Phylogenetic revision of Bonjeania Irwin & Lyneborg (Diptera: Therevidae)

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Abstract. The endemic Australian genus Bonjeania Irwin & Lyneborg is revised. Seven species are described as new: B. angelikae sp.n., B. clamosis sp.n., B. dynastis sp.n., B. flavofemoralis sp.n., B. irwinae sp.n., B. orphne sp.n. and B. trilineata sp.n. Three species, B. actuosa (White), B. nitidifrons (Macquart) and B. segnis (White), are redescribed. All species of Bonjeania were compared in a cladistic analysis with Agapophytus albobasalis Mann and five exemplars of the speciose sister genus Parapsilocephala Kröber, and the phylogenetic relationships of Bonjeania discussed. The male genitalia musculature of B. clamosis sp.n. is described and figured, and discussed with respect to previous studies on other Therevidae.

Introduction

Therevidae are a cosmopolitan group of lower brachyceran Diptera found in a variety of habitats, but with greatest diversity in semi-arid regions. The adults are nectar feeders, whereas the larvae are voracious, fossorial predators of soil arthropods in sandy or friable soils (Irwin & Lyneborg, 1981a,b).

The Agapophytus genus-group is endemic to Australasia and contains the genera Agapophytus Guérin-Méneville, Acrialpula Kröber, Acraspisa Kröber, Belonalyss Kröber, Bonjeania Irwin & Lyneborg, Parapsilocephala Kröber and Acatopygia Kröber (unpublished data). The phylogenetic relationships of the world Therevidae are not yet known and the Agapophytus genus-group does not conform to the traditional classification proposed by Lyneborg (1976) and Irwin & Lyneborg (1981a,b) based on Afrotropical and Nearctic Therevidae. Using this classification, the Agapophytus genus-group are part of Therevidae, but also possess several characters that place them in Phyicineae. It is clear that the current classification is unsatisfactory and in need of revision in a phylogenetic context. The Agapophytus genus-group is united by the following characters: elongate velutum patches on the ventral surfaces of the fore and hind femora; rounded velutum patch on the posteroventral surface of the gonocoxites; separate female accessory gland ducts, three spermathecae and the absence of anteroventral seta at the apex of the hind femur.

In his faunal treatment of Tasmanian Therevidae, White (1915) erected genus Lonchorhynchus for Anabarhynchus nitidifrons (Macquart), and described two new species, L. segnis White and L. actuosa White. Mann (1929) later revised the genus, extending the distributions of L. nitidifrons and L. segnis to the southern and eastern mainland. The genus name Lonchorhynchus was found to be preoccupied for a fossil amphibian (Wiman, 1910), therefore Irwin & Lyneborg (1989) proposed Bonjeania as a replacement name in their catalogue of Australasian and Oceanian Therevidae. Bonjeania is endemic to Australia and is common throughout eastern Australia. The adults are medium-sized therevids with dark coloration and relatively short wings (Fig.1). An unusual feature of Bonjeania is the enormously enlarged aedeagus and gonocoxal apodemes of the male, which in some species extends into the abdominal cavity almost the entire abdomen length. Another interesting autapomorphy for Bonjeania is the secondary reduction of the spermathecae number to one. All other Therevidae have either two (most Therevidae) or three (Phycineae) spermathecae.

In this revision of Bonjeania, B. actuosa, B. nitidifrons and B. segnis are redescribed and seven species are described as new. Bonjeania segnis is similar in external appearance to members of Bonjeania but lacks male genitalia synapomorphies defining the rest of the genus. Rather, B. segnis has many male genital characters (i.e. genitalia not enlarged or elongate) that associate it with Parapsilocephala, the probable sister group to Bonjeania. Mann (1929) and Irwin & Lyneborg (1989) supported the placement of B. segnis in Bonjeania by White (1915). In this revision, B. segnis is included in
Bonjeania, as cladistic analysis clearly places it as the most basal member of the genus.

Since the last revision of Bonjeania by Mann (1929), a substantial amount of new material has accumulated in collections, mainly due to the collecting efforts of M. E. Irwin and G. Daniels. Several species are represented in collections by damaged or single specimens. These are not described here and await the collection of more material.

Materials and methods

Genitalia were macerated in 10% KOH solution at 40–50°C for 1 h to remove soft tissue, then rinsed and dissected in 80% ethanol. Female reproductive organs were stained with a saturated solution of Chlorazol Black in 40% ethanol. Preparations were then placed into glycerine gel and figures were drawn using a camera lucida mounted on a Zeiss Stemi SV-6 stereo-microscope. Internal membranous structures of the female reproductive system were drawn while still in ethanol, as they collapse and distort when placed into glycerine or glycerine gel. Genitalia preparations are stored in glycerine or glycerine gel or both in a genitalia vial mounted on the pin underneath the specimen. Examination of male genitalic musculature was conducted on specimens collected into 80% ethanol and then dissected in distilled water. Specimens examined are given a unique 'MEl' number (yellow label on specimen pin). These
Table 1. Character matrix of exemplar taxa included in cladistic analysis.

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Character polarity was determined using outgroup comparison (Maddison et al., 1984; Nixon & Carpenter, 1994). Those characters with more than one derived state were unordered to avoid any a priori weighting bias. Cladistic analyses were performed using PAUP version 3.1.1 (Swofford, 1993) with the ‘branch and bound’ tree finding algorithm. The analyses were then repeated using Hennig86 version 1.5 (Farris, 1988). The matrix presented in Table 1 was prepared in Macclade version 3.01 (Maddison & Maddison, 1992). Figure 16 was prepared using Clados version 1.2 (Nixon, 1992) with accelerated transformation (ACCTRAN) optimization. Branch support (Fig. 17) was calculated using Autodecay version 3 (Eriksson & Wikstrom, 1996) and PAUP version 3.1.1.

Outgroup taxa

Agapophytus albobasalis Mann was used as the far outgroup to root the cladogram. Bonjeania segnis lacks many of the defining synapomorphies of Bonjeania and has many male genital characters that associate it with Parapsilocephala, the probable sister group to Bonjeania. Parapsilocephala is a large, heterogenous genus containing seven described and numerous undescribed species (Irwin & Yeates, 1995). To determine placement of B. segnis, five exemplars from Parapsilocephala were included in the analysis. These morphologically diverse exemplars were selected in an attempt to adequately sample the diversity within the group. Voucher specimens of Ag. albobasalis and undescribed species of Parapsilocephala are deposited in the University of Queensland Insect Collection (UQIC). Type specimens of P. elegens Kröber and P. bifasciata White examined during this study are located in the BMNH. Parapsilocephala ambocerina Irwin was coded from the detailed original description in Irwin & Yeates (1995) as the type material could not be located and no other specimens are known.

Descriptions of characters and states

Fifty-six characters comprising 128 states were used in the analysis (Appendix 2). Most are binary, but characters 2, 3, 15, 31, 33, 43, 48, 50 and 52 were coded as multistate characters with three states, characters 14 and 45 were coded with four states, and character 13 was coded with five states.

Bonjeania irwin & Lyneborg

Lonchorhynchus; White, 1915: 33 (preoccupied by Wiman, 1910); Mann, 1929: 44.
**Bonjeania** Irwin & Lyneborg, 1989: 356 (nom. nov. for Lonchorhyncha White).

Type species: *Anabarhynchus nitidifrons* Macquart, 1850.

**Diagnosis.** Gonocoxal apodemes usually greatly elongate, projecting posteriorly into abdomen, greater than 4X length of gonocoxite; ventral lobe narrow, directed medially; distiphallus usually extremely long and thin; ejaculatory apodeme and lateral ejaculatory apodeme greatly enlarged; single spermatheca in female; anterior margin of female sternite 8 emarginate; spermathecal duct joins spermathecal sac duct proximal to sac.

**Male. Head:** Lower frons triangular, frons raised into dorsal ridge proximal to antennae; eyes dichoptic; facets of eye equal in size; gena and lateral occiput densely silver pruinescent, covered with long white setae; postocular ridge with single row of 7–12 white to black setae, these grading laterally into fine white setae; palp 2-segmented, basal segment pale brown with long white setae, very sparse silver pruinescence, concave dorsally; distal segment dark brown to black with long white setae, sparse silver pruinescence; labellum black to brown with pale brown pruinescence, sparsely covered with brown setae; style terminal, black, 2-segmented, very sparsely silver pruinescent.

**Thorax:** Scutum ground colour black; scutellum glabrous or matte black pruinescent; postpronotum and proepisternum sparsely to densely silver pruinescent, covered with long white setae (setae longer than width of proepisternum); katepimeron, meron, metepimeron and anatergite entirely silver pruinescent; halter light brown; hind coxa bearing prominent anteroventral process; trochanters with short, sparse, white setae dorsally, glabrous ventrally; fore and hind femora with grey, mid-ventral plaques (transverse bands) sometimes present on abdominal tergites 1–4 (Figs 1, 3B). These unusually thick bands of reflective pruinescence are formed by the dense unidirectional arrangement of microtrichia involving light dispersal and reflection. In males the reflective nature of the velutum of male *Bonjeania* is apparent when the individual is viewed post-erally. Some modifications of the density and orientation of the microtrichia make them highly visible when viewed side on, but dull grey when viewed end on. In *Bonjeania* there are some modifications of the density and orientation of the microtrichia involving light dispersal and reflection. In males of many species of *Bonjeania*, thick transverse velutum plaques are present on abdominal tergites 1–4 (Figs 1, 3B). These unusually thick bands of reflective pruinescence are formed by the dense unidirectional arrangement of microtrichia. The appressed, unidirectional orientation and reflective nature of these microtrichia make them highly visible when viewed side on, but dull grey when viewed end on. In *Bonjeania* there are some modifications of the density and orientation of the microtrichia involving light dispersal and reflection. In males of many species of *Bonjeania*, thick transverse velutum plaques are present on abdominal tergites 1–4 (Figs 1, 3B). These unusually thick bands of reflective pruinescence are formed by the dense unidirectional arrangement of microtrichia. The appressed, unidirectional orientation and reflective nature of these microtrichia make them highly visible when viewed side on, but dull grey when viewed end on. In *Bonjeania* there are some modifications of the density and orientation of the microtrichia involving light dispersal and reflection. In males of many species of *Bonjeania*, thick transverse velutum plaques are present on abdominal tergites 1–4 (Figs 1, 3B). These unusually thick bands of reflective pruinescence are formed by the dense unidirectional arrangement of microtrichia. The appressed, unidirectional orientation and reflective nature of these microtrichia make them highly visible when viewed side on, but dull grey when viewed end on. In *Bonjeania* there are some modifications of the density and orientation of the microtrichia involving light dispersal and reflection. In males of many species of *Bonjeania*, thick transverse velutum plaques are present on abdominal tergites 1–4 (Figs 1, 3B). These unusually thick bands of reflective pruinescence are formed by the dense unidirectional arrangement of microtrichia. The appressed, unidirectional orientation and reflective nature of these microtrichia make them highly visible when viewed side on, but dull grey when viewed end on. In *Bonjeania* there are some modifications of the density and orientation of the microtrichia involving light dispersal and reflection. In males of many species of *Bonjeania*, thick transverse velutum plaques are present on abdominal tergites 1–4 (Figs 1, 3B). These unusually thick bands of reflective pruinescence are formed by the dense unidirectional arrangement of microtrichia. The appressed, unidirectional orientation and reflective nature of these microtrichia make them highly visible when viewed side on, but dull grey when viewed end on. In *Bonjeania* there are some modifications of the density and orientation of the microtrichia involving light dispersal and reflection. In males of many species of *Bonjeania*, thick transverse velutum plaques are present on abdominal tergites 1–4 (Figs 1, 3B). These unusually thick bands of reflective pruinescence are formed by the dense unidirectional arrangement of microtrichia. The appressed, unidirectional orientation and reflective nature of these microtrichia make them highly visible when viewed side on, but dull grey when viewed end on. In *Bonjeania* there are some modifications of the density and orientation of the microtrichia involving light dispersal and reflection. In males of many species of *Bonjeania*, thick transverse velutum plaques are present on abdominal tergites 1–4 (Figs 1, 3B). These unusually thick bands of reflective pruinescence are formed by the dense unidirectional arrangement of microtrichia. The appressed, unidirectional orientation and reflective nature of these microtrichia make them highly visible when viewed side on, but dull grey when viewed end on. In *Bonjeania* there are some modificat...
Phylogenetic revision of Bonjeania

