brown-black, apices dark yellow; tibiae dark yellow; tarsi dark yellow; lower calypter white, with dark yellow margin; wing hyaline, venation



Figure 43. *Panops danielsi* sp. n., female, anterior view [700535]. Body length = 12.0 mm.

dark; vein R_4 without spur vein. Abdomen shape rounded globose, much larger than thorax, dark with metallic green to blue iridescence, vestiture as dense short pile, longer laterally.

Etymology. I am honoured to name this species after the world-renowned Acroceridae taxonomist Dr. Evert Irving Schlinger.

Comments. *Panops schlingeri* sp. n. is known only from two female specimens collected in the Northern Territory. This species is differentiated easily by the green-blue iridescence on the body and dark yellow postpronotal lobes.



Figure 44. *Panops grossi* (Neboiss) comb. n., male, lateral view [700536]. Body length = 9.0 mm.

Subfamily Philopotinae Schiner, 1968

<http://species-id.net/wiki/Philopotinae>

Type genus. *Philopota* Wiedemann. Schlinger, 1971: 186.

Diagnosis. Body shape slightly to strongly arched and never densely pilose; small to medium sized; antennal flagellum stylate; postpronotal lobes enlarged and meeting medially to form collar behind head; tibial spines absent; wing costal vein ending at wing apex, never circumambient; wing venation highly variable, ranging from relatively complete with cells cu-p, bm br, d and basal r_{4+5} present, to highly reduced with only cell br present; cell m_3 absent; veins R_4 and R_5 always present as single vein R_{4+5} ; cubital and medial veins not reaching posterior wing margin; larvae exclusively parasitoids of araneomorph spiders.

Australasian genera

Helle Osten Sacken, 1896; *Schlengeriella* Gillung & Winterton, 2011.

Helle Osten Sacken, 1896

<http://species-id.net/wiki/Helle>

Figs 3A, 56–59

Helle Osten Sacken, 1896: 16 – Hutton 1901: 28; Paramonov 1955: 21; Schlinger and Jefferies 1989: 376. Type species: *Acrocera longirostris* Hudson, 1892: 56 by monotypy.



Figure 45. *Panops grossi* (Neboiss) comb. n., male, dorsal view [700537]. Body length = 9.0 mm.

Diagnosis. Body length: 4.0–6.0 mm [male], 6.0–7.0 mm [female]. Body shape strongly arched; colouration non-metallic (brown or black); head size slightly narrower than thorax width, shape sub-spherical; postocular ridge and occiput rounded; three ocelli, anterior ocellus reduced in size; posterior margin of eye rounded; eye apilose; position of antennae on head near middle of frons; eyes contiguous above



Figure 46. *Panops grossi* (Neboiss) comb. n., male, anterior view [700538]. Body length = 9.0 mm.

antennal base, not contiguous below antennal base; palpus present; proboscis greater than head length; flagellum stylate, apex with terminal seta; postpronotal lobes enlarged, medially contiguous to form collar; subscutellum enlarged; legs not elongated; wing markings absent; costa ending near wing apex, costal margin straight; humeral crossvein absent; radial veins straight or curved towards wing anterior margin; R_1 inflated distally at pterostigma; pterostigma and cell r_1 membranous, not ribbed; R_{2+3} present; R_{4+5} angled anteriorly approximately midway; cell r_{4+5} bisected by 2r-m, basal cell very narrow elongate, closed; 2r-m joining M_1 to R_{4+5} ; cell r_{4+5} present, narrow elongate, closed (open apically when 2r-m rarely absent); crossvein 2r-m present (rarely absent); R_4 without spur vein; medial vein complement with M_1 , M_2 and M_3 present (M_3 fused with CuA_1); discal cell closed completely; medial veins not reaching wing margin; CuA_1 joining M_3 , petiolate to margin; CuA_2 fused to A_1 before wing margin, petiolate; wing microtrichia absent; anal lobe well developed; alula well developed; abdominal tergites smooth, rounded; abdomen shape elongate, narrow cylindrical or conical (male), or rounded and inflated (female).



Figure 47. *Panops grossi* (Neboiss) comb. n., female, oblique view [700539]. Body length = 12.0 mm.



Figure 48. *Panops jade* sp. n., male, lateral view [700540]. Body length = 11.5 mm.

Included species. *Helle longirostris* (Hudson, 1892); *H. rufescens* Brunetti, 1926.

Comments. *Helle* is an endemic genus to New Zealand that is closely related to *Schlingeriella*, the only other philopotine genus in the region (Gillung and Winterton 2011; Winterton et al. 2007). Characteristics supporting this close relationship include thickening of wing vein R_1 at the pterostigma, elongate mouthparts, apilose eyes, 2r-m absent (rarely in *Helle*) and R_{4+5} angled anteriorly approximately half way along vein.



Figure 49. *Panops jade* sp. n., male, dorsal view [700541]. Body length = 11.5 mm.

Helle can be differentiated from all other philopotine genera based on the relatively complete wing venation, inflated R_1 at pterostigma, palpi present and apilose eyes.

Key to *Helle* species

- 1 Body colour brown-black, sometimes with metallic iridescence, scutum without dark markings (Figs 56–57) *H. longirostris* (Hudson, 1892)
- Body colour yellowish-orange, scutum with dark longitudinal stripes, narrower anteriorly (Figs 58–59) *H. rufescens* Brunetti, 1926

Schlingeriella Gillung & Winterton

urn:lsid:zoobank.org:act:99EAC1BE-4A6F-43E0-B61A-6460BF68694E

<http://species-id.net/wiki/Schlingeriella>

Figs 3B, 60–62

Schlingeriella Gillung & Winterton, 2011: 22. Type species: *Schlingeriella irwini* Gillung & Winterton, 2011: 23.



Figure 50. *Panops jade* sp. n., female, lateral view [700542]. Body length = 12.0 mm.



Figure 51. *Panops jade* sp. n., female, dorsal view [700543]. Body length = 12.0 mm.



Figure 52. *Panops jade* sp. n., female, anterior view [700545]. Body length = 12.0 mm.

Diagnosis. Body length: 2.4–4.0 mm [male], 4.4–6.0 mm [female]. Body shape arched; body colouration non-metallic dark brown; head width much smaller than thorax (female) or slightly smaller than thorax (male); head spherical; postocular ridge and occiput extended posteriorly into slight ridge; posterior margin of eye rounded; eyes bare; position of antennae on head near middle of frons, slightly nearer to mouth-parts; eyes contiguous above antennal base, not contiguous below; palpus present; proboscis longer than head; antennal flagellum stylate, apex with terminal seta; thorax with postpronotal lobes enlarged, medially contiguous to form collar; subscutellum



Figure 53. *Panops schlingeri* sp. n., female, lateral view [700546]. Body length = 11.0 mm.



Figure 54. *Panops schlingeri* sp. n., female, oblique view [700547]. Body length = 11.0 mm.



