

Revision of the Australian Bee Genus *Trichocolletes* Cockerell (Hymenoptera: Colletidae: Paracolletini)

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ABSTRACT. The endemic Australian bee genus *Trichocolletes* is revised. Forty species are recognised, including twenty-three new species: *Trichocolletes aeratus*, *T. albigenae*, *T. avialis*, *T. brachytomus*, *T. brunilabrum*, *T. capillosus*, *T. centralis*, *T. dundasensis*, *T. fuscus*, *T. gelasinus*, *T. grandis*, *T. lacaris*, *T. leucogenys*, *T. luteorufus*, *T. macrognaathus*, *T. micans*, *T. nitens*, *T. orientalis*, *T. platyprosopis*, *T. serotinus*, *T. simus*, *T. soror* and *T. tuberatus*. Four new synonymies are proposed: *Paracolletes marginatus lucidus* Cockerell, 1929 = *T. chrysostomus* (Cockerell, 1929); *T. daviesiae* Rayment, 1931 = *T. venustus* (Smith, 1862); *T. marginatulus* Michener, 1965 = *T. sericeus* (Smith, 1862); *T. nigroclypeatus* Rayment, 1929 = *T. venustus* (Smith, 1862). *Trichocolletes rufus* (Rayment, 1930) is moved to *Leioproctus* and *T. rufopilosus* (Rayment, 1935) to *Anthoglossa*. Descriptions are given for new species and redescriptions for species described before 1965, including first descriptions of males of *T. aureotinctus* (Cockerell), *T. burnsi* Michener, *T. latifrons* (Cockerell) and *T. maximus* (Cockerell) and the females of *T. dowerinensis* Rayment and *T. rufibasis* (Cockerell). Lectotypes are designated for *Lamprocolletes venustus* Smith and *Anthoglossa plumata* Smith. Keys to species are provided for both sexes, as are distribution maps and a summary of recorded floral visitation.

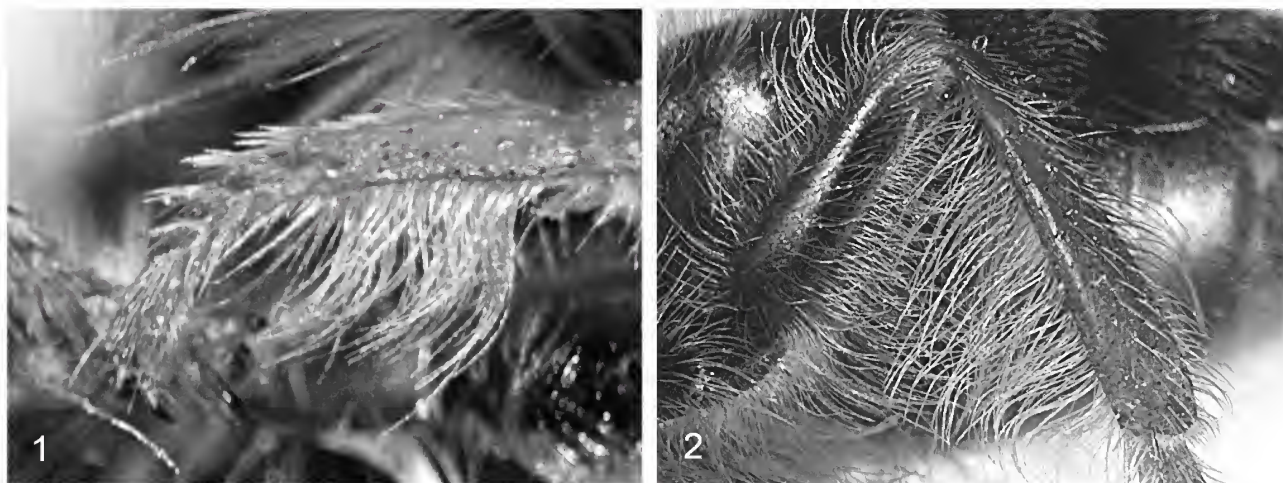
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The monobasic genus *Trichocolletes* (Cockerell, 1912) was erected for the species *Lamprocolletes venustus* Smith by virtue of its conspicuously hairy eyes. Rayment (1929, 1931) added four additional species so that Cockerell's 1934 survey of the family Colletidae in Australia, listed five names in the genus *Trichocolletes*. When Michener (1965) revised the genera of Australian bees, he recognized that species without hairy eyes, previously placed in *Anthoglossa* and *Paracolletes*, belonged in a more broadly defined genus. At the same time Michener created a separate subgenus for the species *T. pulcherrimus* Michener, a decision he recently suggested (Michener, 2007) might merit reexamination. Since 1965, two new species have been added (Houston, 1990), but there has been no revision of the genus. This is, therefore, the first

species-level revision of the genus *Trichocolletes*.

A recent molecular phylogeny of the family Colletidae (Almeida & Danforth, 2009) concluded that the Australian and South American genera traditionally included in the tribe Paracolletini (Michener, 2007), excluding *Callomelitta* and *Paracolletes s. str.*, form a monophyletic group and it has been proposed (Almeida *et al.*, 2012) that the name Neopasiphaeinae should be used for this group. The phylogenetic analysis suggested that the genus *Anthoglossa* is sister to all other Neopasiphaeinae and the genus *Trichocolletes* is, in turn, sister to all Neopasiphaeinae other than *Anthoglossa*. Until morphological clarification of the status of *Paracolletes* is available, we have opted to follow Michener's (2007) family-level names.

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Figs 1–2. *Trichocolletes venustus*, male: (1) fore basitarsus showing plume (2) hind leg (part) showing long hair on femur.

For the present study almost all available material in Australian collections was examined and type specimens were either seen by the authors or examined by experts at the institutions housing them.

Bees of the genus *Trichocolletes* are found only in Australia in the south-eastern temperate, south-western temperate and eremean biomes (as defined by Crisp *et al.*, 2004). Information on behaviour is limited. Many species are active in late winter and spring and the common species of the east coast have been reported (Hacker, 1918; Rayment, 1929, 1935) to show a preference for pea flowers, while a more comprehensive survey of flower visiting records for Western Australian species (Houston, 2000) demonstrated that the bees forage from other flower families as well. Members of the genus have been identified as important pollinators of *Diuris* orchids (Indsto *et al.*, 2006).

Terminology, methods and measurements

The morphological terminology follows that used by Michener (2007) and Harris (1979), including interchangeable use of the words hair and seta. Relative dimensions quoted in the descriptions were measured using an eye-piece graticule on a stereomicroscope with the zoom objective set to give a reading of 50 divisions for the head width. Abbreviations used for the measurements are as in Houston (1990) and are as follows: as follows: *AOD* antennocular distance; *ASD* antennal socket diameter; *BMW* basal width of mandible; *DMA* distance between anterior mandibular articulations; *FL* flagellum length; *HL* head length; *HVO* height of vertex above lateral ocelli; *HW* head width; *IAD* interantennal distance; *LID*; lower interorbital distance; *ML* mandible length; *MOD* diameter of median ocellus; *MSL* malar space length (shortest distance between the abductor swelling and the eye); *OOD* ocellocular distance; *SL* scape length; *SW* scape width; *UFW* upper width of face; *UID* upper interorbital distance; *WOC* width of ocellar cluster. Measurement of the length of the hind tarsus excludes the claws. Metasomal terga are referred to as *T1*, *T2* etc. and sterna as *S1*, *S2* etc. *S7* and *S8*, the “hidden sterna” of males, exhibit useful diagnostic characteristics and were extracted for examination. Individual antennal flagellomeres are referred to by number as *F1*, *F2* etc.

All but three of the type specimens were examined by one of us (MB). The exceptions were examined and photographed by colleagues in the holding institutions on our behalf.

Descriptions are arranged alphabetically.

To minimize repetition in the specific descriptions, eyes are described as “not hairy”, rather than “with scattered, minute setae”. Many males carry a dense fringe of long, sinuous hair on the posterior margin of the fore basitarsus. When the hairs are longer than twice the width of the basitarsus, the fringe is called a plume (Fig. 1), otherwise it is called a brush. The section of the epistomal suture that separates the clypeus from the supra-clypeal area is called the basal suture of the clypeus. The widths of metasomal bands are difficult to measure with any precision, but there are discernable differences between species. Metasomal bands are described as “narrow” if the width of the band on *T2* is less than $\frac{1}{5}$ the distance from the gradulus to the apex of the tergum, measured medially, and “wide” when the band width is more than $\frac{1}{4}$ of that distance.

Characters of individual species are described only where they differ from the typical condition given in the generic description. Unless otherwise noted, the body lengths of all specimens examined were within ± 1 mm of that for the specimen described. Sexes were associated by morphological similarity and coincident collection, except where noted otherwise.

Geospatial coordinates are GPS readings and distributions include Interim Biogeographical Regions of Australia codes (IBRA, 2010) in parentheses. The following abbreviations are used for collections in which the specimens are lodged: AM, Australian Museum, Sydney; AMNH, American Museum of Natural History, New York; ANIC, Australian National Insect Collection, Canberra; BMNH, British Museum (Natural History), London; MV, Museum Victoria, Melbourne; OUM, University Museum, Oxford; QM, Queensland Museum (now including the former UQIC, University of Queensland Insect Collection), Brisbane; SAM, South Australian Museum, Adelaide; WAA, Western Australian Department of Agriculture Insect Reference Collection; WAM, Western Australian Museum, Perth.

Systematics

Genus *Trichocolletes* Cockerell

Trichocolletes Cockerell, 1912, p. 176; Michener, 1965, pp. 78–80. Type-species *Lamprocolletes venustus* Smith, 1862 (original designation).

Diagnosis

Moderately large bees (length 10–18 mm) distinguished by the following combination of characters: fore wings with three submarginal cells; pterostigma short, parallel-sided, ending at, or slightly beyond, base of vein r; basitibial plate of female hidden by setae and incompletely defined; inner hind tibial spur of female almost palmate (Michener, 2007, fig. 39–11b), of male, ciliate and broadened basally; labrum of both sexes at least 0.4× as long as wide, usually polished and smoothly convex, occasionally tectiform; mandibles bidentate, approximately parallel sided; compound eyes of some species covered with conspicuous, long setae; metasomal terga with apical, integumental bands usually metallic gold or silver but sometimes testaceous and inconspicuous.

Descriptions

Male. Face usually quadrate (eye length equal to interorbital distance at level of antennal bases), but sometimes wider than long; clypeus transversely convex, flat or weakly convex longitudinally; glossa broad, bifid; labial and maxillary palpi usually slender, almost reaching end of glossa; labrum uniformly convex (but with a tubercle in one species), length 0.5 to 0.8× width with apical fringe of bristles; mandible bidentate, straight or gently curved, often slightly twisted about longitudinal axis; scape occasionally swollen, but usually slender; gena c. half as wide as eye viewed laterally, rarely wider; flagellum 20% shorter than to 50% longer than head width, occasionally modified apically.

Legs usually slender, occasionally modified; tarsal claws deeply cleft; fore tibial calcar usually with strong apical spine, several long, fine teeth and rounded velum; hind basitibial area usually flattened with a posterior carina, but rarely forming a distinct plate; propodeum smoothly declivous; wings with three submarginal cells, stigma short, just reaching or slightly exceeding vein r.

Terminalia: genital capsule elongate with large gonoforceps, obliquely truncated with long, plumose apical hair, occasionally with simple hair or bare (Figs 29–40); volsellae of moderate size, not enlarged as in *Anthoglossa* (Michener, 1965, figs 197, 192); S8 simple with spatulate apex, narrow neck and cordate base, with only minor interspecific variation (Figs 41–43); S7 variable in form and diagnostically valuable (Figs 44–79), but retaining a combination of characters unique to this genus: partially hollow lateral lobes (arrowed *b* and *e* in Fig. 44), posterior margin usually with pair of blunt, hirsute projections (arrowed *a* in Fig. 44), surface extensively covered with long hair, anterior margin of lobes extended into ligulate processes (*d* in Fig. 44), frequently with a stout triangular tooth with serrated edges near base of each ligulate process (*c* in Fig. 44).

Scape, labrum, mandibles medially and legs usually

orange-brown; apical part of clypeus sometimes orange-brown or cream; metasomal terga sometimes wholly or partly red or orange-brown; apical bands of T1–5 usually gold, silver or white; that of T6 translucent; sterna sometimes with narrow translucent margins.

Clypeus, except ventral rim, usually densely punctate; frons and vertex finely reticulate and closely punctate; mesosoma either with a dull sheen or matt due to fine pit-reticulation that is sometimes strong enough to obscure the close punctures; metasomal terga dull or weakly shining, with weak, irregular, transverse lineolation or occasionally pit-reticulation (in which case the apical bands are lineolate), frequently surface is further roughened with broad, indistinct punctures or scrobiculi.

Eyes with either conspicuous cover of long setae or nearly bare with only scattered, minute setae; face usually densely covered with orange or white hair; mesosoma excluding propodeal triangle usually conspicuously hairy; scutum with finely-branched, moderately long hair; scutellum, metanotum, mesepisternum and sides of propodeum with somewhat longer and more plumose hair, often orange-brown, becoming paler ventrally; fore basitarsus frequently with a plume of long, sinuous hair; coxae, trochanters and femora with mid-length or long, finely-branched hair, usually open but sometimes close or dense; T1 sparsely covered with long, erect, pale hair; T2 usually with similar, shorter hair; remaining terga with sparse or open simple, short, semi-erect hair matching the colour of the underlying integument (inconspicuous when viewed perpendicular to the surface, but often reflective creating a sericeous appearance when illuminated obliquely); sterna with open covering of long, semi-erect, finely-branched pale hair, rarely with dense hair tufts.

Female. As for males, except clypeus often flattened sagittally; rarely labrum tectiform; scape always slender; flagellum between 0.55× and 0.72× as long as head width, never modified.

Tibiae and basitarsi broader and flatter than in males; hind basitibial area usually obscured by dense stiff, curved setae; tarsal claws simple or with an inner ramus; pygidial plate with or without a longitudinal elevation, apex rounded or truncate, emarginate or entire.

Clypeal punctures seldom dense, interspaces often reticulate, especially towards base. Facial hair usually paler than that of male and dense only in paraocular areas and on frons; scutal hair usually shorter and duller than in male; setae of hind basitibial area usually darker than those on surrounding areas; hair of hind femur and outer face of hind tibia plumose; T5 obscured by prepygidial fimbria.

Colour variation. Colours reported in the descriptions are those for specimens in collections. The colours of some species *in vivo* are noticeably brighter. The thoracic hair of foraging female *T. hackeri* (Cockerell), for example, may appear to be mid- to light grey, but darkens considerably within hours *post mortem*. Similarly, *T. maximus* (Cockerell) looks to have brighter orange scutal hair when flying and the sericeous reflections from *T. micans* n.sp. when foraging in sunlight are so bright that the metasoma appears to be covered with pollen.

New combinations

Michener (1965) listed 21 names and Houston (1990) added two more. Of these names, four are synonymized and two are removed to other genera. *T. rufus* is removed to *Leioproctus* on the basis of (a) the pterostigma, which although short, is considerably longer and wider than in any *Trichocolletes* species, (b) the labrum which is short (0.2× as long as wide), (c) inner hind tibial spur, which is very long and uniform in width, not basally broadened as in *Trichocolletes*, (d) absence of translucent apical bands on metasomal terga, (e) polished area of propodeum and (f) very short first flagellomere. The hind basitibial plate is complete and carinate, albeit weakly

pigmented, though this by itself would not be a reason to exclude the species from *Trichocolletes*.

Trichocolletes rufopilosus is removed to *Anthoglossa*. The type specimen has been dissected by the original describer and the genitalia are mounted with the specimen. The greatly enlarged volsellae are typical of those found in *Anthoglossa* species and the type specimen was indistinguishable from an undescribed species of *Anthoglossa* commonly found in the Avon wheatbelt area of Western Australia. Males of this undescribed species have been collected with females having tridentate mandibles and other characteristics of *Anthoglossa* species.