Fig. 2. Bonjeania spp. female genitalia and distal reproductive system. A, B. clamosis sp.n., dorsal view with tergite 8 partially cut away; B, B. nitidifrons (Macerquart), distal reproductive system only. ac = accessory glands; A1 = acanthophorites; A2 = A2 setae; f = furca; ss = spermathecal sac; ssd = spermathecal duct; s = spermatheca; sd = spermathecal duct; t8 = tergite 8. Scale = 0.2 mm.

iorly, but in other genera it is only apparent when viewed anteriorly. Matte pruinescence is a type of pruinescence that is dull in appearance and is not reflective when viewed from any direction due to the scattered arrangement of the microtrichia (Fig. 3C). This pruinescence is typically matte black in colour and is commonly present on the scutellum in Bonjeania.

English (1950) described and figured the larval head capsule and pupal cases of various species of Australian Therividae, including four species from the Agapophythus genus-group (Acraspisa trifasciata Kröber, Acupalpa divisa (Walker), Ag. albobasalis and Ag. aterrimus). These species share larval features such as the absence of a maxillary tuft or beard and minute maxillary palps (English, 1950). The pupae lack an alar spine, a feature present in Anabarynchus Macquart, Megathereva Lyneborg, Platycarenum Kröber and many Nearctic therevine genera (Lyneborg, 1992). The alar spine is also absent in many Australian genera not belonging to the Agapophythus genus-group such as Ectinorhynchus Macquart, Nanexila Winton & Irwin, and in Phycus Walker and Ataenogera Kröber from Central America (Webb & Irwin, 1989; Lyneborg, 1992; Winton et al., 1999). The third-instar larval head capsule and pupal case is known for B. actuosa, B. clamosis and B. segnis. Concordant with other members of the Agapophythus genus-group, the maxillary beard is absent, the maxillary palps are minute and the alar spine is absent.

The arrangement of the male genitalic musculature of B. clamosis (Fig.4A,B) is identical to that described for Anabarynchus tristus Bigot by Ovtshinnikova & Yeates (1998), but with modification of the size and orientation of several of the muscle complexes associated with the internal enlargement of the aedeagus. The muscles of the aedeagus are composed of five muscle pairs: M1, M2, M30, M31 and M32. In Bonjeania the muscle pairs M1 and M2, which suspend and move the aedeagal sheath, are thin and
Fig. 3. Scanning electron micrographs of the erid vestiture. A, *Agapophysus aterrimus* Mann, abdomen velutum; B, *Bonjeania clamosis* sp.n., anterior margin of abdomen velutum plaque (arrow indicates anterior); C, same, scutellum matte pruinescence; D, same, fore femur velutum patch; E, same, hind femur velutum patch.

band-like, indicating that the aedeagus has limited movement either anteriorly or posteriorly. Muscle pairs M31 and M32 of the ejaculatory complex, responsible for pumping ejaculate from the sperm sac to the exterior, are greatly enlarged, with an associated enlargement of the lateral ejaculatory apodeme and the ejaculatory apodeme. These findings corroborate the identity of the articulated lateral ejaculatory apodeme described by Yeates (1992, 1994) and
Flg. 4. Bonjeania clamosis sp.n. male genitalic musculature. A, lateral view; B, gonocoxites, dorsal view. c = cercus; d = distiphallus; da = dorsal apodeme of parameral sheath; ea = ejaculatory apodeme; e = epandrium; g = gonoxocite; ga = gonocoxal apodeme; gs = gonostylus; igp = inner gonocoxal process; h = hypandrium; lea = lateral ejaculatory apodeme; ma = membranous medial atrium; ogp = outer gonocoxal process; ses = subepandrial selerite; v = ventral lobe; va = ventral apodeme of parameral sheath. Scale = 0.2 mm.

1. Median occipital sclerite glossy black; ejaculatory apodeme height equal to or less than length (cf. Fig. 10A) ........................................... 2
   - Median occipital sclerite pruinescent; height of ejaculatory apodeme greater than length (cf. Fig. 6E) .......................... 3
2(1). Femora entirely yellow (Fig. 5G); scutum entirely white dorsolaterally and posteriorly, 2 dorsoentral white spots at transverse suture, poorly defined dorsoentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture (Fig. 5C); katatergum silver pruinescent on all but anterodorsal edge where glossy black .................................. flavofemoralis
   - Mid femur yellow basally (Fig. 5F); pruinescence on scutum restricted to small, white, posterolateral and anterolateral patches (Fig. 5D); katatergum black, very sparsely silver pruinescent, appearing bare but not glossy. ........................................... irwinae
3(1). Frons entirely silver pruinescent except for elliptical glossy brown medial patch above antennal insertions; scutum patterned as in Fig. 5B, white setae covering scutum; scutellum sparsely covered with white setae; mid femur with a single ventromedial bristle; hind femur with 3 ventromedial bristles; postpronotal lobe entirely silver pruinescent, covered with white setae; anepimeron entirely silver pruinescent, more sparsely anteriorly ........................................... trilineata
   - None of these characters present ........................................... 4
4(3). Frons entirely covered with brown setae; katatergum glossy brown; males with frons wider than or equal to width of ocellar triangle (Fig. 5K) ........................................... 5
   - Frons with at least some glabrous patches; katatergum with at least some pruinescence; males with ocellar triangle wider than narrowest point of frons (Fig. 5L). 7
5(4). Legs entirely bright yellow; silver pruinescence along eye margin of upper frons; antennae bright yellow; scutum and scutellum glossy black; wing venation yellow ........................................... orphine
   - Legs and frons not as above; antennae dark brown; scutum and scutellum pruinescent; wing venation dark ........................................... 6
6(5). Coxae black; femora black; tarsomere 2 black with proximal third yellow; scutum and scutellum entirely matte black pruinescent; pleuron without shining white longitudinal stripe; 4–7 dorsoentral bristles; aedeagus and gonocoxal apodemes not elongate; ejaculatory apodemes not greatly enlarged (Fig. 13E–G) ....... segnis
   - Coxae yellow; femora yellow-orange, darkened dorsally; tarsomere 2 black; scutum with areas of white pruinescence; scutellum with sparse brown pruinescence on anterior edge; pilose regions of proepimeron and katatergum forming a shining white longitudinal stripe; 2 or 3 dorsoentral bristles; aedeagus and gonocoxal apodemes greatly enlarged (Fig. 6D–F) ............... actuosa
7(4). Scutum white laterally and anterolaterally, brown medially as far as dorsoentral setae, broad matte black
stripe between dorsocentral setae (Fig.5A); epandrium and ceri elongate; male tergite 8 broad, not emarginate; spermathecal sac reduced (Fig. 2B) ........... nitidifrons

- Scutum without matte black stripe; epandrium width equal to length, ceri short; male tergite 8 greatly emarginate; shape of spermathecal sac as in Fig. 2A.8

8(7). Body length >12 mm; katepisternum densely silver pruinescent on posterior half, very sparsely pruinescent on anterior half so appearing brown but not glossy; frons wrinkled (male unknown).................. dynastis

- Body length <8.5 mm; katepisternum silver pruinescent on all but anterodorsal edge where glossy dark brown; frons smooth ........................................................... clamosis

    - Femora black; tarsi of foreleg dilated (Fig. 5I); dorsum of scutum appearing black, very sparse underlying brown pruinescence.................................................... angelikae

**Bonjeania actuosa** (White) (Figs 5K, 6A–F, 15A)

**Lonchorhynclus actuosus** White, 1915: 35, Fig. 20; Mann, 1929: 46, Fig. 6a,b.

**Bonjeania actuosa** of Irwin & Lyneborg, 1989: 356.

**Diagnosis.** Autapomorphies: lower frons with small triangular silver pruinescent patch along eye halfway between antennae and upper frons; scutellum with sparse brown pruinescence on anterior edge, faint transverse striations; proepimeron silver pruinescent on all but dorsal half where glossy dark brown with only sparse silver pruinescence; katepisternum silver pruinescent on dorsal quarter, black with sparse silver pruinescence on ventral three-quarters, with long white setae on dorsal half; anepisternum entirely black, glossy; pilose regions of proepimeron and katepisternum forming a white longitudinal stripe; coxae yellow; tibiae light brown to yellow with brown apices; basitarsi of all legs yellow with brown apices; all other tarsomeres blackish brown; arms of ventral apodeme of aedeagal sheath very broad, paddle shaped. Shaped characters: entire frons covered with pale brown setae longer than scape, setae slightly shorter on occellar triangle only; frons of male wider than occellar triangle; scutum with white anteromedial patch separating into 2 dorsocentral white stripes extending distally halfway to transverse suture, 2 dorsocentral white spots on transverse suture, scutum entirely white dorsilaterally and distally, well defined dorsocentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture, female with 2 dorsocentral white stripes extending entire length of scutum; anepimeron glossy brown; katepisternum glossy brown; gonocoxal apodemes and aedeagus extremely long.