Figure 55. *Panops schlingeri* sp. n., female, anterior view [700548]. Body length = 11.0 mm.

enlarged; legs not greatly elongated; pulvilli present; wing hyaline, markings absent; costa ending in radial field; costal margin straight in both sexes; humeral crossvein absent; radial veins meeting wing margin before wing apex; R_1 inflated distally at pterostigma; R_{2+3} present; R_{4+5} slightly curved anteriorly midway; veins M_1 , M_2 and M_3 present; discal cell absent; medial veins reaching wing margin (or nearly so); crossvein 2r-m absent; Cu reduced, not reaching wing margin; anal lobe not enlarged; alula well developed; abdomen smooth, rounded, cylindrical in shape, similar width to thorax (male) or greatly rounded, inflated (female).



Figure 56. *Helle longirostris* (Hudson), male, lateral view [700556]. Body length = 5.0 mm.

Included species. *Schlengeriella irwini* Gillung & Winterton, 2011.

Comments. *Schlengeriella* is differentiated from other Philopotinae by medial veins mostly reaching the wing margin, R_1 inflated apically, reduced wing venation (i.e. absence of all wing cells except cell *br*), elongate mouthparts and apilose eyes. See results of Winterton et al. (2007) for phylogenetic placement and divergence times. This genus is represented by only a single species (*S. irwini* sp. n.) from New Caledonia (France). There is dramatic sexual dimorphism in body size, with females considerably larger than the males. This genus was described by Gillung and Winterton (2011) to honour the decades of work by Evert I. Schlinger on world Acroceridae taxonomy. Evert Schlinger not only collected many of the specimens in New Caledonia, he also recognized that it represented a completely new genus of endemic spider flies.



Figure 57. *Helle longirostris* (Hudson), female, lateral view [700557]. Body length = 5.5 mm.

Subfamily Acrocerinae Zetterstedt, 1837

<http://species-id.net/wiki/Acrocerinae>

Type genus. *Acrocera* Meigen 1803: 266.

Diagnosis. Small to medium sized, densely pilose to apilose, body rarely arched; antennal flagellum stylate; postpronotal lobes widely separated, never medially contiguous; wing venation highly variable, ranging from complete with cells cu-p, bm br, d, m₃ and basal r₄₊₅ present, to highly reduced with few closed cells; humeral cross-vein rarely well developed; tibial apical spines absent (rarely present); larvae exclusively parasitoids of araneomorph spiders.



Figure 58. *Helle rufescens* Brunetti, male, lateral view [700558]. Body length = 8.5 mm.

Australasian genera

Ogcodes Latreille, 1797; *Pterodontia* Gray, 1832

Ogcodes Latreille, 1797

<http://species-id.net/wiki/Ogcodes>

Figs 3C, 63–64

Ogcodes Latreille, 1797: 154 – Schlinger 1960: 245; Schlinger & Jefferies 1989: 377. Type species, *Musca gibbosa* Linnaeus, by subsequent monotypy (Latreille 1802: 432).

Oncodes Meigen 1822: 99 [emendation of *Ogcodes* Latreille] – White 1914: 69; Hardy 1921: 77, 1946: 66; Paramonov 1955: 23, 1957: 531.

Note. Synonymy and usage restricted to Australasian region fauna only; see Schlinger (1960) for more exhaustive list.

Diagnosis. Body length: 3.0–5.0 mm [male], 4.0–8.0 mm [female]. Body shape not arched, colouration black, yellow or white, non-metallic; head much smaller than



Figure 59. *Helle rufescens* Brunetti, female, lateral view [700559]. Body length = 7.0 mm.

thorax width, shape sub-spherical; postocular ridge and occiput rounded; two or three ocelli, anterior ocellus sometimes absent; posterior margin of eye rounded; eye apilose; position of antennae on head adjacent to mouthparts; eyes contiguous above antennal base, not contiguous below antennal base; palpus absent; proboscis apparently absent; flagellum shape stylate; apex with terminal setae (or single seta); antenotum not collar-like behind head; subscutellum enlarged; tibial spines absent; pulvilli present; wing hyaline, markings absent; costa ending near wing apex, costal margin straight; humeral crossvein absent; radial veins straight; R_1 inflated or not inflated distally; pterostigma and cell r_1 membranous, not ribbed; only two radial veins present, R_{2+3} absent, R_{4+5} not reaching wing margin; medial vein complement with M_1 , M_2 and M_3 present, or two M veins present; discal cell weakly formed or absent; medial veins not reaching wing margin; cell m_3 absent; CuA_1 absent; CuA_2 separate from A_1 , ending just before wing margin; crossvein $2r-m$ absent; wing microtrichia absent; anal lobe well developed; alula well developed; abdominal tergites smooth, rounded (rarely with tubercles in fossil species); abdomen shape greatly rounded, inflated.

Included species. *Ogcodes* is a distinctive and cosmopolitan genus and the most species-rich in the family. Thirty-four species in two subgenera (*Ogcodes* and *Protogcodes* Schlinger, 1960) are listed by Schlinger and Jefferies (1989) for the Australasian region.



Figure 60. *Schlingeriella irwini* Gillung & Winterton, male, lateral view [700560, 693079]. Body length = 2.4 mm.

Comments. *Ogcodes* is in need of revision and no recent keys to species have been published for the region. The most recent revision of the genus was by Schlinger (1960), but there are many undescribed species in collections and a world revision of the genus is needed. *Ogcodes* is a derived genus with a typical globose body, relatively small head and reduced wing venation. Characters which differentiate *Ogcodes* from all other Acroceridae genera include antennae proximal to mouthparts, palpi absent, proboscis very short, almost all wing cells absent or poorly formed, eyes apilose and R_{2+3} absent.

***Pterodontia* Gray, 1832**

<http://species-id.net/wiki/Pterodontia>

Figs 3D, 65–66

Pterodontia Gray, 1832: 779 – Macquart 1838: 174; Erichson 1840: 161; Walker 1855: 346; Westwood 1876: 513; White 1914: 68; Hardy 1921: 76, 1946: 66;



Figure 61. *Schlingeriella irwini* Gillung & Winterton, female, lateral view [700561, 693080]. Body length = 4.4 mm.

Paramonov 1957: 529; Schlinger 1959: 158. Type species: *Pterodontia flavipes* Gray, 1832: 779 by monotypy.

Nothra Westwood, 1876: 514 – Hardy 1921: 77, 1946: 66. Type species: *Nothra bicolor* Westwood, 1876: 514 by monotypy.

Note. Synonymy and usage list restricted to Australasian region fauna only.