Key to males of the genus *Trichocolletes*

- | | | |
|--------|---|--------------------------------|
| 1 | Eyes hairy | 2 |
| — | Eyes with minute setae only | 18 |
| 2(1) | Scape mostly black | 3 |
| — | Scape mostly orange-brown, occasionally dark brown | 9 |
| 3(2) | Labrum orange-brown; hind tibia and basitarsus broad and flattened | <i>T. dowerinensis</i> Rayment |
| — | Labrum black or dark brown; hind legs normal | 4 |
| 4(3) | Labrum black; genal width approximately equal to eye width; vertex elevated | 5 |
| — | Labrum dark brown | 6 |
| 5(4) | Scutal hair ferruginous, head length $\leq 0.7\times$ head width | <i>T. maximus</i> (Cockerell) |
| — | Scutal hair pale orange-brown, head length c. $0.8\times$ head width | <i>T. grandis</i> n.sp. |
| 6(4) | Large tubercle on labrum | <i>T. tuberatus</i> n.sp. |
| — | Labrum smooth | 7 |
| 7(6) | Seventh sternum with broad lateral lobes | <i>T. lacaris</i> n.sp. |
| — | Seventh sternum with narrow lateral lobes | 8 |
| 8(7) | Hind tarsus as long as hind tibia; lobes of S7 straight (Fig. 68) | <i>T. micans</i> n.sp. |
| — | Hind tarsus $0.9\times$ as long as hind tibia; lateral lobes S7 bowed (Fig. 49) | <i>T. brunilabrum</i> n.sp. |
| 9(2) | Gena with dense white hair | 10 |
| — | Gena with open to close hair | 12 |
| 10(9) | Labrum black; gena width $0.7\times$ eye width; vertex elevated | <i>T. grandis</i> n.sp. |
| — | Labrum orange-brown; gena width c. $\frac{1}{2}$ eye width; vertex normal | 11 |
| 11(10) | Clypeus strongly protuberant | <i>T. leucogenys</i> n.sp. |
| — | Clypeus weakly convex | <i>T. albigenae</i> n.sp. |
| 12(9) | Metasoma orange-brown with indistinct integumental bands | <i>T. brachytomus</i> n.sp. |
| — | Metasoma black with gold or silver integumental bands | 13 |
| 13(12) | Metasoma with narrow silver or pale gold integumental bands | 14 |
| — | Metasomal bands gold, not narrow | 16 |
| 14(13) | Mid and hind femora with dense, long hair (Fig. 4); S7 with little hair (Fig. 51) | <i>T. capillosus</i> n.sp. |
| — | Hair of mid and hind femora normal; S7 with normal amount of hair (Figs 70, 77) | 15 |
| 15(14) | Scape with brown suffusions; fore basitarsal plume short, weak | <i>T. tenuiculus</i> Rayment |
| — | Scape clear orange brown; fore basitarsal plume long, distinct | <i>T. orientalis</i> n.sp. |

16(13)	Mid tibia with dark brown suffusions	17
—	Mid tibia clear orange-brown; hind tibia with fringe of long hair	<i>T. venustus</i>
17(16)	Fore basitarsal plume present; lateral lobes S7 rounded (Figs 57–58)	<i>T. fuscus</i> n.sp.
—	Fore basitarsal plume absent; lateral lobes S7 triangular (Fig. 44)	<i>T. aeratus</i> n.sp.
18(1)	Scape swollen, length < 3× width (Fig. 5)	19
—	Scape slender, length > 3× width (Fig. 6)	24
19(18)	Apical flagellomere flattened and expanded (Fig. 7)	<i>T. dives</i> (Cockerell)
—	Apical flagellomere not flattened or expanded	20
20(19)	Metasoma with inconspicuous metasomal bands	21
—	Metasoma with bright gold metasomal bands	22
21(20)	Hair below antennae short, stiffly erect; base of clypeus bare	<i>T. latifrons</i>
—	Facial hair long, directed dorsally, covering clypeus almost completely	<i>T. burnsi</i>
22(20)	Flagellum crenulate (Fig. 8); clypeal hair stiffly erect	<i>T. hackeri</i>
—	Flagellum normal; clypeal hair long, semi-erect	23
23(22)	Supraclypeal area bare and polished	<i>T. chrysostomus</i>
—	Supraclypeal area densely punctate and pubescent	<i>T. sericeus</i>
24(18)	Malar space almost twice as long as basal mandibular width	<i>T. macrognathus</i> n.sp.
—	Malar space shorter than basal mandibular width	25
25(24)	Apical flagellomere expanded and truncate (Figs 7, 9)	26
—	Apical flagellomere not expanded and truncate	27
26(25)	Metasoma orange-brown; hind tibia greatly expanded, without spurs	<i>T. pulcherrimus</i>
—	Metasoma black with white metasomal bands; hind legs normal	<i>T. gelasinus</i> n.sp.
27(25)	Scape black	<i>T. aureotinctus</i>
—	Scape orange-brown or yellow-brown	28
28(27)	Metasoma partly or entirely red-brown or orange-brown	29
—	Metasoma black with silver or gold metasomal bands	32
29(28)	Metasoma entirely red-brown with indistinct bands	<i>T. erythrurus</i> (Cockerell)
—	Metasoma partly black, with silver or gold bands	30
30(29)	Clypeus declivous, protruding only slightly	<i>T. simus</i> n.sp.
—	Clypeus strongly protuberant	31
31(30)	S7 with step on posterior margin (Fig. 72); hind tibia orange	<i>T. rufibasis</i>
—	S7 without step on posterior margin (Fig. 76); hind tibia dark brown	<i>T. soror</i> n.sp.
32(28)	Length 15–17 mm; S2 with dense, untidy plume	<i>T. marginatus</i> (Smith)
—	Length 10–14 mm; sternal pubescence weak	33
33(32)	Flagellum 20% longer than head width; prementum length ≥ 3.5× eye width	34
—	Flagellum c. as long as head width; prementum length < 3.5× eye width	35
34(33)	Fore basitarsus expanded ventrally	<i>T. multipectinatus</i> Houston
—	Fore basitarsus normal	<i>T. eremophilae</i> Houston
35(33)	Fore trochanter with ventral projection	36
—	Fore trochanter without ventral projection	37

- 36(35) Metasomal bands silver; mid basitarsus slender, bowed longitudinally *T. avialis* n.sp.
 — Metasomal bands gold; mid basitarsus broad, with stiff setae on anterior margin *T. nitens* n.sp.
- 37(35) Pedicel, flagellum and scape concolorous ventrally *T. centralis* n.sp.
 — Pedicel and flagellomere F1 ventrally, darker than scape 38
- 38(37) Metasomal bands wide, silver, margin ferruginous; clypeus flattened *T. platyprosopis* n.sp.
 — Metasomal bands gold; clypeus convex 39
- 39(38) Clypeus black *T. serotinus* n.sp.
 — Clypeus largely orange-brown 40
- 40(39) S7 with step on posterior margin (Fig. 72); hind tibia orange *T. rufibasis*
 — S7 without step on posterior margin (Fig. 76); hind tibia dark brown *T. soror* n.sp.

Key to females of the genus *Trichocolletes*

- 1 Eyes hairy 2
 — Eyes with minute setae only 18
- 2(1) Metasoma red-brown with indistinct gold bands *T. brachytomus* n.sp.
 — Metastoma with distinct bands 3
- 3(2) Labrum dark brown or black, rarely with orange-brown suffusions 4
 — Labrum clear orange-brown, rarely with darker suffusions 9
- 4(2) Hind tarsal claw with small inner ramus 5
 — All claws simple 7
- 5(4) Labrum with medial tubercle *T. tuberatus* n.sp.
 — Labrum uniformly convex 6
- 6(5) Clypeus with moderately small punctures and reticulate interspaces *T. micans* n.sp.
 — Clypeus with coarse, almost contiguous punctures *T. brunilabrum* n.sp.
- 7(4) Gena half as wide as eye; vertex not elevated (Figs 12–13) *T. lacaris* n.sp.
 — Gena c. $\frac{2}{3}$ as wide as eye; vertex elevated (Figs 10–11) 8
- 8(7) Scutal hair ferruginous, dense; clypeus flattened medially *T. maximus* n.sp.
 — Scutal hair pale orange, close; clypeus uniformly convex *T. grandis* n.sp.
- 9(3) Clypeus flattened sagittally 10
 — Clypeus transversely convex, not flattened 14
- 10(9) Pygidial plate with deep linear emargination *T. dowerinensis*
 — Pygidial plate with at most small emargination 11
- 11(10) Metasomal integumental bands wide, brassy *T. aeratus* n.sp.
 — Metasomal integumental bands narrow, silver 12
- 12(11) Length subantennal suture $> \frac{1}{2}$ dorsal width clypeus *T. capillosus* n.sp.
 — Length subantennal suture $< \frac{1}{2}$ dorsal width clypeus 13
- 13(12) Lateral epistomal suture curved *T. leucogenys* n.sp.
 — Lateral epistomal suture straight *T. dundasensis* n.sp.
- 14(9) Malar space short (length c. $0.1 \times$ basal mandibular width) *T. albigenae* n.sp.
 — Malar space $> 0.2 \times$ basal mandibular width 15

- 15(14) Metasomal bands moderately wide, gold; basal suture of clypeus V-shaped *T. venustus*
 — Metasomal bands narrow, silver or gold; basal suture of clypeus various 16
- 16(15) First flagellomere > 2× as long as medial width; clypeal suture concave *T. tenuiculus*
 — First flagellomere < 2× as long as medial width; clypeal suture various 17
- 17(16) Metasomal bands gold; clypeal suture shallow V-shaped *T. fuscus* n.sp.
 — Metasomal bands silver; clypeal suture straight *T. orientalis* n.sp.
- 18(1) Metasomal bands silver, gold or white 19
 — Metasomal bands absent or indistinct 36
- 19(18) Facial hair brown, simple 20
 — Facial hair white or pale brown, plumose 21
- 20(19) Prepygidial fimbria black *T. eremophilae*
 — Prepygidial fimbria orange *T. multipectinatus*
- 21(19) Malar space $\frac{2}{3}$ × basal mandibular width; scutal hair dark brown medially with contrasting pale perimeter *T. macrognathus* n.sp.
 — Malar space $\frac{1}{4}$ × basal mandibular width or less; scutal hair uniformly coloured 22
- 22(21) Hind tarsal claw simple or with minute inner ramus (*Trichocolletes simus* n.sp.) 23
 — Hind tarsal claw with distinct inner ramus 27
- 23(22) Clypeus flat or declivous, not protuberant 24
 — Clypeus protuberant, transversely convex 25
- 24(23) Clypeus flattened, polished with broad irregular depressions *T. platyprosopis* n.sp.
 — Clypeus deflexed near base, polished with close, regular punctures *T. simus* n.sp.
- 25(23) Clypeus almost impunctate, apical half orange-brown *T. dives*
 — Clypeus closely to densely punctate, mostly black 26
- 26(25) Narrow gold metasomal bands; prepygidial fimbria black; body length c. 15 mm *T. marginatus*
 — Wide gold metasomal bands; prepygidial fimbria gold; body length c. 13 mm *T. nitens* n.sp.
- 27(22) Metasoma partly or wholly red-brown 28
 — Metasoma black 29
- 28(27) Margin of pygidial plate with deep, narrow emargination *T. soror* n.sp.
 — Margin of pygidial plate with at most a minute emargination *T. rufibasis*
- 29(27) Supraclypeal area at distinct angle to clypeus 30
 — Supraclypeal area and clypeus nearly coplanar 31
- 30(29) Clypeus coarsely and densely punctate *T. sericeus*
 — Clypeus openly punctate *T. chrysostomus*
- 31(29) Labrum 0.75× as long as wide, tectiform (Fig. 15); metasomal bands white *T. gelasinus* n.sp.
 — Labrum about half as long as wide, uniformly convex; metasomal bands gold 32

- 32(31) Scutal hair dark grey or grey-brown; labial palpus < 0.5× post palpal part of galea *T. hackeri*
 — Scutal hair pale or mid-brown; labial palpus > 0.5× post palpal part of galea 33
- 33(32) Hind tarsal claw only with small inner ramus *T. centralis* n.sp.
 — Hind tarsal claw with large inner ramus 34
- 34(33) Inner hind tibial spur with c. 7 teeth; body length c.15 mm *T. luteorufus* n.sp.
 — Inner hind tibial spur with c. 10 teeth; body length c.12 mm 35
- 35(34) Metasomal bands pale gold or silver with broad ferruginous anterior margin *T. aureotinctus*
 — Metasomal bands uniform gold *T. serotinus* n.sp.
- 36(18) Metasoma orange-brown 37
 — Metasoma black 39
- 37(36) T2 without lateral black marks *T. pulcherrimus*
 — T2 with black marks laterally 38
- 38(37) Impunctate area near antennal bases; tarsal claws simple *T. erythrurus*
 — Face punctate near antennal bases; tarsal claws with large inner rami *T. rufibasis*
- 39(36) T2–4 with white hair laterally; tarsal claws with large inner rami *T. latifrons*
 — Metasoma without white hair; tarsal claws simple *T. burnsi*

Species descriptions

Trichocolletes aeratus n.sp.

Figs 44, 80

Type. Holotype ♂, Bilpin, New South Wales (33.4814°S 150.5480°E), 21 Sep. 2005, M. Batley, ex *Daviesia mimosoides*, in AM K.278547.

Specimens examined. The holotype and the following. **Australian Capital Territory:** 3♂, Black Mountain (35.2633°S 149.0875°E), 1 Oct. 2006, M. Batley, ex *Daviesia mimosoides* & *Hardenbergia violacea*, AM (K.344635–37); Mount Ainslie, 21 Oct. 1993, G. J. Davis & G. V. Maynard, MV; Mount Ainslie, 21 Oct. 1993, G. J. Davis & G. V. Maynard, off *Helipterum*, MV. **New South Wales:** 4♂, Bilpin (33.4814°S 150.5480°E), 9–21 Sep. 2005 & 12 Sep. 2009, M. Batley, ex *Daviesia mimosoides*, AM (K.344632–33,41,42); ♂, 14 km E Coonabarrabran (31.2133°S 149.4022°E), 8 Oct. 2008, M. Batley, ex *Daviesia latifolia*, AM (K.344640); 2♂, ♀, Cunnawarra NP (30.5739°S 152.2583°E), 7 Oct. 2002, M. Batley, ex *Daviesia mimosoides* & *Podolobium ilicifolium*, AM (K.333629–31); 5♀, 30 km S Dubbo, 12 Nov. 1984, N. W. Rodd, AM (K.344634–38); ♂, Grose Vale, 11 Sep. 1978, N. W. Rodd, AM (K.316620); 13♂, 7♀, 1.5 km W Mongarlowe, 23 Oct. & 13 Nov. 1993, G. J. Davis & G. V. Maynard, off *Daviesia mimosoides*, MV (930958–62); 2♂, 12 km S Mount Canobolas (33.4208°S 148.9156°E), 2 Oct. 2008, M. Batley, ex *Pultenaea* sp., AM (K.344638–39); 4♀, Mt Victoria, 20 Oct. 1930, Burns, Alec N., MV (16533,34,46,47); 2♀, Mt Vincent, 20 Nov. 1978, N. W. Rodd, AM (K.316621–22); ♂, Mullion Flora Res. (33.1100°S 149.1700°E), 1 Oct. 2005, M. Batley, ex *Dillwynia* sp., AM (K.344634); ♂, Napoleon Reef (33.4172°S 149.7492°E), 7 Nov. 2005, M. Batley, ex *Daviesia leptophylla*, AM; 2♂, 2♀, Newnes, 24 Sep. 1972, G. Williams, AM (K.316616–19); 4♂, 3♀, Weddin Mtns NP, 24 Sep. 1980, N. W. Rodd, AM (K.316623–29); 2♀, Wentworth Falls, Oct. 1930, Wilson, F E., MV (16501–02). **Queensland:** ♀, Acacia Ridge, 14 Aug. 1966, I. D. Galloway, UQIC; ♂, S of Amiens, 27 Sep. 1967, T. F. Houston, *Daviesia*, SAM (32-024504); ♂, 3♀, Beechmont, 2–5 Oct. 1984, N. W. Rodd, AM (K.316630–33); 6♂, Brisbane, 28 Aug.–4 Sep. 1911, H. Hacker, QM; 3♂, Brisbane, 18 Aug. 1914, H. Hacker, QM; ♀, Brisbane, 8 Sep. 1915, H. Hacker, QM; 2♀, Dunwich, Nth Stradbroke Is., 22 Aug. 1958, F. A. Perkins, UQIC; 2♂, S of Eukey, 26 Sep. 1967,

T. F. Houston, *Daviesia* and *Hardenbergia*, SAM (32-024502, 06); 2♀, Kelvin Grove, 14 Sep. 1912, on *Daviesia*, QM; ♂, ♀, Mt Cooth-Tha, 14 Sep.–19 Oct. 1966, T. F. Houston, SAM (32-024494,500); ♂, Mt Marley nr Stanthorpe, 22 Sep. 1995, D. K. Yeates, at *Hardenbergia violacea* blossom, UQIC; ♂, Stanthorpe, 4 Oct. 1966, J. C. Cardale, UQIC; ♀, Sunnybank, 25 Sep. 1911, H. Hacker, QM; 2♂, ♀, Tooheys Hill, 28 Aug.–4 Sep. 1911, H. Hacker, QM.

Diagnosis

Length 10–11 mm; eyes hairy; metasomal bands wide, brassy colour; male fore basitarsus without plume; female clypeus sagittally flattened.

