

Phylogeny and taxonomic revision of the genus *Eristalopsis* Evenhuis (Diptera: Bombyliidae: Bombyliinae)

XUANKUN LI^{*,1,2} & DAVID K. YEATES¹

¹ Australian National Insect Collection, CSIRO National Research Collections Australia, Canberra, ACT 2601, Australia; Xuankun Li * [xuankun.li@csiro.au]; David K. Yeates [david.yeates@csiro.au] — ² Research School of Biology, Australian National University, Canberra, ACT 2601, Australia — * Corresponding author

Accepted 30.iv.2018.

Published online at www.senckenberg.de/arthropod-systematics on 27.xi.2018.

Editors in charge: Bradley Sinclair & Klaus-Dieter Klass

Abstract. The endemic Australian bee fly genus *Eristalopsis* Evenhuis, 1985 (Bombyliidae: Bombyliinae) is reviewed including 11 new species: *E. aurata* sp.n., *E. concava* sp.n., *E. danielsorum* sp.n., *E. flava* sp.n., *E. maculata* sp.n., *E. minor* sp.n., *E. parva* sp.n., *E. rubra* sp.n., *E. smarti* sp.n., *E. uniformis* sp.n., *E. wrightae* sp.n. In addition, we generate a morphological phylogeny including all recognised species. This genus can easily be distinguished from other Australian genera in the subfamily Bombyliinae by having a 2-segmented antennal flagellum, cell *br* longer than cell *bm*, crossvein *m-m* in apical half of cell *dm*, crossvein *r-m* much longer than crossvein *m-m*, abdominal tergites with black and yellow pattern, and female genitalia without sand chamber. A key to species of *Eristalopsis* is provided.

Key words. *Eristalopsis*, taxonomy, cladistic analysis, new species, bee fly, Diptera, Australia.

1. Introduction

The first *Eristalopsis* species was described in the late 19th century as *Bombylius rubriventris* (BIGOT 1892). ROBERTS (1928) tried to redescribe the species, but he only had a few specimens from several species and may not have seen *B. rubriventris*. Later, two other species, *E. robertsi* (PARAMONOV 1934) and *E. byrrha* (BOWDEN 1971), were described under *Bombylius*.

The genus was established by EVENHUIS (1983) and named *Syrphoides*, because the common *Eristalopsis* species often have yellow and black abdominal markings resembling Syrphidae. However, as the name was preoccupied, it was subsequently changed to *Eristalopsis*, after the syrphid genus *Eristalis* (EVENHUIS 1985).

A monotypic genus *Apiformyia* was established based on a single species *A. australis* (YEATES 2008). However, in a recent morphological phylogeny of the Australian Bombyliinae genera (LI & YEATES 2018), *Apiformyia* is nested within *Eristalopsis*, and was therefore treated as a synonym. The morphological characters of *Eristalopsis* possess significant variation: male eyes holoptic to dichoptic, base of wing vein *Cu* bare or with long scales, second segment of antennal flagellum elongate to short,

wing membrane varying from hyaline to spotted, thickened part of distal spermathecal duct of female genitalia with various forms. However, this genus can still be readily distinguished from other Australian Bombyliinae by characters associated with the female genitalia: female tergite 8 without thick long hairs, acanthophorite spines absent, female sternite 8 only with short hairs.

In the present study the genus *Eristalopsis* is revised with 11 new species described, and a morphological phylogeny of all 15 recognised species is constructed. A key to species of *Eristalopsis* is provided.

2. Material and methods

2.1. Terminology and taxonomic methods

Morphological terminology mostly follows CUMMING & WOOD (2009), the dorsal bridge, basal spermathecal duct and distal spermathecal duct follows YEATES (1994), the

outer apex of gonocoxite and the inner apex of gonocoxite follows LI & YEATES (2018). The specimens were studied and illustrated with a Leica M80 microscope. Genital preparations were made by heating the apical portion of the abdomen in KOH at 100°C for 15–25 min, and then washing in distilled water. After examination in glycerine, the dissections were transferred to a 70% glycerine and 30% ethanol mixture and stored in microvials pinned below the specimen. Photographs were taken using a Leica M205A microscope and stacked using Helicon Focus 5.3 (KOZUB et al. 2000).

Specimens examined were borrowed from the following collections: **AMS** = Australian Museum, Sydney, NSW, Australia; **ANIC** = Australian National Insect Collection, CSIRO National Research Collections Australia, Canberra, ACT, Australia; **QM** = Queensland Museum, Brisbane, QLD, Australia; **MSC** = M.J. Smart Collection, Wolvertholme, UK; **WADA** = Western Australian Department of Agriculture, Perth, WA, Australia.

2.2. Phylogenetic analysis

The 15 *Eristalopsis* species were included in a phylogenetic analysis with *Choristus annexus* (Roberts), *Mandella albohirta* (Roberts) and *Staurostichus limbipennis* (Macquart) chosen as outgroups. Based on our survey, 36 morphological characters obtained from adults (10 head, 9 thorax, 1 abdomen, 10 male genitalia, 6 female genitalia) were numerically coded (see section 3.1.). Most characters are binary except five are multistate. Missing data were coded as “?”. All characters were treated as unordered and with initially equal weight.

The phylogenetic analysis was performed in TNT ver. 1.1 (GOLOBOFF et al. 2008) under both equal weighting and implied weight schemes. We obtained *k* values through a TNT script (setk.run) written by Salvador Arias to calculate an appropriate value for *k* (GOLOBOFF et al. 2008). Parsimony analysis for both search strategies were set holding 10 000 trees in memory. The phylogenetic analysis was conducted with implicit enumeration. The branch support values were calculated with the function implemented in TNT (tree bisection and reconnection, from existing trees, retain trees suboptimal by 10 steps). Character states were mapped on most parsimonious trees using WinClada ver. 1.0 (NIXON 2002), showing only unambiguous changes.

2.3. Other abbreviations

BMNH = The Natural History Museum, London, UK; **DEI** = Deutsches Entomologisches Institut, Eberswalde, Germany; **NHMD** = Natural History Museum of Denmark, Copenhagen, Denmark; **WAM** = Western Australia Museum.

ACT = Australian Capital Territory; **NSW** = New South Wales; **QLD** = Queensland; **NT** = Northern Territory; **WA** = Western Australia; **SA** = South Australia.

av c epand = anteroventral corner of epandrium; **b spmth dt** = basal spermathecal duct; **cerc** = cercus; **d brg** = dorsal bridge;

d spmth dt = distal spermathecal duct; **ej apod** = ejaculatory apodeme; **epand** = epandrium; **gen fk** = genital fork; **goncx** = gonocoxite; **goncx apod** = gonocoxal apodeme; **gonst** = gonostylus; **i ap goncx** = inner apex of gonocoxite; **lat ej proc** = lateral ejaculatory process; **o ap goncx** = outer apex of gonocoxite; **ph** = phallus; **spmth** = spermatheca; **spm pmp** = sperm pump; **tg 9+10** = tergites 9+10.

3. Results and discussion

3.1. List of characters and character states

Head

- 0** Scape length/width (YEATES 1994, character #1): **(0)** $< 5.0 \times$, $> 2.0 \times$; **(1)** $\geq 5.0 \times$; **(2)** $\leq 2.0 \times$. — State (1) is considered an autapomorphy of *Choristus annexus*, and state (2) is considered a synapomorphy for the clade including *Eristalopsis australis* (Yeates), *E. concava* sp.n. and *E. uniformis* sp.n.
- 1** Pedicel length/width (YEATES 1994: 3): **(0)** $< 2.0 \times$; **(1)** $\geq 2.0 \times$. — State (1) supports a clade of *E. flava* sp.n., *E. robertsi* (Paramonov) and *E. wrightae* sp.n.
- 2** Number of the flagellomeres comprising the antennal flagellum (YEATES 1994: 5): **(0)** 1; **(1)** 2 (e.g. Fig. 3B). — State (0) is considered a plesiomorphy in this analysis and only present in *C. annexus*.
- 3** Length of apical antennal flagellum/basal antennal flagellum (LI & YEATES 2018: 3): **(0)** $\leq 0.05 \times$ (e.g. Fig. 5B); **(1)** $> 0.05 \times$ (e.g. Fig. 3B). — State (0) is homoplasious, present in outgroup taxa and *E. byrrha*, *E. minor* sp.n. and *E. smarti* sp.n.
- 4** Vestiture on the antennal flagellum (LI & YEATES 2018: 7): **(0)** only clothed in microtrichia; **(1)** with scales on basal half; **(2)** with short hairs on dorsal surface (e.g. Fig. 14B). — State (1) is considered an autapomorphy of *Mandella albohirta*, and state (2) is an autapomorphy of *E. rubra* sp.n.
- 5** Length of hairs and scales on face compared to length of scape: **(0)** longer (e.g. Fig. 5E); **(1)** shorter (Figs. 2E, 3E, 6E, 17E). — State (1) supports a clade of *E. aurata* sp.n., *E. australis*, *E. concava* sp.n. and *E. uniformis* sp.n.
- 6** Male compound eye separation (YEATES 1994: 11; LI & YEATES 2016: 1): **(0)** holoptic or narrowly separated (e.g. Fig. 3D); **(1)** dichoptic (Figs. 7D, 9D). — State (1) supports the monophyly of *E. danielsoni* sp.n. + *E. maculata* sp.n.
- 7** Posterior margin of eye: **(0)** not strongly concave (e.g. Fig. 3E); **(1)** strongly concave (Fig. 6E). — State (1) is an autapomorphy of *E. concava* sp.n.
- 8** Length of palpus: **(0)** short, not exceeding peristoma, $< 0.3 \times$ length of proboscis (e.g. Fig. 3E); **(1)** long, exceeding peristoma, $\geq 0.3 \times$ length of proboscis (Figs. 4B, 5E, 16E). — State (1) is considered a synapomorphy of *E. byrrha* and *E. smarti* sp.n.
- 9** Female eye separation/ocellar tubercle width (LI & YEATES 2018: 12): **(0)** frons normal, $\leq 3.5 \times$ (e.g. Fig.

3H); (1) frons wide, $> 3.5 \times$. — State (1) is considered an autapomorphy for *C. annexus*.

Thorax

- 10 Pale scales or hairs on lateral margin of scutum (LI & YEATES 2018: 13): (0) absent (e.g. Fig. 3A); (1) present. — State (1) is considered an autapomorphy of *Staurostichus limbipennis*.
- 11 Colour of scutum: (0) blackish or brownish (e.g. Fig. 3A); (1) yellow (Fig. 8A). — State (1) is an autapomorphy of *E. flava* sp.n.
- 12 Large reddish marking on posterior half of scutum: (0) absent (e.g. Fig. 5A); (1) present (Figs. 3AG, 6AG). — State (1) is considered a synapomorphy of *E. australis* and *E. concava* sp.n.
- 13 Colour of scutellum (LI & YEATES 2016: 5): (0) black (e.g. Fig. 5A); (1) anterior black, posterior yellow; (2) orange or reddish (e.g. Fig. 3A). — State (1) is found an autapomorphy of *S. limbipennis*, and state (2) is the synapomorphy of a clade of *E. aurata* sp.n., *E. australis*, *E. concava* sp.n., *E. danielsorum* sp.n., *E. flava* sp.n., *E. maculata* sp.n., *E. robertsi*, *E. rubra* sp.n., *E. uniformis* sp.n. and *E. wrightae* sp.n.
- 14 Hairs on base of wing vein *Cu* (LI & YEATES 2018: 21): (0) absent (e.g. Fig. 3C); (1) present (Figs. 7C, 9C). — State (1) was mainly found in four genera: *Choristus*, *Mandella*, *Staurostichus* and *Zentamyia* Li & Yeates (LI & YEATES 2018) and is considered a synapomorphy of *E. danielsorum* sp.n. and *E. maculata* sp.n. in the present analysis.
- 15 Length of cell *br* compared to cell *bm* (LI & YEATES 2018: 22): (0) longer (e.g. Fig. 3C); (1) almost as long as. — State (1) is considered an autapomorphy of *M. albohirta*.
- 16 Length of crossvein *m-m* compared to cross vein *r-m* (LI & YEATES 2018: 24): (0) $> 0.6 \times$; (1) $\leq 0.3 \times$ (e.g. Fig. 3C); (2) $> 0.3 \times$, $\leq 0.6 \times$ (Figs. 5C, 9C, 10C, 15E, 16C). — State (0) is homoplasious, present in *Choristus* and *Mandella*. State (2) is homoplasious, present in *E. byrrha*, *E. maculata* sp.n., *E. minor* sp.n. and *E. smarti* sp.n.
- 17 Wing pattern: (0) hyaline or infuscated, infuscated area without clear margin (e.g. Fig. 3C); (1) spotted, dark area with clear margin (Figs. 7C, 9C, 10C, 16C). — State (1) is homoplasious, present in *E. danielsorum* sp.n., *E. maculata* sp.n., *E. minor* sp.n. and *E. smarti* sp.n.
- 18 Dorsal bristles on apex of hind femur: (0) absent; (1) present. — State (1) is considered a synapomorphy of *Eristalopsis* in this analysis.

Abdomen

- 19 Abdominal tergite colour (LI & YEATES 2018: 36): (0) entirely blackish; (1) black medially and yellow laterally (e.g. Fig. 3A). — State (1) is a synapomorphy for *Eristalopsis*.

Male genitalia

- 20 Shape of epandrium in dorsal view (LI & YEATES

2018: 38): (0): rectangular; (1) trapezoidal (e.g. Fig. 3L). — State (0) is considered a plesiomorphy in this analysis and only present in *C. annexus*.

- 21 Anterior margin of epandrium in lateral view: (0) with an anteriorly directed process (e.g. Fig. 5M); (1) without an anteriorly directed process (Figs. 3M, 6M, 10M). — State (1) is homoplasious, present in *E. australis*, *E. concava* sp.n. and *E. minor* sp.n.
- 22 Posterolateral margin of epandrium in lateral view: (0) rounded (Figs. 3M, 6M); (1) produced (e.g. Fig. 5M). — State (0) is homoplasious, present in *C. annexus*, *E. australis* and *E. concava* sp.n.
- 23 Anteroventral corner of epandrium/width of epandrium: (0) $< 0.4 \times$ (e.g. Fig. 5M); (1) $\geq 0.4 \times$ (e.g. Fig. 6M). — State (1) is homoplasious, present in *S. limbipennis*, *E. australis*, *E. concava* sp.n., *E. maculata* sp.n., *E. minor* sp.n. and *E. uniformis* sp.n.
- 24 Shape of gonocoxite (LI & YEATES 2018: 43): (0) apex slightly narrower than base; (1) apex gradually narrowed, triangular (e.g. Fig. 3J). — State (0) is considered a plesiomorphy in this analysis and only present in *C. annexus*.
- 25 Gonocoxal fusion seam/length of gonocoxite (LI & YEATES 2018: 45): (0) $< 0.4 \times$; (1) $\geq 0.4 \times$. — State (1) is considered a synapomorphy of *Eristalopsis*.
- 26 Width of gonocoxal apodeme: (0) slender (e.g. Fig. 5J); (1) wide (Figs. 3J, 7J, 9J, 13J). — State (1) is homoplasious, present in *E. australis*, *E. danielsorum* sp.n., *E. maculata* sp.n., and *E. robertsi*.
- 27 Apex of gonocoxal apodeme: (0) unbranched (e.g. Fig. 3J); (1) branched (Figs. 13J, 14J, 18J). — State (1) is a synapomorphy for the clade including *E. robertsi*, *E. rubra* sp.n. and *E. wrightae* sp.n. and *E. flava* sp.n., as the male of *E. flava* sp.n. is unknown and therefore could not be scored.
- 28 Size of ejaculatory apodeme (YEATES 1994: 120): (0) small (Figs. 3J, 6J); (1) large (e.g. Fig. 2J). — State (0) is homoplasious, present in *C. annexus*, *E. australis* and *E. concava* sp.n.
- 29 Length of inner apex of gonocoxite (LI & YEATES 2018: 51): (0) short (e.g. Fig. 3J); (1) long; (2) elongate. — State (2) is considered an autapomorphy of *C. annexus*. State (1) is an autapomorphy of *M. albohirta*.

Female genitalia

- 30 Sand chamber: (0) present; (1) absent (e.g. Fig. 3O). — The absence of the sand chamber was considered a synapomorphy of *Eristalopsis* (LI & YEATES 2018).
- 31 Length of sperm pump (YEATES 1994: 145; LAMBKIN et al. 2003: 184): (0) $< 3.0 \times$ length of genital fork (e.g. Fig. 3O); (1) $\geq 3.0 \times$ length of genital fork. — State (1) is considered an autapomorphy of *S. limbipennis*.
- 32 Distal spermathecal duct length (LI & YEATES 2018: 69): (0) $< 10.0 \times$ length of genital fork (e.g. Fig. 3O); (1) $\geq 10.0 \times$ length of genital fork. — State (1) was considered a synapomorphy of *Staurostichus* + *Mandella* (LI & YEATES 2018).

Table 1. Data matrix for taxa included in phylogenetic analysis.

Character:	0 0 0 0 0 0 0 0 0 0	1 1 1 1 1 1 1 1 1 1	2 2 2 2 2 2 2 2 2 2	3 3 3 3 3 3
Taxon:	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5
<i>Choristus annexus</i>	1 0 0 0 0 0 0 0 0 1	0 0 0 0 1 0 0 0 0 0	0 0 0 0 0 0 0 0 0 2	0 0 0 1 0 0
<i>Mandella albobirta</i>	0 0 1 0 1 0 0 0 0 0	0 0 0 0 1 1 0 0 0 0	1 0 1 0 1 0 0 0 1 1	0 0 1 1 0 0
<i>Staurostichus limbipennis</i>	0 0 1 0 0 0 0 0 0 0	1 0 0 1 1 0 1 0 0 0	1 0 1 1 1 0 0 0 1 0	0 1 1 1 0 0
<i>Eristalopsis australis</i> (Yeates, 2008)	2 0 1 1 0 1 0 0 0 0	0 0 1 2 0 0 1 0 1 1	1 1 0 1 1 1 1 0 0 0	1 0 0 0 1 0
<i>Eristalopsis concava</i> sp.n.	2 0 1 1 0 1 0 1 0 0	0 0 1 2 0 0 1 0 1 1	1 1 0 1 1 1 0 0 0 0	1 0 0 0 1 0
<i>Eristalopsis uniformis</i> sp.n.	2 0 1 1 0 1 0 0 0 0	0 0 0 2 0 0 1 0 1 1	1 0 1 1 1 1 0 0 1 0	?? ? ? ? ?
<i>Eristalopsis aurata</i> sp.n.	0 0 1 1 0 1 0 0 0 0	0 0 0 2 0 0 1 0 1 1	1 0 1 0 1 1 0 0 1 0	?? ? ? ? ?
<i>Eristalopsis byrrha</i> (Bowden, 1971)	0 0 1 0 0 0 0 0 1 0	0 0 0 0 0 0 2 0 1 1	1 0 1 0 1 1 0 0 1 0	1 0 0 1 0 0
<i>Eristalopsis parva</i> sp.n.	0 0 1 1 0 0 0 0 0 0	0 0 0 0 0 0 1 0 1 1	1 0 1 0 1 1 0 0 1 0	1 0 0 0 1 0
<i>Eristalopsis wrightae</i> sp.n.	0 1 1 1 0 0 0 0 0 0	0 0 0 0 0 0 1 0 1 1	1 0 1 0 1 1 0 1 1 0	1 0 0 0 1 1
<i>Eristalopsis danielsorum</i> sp.n.	0 0 1 1 0 0 1 0 0 0	0 0 0 2 1 0 1 1 1 1	1 0 1 0 1 1 1 0 1 0	1 0 0 0 1 0
<i>Eristalopsis maculata</i> sp.n.	0 0 1 1 0 0 1 0 0 0	0 0 0 2 1 0 2 1 1 1	1 0 1 1 1 1 1 0 1 0	1 0 0 0 1 0
<i>Eristalopsis smarti</i> sp.n.	0 0 1 0 0 0 0 0 1 0	0 0 0 0 0 0 2 1 1 1	1 0 1 0 1 1 0 0 1 0	1 0 0 1 0 0
<i>Eristalopsis minor</i> sp.n.	0 0 1 0 0 0 0 0 0 0	0 0 0 0 0 0 2 1 1 1	1 1 1 1 1 1 0 0 1 0	?? ? ? ? ?
<i>Eristalopsis robertsi</i> (Paramonov, 1934)	0 1 1 1 0 0 0 0 0 0	0 0 0 2 0 0 1 0 1 1	1 0 1 0 1 1 1 1 1 0	1 0 0 0 1 1
<i>Eristalopsis rubra</i> sp.n.	0 0 1 1 2 0 0 0 0 0	0 0 0 2 0 0 1 0 1 1	1 0 1 0 1 1 0 1 1 0	?? ? ? ? ?
<i>Eristalopsis flava</i> sp.n.	0 1 1 1 0 0 ? 0 0 0	0 1 0 2 0 0 1 0 1 1	?? ? ? ? ? ? ? ? ?	?? ? ? ? ? ?
<i>Eristalopsis rubriventris</i> (Bigot, 1892)	0 0 1 ? 0 0 ? 0 0 0	0 0 0 0 0 0 2 0 1 1	?? ? ? ? ? ? ? ? ?	?? ? ? ? ? ?

- 33** Distal spermathecal duct (LI & YEATES 2018: 70): **(0)** apical half not thicker than proximal half (e.g. Fig. 3O); **(1)** apical half thicker than proximal half (Figs. 5O, 16O). — State (0) is considered a synapomorphy of a clade including *E. aurata* sp.n., *E. australis*, *E. concava* sp.n., *E. danielsorum* sp.n., *E. flava* sp.n., *E. maculata* sp.n., *E. parva* sp.n., *E. robertsi*, *E. rubra* sp.n., *E. uniformis* sp.n. and *E. wrightae* sp.n.
- 34** Spermatheca shape: **(0)** sphere, length nearly as long as width (Figs. 5O, 16O); **(1)** elongate, length $3.0 \times$ longer than width (e.g. Fig. 3O). — State (1) is considered a synapomorphy of a clade same as above. We interpreted this variation slightly differently in LI & YEATES (2018) with the advanced state of character 34 defined as a thickening of the apical half of the distal spermathecal duct, and not an elongate spermathecal bulb.
- 35** Shape of spermatheca apex (LAMBKIN et al. 2003: 195): **(0)** rounded (e.g. Fig. 3O), **(1)** with small conical point (Figs. 13O, 18O). — State (1) is considered a synapomorphy of *E. robertsi* and *E. wrightae* sp.n.

3.2. Phylogenetic results

Phylogenetic analysis with TNT under an equal weighting scheme produced four most parsimonious trees, with a length of 59 steps, consistency index of 69, and a retention index of 77. We have mapped the Bremer support (B) values and bootstrap values (BS) above and below the nodes respectively on the strict consensus tree (Fig. 1A).

The script returned a value of $k = 1.679688$ for our dataset, which was employed for the implied weighting scheme. One MPT of length = 61, Ci = 67, Ri = 75 was obtained from implied weighting, with the same topolo-

gy as one of the MPTs under the equal weighting scheme (Fig. 1B).