Diagnosis. Body length: 3.0–7.0 mm [male], 4.0–10.0 mm [female]. Body shape not arched. Body colouration non-metallic; head much narrower than thorax width; shape nearly spherical; postocular ridge and occiput rounded; three ocelli; posterior margin of eye rounded; eye pilose (dense); antennae located adjacent to mouthparts; eyes contiguous above antennal base, not contiguous below antennal



Figure 62. *Schlingeriella irwini* Gillung & Winterton, female, anterior view [700562]. Body length = 4.4 mm.

base; palpus absent; proboscis greatly reduced; flagellum stylate, apex with terminal setae (multiple); antenotum shape not collar-like behind head; subscutellum not enlarged, barely visible; tibial spines present; pulvilli present; wing markings absent; costa circumambient; wing costal margin straight or with anterior projection



Figure 63. *Ogcodes* sp., male, lateral view [700563]. Body length = 9.0 mm.

(males); humeral crossvein present or reduced; radial veins curved or angled towards wing anterior margin; R_1 inflated distally at pterostigma (especially in male); pterostigma and cell r_1 membranous, not ribbed; R_{2+3} present; R_{4+5} present as single vein; basal cell r_{4+5} (portion basal to bisecting $2r-m$) merged with discal cell to form composite cell comprising $d+r_{4+5}$; cell m_3 absent; medial vein complement usually a single M vein fused with CuA_1 , petiolate to margin, sometimes with second medial vein originating from cell $d+r_{4+5}$; CuA_2 fused to A_1 before wing margin, petiolate, rarely open to wing margin; wing microtrichia absent; anal lobe well developed; alula present or absent, rarely well developed; abdominal tergites smooth, rounded; abdomen shape greatly rounded, inflated.

Included species. *Pterodontia davisi* Paramonov, 1957; *P. longisquama* Sabrosky, 1947; *P. mellii* Erichson 1840 (= *P. variegata* White, 1914 syn. n.).



Figure 64. *Ogcodes* sp., female, lateral view [700564]. Body length = 5.0 mm.

Key to Australasian *Pterodontia* species

- 1 Thorax black, or yellow suffused with dark brown to black ventrally, abdomen yellow to red laterally on segments 2–4; mid and hind femora brown to black; lower calypter hyaline medially, relatively small ($< \frac{1}{2}$ length of wing) (Western Australia, Tasmania, New South Wales, Queensland) (Fig. 66) *P. melli* Erichson 1840
- Thorax and abdomen completely brown to black; all legs uniformly yellow to white; lower calypter relatively large ($> \frac{1}{2}$ length of wing), uniformly brown...2
- 2 Wing brown infusate (Papua New Guinea)... *P. longisquama* Sabrosky, 1947
- Wing hyaline (Queensland, New South Wales) (Fig. 65)..... *P. davisi* Paramonov 1957



Figure 65. *Pterodontia davisii* Paramonov, male, dorsal view [700565]. Body length = 7.0 mm.

Comments. *Pterodontia* is a cosmopolitan genus containing 19 valid species, three of which are recorded from the Australasian region (Schlinger and Jefferies 1989). *Pterodontia variegata* was described by White (1914) and differentiated from *P. melli* (as *P. macquarti* Westwood, 1848) based on colouration of the fore femur, scutellum and abdomen. Paramonov (1957) examined a range of specimens from various localities and suggested that the former was likely a synonym of the latter. Based on examinations of these and additional specimens this synonymy is supported herein.

Some species of *Pterodontia* have greatly enlarged and sclerotized lower calypters, appearing somewhat like a second pair of wings (e.g. *P. davisii*). Males in this genus typically have sclerotized projections on the costal margin of the wing. Characteristics which diagnose this genus from other acrocerids include head very small relative to thorax width, tibial spines present, cells m_3 , d and basal r_{4+5} fused to form a single cell, eyes densely pilose, antennae adjacent to the ocellar tubercle and mouthparts reduced.



Figure 66. *Pterodontia mellii* Erichson, female, lateral view [700566]. Body length = 11.0 mm.

Contrary to other authors, *Pterodontia* has been placed previously in Panopinae by Schlinger (1981, 1987, 1989) based on the presence of tibial spines. The wing venation of *Pterodontia* is unique among acrocerids.

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A new species of *Geotrigona* Moure from the Caribbean coast of Colombia (Hymenoptera, Apidae)

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Abstract

A new species of the Neotropical stingless bee genus *Geotrigona* Moure from the Caribbean coast of Colombia is described and figured. *Geotrigona joearroyo* **sp. n.** belongs to the *fulvohirta* species group and is distinguished on the basis of color and type of pubescence on the metasomal terga. New geographical records and an updated key to the species of *Geotrigona* are provided.

Keywords

Apoidea, Apinae, Anthophila, Joe Arroyo, Meliponini, Neotropics, stingless bees, taxonomy

Introduction

Stingless bees of the Neotropical genus *Geotrigona* Moure are robust, middle-sized (5–6.5 mm in body length), often black species superficially resembling some *Trigona* Jurine and *Partamona* Schwarz (Michener 2007). *Geotrigona* is widely distributed in the Neotropical region, occurring from Michoacán, Mexico to Santiago del Estero, Argentina, and inhabiting a diverse variety of ecosystems and climates, particularly

along the Andes, where some species can be found at high altitudes. For example, *Geotrigona subrisea* (Cockerell) and *G. tellurica* Camargo & Moure have been collected at 3450 and 4000 m in the Colombian and Bolivian Andes; the latter altitude represents the highest elevation recorded for stingless bees in the Americas (Camargo and Moure 1996; Gonzalez and Engel 2004; Camargo and Pedro 2007; Gonzalez and Sepúlveda 2007). *Geotrigona* nest in the ground, hence their name, and the honey of some species is occasionally used by indigenous peoples, such as that of *G. acapulconis* (Strand) in Mexico (Camargo and Moure 1996; Michener 2007; Ayala et al. in prep.).

Geotrigona is related to *Trigona* and *Tetragona* Lepeletier de Saint Fargeau & Audinet-Serville, as suggested by both morphological and molecular analyses (Camargo and Moure 1996; Michener 2007; Rasmussen and Cameron 2010). The genus was revised by Camargo and Moure (1996), who recognized 16 species and several subspecies that were subsequently elevated to specific rank by Camargo and Pedro (2007), thus increasing the number to 20 species total; Gonzalez and Sepúlveda (2007) described an additional species from Colombia and revised the genus for the country. Based on a morphological phylogenetic analysis, Camargo and Moure (1996) recognized four species groups (Table 1) and discussed possible historical biogeographical scenarios. However, as mentioned by the authors, their phylogenetic hypotheses were not well-resolved, mainly because of the limited number of characters used, most of them recorded from the worker external morphology. Although meliponine taxonomy is based on workers, study of nesting behavior, males, and queens may provide additional characters useful in recognizing cryptic species and in phylogenetic analyses. Unfortunately, the nest and the male of *Geotrigona* are known for only about one-third of the species (Camargo and Moure 1996). Furthermore, despite being widely distributed in the Neotropical region, *Geotrigona* is rather poorly represented in biodiversity collections when compared to other stingless bee genera such as *Trigona* or *Partamona*; it is unknown from some countries where it is likely to occur based on the distribution (e.g., Venezuela, French Guiana). Without a doubt, a significant amount of work remains to be done in the systematics of the group. Herein, we describe a new species of *Geotrigona* of the *fulvohirta* species group based on workers collected in the Caribbean coast of Colombia, provide new geographical records, and an updated key to species of the genus.