Descriptions

Male (holotype).—*Head* width 3.60 mm, body length 10.1 mm. HW 50, HL 40, UID 31, UFW 32, LID 31, DMA 31, HVO 4, WOC 14, MOD 4, OOD 9, IAD 10, ASD 3, AOD 8, ML 22, BMW 3, MSL 7.5, SL 14, SW 3, FL c. 54.—*Eyes* hairy; inner orbits parallel; length malar space c. 0.33× basal mandibular width; middle flagellomeres c. 1.4× as long as wide. Hind tarsus 1.2× as long as hind tibia; hind basitarsus 5.0× as long as wide. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with broad, rounded lateral lobes and short posterior projections (Fig. 44).—*Labrum*, mandible, scape, tarsi, tibiae and apices of femora orange-brown; fore and mid tibiae with dark suffusions medially. T1–5 with wide, brassy bands.—*Clypeus* with contiguous punctures except at ventral margin. Scutum with dull sheen, moderate pit-reticulation and close, small punctures.—*Face* with dense, long, orange hair, finely branched below antennae, plumose above. Scutum with close, long, plumose, bright orange hair, semi-adpressed hair on metasomal terga somewhat longer than in most other species; dark areas of metasomal terga with scattered, short, golden hair.

Female (AM K.316623).—*Head* width 4.05 mm, body length 11.0 mm. HW 50, HL 39, UID 29, UFW 32, LID 32, DMA 32, HVO 3, WOC 13, MOD 3, OOD 8, IAD 8, ASD 3, AOD 10, ML 21, BMW 8, MSL 1.5, SL 15, SW 3, FL c. 34.—*Eyes* hairy; inner orbits slightly divergent ventrally; length malar space c. 0.25× basal mandibular width; clypeus convex, sagittally flattened; basal suture gently concave; middle flagellomeres 1.1× as long as wide; inner hind tibial spur with c. 8 strong teeth; tarsal claws simple; pygidial plate with small apical emargination, strong medial elevation and strongly upturned rim.—*Labrum*, tarsi, hind tibia, anterior face fore tibia, distal ends femora orange-brown; mandible medially, flagellum ventrally, brown. T1–4 with wide, metallic, yellow-gold bands.—*Clypeus* reticulate with dense, large, irregular punctures, becoming open ventrally. Scutal sculpture as for male.—*Face* with long, minutely-branched, pale orange hair, dense on frons and in paraocular areas, open on clypeus and supraclypeal area. Scutum with close, short, plumose, dull orange-brown hair; hind tibial scopa chestnut (dark brown in basitibial area); prepygidial fimbria dull golden brown.

Etymology. The specific name is from the Latin adjective meaning trimmed with brass.

Distribution. Southeastern Queensland, New South Wales central slopes and tablelands (BBS, NET, NSS, SB, SEH, SEQ) (Fig. 80).

Trichocolletes albigenae n.sp.

Figs 45, 81

Type. Holotype ♂, Doyles Creek, New South Wales (32.5219°S 150.7972°E), 22 Aug. 2005, M. Batley, *ex Daviesia genistifolia*, in AM K.278548.

Specimens examined. The holotype and the following. **New South Wales:** 13♂, 2♀, Doyles Creek (32.5219°S 150.7972°E), 19–22 Aug. 2005 & 16 Aug. 2006, M. Batley, *ex Daviesia genistifolia*, AM (K.224639, K.344643–58); 2♀, Doyles Creek (32.5236°S 150.7961°E), 28 Aug. 2006, M. Batley, *ex Daviesia genistifolia*, AM (K.344659–60); ♂, ♀, Pulletop NR (33.9656°S 146.0842°E), 1 Sep. 2009, M. Batley, *ex Templetonia sulcata*, AM (K.344665–66); ♀, Pulletop NR (33.9656°S 146.0842°E), 26 Sep. 2010, M. Batley, *ex Daviesia genistifolia*, AM (K.344667); 2♂, 24 km SE Wollar (32.5547°S 150.0119°E), 28 Aug. 2006, M. Batley, *ex Daviesia genistifolia*, AM (K.344661–62). **South Australia:** 2♀, Pinnaroo (35.5539°S 140.7614°E) 7 Oct. 2003, M. Batley *ex Dillwynia* sp. (AM K.334628, 43).

Diagnosis

Length c. 11 mm; eyes hairy; metasomal bands narrow, silver; genal hair dense, white (less conspicuous in females). Clypeus of both sexes shallowly convex; malar space of female short.

Descriptions

Male (holotype).—*Head* width 3.60 mm, body length 11.1 mm. Relative dimensions: HW 50, HL 39, UID 32, UFW 33, LID 29, DMA 28, HVO 5, WOC 13, MOD 4, OOD 10, IAD 10, ASD 3, AOD 7, ML 19, BMW 7, MSL 1.0, SL 13, SW 3, FL c. 42.—*Eyes* hairy; face narrow, inner orbits convergent ventrally; malar space relatively short (length c. 0.15× basal mandibular width); gena 0.55× as wide as eye viewed laterally; flagellum shorter than head width; middle flagellomeres c. 1.4× as long as wide. Legs slender; hind tarsus 1.2× as long as hind tibia; hind basitarsus 4.3× as long as wide; posterior carina of basitibial area reaches apex. Genital capsule similar to that for *T. orientalis* n.sp.

(Fig. 37); S7 with rectangular lateral lobes, large basal teeth and posterior projections (Fig. 45).—*Labrum*, mandible, scape, tarsi, tibiae and distal ends of femora orange-brown, fore and mid tibiae with darker areas medially; flagellum dark brown dorsally; F2–11 orange-brown ventrally. T1–5 with narrow silver bands stained ferruginous across anterior margin.—*Clypeus* with dense, fine punctures except near ventral rim. Scutum with dull sheen, reticulate with close, small punctures.—*Face* with dense, pale orange, plumose hair; gena with very dense, plumose, white hair. Scutum with open, long, finely-branched, pale orange-brown hair; fore basitarsus with relatively short, tapered plume; anterior margin of hind tibia with open fringe of long, white hair.

Female (AM K.344659).—*Head* width 4.20 mm, body length 12.0 mm. Relative dimensions: HW 50, HL 37, UID 31, UFW 32, LID 31, DMA 31, HVO 29, WOC 4, MOD 13, OOD 4, IAD 8, ASD 3, AOD 8, ML 19, BMW 8, MSL 1.0, SL 15, SW 3, FL c. 30.—*Eyes* hairy; face slightly broader than long, inner orbits gently convergent ventrally; length malar space c. 0.1× basal mandibular width; clypeus shallowly convex, slightly flattened sagittally; gena 0.55× as wide as eye viewed laterally; flagellum short, middle flagellomeres approximately as wide as long; inner hind tibial spur with c. 11 strong teeth; tarsal claws simple; pygidial plate entire, flat.—*Labrum*, mandible, tarsi (except mid basitarsus), hind tibia, distal ends of femora orange-brown; remainder of legs dark brown. T1–4 with narrow silver bands, weakly ferruginous across anterior margin.—*Clypeus* reticulate except along ventral margin, densely punctate. Scutal sculpture as for male.—*Face* with long, plumose hair, white in lower paraocular areas, becoming orange-brown tipped with dark brown near ocelli, dense in paraocular areas and on frons, open on clypeus and supraclypeal area; gena with close, plumose white hair. Scutum with close, plumose, dark-tipped pale orange hair; hind tibial scopa orange-brown laterally, darker medially; prepygidial fimbria dark brown.

Etymology. The specific name, used as a noun in apposition, is from the Latin for white cheeks.

Distribution. Central New South Wales (CP, SB) (Fig. 81).

Trichocolletes aureotinctus (Cockerell)

Figs 29, 46, 82

Anthoglossa aureotincta Cockerell, 1906, p. 16 (female).

Trichocolletes (*Trichocolletes*) *aureotinctus*.—Michener, 1965, p. 79.

Specimens examined. The holotype ♀, Perth, W. Australia, 93-198, *Anthophora aurotincta* (handwritten label, presumably in error), BMNH Hym 17.a.397 and the following. **Western Australia:** 2♂, 12.5 km ENE Anketell, 6–7 Sep. 1981, T.F. Houston, on flowers of *Baeckea stowardii*, WAM (13647, 19124); ♀, 34 km ENE Cosmo Newberry Mission, 12 Sep. 1982, B. Hanich & T. F. Houston, on flowers of *Swainsona*, WAM (13836); 4♂, 11♀, 37 km NE Laverton, 10–12 Sep. 1982, B. Hanich & T. F. Houston, on flowers of *Kennedia nematochlada* & *Daviesia* aff. *grahami*, WAM (13824–34, 13641–44); ♀, 32 km N Mingenew, 14 Sep. 1987, T. F. Houston, on flowers of *Dampiera*, WAM (13562); 2♂, 30 km W Sandstone, 7 Sep. 1981, T.F. Houston, on flowers of *Daviesia grahamsi*, WAM (13645–46).

Diagnosis

Eyes not hairy; metasomal bands moderately broad, silver or pale gold, ferruginous across anterior margins; metasoma

sericeus. Male scape black; mid basitarsus broadened distally. Female with large inner ramus on tarsal claws.

Descriptions

Male (WAM 13642).—*Head* width 3.7 mm, body length 10.1 mm. Relative dimensions: HW 50, HL 36, UID 33, UFW 31, LID 28, DMA 26, HVO 4, WOC 13, MOD 4, OOD 9, ML 15, BMW 6.5, MSL 1, SL 13, SW 3, FL c. 50.—*Eyes* not hairy; inner orbits convergent ventrally; malar space short (length c. 0.15× basal mandibular width); length flagellum equal to head width; middle flagellomeres c. 1.5× as long as wide. Legs slender; hind tarsus 1.3× as long as tibia; length basitarsus 6.0× as long as wide; basitibial area with distinct posterior edge almost reaching apex. Gonoforceps with hair of moderate length (Fig. 29); S7 with broad lateral lobes fused to ligulate processes subsuming basal teeth, posterior projections absent (Fig. 46).—*Mandible* medially amber; labrum, tibiae, tarsi and distal ends of femora orange-brown, fore and mid tibiae with dark infuscations; flagellum ventrally mid-brown; ventral rim clypeus, flagellum dorsally dark brown. T1–5 with broad silver or pale gold bands, ferruginous across anterior margins; T7 red-brown.—*Clypeus* reticulate with dense, large punctures except apically impunctate and polished. Scutum dull with strong pit-reticulation and indistinct, open punctures.—*Face* with long, plumose, white hair, gena with white hair forming a beard; scutum with open, long, finely-branched, white hair; fore coxa, trochanter and tibia with long white hair; remainder of legs with sparse hair only.

Female (WAM 13831).—*Head* width 4.05 mm, body length 11.7 mm. Relative dimensions: HW 50, HL 35, UID 32, UFW 33, LID 30, DMA 28, HVO 3, WOC 15, MOD 4, OOD 8, IAD 6.5, ASD 3, AOD 9, ML 18, BMW 5.5, MSL 1, SL 15, SW 2.5, FL c. 28.—*Eyes* not hairy; face almost quadrate, inner orbits slightly convergent ventrally; malar space short (length c. 0.15× basal mandibular width); clypeus smoothly convex; middle flagellomeres as long as wide; inner hind tibial spur with c. 10 long, closely-spaced teeth; pygidial plate minutely emarginate, medial elevation broad.—*Labrum*, mandible medially, ventral margin of clypeus, anterior faces fore tibia and tarsus orange-brown; remainder of legs brown. T1–4 with broad, pale gold or silver bands, broadly ferruginous across anterior margin.—*Clypeus* reticulate with large, dense punctures except ventral margin impunctate and polished; supraclypeal area with large, close to dense punctures; frontal carina ending in sharp point on supraclypeal area. Sculpture of scutum as for male.—*Face* with long, plumose hair; dense, white on apicolateral corners of clypeus and in paraocular areas; sparse on supraclypeal area and remainder of clypeus; dense, pale orange-brown on frons and vertex. Scutum with open, long, orange-brown hair; hind tibial scopal hair white except rich brown near basitibial area. T2–5 sericeous with simple, semi-adpressed, amber hair; prepygidial fimbria golden-brown.

Remarks. The male has not previously been described. Only the holotype is recorded from as far south as Perth. Given the age of the specimen, the location may be approximate. This species is referred to as F246 and M225 in Houston (2000).

Distribution. Western Australia east of Geraldton (GS, GVD, MUR, SWA?) (Fig. 82).

Trichocolletes avialis n.sp.

Figs 47, 83

Type. Holotype ♂, 20m E Mt Madley, Western Australia, 7 Sep. 1971, in WAM 13797

Specimens examined. The holotype and the following. **Northern Territory:** ♂, 41 Mile Bore, 10 Jul. 1989, N. W. Rodd, AM (K.316639).

Diagnosis

Male (female unknown) eyes not hairy; metasomal bands silver; flagellum largely orange; mid basitarsus bowed; fore trochanter with spine.

Description

Male (holotype).—*Head* width 3.65 mm, body length 12.6 mm. Relative dimensions: HW 50, HL 36, UID 31, UFW 32, LID 32, DMA 33, HVO 4, WOC 15, MOD 4, OOD 8, IAD 9, ASD 3, AOD 9, ML 20, BMW 7, MSL 0.3, SL 12, SW 3, FL c. 43.—*Eyes* not hairy; face narrow; inner orbits divergent ventrally; malar space short (length c. 0.1× basal mandibular width); middle flagellomeres c. 1.3× as long as wide. Legs slender; fore trochanter with ventrally-directed spine; proximal end of mid basitarsus strongly bowed longitudinally; hind tarsus as long as hind tibia; hind basitarsus 4.1× as long as wide; hind basitibial area with pigmented posterior carina reaching apex. Gonoforceps with long, dense hair, otherwise genital capsule like that for *T. orientalis* n.sp. (Fig. 37); S7 (K.316639) with broad, rectangular lateral lobes, lateral edges emarginate, posterior projections, basal teeth and ligulate processes long and thin (Fig. 47).—*Labrum*, ventral 25% clypeus cream; mandible basally pale amber; scape, femora, tibiae, fore tarsus, distal half trochanters, most of flagellum orange-brown; flagellomeres F3–10 dorsally, mid and hind tarsi dark brown. T1–5 with moderately broad silver bands; apex of T7 orange-brown.—*Scutum* shining, closely punctate.—*Face* with dense, finely-branched, bright orange hair, stiffly erect on clypeus; gena with golden hair forming a beard. Scutum with close, long, plumose, orange hair; fore basitarsus with plume of pale gold hair; hind femur openly covered with moderate length, apically-directed, pale orange hair.

Etymology. The specific name is from the Latin adjective meaning out-of-way or off road, referring to the remote collection sites for the two known specimens.

Distribution. Arid areas in northern half of Australia (DMR, LSD) (Fig. 83).

Trichocolletes brachytomus n.sp.

Figs 21, 25, 48, 84

Type. Holotype ♂, Ororoo, South Australia, 24 Dec. 1938, in ANIC.

Specimens examined. The holotype and the following. **New South Wales:** ♂, Kinchega NP (32.4581°S 142.3525°E), 8 Sep. 2007, M. Batley, AM (K.278549). **South Australia:** ♀, Flinders Rg, 1 Sep. 1948, Hall, SAM (32-024542); ♀, Lake Eyre N Sulphur Pen., 1 Aug. 1967, G. Gross, SAM (32-024543); ♀, nr Lake Harry NE Maree, 24 Sep. 1972, H. Mincham, SAM (32-024532); 2♀, Ororoo, 2 Oct. 1937, J.T. Gray, AM (K.316640–41); ♀, same data, SAM (32-024540); 3♂, 3♀, Ororoo, 23 Sep. 1938, J.T. Gray,

SAM (32-024533-40); ♀, Ororoo, 1 Dec. 1938, ANIC; 4♀, data as for holotype; ♂, Ororoo, 14 Jan. 1939, ANIC; 2♂, 3♀, Ororoo, 3 Mar. 1939, ANIC; 2♀, Rev A. P. Burgess, SAM (32-024539,41).

Diagnosis

Eyes hairy; metasoma red with indistinct bands; T2 without dark marks laterally. Male scape and labrum black; hair on supraclypeal area shorter than on surrounding areas.