Both analyses recovered the monophyly of the genus *Eristalopsis* (B = 10, BS = 100), which is well supported by a series of characters: base of wing *Cu* without hairs (14:0), crossvein *m-m* much shorter, about half length of crossvein *r-m* (16:2), apex of hind femur with dorsal bristles (18:1), abdominal tergites with black medially and yellow laterally (19:1), gonocoxal fusion line long, $\geq 0.4 \times$ length of gonocoxite (25:1), and sand chamber absent (30:1).

Some distal clades show relatively high support. The clade with three Northern Territory species *E. uniformis* sp.n. + (*E. australis* + *E. concava* sp.n.) is supported (B = 2, BS = 71) by the short scape (0:2), and long antero-ventral corner of the epandrium (e.g. Fig. 6M) (23:1). Within this clade, the sister relationship of *E. australis* + *E. concava* sp.n. is more strongly supported (B = 4, BS = 94) by the large reddish marking on the posterior half of the scutum (12:1), anterior margin of epandrium smooth in lateral view (21:1), posterior margin of epandrium in lateral view vertical or anteriorly leaned (22:0), and small ejaculatory apodeme (28:0). A Western Australian clade *E. danielsorum* sp.n. + *E. maculata* sp.n. is supported as sister groups (B = 2, BS = 80) by the male compound eye dichoptic (6:1), base of wing vein *Cu* with hairs (14:1), wing spotted (17:1), and gonocoxal apodeme wide (26:1). The weakly supported Queensland clade is recovered (B = 1, BS = -) including three species: *E. flava* sp.n., *E. robertsi* and *E. wrightae* sp.n. by the elongate pedicel (1:1). The New South Wales species, *E. rubra*, is supported (B = 1, BS = -) as sister to this clade by the branching apex of the gonocoxal apodeme (27:1).

All species with orange or reddish scutellum (13:2) are weakly supported (B = 1, BS = -) forming a clade in the distal half of the tree.

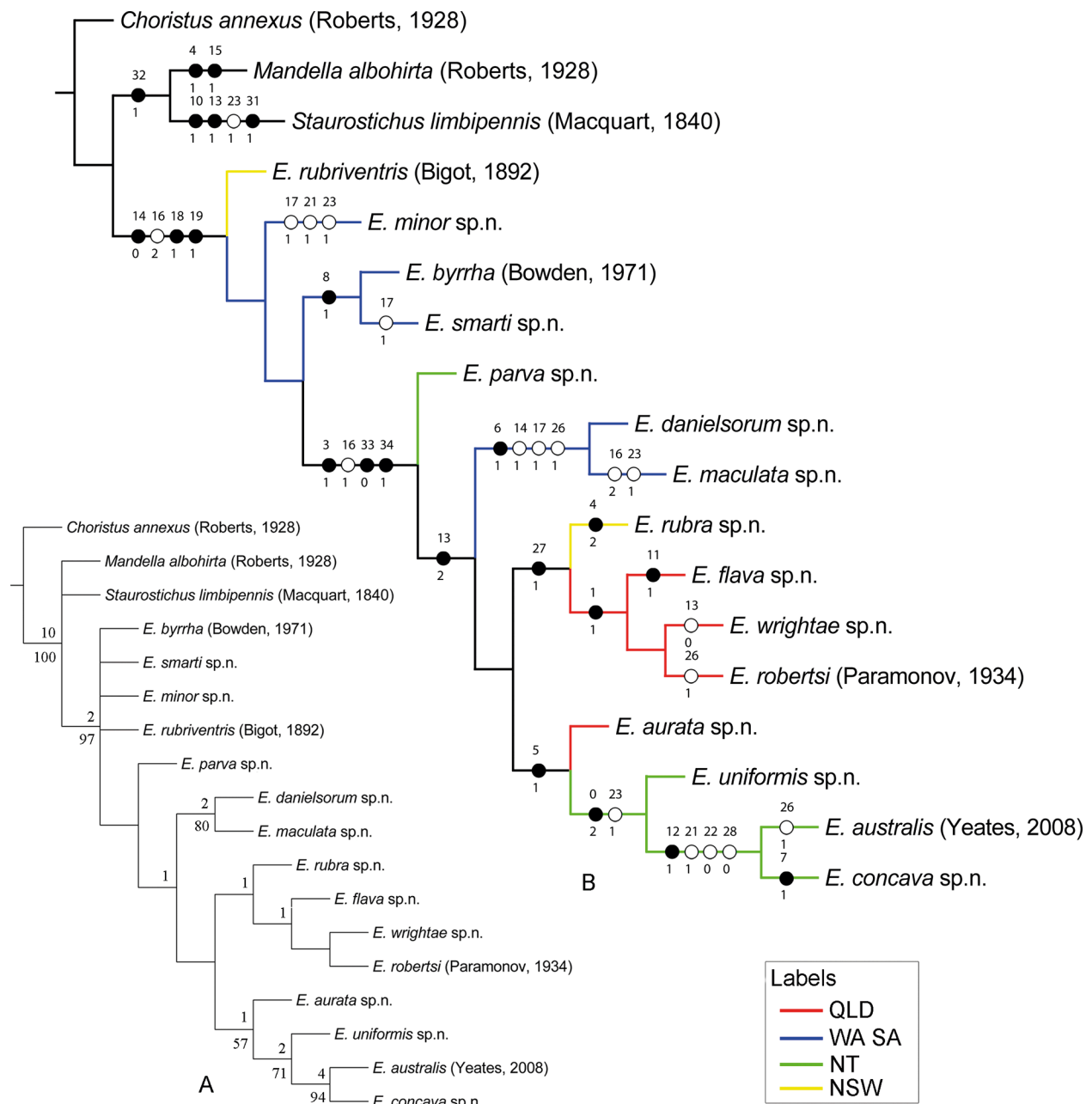


Fig. 1. Phylogenetic relationships of species of *Eristalopsis*. **A:** strict consensus tree from four most parsimonious trees (equal weighting scheme), Bremer support values mapped above branches and bootstrap values over 50% are given below the nodes; **B:** selected tree of four MPTs under equal weighting scheme, same as the single MPT under implied weighting scheme, tree generated from morphological phylogenetic analysis, unambiguous apomorphies mapped on branches, black circles indicate non-homoplasious changes.

4. Taxonomic revision

4.1. *Eristalopsis* Evenhuis

Syrphoides Evenhuis, 1983: 206. Type species: *Bombylius byrrha* Bowden, 1971, by original designation [preoccupied by Hippa, 1968].

Eristalopsis Evenhuis, 1985: 289 (new replacement name for *Syrphoides* Evenhuis, 1983). Type species: *Bombylius byrrha* Bowden, 1971, automatic.

Apiformyia Yeates, 2008: 32. Type species: *Apiformyia australis* Yeates, 2008, by original designation (new synonymy in LI & YEATES 2018).

Diagnosis. The following generic diagnosis was provided by LI & YEATES (2018), but with more species included herein, the diagnosis can be further clarified: Flagellum 2-segmented (apical flagellomere sometimes elongate). Cell r_3 closed; cell *br* much longer than cell *bm*, crossvein *m-m* located on apical half of cell *dm*; cell *cup* open. Abdominal tergites yellow with median black marking. Male epandrium trapezoidal. Gonocoxite triangular, apex gradually narrowed; division short, fusion seam long; outer and inner apex acute but not elongate. Female sand chamber absent. Genital fork divided into two straight sclerites. Sperm pump strong and not elongate, clothed with thick longitudinal muscles and darkly

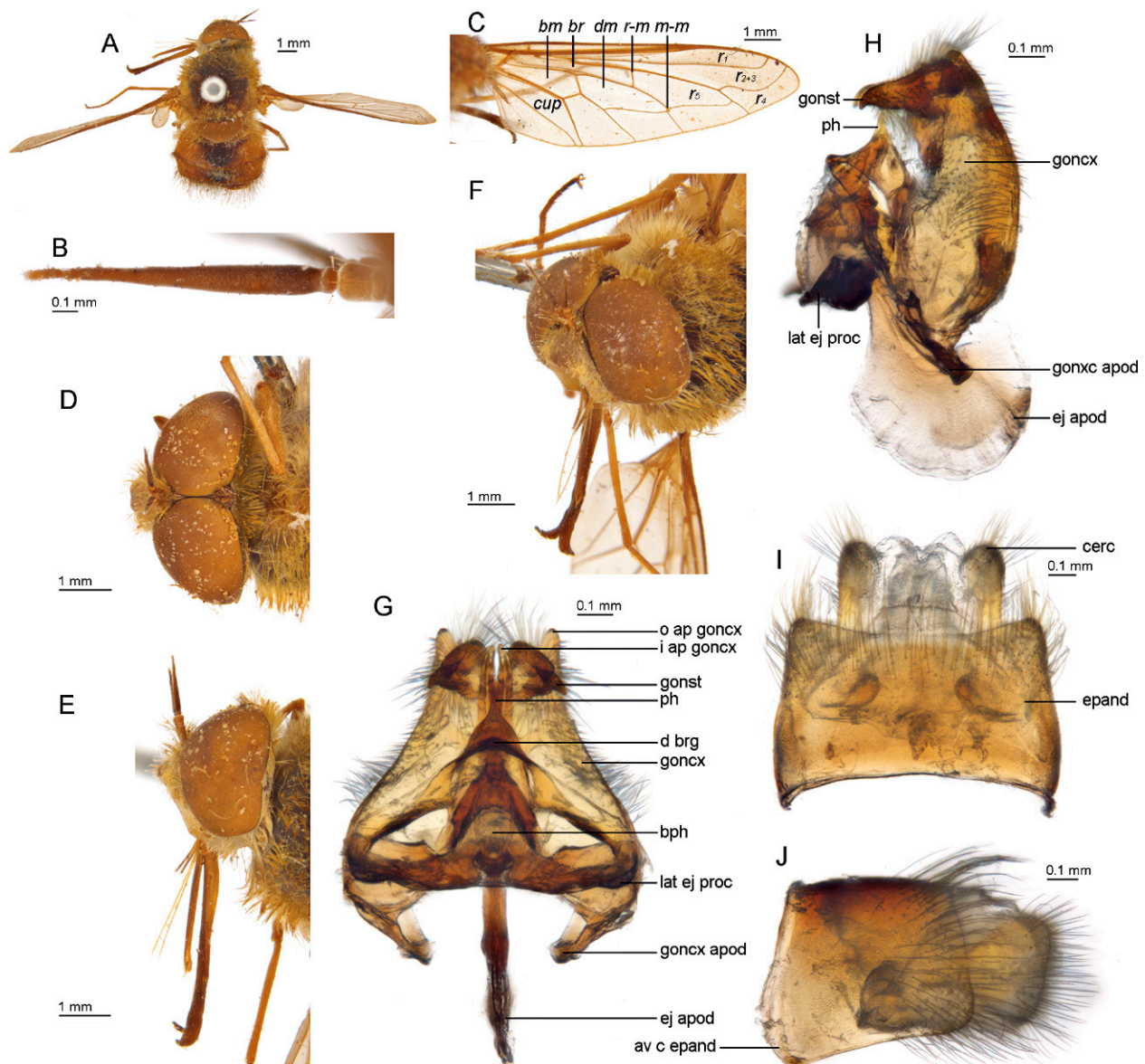


Fig. 2. *Eristalopsis aurata* sp.n. ♂: **A:** dorsal; **B:** flagellum; **C:** wing; **D:** head, dorsal; **E:** head, lateral; **F:** head, profile; **G:** genital capsule, dorsal; **H:** genital capsule, lateral; **I:** epandrium, dorsal; **J:** epandrium, lateral. Scale bars = 1.0 mm (A, C–F); = 0.1 mm (B, G–J).

coloured, with both collars and lateral papillae present. Distal spermathecal duct of normal length and thickened on apical half. Spermatheca large.

Distribution. NSW, QLD, SA, WA, NT.

Species included. *E. aurata* sp.n., *E. australis* (Yeates, 2008), *E. byrrha* (Bowden, 1971), *E. concava* sp.n., *E. danielsorum* sp.n., *E. flava* sp.n., *E. maculata* sp.n., *E. minor* sp.n., *E. parva* sp.n., *E. robertsi* (Paramonov, 1934), *E. rubra* sp.n., *E. rubriventris* (Bigot, 1892), *E. smarti* sp.n., *E. uniformis* sp.n., *E. wrightae* sp.n.

4.2. Key to species of *Eristalopsis*

- | | | |
|----|---|-------------------------------------|
| 1 | Scutum wholly yellow (Fig. 8A) | <i>E. flava</i> sp.n. |
| 1' | Scutum mostly blackish or brownish | 2 |
| 2 | Scutum with a large subquadrate reddish marking on posterior margin (Figs. 3A,G, 6A,G) | 3 |
| 2' | Scutum without reddish marking on posterior margin | 4 |
| 3 | Posterior margin of eye not strongly concave (Fig. 3E) | <i>E. australis</i> (Yeates) |
| 3' | Posterior margin of eye strongly concave (Fig. 6E) | <i>E. concava</i> sp.n. |
| 4 | Male eyes dichoptic (Figs. 7D, 9D). Base of wing vein Cu with long scales | 5 |
| 4' | Male eyes holoptic or nearly so. Base of wing vein Cu without long scales | 6 |
| 5 | Wing with distinct spotted markings (Fig. 9C). Scutum with three pale pruinulent stripes. Abdominal tergite 2 with distinct white scale band (Figs. 9A,G) | <i>E. maculata</i> sp.n. |
| 5' | Wing infuscated on anterior half, without distinct spotted markings (Fig. 7C). Scutum without pale pruinulent stripes. Abdominal tergite 2 without scale band (Fig. 7A) | <i>E. danielsorum</i> sp.n. |

- 6 Wing with distinct spotted markings. Crossvein *m-m* long (Figs. 16C, 10C) 7
- 6' Wing without distinct spotted markings. Crossvein *m-m* short (Figs. 2C, 3C, 5C, 6C, 11C, 13C, 14C, 15C, 17C, 18C) 8
- 7 Hind femur with row of anterior bristles and row of anteroventral bristles. Abdominal tergites mostly orange with black markings medially. Anteroventral corner of epandrium short (Fig. 16M) *E. smarti* sp.n.
- 7' Hind femur with only row of anteroventral bristles. Abdominal tergites mostly black with some reddish markings posterolaterally. Anteroventral corner of epandrium long (Fig. 10J) *E. minor* sp.n.
- 8 Scutellum black, at most with small reddish marking (Figs. 5A,G, 11A,G, 15A, 18A,G) 9
- 8' Scutellum entirely orange or entirely reddish (Figs. 2A, 13A,G, 14A, 17A) 12
- 9 Second segment of flagellum short, less than $0.1 \times$ length of 1st (Fig. 5B). Palpus long (Figs. 4B, 5E) *E. byrrha* (Bowden)
- 9' Second segment of flagellum long, about $0.2 \times$ length of 1st (Figs. 11B, 18B). Palpus short (Figs. 11E, 15C, 18E) 10
- 10 Face covered with long pale yellow scales admixed with long blackish-brown hairs, without white scales laterally (Fig. 18F). Wing membrane slightly infuscated, and darker towards basal area (Fig. 18C) *E. wrightae* sp.n.
- 10' Face covered with long blackish-brown hairs, with white scales laterally (Fig. 11F). Wing membrane hyaline (Figs. 11C, 15E) 11
- 11 Femora and tibia without black scales (Fig. 15B). Distributed in NSW *E. rubriventris* (Bigot)
- 11' Anterior face of femora and tibia with black scales (Fig. 11F). Distributed in NT *E. parva* sp.n.
- 12 Face covered with short hairs, blackish-brown hairs absent (Figs. 2E, 17E). Gonocoxal apodeme not branching (Figs. 2G, 17G) 13
- 12' Face covered with long hairs, blackish-brown hairs present (Figs. 13E, 14E). Gonocoxal apodeme branching (Figs. 13J, 14G) 14
- 13 Antennal flagellum brownish yellow, scape and pedicel orange. Scutum mostly reddish brown, except posterolateral and posterior margin orange (Fig. 2A). Outer apex of male gonocoxite subacute and straight (Fig. 2G) *E. aurata* sp.n.
- 13' Antennal flagellum totally black. Scutum wholly black (Fig. 17A). Outer apex of male gonocoxite acute and curved outwards (Fig. 17G) *E. uniformis* sp.n.
- 14 Antennal pedicel relatively long, $2.3 \times$ as long as wide. 2nd segment of flagellum relatively long, $0.15 \times$ length of 1st (Fig. 13B). Wing membrane slightly infuscated (Fig. 13C) *E. robertsi* (Paramonov)
- 14' Antennal pedicel normal, $1.0 \times$ as long as wide. 2nd segment of flagellum short, $0.1 \times$ length of 1st (Fig. 14B). Wing membrane strongly infuscated (Fig. 14C) *E. rubra* sp.n.

4.3. Species of *Eristalopsis*

4.3.1. *Eristalopsis aurata* sp.n.

Fig. 2A–J

Diagnosis. A combination of: medium-sized, yellowish bombyliine; antennal flagellum brownish yellow, scape and pedicel orange; scutum mostly reddish brown, scutellum orange; outer apex of male gonocoxite subacute.

Description. *MALE*: Body length 9.3 mm, wing length 9.9 mm. *Head*: Head about $1.9 \times$ wider than long, mostly reddish brown with thick pale pruinescence and covered with pale yellow to brown scales and hairs. Eyes holoptic. Frons long, $3.2 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $0.2 \times$ length of upper frons, reddish brown with short golden scales. Ocellar tubercle slightly raised, reddish brown with grey pruinescence, with short brown hairs. Face with thick pale pruinescence, covered with short pale yellow to dark yellow scales. Gena with thick pale pruinescence and white to pale yellow hairs. Clypeus brown with thick pale pruinescence. Occiput with golden scales. Posterior eye margin not strongly concave. Antenna mostly orange, except flagellum brownish yellow; scape with sparse pale pruinescence and long yellow hairs, pedicel with sparse pale pruinescence and short yellow hairs. Scape relatively long, $2.9 \times$ as long as wide, and $2.2 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, $1.5 \times$ as long as wide. Flagellum elongate, $10.0 \times$ as long as wide, $2.0 \times$ as long as scape + pedicel ($3.0 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.1 \times$ length of 1st (Fig. 2B). Palpus thin and short, dark yellow with short brown hairs, one-segmented. Mouthparts slender, $2.7 \times$ as long as eye length ($1.9 \times$ as long as head length), labellum thin and filiform (Fig. 2E). *Thorax*: Scutum mostly reddish brown with sparse pale pruinescence, except posterolateral and posterior margin orange. Scutum covered with short golden scales posterior half admixed with short brown hairs, hairs denser on anterior half; postalar callosity with brown hairs admixed with golden scales, postalar wall with some strong dark yellow hairs. Scutellum orange, with sparse pale pruinescence, mostly covered with brown hairs admixed with golden scales. 4 brownish-yellow notopleural setae present, postalar setae absent. Pleura mostly reddish brown with thick pale pruinescence, densely covered with pale yellow hairs, but anepimeron, meron, laterotergite and mediotergite bare, hairs darker on dorsal margin of anepisternum. *Legs*: Legs mostly dark yellow except tarsomere 5 brown; mostly covered in yellow scales, except femora with pale yellow scales, and long white hairs on basal half of ventral face; hind femur with row of short anteroventral bristles, apex of hind femur with additional short bristles. Hairs and bristles on legs short and dark yellow. Fore tibia $1.7 \times$ longer than fore basitarsus, mid tibia $2.4 \times$ longer than mid basitarsus, hind tibia $2.0 \times$ longer than hind basitarsus. *Wing*: Wing membrane hya-

line, but brown towards base of wing. Crossvein *r-m* arising 0.6 from base of cell *dm*; crossvein *m-m* short (Fig. 2C). Basicosta dark yellow. Halter stem yellow, knob dark yellow. **Abdomen:** Tergites mostly orange with median brown markings. Tergite 1 mostly orange but reddish brown medially; tergites 2–5 mostly orange except triangular brown marking medially. Tergites mostly covered with yellow hairs, posterior margin admixed with long brown hairs. Sternites yellow, covered with white to pale yellow scales. **Genitalia.** Epandrium trapezoid, posterior margin slightly convex, anterior and posterior margins slightly concave (Fig. 2I). Hypandrium present, anterior margin concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 2G); gonocoxal apodeme strong, incurved and apex branched; lateral ejaculatory process strong, $3.0 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite subacute, short; dorsal bridge with lateral hollow (Fig. 2H); gonostylus slender and pointed dorsally, $3.5 \times$ longer than wide. **FEMALE:** Unknown.

Remarks. *Eristalopsis aurata* sp.n. is similar to *E. uniformis* sp.n., but differs in having the scutum colour pale, the antennal scape and pedicel orange, and the outer apex of male gonocoxite subacute.

Distribution. QLD.

Etymology. This specific name refers to the orange coloured antennal scape and pedicel.

Type material. Holotype ♂ (QM), 'Lake Boronto (=Wincheura) | Newcastle Bay, C. York, Q. | 2-26.ix.1974 | G.B. Monteith | Open forest' printed; '*Eristalopsis aurata* | Li & Yeates, 2018 | HOLOTYPE' printed, red (QM: T244587).

4.3.2. *Eristalopsis australis* (Yeates, 2008)

Fig. 3A–O

Apiformyia australis Yeates, 2008: 32. Type-locality: Australia (NT); Holotype ♂, ANIC.

Eristalopsis australis (Yeates, 2008): Li & Yeates, 2018: 357.

Diagnosis. A combination of: large-sized, yellowish bombyliine; scutum with large subquadrate reddish marking on posterior margin; scutellum orange; ocellar tubercle, scape and pedicel with pale yellow hairs; second segment of antennal flagellum long.