**Male.** Body length 9.5–11.3 mm. **Head** (Fig.5K): Lower frons black, glossy with small triangular silver pruinescent patch along eye halfway between antennae and upper frons, rugose with longitudinal furrows; upper frons silver pruinescent on anterior edge, gold pruinescent posteriorly; occellar triangle gold-silver pruinescent; entire frons covered with pale brown setae longer than scape, setae slightly shorter on occellar triangle only; face covered with short, sparse silver pruinescence; width of occellar triangle 0.83–0.88 X width of narrowest part of frons; median occipital sclerite entirely silver pruinescent; scape brown, sparsely silver pruinescent, covered with black setae, 4 or 5 stout, black, dorsal setae in 1 or 2 rows; pedicel brown, sparsely silver pruinescent, covered with black setae; flagellum brown, with sparse silver pruinescence, short, 1.4–1.7 X length of scape. **Thorax:** Dark setae covering scutum; colours and pattern on scutum produced by pruinescence: white anteromedial patch dividing into 2 dorsocentral white stripes extending posteriorly halfway to transverse suture, 2 dorsocentral white spots on transverse suture, scutum white dorsilaterally and distally, well defined dorsocentral white stripes extending from posterior margin of scutum anteriorly halfway to transverse suture, all white areas on scutum bordered by golden brown pruinescence; scutellum with sparse brown pruinescence on anterior edge, with faint transverse striations, covered with dark setae; subscutellum with brown pruinescence medially, silver laterally; postpronotal lobe entirely silver pruinescent, entirely covered with long dark setae similar to those on dorsum of scutum; proepimeron silver pruinescent on all but dorsal half where glossy dark brown with only sparse silver pruinescence; katepisternum silver pruinescent on dorsal quarter, black with sparse silver pruinescence on ventral three-quarters, with long white setae on dorsal half; anepisternum entirely black, glossy, entirely covered with long white and brown setae (pilose regions of proepimeron and katepisternum thus forming a white longitudinal stripe); anepimeron glossy brown; katepisternum glossy brown, entirely covered with long brown setae; coxae yellow; fore and mid coxae glossy, entirely covered with long white setae, hind coxa glossy anteriorly, sparsely white pruinescent posteriorly, with long white setae restricted to dorsal and lateral surface; trochanters bright yellow; femora yellow, darkened dorsally; fore and mid femora with long white setae posteriorly, short, white setae anteriorly; tibiae light brown to yellow with brown apices; basitarsi of all legs yellow with brown apices; all other tarsomeres blackish brown; fore basitarsus approximately same width as mid basitarsus; wing venation dark; all thoracic macrosetae dark; scutal chaetotaxy: np 4; sa 1; pa 1; dc 2 or 3; sc 1. **Abdomen:** Elongate, 1.4–1.7 X length of head and thorax combined; brownish black; tergites 1–4 posterodorsally with yellowish white velutum on posterior edge only; remainder of dorsomedial part of tergite 1 densely brown pruinescent, glossy laterally; tergites 2 and 3 glossy brown, sparsely brown pruinescent, velutum continuing posterolaterally; tergites 4–6 and 8 glossy brown, tergite 7 distinctly paler brown; tergites 2–7 covered with moderately long white setae; sternite 1 glossy brown, glabrous; sternites 2–4 glossy brown with long white setae; sternites 2 and 3 with posterior bands of milky white pruinescence; sternites 5–8 brown with long brown setae. **Genitalia** (Fig.6A–F): Epandrium elongate, anterior margin not emarginate; medial atrium between gonocoxites narrow; hypandrium with numerous long setae and medial sclerotized ridge; gonocoxal apodeme extremely long, extending into abdominal segment.

Fig. 5. Bonjeania spp. A, B. nitidifrons (Macquart), scutum, dorsal view; B, B. trilineata sp.n., scutum, dorsal view; C, B. flavofemoralis sp.n., scutum, dorsal view; D, B. irwinae sp.n., scutum, dorsal view; E, B. angelikae sp.n., mid femur, posterior view; F, B. irwinae sp.n., mid femur, posterior view; G, B. flavofemoralis sp.n., mid femur, posterior view; H, B. clamosis sp.n., mid femur, posterior view; I, same, fore basitarsus lateral view; J, B. angelikae sp.n., fore basitarsus lateral view; K, B. actuosa (White), male head, anterior view; L, B. clamosis sp.n., male head, anterior view. Scales = 0.2 mm.

I: distiphallus extremely long, recurved dorsally proximal to base of ejaculatory apodeme; ventral apodeme greatly enlarged, paddle-shaped; ejaculatory apodeme and lateral ejaculatory apodeme greatly enlarged.

Female. Body length 11.9 mm. Similar to male except flagellum 2.2X length of scape; 2 dorsocentral white stripes extend entire length of scutum; yellowish white velutum absent on tergite 4, absent laterally on tergites 2 and 3, absent on sternites.

Comments. Bonjeania actuosa is one of the largest species in the genus. Adults are rapid fliers and females characteristically dab the end of their abdomen on the substrate when at rest. The male genitalia are greatly enlarged, extending into abdominal segment 1. Bonjeania
**Bonjeania angelikae** Winterton & Skevington sp.n.  
(Figs 5E, J, 7A-E, 15A)

**Diagnosis.** Autapomorphies: dorsum of scutum mostly brown, brown extending laterally only around transverse suture; mid femur yellow on distal two-thirds, brown proximally. Shared characters: scutum white laterally and posteriorly, dorsocentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture, 2 dorsocentral white spots on transverse suture; proepimeral silver pruinescent on all but ventral sixth where glossy dark brown to sparsely silver pruinescent; katepisternum silver pruinescent on all but anterodorsal edge where glossy dark brown; nonpilose regions of proepimeral, katepisternum and anepisternum thus forming a glossy brown transverse stripe; anepimera glossy brown medially, otherwise sparsely silver pruinescent; kateatergite silver pruinescent, entirely covered with long white setae; coxae black to brown, silver pruinescent; fore and mid coxae entirely covered with long white setae, hind coxa with long white setae restricted to dorsal and lateral surface; trochanters glossy brown; fore and hind femora black to brown; mid femur yellow on distal two-thirds, brown proximally; fore and mid femora with long white setae posteriorly, short, dark setae anteriorly; mid and hind femora with no outstanding ventromedial bristles; tibiae black; basitarsi of mid and hind legs yellow on proximal half, black distally; all other tarsomeres black; tarsomeres of fore leg not dilated, basitarsi approximately same width as basitarsi of mid leg; wing venation dark; all thoracic macrosetae dark; scutal chaetotaxy: np 4; sa 1; pa 1; dc 2; sc 1. **Abdomen:** 1.0–1.2 × length of head and thorax combined; black; tergites 2–4 posterodorsally with yellowish white velutum, with wider medial band or plaque of thick white velutum anterior to yellowish white band; remainder of dorsum of tergite 1 brown pruinescent, silver on posterior margin; tergites 2 and 3 sparsely brown pruinescent, with velutum continuing posterolaterally; tergite 4 very sparsely brown pruinescent; tergites 5–8 glossy black; tergites 1 and 2 with long white setae anteriorly; tergite 3 covered with brown setae on all but anteromedial area; tergites 4–8 covered with brown setae; sternite 1 glossy, black, glabrous; sternites 2 and 3 glossy black, glabrous on anterior half, with white setae posteriorly, posterior bands of milky white pruinescence present; sternites 4–7 glossy black with brown setae. **Genitalia** (Fig. 7A–E): Epandrium length shorter than width; cerci elongate; tergite 8 highly emarginate; median atrium between gonocoxites wide; outer gonocoxal process fused basally to gonocoxal apodeme; epandrium fused to gonocoxal apodeme; arms of ventral lobe of aedeagal sheath narrow; ejaculatory apodeme rounded in profile.

**Male.** Body length 6.8–7.8 mm. **Head:** Lower frons black to brown, glossy, transverse striations on dorsal surface of ridge; upper frons including occipital triangle brown pruinescent, covered with brown setae shorter than scape, shortest on occipital triangle; face covered with short, dense silver pruinescence; width of occipital triangle 1.0–1.2 × width of narrowest part of frons; median occipital sclerite entirely silver or brown pruinescent; scape brown, densely silver pruinescent, covered with brown setae, 2–5 stout, black, dorsal setae in 1 or 2 rows; pedicel brown, silver pruinescent, covered with brown setae; flagellum brown, silver pruinescent, 2.3 × length of scape. **Thorax:** Dark setae covering scutum; colours on scutum given by pruinescence, white laterally and posteriorly, dorsocentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture, 2 dorsocentral white spots on transverse suture, remainder of scutum brown, brown extending laterally only around transverse suture; scutellum covered with dark setae; scutellum entirely brown pruinescent; postpronotal lobe silver pruinescent on ventral half, with scattered dark setae on dorsal half; proepimeral silver pruinescent on all but ventral sixth where glossy dark brown to sparsely silver pruinescent, weakly striated; katepisternum silver pruinescent on all but anterodorsal edge where glossy dark brown, rugose, with a few long white setae anterodorsally; anepisternum glossy dark brown with silver pruinescence along dorsal and posteroverentral edges only, entirely covered with long white setae (nonpilose regions of proepimeral, katepisternum and anepisternum thus forming a glossy brown transverse stripe); anepimeron glossy brown medially, otherwise sparsely silver pruinescent; kateatergite silver pruinescent, entirely covered with long white setae; coxae black to brown, silver pruinescent; fore and mid coxae entirely covered with long white setae, hind coxa with long white setae restricted to dorsal and lateral surface; trochanters glossy brown; fore and hind femora black to brown; mid femur yellow on distal two-thirds, brown proximally; fore and mid femora with long white setae posteriorly, short, dark setae anteriorly; mid and hind femora with no outstanding ventromedial bristles; tibiae black; basitarsi of mid and hind legs yellow on proximal half, black distally; all other tarsomeres black; tarsomeres of fore leg not dilated, basitarsi approximately same width as basitarsi of mid leg; wing venation dark; all thoracic macrosetae dark; scutal chaetotaxy: np 4; sa 1; pa 1; dc 2; sc 1. **Abdomen:** 1.0–1.2 × length of head and thorax combined; black; tergites 2–4 posterodorsally with yellowish white velutum, with wider medial band or plaque of thick white velutum anterior to yellowish white band; remainder of dorsum of tergite 1 brown pruinescent, silver on posterior margin; tergites 2 and 3 sparsely brown pruinescent, with velutum continuing posterolaterally; tergite 4 very sparsely brown pruinescent; tergites 5–8 glossy black; tergites 1 and 2 with long white setae anteriorly; tergite 3 covered with brown setae on all but anteromedial area; tergites 4–8 covered with brown setae; sternite 1 glossy, black, glabrous; sternites 2 and 3 glossy black, glabrous on anterior half, with white setae posteriorly, posterior bands of milky white pruinescence present; sternites 4–7 glossy black with brown setae. **Genitalia** (Fig. 7A–E): Epandrium length shorter than width; cerci elongate; tergite 8 highly emarginate; median atrium between gonocoxites wide; outer gonocoxal process almost as long as gonostyli; inner gonocoxal process fused basally to gonocoxal apodeme; hypandrium with few small setae; distiphallus recurved dorsally proximal to ejaculatory apodeme; arms of ventral lobe of aedeagal sheath narrow; ejaculatory apodeme rounded in profile.