Descriptions

Male (holotype).—*Head* width 4.20 mm, body length 12.0 mm. Relative dimensions: HW 50, HL 37, UID 31, UFW 32, LID 29, DMA 29, HVO 4, WOC 14, MOD 4, OOD 9, IAD 10, ASD 3, AOD 8, ML 19, BMW 6, MSL 1.5, SL 13, SW 3, FL c. 51.—*Eyes* hairy; face broad, eyes slightly convergent ventrally; length malar space c. 0.3× basal mandibular width; length flagellum equal to head width, middle flagellomeres c. 1.5× as long as wide. Legs robust; inner faces of fore and mid tibiae with angular ridge on distal half; fore basitarsus strongly broadened near calcar; hind tarsus 1.1× as long as hind tibia; hind basitarsus 3.8× as long as wide; basitibial area carinate and elevated above surroundings, carina reduced to angular edge on proximal 40% of anterior margin (Fig. 25). Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 (K.278549) posterior projections short and blunt, lateral lobes tapered with posterior margin crenulate (Fig. 48).—*Head* and mesosoma black except flagellomeres F2–8 yellow-brown ventrally, distitarsi orange-brown. Metasoma red, bands indistinct but occasionally with ill-defined gold reflections.—*Clypeus* with contiguous punctures except apical margin impunctate; scutum with dull sheen, moderate pit-reticulation and close, fine punctures.—*Face* with finely-branched, white hair, long, dense in paraocular areas, on frons and basal half clypeus; shorter, dense and stiffly erect on supraclypeal area. Scutum with close, long, plumose, very pale orange hair; fore basitarsus with plume; anterior margin of hind tibia with open fringe of long, white hair; metasomal terga sericeous with open, semi-adpressed, pale golden hair.

Female (AM K.316640).—*Head* width 4.45 mm, body length 13.0 mm. HW 50, HL 34, UID 30, UFW 32, LID 30, DMA 32, HVO 4, WOC 13, MOD 3, OOD 9, IAD 9, ASD 3, AOD 9, ML 17, BMW 7.5, MSL 1.5, SL 15.5, SW 2, FL c. 33.—*Eyes* hairy; face broad, inner orbits parallel; malar space short (length c. 0.2× basal mandibular width); clypeus convex, basal half flattened sagittally; middle flagellomeres as long as wide; inner hind tibial spur with c. 8 long teeth; basitibial area elevated above surrounding surfaces, posterior margin with thickened ridge forming an irregular edge (Fig. 21); hind tarsal claw small inner ramus; pygidial plate entire with strong medial elevation.—*Integument* of head and mesosoma black except labrum amber; legs dark orange-brown; mandible medially, flagellum ventrally dark brown. Metasoma red with indistinct, narrow, gold bands; T2 without dark lateral marks.—*Clypeus* dull with weak pit-reticulation and close punctures, except near apical margin; supraclypeal area with smaller, dense punctures; scutum dull with moderately strong pit-reticulation and dense punctures.—*Face* with long, white hair, becoming pale orange towards ocelli, dense in paraocular areas and on frons, sparse on clypeus. Scutum with dense, minutely-branched, bright orange hair; hind tibial scopa pale orange; prepygidial fimbria orange.

Etymology. The specific name is from the Latin adjective meaning clipped, referring to the hair on the supraclypeal area of the male.

Distribution. South Australia and far western New South Wales (DRP, FLB, SSD, STP) (Fig. 84).

Trichocolletes brunilabrum n.sp.

Figs 49, 85

Type. Holotype ♂, 7 km N Wongawol HS, Western Australia, 29–30 Jul. 1983, T. F. Houston & R. P. McMillan, on flowers of *Swainsona*, in WAM 13651.

Specimens examined. The holotype and the following. **Western Australia:** 3♂, same data as holotype WAM (13648–50); ♀, Belele, A. Snell, WAM (19118); 2♀, Belele, WAM (13710–11); 3♀, Boolathana Station (24.53°S 113.78°E), 29 May–25 Aug. 1995, N. Hall, WAM (22207–08, 21024); ♀, Bush Bay (25.06°S 113.70°E), 23 May–23 Aug. 1995, N. Hall, WAM (21025); ♀, 37 km SW Glenayle HS, 6–9 Aug. 1983, T. F. Houston & R. P. McMillan, on flowers of *Swainsona*, WAM (13652); ♀, 13 km WSW Hamelin, 23 Aug. 1980, T. F. Houston, on flowers of *Swainsona*, WAM (13989); 3♀, 30 km NW Lorna Glen HS, 10 Aug. 1983, T. F. Houston & R. P. McMillan, on *Indigofera georgei*, WAM (13653–55); 3♀, 31 km ESE Minnie Creek HS, 2 Sep. 1980, C. A. Howard & T. F. Houston, on flowers of *Swainsona*, WAM (13984–86).

Diagnosis

Length c. 11 mm; eyes hairy; scape black in both sexes; legs black; metasoma sericeous with moderately wide, silver bands, narrowly ferruginous across anterior margins; labrum without a tubercle; known only from western Australia. Male fore basitarsus with short hair only; S7 with narrow, rectangular lateral lobes. Female clypeus coarsely sculptured; hind tarsal claw with inner ramus.

Descriptions

Male (holotype).—*Head* width 3.60 mm, body length 11.1 mm. Relative dimensions: HW 50, HL 37, UID 30, UFW 31, LID 29, DMA 28, HVO 4, WOC 14, MOD 4, OOD 8, IAD 8, ASD 3, AOD 7, ML 17, BMW 7, MSL 2.5, SL 15, SW 3, FL c. 52.—*Eyes* hairy, length malar space c. 0.25× basal mandibular width; length flagellum equal to head width, all flagellomeres longer than wide; hind tarsus 0.9× as long as hind tibia; hind basitarsus 4.4× as long as wide; posterior carina of basitibial area extends well beyond apex. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with thin, rectangular lateral lobes and large basal teeth (Fig. 49).—*Labrum* amber with black suffusions; mandible medially amber; flagellum dark brown, paler ventrally; distitarsi apically orange-brown. T1–5 with broad, silver bands.—*Clypeus* coarsely punctate, with moderately large, coalescent punctures and irregular, narrow interspaces; scutum with dull sheen, moderately strong pit-reticulation and close small punctures.—*Face* with dense, long, white hair. Scutum with close, long, finely-branched pale brown hair; fore basitarsus without distinct plume; hind femur with open fringe long white hair on anterior margin.

Female (WAM13653).—*Head* width 3.90 mm, body length 11.6 mm. Relative dimensions: HW 50, HL 37, UID 29, UFW 32, LID 35, DMA 30, HVO 3, WOC 15, MOD 4,

OOD 8, IAD 7, ASD 3, AOD 9, ML 15, BMW 8, MSL 2.0, SL 15, SW 3, FL c. 29.—*Eyes* hairy; length malar space c. 0.15× basal mandibular width; clypeus gently convex, basal suture shallowly V-shaped; middle flagellomeres c. 1.1× as long as wide; inner hind tibial spur with c. 8 long teeth; hind tarsal claw with distinct, sharp inner ramus, mid tarsal claw with minute inner ramus, fore tarsal claw simple; pygidial plate with medial elevation and small emargination.—*Labrum*, mandible medially dark brown; distitarsi apically orange-brown. T1–4 with wide silver bands, narrowly ferruginous across anterior margins.—*Clypeus* strongly reticulate, coarsely punctate with large dense punctures partially coalescent. Scutum dull with strong pit-reticulation obscuring punctures.—*Face* with long white plumose hair, becoming pale brown hair near ocelli, dense in paraocular areas and on frons, sparse on clypeus and supraclypeal area. Scutum with close, plumose, pale orange-brown hair; tibial scopa brown medially, white laterally; prepygidial fimbria pale brown.

Remarks. The sexes were associated by morphological similarity and geographic distribution only. This species is referred to as F267 in Houston (2000).

Distribution. Predominantly east from Shark Bay, Western Australia, with one record from near Perth (CAR, GAS, MUR, SWA) (Fig. 85).

Trichocolletes burnsi Michener

Figs 30, 50, 86

Trichocolletes (Trichocolletes) burnsi Michener, 1965, p. 263 (female).

Specimens examined. The holotype ♀, Wentworth Falls, NSW, 7 Oct. 1930, A. N. Burns, MV (T-6265) and the following. **Australian Capital Territory:** ♂, Picadilly Circus, Brindabella Range, 24 Nov. 1981, J. C. Cardale, ANIC; ♂, Picadilly Circus, Brindabella Range, 2 Jan. 1986, D.C.F. Rendz, ANIC. **New South Wales:** ♀, 7 km NE Bilpin, 25 Oct. 1977, N. W. Rodd, AM (K.316653); 2♀, Bilpin, 9 Oct. 1978, N. W. Rodd, AM (K.316655–56); ♂, Clarence, 4 Oct. 1988, N. W. Rodd, AM (K.316662); ♀, Cunnawarra NP (30.5283°S 152.3133°E), 11 Nov. 2003, M. Batley, AM (K.316496); ♂, Gibraltar Range NP (29.5528°S 152.2531°E), 20 Sep. 2000, M. Batley, AM (K.316497); 2♀, Haystack Ridge, 19 Oct. 1977, N. W. Rodd, AM (K.316651–52); ♀, Haystack Ridge, 7 Nov. 1977, N. W. Rodd, AM (K.316654); ♂, Kosciusco, 24 Nov. 1921, R. J. Tillyard, QM; 4♂, 3♀, Mt Tomah, 10 Oct. 1977, N. W. Rodd, AM (K.316642–48); ♂, ♀, Mt Tomah, 11 Oct. 1977, N. W. Rodd, AM (K.316649–50); 4♂, ♀, 3 km S Mt Wilson, 8 Oct. 1979, N. W. Rodd, AM (K.316657–61); ♂, Mount Wilson (33.5417°S 150.3414°E), 24 Sep. 2002, M. Batley, AM (K.316498); 2♀, Mount Wilson (33.5417°S 150.3414°E), 20 Oct. 2002, M. Batley, AM (K.316500–01); ♂, Narrow Neck (33.7492°S 150.2800°E), 27 Sep. 2002, M. Batley, AM (K.316499); ♂, Wentworth Falls, 27 Oct. 1930, Burns, Alec N., MV(16561). **Victoria:** ♂, The Grampians 23 Oct. 1932, Burns, Alec N., MV(16529); ♂, Mirimbah, 12 Nov. 1957, Neboiss, Arturs, MV(16496).

Diagnosis

Length 12–14 mm; eyes not hairy; metasomal bands indistinct; clypeus short. Male hair on clypeus and supraclypeal area dorsally directed; mid basitarsus bowed; ventral surface of hind femur without hair. Female tarsal claws simple; metasomal terga without white hair.

Descriptions

Male (AM K.316499), not previously described.—*Head* width 4.3 mm, body length 12.8 mm. Relative dimensions: HW 50, HL 33, UID 29, UFW 31, LID 36, DMA 32, HVO 4, WOC 11, MOD 4, OOD 9, IAD 11, ASD 3, AOD 7, ML 21, BMW 7, MSL 3.5, SL 12, SW 4, FL c. 57.—*Eyes* not hairy; face broad, inner orbits strongly divergent ventrally; scapes slightly swollen (width 0.35× length); length malar space c. 0.7× basal width mandible; clypeus short (length 0.35× as long as wide); labrum uniformly convex with slight longitudinal depression medially; middle flagellomeres 1.8× as long as wide. Legs slender; distitarsi rather broad; mid basitarsus slightly bowed and twisted distally; hind tarsus 1.2× as long as hind tibia; length basitarsus 4.9× as long as wide; basitibial area with posterior carina reaching apex. Gonoforceps with long hair (Fig. 30) as in *T. orientalis* n.sp.; S7 with very broad, rectangular lateral lobes and short posterior projections (Fig. 50).—*Labrum*, mandible basally, ventral rim of clypeus, cream; tibiae, tarsi, scape, flagellomeres F1–7 ventrally and half F1 dorsally, orange-brown; trochanters and femora dark brown suffused with variable amounts of orange-brown. T1–6 and S1 with apical margins indistinctly dark brown.—*Clypeus* with dense, small punctures except narrow basal margin impunctate. Scutum dull with weak pit-reticulation.—*Face* with dense, finely-branched, bright orange hair, stiff and obliquely vertically directed on clypeus and supraclypeal area; vertex with tuft of long orange hair behind ocelli; lower gena with dense beard of long white hair. Scutum with close, long, finely-branched, orange hair; fore basitarsus with fringe of finely-branched white hair. T1,2 with sparse cover of long, erect, finely-branched white hair; remaining terga with simple, semi-erect hair matching underlying integument.

Female (AM K.316500).—*Head* width 4.55 mm, body length 13.1 mm. Relative dimensions: HW 50, HL 36, UID 27, UFW 31, LID 36, DMA 32, HVO 4, WOC 12, MOD 4, OOD 8, IAD 8, ASD 3, AOD 10, ML 23, BMW 8, MSL 4.5, SL 15, SW 2, FL c. 34.—*Eyes* not hairy; face broad, inner orbits strongly divergent ventrally; malar space c. 0.6× basal width mandible; clypeus short (length 0.45× as long as wide), uniformly convex transversely; middle flagellomeres c. 1.2× as long as wide; inner hind tibial spur with c. 9 teeth; tarsal claws simple; pygidial plate with strong medial elevation.—*Labrum* and mandibles brown; legs dark brown with orange-brown suffusions on fore and mid femora, tibiae and all distitarsi.—*Clypeus* weakly reticulate with open punctures becoming close towards lateral margins. Apical margins T1–4 smoother than remainder of terga.—*Face* with dense, long, plumose white hair becoming dark brown near vertex. Scutum with dense, short, plumose, dark brown hair; pre-pygidial fimbria dark-brown or black.

Remarks. Similar to *T. latifrons* from which male may be distinguished clypeal hair, mid basitarsus and absence of hair from ventral surface of hind femur. Females may be distinguished from *T. latifrons* by the tarsal claws and absence of white hair from metasomal terga.

Distribution. Montane areas of eastern Australia from southern Queensland to Victoria (AA, NET, SB, SEH, VM) (Fig. 86).



Figs 3–4. *Trichocolletes capillosus* n.sp., male: (3) left fore tarsus (arrow indicates setose projection) (4) ventral view of mid and hind legs showing long hair on femora (arrowed).

Trichocolletes capillosus n.sp.

Figs 3–4, 51, 87

Type. Holotype ♂, Coomberdale, Western Australia, 9 Jul. 1976, R. P. McMillan, in WAM 13792.

Specimens examined. The holotype and the following. **Western Australia:** 2♂, same data as holotype, WAM (13793–94); 3♂, Bolgart, 12 Nov. 1950, ANIC; ♀, 30 km E Cramphorne (31.7939°S 118.8731°E), 20 Oct. 2009, M. Batley, AM (K.344667); ♂, 14 km NW Narrogin (32.8761°S 117.0425°E), 9 Oct. 2009, M. Batley, ex *Gastrolobium crassifolium*, AM (K.278550); ♂, Nabawa, 9 Jul. 1998, S. R. Patterson, WAM (21393); ♂, 11 mi N of New Norcia, 18 Aug. 1971, T. F. Houston, on *Daviesia* & *Pultenaea*, SAM (32-024670); ♂, Stathams, WAM (13713); ♂, Wamenusking, WAM (13700); ♀, 15 km N Westonia (31.1981°S 118.7586°E), 19 Sep. 2004, M. Batley, ex *Gastrolobium* sp. AM (K.344666).

Diagnosis

Eyes hairy; metasomal bands narrow, silver. Male mid and hind femora with very long, dense hair (Fig. 4). Female upper margin of clypeus narrow.

Descriptions

Male (AM K.278550).—**Head** width 3.75 mm, body length 11.5 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 31, LID 31, WOC 14, MOD 4, OOD 9, IAD 9, ASD 4, AOD 7, ML 20, BMW 7, MSL 3.0, SL 13, SW 3, FL c. 53.—**Eyes** hairy; face approximately quadrate, inner orbits parallel; length malar space c. 0.45× basal mandibular width; flagellum longer than head width, middle flagellomeres c. 1.4× as long as wide. Legs slender; fore basitarsus noticeably short, abruptly thicker at distal end, which bears a tuft of setae on inner margin (Fig. 3); hind tarsus as long as hind tibia; hind basitarsus 4.7× as long as wide; posterior carina of basitibial area reaches apex. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 relatively glabrescent, triangular lateral lobes fused with short ligulate process,

subsuming basal teeth, posterior projections virtually obsolete (Fig. 51).—**Labrum**, mandible medially, scape, tarsi, tibiae, distal ends femora orange-brown, except fore basitarsus cream or pale orange-brown; flagellomeres F2–8 yellow-brown ventrally; remainder of flagellum dark brown. T1–5 with narrow silver bands; T7 dark orange-brown. Wings noticeably darkened.—**Scutum** with dull sheen, moderate pit-reticulation and close, small punctures.—**Face** with dense, long, finely-branched, orange hair. Scutum with close, long, plumose, orange hair; fore basitarsus with plume of long orange hair on proximal half (Fig. 3); mid and hind femora with unusually long, dense, orange hair (Fig. 4).