Material and methods

Morphological terminology follows that of Michener (2007), except for torulus herein used instead of antennal alveolus or socket, while the format for the descriptions generally follows that used by Gonzalez and Sepúlveda (2007). Measurements were taken using an ocular micrometer on an Olympus SZX-12 stereomicroscope. Photomicrographs were taken using a Nikon D1x digital camera attached to an Infinity K-2 long-distance microscopic lens. Measurements in descriptions are for the holotype, with

Table 1. Summary of currently included species in *Geotrigona* with information on the known sexes, nest and distribution. Sex/caste: ♀ = worker; ♂ = male; - = unknown. The distribution and nesting sites are based on Camargo and Moure (1996) and Camargo and Pedro (2007), with some modifications from Gonzalez and Sepúlveda (2007) and the present study.

Species	Sex	Nest	Distribution
<i>“fulvohirta species group”</i>			
<i>G. acapulconis</i> (Strand, 1919)	♀♂	+	Mexico
<i>G. chiriquiensis</i> (Schwarz, 1951)	♀	+	Panama
<i>G. fulvohirta</i> (Friese, 1900)	♀	+	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>G. fumipennis</i> Camargo & Moure, 1996	♀	-	Ecuador
<i>G. joearroyoi</i> Gonzalez & Engel, sp. n.	♀	-	Colombia
<i>G. kaba</i> Gonzalez & Sepúlveda, 2007	♀		Colombia
<i>G. leucogastra</i> (Cockerell, 1914)	♀	-	Ecuador
<i>G. lutzi</i> Camargo & Moure, 1996	♀♂	-	Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
<i>G. terricola</i> Camargo & Moure, 1996	♀	-	Guatemala, Honduras
<i>“mombuca species group”</i>			
<i>G. aequinoctialis</i> (Ducke, 1925)	♀	+	Brazil
<i>G. argentina</i> Camargo & Moure, 1996	♀♂	+	Argentina, Bolivia, Paraguay
<i>G. fulvatra</i> Camargo & Moure, 1996	♀	-	Bolivia, Peru
<i>G. mattogrossensis</i> (Ducke, 1925)	♀♂	+	Brazil, Bolivia
<i>G. mombuca</i> (Smith, 1863)	♀♂	+	Brazil, Paraguay
<i>G. xanthopoda</i> Camargo & Moure, 1996	♀	-	Brazil
<i>“subterranea species group”</i>			
<i>G. subterranea</i> (Friese, 1901)	♀♂	+	Brazil
<i>“subgrisea species group”</i>			
<i>G. kraussi</i> (Schwarz, 1951)	♀	+	Panama
<i>G. kwyrakai</i> Camargo & Moure, 1996	♀	-	Brazil
<i>G. subfulva</i> Camargo & Moure, 1996	♀	-	Brazil, Colombia
<i>G. subgrisea</i> (Cockerell, 1920)	♀	-	Brazil, Colombia
<i>G. subnigra</i> (Schwarz, 1940)	♀	-	Brazil, Guyana
<i>G. tellurica</i> Camargo & Moure, 1996	♀♂	-	Bolivia, Ecuador, Peru

values for paratypes in parentheses. Institutional acronyms used herein are: **AMNH**, American Museum of Natural History, New York, USA; **ICN**, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia; and **SEMC**, Snow Entomological Collection, Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas, USA. The symbol for female and that word itself are used below for worker, not queen.

Systematics

Tribe Meliponini Lepeletier de Saint Fargeau, 1836

Genus *Geotrigona* Moure, 1943

Geotrigona joearroyoi, sp. n.

urn:lsid:zoobank.org:act:14F5E52A-0EDD-4D51-BB44-8EA7CB2E65DD

http://species-id.net/wiki/Geotrigona_joearroyoi

Figs 1–5

Holotype. ♀, COLOMBIA: Magdalena, Santa Marta, on the road from Bastidas to Bahía Concha, 11°15.874'N, 74°09.924'W; Dec 18, 2011, 99 m., V.H. Gonzalez (ICN).

Paratypes. Two workers with the same data as the holotype (SEMC, ICN).

Diagnosis. This species belongs to the *fulvohirta* species group *sensu* Camargo and Moure (1996) recognized by the metatibia with posterodistal margin distinctly projecting into an angle or tooth (Figs 1, 3). It is most similar to *G. fumipennis* Camargo & Moure sharing antennal scape with short setae (about as wide as half width of scape), body pubescence predominantly dark brown to black, and metabasitarsus with posterior margin slightly convex (Fig. 3). It can be distinguished from that species by metasomal terga with black setae except on sixth tergum (Figs 1, 2) and distal margins of second to fifth terga without appressed, branched setae. In *G. fumipennis* the metasomal terga have grayish setae and distal margins of second to fifth terga are distinctly covered by appressed, branched setae.

Description. *Worker:* Total body length 5.2 mm (4.8–5.2 mm); head width 2.5 mm (2.4–2.5 mm); forewing length (measured from apex of humeral sclerite) 5.6 mm (5.6–5.7 mm). Head 1.3 times wider than long; inner orbits of compound eyes converging below (Fig 4); malar area short, about 0.4 times width of third flagellomere; clypeus about 1.7 times broader than long; intertorular distance about as long as torular diameter; torulorbital distance about twice as long as torular diameter; interocellar distance 2.3 times median ocellar diameter, 1.1 times longer than ocellocular distance; ocelloccipital distance about half median ocellar diameter; scape 6 times longer than wide, about as wide as width of third flagellomere; pedicel about as long as broad, shorter than first flagellomere; flagellomeres slightly longer than broad, apical flagellomere longest; compound eye 2.9 times longer than broad; gena about as broad as compound eye in profile. Metatibia 2.7 times longer than broad with posterodistal margin distinctly projected into an angle, distal margin emarginate between projection and penicillum, corbicula on distal one-third; metabasitarsus about twice as long as broad, slightly convex on posterior margin (Fig. 3).

Integument smooth and shiny, as in other species of the genus.

Color black, including tegula and humeral sclerite, except dark reddish brown on mandible distally, flagellum (yellowish ventrally), and distitarsi. Wing membranes and veins light ferruginous, slightly dusky distally including pterostigma (Figs 1, 2).



Figures 1–5. Worker of *Geotrigona joearroyoi* Gonzalez and Engel, sp. n. (holotype depicted except paratypes in figures 3, 5) **1** Lateral habitus **2** Dorsal habitus **3** Hind leg showing outer surfaces of metatibia and metabasitarsus **4** Facial view **5** Detail of antennal scape and basal flagellomeres.