**Female.** Body length 7.3–9.4 mm. Similar to male except: flagellum 2.0–2.4 × length of scape; yellowish white velutum absent on tergite 4, sometimes absent on tergite 2 and sternite 2; tergites 2–4 with wider medial band of white velutum anterior to yellowish white band absent. **Comments.** *Bonjeania angelikae* is closely related to *B. clamosis* and can be distinguished by the mid femur coloration. This species is known from inland central New South Wales and...
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Fig. 6. Bonjeania actuosa (White), male genitalia. A, Gonocoxite, lateral view; B, epandrium, dorsal view; C, gonocoxite, dorsal view; D, same, with aedeagus in situ, dorsal view; E, base of aedeagus, lateral view; F, same, dorsal view. Scales = 0.2 mm.

the Australian Capital Territory (Fig. 15A). The specific epithet is in honour of Angelika W. Skevington.

Material examined. Holotype, AUSTRALIA: NSW, Urila, 25 km S Queanbeyan, ex Malaise trap, δ, 16-24.xii.1987 (Irwin) (ANIC). Paratypes, AUSTRALIA: same data as holotype, 2δ, 18♀ (ANIC). ACT, Black Mountain, light trap, δ, 20.xi.1969 (Common) (ANIC); Black Mountain, Malaise trap, δ, 16♀, various dates, (Irwin) (ANIC). Other material, AUSTRALIA: same data as holotype, 31♀ (IRWC); Mt Kaputar N.P., Upper Bullawa Ck, Malaise trap, 8♀, 15-19.i.1994 (Irwin, Yeates) (IRWC); Warrumbungle N.P., various dates, 14♀, 19.xii.1987-17.xii.1995 (Irwin, Yeates) (IRWC); 15 km W Coonabarabran, Malaise, 9♀, 19.xii.1987 (Irwin) (IRWC); Lake George, Cullarin Winery, Malaise, 9♀, 15-24.i.1988 (Irwin) (IRWC); 23 km SW Mendooran, Goonoo State Forest, Malaise trap, 9♀, 14.i.1994 (Irwin, Yeates) (IRWC).
**Fig. 7.** *Bonjeania angeli* sp.n. male genitalia. A. Gonocoxite, epandrium, tergite and sternite 8 with aedeagus *in situ*, lateral view; B, epandrium, dorsal view; C, tergite 8, dorsal view; D, gonocoxites with aedeagus *in situ*, dorsal view; E, gonocoxites, ventral view. Scale = 0.2 mm.

*Bonjeania clamosis* Winterton & Skevington sp.n.  
(Figs 3A–E, 4, 5H–I.L, 8A–F, 15B)

**Diagnosis.** Autapomorphies: none identified. Shared characters: scutum with white anteromedial patch dividing into 2 dorsocentral white stripes extending distally halfway to transverse suture, 2 dorsocentral white spots on transverse suture, scutum entirely white dorsolaterally and distally, poorly defined dorsocentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture; proepimeron silver pruinescent on all but ventral sixth where glossy dark brown to sparsely silver pruinescent; katepisternum silver pruinescent on all but anterodorsal edge where glossy dark brown; nonpilose regions of proepimeron, katepisternum and...
2 sparsely brown pruinescent, velum continuing posterolaterally; tergite 3 sparsely brown pruinescent anterolaterally, glossy black posterolaterally, anterodorsal saddle and specialized patch densely brown pruinescent, remaining anterodorsal two-thirds sparsely brown pruinescent, velum usually continuing posterolaterally; tergite 4 sparsely brown pruinescent over anterior three-quarters; tergites 5–8 black; tergites 2–7 covered with moderately long brown setae; sternites 1 and 2 glossy black, glabrous; sternites 3 and 4 glossy black with long white setae and posterior bands of milky white pruinescence present or absent; sternites 5–8 black, with long brown setae. *Genitalia* (Fig. 8A–F): Identical to *B. angelikae* except outer gonocoxal process variable in size.

**Female.** Body length 5.8–9.9 mm. Similar to male except: all tibiae black; abdomen as long as or longer than head and thorax combined (usually much longer); tergites 2–4 with wider medial band of white velutum anterior to yellowish white band absent.

**Comments.** Yeates (1992, 1994), in his systematic studies of Bombyliidae and Scenopinidae, figured the male genitalia of *B. clamosis* as *Bonjeania* sp. 1. *Bonjeania clamosis* is the most widely distributed species in the genus with large series of individuals from New South Wales and south-eastern Queensland (Fig. 15B). The specific epithet is derived from the Latin *clamor* meaning proclaiming, exclamatory, referring to shape of the scutal markings.

**Material examined.** Holotype. AUSTRALIA: Qld, 6 km N Taroom (25°36′S, 149°46′E), mv lamp, δ, 25.xi.1992 (DANIELS (AMS)). Paratypes. AUSTRALIA: Qld, Carnarvon N.P., Mt Moffatt section, Top Shelter Shed, mv light, δ, in copula, 12.xii.1987 (YEATES) (UQIC); Carnarvon N.P., Mt Moffatt section, 3 km SE Headquarters, sand under *Eucalyptus* tree (reared from larva-pupal case mounted on pin beneath specimen), 2, 20.xi.1995 (IRWIN) (QM); Lawn Hill N.P., Musselbrook Resource Centre (18°35′S, 138°07′E), mv lamp, δ, 19.iv.1995 (DANIELS, SCHNEIDER) (UQIC); Lake Broadwater, nr Dalby, site A (27°21′S, 151°06′E), mv lamp, δ, in copula, 24.xii.1986 (DANIELS) (AMS). NSW, Warrumbungle N.P., Browns Ck, 2.5 km W Woolshed, Malaise trap, 5δ, 5♀, 17.xii.1995 (IRWIN) (QM); Urila, 26 km S Queanbeyan, 3♀, 2♀, 26.xii.1987 (IRWIN) (ANIC); Round Hill Fauna Reserve, δ, 23.x.1977 (DANIELS) (UQIC); Goonoowia State Forest, 23 km SW Mendooran, δ, 14.i.1994 (IRWIN, YEATES) (ANIC). Other material, AUSTRALIA: Qld, Carnarvon N.P., Mt Moffatt section (25°03′S, 148°00′E), Malaise trap, 4♀, 499♀, 22–26.xi.1995 (IRWIN, GAIMARI) (IRWC); Lake Broadwater, nr Dalby, site A (27°21′S, 151°06′E), δ, 30.1.1987 (DANIELS) (GDBC); 6 km N Taroom (25°36′S, 149°46′E), mv lamp, 3♀, 3♂, 25.xii.1992, 1 pair in copula (DANIELS) (GDBC); Cumnarulla, δ, Oct. 1944 (GEARY) (AMS); 6 km N Taroom (25°36′S, 149°46′E), mv lamp, 2♂, 3♀, 1.x.1991, 1 pair in copula (DANIELS, MAYNARD) (GDBC); Nathan Gorge, Taroom District, pitfall trap, 5♀, 13.xi.1997 (LOWLESS) (QM); 16 km N Boonah (27°54′S, 152°41′E), 17.ix.1994 (BOWELL) (QM); Lawn Hill N.P. (18°38′S, 138°12′E), 5♀, 26.iv.1995 (DANIELS, SCHNEIDER) (UQIC); Lawn Hill N.P. (18°38′S, 138°12′E), 2♀, 8.v.1995 (DANIELS, SCHNEIDER) (UQIC). NSW, Mt Kaputar N.P., Malaise trap, 13♀, 18.i.1994 (IRWIN, YEATES) (IRWC);

Fig. 8. *Bonjeania clamosis* sp.n. male genitalia. A. Gonocoxite, epandrium and tergite 8 with aedeagus in situ, lateral view; B, epandrium, dorsal view; C, tergite 8, dorsal view; D, gonocoxites with aedeagus in situ, dorsal view; E, gonocoxites, ventral view; F, same, ventral view. Scale = 0.2 mm.

Bonjeania dynastis Winton & Skevington sp.n.
(Fig. 15A)

Diagnosis. Autapomorphies: body length greater than 12 mm; katepisternum densely silver pruinose on posterior half, very sparsely pruinose on anterior half so appearing brown but not glossy. Shared characters: scutum with white anteromedial patch separating into 2 dorsocentral white stripes extending distally halfway to transverse suture, 2 dorsocentral white spots on transverse suture, scutum entirely white dorsolaterally and distally, poorly defined dorsocentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture; proepimeron silver pruinose on all but posterior third where glossy dark brown; non-pilose regions of katepisternum and anepisternum forming a vague brown transverse stripe.

Female. Body length 12.6 mm. Head: Frons black, glossy, striated longitudinally; upper frons silver pruinose, gold pruinose on and adjacent to occellar triangle; upper frons including occellar triangle with brown setae shorter than scape; face covered with short, dense silver pruinose; width of occellar triangle 0.7X length of narrowest part of frons; median occipital sclerite entirely sparsely silver pruinose; scape black, densely silver pruinose, covered with brown setae; 4–7 stout, black, dorsal setae in 1 or 2 rows; pedicel black, densely silver pruinose, covered with brown setae; flagellum dark brown, with sparse silver pruinosecence, 1.9X length of scape. Thorax: Dark setae covering scutum; colours on scutum given by pruinosecence: white anteromedial patch separating into 2 dorsocentral white stripes extending distally halfway to transverse suture, 2 dorsocentral white spots on transverse suture, scutum entirely white dorsolaterally and distally, poorly defined dorsocentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture, all white areas on scutum bounded by golden brown pruinosecence; scutum covered with dark setae; substicalium entirely brown pruinose; postpronotal lobe silver pruinose on ventral half, covered with dark setae; proepimeron silver pruinose on all but posterior third where glossy dark brown; katepisternum densely silver pruinose on posterior half, very sparsely pruinose on anterior half so appearing brown but not glossy, with a few long white setae anterodorsally; anepisternum glossy dark brown with silver pruinosecence on posteroventral corner only, entirely covered with long white setae; anepimeron with narrow, glossy brown medial stripe, otherwise silver pruinose, with long white setae around glabrous area only; katatergite silver pruinose, entirely covered with long white setae; coxae dark brown, densely silver pruinose dorsally; fore and mid coxae entirely covered with long white setae, hind coxa with long white setae restricted to dorsal and lateral surface; trochanters glossy brown; femora dark brown; fore and mid femora with short, pale setae posteriorly, short, dark setae anteriorly; mid and hind femora with no outstanding ventromedial bristles; tibiae dark brown; tarsi dark brown; tarsomere of fore leg not dilated, basitarsi approximately same width as basitarsi of mid leg; wing venation dark; all thoracic macrosetae dark; scutal chaetotaxy: np 5; sa 1; pa 1; dc 1 or 2; sc 2. Abdomen: 1.4X length of head and thorax combined; black; tergites 1–4 posterodorsally with yellowish white velutum; remainder of dorsum of tergite 1 brown pruinose, with small patch of silver pruinosecence anterior to velutum; tergites 2–4 sparsely brown pruinose; velutum continuing posterolaterally on tergites 2 and 3; tergites 5–8 glossy black; tergites 1–8 entirely covered with short brown setae; sternite 1 glossy, black, glabrous; sternites 2 and 3 glabrous on anterior half, with long white setae posteriorly, yellowish white velutum present; sternites 4 and 5 glossy black with brown setae; sternites 6 and 7 glossy black with white setae.