Redescription. **MALE:** Body length 10.8–14.3 mm, wing length 10.5–13.6 mm. **Head:** Head about $1.6 \times$ wider than long, mostly yellow with thick pale pruinescence and covered with pale yellow scales and hairs. Eyes narrowly separated by $0.2 \times$ length of ocellus. Frons small, $3.3 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $0.6 \times$ length of upper frons, dark yellow with short pale yellow scales. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence and yellow hairs. Face with sparse pale pruinescence, covered in sparse pale yellow scales. Gena with thick pale pruinescence and white hairs. Clypeus brownish yellow with sparse pale pruinescence. Occiput with pale yellow scales admixed with yellow hairs. Posterior

eye margin not strongly concave. Antenna mostly dark blackish brown except scape dark brown with uneven brown markings; scape and pedicel with sparse pale pruinescence and pale yellow hairs, ventral hairs of scape long, hairs on pedicel short, flagellum bare. Scape relatively short, $2.0 \times$ as long as wide, and $2.4 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, as long as wide. Flagellum elongate, $10.0 \times$ as long as wide, $2.4 \times$ as long as scape + pedicel ($3.4 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.2 \times$ length of 1st (Fig. 3B). Palpus thin and short, yellow with short yellow hairs admixed with few brown hairs, one-segmented. Mouthparts slender, $4.8 \times$ as long as eye length ($2.7 \times$ as long as head length), labellum thin and filiform (Fig. 3E). **Thorax:** Scutum mostly black with thick grey pruinescence, except postalar callosity reddish and middle of posterior margin with large subquadrate reddish marking. Scutum covered with short pale yellow hairs, hairs denser on anterior half and each hair darker apically; postalar wall with pale yellow hairs admixed row of strong yellow hairs. Scutellum orange, with sparse pale pruinescence, covered with pale yellow hairs and scales admixed with black hairs. 6 dark yellow notopleural setae present, postalar setae absent. Pleura mostly black with thick pale pruinescence, densely covered with admixed white to yellow hairs, but anepimeron, meron, laterotergite and mediotergite bare, hairs darker on dorsal margin of anepisternum. **Legs.** Legs dark yellow and mostly covered with yellow scales, except apex of femora and anterior face of tibiae with more black scales; mid and hind femora with row of short anteroventral bristles. Hairs and bristles on legs short and black. Fore tibia $1.5 \times$ longer than fore basitarsus, mid tibia $2.4 \times$ longer than mid basitarsus, hind tibia $2.0 \times$ longer than hind basitarsus. **Wing.** Wing membrane hyaline, but brown towards basal third of wing. Crossvein *r-m* arising 0.7 from base of cell *dm*; crossvein *m-m* short (Fig. 3C). Basicosta yellow. Halter stem yellow, knob pale yellow. **Abdomen:** Tergites mostly yellow with median blackish-brown markings. Tergite 1 mostly blackish brown but yellow posterolaterally; tergites 2–4 mostly yellow except nearly trapezoid blackish-brown marking medially; tergites 5–9 mostly yellow except blackish-brown marking medially. Tergites mostly covered with white to pale yellow scales and hairs, posterior margin of tergite 1 with black hairs medially, posterior half of tergites 2–4 with short black hairs, hairs longer posterolaterally. Sternites yellow and with pale yellow hairs, few black hairs admixed on sternites 3–5. **Genitalia.** Epandrium trapezoid, anterior margin concave, posterior margin slightly concave (Fig. 3L). Hypandrium present, anterior margin concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 3J); gonocoxal apodeme strong and incurved; lateral ejaculatory process strong, $3.6 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 3K); gonostylus slender and pointed dorsally, $3.0 \times$ longer than

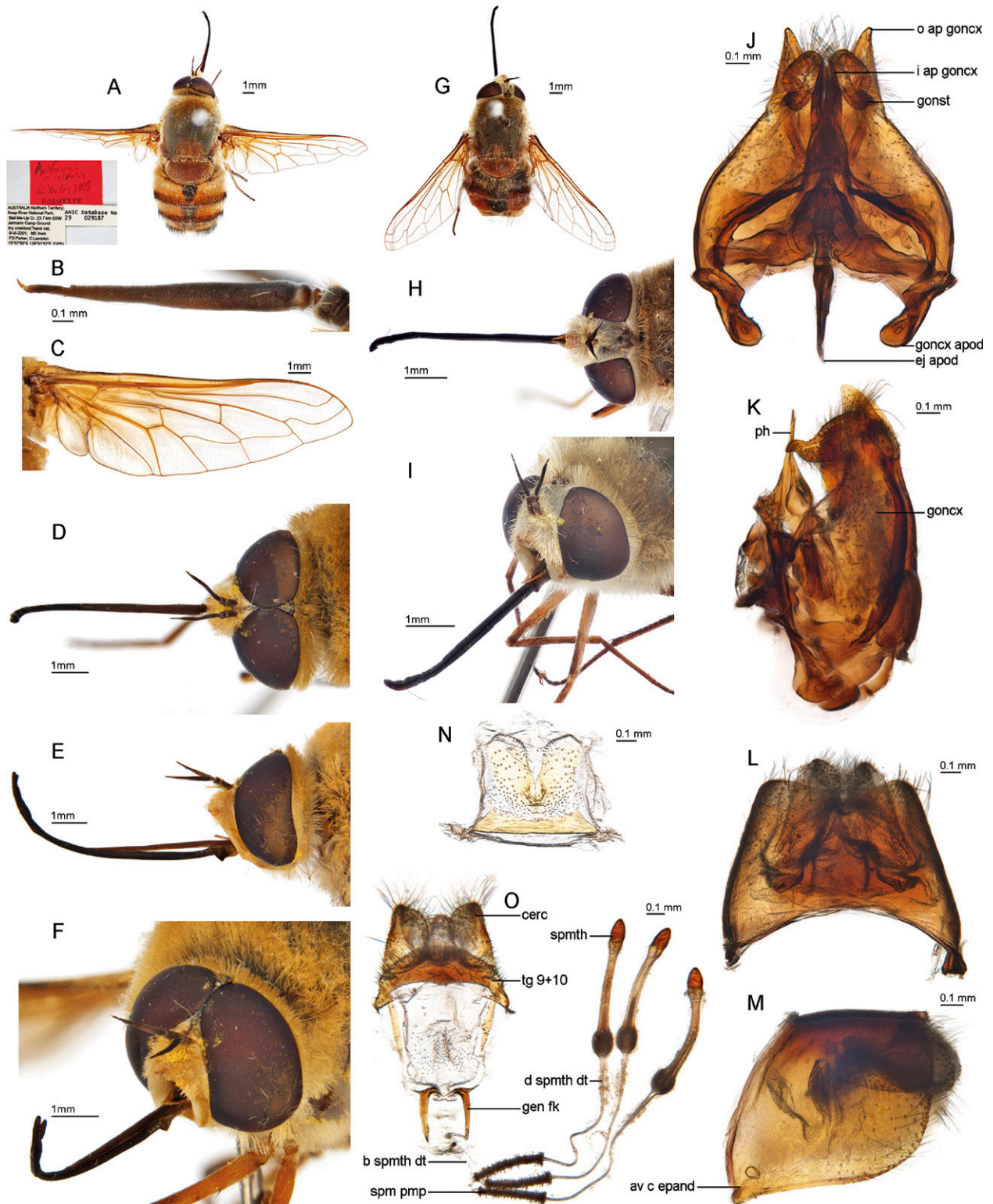


Fig. 3. *Eristalopsis australis* (Yeates) ♂ holotype (A–F, J–M); ♀ paratype (G–I, N–O): A: dorsal; B: flagellum; C: wing; D: head, dorsal; E: head, lateral; F: head, profile; G: dorsal; H: head, dorsal; I: head, profile; J: genital capsule, dorsal; K: genital capsule, lateral; L: epandrium, dorsal; M: epandrium, lateral; N: sternite 8, ventral; O: genitalia and spermathecae. Scale bars = 1.0 mm (A, C–I); = 0.1 mm (B, J–O).

wide. **FEMALE:** Body length 14.0–15.8 mm, wing length 15.5–16.9 mm. Similar to male, except frons black with thick grey pruinescence, $2.6 \times$ as wide as ocellar tubercle, frons with short yellow scales and hairs admixed with few short black hairs. Hairs on ocellar tubercle dark yellow to blackish brown (Fig. 3H). Notopleural setae pale yellow. Wings more hyaline. Sternites mostly with white to pale yellow hairs, except sternites 2–6 admixed with blackish-brown hairs, distal segments have more black hairs. Tergite 8 without thick long hairs. Acanthophorite

low to blackish brown (Fig. 3H). Notopleural setae pale yellow. Wings more hyaline. Sternites mostly with white to pale yellow hairs, except sternites 2–6 admixed with blackish-brown hairs, distal segments have more black hairs. Tergite 8 without thick long hairs. Acanthophorite

spines absent. Genital fork divided into two straight sclerites. Sperm pump strong, with both collars and lateral papillae. Distal spermathecal duct of normal length and not thickened. Spermatheca large and elongate, basal part spherical, apex nearly conical (Fig. 3O).

Distribution. NT, WA.

Remarks. *Eristalopsis australis* (Yeates, 2008) is the type species of *Apiformyia*, but *Apiformyia* was found to be nested within *Eristalopsis* in a morphological phylogenetic analysis (LI & YEATES 2018). Accordingly, *Apiformyia* was proposed as a junior synonym of *Eristalopsis*. In the present revision, two more new species, *E. concava* sp.n. and *E. uniformis* sp.n., are described from the paratypes of *E. australis* (YEATES 2008).

Type material. Holotype ♂ (ANIC), 'AUSTRALIA Northern Territory; | Keep River National Park; | Bail-Me-Up Cr. 23.7 km SSW | Jarnarm Camp Ground | dry creekbed. hand net; | 9-VI-2001, ME Irwin | FD Parker, C Lambkin | 15°57'55"S 129°01'52"E (GPS)' printed; '*Apiformyia* | *australis* | D. Yeates, 2008 | HOLOTYPE' handwritten, red; 'ANIC Database No. | 29 029187' printed. – Paratypes: 13♂ 5♀, same data as holotype (ANIC: 29-038721–29-038725, 29-038727–29-038732 [♂]; 29-038734–29-038738 [♀]).

4.3.3. *Eristalopsis byrrha* (Bowden, 1971)

Figs. 4A,B, 5A–O

Bombylius byrrhus Bowden, 1971: 297. Type-locality: Australia (WA); Holotype ♂, NHMD.

Eristalopsis byrrha (Bowden, 1971): Evenhuis & Greathead, 1999: 149.

Diagnosis. A combination of: medium-sized, yellow and black bombyliine; second segment of antennal flagellum short; palpus long. scutellum black; legs mostly dark yellow, except base of fore femur and tarsi blackish brown.

Redescription. **MALE:** Body length 7.3 mm, wing length 6.6 mm. **Head:** Head about $1.8 \times$ wider than long, mostly black with thick pale pruinescence and covered with pale yellow to golden scales admixed with blackish-brown to black hairs. Eyes narrowly separated by $0.3 \times$ length of ocellus. Frons short, $1.7 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $0.75 \times$ length of upper frons, blackish brown with pale yellow scales. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with blackish-brown hairs. Face with thick pale pruinescence, covered in dense golden scale admixed with long black hairs. Gena with thick pale pruinescence and pale yellow hairs. Clypeus black with thick pale pruinescence. Occiput with golden scales. Posterior eye margin not strongly concave. Antenna dark blackish brown; scape and pedicel with sparse pale pruinescence and mostly black hairs except pedicel with few yellow scales admixed, hairs on scape long and on pedicel short, flagellum bare. Scape relatively long, $4.7 \times$ as long as wide, and $3.1 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, $1.5 \times$ as long as wide. Flagellum long, $10.3 \times$ as long as wide, $1.3 \times$ as long as scape + pedicel ($1.8 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.04 \times$ length of

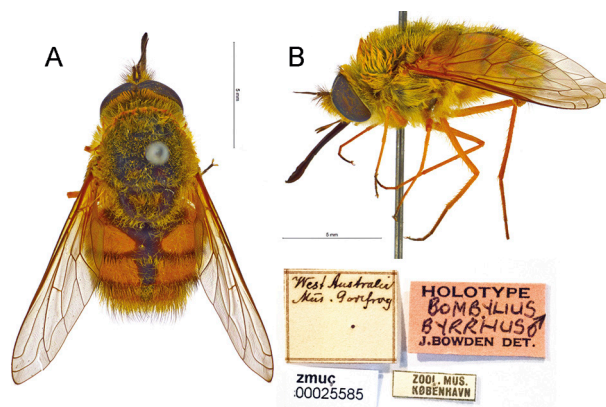


Fig. 4. *Eristalopsis byrrha* (Bowden) ♂ holotype **A:** dorsal; **B:** lateral. Scale bars = 5 mm. Photograph from digitized type collection of Natural History Museum of Denmark <http://www.daim.snm.ku.dk/digitized-type-collection-details-simple?catno=zmu00025585> (NHMD).

1st (Fig. 5B). Palpus thin and long, blackish brown with short brown to black hairs, one-segmented. Mouthparts slender, $3.8 \times$ as long as eye length ($2.2 \times$ as long as head length), labellum thin and filiform (Fig. 5E). **Thorax:** Scutum and scutellum black with grey pruinescence, pruinescence thick on lateral margin of scutum, sparse on scutellum. Scutum and scutellum covered with long golden hairs admixed with black hairs, postalar callosity with some strong black hairs. 3 golden notopleural setae present, postalar setae absent. Pleura black with thick pale pruinescence, densely covered with admixed golden hairs, but anepimeron, meron, laterotergite and mediotergite bare. **Legs.** Legs mostly dark yellow, except base half of femora blackish brown, mostly covered with yellow scales, but ventral face with long yellow hairs; mid femur with row of short antrioral bristles, hind femur with row of short anteroventral bristles. Hairs and bristles on legs short and blackish brown. Fore tibia $1.8 \times$ longer than fore basitarsus, mid tibia $2.4 \times$ longer than mid basitarsus, hind tibia $2.3 \times$ longer than hind basitarsus. **Wing.** Wing membrane hyaline, but brown towards basal third of wing. Crossvein *r-m* arising 0.6 from base of cell *dm*; crossvein *m-m* short (Fig. 5C). Basicosta dark brown. Halter stem pale yellow, knob yellow. **Abdomen:** Tergites mostly orange with median black markings. Tergite 1 mostly blackish brown with orange posterolaterally; tergites 2–6 mostly orange except triangular black marking medially, tergites 7–8 mostly black with yellow margins. Tergites mostly covered with long golden hairs, posterior margin of tergites 2–5 with black hairs admixed on posterior margin, hairs longer posterolaterally. Sternites blackish brown except posterior margin yellow, covered with golden hairs. **Genitalia.** Epandrium trapezoid, anterior margins concave, posterior margin not strongly concave (Fig. 5L). Hypandrium present, anterior margin slightly concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 5J); gonocoxal apodeme strong and incurved; lateral ejaculatory process strong, $2.5 \times$ longer

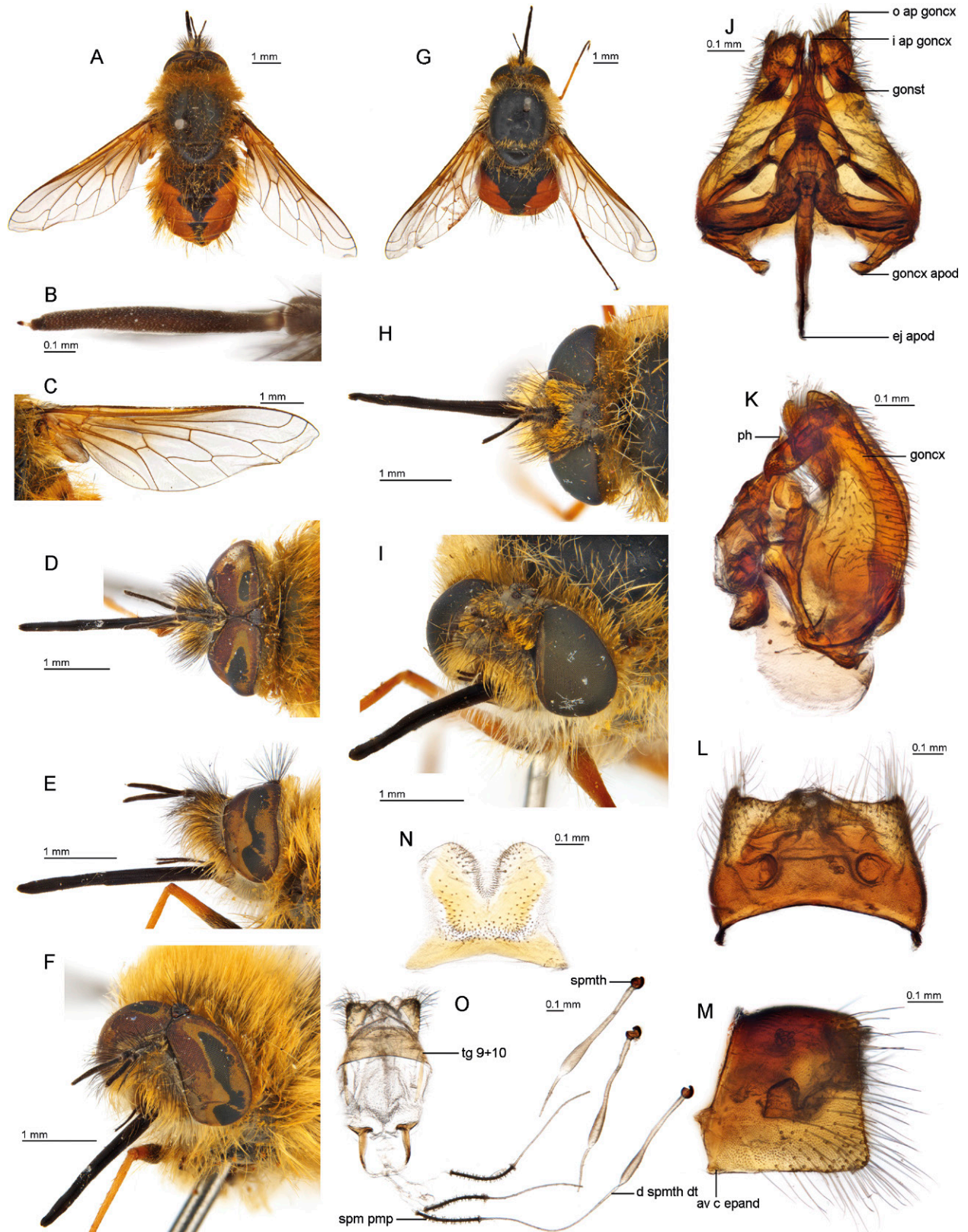


Fig. 5. *Eristalopsis byrrha* (Bowden) ♂ (A–F, J–M); ♀ (G–I, N–O): A: dorsal; B: flagellum; C: wing; D: head, dorsal; E: head, lateral; F: head, profile; G: dorsal; H: head, dorsal; I: head, profile; J: genital capsule, dorsal; K: genital capsule, lateral; L: epandrium, dorsal; M: epandrium, lateral; N: sternite 8, ventral; O: genitalia. Scale bars = 1.0 mm (A, C–I); = 0.1 mm (B, J–O).

than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 5K); gonostylus slender

and pointed dorsally, $2.6 \times$ longer than wide. **FEMALE:** Body length 7.8 mm, wing length 7.1 mm. Similar to male, except frons black with thick grey pruinescence,

2.7 × as wide as ocellar tubercle, frons with short golden scales admixed with long blackish-brown hairs (Fig. 5H). Legs mostly dark yellow, except base of fore femur and tarsi blackish brown. Legs mostly covered with yellow scales, except base half of femora with pale yellow scales admixed with pale yellow hairs ventrally, mid and hind femora with row of long anteroventral dark yellow bristles. Hairs and bristles on legs short and black. Fore tibia 1.8 × longer than fore basitarsus, [mid tarsus broken off and missing], hind tibia 2.0 × longer than hind basitarsus. Wing more hyaline than male. Base of vein *Cu* with long pale yellow scales. Stump vein sometimes present on *R*₄. Sternites mostly yellow, except anterior half of sternites 2–3 black. Tergite 8 without thick long hairs. Acanthoporphite spines absent. Genital fork divided into two T-shaped sclerites. Sperm pump strong, with both collars and lateral papillae. Distal spermathecal duct of normal length and thickened on apical half, base of thickened part thicker. Spermatheca small and spherical (Fig. 5O).

Distribution. WA.

Type material. Holotype ♂ (NHMD) [type photos examined], ‘West Australia | Mus[eum] Godefroy’ handwritten; ‘HOLOTYPE | BOMBYLIUS | BYRRHUS ♂ | J. BOWDEN DET.’ handwritten, red; ‘ZOOLOG. MUS. | KOBENHAVN’ printed; ‘zmuc | 00025585’ printed. (NHMD) (Fig. 4).

4.3.4. *Eristalopsis concava* sp.n.

Fig. 6A–O

Diagnosis. A combination of: large-sized, brownish yellow bombyliine, most similar to *E. australis*, but diagnosed as being darker, larger, with strongly indented posterior eye margin, male epandrium with elongated anteroventral part, and gonocoxal apodeme weaker.

Description. **MALE:** Body length 14.9–15.9 mm, wing length 14.4–14.9 mm. **Head:** Head about 1.7 × wider than long, mostly yellow with thick pale pruinescence and covered with white to yellow scales and hairs. Eyes holoptic. Frons small, 3.4 × length of ocellar tubercle, upper half narrow and black; lower half triangular, 0.5 × length of upper frons, dark yellow with short pale yellow to yellow scales. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with blackish-brown to black hairs. Face with sparse pale pruinescence, covered in sparse yellow scales. Gena with thick pale pruinescence and white hairs. Clypeus yellow with sparse pale pruinescence. Occiput with pale yellow to yellow hairs. Posterior eye margin strongly concave. Antenna mostly black, except scape blackish brown; scape and pedicel with thick pale pruinescence and mostly yellow hairs except dorsal face admixed with black hairs, ventral hairs of scape long, hairs on pedicel short, flagellum bare. Scape relatively short, 1.5 × as long as wide, and 1.7 × as long as pedicel, uniform from base to apex. Pedicel normal, 1.1 × as long as wide. Flagellum elongate, 10.0 × as long as wide, 3.0 × as long as scape + pedicel (4.8 × as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment 0.4 × length of 1st (Fig. 6B). Palpus thin and short, dark yellow with

short yellow hairs, one-segmented. Mouthparts slender, 3.5 × as long as eye length (2.6 × as long as head length), labellum thin and filiform (Fig. 6E). **Thorax:** Scutum mostly black with thick grey pruinescence, except postalar callosity reddish and middle of posterior margin with large subquadrate reddish marking. Scutum covered with short pale yellow hairs, hairs denser on anterior half and each hair darker apically; posterior half admixed with short black hairs; postalar callosity with pale yellow hairs admixed with some black hairs, postalar wall with some strong black hairs. Scutellum orange, with sparse pale pruinescence, mostly covered with black hairs, posterior margin admixed with yellow hairs and scales. 5 black notopleural setae present, postalar setae absent. Pleura mostly black with thick pale pruinescence, densely covered with admixed white to yellow hairs, but anepimeron, meron, laterotergite and mediotergite bare, hairs darker on dorsal margin of anepisternum. **Legs.** Legs dark yellow and mostly covered with yellow scales, except apex of femora, dorsal face of fore femur, anterior face of fore and mid tibiae and hind tibia with black scales; mid and hind femora with row of short anteroventral bristles, apex of hind femur with additional short bristles. Hairs and bristles on legs short and black. Fore tibia 1.4 × longer than fore basitarsus, mid tibia 1.8 × longer than mid basitarsus, hind tibia 1.9 × longer than hind basitarsus. **Wing.** Wing membrane mostly hyaline, brown towards basal third of wing. Crossvein *r-m* arising 0.65 from base of cell *dm*; crossvein *m-m* short (Fig. 6C). Basicosta yellow. Halter stem dark yellow, knob yellow. **Abdomen:** Tergites mostly yellow with median blackish-brown markings. Tergite 1 mostly blackish brown but posterior half yellow; tergites 2–4 mostly yellow except blackish-brown markings medially; tergites 5–9 invisible from dorsal view. Tergites mostly covered with white to pale yellow scales and hairs, posterior half of tergites 1–3 with short black hairs, hairs longer posterolaterally, posterolateral areas of tergite 4 with long black hairs. Sternites yellow and with pale yellow hairs, sternite 7 admixed with black hairs. **Genitalia.** Epandrium trapezoid, anterior margin concave, posterior margin slightly concave (Fig. 6L). Hypandrium present, anterior margin concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 6J); gonocoxal apodeme weak and incurved; lateral ejaculatory process strong, 3.1 × longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 6K); gonostylus slender and pointed dorsally, 3.3 × longer than wide. **FEMALE:** Body length 14.0–15.8 mm, wing length 15.5–16.9 mm. Similar to male, except frons black with thick grey pruinescence, 3.7 × as wide as ocellar tubercle, frons with short yellow scales and hairs admixed with short black hairs. Hairs on ocellar tubercle dark yellow to blackish brown (Fig. 6H). Wings more hyaline. Tergite 8 without thick long hairs. Acanthoporphite spines absent. Genital fork divided into two straight sclerites. Sperm pump strong, with both collars and lateral papillae. Distal spermathecal duct of normal length and