Body pubescence black, except: inferior half of face and gena with dense, branched, short, appressed grayish setae; superior half of face, pronotal lobe, metepisternum, sides of propodeum, and metatibia basally with dark brown setae; tergum six and sterna with grayish setae. Clypeus with erect setae about 0.6 times median ocellar diameter; scape with abundant, short, erect, simple setae, about as long as or slightly longer (0.5–0.6 times) than half width of scape (Fig. 5); frons with longer erect setae than on clypeus, 1.2 times median ocellar diameter; vertex with erect setae 1.6–1.8 times median ocellar diameter; mesoscutum with erect setae about as long as median ocellar diameter, longer on anterior margin; mesoscutellum and mesepisternum with erect setae 1.2 times median ocellar diameter; metatibia with long erect setae, 2.4–2.8 times median ocellar diameter. First metasomal tergum practically glabrous, with scattered,

minute erect setae on disc and denser, longer (0.5 times median ocellar diameter) erect setae laterally; remaining terga with simple, semierect to erect setae progressively increasing in density and length towards distal terga; tergum sixth with both simple and appressed, branched setae (1.2–1.6 times median ocellar diameter).

Male: Unknown.

Queen: Unknown.

Etymology. The species is named in tribute to the late Colombian tropical music singer, composer, and songwriter Alvaro José Arroyo González (1 November 1955–26 July 2011). This artist, also known as Joe Arroyo or El Joe, was nationally and internationally known for his unique way of combining a diverse array of Caribbean music styles, including salsa, cumbia, porro, soca, kompa, and zouk (Harris 2012).

Comments. Based on the limited material available it appears that *G. joearroyoi* and *G. fumipennis* are allopatric species: *G. joearroyoi* inhabiting lowland dry forests in the Colombian Caribbean, *G. fumipennis* occupying lowland dry forests as well as montane to premontane rain forests along the western slope of the Andes in southern Ecuador (Camargo and Moure 1996).

***Geotrigona fulvohirta* (Fries)**

http://species-id.net/wiki/Geotrigona_fulvohirta

Trigona fulvohirta Fries, 1900: 385 [♀]

New record. COLOMBIA: 4♀♀, Meta, Villavicencio [4°08'N, 73°40'W; 467 m], B. Colina; M. Salazar, E. Palacios. 20-04-04 [April 20, 2004] (ICN).

Comments. This species was previously known in Colombia from the departments of Amazonas, Boyacá, and Putumayo (Camargo and Pedro 2007; Gonzalez and Sepúlveda 2007).

***Geotrigona kaba* Gonzalez & Sepúlveda**

http://species-id.net/wiki/Geotrigona_kaba

Geotrigona kaba Gonzalez & Sepúlveda, 2007: 104 [♀]

New record. COLOMBIA: 1♀, Dept. Boyacá, Muzo [5°31'48"N, 74°6'36"W], 900 m, 1936, J. Bequaert collector (AMNH).

Comments. This species was previously known only from the type locality (Porce, Antioquia) in northwestern Colombia. The worker at the AMNH was collected on the western slope of the Eastern Andes in central Colombia and bears a red label indicating a holotype designation by H.F. Schwarz, who intended to name it after the department.

***Geotrigona mombuca* (Smith)**

http://species-id.net/wiki/Geotrigona_mombuca

Trigona mombuca Smith, 1863: 509 [♀]

Geotrigona inusitata Moure and Camargo, 1992: 53 [♀]

New record. PARAGUAY: 1♀, Alto Paraguay: Parque Nacional Defensores del Chaco, Cruce 4 de Mayo, Mojón 16, 18.i.2001, B. Garcete, coll. (SEMC).

Comments. This species was previously known in Paraguay from the state of Misiones (Camargo and Pedro 2008).

***Geotrigona subgrisea* (Cockerell)**

http://species-id.net/wiki/Geotrigona_subgrisea

Trigona subgrisea Cockerell, 1920: 465 [♀]

New record. COLOMBIA: 1♀, Huila, San Agustín, Hostal Huaka-Yo, 1°53.311'N, 76°17.812'W, 1748 m; Dec 29, 2011; V.H. Gonzalez (SEMC).

Comments. This species is known from Brazil (Roraima) and Colombia (Departments of Boyacá, Cundinamarca, Putumayo, and Tolima). Camargo and Moure (1996) examined a single female specimen from Tolima, which had a low carina on the vertex, in comparison to the Brazilian specimens; they suspected of a differentiated population of this species in Colombia. Gonzalez and Sepúlveda (2007) expanded the distribution range in Colombia, noting that all records came from the Andean region (as in this new record) as well as minor differences in the wing color, namely the forewing dusky apically. It is likely that the Colombian specimens are actually a distinct species given these subtle differences but more importantly their allopatric distribution; however, more records as well as the study of males of both species are necessary to test this hypothesis.

Key to species of *Geotrigona* (workers)

Modified from Camargo and Moure (1996).

- | | |
|------|--|
| 1 | Metatibia with posterodistal margin broadly rounded, not projecting into a distinct angle or tooth; distal margin straight or weakly emarginate2 |
| – | Metatibia with posterodistal margin distinctly projecting into an angle or tooth (Fig. 3); distal margin, between tooth and penicillum, strongly emarginate (<i>fulvohirta</i> species group)14 |
| 2(1) | Vertex with distinct carina behind ocelli (<i>subgrisea</i> species group)3 |

- Vertex slightly elevated or rounded, without distinct carina behind ocelli (*mombuca* species group) **8**
- 3(2) Vertex and mesoscutum predominantly with dark brown setae **4**
- Vertex and mesosoma predominantly with light ferruginous setae..... **5**
- 4(3) Vertex with low (~ 0.06 mm in height), somewhat vertical carina (Panama) .
..... ***G. kraussi* (Schwarz)**
- Vertex with higher (0.08–0.10 mm), anteriorly directed carina, nearly covering posterior margin of lateral ocelli (Brazil, Guyana) ***G. subnigra* (Schwarz)**
- 5(3) Wing membranes uniformly light ferruginous; scape with setae shorter than half width of scape (eastern slope of Andean region of Bolivia, Peru, and Ecuador)...
..... ***G. tellurica* Camargo & Moure**
- Wing membranes hyaline; scape with setae of variable length among species... **6**
- 6(5) Scape with setae shorter than half width of scape; legs with light ferruginous setae as on remaining areas of body (Brazil, Colombia)
..... ***G. subgrisea* (Cockerell)**
- Scape with longer setae, at least half width of scape, distinctly branched apically; legs with pubescence of variable color among species **7**
- 7(6) Legs with light ferruginous setae as on remaining areas of body (Brazil: Paraná, Rondônia) ***G. kwyrakai* Camargo & Moure**
- Legs with brownish-grey setae contrasting with light reddish brown setae on remaining areas of the body (Brazil: Amazonas; Colombia: Amazonas).....
..... ***G. subfulva* Camargo & Moure**
- 8(2) Metatibia yellowish contrasting with black integument on remaining areas of body; body with dark brown to black setae except on sterna and apical terga with whitish setae ***G. xanthopoda* Camargo & Moure**
- Metatibia dark brown to black as on remaining areas of body; setae of variable color among species **9**
- 9(8) Body pubescence light ferruginous..... **10**
- Body pubescence either predominantly whitish or black or a mixture of both..... **11**
- 10(9) Interocellar distance slightly longer than ocellocular distance; wing membranes light ferruginous basally, dusky apically.....
..... ***G. fulvatra* Camargo & Moure**
- Interocellar distance distinctly longer than ocellocular distance (such a difference equal to half median ocellar diameter); wing membranes subhyaline, not bicolorous as above ***G. mattogrossensis* (Ducke)**
- 11(9) Mesepisternum predominantly with whitish setae..... **12**
- Mesepisternum predominantly with dark brown to black setae..... **13**
- 12(11) Wing membranes hyaline (Paraguay; northeastern, central west, and south-eastern Brazil) ***G. mombuca* (Smith)**
- Wing membrane slightly ferruginous (Brazil: Pará, Maranhão, Ceará)
..... ***G. aequinoctialis* (Ducke)**