Male. Unknown.

Comments. One of the largest species of Bonjeania it is known only from three females from New South Wales (Fig. 15A). The specific epithet is derived from the Greek dynastes meaning master, ruler, referring to size of the individuals.


Bonjeania flavofemoralis Winton & Skevington sp.n. (Figs 1, 5C–G, 9A–E, 15C)

Diagnosis. Autapomorphies: frons entirely black, glossy, glabrous; femora bright yellow; basitarsi of hind leg yellow, all other tarsomeres black. Shared characters: median occipital sclerite entirely sparsely silver pruinose; scape black, densely silver pruinose, covered with brown setae; 4–7 stout, black, dorsal setae in 1 or 2 rows; pedicel black, densely silver pruinose, covered with brown setae; flagellum dark brown, with sparse silver pruinosecence, 1.9X length of scape. Head: Frons black, glossy, striated longitudinally; upper frons silver pruinose, gold pruinose on and adjacent to occellar triangle; upper frons including occellar triangle with brown setae shorter than scape; face covered with short, dense silver pruinose; width of occellar triangle 0.7X length of narrowest part of frons; median occipital sclerite entirely sparsely silver pruinose; scape black, densely silver pruinose, covered with brown setae; 4–7 stout, black, dorsal setae in 1 or 2 rows; pedicel black, densely silver pruinose, covered with brown setae; flagellum dark brown, with sparse silver pruinosecence, 1.9X length of scape. Thorax: Dark setae covering scutum; colours on scutum given by pruinosecence: white anteromedial patch separating into 2 dorsocentral white stripes extending distally halfway to transverse suture, 2 dorsocentral white spots on transverse suture, scutum entirely white dorsolaterally and distally, poorly defined dorsocentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture, all white areas on scutum bounded by golden brown pruinosecence; scutellum covered with dark setae; substicalium entirely brown pruinose; postpronotal lobe silver pruinose on ventral half, covered with dark setae; proepimeron silver pruinose on all but posterior third where glossy dark brown; katepisternum densely silver pruinose on posterior half, very sparsely pruinose on anterior half so appearing brown but not glossy, with a few long white setae anterodorsally; anepisternum glossy dark brown with silver pruinosecence on posteroventral corner only, entirely covered with long white setae; anepimeron with narrow, glossy brown medial stripe, otherwise silver pruinose, with long white setae around glabrous area only; katatergite silver pruinose, entirely covered with long white setae; coxae dark brown, densely silver pruinose dorsally; fore and mid coxae entirely covered with long white setae, hind coxa with long white setae restricted to dorsal and lateral surface; trochanters glossy brown; femora dark brown; fore and mid femora with short, pale setae posteriorly, short, dark setae anteriorly; mid and hind femora with no outstanding ventromedial bristles; tibiae dark brown; tarsi dark brown; tarsomere of fore leg not dilated, basitarsi approximately same width as basitarsi of mid leg; wing venation dark; all thoracic macrosetae dark; scutal chaetotaxy: np 5; sa 1; pa 1; dc 1 or 2; sc 2. Abdomen: 1.4X length of head and thorax combined; black; tergites 1–4 posterodorsally with yellowish white velutum; remainder of dorsum of tergite 1 brown pruinose, with small patch of silver pruinosecence anterior to velutum; tergites 2–4 sparsely brown pruinose; velutum continuing posterolaterally on tergites 2 and 3; tergites 5–8 glossy black; tergites 1–8 entirely covered with short brown setae; sternite 1 glossy, black, glabrous; sternites 2 and 3 glabrous on anterior half, with long white setae posteriorly, yellowish white velutum present; sternites 4 and 5 glossy black with brown setae; sternites 6 and 7 glossy black with white setae.

Male. Body length 7.9 mm. Head: Lower frons entirely black, glossy, glabrous; upper frons lacking pruinosecence, covered with white setae about half length of pedicel; occellar triangle gold-silver pruinose, with small, sparse white setae between ocelli, larger, dense, white setae clustered on posterior
edge of triangle; face covered with short, dense silver pruinescence; width of ocellar triangle 1.4–1.5× width of narrowest part of frons; median occipital sclerite glossy black, with silver pruinescence restricted to postocular ridge; scape pale brown, densely silver pruinescent, covered with white and black setae, 2 stout, black, dorsomedial setae; pedicel pale brown, densely silver pruinescent, covered with brown setae; flagellum dark brown, palest medially, with sparse silver pruinescence, 2.2× length of scape. Thorax (Fig. 5C,G): Dark setae covering scutum; colours on scutum given by pruinescence: 2 dorsocentral white spots on transverse suture, scutum entirely white dorsolaterally and distally, poorly defined dorsocentral white stripes extending from posterior of scutum anteriorly halfway to transverse suture; scutellum covered with dark setae; subscutellum entirely brown pruinescent; postpronotal lobe silver pruinescent on ventral half, with scattered dark setae on dorsal half; proepimeron silver pruinescent on all but ventral sixth where sparsely silver pruinescent, weakly striated; katepisternum silver pruinescent on all but anterodorsal edge where glossy black, rugose, with a few long white setae anterodorsally; anepisternum black with silver pruinescence over entire surface or at least along ventral two-thirds, entirely covered with long white setae; anepimeron glossy brown medially, otherwise sparsely silver pruinescent; katatergite glossy black, entirely covered with long white setae; coxae black, densely silver pruinescent dorsally; fore and mid

![Fig. 9. Bonjeania flavofemoralis sp.n. male genitalia. A. Gonocoxite, epandrium, tergite and sternite 8 with aedeagus in situ, lateral view; B. epandrium, dorsal view; C. tergite 8, dorsal view; D. gonocoxites, ventral view; E. aedeagus, dorsal view. Scales = 0.2 mm.](image-url)
coxae entirely covered with long white setae. Hind coxa with long white setae restricted to dorsal and lateral surface; trochanters glossy brown; femora bright yellow; fore and mid femora with long white setae posteriorly. Short, pale setae anteriorly; mid and hind femora with no outstanding ventromedial bristles; tibiae blackish brown; basitarsi of hind leg yellow, all other tarsomeres black; tarsomere of fore leg dilated, basitarsi 1.4–1.6X width of basitarsi of mid leg; wing venation dark; all thoracic microsetae dark; scutal chaetotaxy: np 4; sa 1; pa 1; dc 1 or 2; se 1 or 2. Abdomen: Short, 1.0X length of head and thorax combined; black; tergites 1–4 posterocephallally with yellowish white velutum; tergites 2–4 with wider medial band of white velutum anterior to yellowish white band; remainder of dorsum of tergites 1–3 sparsely brown pruine or scutum; velutum not continuing posterolaterally on tergites; tergite 4 glossy black; tergites 5–8 entirely glossy black; tergites 1 and 2 with long white setae laterally; tergite 3 covered with long white setae on all but anteromedial area; tergites 4–7 entirely covered with long white setae; sternite 1 glossy, black, glabrous; sternite 2 glossy black, glabrous on anterior half; sternites 3–7 glossy black with long white setae; no milky white pruine on any sternites. Genitalia (Fig. 9A–E): Epandrium wider than long along midline; cerci elongate; tergite 8 greatly emarginate; outer gonocoxal process with posterovertral process, medial atrium large; distiphallus relatively straight; lateral ejaculatory apodeme and ejaculatory apodeme enlarged, but not as much as other species.

Female. Body length 6.1–8.5 mm. Similar to male except: flagellum 2.4–2.7X length of scape; tergites 2–4 with wider medial band of white velutum anterior to yellowish white band absent.

Comments. The specific epithet is derived from the Latin flavus meaning golden yellow and femur meaning thigh, referring to the distinctive femor colouration. All specimens are known only from central Queensland (Fig. 15C).

Holotype, AUSTRALIA: Qld, Carnarvon N.P., Mt Moffatt section, Malaise trap nr Mt Moffatt, δ, 19–23.1.1998 (Winterton, Skevington) (QM). Paratypes, AUSTRALIA: δ, same label data as holotype (QM); Carnarvon N.P., Mt Moffatt section, Malaise trap, 1δ, 9, 23–26.xi.1995 (Irwin, Gaimari) (QM); 6 km N Taroom (25°36'S, 149°46'E), 9, 11.iv.1993 (Daniels) (GDCB).

Bonjeania irwinae Winterton & Skevington sp.n.
(Figs 5D, F, 10A–F, 15C)

Diagnosis. Autapomorphies: pruine on scutum as small, white, posterolateral and anterolateral patches; proepimeron entirely silver pruine; katepisternum black, very sparsely silver pruine, appearing bore but not glossy; mid femur basally, dark distally; fore and hind tibiae black, mid tibia yellow anteriorly, pale brown posteriorly. Shared characters: median occipital sclerite glossy black; anepisternum entirely silver pruine; fore basitarsus dilated; males with tergites 2–4 posterocephallally with yellowish white velutum on posterior margin, with wider medial band of white velutum anterior to this; yellowish-white velutum continuing posterolaterally on tergite 2; tergites 2–8 covered with moderately long white setae; gonocoxite with posteroventral process; distiphallus relatively short and straight; ejaculatory apodeme smaller than other species.

Male. Body length 7.2 mm. Head: Frons entirely black, glossy, except ocellar triangle sparsely brown pubescent; lower frons glabrous; upper frons covered with white setae shorter than scape, setae shorter on ocellar triangle; face silver pruine; width of ocellar triangle 1.5–1.6X width of narrowest part of frons; median occipital sclerite glossy black, with silver pruine restricted to postocular ridge; scape black, densely silver pruine, covered with brown setae, 2 or 3 stout, black, dorsal setae in one row; pedicel black, densely silver pruine, covered with brown setae; flagellum dark brown, with dense silver pruine, long, 2.6–2.8X length of scape. Thorax. (Fig. 5D): Dark setae covering scutum; only pruine on scutum small, white, posterolateral and anterolateral patches; scutellum covered with dark setae; subscutellum sparsely brown pruine; postpronotal lobe lacking pruine, with scattered dark setae on dorsal half; proepimeron entirely silver pruine; katepisternum black, very sparsely silver pruine, appearing bare but not glossy, with a few long white setae anterodorsally; anepisternum entirely silver pruine, covered with long white setae; anepimeron silver pruine with glossy brown medial stripe; katatergite sparsely silver pruine, covered with long white setae; coxae black, densely silver pruine dorsally; fore and mid coxae entirely covered with long white setae, hind coxa with long white setae restricted to dorsal and lateral surface; trochanters glossy brown; fore and hind femora black; mid femur yellow with posteroventral dark stripe; fore and mid femora with long white setae posteriorly, short, dark setae anteriorly; fore and hind tibiae black; mid tibia yellow anteriorly, pale brown posteriorly; basitarsi of mid and hind legs yellow on basal two-thirds, black distally; all other tarsomeres black; fore basitarsus dilated, 1.4–1.7X width of basitarsi of mid leg; wing venation dark; all thoracic microsetae dark; scutal chaetotaxy: np 3 or 4; sa 1; pa 1; dc 1 or 2; se 1. Abdomen: Slightly shorter than length of head and thorax combined; black; tergite 1 brown pruine; tergites 2–4 posterocephallally with yellowish white velutum on posterior margin, with wider medial band of white velutum anterior to this; remainder of tergites 2–4 glossy black; yellowish-white velutum continuing posterovertral on tergite 2; tergites 5–7 glossy black; tergite 8 black with sparse silver pruine; tergites 2–8 covered with moderately long white setae; sternite 1 glossy black, glabrous; sternite 2 glossy black with long white setae and posterior band of milky white pruine; sternite 3 glossy black with long white setae and posterior band of milky white pruine; sternite 4–7 glossy black, with long brown setae. Genitalia (Fig. 10A–F): Epandrium wider than long; cerci elongate; tergite 8 greatly emarginate; gonocoxite with posteroventral process, medial atrium relatively large, inner gonocoxal process apically spatulate, long narrow basal process directed anteriorly; distiphallus relatively short and straight; lateral ejaculatory apodeme and ejaculatory apodeme smaller than other species.