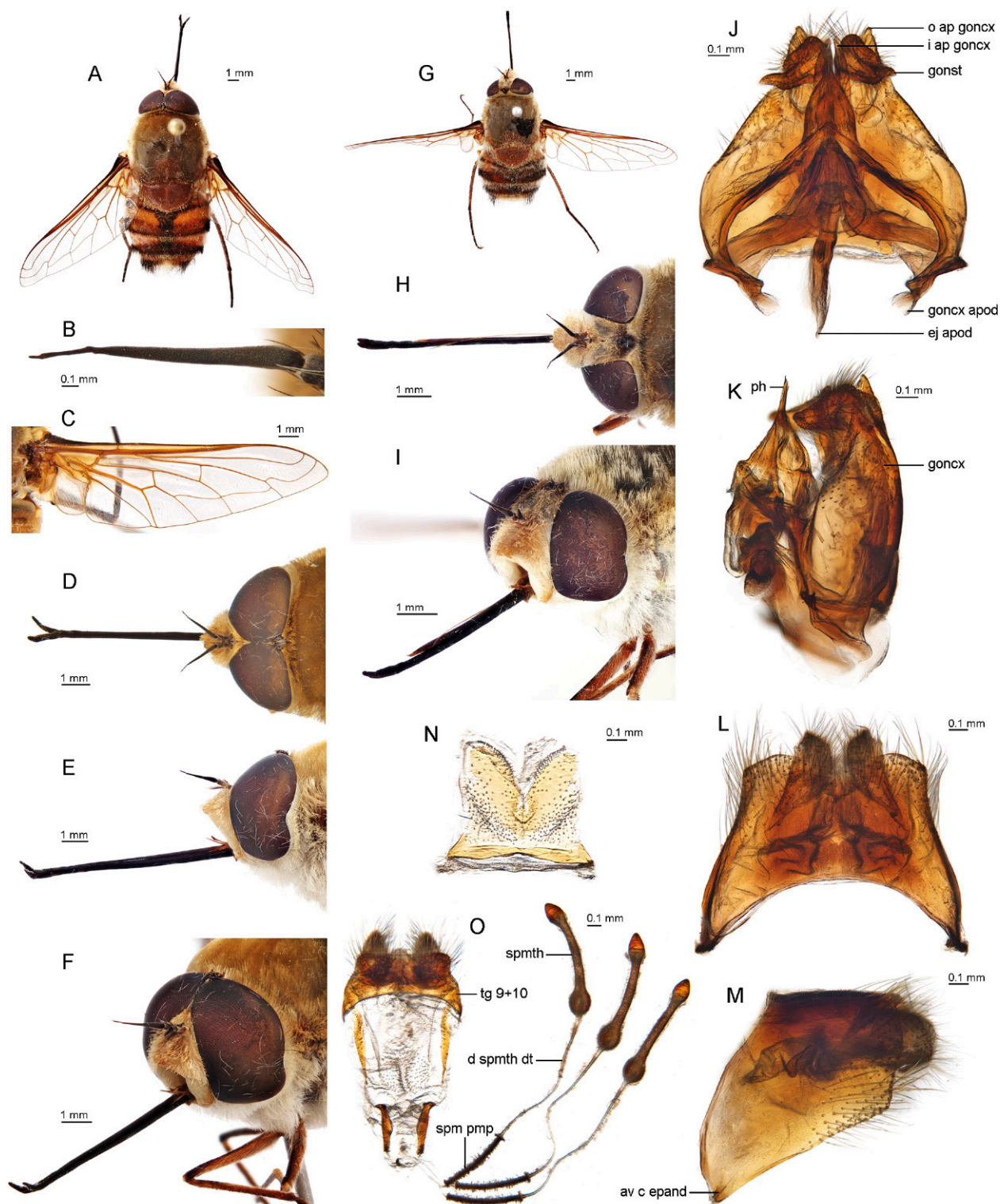


Fig. 6. *Eristalopsis concava* sp.n. ♂ (A–F, J–M); ♀ (G–I, N–O): **A:** dorsal; **B:** flagellum; **C:** wing; **D:** head, dorsal; **E:** head, lateral; **F:** head, profile; **G:** dorsal; **H:** head, dorsal; **I:** head, profile; **J:** genital capsule, dorsal; **K:** genital capsule, lateral; **L:** epandrium, dorsal; **M:** epandrium, lateral; **N:** sternite 8, ventral; **O:** genitalia and spermathecae. Scale bars = 1.0 mm (A, C–I); = 0.1 mm (B, J–O).

not thickened. Spermatheca large and elongate, basal part spherical, apex nearly conical (Fig. 6O).

Remarks. The specimens of *Eristalopsis concava* sp.n. were originally identified as *Eristalopsis australis* (Yeates, 2008) (two of them were designated as paratypes), which is similar to the latter, but the body is larger

and darker, the posterior margin of eyes strongly concave and the male epandrium with elongated anteroventral part, and the gonocoxal apodeme weak.

Distribution. NT, WA.

Etymology. This specific name refers to the posterior margin of the eyes being strongly concave.

Type material. Holotype ♂ (ANIC), 'AUSTRALIA: NT NE Arnhem Land | Mosquito Ck area; vegetated | sand dunes, Caught over *Calytrix* | Hand caught; 19-22 Aug [20]07 | D. Yeates, C. Manchester | 12°25'43"S 136°49'55"E' printed; '*Eristalopsis concava* | Li & Yeates, 2018 | HOLOTYPE' printed, red; 'ANIC Database No. | 29 038567' printed. – Paratypes: 2♂, 3♀, same data as holotype (ANIC: 29-038568–29-038569 [♂], 29-038570–29-038572 [♀]).

4.3.5. *Eristalopsis danielsorum* sp.n.

Fig. 7A–O

Diagnosis. A combination of: large-sized, brown coloured bombyliine; male eyes dichoptic; wing membrane infuscated on anterior half, without distinct spot; base of vein *Cu* with dense long pale yellow scales; scutellum orange.

Description. **MALE:** Body length 10.4 mm, wing length 10.9 mm. **Head:** Head about $2.4 \times$ wider than long, mostly blackish brown with thick pale pruinescence and covered in white to dark yellow scales admixed with blackish-brown hairs. Eye dichoptic, separate by $0.65 \times$ width of ocellar tubercle. Frons short, $1.7 \times$ length of ocellar tubercle, blackish brown with dark yellow scales admixed with blackish-brown hairs. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with long blackish-brown hairs. Face with thick pale pruinescence and pale yellow scales admixed with long blackish-brown hairs. Gena with thick pale pruinescence and white scales. Clypeus blackish brown with thick pale pruinescence. Occiput with dark yellow scales admixed with blackish-brown hairs. Posterior eye margin not strongly concave. Antenna black; scape with thick pale pruinescence and long blackish-brown hairs, pedicel with sparse pale pruinescence and short blackish-brown hairs, flagellum bare. Scape relatively long, $3.0 \times$ as long as wide, and $2.6 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, $1.2 \times$ as long as wide. Flagellum elongate, $12.8 \times$ as long as wide, $1.7 \times$ as long as scape + pedicel ($2.3 \times$ as long as scape), conical and slightly depressed on side, 2-segmented with apical stylus; 2nd segment $0.07 \times$ length of 1st (Fig. 7B). Palpus thin and short, brownish yellow with pale yellow to brown hairs, one-segmented. Mouthparts slender and elongate, $4.3 \times$ as long as eye length ($2.6 \times$ as long as head length), labelum thin and filiform (Fig. 7E). **Thorax:** Scutum mostly black except postalar callus brownish, covered with pale pruinescence. Scutum with dark yellow scales admixed with blackish-brown hairs, hairs denser on anterior half, posterior half with brown hairs; postalar callosity with long white to pale yellow scales admixed with long black hairs, postalar wall with some strong blackish-brown to black hairs. Scutellum orange with pale pruinescence, and with blackish-brown hairs admixed with pale yellow scales. 4 blackish-brown to black notopleural setae present, postalar setae absent. Pleura mostly black with thick grey pruinescence, densely covered with mostly pale yellow scales, anepisternum admixed with some dark yellow to blackish-brown hairs on dorsal half, anepimeron, meron, laterotergite and mediotergite bare, hairs darker on dorsal margin of anepisternum. **Legs.** Legs mostly

dark yellow, except tarsi 4 and 5 black. Mostly covered in white scales, except anterior face of tibiae and anterior half of femora admixed with black scales; femora with long ventral white hairs on basal half. Fore femur with few anteroventral black bristles; mid femur with some anteroventral black bristles; hind femur with row of anteroventral black bristles. Other hairs and bristles on legs short and black. Fore tibia $2.1 \times$ longer than fore basitarsus, mid tibia $2.6 \times$ longer than mid basitarsus, hind tibia $2.1 \times$ longer than hind basitarsus. **Wing.** Wing membrane infuscated on anterior half, crossvein *r-m* with inconspicuous brown spot. Base of vein *Cu* with dense long pale yellow scales. Crossvein *r-m* arising 0.65 from base of cell *dm*; crossvein *m-m* short (Fig. 7C). Basicosta brown. Halter stem dark yellow, knob yellow. **Abdomen:** Tergites mostly orange except tergite 1 mostly black but yellow posterolaterally, tergites 2–5 with median triangular black markings. Tergite 1 with dense long yellow hairs admixed with black hairs, tergites 2–6 with short dark yellow scales admixed with black hairs. Sternites blackish brown except posterior half yellow, with thick grey pruinescence and dense pale yellow scales admixed with some black hairs. **Genitalia.** Epandrium trapezoid, anterior margin concave, posterior margin slightly concave (Fig. 7L). Hypandrium present, anterior margin slightly concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 7J); gonocoxal apodeme strong, incurved; lateral ejaculatory process strong, apical half expanded, $3.0 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 7K); gonostylus slender and pointed dorsally, $3.5 \times$ longer than wide. **FE-MALE:** Body length 10.1 mm, wing length 11.6 mm. Very similar to male, except frons black with thick grey pruinescence, $2.4 \times$ as wide as ocellar tubercle, frons with pale yellow and golden scales admixed with black hairs (Fig. 7H). Tergite 8 without thick long hairs. Acanthophorite spines absent. Genital fork divided into two L-shaped sclerites. Sperm pump strong, with both collars and lateral papillae. Distal spermathecal duct of normal length and not thickened. Spermatheca large and elongate, basal part spherical, apex nearly conical (Fig. 7O).

Remarks. *Eristalopsis danielsorum* sp.n. is similar to *E. maculata* sp.n., but the wing of *E. danielsorum* sp.n. is without distinct spots, pruinescence on the scutum not forming stripes, and abdominal tergite 2 is without a pale scale band.

Distribution. WA, SA.

Etymology. This species is named after the holotype collectors G. and A. Daniels.

Type material. Holotype ♂ (AMS), 'Cape Le Grand Nat[ional] | Park, W.A. | 33°58'S 122°07'E | 10 Jan 1987 | G. and A. Daniels' printed; '*Eristalopsis danielsorum* | Li & Yeates, 2018 | HOLOTYPE' printed, red; 'Australian Museum | K 504549' printed. – Paratype: 1♀, 'Pt Davenport, S.A. | 35°10'S 137°20'E | 8 Nov 1979 | on ground | G.S. Taylor' printed; '*Eristalopsis danielsorum* | Li & Yeates, 2018 | PARATYPE' printed, blue (QM: T244588).

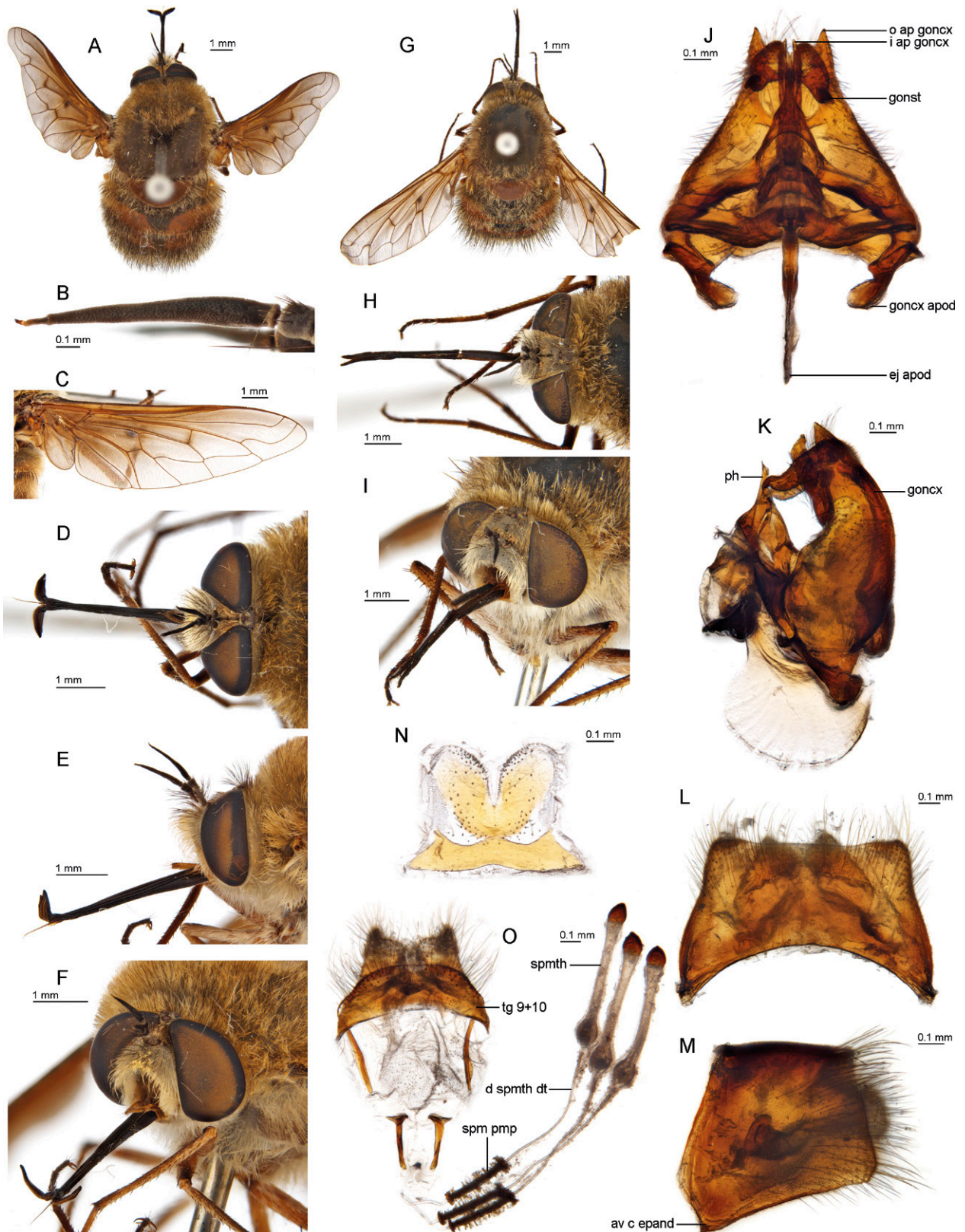


Fig. 7. *Eristalopsis danielsorum* sp.n. ♂ (A–F, J–M); ♀ (G–I, N–O): **A:** dorsal; **B:** flagellum; **C:** wing; **D:** head, dorsal; **E:** head, lateral; **F:** head, profile; **G:** dorsal; **H:** head, dorsal; **I:** head, profile; **J:** genital capsule, dorsal; **K:** genital capsule, lateral; **L:** epandrium, dorsal; **M:** epandrium, lateral; **N:** sternite 8, ventral; **O:** genitalia and spermathecae. Scale bars = 1.0 mm (A, C–I); = 0.1 mm (B, J–O).

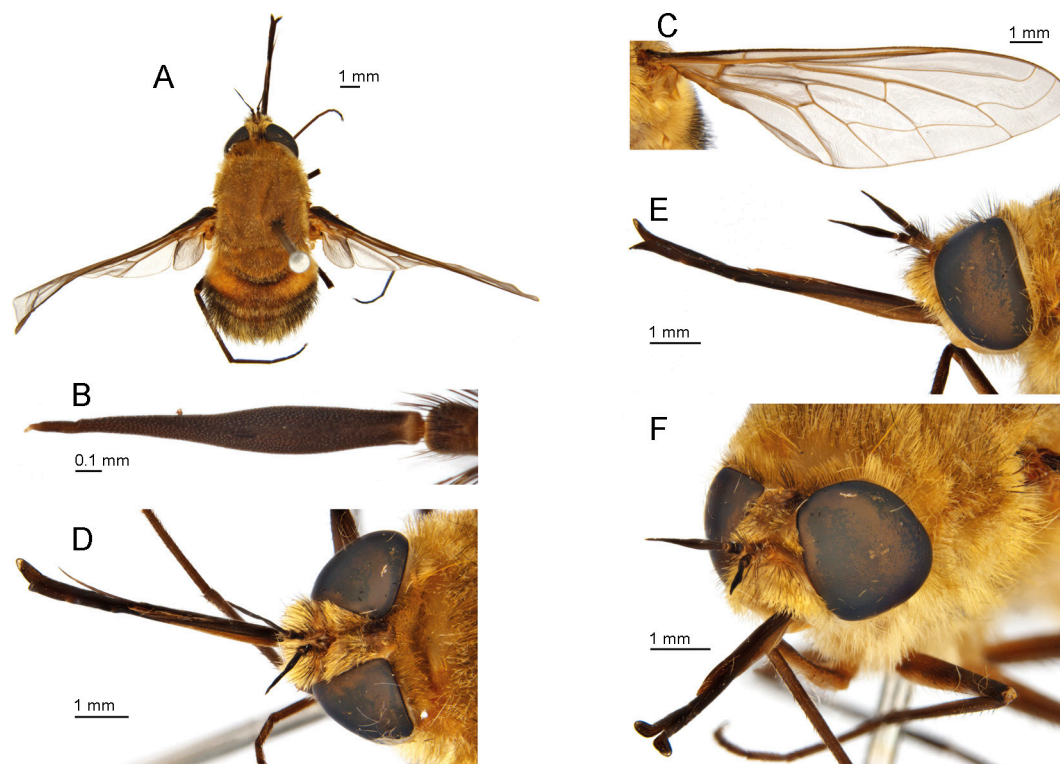


Fig. 8. *Eristalopsis flava* sp.n. ♀: **A:** dorsal; **B:** flagellum; **C:** wing; **D:** head, dorsal; **E:** head, lateral; **F:** head, profile. Scale bars = 1.0 mm (A, C–F); = 0.1 mm (B).

4.3.6. *Eristalopsis flava* sp.n.

Fig. 8A–F

Diagnosis. A combination of: medium-sized, yellowish bombyliine; scutum and scutellum yellow; antennal scape yellow; pedicel long, $2.0 \times$ as long as wide.

Description. **FEMALE:** Body length 12.0 mm, wing length 13.2 mm. **Head:** Head about $1.65 \times$ wider than long, mostly light brown with thick pale pruinescence and covered with pale yellow scales and admixed with black hairs. Eyes dichoptic, separate by $2.5 \times$ width of ocellar tubercle. Frons long, $2.0 \times$ length of ocellar tubercle, covered with golden scales admixed with black hairs. Ocellar tubercle slightly raised, light brown with grey pruinescence, with black hairs. Face with thick pale pruinescence, covered with short pale yellow to golden scales admixed with few black hairs. Gena with thick pale pruinescence and pale yellow hairs. Clypeus pale yellow with thick pale pruinescence. Occiput with golden scales, area adjacent to eye margins admixed with black hairs. Posterior eye margin not strongly concave. Antenna mostly blackish brown, except scape yellow; scape with sparse pale pruinescence and long black hairs, pedicel with short brown hairs. Scape relatively long, $2.9 \times$ as long as wide, and $1.7 \times$ as long as pedicel, uniform from base to apex. Pedicel long, $2.0 \times$ as long as wide. Flagellum elongate, $14.3 \times$ as long as wide, $1.9 \times$ as long as scape + pedicel ($3.0 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.15 \times$ length of 1st (Fig. 8B). Palpus thin and short, blackish brown with short black hairs,

one-segmented. Mouthparts slender, $4.0 \times$ as long as eye length ($2.9 \times$ as long as head length), labellum thin and filiform (Fig. 8E). **Thorax:** Scutum and scutellum yellow, with sparse pale pruinescence, covered in golden scales admixed with black hairs; postalar wall with some strong golden to brown hairs. 3 short blackish-brown and 1 long brownish-yellow notopleural setae present, long seta brown apically, postalar setae absent. Pleura mostly brown with thick pale pruinescence, densely covered with pale yellow to golden hairs, but anepimeron, meron, laterotergite and mediotergite bare, hairs darker on dorsal margin of anepisternum. **Legs.** Legs mostly dark yellow; mostly covered in black scales, except posterior face of femora and tibiae with pale yellow scales, base half of hind femora with long ventral pale yellow hairs; apical half of mid femur with few short anterior black bristles, hind femur with row of long anteroventral black bristles, apex of hind femur with additional bristles. Hairs and bristles on legs short and black. Fore tibia $1.8 \times$ longer than fore basitarsus, mid tibia $2.2 \times$ longer than mid basitarsus, hind tibia $2.0 \times$ longer than hind basitarsus. **Wing.** Wing membrane hyaline, but darker towards base of wing. Crossvein *r-m* arising 0.65 from base of cell *dm*; crossvein *m-m* short (Fig. 8C). Basicosta dark yellow. Halter stem yellow, knob pale yellow. **Abdomen:** Tergites orange with median area slightly darker. Tergite 1 covered with pale yellow hairs, tergite 2 mostly with golden hairs and posterior half admixed with black hairs, tergites 3–6 covered with admixed black hairs and golden scales, distal segments with more golden hairs. Sternites yellow, covered with golden scales admixed

with black hairs. *Genitalia*. Not dissected. **MALE**: Unknown.

Remarks. *Eristalopsis flava* sp.n. differs markedly from congeners by having a yellow coloured scutum.

Distribution. QLD.

Etymology. This specific name refers to the yellow scutum.

Type material. Holotype ♂ (QM), '13 km N of Dunwich | North Stradbroke Is[land], | Qld 26°55'S 153°09'E | 16 Mar 1986 | D.K. Yeates' printed; '*Eristalopsis flava* | Li & Yeates, 2018 | HOLOTYPE' printed, red (QM: T244589).

4.3.7. *Eristalopsis maculata* sp.n.

Fig. 9A–O

Diagnosis. A combination of: large-sized, robust bomb-yliline; male eyes dichoptic; wing spotted dark brown markings; base of vein *Cu* with dense long scales; scutum with three pale pruinose stripes; scutellum orange; abdominal tergite 2 with distinct white scale band.