- 13(11) Small bees (head width: ≤ 2.4 mm); vertex with short (less than one-fourth length of scape) and thick setae; scape with setae at most one-third width of scape; metasomal sterna, especially basal segments, with brownish-grey setae; wing membranes slightly brownish ***G. argentina* Camargo & Moure**
- Larger bees (head width: 2.6–2.7 mm); vertex with longer (about two-fifths length of scape) and thinner setae; scape with abundant and longer setae, about two-fifths width of scape; metasomal sterna grayish setae; wing membranes variable, hyaline or subhyaline to slightly brownish..... ***G. subterranea* (Friese)**
- 14(1) Scape with long setae, at least 0.75 times width of scape **15**
- Scape with short setae, at most half width of scape (Fig 5) **19**
- 15(14) Head (including scape) and mesosoma with predominantly light ferruginous setae..... **16**
- Head and mesosoma with predominantly dark brown setae..... **17**
- 16(15) Scape with long setae, nearly twice as long as width of scape; metasoma with predominantly light ferruginous setae; wings membrane subhyaline, slightly yellowish (Panama) ***G. chiriquiensis* (Schwarz)**
- Scape with shorter setae, about 1.4 times width of scape; metasoma with predominantly whitish or grayish setae; wings membrane hyaline, darker apically (Colombia) ***G. kaba* Gonzalez & Sepúlveda**
- 17(15) Scape with short setae, about 0.75 times width of scape..... ***G. terricola* Camargo & Moure**
- Scape with longer setae, 1.4–1.5 times width of scape..... **18**
- 18(17) Wing membranes hyaline, veins and microtrichia honey colored (Ecuador, Pacific coast) ***G. leucogastra* (Cockerell)**
- Wing membranes light ferruginous, slightly darkened, veins and microtrichia dark brown (Guatemala to Costa Rica) ***G. lutzi* Camargo & Moure**
- 19(14) Body pubescence predominantly light ferruginous; forewing light ferruginous basally, darker distally, particularly marginal cell..... ***G. fulvohirta* (Friese)**
- Body pubescence predominantly brownish-grey or black; forewing entirely light ferruginous, not bicolorous as above **20**
- 20(19) Scape and mesepisternum with whitish setae; metabasitarsus with posterior margin straight or nearly so (Mexico)..... ***G. acapulconis* (Strand)**
- Scape and mesepisternum with dark brown to black setae; metabasitarsus with posterior margin slightly convex (Ecuador, Colombia)..... **21**
- 21(20) Metasomal terga with grayish setae, third to sixth terga distally with distinct, appressed, branched setae (western Ecuador) ***G. fumipennis* Camargo & Moure**
- Metasomal terga with black to dark brown setae except grayish on tergum sixth, second to fifth terga distally without appressed, branched setae, present only on sixth tergum (Colombian Caribbean) ***G. joearroyoi* sp. n.**

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A new wild, pollinating bee species of the genus *Tetraloniella* from the Arabian Peninsula (Hymenoptera, Apidae)

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Abstract

A new species of the eucerine bee genus *Tetraloniella* Ashmead (Apinae: Eucerini) is described and figured from central Saudi Arabia and Qatar. *Tetraloniella* (*Tetraloniella*) *persiciformis* sp. n. is distinguished on the basis of coloration, integumental sculpturing, male metafemoral structure, and male terminalia. A floral record of *Pulicaria undulata* (L.) C.A. Mey. (Compositae) is noted for some of the material. Females superficially resemble those of *Tarsalia persica* (Warncke) (Ancyloini) in overall coloration but can be distinguished by the typical generic and tribal characters.

Keywords

Apoidea, Anthophila, Apinae, Eucerini, *Tetraloniella*, taxonomy, bees, Saudi Arabia, Qatar

Introduction

The bees of the widespread tribe Eucerini are notorious for their large numbers of similar species, with the distinctions even between genera being subtle and challenging to the melittologist. This is certainly true for the genus *Tetraloniella* Ashmead, in which distinctions with some *Synhalonia* Patton represent a significant obstacle to the taxonomist, not to mention ecologists, pollination biologists, and conservationists. Furthermore, even the validity of taxa such as *Melissina* Cockerell and *Xenoglossodes* Ashmead, today lumped as synonyms of *Tetraloniella* s. str. in a retrograde classification (LaBerge 2001; Michener 2007), highlights the challenges. It is, therefore, refreshing when remarkably distinctive members of this group are discovered and enhance our knowledge of variation within the larger lineage and expand our understanding of plant associations and biogeography. Along this line, we herein provide the description of a new species of *Tetraloniella* s. str. recently recognized from central and eastern areas of the Arabian Peninsula (Riyadh, Saudi Arabia and Qatar), and representing the first formal records of the subgenus from Saudi Arabia and Qatar.

Material and methods

Material examined herein is deposited in the Plant Protection Department Museum of Insects, College of Food and Agriculture Sciences, King Saud University, Riyadh, Kingdom of Saudi Arabia (PPDM) and Division of Entomology (Snow Entomological Collections), University of Kansas Natural History Museum, Lawrence, Kansas, USA (SEMC). Morphological terminology follows that of Engel (2001) and Michener (2007). Photomicrographs were prepared with a Canon 7D digital camera attached to an Infinity K-2 long-distance microscope lens. Measurements were made with an ocular micrometer attached to an Olympus SZX-12 stereomicroscope.