Female. Body length 6.6–9.1 mm. Similar to male except: flagellum 2.1–2.6X length of scape; all tibiae black; abdomen
as long as or longer than head and thorax combined (usually much longer); yellowish white velutum of abdominal tergites 2–4 usually as in male, but sometimes absent or present and continuing posterolaterally on tergites 2 and 3; tergites 2–4 with wider medial band of white velutum anterior to yellowish white band absent.

**Comments.** *Bonjeania irwiniae* is the sister species to *B. flavofemoralis*, as they both have reductions in the size of the ejaculatory apodeme and a shorter, relatively straight distiphallus. *Bonjeania irwiniae* is recorded from central New South Wales and Queensland (Fig. 15C). The specific epithet is in honour of Bonnie-Jean Irwin.

**Material examined.** Holotype, AUSTRALIA: NSW, Goonoo State Forest, 23 km SW Mendooran, Malaise trap, 1♂, 4.i.1994 (Irwin, Yeates) (ANIC). Paratypes, AUSTRALIA: NSW, ♀, same label data as holotype (ANIC); Warrumbungle N.P., Wombelong Ck, at woolshed, ♂, 27.xii.1987 (Irwin) (ANIC); Warrumbungle N.P., Browns Ck nr Wombelong Ck (31°16'S, 148°57'E), ♀, 12–16.xii.1995 (Irwin) (ANIC); Warrumbungle N.P., Browns Ck 2.5 km N Woolshed, ♂, 15.i.1994 (Irwin, Yeates) (ANIC); Warrumbungle N.P., Buckleys Ck 1.5 km NE Blackman Camp, Malaise trap, ♂, 14.i.1994 (Irwin, Yeates) (ANIC); Mt Kaputar N.P., Upper Eulah Ck, ♂, 18.i.1994 (Irwin, Yeates) (ANIC); Mt Kaputar N.P., Upper Eulah Ck, ♂, 18.i.1994 (Irwin, Yeates) (ANIC). Qld, Carnarvon N.P., Mt Moffatt section. Malaise trap, 5♀, 23–26.xi.1995 (Irwin, Gaimari) (QM); Carnarvon N.P., Mt Moffatt section, 3 km SE park headquarters (25°04'S, 148°00'E), sand under *Eucalyptus* tree, reared (pupal case mounted on pin beneath specimen), ♂, 20.xi.1995 (Irwin) (QM).
Bonjeania nitidifrons (Macquart) (Figs 2B, 5A, 11A–E, 15C)

Anabarhynchus nitidifrons Macquart, 1850: 405(101), Tab. 9, Fig. 15.
Lonchorhynus nitidifrons of White, 1915: 34, Figs 18, 19; Mann, 1929: 48, Figs 6c,d.
Bonjeania nitidifrons of Irwin & Lyneborg, 1989: 356.

Diagnosis. Autapomorphies: scutum white laterally and anterolaterally, brown medially as far as dorsocentral setae, matte black stripe between dorsocentral setae; epandrium elongate; cerci elongate; tergite 8 long, not emarginate; hypandrium with 2 patches of setae, each lateral of midline; spermathecal sac reduced; conical, sclerotized structure present on spermathecal sac duct. Shared characters: proepimeron entirely silver pruinescent; katepisternum silver pruinescent on all but anterior third where glossy dark brown; nonpilose regions of katepisternum and anepisternum forming a poorly defined brown transverse stripe; anepimeron entirely silver pruinescent; gonocoxal apodeme and distiphallus extremely long; ejaculatory apodeme greatly enlarged.

Male. Body length 12.0 mm. Head: Lower frons black, glossy, striated longitudinally; upper frons brown pruinescent on and adjacent to ocellar triangle, covered with pale brown setae shorter than scape; face covered with short, dense silver pruinescence, width of ocellar triangle 1.3X width of narrowest part of frons; median occipital sclerite brown pruinescent on dorsal quarter, silver pruinescent on remainder; scape dark brown, sparsely silver pruinescent, covered with brown setae, 2 stout, black, dorsal setae; pedicel and flagellum dark brown, sparsely silver pruinescent, pedicel covered with short brown setae. Thorax (Fig. 5A): Dark setae covering scutum; colours on scutum given by pruinescence, white laterally and anterolaterally, brown medially as far as dorsocentral setae, matte black stripe between dorsocentral setae; scutellum covered with dark setae; subscutellum entirely brown pruinescent; postpronotal lobe silver pruinescent with scattered white setae; proepimeron entirely silver pruinescent; katepisternum silver pruinescent on all but anterior third where glossy dark brown, striated, with a few long white setae anterodorsally; anepisternum glossy dark brown with silver pruinescence on posterolateroventral corner only, entirely covered with long white setae (non-pilose regions of katepisternum and anepisternum thus forming a faint brown transverse stripe); anepimeron entirely silver pruinescent, with only a few ventral white setae; kateatergite silver pruinescent, entirely covered with long white setae; coxae brown to black, densely silver pruinescent dorsally; fore and mid coxae entirely covered with long white setae, hind coxa with long white setae restricted to dorsal and lateral surface; trochanters glossy brown; femora brown to black; fore and mid femora with long white setae posteriorly, short, dark setae anteriorly; midhind femora with no outstanding ventromedial bristles; tibiae blackish brown; basitarsi of mid and hind legs yellowish basally, blackish brown distally; all other tarsomeres blackish brown; wing venation dark; all thoracic macrosetae dark; scutal chaetotaxy: np 3 or 4; sd 1; pa 1; dc 2; sc 2. Abdomen: Tergites 2–4 posterodorsally with yellowish white velutum, with wider medial band of white velutum anterior to yellowish white band. Genitalia (Fig. 11A–E): Epandrium elongate, posterolateral corners projecting posteriorly; cerci elongate; tergite 8 long, not emarginate; gonoxostyle without posteroventral process, medial atrium large, gonocoxal apodeme extremely long; hypandrium with 2 patches of setae, each located lateral of midline; distiphallus extremely long, relatively straight; ventral apodeme of aedeagal sheath narrow; lateral ejaculatory apodeme and ejaculatory apodeme greatly enlarged.

Female. Body length 8.9–10.3 mm. Similar to male except: flagellum brown, with sparse silver pruinescence, 2.1X length of scape; abdomen 1.2–1.4X length of head and thorax combined; black; tergites 1–4 posterodorsally with yellowish white velutum; remainder of dorsum of tergite 1 densely brown pruinescent; tergites 2–4 sparsely brown pruinescent, velutum continuing posterolaterally; tergites 5–8 glossy black; tergite 1 with brown setae restricted to lateral region; tergites 2–8 entirely covered with brown setae; sternite 1 glossy, black, glabrous; sternite 2 glossy black, glabrous on anterior half; sternites 3–7 glossy black with brown setae; milky white pruinescent bands on sternites 2–4. Genitalia (Fig. 2B). Spermathecal sac reduced; conical, sclerotized structure present on spermathecal sac duct.

Comments. Bonjeania nitidifrons has extremely elongate male genitalia similar to B. actuosa. The long tergite 8 of the male and reduced spermathecal sac of the female are autapomorphic for this species. The matte black scutal stripe easily distinguishes this species from other members of the genus. Bonjeania nitidifrons is recorded from Tasmania, New South Wales and the Australian Capital Territory (Fig. 15C).

Material examined. Holotype, AUSTRALIA: Tas, Wedge Bay (MNHN), Other material, AUSTRALIA: Tas, Mangalore, 29°15–16.ii.1914 (White) (BMNH); Mt George nr George Town (41°06’S, 146°52’E), 29°, 3.ii.1988 (Daniels) (GDCB); 25 km W Bridport (41°04’S, 147°09’E), on Eucalyptus trunk, 29°, 2.i.1988 (Daniels) (GDCB). NSW, Urila, 26 km S Queanbeyan, Malaise trap, 29°, 16–24.xi.1987 (Irwin) (AMS). ACT, Black Mountain (35°16’S, 149°06’E), ex Malaise trap, 29°, 15–21.i.1988 (Irwin) (AMS).

Bonjeania orphne Winterton & Skevington sp.n. (Figs 12A–G, 15B)

Diagnosis. Autapomorphies: antennae bright yellow; scutum entirely black with short pale setae; legs and wing venation bright yellow; female wing hyaline; abdomen black, with pale setae. Shared characters: frons covered with short brown setae; frons of male slightly wider than ocellar triangle; proepimeron, katepimeron and katepisternum with longitudinal silver pruinescent stripe; abdominal velum plaques absent; gonostylus with long medially directed setae basally.


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Male. Body length 7.0–7.9 mm. Head: Frons black, glossy with silver pruinescence along eye margin between antennae and ocellar triangle, silver pruinescent below level of antennae; entire frons covered with short, brown setae; width of ocellar triangle 0.90–0.95 × width of narrowest part of frons; median occipital sclerite sparsely brown pruinescent; antenna bright yellow, sparsely silver pruinescent, scape covered with black setae, 1–7 stout, black, dorsal setae in 2 or 3 rows; pedicel covered with small, brown setae; flagellum 2.5–2.8 × length of scape, very broad in basal half. Thorax: Scutum and scutellum entirely glossy black, covered with pale setae; scutellum sparsely silver pruinescent; pleuron glossy black except for

Fig. 11. Bonjeania nitidifrons (Macquart), male genitalia. A, Gonocoxite and epandrium with aedeagus in situ, lateral view; B, epandrium, dorsal view; C, tergite 8, dorsal view; D, gonocoxites, ventral view; E, aedeagus, dorsal view. Scales = 0.2 mm.
longitudinal silver pruinescent (velutum) stripe encompassing the ventral half of the proepimeron, dorsal third of katepisternum, katepimeron and meron, long white setae on anepisternum and katepisternum, katatergite with strong dark setae; fore and mid coxae bright yellow, hind coxa black, coxae silver pruinescent, long white setae ventrolaterally; legs completely bright yellow, femora with fine pale setae on anterior and posterior surfaces; fore basitarsus approximately same width as basitarsi of mid and hind legs; wing venation yellow; all thoracic macrosetae dark; scutal chaetotaxy: np 4; sa 1; pa 1; dc 2 or 3; sc 1. 