Description. **MALE**: Body length 10.4–10.5 mm, wing length 10.9–11.1 mm. **Head**: Head about $2.7 \times$ wider than long, mostly blackish with thick pale pruinescence, covered in admixed pale yellow to black hairs. Eye dichoptic, separate by $0.6 \times$ width of ocellar tubercle. Frons short, $1.2 \times$ length of ocellar tubercle, blackish brown with long golden scales and black hairs. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with long blackish-brown hairs. Face with sparse grey pruinescence and long pale to dark yellow scales admixed long black hairs. Gena with thick pale pruinescence and pale yellow hairs. Clypeus brown with sparse pale pruinescence. Occiput with short blackish-brown hairs and pale yellow scales. Posterior eye margin not strongly concave. Antenna black; scape and pedicel with thick pale pruinescence and black hairs, hairs on scape long and on pedicel short, flagellum bare. Scape relatively long, $3.0 \times$ as long as wide, and $3.0 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, $1.1 \times$ as long as wide. Flagellum elongate, $12.8 \times$ as long as wide, $1.9 \times$ as long as scape + pedicel ($2.6 \times$ as long as scape), conical and slightly depressed on side, 2-segmented with apical stylus; 2nd segment $0.1 \times$ length of 1st (Fig. 9B). Palpus thin and short, dark yellow with brown hairs, one-segmented. Mouthparts slender and elongate, $5.0 \times$ as long as eye length ($3.0 \times$ as long as head length), labellum thin and filiform (Fig. 9E). **Thorax**: Scutum mostly black except postalar callus light brown, covered with pale pruinescence, pruinescence dense on scutal margin, forming three pale stripes medially. Scutum with admixed pale yellow scales and brown to black hairs, more pale hairs on lateral margin, and more black hairs posteriorly; postalar callosity with long white to pale yellow scales admixed with long black hairs, postalar wall with some strong black to golden hairs. Scutellum orange with pale pruinescence, with admixed white scales and black hairs. 4 dark yellow notopleural setae present, postalar setae absent. Pleura black with thick grey pruinescence, densely covered in ad-

mixed white to brownish-yellow hairs, anepisternum admixed with some black hairs on dorsal half, anepimeron, meron, laterotergite and mediotergite bare, hairs darker on dorsal margin of anepisternum. **Legs**. Legs mostly dark yellow, except tarsi 4 and 5 black. Femora and tibia with black scales except ventral face of femora with long white scales. Femora with long ventral blackish-brown hairs and long anteroventral black bristles, hairs denser on hind femur, more sparse on fore femur, more bristles on hind femur than mid and fore femora. Other hairs and bristles on legs short and blackish brown. Fore tibia $2.1 \times$ longer than fore basitarsus, mid tibia $2.7 \times$ longer than mid basitarsus, hind tibia $2.3 \times$ longer than hind basitarsus. **Wing**. Wing membrane infuscated and darker anteriorly and basally, with spotted dark brown markings on base of R_4 , apex of M_1 , crossvein *r-m*, crossvein *m-m*, base of crossvein *m-cu* and apex of cell *bm*. Base of vein *Cu* with dense long brownish-yellow scales. Crossvein *r-m* arising 0.65 from base of cell *dm*; crossvein *m-m* long (Fig. 9C). Basicosta blackish brown. Halter stem yellow, knob pale yellow. **Abdomen**: Tergites mostly orange except tergite 1 black, tergites 2–3 with median rectangular black markings. Tergite 1 with dense long yellow hairs laterally, tergites 2–7 with short golden scales admixed with long black hairs, posterior margin with curved long white scales. Sternites blackish brown except posterior margins yellow, with thick grey pruinescence and dense white scales admixed with brownish-yellow scales with some black hairs. **Genitalia**. Epandrium trapezoid, anterior margin concave, posterior margin slightly concave (Fig. 9L). Hypandrium present, anterior margin concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 9J); gonocoxal apodeme strong, incurved and apex branched; lateral ejaculatory process strong, $2.7 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 9K); gonostylus slender and pointed dorsally, $3.0 \times$ longer than wide. **FEMALE**: Body length 10.7–11.0 mm, wing length 10.9–11.2 mm. Very similar to male, except frons black with thick grey pruinescence, $2.4 \times$ as wide as ocellar tubercle, frons with yellow scales and black hairs (Fig. 9H). Stump vein sometimes present on R_4 . Abdominal tergites 2–6 with short scales admixed with long black hairs, posterior margin with dense white to pale yellow scales, tergite 2 with distinct white band. Tergite 8 without thick long hairs. Acanthoporphite spines absent. Genital fork divided into two L-shaped sclerites. Sperm pump strong, with both collars and lateral papillae. Distal spermathecal duct of normal length and not thickened. Spermatheca large and elongate, basal part spherical, apex nearly spherical (Fig. 9O).

Remarks. *Eristalopsis maculata* sp.n. is similar to *E. danielsorum* sp.n., but differs as follows: wing strongly spotted; scutum with three pale pruinose stripes; abdominal tergite 2 with distinct white band of scales.

Distribution. WA.

Etymology. This specific name refers to its spotted wing.

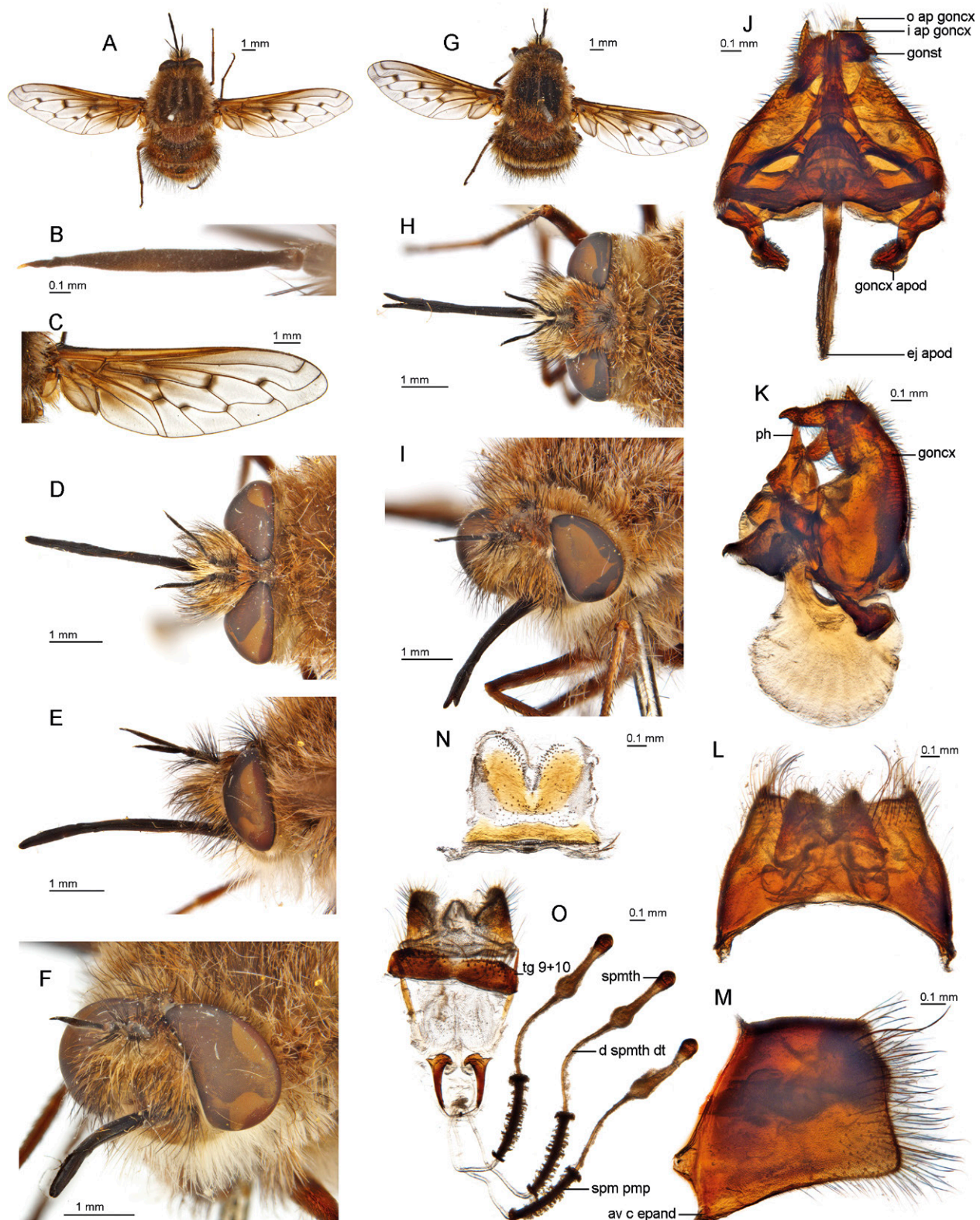


Fig. 9. *Eristalopsis maculata* sp.n. ♂ (A–F, J–M); ♀ (G–I, N–O). A: dorsal; B: flagellum; C: wing; D: head, dorsal; E: head, lateral; F: head, profile; G: dorsal; H: head, dorsal; I: head, profile; J: genital capsule, dorsal; K: genital capsule, lateral; L: epandrium, dorsal; M: epandrium, lateral; N: sternite 8, ventral; O: genitalia and spermathecae. Scale bars = 1.0 mm (A, C–I); = 0.1 mm (B, J–O).

Type material. Holotype ♂ (ANIC), ‘12.IX.1982 AB | N[ea]r. Parrot Ridge | W[estern]. Aust[r]alia., MJ Smart | S31°31' E115°42''; ‘At flowers in | Jarrah/Banksia | Mixed Woodland | Elev[ation]. c[irc]a. 50 m’ printed; ‘*Eristalopsis maculata* | Li & Yeates, 2018 | HOLOTYPE’ printed, red; ‘ANIC Database No. | 29 041437’

printed (ANIC). – Paratypes: 1♂, 3♀, same data as type (ANIC: 29-041438 [♂]; 29-041439–29-041441 [♀]). 1♀, ‘26.IX.1982 J | Nr. Parrot Ridge | W[estern]. Aust[r]alia., MJ Smart | S31°31' E115°42'', ‘At flowers in | Jarrah/Banksia | Mixed Woodland | Elev[ation]. c[irc]a. 50 m’ printed; ‘*Eristalopsis maculata* |

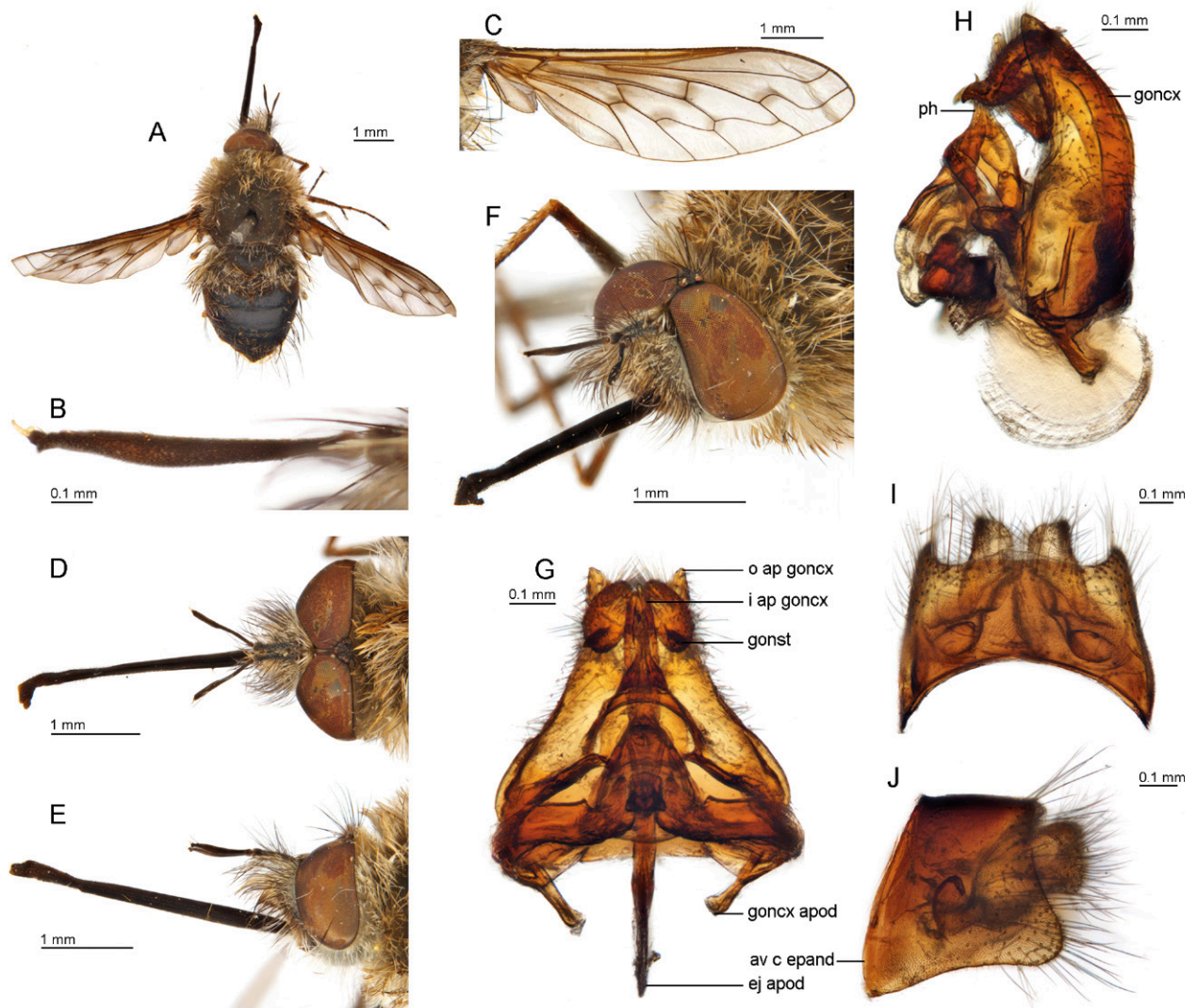


Fig. 10. *Eristalopsis minor* sp.n. ♂: A: dorsal; B: flagellum; C: wing; D: head, dorsal; E: head, lateral; F: head, profile; G: genital capsule, dorsal; H: genital capsule, lateral; I: epandrium, dorsal; J: epandrium, lateral. Scale bars = 1.0 mm (A, C–F); = 0.1 mm (B, G–J).

Li & Yeates, 2018 | PARATYPE' printed, blue (MSC). 1♀, '29. VIII.1981 Z | Military R[oa]d. N[ea]r. | Wabling Hill | W[estern]. Aust[ralia]., MJ Smart | S31°31' E115°42' printed; 'At flowers in | Jarrah/Banksia | Mixed Woodland | Elev[ation]. c[irc]a. 50 m' printed; '*Eristalopsis maculata* | Li & Yeates, 2018 | PARATYPE' printed, blue; 'ANIC Database No. | 29 041442' printed (ANIC).

4.3.8. *Eristalopsis minor* sp.n.

Fig. 10A–J

Diagnosis. A combination of: small-sized, spotted-winged bombyliine; crossvein *m-m* long; scutellum black; hind femur with row of anteroventral bristles; abdominal tergites mostly black with some reddish markings posterolaterally; anteroventral corner of epandrium long.

Description. **MALE:** Body length 6.8 mm, wing length 6.3 mm. **Head:** Head about $2.0 \times$ wider than long, mostly blackish with thick pale pruinescence and covered in admixed white to black hairs. Eyes narrowly separated by $0.2 \times$ width of ocellus. Frons short, $1.8 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $1.1 \times$ length of upper frons, blackish brown

with white to blackish-brown scales. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with long brown to black hairs. Face with thick pale pruinescence and with long pale yellow to yellow scales admixed with long black hairs. Gena with thick pale pruinescence and white hairs. Clypeus blackish brown with sparse pale pruinescence. Occiput with pale yellow to yellow scales. Posterior eye margin not strongly concave. Antenna black; scape and pedicel with thick pale pruinescence and blackish-brown hairs, hairs on scape long and on pedicel short, flagellum bare. Scape relatively long, $4.0 \times$ as long as wide, and $3.3 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, $1.2 \times$ as long as wide. Flagellum elongate, $10.2 \times$ as long as wide, $1.6 \times$ as long as scape + pedicel ($2.1 \times$ as long as scape), conical and slightly depressed on side, 2-segmented with apical stylus; 2nd segment $0.03 \times$ length of 1st (Fig. 10B). Palpus thin and short, blackish brown with golden hairs, one-segmented. Mouthparts slender and elongate, $4.9 \times$ as long as eye length ($2.7 \times$ as long as head length), labellum thin and filiform (Fig. 10E).

Thorax: Scutum and scutellum black, with grey pruinescence, pruinescence denser margins of scutum. Scutum and scutellum mostly covered with pale yellow scales admixed with black hairs, postalar wall with strong black hairs, posterior margin of scutellum with admixed white and golden scales and black hairs. 3 dark yellow notopleural setae present, postalar setae absent. Pleura black with thick grey pruinescence, mostly covered with white hairs, anepisternum admixed with dark yellow hairs and black hairs on dorsal margin, anepimeron, meron, laterotergite and mediotergite bare. **Legs.** Legs mostly dark yellow, except femora mostly black but apex of fore and mid femora dark yellow; tarsomeres 4 and 5 black. Legs mostly covered with white scales, ventral face of base half of femora with long white to pale yellow hairs; mid femur with some long anteroventral black bristles on apex half; hind femur with row of long anteroventral black bristles, more bristles on apex of hind femur. Other hairs and bristles on legs short and black. Fore tibia $1.65 \times$ longer than fore basitarsus, mid tibia $2.0 \times$ longer than mid basitarsus, hind tibia $2.0 \times$ longer than hind basitarsus. **Wing.** Wing membrane infuscated and darker anteriorly and basally, with spotted brown markings on base of R_4 , apex of M_1 , crossvein $r-m$, crossvein $m-m$, base of crossvein $m-cu$ and apex of cell bm . Base of vein Cu bare. Crossvein $r-m$ arising 0.65 from base of cell dm ; crossvein $m-m$ long (Fig. 10C). Basicosta blackish brown. Halter stem dark yellow, knob dark yellow. **Abdomen:** Tergites mostly black, tergites 2–5 with some reddish markings posterolaterally. [Most vestiture on tergites abraded]. Tergites mostly with white and golden scales admixed with long back hairs on posterior margin. Sternites blackish-brown, with thick grey pruinescence and dense white scales admixed with some black hairs. **Genitalia.** Epandrium trapezoid, anterior margin concave, anteroventral corner of epandrium long, posterior margin straight (Fig. 10I). Hypandrium present, anterior margin slightly concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong, expanded apically (Fig. 10G); gonocoxal apodeme strong, incurved and apex branched; lateral ejaculatory process strong, $3.5 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 10H); gonostylus slender and pointed dorsally, $2.7 \times$ longer than wide. **FEMALE:** Unknown.

Remarks. *Eristalopsis minor* sp.n. is similar to *E. smarti* sp.n., but the hind femur of *E. minor* sp.n. has one row of anteroventral bristles, the abdominal tergites are mostly black with some reddish markings posterolaterally, and the anteroventral corner of the epandrium is long.

Distribution. WA.

Etymology. This specific name refers to its small body size.

Type material. Holotype ♂ (ANIC), '10.X.1981 R | Cypress R[oa] d., Pinjar | W[estern]. Aust[r]alia., MJ Smart | S31°35', E115°48"', printed; 'At flowers among | *Banksia* scrub | Elev[ation]. c[irc]a. 60 m' printed; '*Eristalopsis minor* | Li & Yeates, 2018 | HOLOTYPE' printed, red; 'ANIC Database No. | 29 041443' printed (ANIC).

4.3.9. *Eristalopsis parva* sp.n.

Fig. 11A–O

Diagnosis. A combination of: small to medium sized, yellowish bombyliine, face covered with long blackish-brown hairs, with white scales laterally; wing membrane hyaline; anterior face of femora and tibia with black scales; outer apex of male gonocoxite short and subacute; spermatheca of female genitalia rounded.