Systematics

Genus *Tetraloniella* Ashmead

Subgenus *Tetraloniella* Ashmead

Tetraloniella (*Tetraloniella*) *persiciformis*, sp. n.

urn:lsid:zoobank.org:act:B18D9320-0FA2-4730-A57C-C6C9D04E73D9

http://species-id.net/wiki/Tetraloniella_persiciformis

Figs 1–12

Holotype. ♂, 30.V.81 [30 May 1981], Riyadh, Saudi Arabia (SEMC).

Paratypes. Three total paratypes: 1♀, same data as holotype (SEMC); 1♀, Saudi Arabia, Riyadh, Al Amariah, [Mazra'ah] Majra Al-Gasim [farm], 6.vi.2011 [6 June

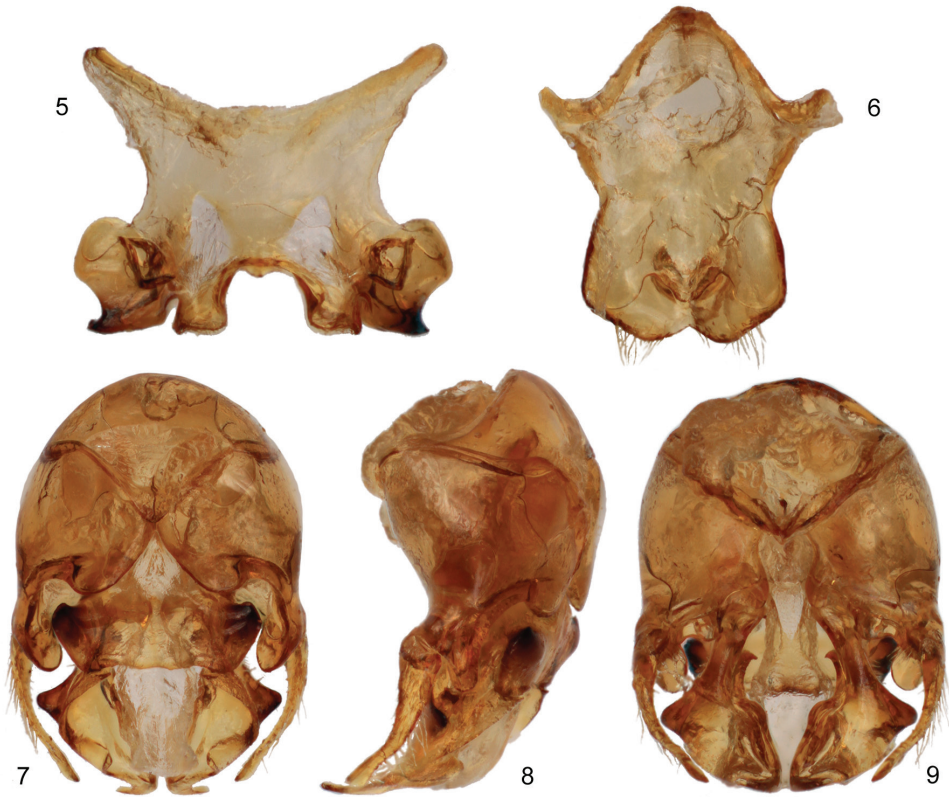


Figures 1–4. Male of *Tetraloniella persiciformis* sp. n. **1** Lateral habitus **2** Dorsal habitus **3** Facial view **4** Metafemur, with medioventral tubercle (arrow).

2011], M.A. Hannan // at flowers of *Pulicaria undulata* (PPDM); 1♂, Qatar, Al Sin-nah, 14.ix.1979 [14 September 1979], C.G. Roche (SEMC).

Diagnosis. The new species is structurally quite similar to the widespread *Tetraloniella* (*Tetraloniella*) *julliani* (Pérez) but differs by the lighter coloration (*T. julliani* is largely black to dark brown throughout) and in the structure of the terminalia. The combination of the integumental and pubescence coloration (Figs 1–3, 10–12), presence of the metafemoral medioventral tubercle (Fig. 4), and male terminalia (Figs 5–9) also serve to distinguish the species from its congeners.

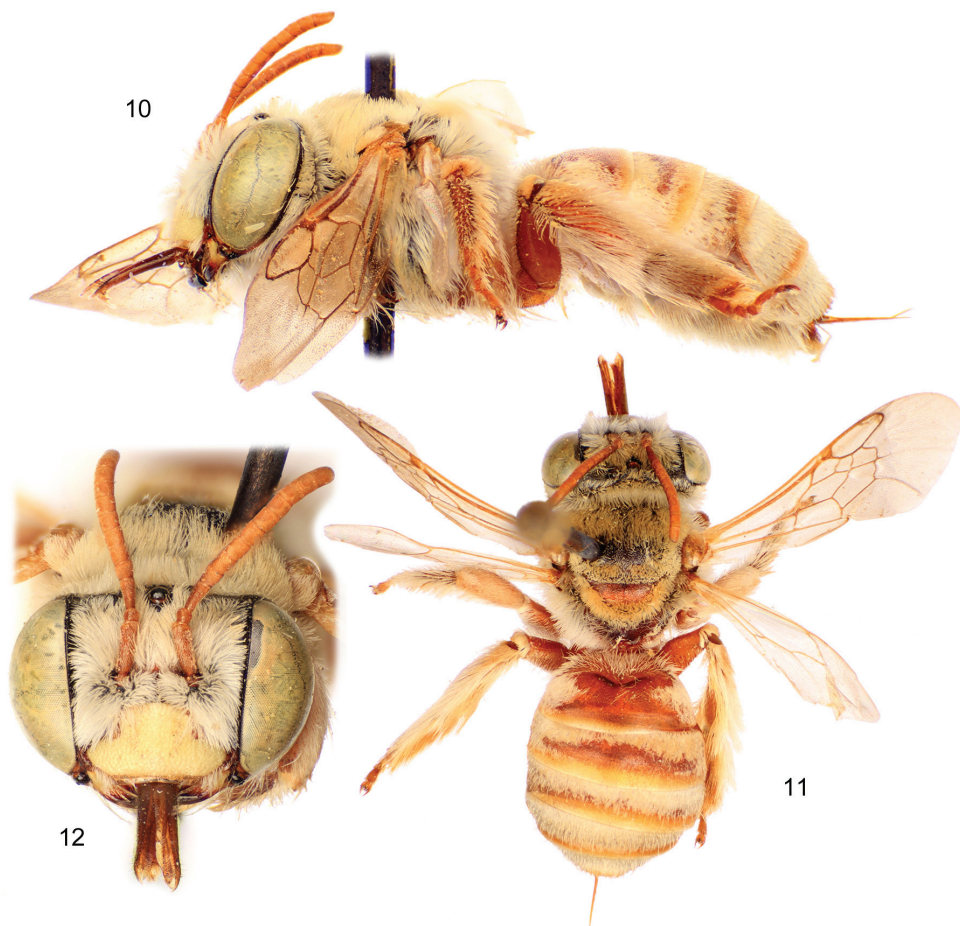
Description. ♂: Total body length 7.74 mm; forewing length 5.50 mm. Head wider than long, length 1.90 mm, width 2.73 mm; clypeus weakly protuberant, weakly and gently convex in profile; five maxillary palpomeres, ratio among them 1.0:0.87:0.40:0.27:0.27; antenna elongate, extending posteriorly to at least apex of disc of fourth metasomal tergum; first flagellomere 0.13 mm long, only slightly longer than pedicel, second flagellomere 6.6 times length of first flagellomere; length of second flagellomere 0.86 mm; length of third flagellomere 0.70 mm; apical five flagellomeres weakly crenulate; compound eyes converging below, slightly diverging above. Intertegular distance 1.83 mm. Metafemur with medial tubercle bearing small set of erect setae on ventral surface. Forewing with basal vein distad cu-a by about twice vein width; first submarginal cell shorter than combined lengths of second and third