Female (AM K.344667).—**Head** width 4.05 mm, body length 11.7 mm. Relative dimensions: HW 50, HL 39, UID 29, UFW 32, LID 32, WOC 13, MOD 3, OOD 8, IAD 8, ASD 4, AOD 9, ML 21, BMW 7, MSL 2.0, SL 16, SW 3, FL c. 31.—**Eyes** hairy; face slightly wider than longer, inner orbits parallel; malar space moderately long (length c. 0.4× basal mandibular width); clypeus convex, sagittally flattened, basal suture V-shaped; basal width clypeus < 2× length subantennal suture; middle flagellomeres c. 1.1× as long as wide; hind tibial spur with c. 7 long teeth; tarsal claws simple; pygidial plate emarginate with low medial elevation.—**Labrum**, mandible, tarsi, hind tibiae, apices femora orange-brown, with dark brown medially on fore and mid tibiae; flagellomeres F2–10 yellow-brown ventrally; remainder of flagellum dark brown. T1–4 with narrow silver bands. Wings darkened.—**Clypeus** weakly reticulate basally with dense medium punctures medially, sparse laterally, apico-lateral corners with dense, fine punctures. Scutal sculpture as for male.—**Face** with long, plumose, pale hair, dark-tipped near ocelli, dense in paraocular areas and on frons, sparse on clypeus and supra-clypeal area. Scutum with close, plumose, dark-tipped pale brown hair; scopal hair orange-brown laterally, darker medially; pre-pygidial fimbria dark brown.

Remarks. Sexes associated by morphological similarity and mitochondrial cytochrome oxidase subunit I DNA sequence (results not shown). This species is referred to as M242 in Houston (2000). Females resemble those of *T. leucogenys* n.sp. and *T. dundasensis* n.sp. from which they may be distinguished by the relatively narrow upper margin of clypeus.

Etymology. The specific name is from the Latin adjective meaning very hairy referring to the femora of the male.

Distribution. Avon wheatbelt area of Western Australia (AW, GS, JF) (Fig. 87).

Trichocolletes centralis n.sp.

Figs 52, 88

Type. Holotype ♂, 30 km W Sandstone [27.59S, 119.18E], Western Australia, 7 Sep. 1981, T. F. Houston, on flowers of *Daviesia grahmi*, in WAM 13563. Co-ordinates on the label refer to the location of Sandstone at 27°59'S 119°18'E.

Specimens examined. The holotype and the following. **New South Wales:** 3♂, Dolo Creek (31.6933°S 142.8697°E), 7 Sep. 2007, M. Batley, AM (K.334669–71). **Queensland:** ♂, 34 km E Cunnamulla (28.0456°S 146.0658°E), 24 Aug. 2007, M. Batley, AM (K.334668); 7♂, 2♀, 70 mi NW Quilpie, 17 Aug. 1968, J. C. & T. F. Houston, on *Crotalaria eremaea*, SAM (32-024508, 10, 11) & UQIC; 2♂, 4♀, 8 mi NE Windorah, 16 Aug. 1968, J. C. & T. F. Houston, on *Kennedia prorepens*, UQIC & SAM (32-024509). **South Australia:** ♂, ♀, 70 mi N Marree, 13 Aug. 1969, E. M. Exley, UQIC; 3♂, 9♀, Simpson Desert, 15–18 Sep. 1971, T. F. Houston, on *Swainsona*, *Crotalaria*, *Goodenia* & *Helipterum*, SAM (32-024645–56). **Western Australia:** 3♂, 2♀, 24–25 km ENE Beyondie HS, 17–20 Aug. 1984, T. F. Houston & B. P. Hanich, on flowers of *Thryptomene maisonneuwei* & *Scaevola spinescens*, WAM (13540–44); ♀, Beyondie Little Sandy Desert (24.5833°S 120.2833°E), 28 Aug. 1997, D. Knowles & A. Start, visiting *Swainsona*, WAM (21021); ♂, ♀, Cardabia, K. T. Richards, WAA (45286–87); ♂, 36 km N Charlies Knob, 1 Aug. 1983, T. F. Houston & R. P. McMillan, on flowers of *Swainsona*, WAM (13558); ♂, 28 km N Charlies Knob, 6 Aug. 1983, T. F. Houston & R. P. McMillan, on flowers of *Dicrastylis exsuccosa*, WAM (13557); 6♂, 37 km SW Glenayle HS, 6–9 Aug. 1983, T. F. Houston & R. P. McMillan, on flowers of *Swainsona*, WAM (13547–52); 3♂, ♀, Karijini National Park (22.5250°S 118.7833°E), 20 Aug. 2001, T. F. Houston, on flowers of *Gompholobium polyzygum*, WAM (29092–95); 8♂, 2♀, 15 km N Kumarina Hotel, 21 Aug. 1984, T. F. Houston & B. P. Hanich, on flowers of *Thryptomene maisonneuwei* & *Swainsona*, WAM (13530–39); ♀, 28 km WSW Lenister, 11 Aug. 1983, T. F. Houston & R. P. McMillan, on flowers of *Baeckea stowardii*, WAM (13556); ♂, 33 km WSW Lenister, 11 Aug. 1983, T. F. Houston & R. P. McMillan, on flowers of *Dicrastylis brunnea*, WAM (13555); ♂, ♀, 30 km NW Lorna Glen HS, 10 Aug. 1983, T. F. Houston & R. P. McMillan, on flowers of *Ptilotus obovatus*, WAM (13553–54); 2♂, 17 km E Mt Nossiter, 7 Aug. 1983, T. F. Houston & R. P. McMillan, on flowers of *Dicrastylis exsuccosa*, WAM (13559–60); 4♂, 30 km W Sandstone, 7 Sep. 1981, T. F. Houston, on flowers of *Daviesia grahmi*, WAM (13563–67); 2♀, 8 km NE Tamala HS (26.70°S 113.71°E), 21–23 Aug. 1980, C. A. Howard & T. F. Houston, on flowers of *Mirbelia ramulosa*, WAM (13835, 14422); 3♂, 7♀, 16 km SW Tangadee HS, 22 Aug. 1984, T. F. Houston & B. P. Hanich, on flowers of *Swainsona*, WAM (13520–29); 2♂, ♀, 25 km SW Tangadee HS, 22 Aug. 1984, T. F. Houston & B. P. Hanich, on flowers of *Swainsona*, WAM (13523, 45, 46); ♂, 7 km N Wongawol HS, 29–30 Jul. 1983, T. F. Houston & R. P. McMillan, WAM (13561); ♀, Woomera, 15 Sep. 1968, H. Mincham, on flowering legume shrub, SAM (32-024507).

Diagnosis

Length 11–13 mm; eyes not hairy; malar space short; metasoma sericeous with broad bands. Male metasoma slender; legs slender; tibiae, tarsi and antenna ventrally orange-brown. Female pubescence of scutum short, dense; only hind tarsal claw with small inner ramus.

Variation

The colour of the metasomal bands varies from silver to moderately bright gold and that of the scutal hair ranges from orange-brown to almost white. No correlation was found between colour and geographic location. The apical half of the flagellum is darkened ventrally in some males.

Descriptions

Male (holotype).—*Head* width 3.80 mm, body length 11.8 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 32, LID 31, DMA 30, HVO 5, WOC 14, MOD 4, OOD 8, IAD 9, ASD 3, AOD 8, ML 20, BMW 7, MSL 1.0, SL 12, SW 3, FL c. 53.—*Eyes* not hairy; face narrow; malar space short (length c. 0.1× basal mandibular width); length flagellomeres c. 1.5× width. Legs slender; hind tarsus 1.2× as long as hind tibia; hind basitarsus 3.5× as long as wide; posterior carina of basitibial area reaches apex. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with long, thin posterior projections and ligulate processes, rectangular lateral lobes with sinuate posterior margin (Fig. 52).—*Labrum* cream; ventral rim clypeus amber; scape, pedicel, flagellum ventrally, tarsi, tibiae and femora orange-brown, with medial brown areas on fore and mid femora; flagellum dorsally, coxae, trochanters dark brown. T1–5 with broad, pale gold bands (see variation); T7 and large part of S6 orange-brown.—*Scutum* with dull sheen, weak pit-reticulation and dense, small punctures.—*Face* with dense orange hair, erect on clypeus. Scutum with close, long, plumose, orange hair; fore basitarsus with tapered golden plume; hind femur with fringe of long hair on anterior margin; metasoma sericeous with semi-adpressed simple hair.

Female (WAM13523).—*Head* width 4.00 mm, body length 12.6 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 32, LID 32, DMA 30, HVO 4, WOC 13, MOD 3, OOD 8, IAD 7, ASD 4, AOD 9, ML 20, BMW 6, MSL 0.5, SL 15, SW 3, FL c. 32.—*Eyes* not hairy; face quadrate; malar space short (length c. 0.1× basal mandibular width); clypeus transversely convex; middle flagellomeres as long as wide; inner hind tibial spur with c. 7 long, well-spaced teeth; fore tibial calcar with c. 5–6 strong teeth; hind tarsal claw only with small inner ramus; pygidial plate apically entire with broad medial elevation.—*Labrum*, mandibles medially, apical rim clypeus amber; anterior margins of fore and mid tibia orange-brown; remainder of legs dark brown. T1–4 with broad pale gold bands, narrowly ferruginous across anterior margin.—*Clypeus* reticulate basally, with large punctures, becoming polished and sparsely punctate apically. Scutal sculpture as for male.—*Face* with long white, plumose hair, becoming dark brown near ocelli, dense in apicolateral corners of clypeus, paraocular areas and on frons, sparse on clypeus and supraclypeal area. Scutum densely covered with short, finely-branched, pale brown or orange-brown hair; tibial scopa white or pale orange except near basitibial area; prepygidial fimbria gold.

Remarks. This species is referred to as F246 (part), M219, F273 and M228 in Houston (2000).

Etymology. The specific name, used as a Latin adjective, refers to the regions where the species has been found.

Distribution. Central, arid areas of Australia (BHC, CHC, GAS, GAW, GD, GS, LSD, ML, MUR, PIL, SSD, STP) (Fig. 88).

*T. sericeus**T. rufibasis**T. dives* (dorsal view)*T. hackeri* (anterior view)*T. pulcherrimus* (dorsal view)

Figs 5–9. Parts of antennae of male *Trichocolletes* illustrating: (5) swollen and (6) non-swollen scapes; (7) modified F1 and F11; (8) crenulate flagellum and (9) modified F11.

Trichocolletes chrysostomus (Cockerell)

Figs 53, 89

Paracolletes chrysostomus Cockerell, 1929a p. 202 (male).

Trichocolletes (*Trichocolletes*) *chrysostomus*.—Michener, 1965 p. 79.

Paracolletes marginatus lucidus Cockerell, 1929a, p. 203 (female). **n. syn.**

Trichocolletes (*Trichocolletes*) *lucidus*.—Michener, 1965 p. 80.

Specimens examined. The holotypes of *T. chrysostomus* ♂, Eradu, Western Australia, Nicolson, 8 Sep. 1926, AM (K.95633) and *T. lucidus* ♀, Geraldton, Western Australia, Nicolson, 4 Sep. 1926, AM (K.95634) and the following. **South Australia:** 6♂, Hincks Nat. Pk (33.50°S 136.90°E), 12 Oct. 1972, C. A. & T. F. Houston, on *Dillwynia uncinata*, SAM (32-024627 to 32); ♀, Kimba-Wudinna Road, 8 Oct. 1974, T. F. Houston, SAM (32-024633); ♂, 35 km E Wudinna (33.1581°S 135.8219°E), 15 Sep. 2004, M. Batley, AM (K.316503). **Western Australia:** ♂, 3♀, Badgingarra National Park, 1–3 Oct. 1980, T. F. Houston, on flowers of *Jacksonia*, WAM (13568–71); ♂, ♀, Badgingarra Natl Park (30.5306°S 115.4306°E), 15 Sep. 1995, J. Cane & L. Kervin, ex *Daviesia*?, WAM (32095–96); ♂, ♀, 18 km NW Eneabba, 9–12 Sep. 1987, T. F. Houston, on flowers of *Jacksonia ulicina*, WAM (13578, 13858); ♂, 31 km 9° W of N Eneabba, 28 Aug. 1999, T. F. Houston, on flowers of *Daviesia incrassata* ssp. *teres*, WAM (27522); ♂, c. 5 km W Eurardy HS (27.6611°S 114.6944°E), 24 Aug. 1999, T. F. Houston, on flowers of *Jacksonia cupulifera*, WAM (27505); ♂, 13 mi N Geraldton, 19 Aug. 1971, T. F. Houston, SAM (32-024626); ♂, Kenwick, 14 km SE Perth, 10 Sep. 1980, J. Lewis, on *Bossaia*, WAM (13600); 6♀, Watheroo National Park (30.20°S 115.83°E), 3–5 Oct. 1980, T. F. Houston, on flowers of *Daviesia brevifolia*, WAM (13572–77).

Diagnosis

Length male c. 12 mm, female c. 13 mm; eyes not hairy; metasomal bands moderately wide; prominent supraclypeal area inclined to clypeus, viewed laterally. Male scapes swollen; supraclypeal area bare, polished, impunctate on anterior surface; female clypeus with open, large punctures.

Descriptions

Male (AM K.316503).—*Head* width 3.6 mm, body length 11.9 mm. Relative dimensions: HW 50, HL 41, UID 33, UFW 32, LID 30, DMA 30, HVO 4, WOC 15, MOD 5, OOD 9, IAD 8, ASD 3, AOD 8, ML 19, BMW 6, MSL 1.5, SL 12, SW 6, FL c.44.—*Eyes* not hairy; face narrow, inner orbits subparallel; malar space c. 0.3× basal width mandible; scape swollen (width 0.48× length); anterior face supraclypeal area pentagonal, weakly depressed medially, inclined relative to clypeus viewed laterally; flagellomeres F1–6 flattened ventrally and conspicuously hirsute; middle flagellomeres slightly longer than wide. Legs robust; mid basitarsus short (length 2.3× width); hind tarsus 1.1× as long as hind tibia; hind basitarsus 4.3× as long as wide; basitibial area flattened but acarinate. Genital capsule similar to that for *T. sericeus* (Fig. 40); S7 with triangular lateral lobes, basal teeth obsolete, posterior projections small (Fig. 53).—*Labrum*, mandible medially, scape, mid and hind tarsi, distal ends femora, proximal ends tibiae, ventral surfaces flagellomeres F1–6, distal half F11 orange-brown; legs and remainder of flagellum brown. T1–5 with broad, orange-gold bands, ferruginous across anterior margin.—Anterior face of supraclypeal area polished and impunctate, clypeus densely punctate, except apical margin; scutum dull with strong pit-reticulation obscuring punctures.—*Face*, except supraclypeal area, with dense, long, minutely-branched, bright orange hair. Scutum with close, long, plumose, orange hair; fore basitarsi without distinct plume; posterior margin of mid basitarsus with dense fringe of long, golden hair; trochanters and hind femur with copious, long, golden hair.

Female (WAM 13568).—*Head* width 4.2 mm, body length 13.0 mm. Relative dimensions: HW 50, HL 39, UID 31, UFW 33, LID 32, DMA 30, HVO 3, WOC 15, MOD 4, OOD 8, IAD 8, ASD 4, AOD 9, ML 19, BMW 7, MSL 2, SL 15, SW 3, FL c. 28.—*Eyes* not hairy; face approximately quadrate, inner orbits parallel; length malar space c. 0.3× basal width mandible; basal suture clypeus straight; supraclypeal area with triangular anterior face at distinct angle to clypeus viewed laterally; flagellum moderately short; middle flagellomeres approximately as long as wide; inner hind tibial spur with c. 12 long teeth; hind basitibial area large, c. 0.3× as long as hind tibia; tarsal claws with large, triangular inner ramus; pygidial plate emarginate, strongly sculptured.—*Labrum*, mandible medially, ventral rim of clypeus, f3–10 ventrally, orange-brown; scape, remainder of flagellum and legs dark brown, with dull orange-brown on anterior surface of fore tibia. T1–4 with moderately wide silver-white bands.—*Clypeus* reticulate with open, large punctures; anterior face of supraclypeal area with sparse punctures; remainder of face densely punctured; scutum dull with strong pit-reticulation.—*Face* with long, white, plumose hair becoming pale orange-brown near ocelli, dense in paraocular areas and on frons, sparse on clypeus

and supraclypeal area. Scutum with close, short, plumose, dark-tipped brown hair; hind tibial scopa orange-brown except dark brown near basitibial area; prepygidial fimbria golden-brown.

Remarks. The holotypes of *T. chrysostomus* and *T. lucidus* both carry labels with the word “TYPE” in Cockerell’s hand.

This species is similar to *T. sericeus*, which is found in the eastern half of the continent. Both sexes have a shorter head length than *T. sericeus* and males may be distinguished by the bare, sparsely punctate supraclypeal area and females by the less dense punctures of the clypeus. The female specimens examined were less brightly coloured than many of the males, which may be a result of their collection later in the season.

This species is referred to as F248/M221 and M222 in Houston (2000).

Distribution. Coastal Western Australia and southern South Australia (EYB, GS, MAL, SWA) (Fig. 89).