Description. **MALE:** Body length 6.6–8.9 mm, wing length 6.9–9.3 mm. **Head:** Head about $2.3 \times$ wider than long, mostly blackish with thick pale pruinescence and covered with white to blackish brown scales admixed with blackish-brown hairs. Eyes holoptic. Frons long, $2.8 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $0.5 \times$ length of upper frons, blackish brown with short blackish-brown scales. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with blackish-brown hairs. Face with thick pale pruinescence and covered with sparse long blackish-brown hairs, with white scales laterally. Gena with thick pale pruinescence and white hairs. Clypeus brown with sparse pale pruinescence. Occiput with golden scales. Posterior eye margin not strongly concave. Antenna blackish brown; scape and pedicel with sparse pale pruinescence and blackish-brown hairs, hairs on scape long, on pedicel short, flagellum bare. Scape long, $4.0 \times$ as long as wide, and $3.6 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, $1.2 \times$ as long as wide. Flagellum elongate, $15.0 \times$ as long as wide, $1.55 \times$ as long as scape + pedicel ($2.15 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.16 \times$ length of 1st (Fig. 11B). Palpus thin and short, blackish brown with short brown hairs, one-segmented. Mouthparts slender, $6.1 \times$ as long as eye length ($3.6 \times$ as long as head length), labellum thin and filiform (Fig. 11E). **Thorax:** Scutum mostly black with thick grey pruinescence, except postalar callosity with small reddish markings. Scutum covered with short golden hairs, hairs denser on anterior half; posterior half more sparse and admixed with some black hairs; postalar wall with some strong golden hairs. Scutellum mostly black, sometimes with inconspicuous reddish markings, with sparse pale pruinescence, covered with golden hairs admixed with black hairs. 2 dark yellow notopleural setae present, postalar setae absent. Pleura mostly black with thick pale pruinescence, densely covered with pale yellow hairs except dorsal margin of anepisternum with golden hairs, but anepimeron, meron, laterotergite and mediotergite bare. **Legs.** Legs mostly dark yellow except tarsus blackish brown; anterior face of femora and tibiae covered in black scales, posterior face of femora and tibiae covered in white scales, base half of femora with long ventral white scales; anterior face of mid femur with some short blackish-brown setae, hind femora with a row of long anteroventral blackish-brown bristles, apex of hind femur with additional short bristles. Hairs and bristles on legs short and black. Fore tibia $1.7 \times$ longer than fore basitarsus, mid tibia $2.2 \times$ longer than mid basi-

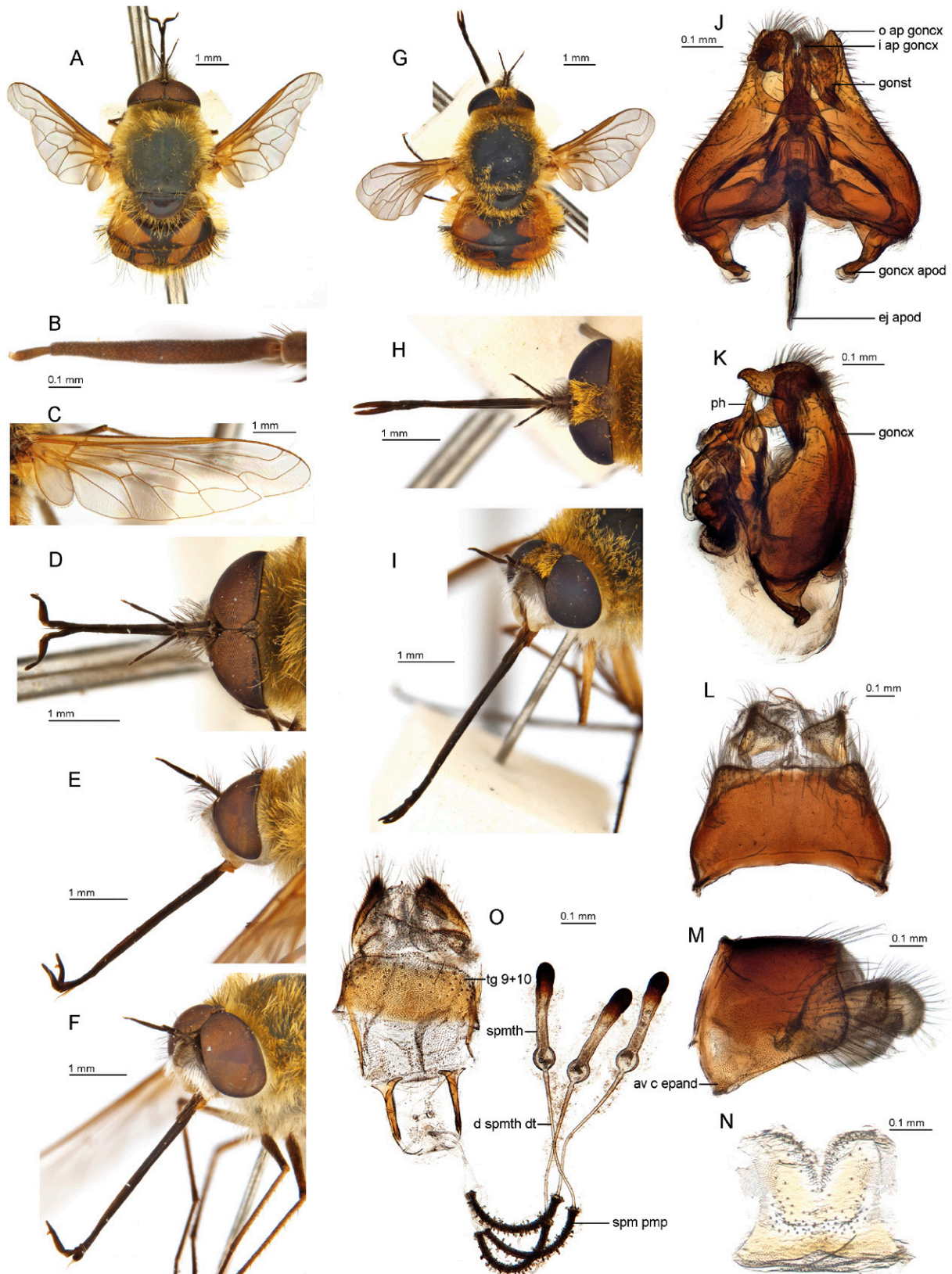


Fig. 11. *Eristalopsis parva* sp.n. ♂ (A–F, J–M); ♀ (G–I, N–O): A: dorsal; B: flagellum; C: wing; D: head, dorsal; E: head, lateral; F: head, profile; G: dorsal; H: head, dorsal; I: head, profile; J: genital capsule, dorsal; K: genital capsule, lateral; L: epandrium, dorsal; M: epandrium, lateral; N: sternite 8, ventral; O: genitalia and spermathecae. Scale bars = 1.0 mm (A, C–I); = 0.1 mm (B, J–O).

tarsus, hind tibia $2.0 \times$ longer than hind basitarsus. *Wing.* Wing membrane hyaline, but slightly darker towards base of wing. Crossvein *r-m* arising 0.6 from base of cell *dm*;

crossvein *m-m* short (Fig. 11C). Basicosta pale yellow. Halter stem yellow, knob pale yellow. *Abdomen:* Tergites mostly dark yellow with median black markings. Tergite

1 mostly black but yellow posterolaterally; tergites 2–5 mostly yellow with a median narrow black marking widening on anterior and posterior margins, and some small black markings laterally. Tergite 1 covered with golden hairs, tergites 2–5 mostly covered with golden scales and posterior margins admixed with long black hairs, hairs longer posterolaterally. Sternites mostly black, except sternite 1 mostly yellow with median rectangular black marking, tergite 2 mostly yellow with median triangular black marking and posterior margin pale yellow. Sternites covered in thick pale pruinescence and pale yellow scales. **Genitalia.** Epandrium trapezoid, anterior margin concave, posterior margin slightly concave (Fig. 11L). Hypandrium present, anterior margin slightly concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 11J); gonocoxal apodeme strong and incurved, apex branched; lateral ejaculatory process strong, expanded apically, $3.4 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 11K); gonostylus slender and pointed dorsally, $3.8 \times$ longer than wide. **FEMALE:** Body length 4.3–10.0 mm, wing length 5.0–10.2 mm. Similar to male, except frons black with thick grey pruinescence, $2.4 \times$ as wide as ocellar tubercle, frons with short golden scales and admixed with black hairs (Fig. 11H). Tergite 8 without thick long hairs. Acanthoporphite spines absent. Genital fork divided into two straight sclerites. Sperm pump strong, with both collars and lateral papillae. Distal spermathecal duct of normal length and not thickened. Spermatheca large and elongate, basal part spherical, apex nearly spherical (Fig. 11O).

Remarks. *Eristalopsis parva* sp.n. is similar to *E. rubriventris* but differs from it in having black scales on the anterior face of femora and tibiae. Besides, *E. rubriventris* is only known from a single female specimen collected in Sydney, therefore these are very likely to be different species.

Eristalopsis parva sp.n. is also similar to *E. wrightae* sp.n., but differs from it as follows: face covered with long blackish-brown hairs, with white scales laterally; wing membrane hyaline, slightly darker towards basal area; outer apex of male gonocoxite short and subacute; gonocoxal apodeme of male genitalia not branched apically; spermatheca of female genitalia rounded.

Distribution. NT.

Etymology. This specific name refers to the small body size of this species.

Type material. Holotype ♂ (ANIC), 'Koongarra, 15 km | E of Mt. Cahill, | N.T. | 6-9 March 1973 | D.H. Colless' printed; '*Eristalopsis parva* | Li & Yeates, 2018 | HOLOTYPE' printed, red; 'ANIC Database No. | 29 041444' printed (ANIC). – Paratypes 1♂, 7♀, same data as holotype (ANIC: 29-041445 [♂]; 29-041446–29-041452 [♀]).

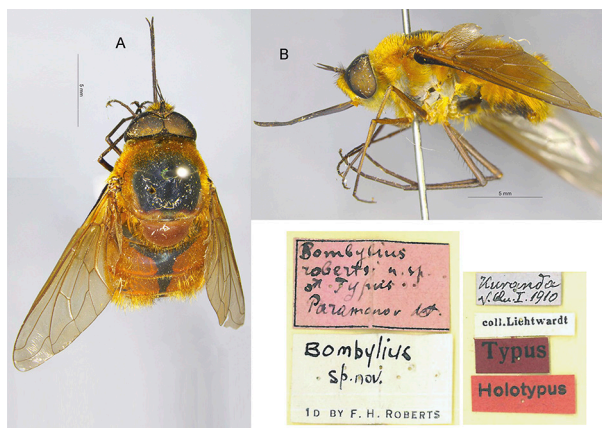


Fig. 12. *Eristalopsis robertsi* (Paramonov) ♂ holotype **A:** dorsal; **B:** lateral. Scale bars = 5 mm. Photographed by F. Menzel (DEI).

4.3.10. *Eristalopsis robertsi* (Paramonov, 1934)

Figs. 12A,B, 13A–O

Bombylius robertsi Paramonov, 1934: 31. Type-locality: Australia (QLD); Holotype ♂, DEI.

Eristalopsis robertsi (Paramonov, 1934): Evenhuis & Greathead, 1999: 149.

Diagnosis. A combination of: large-sized, reddish bombyliine; wing membrane slightly infuscated; scutellum reddish; antennal pedicel long, $2.3 \times$ as long as wide; second segment of flagellum long; gonocoxal apodeme of male genitalia branched apically.

Redescription. **MALE:** Body length 14.0–16.0 mm, wing length 14.2–16.0 mm. **Head:** Head about $1.9 \times$ wider than long, mostly blackish brown with thick pale pruinescence and covered with yellow to black scales and hairs. Eyes holoptic. Frons long, $3.0 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $0.7 \times$ length of upper frons, blackish brown with golden scales admixed with blackish-brown hairs. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with blackish-brown hairs. Face with thick pale pruinescence and covered in moderate golden scales admixed with blackish-brown hairs. Gena with thick pale pruinescence and yellow hairs. Clypeus blackish brown with thick pale pruinescence. Occiput with dark yellow hairs, dorsal half of posterior eye margin admixed with black hairs. Posterior eye margin not strongly concave. Antenna black; scape with thick pale pruinescence and long blackish-brown hairs, ventral face admixed with few golden scales, pedicel with sparse pale pruinescence and short blackish-brown hairs. Scape relatively long, $3.0 \times$ as long as wide, and $1.7 \times$ as long as pedicel, uniform from base to apex. Pedicel long, $2.3 \times$ as long as wide. Flagellum elongate, $10.0 \times$ as long as wide, $1.8 \times$ as long as scape + pedicel ($2.9 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.19 \times$ length of 1st (Fig. 13B). Palpus thin and short, blackish brown with short black hairs, one-segmented. Mouthparts slender, $4.0 \times$ as long as eye length ($2.8 \times$ as long as head length), labellum thin and

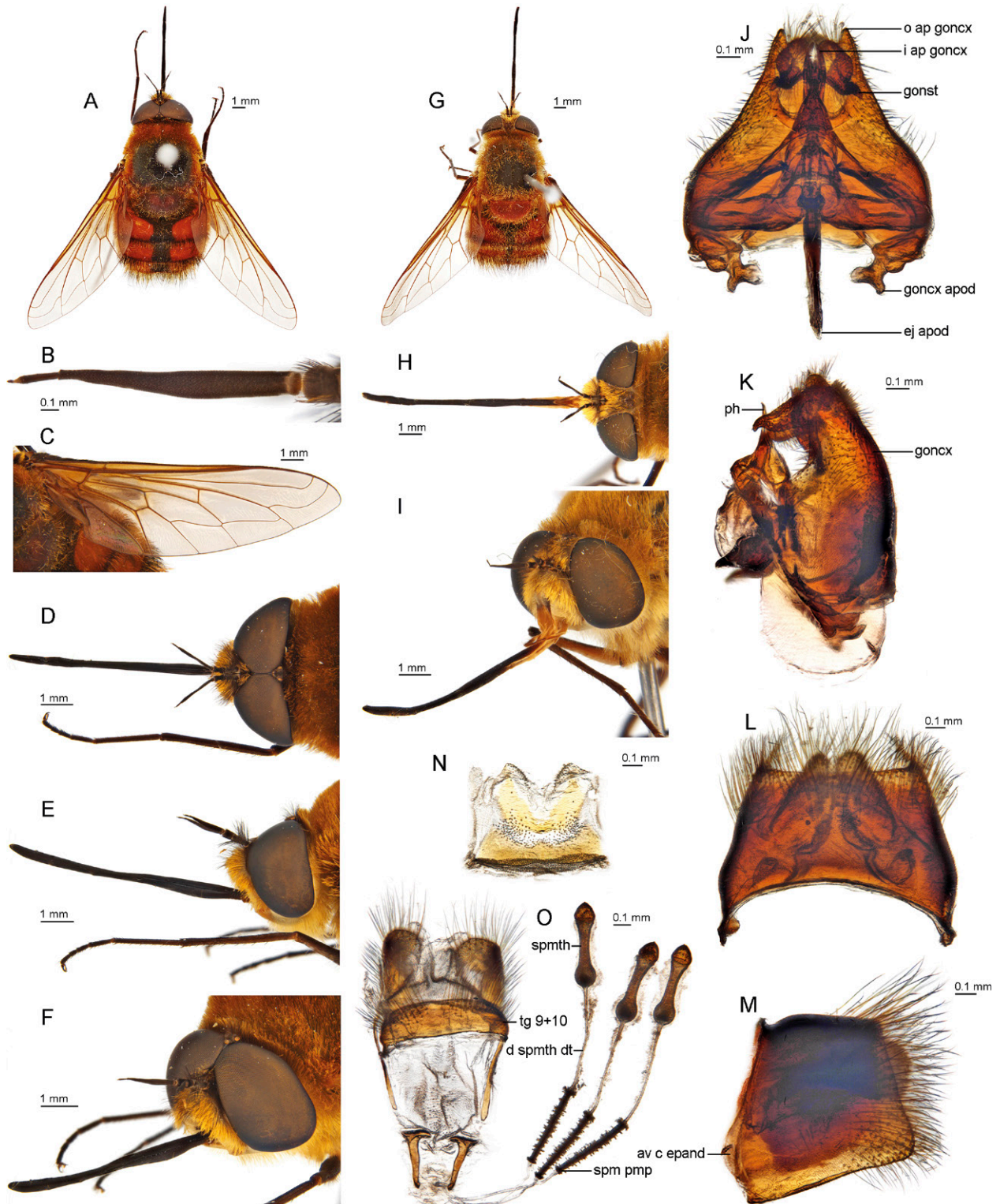


Fig. 13. *Eristalopsis robertsi* (Paramonov) ♂ (A–F, J–M); ♀ (G–I, N–O): **A:** dorsal; **B:** flagellum; **C:** wing; **D:** head, dorsal; **E:** head, lateral; **F:** head, profile; **G:** dorsal; **H:** head, dorsal; **I:** head, profile; **J:** genital capsule, dorsal; **K:** genital capsule, lateral; **L:** epandrium, dorsal; **M:** epandrium, lateral; **N:** sternite 8, ventral; **O:** genitalia and spermathecae. Scale bars = 1.0 mm (A, C–I); = 0.1 mm (B, J–O).

filiform (Fig. 13E). **Thorax:** Scutum mostly black with thick grey pruinescence, except postalar callosity reddish. Scutum covered with short golden scales admixed with short black hairs, hairs denser on anterior half; postalar callosity with black hairs admixed with golden scales, postalar wall with some strong black to golden

hairs. Scutellum reddish, with sparse pale pruinescence, mostly covered with black hairs admixed with golden scales. 4 short black and 1 long brown notopleural setae present, postalar setae absent. Pleura mostly black with thick pale pruinescence, densely covered with golden hairs, but anepimeron, meron, laterotergite and medioter-

gite bare, hairs darker on dorsal margin of anepisternum. **Legs.** Legs dark brown and mostly covered with black scales, posterior face of fore, mid and base of hind femora admixed with golden scales; hind and anterior half of mid femora with row of short anteroventral bristles, apex of hind femur with additional short bristles. Hairs and bristles on legs short and black. Fore tibia $1.7 \times$ longer than fore basitarsus, mid tibia $2.4 \times$ longer than mid basitarsus, hind tibia $1.9 \times$ longer than hind basitarsus. **Wing.** Wing membrane slightly infuscated, darker towards basal and anterior area of wing. Crossvein *r-m* arising 0.65 from base of cell *dm*; crossvein *m-m* short (Fig. 13C). Basicosta dark yellow. Halter stem dark yellow, knob yellow. **Abdomen:** Tergites mostly orange with median black markings. Tergite 1 mostly black but orange posterolaterally; tergite 2 mostly orange except median narrow black marking widening anteriorly to meet the marking on tergite 1; tergites 3–5 mostly orange except black marking medially; tergites 6–9 mostly black. Tergites mostly covered with pale yellow to golden scales and hairs, posterior margin of tergites 2–8 with black hairs, hairs longer posterolaterally and on posterior segments. Sternites mostly black except posterior margin and lateral yellow, covered with yellow hairs admixed with black hairs. **Genitalia.** Epandrium trapezoid, anterior margin concave, posterior margin slightly concave (Fig. 13L). Hypandrium present, anterior margin concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 13J); gonocoxal apodeme strong, incurved and apex branched; lateral ejaculatory process strong, $3.2 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 13K); gonostylus slender and pointed dorsally, $3.2 \times$ longer than wide. **FEMALE:** Body length 10.9–14.2 mm, wing length 12.9–16.3 mm. Similar to male, except frons black with thick grey pruinescence, $2.4 \times$ as wide as ocellar tubercle, frons with short golden scales admixed with black hairs (Fig. 13H). Hair colour paler. Scutellum orange. Wings more hyaline. Basicosta yellow. Some females with darker body colour. Scutellum blackish brown to black. Abdomen sometimes similar to male, but in many cases mostly black, except posterolateral of tergite 1 and lateral of tergites 2–5 orange. Tergite 8 without thick long hairs. Acanthophorite spines absent. Genital fork divided into two L-shaped sclerites. Sperm pump strong, with both collars and lateral papillae. Distal spermathecal duct of normal length and not thickened. Spermatheca large and elongate, basal part spherical, apex nearly conical with small conical point (Fig. 13O).

Remarks. *Eristalopsis robertsi* was the first unnamed allied form of *E. rubriventris* described by ROBERTS (1928: 450). About half of the females examined have a mostly black abdomen, the remainder are similar to the male with abdominal tergites mostly reddish. Colour of scutellum varies from fully reddish to almost black with a few reddish markings.

Distribution. QLD.

Type material. Holotype ♂ (DEI) [type photos examined], ‘Kuranda | N. Qu. I. 1910’ handwritten; ‘coll. Liehtwardt’ printed; ‘Typus’ printed, red; ‘Holotypus’ printed, red; ‘Bombylius robertsi n. sp. | ♂ Typus | Paramonov det.’ handwritten, red; ‘Bombylius | sp. nov. | ID BY F. H. ROBERTS’ handwritten; (DEI) (Fig. 12)

4.3.11. *Eristalopsis rubra* sp.n.

Fig. 14A–J

Diagnosis. A combination of: medium-sized, reddish bombyliine; scutellum mostly orange; antennal pedicel normal, as long as wide; flagellum with some short hairs dorsally; second segment of flagellum short; wing membrane strongly infuscated; gonocoxal apodeme of male genitalia branched apically.

Description. **MALE:** Body length 9.6–10.9 mm, wing length 10.0–11.4 mm. **Head:** Head about $2.2 \times$ wider than long, mostly blackish with thick pale pruinescence and covered with pale yellow to black scales and hairs. Eyes holoptic. Frons long, $2.6 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $0.95 \times$ length of upper frons, blackish brown with short golden scales admixed with long blackish-brown scales. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with blackish-brown hairs admixed with dark yellow hairs. Face with thick pale pruinescence and covered with dense golden scales admixed with long black hairs. Gena with thick pale pruinescence and pale yellow hairs. Clypeus blackish brown with thick pale pruinescence. Occiput with pale yellow to golden scales admixed with few blackish-brown hairs. Posterior eye margin not strongly concave. Antenna dark blackish brown; scape and pedicel with sparse pale pruinescence and black hairs admixed with golden scales on ventral face, hairs on scape long, on pedicel short, flagellum with some short hairs dorsally. Scape normal, $2.8 \times$ as long as wide, and $3.0 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, as long as wide. Flagellum elongate, $15.0 \times$ as long as wide, $2.4 \times$ as long as scape + pedicel ($3.4 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.1 \times$ length of 1st (Fig. 14B). Palpus thin and short, yellow with short yellow hairs admixed with few brown hairs, one-segmented. Mouthparts slender, $3.15 \times$ as long as eye length ($2.4 \times$ as long as head length), labellum thin and filiform (Fig. 14E). **Thorax:** Scutum mostly black with thick grey pruinescence, except postalar callosity with small reddish markings. Scutum covered with short golden hairs, hairs denser on anterior half and apex darker; posterior half admixed with some black hairs; postalar wall without strong hairs. Scutellum mostly orange except anterior margin black, with sparse pale pruinescence, covered with dark yellow hairs admixed with black hairs. 3 dark yellow notopleural setae present, setae brown apically, postalar setae absent. Pleura mostly black with thick pale pruinescence, densely covered with admixed golden to orange hairs, but anepimeron, meron, laterotergite and mediotergite bare, hairs orange on dorsal half of anepisternum. **Legs.** Legs mostly dark yellow except

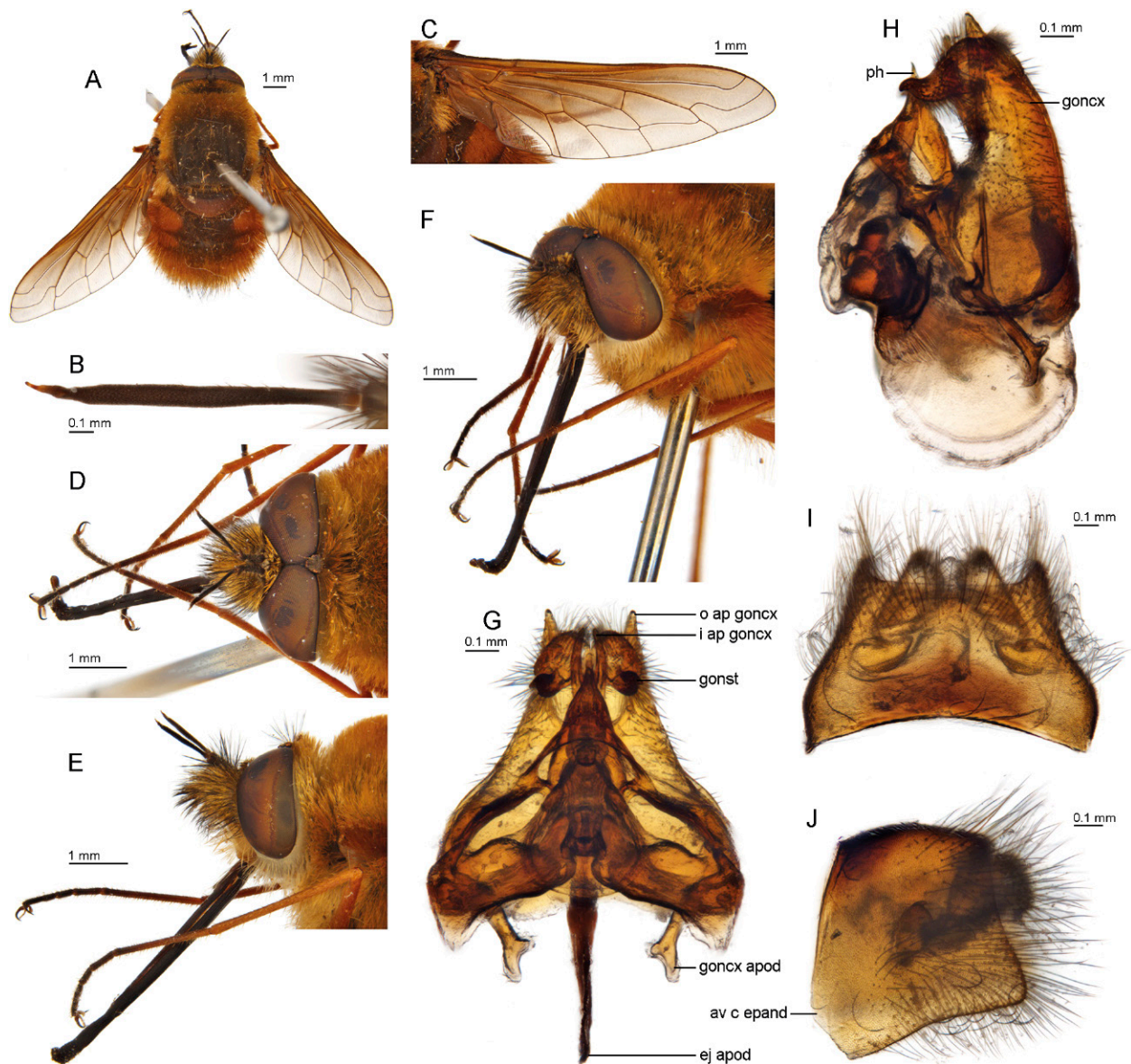


Fig. 14. *Eristalopsis rubra* sp.n. ♂: **A:** dorsal; **B:** flagellum; **C:** wing; **D:** head, dorsal; **E:** head, lateral; **F:** head, profile; **G:** genital capsule, dorsal; **H:** genital capsule, lateral; **I:** epandrium, dorsal; **J:** epandrium, lateral. Scale bars = 1.0 mm (A, C–F); = 0.1 mm (B, G–J).

segments of tarsus gradually turning to black distally; mostly covered with dark yellow scales, basal half of femora with long pale yellow scales; apical half of hind femora with row of anteroventral dark yellow bristles. Hairs and bristles on legs short and dark yellow. Fore tibia $1.7 \times$ longer than fore basitarsus, mid tibia $2.15 \times$ longer than mid basitarsus, hind tibia $1.8 \times$ longer than hind basitarsus. *Wing.* Wing membrane strongly infuscated, and darker on base and anterior margin. Crossvein *r-m* arising 0.7 from base of cell *dm*; crossvein *m-m* short (Fig. 14C). Basicosta dark brown. Halter stem pale yellow, knob yellow. *Abdomen:* Tergites mostly black with orange markings laterally. Tergite 1 mostly blackish brown but yellow posterolaterally; tergites 2–6 mostly black except lateral margins orange. Tergites mostly covered with golden hairs, hairs dark apically, posterior margin of tergites 2–6 with long black hairs, hairs longer posterolaterally. Sternites yellow and with

pale yellow scales admixed with golden hairs. *Genitalia.* Epandrium trapezoid, anterior margin concave, posterior margin straight (Fig. 14I). Hypandrium present, anterior margin slightly concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 14G); gonocoxal apodeme strong and incurved, apex branched; lateral ejaculatory process strong, expanded apically, $2.5 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 14H); gonostylus slender and pointed dorsally, $2.0 \times$ longer than wide. **FEMALE:** Unknown.