Figures 5–9. Male terminalia of *Tetraloniella persiciformis* sp. n. **5** Metasomal sternum VII **6** Sternum VIII **7** Genital capsule, dorsal view **8** Genital capsule, lateral view **9** Genital capsule, ventral view.

submarginal cells; first submarginal cell only slightly longer than third submarginal cell; anterior border of second submarginal cell slightly longer than anterior border of third submarginal cell; 1m-cu basad 1rs-m by about twice vein width; 2m-cu basad 2rs-m by about vein width; hind wing with 10–11 distal hamuli. Metasomal sternum VI medial extension with somewhat truncate apical margin, with narrow median longitudinal furrow on disc broadening slightly at its extreme apex, with paired strong carinae loosely paralleling lateral margins of median expansion, separated from actual sternal margin by less than one-quarter median ocellar diameter, carinae curving inward slightly and terminating at broadened opening of median furrow; terminalia as in figures 5–9 [note that sternum VII is similar to that of *T. alticincta* (Lepeletier de Saint Fargeau), while the gonostylus is simple and decurved].

Integument of head largely shiny. Labrum and clypeus smooth with shallow coarse and contiguous punctures; face, vertex, and gena with small, contiguous irregular punctures, giving surface a roughened appearance except extreme borders with compound eyes smooth; postgena coarsely imbricate. Pronotum finely imbricate with sparse minute punctures; mesoscutum, mesoscutellum, and metanotum with shallow,



Figures 10–12. Female of *Tetraloniella persiciformis* sp. n. **10** Lateral habitus **11** Dorsal habitus **12** Facial view.

contiguous, coarse punctures; pleura as on mesoscutum although punctures stronger; basal area of propodeum longitudinally rugulose giving way to coarse, irregular contiguous punctures; metasomal terga finely imbricate with small, well-defined punctures separated by less than a puncture width, in many areas contiguous or nearly so, extreme apical margins of terga impunctate and finely imbricate; sterna as on terga although punctures more coarse and shallow, and more widely spaced, particularly on more basal sterna.

Mandible yellow except dark brown at apex; labiomaxillary complex dark brown; labrum yellow; clypeus yellow; remainder of head black except scape and pedicel brown, flagellum yellowish brown; mesosoma black except tegula semitranslucent and light brown; legs dark brown except tarsi lighter brown, spurs pale yellow; wing membranes hyaline, veins light brown except those along costal margin darker; metasomal terga tending toward dark reddish brown in basal half, blending by midlength to

brown and then to light, semitranslucent brown by apical margin, except tergum VII brown throughout; sterna reddish brown.

Integument largely obscured by pubescence except apically on metasomal terga and on sterna. Pubescence white to pale ochraceous, setae long, dense (typically obscuring much of integument), and plumose; metafemoral tubercle with patch of erect ochraceous setae, which extend in a line basad and become progressively shorter and less dense (Fig. 4); metasomal terga II–VI with erect to suberect setae, sparse setae, otherwise largely covered in shorter, appressed, plumose tomentum except along apical margins of terga III–VI and in apical half of tergum II where tomentum is replaced by short, appressed, simple setae; tergum I with appressed tomentum as on succeeding terga restricted to sub-apicolateral patches.

Female: As described for the male except in typical gender differences for eucerines and with the following modifications: Total body length 8.33 mm; forewing length 5.73 mm. Head wider than long, length 1.93 mm, width 3.13 mm; upper interorbital distance 1.88 mm, lower interorbital distance 1.61 mm. Intertegular distance 2.03 mm. Metafemur without ventral median tubercle; basimetatibial plate quite short, broadly rounded, largely obscured by setae from apex of femur. Sculpturing as in male except not as obscured by dense pubescence centrally on mesoscutum and anteriorly on mesoscutellum. Mandible yellow except apical half dark reddish brown with black apex; scape, pedicel, and flagellum yellowish brown; mesosoma dark reddish brown, ranging to black on mesoscutum, metanotum, and areas of pleura (areas of reddish brown greater one paratype than the other); legs reddish brown; metasoma reddish brown except apical margins of terga light brown and semi-translucent. Pubescence generally as in female except more ochraceous on vertex and dorsum of mesosoma than in male; scopal setae white on anterior surfaces, yellowish-orange on posterior surfaces and densely plumose.

Etymology. The specific epithet is a reference to the superficial resemblance of the female to *Tarsalia persica* (Warncke) (Ancyilaini).

Comments. The Saudi female collected at Amariah in 2011 was captured between 8am–12pm and while sweeping on *Pulicaria undulata* (L.) C.A. Mey. (Compositae), known locally as [Jethjath]. The collection site was at the base of an elevated area near to Wadi Amariah and the highway to Riyadh.

Discussion

It is interesting to note that the overall color pattern of this species is superficially similar to that of the wholly unrelated *T. persica* (Warncke), known from Iran (Warncke 1979). Indeed, during an initial, quick sort of bee material collected from Amariah one of us (MSE) quickly placed the unassociated female as a possible *T. persica* until the specimen was examined under a microscope and the true identity was revealed. Males are easily recognized as *Tetraloniella* while the females differ from the Ancyilaini [refer to Engel et al. (2008) and ICZN (2010) for spelling] by the usual tribal differences

[e.g., cu-a in hind wing moderately oblique at about one-half length of the second abscissa of M+Cu (second abscissa of M+Cu much shorter in Ancyilaini); jugal lobe of hind wing about one-half vannal lobe (less than one-half vannal lobe in Ancyilaini); long paraglossae (short in Ancyilaini)].

With around 110 described species, *Tetraloniella* s.str. is one of the most diverse lineages in the Eucerini, second only to *Eucera* Scopoli. Merely 35 species are known from the New World and these have been recently revised, as have the approximately 32 sub-Saharan taxa (Eardley 1989) along with the four living in Madagascar (Pauly et al. 2001). The large and diverse Palaearctic fauna remains the greatest challenge and one of the more intractable problems given the ease in confusing species with *Synhalonia*.

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