**Abdomen:** Short, 1.0× length of head and thorax combined; glossy black, tergites 1–3 grey-brown pruinescent; velutum plaques absent; abdomen covered with numerous short, pale setae; inner gonocoxal process not fused to gonocoxal apodeme; gonostylus with long medially directed setae basally; ejaculatory apodeme greatly enlarged; tergite 8 emarginate.

**Female** (Fig. 12F). Body length 8.9–10.3 mm. Similar to male except: frons wider than male; scutum and abdomen with short dark setae instead of long pale setae.

**Comments.** *Bonjeania orphne* sp. n. is closely related to *B. acuta* with similarities in frons shape and pleuron coloration. It is easily distinguished by the bright yellow coloration of the legs, antennae and wing venation. *Bonjeania orphne* sp. n. is known from central New South Wales and Carnarvon National Park (Queensland) (Fig. 15B). The specific epithet is from the Greek *orphne* meaning the darkness of night, referring to the dark body coloration.


**Bonjeania segnis** (White) (Figs 13A–G, 15B)

*Lonchorhynchus segnis* White, 1915: 37; Mann, 1929: 47. 

**Bonjeania segnis** of Irwin & Lyneborg, 1989: 356.

**Diagnosis.** Autapomorphies: frons black, shining with small triangular silver pruinescent patch along eye halfway between antennae and ocellar triangle; transverse silver pruinescent stripe halfway between these patches and ocellar triangle; flagellum very broad in basal half; scutum entirely pale black pruinescent; katepisternum entirely silver pruinescent; 4–7 dorsocentral bristles; basitarsi yellow with distal third black; tarsomere 2 black with proximal third yellow, tarsomeres 3–5 black; abdomen brown, with yellowish posterolateral edges to tergites 2–4; epandrium much wider than long; gonocoxal apodemes short; distiphallus short; lateral ejaculatory apodeme and ejaculatory apodeme not disproportionately enlarged. Shared characters: entire frons covered with brown hairs about same length as scape, hairs slightly shorter on ocellar triangle only; frons of male wider than ocellar triangle; proepimeron entirely silver pruinescent; anepimeron entirely shining brown; katatergite shining brown; tibiae yellow with distal sixth black. 

**Male.** Body length 6.0–6.9 mm. **Head:** Frons black, shining with small triangular silver pruinescent patch along eye halfway between antennae and ocellar triangle, transverse silver pruinescent stripe halfway between these patches and ocellar triangle; entire frons covered with brown hairs about same length as scape, hairs slightly shorter on ocellar triangle only; face with sparse silver pruinescence; width of ocellar triangle 0.81–0.91× width of narrowest part of frons; median occipital sclerite sparsely brown pruinescent; scape brown to black, sparsely silver pruinescent, covered with brown setae; pedicel brown to black, sparsely silver pruinescent, covered with brown setae; flagellum brown to black with sparse silver pruinescence, 2.5–2.8× length of scape, very broad in basal half. 

**Thorax:** Scutum entirely matte black pruinescent, covered with dark setae; scutellum covered with dark setae; subscutellum entirely brown pruinescent; postpronotal lobe sparsely silver pruinescent, with scattered white setae; proepimeron entirely silver pruinescent; katepisternum entirely silver pruinescent, with a few long, white setae anterodorsally; anepisternum shining dark brown with silver pruinescence along dorsal edge only, entirely covered with long white setae; anepimeron entirely shining brown; katatergite shining brown, with a few long white setae; coxae black, densely silver pruinescent; and mid coxae entirely covered with long white setae, hind coxa with long white setae restricted to dorsal and lateral surface; trochanters black, silver pruinescent; femora black; fore and mid femora with long, white hairs posteriorly, short, pale hairs anteriorly; mid and hind femora with no outstanding ventromedial bristles; tibiae yellow with distal sixth black; basitarsi yellow with distal third black; tarsomere 2 black with proximal third yellow; tarsomeres 3–5 black; tarsomere of fore leg not dilated, basitarsi approximately same width as basitarsi of mid leg; wing venation dark; all thoracic macrosetae dark; scutum chaetotaxy: np 3; sa 1; pa 1; dc 4–7; sc 1. 

**Abdomen:** Short, 1.0× length of head and thorax combined; brown, with yellowish posterolateral edges to tergites 2–4; tergites 2–4 posterodorsally and posterolaterally with yellowish white velutum, medial section brown; tergite 1 brown pruinescent with silver pruinescent posterolateral edges; tergites 2–6 without pruinescence; tergites 1–6 with short brown hairs; sternite 1 shining, brown, glabrous; sternites 2 and 3 with yellowish white velutum on posterior edges; sternites 2–4 shining yellowish brown with short, pale hairs; sternites 5–7 shining dark brown with short, pale hairs. 

**Genitalia** (Fig. 13A–G): epandrium very short, much wider at midpoint than length; tergite 8 emarginate; outer gonocoxal process well developed, hypandrium fuse laterally to gonocoxites; gonocoxal apodemes shorter than gonocoxite length; distiphallus short; ventral apodeme less

than half length of ejaculatory apodeme; dorsal apodeme greatly reduced; lateral ejaculatory apodeme and ejaculatory apodeme enlarged, but not disproportionately as in other species of *Bonjeania*.

**Female.** Body length 6.4–6.8 mm. Similar to male except upper frons width twice that of ocellar tubercle. **Genitalia:** As per genus description.

**Comments.** The short aedeagus and gonocoxal apodemes separate *B. segnis* from the rest of *Bonjeania*. Mann (1929) recorded *B. segnis* from Tasmania and New South Wales (Fig. 15B).

**Material examined.** Holotype, AUSTRALIA: Tas, ♂, 14.xii.1911 (White) (NHM). Other material, AUSTRALIA: Tas, Hobart, 2♂, 29.x.1916, 2♂, 11.xi.1917 (Cole) (SAM); Hobart, ♀, 4.i.1951 (Riek) (ANIC).

**Bonjeania trilineata** Winterton & Skevington sp.n.
(Figs 5B, 14A–E, 15A)

**Diagnosis.** Autapomorphies: frons entirely silver pruinose except for elliptical, glabrous, brown medial patch above
antennal insertions; white setae covering scutum; scutum entirely white pruinose with 3 brown longitudinal stripes; scutellum sparsely covered with white setae; postpronotal lobe entirely silver pruinose, covered with white setae; anepimeron entirely silver pruinose, more sparsely anteriorly; mid femur with single ventromedial bristle; hind femur with 3 ventromedial bristles. Shared characters: proepimeron silver pruinose on all but posterior edge where glossy dark brown; katepistemum silver pruinose on all but anterior third where glossy dark brown; nonpilose regions of katepistemum and anepistemum forming a glossy brown transverse stripe; tibiae yellowish brown, darkened apically; gonocoxite with posteroventral process; ejaculatory apodeme enlarged.

Male. Body length 7.0 mm. Head: frons entirely silver pruinose except for elliptical glossy brown medial patch above antennal insertions; ocellar triangle silver pruinose; lower frons glabrous, upper frons with patch of white setae shorter than scape, much shorter white setae on ocellar triangle; face silver pruinose, glabrous; width of ocellar triangle 1.1× width of narrowest part of frons; median occipital sclerite densely silver pruinose; scape dark brown, sparsely silver pruinose, covered with white setae and 4 or 5 stout, black, dorsal setae; pedicel dark brown, sparsely silver pruinose, covered with brown setae; flagellum brown, palest proximally, with sparse silver pruinose, long, 2.2× length of scape. Thorax (Fig.5B): white setae covering scutum; colours on scutum given by pruinose: scutum entirely white laterally and posteriorly, brown pruinose anterior area divided into 3 stripes by 2 complete, white longitudinal pruinose stripes; scutellum sparsely covered with white setae; subscutellum entirely white pruinose; postpronotal lobe entirely silver pruinose, covered with white setae; proepimeron silver pruinose on all but posterior edge where glossy dark brown; katepistemum silver pruinose on all but anterior third where glossy dark brown, with a few long white setae anterodorsally; anepistemum glossy dark brown with a tiny patch of silver pruinose on posteroventral edge only, entirely covered with long white setae; anepimeron entirely silver pruinose, more sparsely anteriorly, with a few white setae; katatergite silver pruinose, entirely covered with long white setae; coxae

Fig. 14. Bonjeania trilineata sp.n. male genitalia. A, Gonocoxite and epandrium with aedeagus in situ, lateral view; B, epandrium, dorsal view; C, tergite 8, dorsal view; D, gonocoxites, ventral view; E, gonocoxites with aedeagus in situ, dorsal view. Scales = 0.2 mm.

black, sparsely silver pruinescent dorsally; fore and mid coxae entirely covered with long white setae, hind coxa with long white setae restricted to dorsal and lateral surface; trochanters brown; femora dark brown; fore and mid femora with long white setae posteriorly, short, white setae anteriorly; mid femur with single ventromedial bristle; hind femur with 3 ventromedial bristles; tibiae yellowish brown, darkened apically; basitarsi of mid and hind legs yellowish basally, blackish brown distally; all other tarsomeres blackish brown; tarsomere of fore leg not dilated, basitarsi approximately same width as basitarsi of mid leg; wing venation dark; thoracic macrosetae dark (one np white); scutal chaetotaxy: np 4; sa 1; pa 1; dc 2; sc 1. Abdomen: brown, with faint grey pruinescence on segments 2-6 dorsally; terminalia brown; all setae white. Genitalia (Fig. 14A–E): epandrium wider than long; cerci elongate; tergite 8 slightly emarginate; gonocoxite with posteroventral process, medial atrium relatively large, margin heavily sclerotized, inner gonocoxal process separate from gonocoxal apodeme; distiphallus relatively straight; lateral ejaculatory apodeme and ejaculatory apodeme enlarged.

Female. Unknown.

Comments. The specific epithet describes the highly distinctive markings on the scutum. The markings on the head
and thorax, and the pale setae colouration make this species easily recognizable. A single male specimen is known from central Australia (Fig. 15A).


Results of phylogenetic analysis

Analyses of the data matrix in Table 1 using PAUP and Hennig86 both produced a single most parsimonious cladogram (MPC) of length 131 steps (CI = 0.55, RI = 0.71)
Bonjeania with numerous vestiture plesiomorphies. Although Bonjeania actuosa and Bonjeania flavofemoralis + B. irwinae have branch supports of two.

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Appendix 1

Database reference numbers for specimens included in the material examined lists. Numbers are presented in the order given in the material examined lists, each locality is separated by a semicolon. Each specimen has been entered into MANDALA, the world-wide Therevidae specimen database maintained by MEI at the University of Illinois. This database will soon be searchable at the website: http://www.inhs.uiuc.edu/cee/therevid/stiletto_fly.html.