Trichocolletes dives (Cockerell)

Figs 7, 23, 31, 54, 90

Anthoglossa dives Cockerell, 1914b, p. 39.

Trichocolletes (Trichocolletes) dives.—Michener, 1965, p. 79.

Specimens examined. The holotype ♀, Yallingup, nr Cape Naturaliste, Western Australia, R. E. Turner, Sep. 14–31 Oct. 1913, BMNH Hym.17.a.393 and the following. **Western Australia:** ♂, ♀, Barracca Nature Reserve, 8 km NE Muchea, 23 Jul. & 13 Aug. 1999, T. F. Houston, on flowers of *Daviesia physodes*, WAM (27174, 82); ♀, Cannington, 16 Oct. 1954, R. P. McMillan, WAM (13512); ♀, Chidlow, 1 Jun. 1934, WAA (45284); ♀, 18 km NW Eneabba, 9–12 Sep. 1987, T. F. Houston, on flowers of *Daviesia*, WAM (13978); ♂, 16 km NW Eneabba, 24 Jun. 1999, T. F. Houston, on flowers of *Daviesia trifolia*, WAM (27173); 2♀, 25 km 15° W of N Eneabba, 28 Aug. 1999, T. F. Houston, on flowers of *Jacksonia hakeoides*, WAM (27520–21); ♀, 28 km 26° W of N Eneabba, 28 Aug. 1999, T. F. Houston, on flowers of *Daviesia divaricata*, WAM (27513); 4♂, ♀, 31 km 9°W of N Eneabba, 23–25 Jun. 1999, T. F. Houston, on flowers of *Daviesia trifolia*, WAM (27169–72, 79); ♂, ♀, Mahogany Ck, WAM (13511); ♂, Nabawa, 9 Jul. 1998, S. R. Patterson, WAM (21391); ♂, Stathams, WAM (13505); ♀, 1.5 km S Yallingup, 12–13 Nov. 1986, T. F. Houston, on flowers of *Daviesia*, WAM (13979); ♂, Yanchep-Lancelin Road 10 km ESE Guilderton, 28 Aug. 1982, T. F. Houston, on flowers of *Daviesia divaricata*, WAM (13503).

Diagnosis

Length c. 14 mm; eyes not hairy; metasomal bands wide, bright gold; clypeus wholly (male) or partly (female) yellow-brown and sparsely punctate. Male flagellum very long with apical segment expanded and flattened.

Variation

Males from the Yanchep-Busselton area at the southern end of the known range exhibit generally denser pubescence and a curved, ventrally expanded first flagellomere.

Descriptions

Male (WAM 27175).—*Head* width 4.4 mm, body length 13.9 mm. Relative dimensions: HW 50, HL 34, UID 29, UFW 30, LID 32, DMA 32, HVO 5, WOC 13, MOD 3, OOD 8, IAD 9, ASD 4, AOD 6, ML 21, BMW 6, MSL 2,

SL 8, SW 4, FL c. 78.—*Eyes* not hairy; face broad; inner orbits ventrally divergent; clypeus flattened apicolaterally; length malar space c. 0.4× basal width mandible; labrum truncate, uniformly convex; scape short and swollen (width 0.5× length); flagellum much longer than head width; F2–9 c. 2.8× as long as wide, F11 and part F10 flattened and expanded (Fig. 7). Legs long and slender; hind tarsus c. 1.3× as long as hind tibia; hind tibia gently bowed transversely; hind basitarsus c. 6.0× as long as wide, gently bowed longitudinally; posterior carina of hind basitibial area extends slightly past apex. Costal margin of third submarginal cell of forewing noticeably narrow. Gonoforceps with sparse hair, narrowed preapically (Fig. 31); S7 with lateral lobes compressed and fused with posterior projections and basal teeth (Fig. 54).—*Clypeus* yellow-brown; labrum, scape, mandible medially, tarsi, distal half fore femur, anterior faces mid femur, fore and mid tibia, orange-brown; remainder of legs dark brown; flagellomeres F1–9 mottled orange-brown ventrally, dark brown dorsally, F11 ventrally with large, medial brown patch. T1–5 with broad gold bands; T7 red-brown. Wings darkened.—*Clypeus* weakly reticulate, shining, with scattered setiferous punctures; supraclypeal area densely punctate; scutum strongly pit-reticulate and indistinctly punctate.—*Face* above base of clypeus with dense, erect, finely-branched, orange hair; lower paraocular area with short, adpressed, pale hair; clypeus with sparse, long, simple, orange hair. Scutum with close, plumose, dark-tipped pale brown hair; fore trochanter and femur with copious, long, orange hair; fore basitarsus without plume; anterior margin of hind tibia with fringe of mid-length orange hair.

Female (WAM 27182).—*Head* width 4.5 mm, body length 14.3 mm. Relative dimensions: HW 50, HL 37, UID 29, UFW 31, LID 31, DMA 31, HVO 4, WOC 13, MOD 3, OOD 8, IAD 7, ASD 3, AOD 8, ML 21, BMW 7, MSL 1, SL 13, SW 3, FL c. 36.—*Eyes* not hairy; face broad, inner orbits slightly divergent ventrally; malar space c. 0.25× basal width mandible; clypeus uniformly convex with slight sagittal flattening; supraclypeal area prominent; frontal carina ending in small tubercle on supraclypeal area; flagellum moderately long; middle flagellomeres c. 1.2× as long as wide; basitibial area well-defined with sharp edges on both margins (obscured by setae unless worn) (Fig. 23); tarsal claws simple; inner hind tibial spur with c. 8 strong teeth; pygidial plate very broad and coarsely sculptured.—*Labrum*, mandible medially, apical half of clypeus orange-brown; legs, flagellum dark brown. T1–4 with broad, gold bands, ferruginous across anterior margin.—*Clypeus* reticulate, shining with scattered, large punctures, supraclypeal area with contiguous, large punctures; scutum dull with strong pit-reticulation.—*Face* with long, brown, plumose hair, dense in paraocular areas and on frons, open on supraclypeal area and sparse on clypeus. Scutum with close, short, plumose, dark-tipped pale brown hair; prepygidial fimbria honey-coloured; hind tibial scopa dark brown.

Remarks. This species is referred to as *T. dives* and F258 in Houston (2000).

Distribution. Southern coastal Western Australia (JF, GS, SWA) (Fig. 90).

Trichocolletes dowerinensis Rayment

Figs 32, 41, 55, 91

Trichocolletes dowerinensis Rayment, 1931, p. 162 (male).

Specimens examined. The holotype ♂, Dowerin, Western Australia, ANIC and the following. **Western Australia:** ♂, 9 km E by S Carrabin, 9 Oct. 1981, I. D. Naumann & J. C. Cardale, ANIC; ♂, Bejoording, Dec. 1949, R. P. McMillan, WAM (13818); 3♀, Boorabbin Rock, 4–9 Oct. 1981, T. F. Houston, on flowers of *Daviesia croniniana* & *Jacksonia*, WAM (13848–50); 3♂, 2♀, Broomehill, WAM (13712,74–76,13820); ♀, 22 km N Bullfinch, 7 Sep. 1979, T. F. Houston, on flowers of *Swainsona microphylla*, WAM (13967); ♂, Cunderin, Aug.–Sep. 1913, WAM (13822); ♂, Dryandra, 11 Oct. 1965, A. Douglas, WAM (13519); 6♂, 31 km 9° W of N Eneabba, 28 Aug. 1999, T. F. Houston, on flowers of *Daviesia incarsata* ssp. *teres*, WAM (27526–31); ♀, Eneabba, 6 Sep. 1996, R. P. McMillan, on flowers of *Jacksonia ulicina*, WAM (18463); ♂, Eneabba, 13 Sep. 1996, R. P. McMillan, on *Daviesia*, WAM (21023); ♀, NE Eneabba, 27 Aug. 1995, J. Cane & L. Kervin, ex *Daviesia* sp., WAM (32094); ♀, 60 km N Esperance (33.3611°S 121.6992°E), 29 Sep. 2004, M. Batley, ex *Daviesia* sp., AM (K.316513); 4♂, 13 km 35°S of W Eurardy HS (27.7611°S 114.5694°E), 25–26 Aug. 1999, T. F. Houston, on flowers of *Mirbelia trichocalyx* and *Jacksonia velutina*, WAM (27495–98); 6♀, 61 km E Hyden, 14 Oct. 1978, T. F. Houston, on flowers of *Burtonia hendersoni*, WAM (13842–47); ♂, 7.5 km WSW Lake Cronin, 19–26 Sep. 1978, T. F. Houston, on flowers of *Daviesia aphylla* and *Gastrolobium* sp., WAM (13516–17); 3♂, ♀, 5.5–6.5 km SW McDermid Rock, 27 Sep.–3 Oct. 1978, T. F. Houston, on flowers of *Pultenaea* sp. & *Daviesia aphylla*, WAM (13513–5, 13855); ♂, Merredin, Oct. 1948, A. Douglas, WAM (13821); ♂, Minnivale, WAM (13715); 2♀, Mt Observation, 21 Oct. 1987, R. P. McMillan, WAM (13853–54); ♂, National Park, WAM (13819); ♀, 6 km W Newdegate (33.1011°S 118.9639°E), 8 Oct. 2009, M. Batley, ex *Gastrolobium ilicifolium*, AM; ♂, 2♀, North Tarin Rock Reserve (32.98°S 118.23°E), 16–18 Oct. 1985, T. F. Houston, on flowers of *Gastrolobium* sp., WAM (13518, 13851–52); ♀, Stirling Ranges NP SE Camel Lake, 2 Oct. 1995, J. Cane & L. Kervin, ex *Gastrolobium spinosum* & *Daviesia flexuosa*, WAM (32098); ♀, 12 km NW Tarin Rock (33.0544°S 118.1456°E), 9 Oct. 2009, M. Batley, ex *Gastrolobium glaucum*, AM; ♀, Tutanning Reserve 18–25 km E Pingelly, 30 Oct.–3 Nov. 1980, T. F. Houston, on flowers of *Daviesia brevifolia*, WAM (13856); ♂, Wamenusking, WAM (13761); 2♂, 2♀, 15 km N Westonia (31.1981°S 118.7586°E), 19 Sep. 2004, M. Batley, ex *Gastrolobium* sp., AM (K.316509–12); ♂, 23 km E Yellowdine, 10 Oct. 1981, I. D. Naumann & J. C. Cardale, ANIC.

Diagnosis

Length male c. 12 mm, female c. 14 mm; eyes hairy; metasomal bands broad silver. Male hind tibia and basitarsus broad, flat; metasoma with prominent stiff, black setae. Female pygidial plate with deep, linear emargination, tarsal claws simple.

Descriptions

Male (K.316510).—*Head* width 4.25 mm, body length 11.9 mm. Relative dimensions: HW 50, HL 36, UID 33, UFW 33, LID 30, DMA 29, HVO 4, WOC 15, MOD 4, OOD 9, IAD 9, ASD 3, AOD 9, ML 18, BMW 7, MSL 2.5, SL 15, SW 4, FL c. 54.—*Eyes* hairy; face broad, inner orbits slightly convergent ventrally; length malar space c. 0.45× basal width mandible; middle flagellomeres c. 1.25× as long as wide; fore and mid basitarsi bowed transversely; mid basitarsus broad and laterally compressed; hind basitarsus flattened with slight transverse curvature and expanded posteriorly (ta2,3 less strongly expanded); hind tarsus 1.1× as long as tibia; hind basitarsus 2.4× as long as wide; basitibial region separated from surroundings by sharp edges; fore tibial calcar with short apical spine but without teeth. Penis valves short (Fig. 32); S7 unlike any other species, lateral lobes rounded and bulbous (Fig. 55).—*Labrum*, mandible basally, apical half of clypeus milky or yellow-brown; basal 10% scape

orange-brown; femora, tibiae and tarsi orange-brown with dark suffusions on femora; anterior face fore basitarsus with cream marking; ventral surface flagellum brown. T1–3 with broad silver-white bands, remaining terga with similar bands becoming increasingly translucent from T4 to T6.—*Scutum* strongly reticulate.—*Face* with dense, long, erect, plumose, orange hair. Scutum with open, long, plumose, dull orange hair; fore basitarsus without plume; margins of hind tibia and tarsi with conspicuous fringes of open, long, white hair; T3–7 with scattered, erect, long black setae, denser on T6,7.

Female (AM K.316509), not previously described.—*Head* width 4.6 mm, body length 13.9 mm. Relative dimensions: HW 50, HL 36, UID 31, UFW 32, LID 31, DMA 29, HVO 3, WOC 14, MOD 4, OOD 8, IAD 8, ASD 3, AOD 9, ML 19, BMW 6, MSL 2, SL 16, SW 3, FL c. 30.—*Eyes* hairy; face broad, inner orbits parallel; length malar space c. 0.35× basal width mandible; clypeus convex, sagittally flattened; supraclypeal area prominent; middle flagellomeres c. 1.3× as long as wide; inner hind tibial spur with c. 11 teeth; basitibial area relatively small, well-defined except apically; tarsal claws simple; fore tibial calcar with 0 to 2 teeth; pygidial plate with long, linear emargination.—*Labrum*, mandible medially, tibiae, tarsi, anterior surface of fore femur and distal ends of mid and hind femora, orange-brown; apical half clypeus dark brown. T1–4 with white apical bands.—*Clypeus* very weakly reticulate with medium to large punctures, dense medially, sparse laterally; extreme lateral margins densely and finely punctate; supraclypeal area impunctate medially, margins densely punctate.—Paraocular areas and frons with long, plumose pale orange-brown hair, white in lower paraocular areas; scutum with open, plumose, brown-tipped, pale orange hair; prepygidial fimbria dark brown.

Remarks. The female has not previously been described. This species is referred to as F257/M218 in Houston (2000).

Distribution. Southwestern Western Australia (AW, COO, ESP, GS, JF, MAL) (Fig. 91).

Trichocolletes dundasensis n.sp.

Fig. 92

Type. Holotype ♀, 5.5–6.5 km SW McDermid Rock, Western Australia (32.02°S 120.73°E), 27 Sep. to 3 Oct. 1978, T. F. Houston, on flowers of *Daviesia aphylla*, in WAM 13608.

Specimens examined. The holotype and the following. **Western Australia:** 2♀, same data as holotype, WAM (13611,12); ♀, Kanowna, 21 Aug. 1974, A. M. & M. J. Douglas, on *Mesembrion*, WAM (13892); ♀, 16 km S Norseman (32.3403°S 121.7575°E), 7 Oct. 2009, M. Batley, ex *Daviesia benthamii*, AM (K.344672); ♀, North Tarin Rock Reserve (32.98°S 118.23°E), 16–18 Oct. 1985, T. F. Houston, on flowers of *Gastrolobium* sp., WAM (13899); ♀, Torndirrup (35.10°S 117.92°E), 25 May–1 Nov. 1983, P. H. Dyer & J. Lyon, WAM (13980); 2♀, Tutanning Reserve 18–25 km E Pingelly, 30 Oct.–3 Nov. 1980, T. F. Houston, on flowers of *Daviesia brevifolia*, WAM (13897–98).

Diagnosis

Female (male unknown) eyes hairy; clypeus flattened; metasomal bands narrow, silver; supraclypeal area broad; lateral epistomal suture straight.

Description

Female (holotype).—*Head* width 4.20 mm, body length 12.1 mm. HW 50, HL 36, UID 29, UFW 32, LID 31, DMA 31, HVO 5, WOC 13, MOD 3, OOD 8, IAD 8, ASD 4, AOD 9, ML 19, BMW 7, MSL 2.0, SL 14, SW 3, FL c. 33.—*Eyes* hairy; face wider than long; length malar space c. 0.25× basal mandibular width; clypeus protuberant, sagittally flattened or slightly depressed; basal suture shallow V-shape; basal width clypeus >2× length subantennal suture; supraclypeal area viewed laterally at distinct angle to base clypeus; epistomal suture between base of clypeus and base of mandible straight; distance from anterior tentorial pit to base of mandible 2× distance from pit to base clypeus; frontal carina ends in small tubercle on supraclypeal area; middle flagellomeres c. 1.2× as long as wide; inner hind tibial spur with c. 7 teeth; tarsal claws simple; pygidial plate entire, flat medially.—*Labrum*, rim of clypeus, distal ends of femora and anterior surface of fore tibia orange-brown. T1–4 with narrow silver bands.—*Clypeus* weakly reticulate with large punctures, dense medially, close laterally; scutum with dull sheen, strongly pit-reticulate with close, small punctures.—*Face* with pale orange-brown hair, darker near ocelli, sparse on clypeus and supraclypeal area, dense elsewhere. Scutum with close, plumose, orange-brown hair with dark tips; prepygidial fimbria dark brown or black.

Remarks. Similar to *T. capillosus* n.sp. from which it differs by the width of the supraclypeal area and to *T. leucogenys* n.sp. (see below).