Distribution. NSW.

Remarks. *Eristalopsis rubra* sp.n. was the third unnamed allied form of *E. rubriventris* described by ROBERTS (1928: 450). *Eristalopsis rubra* sp.n. is similar to *E. robertsi*, but differs from it by the antennal pedicel is normal, as long as wide; the second segment of flagellum

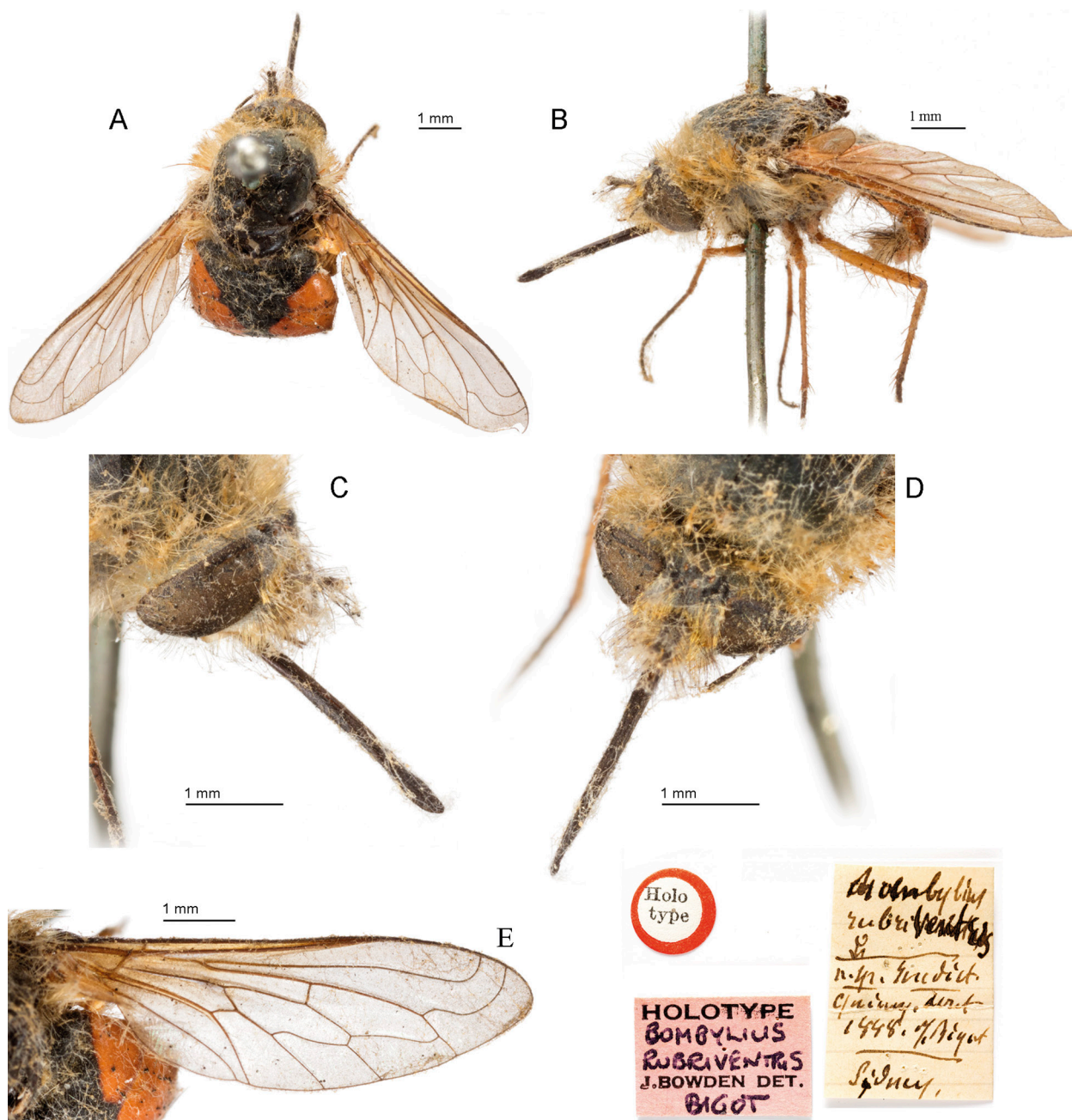


Fig. 15. *Eristalopsis rubriventris* (Bigot) ♀ holotype **A:** dorsal; **B:** lateral; **C:** head, lateral; **D:** head, dorsal; **E:** wing. Scale bars = 1.0 mm. Photographed by E. McAlister (BMNH).

relatively short, $0.1 \times$ as long as first segment and the wing membrane strongly infuscated.

Etymology. This specific name refers to the reddish body colour.

Type material. Holotype ♂ (AMS), 'Bilpin Blue M[oun]t[ai]ns. | N.S.W. 21.9.1978 | N.W. Rodd'; 'RODD COLLECTION' printed, green; 'Australian Museum | K 504607'; '*Eristalopsis rubra* | Li & Yeates, 2018 | HOLOTYPE' printed, red. – Paratypes: 2♂, same data as holotype (AMS: K504608–K504609).

4.3.12. *Eristalopsis rubriventris* (Bigot, 1892)

Fig. 15A–E

Bombylius rubriventris Bigot, 1892: 365. Type-locality: Australia (NSW); Holotype ♀, BMNH.

Eristalopsis rubriventris (Bigot, 1892): EVENHUIS & GREATHEAD 1999: 149.

Diagnosis. A combination of: medium-sized, black and reddish bombyliine; face covered with long pale yellow scales admixed with long blackish-brown hairs; scutum and scutellum black; wing membrane hyaline, only slightly darker towards base; crossvein *m-m* long.

Original description [translated from Latin]. **FEMALE:** Body length 6.5 mm. Antenna (incomplete) black; face

pale yellow; hairs pale yellow; gena white; frons with yellowish hair; thorax black, anterior gray; halter yellow, club white; abdomen smooth, yellow, with black median vitta, base broad, apex pointed, infuscated; leg yellow, tarsi dark; wings almost hyaline, base of wing pale brownish-red.

Remarks. Based on all examined specimens in this study, *Eristalopsis rubriventris* is most similar to *E. parva* sp.n. because the colour of the scutellum is black and the wing membrane hyaline in both species. However, in *E. parva* sp.n. the anterior face of the femora and tibiae is covered in black scales. Besides, *E. rubriventris* is only known from a single female specimen in poor condition, and all the specimens of *E. parva* sp.n. are collected from NT.

The only other NSW species found in the present study, *E. rubra* sp.n., is quite different from the type of *E. rubriventris* in having the body colour reddish, the scutellum reddish and the wing membrane infuscated.

Type material. Holotype ♀ (BMNH) [type photos examined], ‘*Bombylius rubriventris* | ♀ | n.sp. 1848 Bigot | Sydney’ handwritten; ‘HOLOTYPE BOMBYLIUS RUBRIVENTRIS J. BOWDEN DET. BIGOT’ handwritten; ‘Holo | type’ printed, rounded; (BMNH) (Fig. 15).

4.3.13. *Eristalopsis smarti* sp.n.

Fig. 16A–O

Diagnosis. A combination of: medium-sized, spotted-winged bombyline; crossvein *m-m* long; scutellum black; hind femur with row of anterior bristles and row of anteroventral bristles; abdominal tergites mostly orange with black marking medially; anteroventral corner of epandrium short.

Description. **MALE:** Body length 10.1 mm, wing length 9.3 mm. **Head:** Head about $1.7 \times$ wider than long, mostly blackish with thick pale pruinescence and covered in admixed pale yellow to black hairs. Eyes narrowly separated by $0.3 \times$ width of ocellus. Frons short, $1.8 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, as long as upper frons, blackish brown with short pale yellow scales admixed blackish-brown hairs. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence, with long blackish-brown hairs. Face with thick pale pruinescence and with long pale yellow to yellow scales admixed with long black hairs. Gena with thick pale pruinescence and white hairs. Clypeus blackish brown with thick pale pruinescence. Occiput with pale yellow to yellow scales admixed with blackish-brown hairs. Posterior eye margin not strongly concave. Antenna black; scape and pedicel with thick pale pruinescence and brown to black hairs, hairs on scape long, on pedicel short, flagellum bare. Scape relatively long, $3.3 \times$ as long as wide, and $3.3 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, $1.1 \times$ as long as wide. Flagellum elongate, $11.3 \times$ as long as wide, $1.7 \times$ as long as scape + pedicel ($2.3 \times$ as long as scape), conical and slightly depressed on side, 2-segmented with apical stylus; 2nd segment $0.05 \times$ length of 1st (Fig. 16B). Palpus thin and long, dark yellow with pale yellow to brown

hairs, one-segmented. Mouthparts slender and elongate, $5.0 \times$ as long as eye length ($2.8 \times$ as long as head length), labellum thin and filiform (Fig. 16E). **Thorax:** Scutum and scutellum black, with grey pruinescence, pruinescence denser on margins of scutum. Scutum and scutellum mostly covered with yellow scales admixed with black hairs, posterior margin of scutum with pale yellow scales, postalar wall with strong black hairs, posterior margin of scutellum with admixed dark yellow and black hairs. 3 dark yellow notopleural setae present, postalar setae absent. Pleura black with thick grey pruinescence, mostly covered with pale yellow hairs, anepisternum admixed with dark yellow hairs and black hairs on dorsal margin, anepimeron, meron, laterotergite and mediotergite bare. **Legs.** Legs mostly dark yellow, except base half of fore and mid femora and hind femur black; tarsi 4 and 5 black. Legs mostly covered with pale yellow hairs, ventral face of basal half of femora with long white hairs; mid femur with some long anteroventral black bristles; hind femur with row of long anterior black bristles and row of long anteroventral black bristles, more bristles on apex of hind femur. Other hairs and bristles on legs short and black. Fore tibia $1.6 \times$ longer than fore basitarsus, mid tibia $2.0 \times$ longer than mid basitarsus, hind tibia $2.0 \times$ longer than hind basitarsus. **Wing.** Wing membrane infuscated and darker anteriorly and basally, with spotted brown markings on base of *R*₄, apex of *M*₁, crossvein *r-m*, crossvein *m-m*, base of crossvein *m-cu* and apex of cell *bm*. Base of vein *Cu* bare. Crossvein *r-m* arising 0.7 from base of cell *dm*; crossvein *m-m* long (Fig. 16C). Basicosta blackish brown. Halter stem dark yellow, knob yellow. **Abdomen:** Tergites mostly orange with black marking in centre. Tergite 1 mostly black but yellow posterolaterally; tergites 2–8 mostly orange except triangular black marking medially. [Most hairs on abdominal tergites abraded]. Tergites mostly with yellow hairs admixed with curved pale yellow to golden scales, with long back hairs on posterior margin. Sternites blackish brown except posterior margins yellow, with thick grey pruinescence and dense white scales admixed with some black hairs. **Genitalia.** Epandrium trapezoid, anterior margin concave, posterior margin straight (Fig. 16L). Hypandrium present, anterior margin slightly concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 16J); gonocoxal apodeme strong, incurved; lateral ejaculatory process strong, expanded apically, $2.7 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 16K); gonostylus slender and pointed dorsally, $2.5 \times$ longer than wide. **FEMALE:** Body length 8.0 mm, wing length 12.9 mm. Very similar to male, except frons black with thick grey pruinescence, $3.0 \times$ as wide as ocellar tubercle, frons with white and golden scales admixed with black hairs (Fig. 16H). Abdominal tergites with larger black area, tergites 1–2 mostly black. Tergite 8 without thick long hairs. Acanthophorite spines absent. Genital fork divided into two T-shaped sclerites. Sperm pump strong, with both collars and lateral papillae. Distal sper-

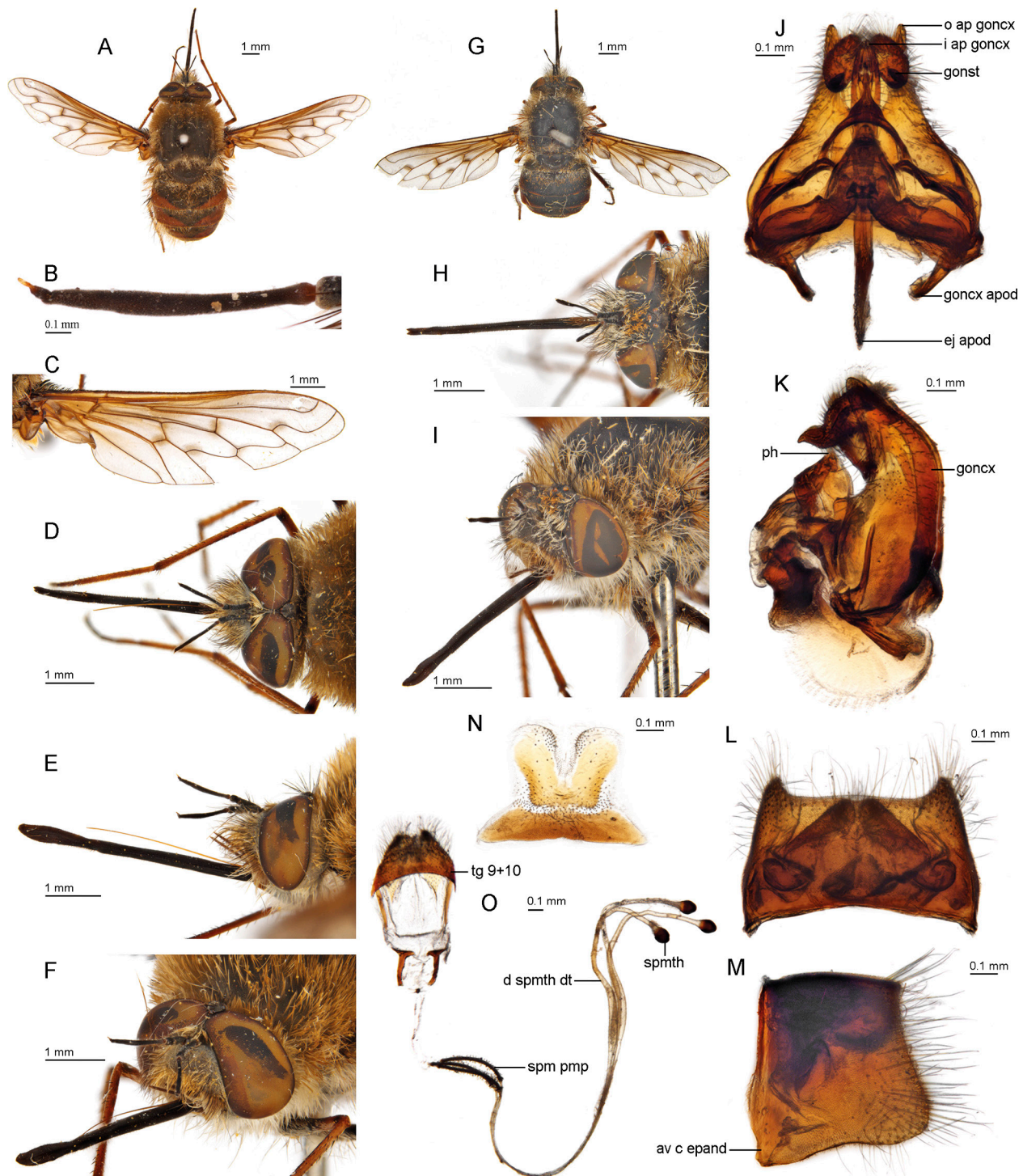


Fig. 16. *Eristalopsis smarti* sp.n. ♂ (A–F, J–M); ♀ (G–I, N–O): **A:** dorsal; **B:** flagellum; **C:** wing; **D:** head, dorsal; **E:** head, lateral; **F:** head, profile; **G:** dorsal; **H:** head, dorsal; **I:** head, profile; **J:** genital capsule, dorsal; **K:** genital capsule, lateral; **L:** epandrium, dorsal; **M:** epandrium, lateral; **N:** sternite 8, ventral; **O:** genitalia and spermathecae. Scale bars = 1.0 mm (A, C–I); 0.1 mm (B, J–O).

mathecal duct of normal length and thickened on apical half. Spermatheca small and nearly spherical (Fig. 16O).

Remarks. *Eristalopsis smarti* sp.n. is similar to *E. minor* sp.n., but differs in having the hind femur with row of anterior bristles and row of anteroventral bristles, the abdominal tergites mostly orange with black marking medially, and the anteroventral corner of epandrium short.

Distribution. WA.

Etymology. This species is named after the holotype collector, M.J. Smart.

Type material. Holotype ♂ (ANIC), ‘30.X.1982 N | Cypress R[oa] d., Pinjar, | W[estern]. Aust[r]alia., MJ Smart | S31°35' E115°48' printed; ‘At flowers among | *Banksia* scrub | Elev[ation]. c[irc]a. 60 m’ printed; ‘*Eristalopsis smarti* | Li & Yeates, 2018 | HOLOTYPE’ printed, red; ‘ANIC Database No. | 29 041459’ printed (ANIC). – Paratypes: 1 ♀, same data as type (ANIC: 29-041460).

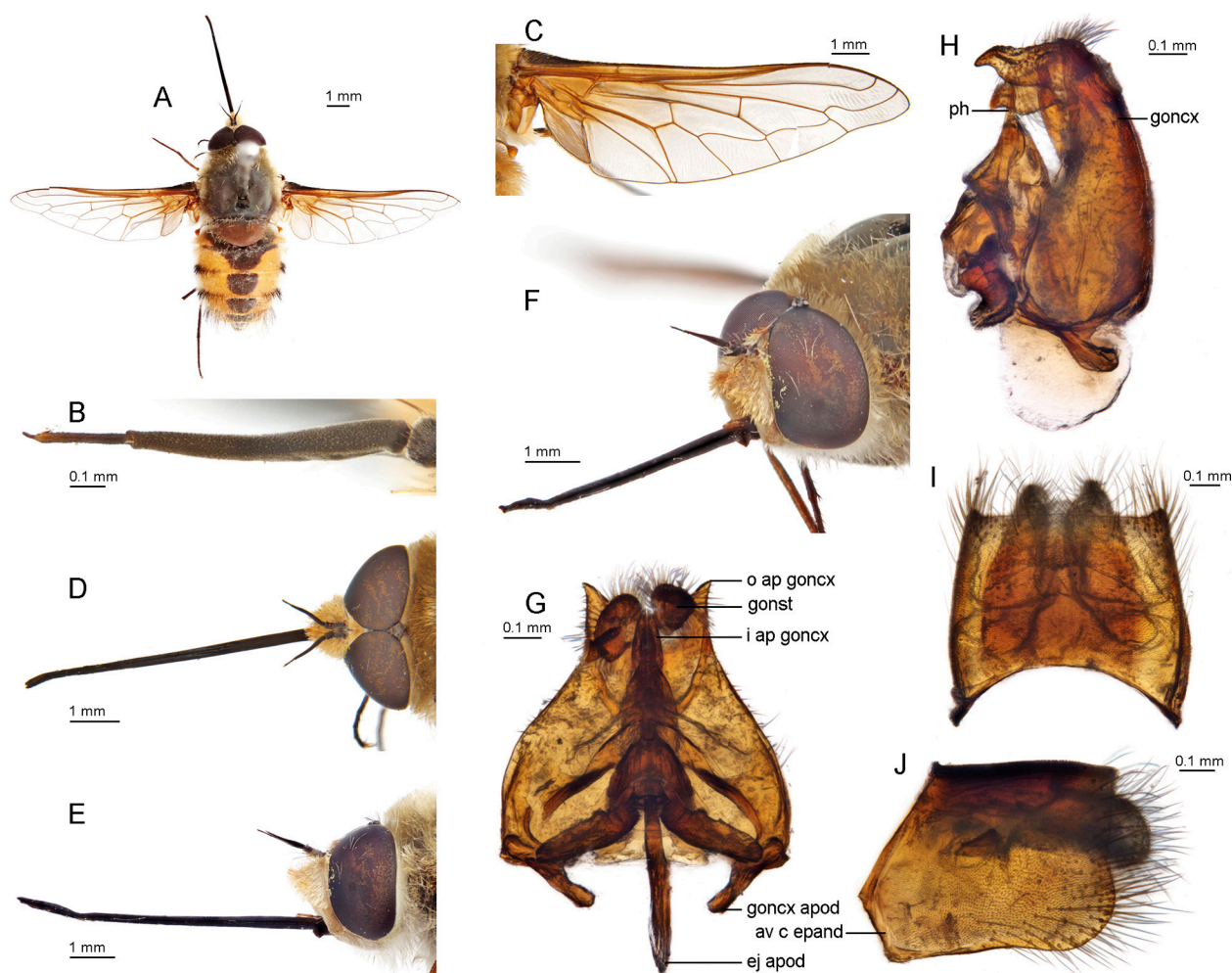


Fig. 17. *Eristalopsis uniformis* sp.n. ♂: **A:** dorsal; **B:** flagellum; **C:** wing; **D:** head, dorsal; **E:** head, lateral; **F:** head, profile; **G:** genital capsule, dorsal; **H:** genital capsule, lateral; **I:** epandrium, dorsal; **J:** epandrium, lateral. Scale bars = 1.0 mm (A, C–F); = 0.1 mm (B, G–J).