MANDALA contains information on collection data, ecology, nomenclatural status, institutional collection deposition and bibliographic references. Individual records are identified using their unique combination of three-letter code and six-digit number.

**Bonjeania actuosa**

*Lectotype:* MEI 090828. *Paralectotype:* MEI 090829-31. *Other material:* MEI 026580; MEI 026582; MEI 026583; MEI 026210-12 026214-16; MEI 090800; MEI 090748-50; MEI 090801-17; MEI 090818-9; MEI 026213; MEI 027270; MEI 026581.

**Bonjeania angelicae**

*Holotype:* MEI 026478. *Paratypes:* MEI 026480 026484 026488 026493 026496-8 026500-2 026504-5 026510 026514 026516 026522 026540 026544 026562 026574; MEI 026475; MEI 026479; MEI 026528-32 026534-38 026546-50 026560. *Other material:* MEI 026489 026491-2 026494-5 026499 026503 026506-9 026511-2 026515 026518-21 026523-6 026539 026554-5 026557-8 026561; MEI 026564-6 026568-9 026571-2 026578; MEI 026312 026336-7 026362 026367 026371-2 026374 026380 026387 026394 026425 026434 051036; MEI 026573; MEI 026553; MEI 026461.

**Bonjeania clavillosa**

*Holotype:* MEI 033635. *Paratypes:* MEI 033885 033883; MEI 033616; MEI 026263 026251; MEI 049550; MEI 039515 039534 039539 039585 039597 039601 046205 046207 046214 051055; MEI 026476 026481 026483 026527; MEI 026261; MEI 026270. *Other material:* MEI 031134-5 031188 031190-6 031198 031207 031210-1 031221 031244-5 031248 031278 031283-4 031296 031319 031345 031347 031376 031392 031405 031425 031429-30 031435 031472 031478 031541 031548 031568 031571 031579 031587 031594 031603 031609 031616 031619 031627 031669 031624 031649 031656 031661; MEI 026262; MEI 033643 033633 033636-7 (033631-2 in copula); MEI 026260; MEI 027260 (027257 and 027259 in copula); MEI 090820; MEI 090821; MEI 033618; MEI 033617; MEI 026356 026373 026375 026414-7 026423 026428 026430-1 026435-7; MEI 026271 026344 026359-60 026364 026370 026376-7 026418-9 026420-2 026424-35 026438 026445-7 026449 026451-60 026462-4 026466-73; MEI 026256-8 026264 026268-9 026272 026278-310 026313-23 026338-9 026341-2 026361 026370 026379 026396-400 026409-13 026442 026541 026563 039255-79 039339-40 039352 039377 039456 039460 039463 039469 039480 039505 039530-1 039541 039547 039553 039558 039561 039617 045442 046200-3 046215-7 046222 046226-7 046236 046238 046305 048912 049041 050775 050794 050796 050800 050815-7 050822 050824 050830 050840 050925 050930 051006 051060 051077 051165; MEI 026345; MEI 026517 026533 026575; MEI 026589-90 027232 027241; MEI 027236-7 027239 026588 026587; MEI 026586; MEI 026591 027238; MEI 080296; WAM 872124; WAM 872090; WAM 872089; WAM 872104; MEI 027255.

**Bonjeania dynastis**

*Holotype:* MEI 027246. *Paratypes:* MEI 027247; MEI 109394.

**Bonjeania flavofemoralis**

*Holotype:* MEI 090892. *Paratypes:* MEI 090893; MEI 031189 031209 031396 031459 031544 031548 031570 031578 031596 031663; MEI 033666.

**Bonjeania irwinae**

*Holotype:* MEI 026273. *Paratypes:* MEI 026332; MEI 026311; MEI 050811; MEI 026440; MEI 026405; MEI 026552; MEI 031208 031280 031420 031428 031604; MEI 049550 049552.

**Bonjeania nitidifrons**

*Holotype:* MEI 090832. *Other material:* MEI 090833-4; MEI 027248-9; MEI 027250; MEI 026356; MEI 026477.

**Bonjeania orphne**

*Holotype:* MEI 050727. *Paratypes:* MEI 026202 026204; MEI 035710 039300 051087-8; MEI 026205-7; MEI 026203; MEI 031426.

**Bonjeania segnis**

*Holotype:* MEI 090835. *Other material:* MEI 090824-5; MEI 090826-7; MEI 109391.

**Bonjeania trilineata**

*Holotype:* MEI 027262.
Appendix 2

Head

1. Flagellum length: (0) shorter than scape and pedicel length combined; (1) longer than scape and pedicel length combined.
2. Scape length: (0) greater than 4X pedicel length; (1) 2–3X pedicel length; (2) less than 2X pedicel length.
3. Frons shape: (0) rounded; (1) flattened, antennae raised on tubercle (Fig. 5K); (2) rounded, transverse tubercle on frons just above antennal bases (Figs 1, 5L).
4. Frons surface: (0) wrinkled (Fig. 5K); (1) smooth.
5. Frons vestiture: (0) with silver pruinescence absent (Fig. 5L); (1) silver pruinescence present (Fig. 5K).
6. Male frons width: (0) narrower than ocellar triangle (Fig. 5K); (1) wider than ocellar triangle (Fig. 5L).
7. Male occiput shape: (0) convex at dorsolateral margin; (1) concave or straight at dorsolateral margin.
8. Median occipital sclerite: (0) smooth, glabrous; (1) covered with pruinescence.

Thorax

10. Scutum patterning: (0) without white spots; (1) with 2 white spots opposite transverse suture.
11. Scutum patterning: (0) with 2 anterior dorsoventral white stripes; (1) stripes absent.
12. Number of notopleural bristles: (0) 4; (1) 3.
13. Proepimeron vestiture: (0) silver pruinescence on all but ventral sixth; (1) silver pruinescence on all but posterior third; (2) glabrous; (3) silver pruinescence on all but dorsal half; (4) completely silver pruinescent.
14. Katepisternum vestiture: (0) silver pruinescent except for anterodorsal margin; (1) silver pruinescent except for anterior third; (2) entirely silver pruinescent; (3) dorsal margin silver pruinescent.
15. Aneupisternum vestiture: (0) silver pruinescent; (1) glabrous; (2) glabrous with silver pruinescence in posteroventral corner.
16. Aneupisteron vestiture: (0) silver pruinescent; (1) glabrous.
17. Kaatergite vestiture: (0) silver pruinescent; (1) glossy, glabrous.
18. Katepisternum vestiture: (0) with long setae; (1) long setae absent.
19. Scutellum vestiture: (0) without pruinescence; (1) matte black pruinescent.
20. Coxae colour: (0) dark; (1) pale.
21. Tibiae: (0) wholly black or yellow; (1) yellow with dark apices.
22. Hind tibia vestiture: (0) long, reflective setae admixed with shorter dark setae; (1) short dark setae only.
23. Foreleg basitarsus: (0) narrow cylindrical (Fig. 5J); (1) dilated, laterally compressed (Fig. 5I).
24. Mid and hind leg basitarsi: (0) yellow basally, black distally, all other tarsomeres black; (1) wholly black or yellow.
25. Male wing: (0) patterned; (1) hyaline.

Abdomen

26. Velutum pattern on male abdomen: (0) absent; (1) present as thickened bands ('velutum plaques') adjacent to abdominal intersegmental membranes (Fig. 1).
27. Setae on abdominal tergite 2: (0) uniform in size and evenly distributed; (1) patch of short modified setae concentrated in a small posteromedial patch.
28. Male abdomen length: (0) elongate; (1) short.
29. Male abdomen vestiture: (0) with dark setae; (1) entirely covered with white setae.

Male genitalia

30. Posteroventral surface of gonocoxite: (0) without additional processes (Fig. 8E); (1) small blunt process present (Fig. 14D).
31. Ventral lobe shape: (0) short, paddle-shaped; (1) long and narrow, directed medially at approximately halfway; (2) broad, not paddle-shaped, directed medially.
32. Ventral lobe: (0) glabrous or with small setae; (1) with strong apical spines.
33. Gonocoxal apodeme length: (0) shorter than gonocoxite; (1) equal to gonocoxite; (2) much longer than gonocoxite.
34. Base of gonocoxal apodeme: (0) base of gonocoxal apodeme flattened, without posterodorsal process; (1) with posterodorsal process connecting gonocoxal apodeme to posterolateral margin of epandrium.
35. Gonocoxal apodeme: (0) attached to anterodorsal margin of gonocoxite; (1) attached to posterodorsal margin of gonocoxite.
36. Inner gonocoxal process: (0) separate from gonocoxal apodeme (Fig. 14E); (1) fused to base of gonocoxal apodeme (Fig. 8D).
37. Basal part of gonostylist with long, medially directed setae: (0) present; (1) absent.
38. Hypandrium vestiture: (0) with short setae; (1) glabrous.
39. Hypandrium: (0) flattened, without ventral process; (1) with ventral process.
40. Hypandrium: (0) separate from gonocoxites; (1) fused laterally to gonocoxites.
41. Epandrium length along medial line: (0) longer than epandrium width at midpoint; (1) shorter than epandrium width at midpoint.
42. Cerci length: (0) short; (1) long.
43. Distiphallus length: (0) shorter than ejaculatory apodeme (Fig. 13G); (1) slightly longer than ejaculatory apodeme; (2) much longer than ejaculatory apodeme (Fig. 6D).
44. *Distiphallus* with dorsal process: (0) absent; (1) present.

45. *Shape and size of lateral ejaculatory apodeme*: (0) long, band-like; (1) small, projecting laterally; (2) large, band-like, projecting laterally; (3) extremely large, not band-like, projecting laterally (Fig. 6F).

46. *Ventral apodeme of aedeagus*: (0) divided medially; (1) fused.

47. *Length of ventral apodeme relative to ejaculatory apodeme*: (0) up to half of ejaculatory apodeme length (Fig. 13G); (1) equal to ejaculatory apodeme length (Fig. 6E).

48. *Dorsal apodeme of aedeagus*: (0) strongly sclerotized; (1) poorly sclerotized; (2) reduced or absent.

49. *Ejaculatory apodeme size*: (0) reduced (Fig. 13G); (1) greatly enlarged (Fig. 6E).

50. *Shape of male tergite 8*: (0) very narrow, greatly emarginate medially (Fig. 8C); (1) narrow, slightly emarginate medially (Fig. 13B); (2) broad, only slightly emarginate (Fig. 11C).

51. *Male sternite 8 length*: (0) long; (1) short.

**Female genitalia**

52. *Spermathecal sac shape*: (0) simple, elongate with outer reticulated lobes; (1) simple, without additional lobes (Fig. 2A); (2) reduced (Fig. 2B).

53. *Number of spermathecae*: (0) 3; (1) one.

54. *Spermathecal ducts joined to spermathecal sac duct*: (0) close to bursa; (1) close to spermathecal sac.

55. *Spermathecal ducts with short, sclerotized section*: (0) present; (1) absent (Fig. 2A).

56. *Anterior margin of female sternite 8*: (0) straight; (1) emarginate (Fig. 12F).