Etymology. The specific name is a Latin adjective meaning from Dundas, an abandoned gold-mining town near one of the collection sites.

Distribution. Southwestern Australia (AW, COO, MAL, MUR) (Fig. 92).

Trichocolletes eremophilae Houston

Fig. 93

Trichocolletes (Trichocolletes) eremophilae Houston, 1990, p. 615.

Diagnosis

Eyes not hairy; proboscis relatively elongate, prementum length at least 3.5× eye width viewed laterally. Gena of female produced posterioventrally; lower clypeus sparsely punctate and shining; facial hair brown, simple; mid-tibial spur strongly curved and serrate medially; prepygidial fimbria black. Hair on clypeus of male erect, appearing cropped; T7 wholly yellow-brown; fore basitarsus unmodified; fore calcar with c. 3 teeth.

Remarks. Exhibits a preference for flowers of *Eremophila*. Detailed descriptions are given by Houston (1990).

Distribution. South Western Australia between Geraldton, Meekatharra and Kalgoorlie (GS, MUR, YAL) (Fig. 93).

Trichocolletes erythrurus (Cockerell)

Figs 56, 94

Paracolletes erythrurus Cockerell, 1914a, p. 5.*Trichocolletes (Trichocolletes) erythrurus*.—Michener, 1965, p. 79.

Specimens examined. The holotype ♀, in BMNH (Hym 17.a.456) and the following. **Western Australia:** ♀, 91 km NE Albany (34.4781°S 118.6283°E), 23 Oct. 2009, M. Batley, AM (K.316520); ♀, 5–8 km ENE Augusta, 27 Oct. 1982, C. A. Howard & T. F. Houston, on flowers of *Viminaria*, WAM (13957); ♂, Bannister, WAM (13962); ♀, Beekeepers Reserve Eneabba-Leeman-Jurien area, M. Lyons, WAM (13924); 2♂, Bickley, Perth, 24 Sep. 1985, R. Peakall, on flowers of *Kennedia concinna*, WAM (13946–47); ♀, N Broke Inlet, 26 Oct. 1982, C. A. Howard & T. F. Houston, on flowers of *Viminaria*, WAM (13958); ♀, Brookton Hwy Darling Range E of Karragullen, 17 Sep. 1978, T. F. Houston, on flowers of *Kennedia concinna*, WAM (13954); ♀, 1 km NE Bullsbrook East, 11 Oct. 1980, C. A. Howard & T. F. Houston, on flowers of *Gastrolobium*, WAM (13925); ♂, 9♀, Calgardup, WAM (13938–45, 63–64); ♀, Cannington, 16 Oct. 1954, R. P. McMillan, WAM (13961); 7♂, ♀, Deanmill, 5 Oct. 1982, R. P. McMillan, WAM (13930–37); ♂, Denmark, Oct., L. J. Newman, WAA (80824); ♀, Dryandra, 2 Nov. 1992, M. R. Williams, WAM (13917); ♂, 5♀, Dryandra State Forest 27 km NW Narrogin, 10 Dec. 1991, T. F. Houston, on flowers of *Gastrolobium parviflorum* & *Bossaia*, WAM (13911–16); 2♂, Gooseberry Hill 19 km E Perth, 28 Aug. 1993, T. F. Houston, patrolling flowers of *Daviesia*, WAM (13921–22); 3♂, 3♀, Gooseberry Hill (31.9528°S 116.0486°E), 16 Sep. 2003 & 24 Sep. 2004, M. Batley, ex *Chorizema dicksonii*, *Kennedia coccinea* & *Hardenbergia comptoniana*, AM (K.316514–19); 11♂, 3♀, Kalgan-Manypeaks NE Albany, 18 Oct. 1974, C. A. & T. F. Houston, on flowers of *Chorizema*, SAM (32-024546–59); ♀, King George Sound, AM (K.48370); 3♂, 2♀, Koondoola Cons. Area 12 km N Perth, 22 Sep. 2000, T. F. Houston, on flowers of *Gompholobium confertum*, WAM (27801–05); ♂, 4♀, Margaret R., WAM (13950-52,65–66); 2♀, 7.5 km SW Margaret River, 18 Nov. 1986, T. F. Houston, on flowers of *Viminaria*, WAM (13948–49); ♀, Meelup Beach road 27 km W Busselton, 25 Oct. 1992, T. F. Houston, on flowers of book-leaf poison, WAM (13923); ♂, Murdoch 13 km S Perth, 13 Oct. 1980, T. F. Houston, on flowers of *Daviesia polyphylla*, WAM (13926); ♂, 17.3 km S Mogumber, 11 Sep. 1988, R. P. McMillan, on flowers of *Gastrolobium bennettsianum*, WAM (13959); ♀, 14 km NW Narrogin (32.8761°S 117.0425°E), 9 Oct. 2009, M. Batley, ex *Gastrolobium* sp., AM (K.316521); ♂, 50mil N Ravensthorpe, 25 Aug. 1964, G. Lallfitz, WAM (13956); ♀, 63 km E Ravensthorpe (33.6753°S 120.6928°E), 8 Oct. 2009, M. Batley, AM; ♂, 5 km S Pemberton, 26 Sep. 1987, D. K. McAlpine, AM (K.316665); ♂, Point Heron Area, 2 Oct. 1977, A. M. & M. J. Douglas, WAM (13955); ♂, Porongurup, 11 Oct. 1925, K. A. Spenser, WAM (13960); 2♂, ♀, Stirling Range, 17 Oct. 1974, C. A. & T. F. Houston, on flowers of *Daviesia*, SAM (32-024544–45,67); ♂, 2♀, Stirling Ranges NP, SE Camel Lake, 2 Oct. 1995, J. Cane & L. Kervin, ex *Gastrolobium spinosum* & *Bossaia linophylla*, WAM (32097,99,101); ♂, Swan River, Sep., WAA (80834); ♀, Adjacent E side of Walyunga Nat. Park 35 km NE Perth, 9 Oct. 1978, T. F. Houston, on flowers of *Gastrolobium calycinum*, WAM (13953); ♂, 2♀, c. 10 km NE Wannamal RS, 10 Sep. 1983, C. A. & T. F. Houston, on flowers of *Gastrolobium*, WAM (13918–20); ♂, Williams, 21 Oct. 1991, S.R. Patterson, WAM (18464); ♂, Yallingup, nr Cape Naturaliste, 14 Sep.–31 Oct. 1913, R. E. Turner, BM.

Diagnosis

Length c. 12 mm; eyes not hairy; metasoma red-brown; metasomal bands absent or indistinct. Male hind legs unmodified; female with a polished, impunctate area below and laterad of antennal sockets.

Descriptions

Male (K.316519).—**Head** width 3.9 mm, body length 11.9 mm. Relative dimensions: HW 50, HL 36, UID 33, UFW 33, LID 30, DMA 29, HVO 4, WOC 15, MOD 4, OOD 9, IAD 9, ASD 3, AOD 9, ML 18, BMW 7, MSL 2.5, SL 15, SW 4, FL c. 54.—**Eyes** not hairy; face broad, inner orbits ventrally divergent; malar space c. 0.45× basal width mandible; middle flagellomeres c. 1.6× as long as wide, weakly crenulate. Legs slender; hind tarsus 1.1× as long as hind tibia; hind

basitarsus 6.0× as long as wide; basitibial area indistinct. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with narrow, triangular lateral lobes fused with basal teeth, posterior projections and ligulate processes long and thin (Fig. 56).—**Integument** of head and mesosoma black except labrum, mandible basally, white or milky amber; apical half clypeus pale amber; scape, tibiae, tarsi and distal ends of femora, orange-brown; flagellum ventrally and large patch on posterior half of mid tibia, brown. Metasoma orange-brown with irregular dark brown markings on lateral margins all terga, glandular area on lateral margins T2, black.—**Scutum** dull with strong pit-reticulation obscuring punctures.—**Face** with dense, long, finely-branched, orange hair, stiffly erect on clypeus. Scutum with open, long, finely-branched, orange hair; fore basitarsus with short brush; trochanters with long, white hair; T1,2 with sparse, long, pale orange hair; T3–7 with a mixture of adpressed and semi-erect dark brown hair.

Female (AM K.316518).—**Head** width 4.5 mm, body length 12.2 mm. Relative dimensions: HW 50, HL 36, UID 31, UFW 32, LID 31, DMA 29, HVO 3, WOC 14, MOD 4, OOD 8, IAD 8, ASD 3, AOD 9, ML 19, BMW 6, MSL 2, SL 16, SW 3, FL c. 30.—**Eyes** not hairy; face broad, inner orbits slightly divergent ventrally; length malar space c. 0.2× basal width mandible; clypeus uniformly convex; supraclypeal area convex, protruberant; middle flagellomeres c. 1.1× as long as wide; inner hind tibial spur with c. 9 teeth; tarsal claws simple; pygidial plate entire, medial longitudinal elevation narrow.—**Integument** of head and mesosoma black except labrum, ventral rim of clypeus, mandible medially, tarsi, tibiae and apices of femora, orange-brown; tibiae with areas of brown posteriorly. Metasoma orange-brown, occasionally with darker suffusions; glandular area on lateral margin T2 black or dark brown.—**Clypeus** basally weakly reticulate with close, large punctures, apically sparsely punctured, polished; supraclypeal area with contiguous punctures coalescing to form irregular grooves; paraocular area densely punctate except impunctate and polished below and laterad of antennal socket. Scutum dull with strong pit-reticulation.—**Face** with off-white hair, brown-tipped near ocelli, dense in paraocular areas and on frons, sparse on clypeus. Scutum with close, short, plumose, pale brown hair; hind tibial scopa pale brown; T2–5 openly covered with simple, short, adpressed, dark brown hair; prepygidial fimbria pale brown.

Remarks. This species is referred to as F261/M232 in Houston (2000).

Distribution. Southwestern Australia (AW, ESP, JF, MAL, WAR, SWA) (Fig. 94).

Trichocolletes fuscus n.sp.

Figs 57–58, 95

Type. Holotype ♂, Munghorn Gap NR, New South Wales (32.4247°S 149.8353°E), 10 Sep. 2005, M. Batley, ex *Leucopogon lanceolatus*, in AM K.278551.

Specimens examined. The holotype and the following. **New South Wales:** ♂, same data as holotype; 2♂, Conimbla NP (33.7972°S 148.4442°E), 30 Sep. 2005, M. Batley, ex *Leucopogon ericoides*, AM (K.344696–97); 2♂, ♀, 45 km NE Hillston (33.1906°S 145.8672°E), 19 Sep. 2005, M. Batley, ex *Templetonia aculeata*, AM (K.344692–94); 19♂, 7♀, 27 km S Mount

Hope (32.9936°S 145.9006°E), 19 Sep. 2005, 3 Sep. 2007 & 1 Sep. 2009, M. Batley, ex *Eutaxia microphylla*, AM (K.344678–91, K.344698–705, K.344709–11); ♂, Mount Wilson (33.5417°S 150.3414°E), 24 Sep. 2002, M. Batley, ex *Daviesia ulicifolia*, AM (K.344674); ♂, Pilliga NR (30.7442°S 149.5131°E), 18 Sep. 2000, M. Batley, ex *Pultenaea microphylla*, AM (K.344673); 2♂, Turramurra (33.6864°S 151.1600°E), 28–29 Aug. 2005, M. Batley, ex *Dillwynia retorta*, AM (K.344675–76).

Diagnosis

Length 10–11 mm; eyes hairy; metasomal bands moderately narrow, gold. Male fore basitarsus with plume; S7 with subtriangular lateral lobes (Figs 57–58). Female basal margin of the clypeus V-shaped; inner hind tibial spur with c. 7 teeth; pygidial plate with weak medial elevation.

Variation

S7 of males varies in shape with the degree of emargination between the anterior edge of the lateral lobe and the basal tooth ranging from no emargination to strong emargination (Figs 57–58). A population from one collection site, yielded specimens covering half the total range of variation. No correlation between the shape of S7 and geographic location was found.

Descriptions

Male (holotype).—*Head* width 3.90 mm, body length 10.8 mm. Relative dimensions: HW 50, HL 37, UID 30, UFW 32, LID 31, DMA 30, HVO 4, WOC 14, MOD 3, OOD 9, IAD 9, ASD 4, AOD 9, ML 19, BMW 7, MSL 2.5, SL 13, SW 3, FL c. 50.—*Eyes* hairy; face wider than long, inner orbits parallel; malar space c. 0.35× basal mandibular width; length flagellum equal to head width, middle flagellomeres c. 1.4× as long as wide. Legs slender; length fore basitarsus 0.25× head width; hind tarsus as long as hind tibia; hind basitarsus 4.3× as long as wide; basitibial area with weak posterior carina almost reaching apex. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with short posterior processes, triangular lateral lobes either fused with basal teeth or separated from them by a small emargination (Figs 57–58).—*Labrum*, mandible medially, scape, hind tibia, anterior faces fore and mid tibiae orange-brown. T1–5 with narrow, gold bands; T7 dull orange-brown.—*Clypeus* densely punctate except apical 20% impunctate and polished; scutum dull with strong pit-reticulation and barely visible, open punctation.—*Face* with dense, long, finely-branched, bright orange hair. Scutum with open, plumose bright orange hair; fore basitarsus with tapered orange plume; trochanters with abundant long, pale hair.

Female (AM K.334688).—*Head* width 4.00 mm, body length 10.4 mm. Relative dimensions: HW 50, HL 37, UID 30, UFW 32, LID 31, DMA 31, HVO 3, WOC 14, MOD 3, OOD 8, IAD 8, ASD 4, AOD 9, ML 22, BMW 7, MSL 1.5, SL 15, SW 3, FL c. 33.—*Eyes* hairy; face broad; inner orbits parallel; malar space moderately short (length c. 0.15× basal mandibular width); clypeus gently convex, at most slightly flattened basally, basal suture shallow V-shaped; flagellum moderately short, middle flagellomeres c. 1.3× as long as wide; inner hind tibial spur with c. 7 teeth; tarsal claws simple; pygidial plate emarginate, with weak but strongly sculptured medial elevation.—*Labrum*, mandible medially, tarsi, hind tibia, front surface of fore and mid tibiae, distal ends of femora orange brown; remainder of legs dark brown. T1–4 with moderately narrow gold bands.—*Clypeus* closely to densely punctate, dulled basally with pit-reticulation; supraclypeal

area with dense punctures coalescing to form irregular longitudinal grooves; scutum with dull sheen, moderately strong reticulation with small, close punctures.—*Face* with long, plumose, pale orange hair becoming darker near ocelli, dense in paraocular areas and on frons, open on clypeus and supraclypeal area. Scutum with close, moderately short, plumose, orange hair; prepygidial fimbria honey-brown.

Remarks. Similar to *T. aeratus* n.sp., but darker, with narrower, bronze metasomal bands and sparser scutal hair. Males may be distinguished from *T. aeratus* n.sp. by presence of fore basitarsal plume and the shape of S7, while females differ in the V-shaped basal margin of clypeus (smoothly concave in *T. aeratus* n.sp.) and the smaller number of teeth on the inner hind tibial spur.

Etymology. The specific epithet is a Latin adjective meaning dusky.

Distribution. Central New South Wales from coast to western plains (BBS, MDD, NSS, SB) (Fig. 95).

Trichocolletes gelasinus n.sp.

Figs 14–15, 33, 59, 96

Type. Holotype ♂, Neerabup National Park, 38 km NNW Perth, Western Australia (31.74°S 115.77°E), 13 Aug. 2000, T. F. Houston, on flowers of *Hardenbergia comptoniana*, in WAM 27809.