4.3.14. *Eristalopsis uniformis* sp.n.

Fig. 17A–J

Diagnosis. A combination of: large-sized, brownish yellow bombyliine, most similar to *E. australis*, but diagnosed by being paler, smaller, scutum without reddish marking on posterior margin, and ocellar tubercle, scape and pedicel with black hairs.

Description. **MALE:** Body length 11.4–12.3 mm, wing length 10.0–10.6 mm. **Head:** Head about $2.1 \times$ wider than long, mostly yellow with thick pale pruinescence and covered with pale yellow scales and hairs, a few blackish-brown hairs admixed. Eyes narrowly separated by $0.2 \times$ length of ocellus. Frons long, $3.6 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $0.7 \times$ length of upper frons, brown with short yellow scales and brown scales admixed. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence and blackish-brown hairs. Face with sparse pale pruinescence and covered in sparse pale yellow hairs and scales. Gena with thick pale pruinescence and white hairs. Clypeus blackish brown with sparse pale pruinescence. Occiput with admixed blackish-brown to yellow

hairs. Posterior eye margin not strongly concave. Antenna dark blackish brown; scape and pedicel with thick pale pruinescence and pale yellow to black hairs, ventral hairs of scape long, hairs on pedicel short, flagellum bare. Scape relatively short, $2.0 \times$ as long as wide, and $2.1 \times$ as long as pedicel, uniform from base to apex. Pedicel normal, as long as wide. Flagellum elongate, $9.5 \times$ as long as wide, $2.4 \times$ as long as scape + pedicel ($3.4 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.3 \times$ length of 1st (Fig. 17B). Palpus thin and short, dark yellow with short brown hairs, one-segmented. Mouthparts slender, $4.8 \times$ as long as eye length ($2.8 \times$ as long as head length), labellum thin and filiform (Fig. 17E). **Thorax:** Scutum black with thick grey pruinescence. Scutum covered with short pale yellow hairs, hairs denser on anterior half and each hair darker apically; postalar callosity with pale yellow hairs admixed with some short black hairs, postalar wall with some strong yellow hairs. Scutellum mostly orange except anterior margin black, with sparse pale pruinescence, covered with pale yellow hairs admixed with black hairs. 5 black notopleural setae present, postalar setae absent. Pleura mostly black with thick pale pruin-

escence, densely covered with admixed white to yellow hairs, but anepimeron, meron, laterotergite and mediotergite bare, hairs darker on dorsal margin of anepisternum. **Legs.** Legs mostly dark yellow, femora mostly covered with black scales, except posterior face of mid and hind femora with pale yellow hairs and scales; tibiae mostly covered with yellow scales except anterior face of fore and mid legs and hind legs with black scales; tarsi covered with black scales; mid and hind femora with row of anteroventral bristles. Hairs and bristles on legs short and black. Fore tibia $1.3 \times$ longer than fore basitarsus, mid tibia $1.9 \times$ longer than mid basitarsus, hind tibia $1.8 \times$ longer than hind basitarsus. **Wing.** Wing membrane mostly hyaline brown infuscation towards basal third of wing. Crossvein *r-m* arising 0.7 from base of cell *dm*; crossvein *m-m* short (Fig. 17C). Basicosta brown. Halter stem dark yellow, knob yellow. **Abdomen:** Tergites mostly yellow with median blackish brown markings. Tergite 1 mostly blackish brown but yellow posterolaterally; tergite 2 mostly yellow except median triangular blackish-brown markings; tergites 3–9 mostly yellow except median blackish-brown markings, narrower in midline than at sides. Tergites mostly covered with white to pale yellow scales and hairs, posterior margin of tergites 2–4 and tergite 5 posterolaterally with black hairs. Sternites yellow and with pale yellow hairs, some black hairs admixed on sternites 2–6, distal segments have more black hairs. **Genitalia.** Epandrium trapezoid, anterior margin concave, posterior margin straight (Fig. 17I). Hypandrium present, anterior margin slightly concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 17G); gonocoxal apodeme strong and incurved; lateral ejaculatory process strong, $3.0 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge without lateral hollow (Fig. 17H); gonostylus slender and pointed dorsally, $2.7 \times$ longer than wide. **FEMALE:** Unknown.

Remarks. The specimens of *Eristalopsis uniformis* sp.n. were originally identified as paratypes of *Eristalopsis australis*, which is similar to the latter, but the scutum is black without a reddish marking on the posterior margin, and the ocellar tubercle, scape and pedicel with black hairs.

Distribution. NT.

Etymology. This specific name refers to the scutum black without reddish markings.

Type material. Holotype ♂ (ANIC), 'AUSTRALIA Northern Territory; | Keep River National Park; | Bail-Me-Up Cr. 23.7 km SSW | Jarrnarm Camp Ground | dry creekbed. hand net; | 9-VI-2001, ME Irwin | FD Parker, C Lambkin | 15°57'55"S 129°01'52"E (GPS)' printed; '*Eristalopsis uniformis* | Li & Yeates, 2018 | HOLOTYPE', printed, red; '*Apiformyia australis* | Yeates, 2008 | PARATYPE' printed, blue; 'ANIC Database No. | 29 038726' printed. – Paratypes: 1♂, same data as holotype (ANIC 29-038733). 1♂, 'AUSTRALIA: NT NE Arnhem Land | Mosquito Ck area; vegetated | sand dunes, Caught over *Calytrix* | Hand caught; 19–22 Aug [20]07 | D. Yeates, C. Manchester | 12°25'43"S 136°49'55"E' printed; '*Eristalopsis concava* | Li & Yeates, 2018 | PARATYPE' printed, blue; '*Apiformyia australis* | Yeates, 2008 | PARATYPE' printed, blue; 'ANIC Database No. | 29 038739' printed.

4.3.15. *Eristalopsis wrightae* sp.n.

Fig. 18A–O

Diagnosis. A combination of: medium-sized, yellow and black bombyliine; face covered with long pale yellow scales admixed with long blackish-brown hairs; scutum and scutellum black; wing membrane slightly infuscated, and darker towards basal area; gonocoxal apodeme of male genitalia branched apically.

Redescription. **MALE:** Body length 5.3–10.2 mm, wing length 6.4–10.7 mm. **Head:** Head about $2.0 \times$ wider than long, mostly blackish with thick pale pruinescence and covered with white to blackish brown hairs and scales. Eyes holoptic. Frons long, $2.5 \times$ length of ocellar tubercle, upper half narrow and black; lower half triangular, $0.75 \times$ length of upper frons, blackish brown with short blackish-brown scales. Ocellar tubercle slightly raised, black to dark brown with grey pruinescence and blackish-brown hairs. Face with thick pale pruinescence and covered with long pale yellow scales admixed with long blackish-brown hairs. Gena with thick pale pruinescence and white hairs. Clypeus brown with thick pale pruinescence. Occiput with golden hairs, margin adjacent to eye admixed with blackish-brown hairs. Posterior eye margin not strongly concave. Antenna blackish brown; scape and pedicel with sparse pale pruinescence and blackish-brown hairs, hairs on scape long, on pedicel short, flagellum bare. Scape long, $4.0 \times$ as long as wide, and $2.0 \times$ as long as pedicel, uniform from base to apex. Pedicel long, $2.0 \times$ as long as wide. Flagellum elongate, $9.5 \times$ as long as wide, $1.7 \times$ as long as scape + pedicel ($2.6 \times$ as long as scape), conical and slightly laterally compressed, 2-segmented with apical stylus; 2nd segment $0.15 \times$ length of 1st (Fig. 18B). Palpus thin and short, blackish brown with blackish-brown hairs, one-segmented. Mouthparts slender, $4.0 \times$ as long as eye length ($2.6 \times$ as long as head length), labellum thin and filiform (Fig. 18E). **Thorax:** Scutum mostly black with thick grey pruinescence. Scutum covered with short golden scales admixed with black hairs, hairs denser on anterior half; posterior half with more black hairs; postalar wall with some strong golden hairs. Scutellum mostly black, with sparse pale pruinescence, covered with golden scales admixed with black hairs. 3 golden notopleural setae present, postalar setae absent. Pleura mostly black with thick pale pruinescence, densely covered with pale yellow to golden hairs, but anepimeron, meron, laterotergite and mediotergite bare. **Legs.** Legs mostly dark yellow except tarsus blackish brown; mostly covered with dark brown scales, except femora mostly covered with yellow scales, but apex of anterior face with dark brown scales. Hind femur with row of long anteroventral brownish-yellow bristles, apex of hind femur with additional bristles. Hairs and bristles on legs short and brown. Fore tibia $2.0 \times$ longer than fore basitarsus, mid tibia $2.3 \times$ longer than mid basitarsus, hind tibia $2.0 \times$ longer than hind basitarsus. **Wing.** Wing membrane slightly infuscated, and darker towards base of wing. Crossvein *r-m* arising 0.6 from base of cell *dm*; crossvein *m-m* short (Fig. 18C). Basicosta pale dark yel-

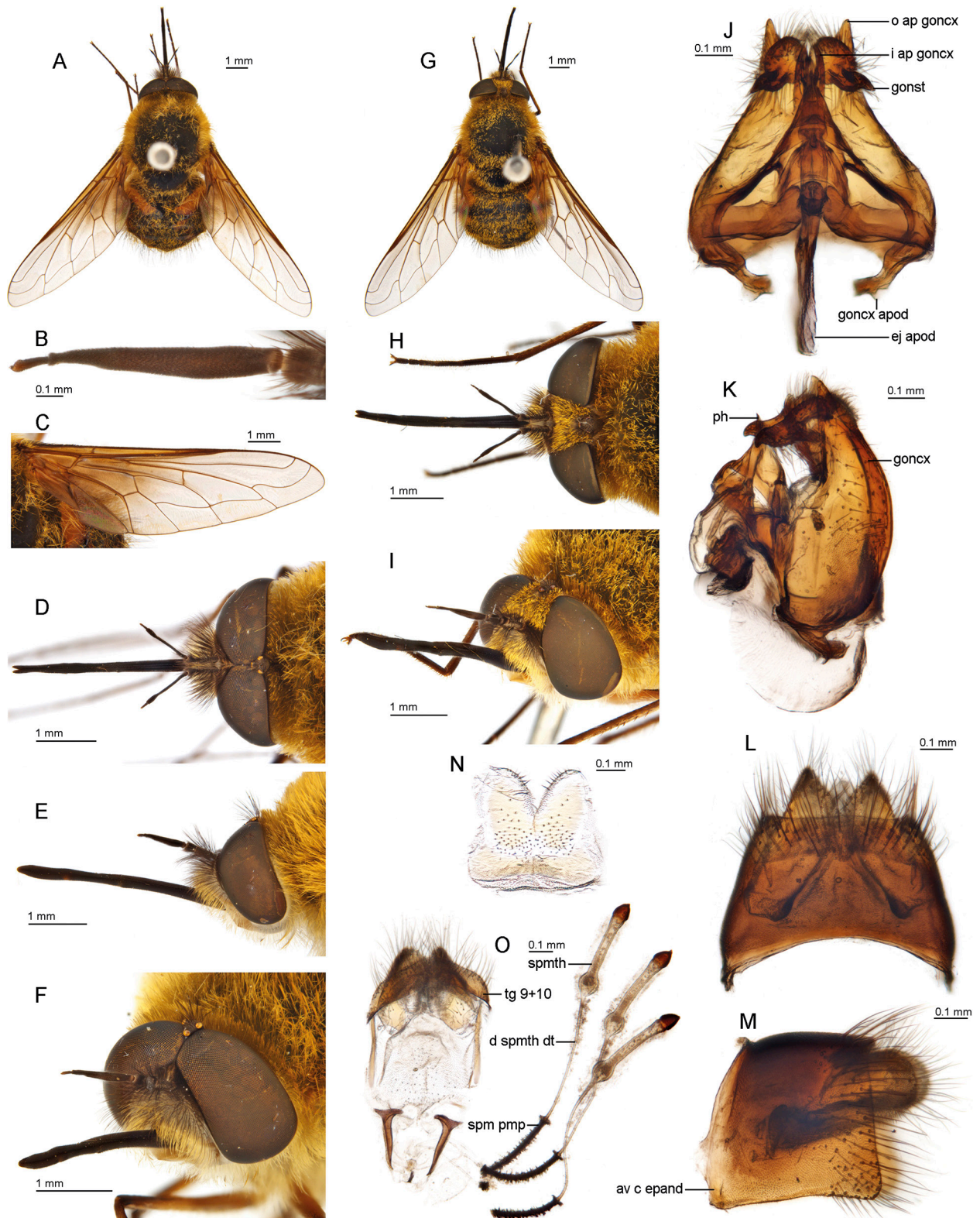


Fig. 18. *Eristalopsis wrightae* sp.n. ♂ (A–F, J–M); ♀ (G–I, N–O): A: dorsal; B: flagellum; C: wing; D: head, dorsal; E: head, lateral; F: head, profile; G: dorsal; H: head, dorsal; I: head, profile; J: genital capsule, dorsal; K: genital capsule, lateral; L: epandrium, dorsal; M: epandrium, lateral; N: sternite 8, ventral; O: genitalia and spermathecae. Scale bars = 1.0 mm (A, C–I); = 0.1 mm (B, J–O).

low. Halter stem dark yellow, knob pale dark yellow. **Abdomen:** Tergites mostly black with dark yellow markings laterally. Tergite 1 mostly black but yellow posterolaterally; tergite 2 with large yellow lateral markings; tergites

3–5 with reddish markings. Tergite 1 covered with golden hairs, tergites 2–5 mostly covered with golden scales and posterior margin admixed with long black hairs, hairs longer posterolaterally. Sternites 1–2 mostly yellow with

median black markings, sternites 3–6 mostly black except posterior margin pale yellow. Sternites covered in thick pale pruinescence and pale yellow scales, posterior segments admixed with some black hairs. **Genitalia.** Epandrium trapezoid, anterior margin concave, posterior margin straight (Fig. 18L). Hypandrium present, anterior margin slightly concave. Gonocoxa with apex much narrower than base, nearly triangular, ejaculatory apodeme large and strong (Fig. 18J); gonocoxal apodeme strong and incurved, apex branched; lateral ejaculatory process strong, expanded apically, $3.2 \times$ longer than wide; inner apex of gonocoxite acute, shorter than outer apex; outer apex of gonocoxite acute, short; dorsal bridge with lateral hollow (Fig. 18K); gonostylus slender and pointed dorsally, $3.0 \times$ longer than wide. **FEMALE:** Body length 6.8–10.1 mm, wing length 8.0–10.7 mm. Similar to male, except frons black with thick grey pruinescence, $3.5 \times$ as wide as ocellar tubercle, frons with short golden scales and admixed with blackish brown hairs (Fig. 18H). Tergite 8 without thick long hairs. Acanthophorite spines absent. Genital fork divided into two straight sclerites. Sperm pump strong, with both collars and lateral papillae. Distal spermathecal duct of normal length and not thickened. Spermatheca large and elongate, basal part spherical, apex nearly conical with small conical point (Fig. 18O).

Distribution. QLD.

Remarks. *Eristalopsis wrightae* sp.n. was the second unnamed allied form of *E. rubriventris* described by ROBERTS (1928: 450) in his redescription of *E. rubriventris*.

Eristalopsis wrightae sp.n. is similar to *E. parva* sp.n., but differs as follows: face covered with long pale yellow scales admixed with long blackish-brown hairs; wing membrane slightly infuscated, and darker towards basal area; outer apex of male gonocoxite long and acute; gonocoxal apodeme of male genitalia branched apically; spermatheca of female genitalia nearly conical.

In some specimens of *E. wrightae* sp.n. with the wing membrane is hyaline, the abdominal marking varies from mostly yellow with median black marking to mostly black with yellow marking laterally.

The authors observed females of *Eristalopsis wrightae* sp.n. and *E. robertsi* ovipositing in very dark, dense coastal rainforest near Rainbow Beach (Great Sandy National Park, QLD) in December 2017. During this period, the authors also observed female *Meomyia*, *Mandella*, *Staurostichus* (Bombyliinae), *Villa* (Anthracinae) and *Comptosia* (Lomatiinae), sand gathering and ovipositing in adjacent open Eucalypt forests, but never in the rainforest. It is interesting to note the coincidence that *Eristalopsis* have lost their sand chamber and acanthophorites, and the rainforest has a deep layer of leaf litter, with sand generally unavailable on the surface. Perhaps the loss of the sand chamber in *Eristalopsis* is an adaptation to oviposition on the dense leaf-litter of the rainforest floor.

Etymology. The species is named after Susan Wright, an experienced collector of Diptera, who is the Collection Manager for QM, working with Christine Lambkin.

Type material. Holotype ♂ (ANIC), ‘Bundaberg, | Q. Feb. 1971 | H. Frauca’; ‘*Eristalopsis smarti* | Li & Yeates, 2018 | HOLOTYPE’ printed, red; ‘ANIC Database No. | 29 041461’ printed (ANIC). – Paratypes: 3♂, 1♀, same data as holotype (ANIC: 29-04146229–041464 [♂]; 29-041465 [♀]).

5. Acknowledgements

Thanks to Christine Lambkin (QM), Susan Wright (QM), Dan Bickel (AMS), Russell Cox (AMS) and M.J. Smart (MSC) for arranging the loan of specimens. Thanks to Frank Menzel (DEI) for taking photos of the type material of *Eristalopsis robertsi* and thanks to Erica McAlister (BMNH) for taking photos of the type material of *E. rubriventris*. Thanks to Natural History Museum of Denmark for allowing use of photos of their type material in the digitized type collection. Thanks to the Entomological Society of Queensland’s collecting permits WITK15549915 and TWB/02B/2015 which enabled our fieldwork in Cooloolool (QLD). Thanks to Christine Lambkin (QM), an anonymous reviewer and the editor Bradley Sinclair (Canadian National Collection of Insects) for providing important suggestions for improvement of the manuscript.

6. References

- BIGOT J.M.F. 1892. Diptères nouveaux ou peu connus. 37^e partie. XLVI Bombyliidi (mihi) 1^{re} partie. – Annales de la Société Entomologique de France **61**: 321–376.
- BOWDEN J. 1971. Notes on some Australian Bombyliidae in the Zoological Museum, Copenhagen (Insecta, Diptera). – Steenstrupia **1**: 295–307.
- CUMMING J.M., WOOD D.M. 2009. Adult morphology and terminology. Pp. 9–50 in: BROWN B.V., BORKENT A., CUMMING J.M., WOOD D.M., WOODLEY N.E., ZUMBADO M. (eds), Manual of Central American Diptera. Volume I. – NRC Research Press, Ottawa.
- EVENHUIS N.L. 1983. Studies in Pacific Bombyliidae (Diptera) IX. Systematic remarks on Australian Bombyliinae with descriptions of new genera. – International Journal of Entomology **25**: 206–214.
- EVENHUIS N.L. 1985. Replacement name for *Syrphoides* Evenhuis (Diptera: Bombyliidae). – International Journal of Entomology **27**: 289.
- EVENHUIS N.L., GREATHEAD D.J. 1999. Word Catalog of Bee Flies. – Leiden, Backhuys. 756 pp.
- GOLOBOFF P.A., FARRIS J.S., NIXON K.C. 2008. TNT, a free program for phylogenetic analysis. – Cladistics **24**: 774–786.
- HIPPA H. 1968. A generic revision of the genus *Syrphus* and allied genera (Diptera, Syrphidae) in the Palaearctic region, with descriptions of the male genitalia. – Acta Entomologica Fennica **25**: 1–94.
- KOZUB D., KHMELIK V., SHAPOVAL J., CHENTSOV V., YATSENKO S., LITOVCHENKO B., STARIKH V. 2000. Helicon Focus 5.3. – Elicon Soft Ltd.
- LAMBKIN C.L., YEATES D.K., GREATHEAD D.J. 2003. An evolutionary radiation of bee flies in semi-arid Australia: systematics of the Exoprosopini (Diptera: Bombyliidae). – Invertebrate Systematics **17**: 735–891.
- LI X., YEATES D.K. 2016. Revision of the Australian bee fly genus *Eusurbus* Roberts, 1929 (Bombyliidae, Bombyliinae), and description of *Zentamyia* gen. nov. – Insect Systematics & Evolution **47**(5): 471–510.
- LI X., YEATES D.K. 2018. Morphological phylogeny of the Australian genera of the bee fly subfamily Bombyliinae (Diptera: Bombyliidae) with description of four new genera. – Invertebrate Systematics **32**(2): 319–399.

- NIXON K.C. 2002. WinClada ver. 1.00.08. — Published by the author, Ithaca, NY.
- PARAMONOV S.J. 1934. Ueber einige exotische (hauptsächlich süd-amerikanische) Bombyliiden (Dipteren). — *Konowia* **13**: 22–34.
- ROBERTS F.H.S. 1928. A revision of the Australian Bombyliidae (Diptera). Part ii. — *Proceedings of the Linnean Society of New South Wales* **53**: 413–455.
- YEATES D.K. 1994. Cladistics and classification of the Bombyliidae (Diptera: Asiloidea). — *Bulletin of the American Museum of Natural History* **219**: 1–191.
- YEATES D.K. 2008. *Apiformyia*, a new genus of Australian bee flies (Diptera: Bombyliidae, Bombyliinae) with affinities to the New World *Heterostylum* Macquart. — *Zootaxa* **1714**: 31–36.

Electronic Supplement File

at <http://www.senckenberg.de/arthropod-systematics>

File 1: li&yeates-bombyliidaeeristalopsis-asp2018-electronic supplement.doc — Additional material examined.

Zoobank Registrations

at <http://zoobank.org>

Present article: <http://zoobank.org/urn:lsid:zoobank.org:pub:8374AC12-8256-4BD5-A2B2-50EC642736EE>

***Eristalopsis aurata* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:DF7A13A2-F42E-4445-8131-9B4F07EC2719>

***Eristalopsis concava* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:60358064-3FEC-443A-A1E2-9EBC-C982DE24>

***Eristalopsis danielsorum* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:FCCDA1E-7F1D-4DB9-9090-ADAB-806B06EA>

***Eristalopsis flava* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:F37CD00F-AD2F-4C4F-87C9-86CF024ACCE5>

***Eristalopsis maculata* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:A5FE2196-DD16-46DD-B77E-6E5C6EB0C311>

***Eristalopsis minor* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:EB19372C-5B1E-4688-804D-355AF9F55321>

***Eristalopsis parva* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:F13557B4-E1A9-4D12-9D2D-696D8B-7CDD1B>

***Eristalopsis rubra* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:D7B5A5E0-EBF2-41B6-AA63-1DC7AE2861FC>

***Eristalopsis smarti* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:C99DA619-50D0-4A9A-A408-8FE510631FF9>

***Eristalopsis uniformis* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:3A7C6288-DB24-4F30-93AD-6432816D710F>

***Eristalopsis wrightae* Li & Yeates, 2018:** <http://zoobank.org/urn:lsid:zoobank.org:act:0F5CA776-E1E1-4603-AC63-CD-6B65689EB6>