Specimens examined. The holotype and the following. **Western Australia:** 4♂, same data as holotype; ♀, Barracca Nature Reserve, 8 km NE Muchea, 23 Jul. 1999, T. F. Houston, on flowers of *Daviesia physodes*, WAM (27180); ♀, Beechboro, 3 Sep. 1969, R. J. Lawrence, WAA (80848); ♂, ♀, Beekeepers Reserve Eneabba-Leeman-Jurien area, 18–19 Jul. 1987, M. Lyons, WAM (13638–39); 3♂, Boranup, 11 Sep. 1965, G. H. Riley, WAM (13812–14); ♂, Busselton, 4 Sep. 1943, O. Dawson, ANIC; 19♂, 8♀, Cottesloe, WAM (13715–16, 19–20, 22–46); ♀, Drummond Cove, 6 Mar. 1973, N. McFarland, WAA (45288); 4♂, 3♀, 13 mi. N Geraldton, 19 Oct. 1971, T. F. Houston, SAM (32-024634–40); 3♀, 13 km S Grass Patch, 17 Oct. 1974, I. D. Naumann & J. C. Cardale, ANIC; 2♀, 25 km 15°W of N Eneabba, 28 Aug. 1999, T. F. Houston, WAM (27518–19); ♀, 31 km 9° W of N Eneabba, 28 Aug. 1999, T. F. Houston, WAM (27532); 4♀, Watheroo NP, 3–5 Oct. 1980, T. F. Houston, on flowers of *Daviesia divaricata*, WAM (13837, 39–41); ♂, 18 km NW Eneabba, 9–12 Sep. 1987, T. F. Houston, on flowers of *Daviesia*, WAM (13640); 2♀, c. 5 km W Eurardy HS, 24 Aug. 1999, T. F. Houston, WAM (27506–07); 5♀, 5 km 23°N of W Eurardy HS, 27 Aug. 1999, T. F. Houston, WAM (27500–04); 5♀, ♂, Kings Park, Western Australia, 10 Oct. 1988, T. F. Houston, WAM (18456–61); ♂, Knights Track Beekeepers Reserve Eneabba-Leeman-Jurien area, 2 Jul. 1987, M. Lyons, on flowers of *Daviesia quadrilatera*, WAM (13637); 2♂, Margt R. Dist., Aug. & Oct. 1912, WAM (13795) & ANIC; 4♀, Stirling Range, 17 Oct. 1974, C. A. & T. F. Houston, SAM (32-024641–44); 3♀, Swanbourne, WAM (13782–84); ♀, Swan River, Sep., L. J. Newman, WAA (80828); 6♂, Swan River, Jul., D. Swan, WAA (45274–6, 79–81); ♂, Tathra NP, 26 Jul. 1995, R. P. McMillan, WAM (21022); 3♂, Yanchep-Lancelin Rd 10 km ESE Guilderton, 26 Aug. 1982, T. F. Houston, on flowers of *Daviesia divaricata*, WAM (13634–36).

Diagnosis

Length 13–14 mm; eyes not hairy; metasomal bands broad, white. Male flagellum distinctively modified (Fig. 14); female labrum elongated, tectiform (Fig. 15); malar space short.

Descriptions

Male (holotype).—*Head* width 4.35 mm, body length 13.1 mm. Relative dimensions: HW 50, HL 36, UID 30, UFW 32, LID 30, DMA 28, HVO 4, WOC 14, MOD 4, OOD 9, IAD 9, ASD 3, AOD 8, ML 21, BMW 6, MSL 1.5, SL 11, SW 3, FL c. 54.—*Eyes* not hairy; face wide, inner orbits subparallel; length malar area c. 0.25× basal mandibular width; flagellum longer than head width; distal flagellomere expanded, truncate with apical concavity (Fig. 14); middle flagellomeres crenulate, 1.7× as long as wide. Legs slender; hind tarsus as long as hind tibia; hind basitarsus 4.3× as long as wide; posterior carina of basitibial area almost reaching apex; malus of fore tibial calcar truncate and deflexed forming margin of velum. Apex of gonoforceps transversely rather than obliquely truncate (Fig. 33); S7 with large rectangular opening to cavity in the rectangular lateral lobes (Fig. 59).—*Labrum*, mandible, scape, tarsi, hind tibia, apices fore and mid tibiae orange-brown; flagellum and remainder of legs dark brown. T1–5 with broad white bands narrowly ferruginous across anterior margin; T7 red-brown.—*Scutum* dull with strong pit-reticulation.—*Face* with dense long, plumose, bright orange hair. Scutum with close to dense, long, plumose, orange hair; fore basitarsus with weak, pale gold plume; anterior margin of hind tibia with weak row of finely-branched white hair.

Female (WAM 18457).—*Head* width 4.50 mm, body length 14.0 mm. Relative dimensions: HW 50, HL 37, UID 30, UFW 32, LID 31, DMA 28, HVO 3, WOC 13, MOD 3, OOD 8, IAD 7, ASD 3, AOD 9, ML 21, BMW 6, MSL 1.0, SL 14, SW 3, FL c. 35.—Robust; eyes not hairy; face almost quadrate, inner orbits parallel; length malar space c. 0.15× basal mandibular width; clypeus transversely convex; supraclypeal area prominent; labrum long (length 0.75× width), somewhat tectiform but not carinate (Fig. 15); middle flagellomeres 1.1× as long as wide; apical flagellomere obliquely truncate; inner hind tibial spur with c. 11 strong teeth; fore tibial calcar with c. 4 fine teeth; tarsal claws with large, sharp inner ramus; pygidial plate broad, coarsely coriarius with low, broad medial elevation.—*Labrum*, mandible, tarsi and tibiae orange-brown; outer faces of fore and hind tibiae and basitarsi with dark brown suffusions; lower margin of clypeus dark brown. T1–4 with broad, white bands narrowly ferruginous across anterior margins; pygidial plate dull red basally, darker apically; wings darkened.—*Clypeus* pit-reticulate with dull sheen, closely punctate except along midline.—*Face* with long, plumose hair, pale ventrally becoming orange-brown towards ocelli, sparse on clypeus and supraclypeal area, dense in paraocular areas, apicolateral corners of clypeus and on frons. Scutum with close, short, plumose, dark-tipped orange-brown hair; prepygidial fimbria orange-brown.

Remarks. Smith (1853) incorrectly associated male and female specimens from different species in his original description of *Anthoglossa plumata*, as Michener (1965) implied. Mr David Notton (BMNH) kindly examined, described and photographed the male specimen described as *A. plumata* by Smith and confirmed that it matched the description given above. Accordingly, the female specimen BMNH Hym.17.a.394 is here formally designated as the lectotype of *Anthoglossa plumata*.

Trichocolletes gelasinus is referred to as F251/M226 (part) in Houston (2000).

Etymology. The specific name, used as a noun in apposition,

is from the Latin word for dimple and refers to the apex of the male flagellum.

Distribution. Coastal southwestern Australia (ESP, GS, MAL, SWA) (Fig. 96).

Trichocolletes grandis n.sp.

Figs 11, 60, 97

Type. Holotype ♂, 50 km SE Broken Hill, New South Wales (32.1831°S 141.9067°E), 8 Sep. 2007, M. Batley, *ex Swainsona viridis*, in AM K.278552.

Specimens examined. The holotype and the following. **New South Wales:** 5♀, same data as holotype, AM (K.344718–22); 5♀, 50 km E Broken Hill (31.8875°S 141.9592°E), 7 Sep. 2007, M. Batley, *ex Swainsona viridis*, AM (K.344714–17,28); 5♀, 18 km S Ivanhoe (33.0036°S 144.4433°E), 25 Sep. 2010, M. Batley, AM (K.344723–27); 2♀, Kinchega NP (32.4272°S 142.3497°E), 29 Sep. 2003, M. Batley, *ex Swainsona purpurea*, AM (K.344712–13). **South Australia:** 2♂, 4♀, 42 km E Coober Pedy on Oodnadatta Rd, late July 1991, B. Greenwood, ANIC.

Diagnosis

Length c. 13 mm; eyes hairy; metasomal bands silver; gena wide; vertex elevated; colour of metasoma variable. Labrum usually black in both sexes, but see comments on variation. Male gena with dense white hair.

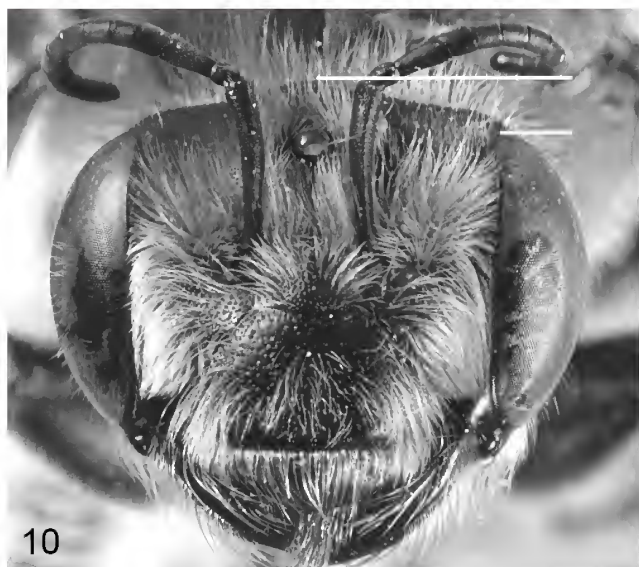
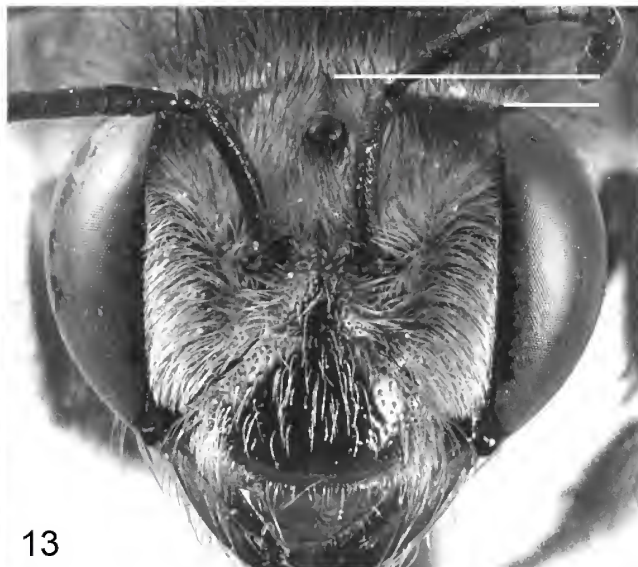
Variation

Specimens collected at Coober Pedy were strikingly different in colour from those collected elsewhere. Males differed primarily in the colour of the pubescence, but females exhibited altered integumental colour. The metasoma of females was mostly red, legs brown and labrum amber, instead of black. Coober Pedy females retained weak metasomal hair bands but the integumental colour bands on the terga were frequently indistinct. One specimen exhibited intermediate colouring, with large areas of dark brown on T1,2, integumental metasomal colour bands and darker legs. Both sexes from Coober Pedy had strongly orange-brown pubescence, but this may have been the result of mineral staining. In all other respects, including the elevated vertex, dense genal hair and intermediate length setae on the eyes, the specimens were identical to those from other locations.

The scapes of one male specimen were black, but all other males had orange scapes.

Descriptions

Male (holotype).—*Head* width 4.05 mm, body length 12.6 mm. Relative dimensions: HW 50, HL 41, UID 32, UFW 33, LID 32, DMA 33, HVO 4, WOC 14, MOD 3, OOD 9, IAD 9, ASD 3, AOD 8, ML 18, BMW 8, MSL 1.0, SL 14, SW 4, FL c. 44.—*Eyes* hairy, but length of setae about half that in other hairy-eyed species, face broad, inner orbits approximately parallel, malar area short (length c. 0.1× basal mandibular width), clypeus protuberant, vertex elevated, gena 0.7× as wide as eye viewed laterally, flagellum shorter than head width, middle flagellomeres c. 1.4× as long as wide. Legs slender, hind tarsus 1.1× as long as hind tibia, hind basitarsus 3.9× as long as wide, posterior carina of basitibial area reaches apex. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with slightly rounded, rectangular lateral lobes and large basal teeth (Fig. 60).—*Scape*, small area of mandible medially, tarsi, hind tibia, small areas on fore and

*T. maximus**T. grandis* n.sp.*T. venustus**T. nitens* n.sp.Figs 10–13. Faces of female *Trichocolletes* with elevated (10 and 11) or normal (12 and 13) vertex.

mid tibiae and flagellomeres F2–7 ventrally, orange-brown. T1–5 with moderately broad, silver bands.—*Clypeus* with dense, fine punctures except rim impunctate and polished, scutum dull with strong pit-reticulation and small, close to dense punctures.—*Face* with dense, long, pale orange hair, finely-branched on clypeus, becoming plumose towards vertex, gena with very dense, finely-branched white hair. Scutum closely covered with long, plumose, pale orange hair, fore basitarsus with pale gold plume, anterior margin of hind tibia with sparse fringe long, white hair, metasoma with scattered, erect, white hair in addition to the normal semi-adpressed hair matching the underlying integument.

Female (AM K.344714).—*Head* width 4.05 mm, body length 13.0 mm. Relative dimensions: HW 50, HL 40, UID 31, UFW 33, LID 33, DMA 34, HVO 5, WOC 14, MOD 3, OOD 9, IAD 9, ASD 3, AOD 10, ML 18, BMW 8, MSL 1.0, SL 15, SW 3, FL c. 33.—*Eyes* hairy, length of setae as for male, face broad, inner orbits approximately parallel, malar space short (length c. 0.1× basal mandibular width),

clypeus convex both longitudinally and transversely with small longitudinal depression medially, vertex elevated, gena 0.85× as wide as eye viewed laterally, middle flagellomeres as long as wide, inner hind tibial spur with c. 7 teeth, tarsal claws simple, pygidial plate broad, entire, without medial elevation.—*Mandible* medially red-brown. T1–4 with moderately broad, silver bands.—*Clypeus* reticulate with large, close to dense punctures, sculpture of scutum as for male.—*Face* with long, white, finely-branched hair, close to dense in paraocular areas and on frons, open on clypeus, gena with close to dense long, white, finely-branched hair. Scutum with close to dense moderately long, plumose, pale orange hair. T1–4 with weak but distinct apical hair bands covering the silver integumental bands, prepygidial fimbria pale brown, tibial scopa white, darker near basitibial area.

Etymology. The specific name is a Latin adjective referring to the relatively large size of this species.

Distribution. Arid areas of western New South Wales and South Australia (BHC, DRP, RIV, STP) (Fig. 97).



Figs 14–15. *Trichocolletes gelasinus* n.sp. (14) apex of male flagellum (15) clypeus and labrum of female.

Trichocolletes hackeri (Cockerell)

Figs 8, 61, 98

Anthoglossa hackeri Cockerell, 1913b, p. 373.

Trichocolletes (Trichocolletes) hackeri.—Michener, 1965, p. 79.

Specimens examined. The holotype ♀, Tambourine Mountain, Queensland, 27 Oct. 1912, H. Hacker, QM (Hy/4080) and the following. **New South Wales:** 4♂, Gibraltar Range NP, 16 Nov. 1979, N. W. Rodd, AM (K.316670–73); ♀, 3 km N Lansdowne, 15 Nov. 1985, G. Williams, ex *Acmena smithii*, AM (K.316696); 2♀, Macquarie Pass (34.5961°S 150.6714°E), 30 Oct. 2007, M. Batley, AM (K.316522–23); 2♂, Tooloom Scrub via Urbanville, 22 Oct. 1972, G. B. Monteith, UQIC; ♂, ♀, 8 km W Tyalgum, 23 Sep. 1983, N. W. Rodd, AM (K.316680–81). **Queensland:** ♀, Beechmont, 5 Oct. 1984, N. W. Rodd, AM (K.316682); ♀, Bunya Mtns, 24 Oct. 1958, S. Sekhon, UQIC; ♀, Bunya Mtns, 24 Oct. 1958, C. D. Michener, UQIC; ♂, 2♀, Bunya Mtns, 29 Nov. 1967, T. F. Houston, WAM (8993–95); 4♀, Bunya Mtns, 29 Nov. 1967, T. F. Houston, SAM (32-024477,79,80,82); ♂, Mt Glorious, 8 Oct. 1966, J. C. Cardale, UQIC; 2♂, Mt Lindesay, 15 Nov. 1967, T. F. Houston, SAM (32-024478,81); ♂, Mt Lindesay, 15 Nov. 1967, T. F. Houston, UQIC; ♂, Mt Lindesay, 15 Nov. 1967, T. F. Houston, WAM (8996); ♂, ♀, Natl Pk, Dec. 1921, H. Hacker, ANIC; 11♂, Natl Pk, Dec. 1921, H. Hacker, QM; 2♂, 4♀, 18 km S Ravenshoe, 9 Sep. 1983, N. W. Rodd, AM (K.316674–79); 12♂, ♀, 18 km S Ravenshoe, 16 Oct. 1984, N. W. Rodd, AM (K.316683–95); 5♂, 4♀, Tamborine Mountain, 24, 27 Oct. 1912, H. Hacker, *Parsonia velutina*, QM.

Diagnosis

Eyes not hairy; colouring unlike any other species, metasoma dull black with bright, metallic gold metasomal bands. Labial palpus of both sexes very short and flattened. Male flagellum strongly crenulate; hind legs long and slender. Female tarsal claws cleft, scutal pubescence dark grey or grey-brown.

Descriptions

Male (AM K.316672).—*Head* width 3.9 mm, body length 12.0 mm. Relative dimensions: HW 50, HL 36, UID 28.5, UFW 31, LID 30, DMA 30, HVO 4, WOC 12, MOD 4, OOD 9, IAD 9, ASD 3, AOD 7, ML 21, BMW 7, MSL 1, SL 13, SW 5, FL c. 70.—*Eyes* not hairy; face narrow, longer than wide, inner orbits approximately parallel; length malar space c. 0.2× basal width mandible; scape stout, barely reaching medial ocellus (width 0.35× length); flagellum long, crenulate (Fig. 8). Legs long, slender; hind tarsus 1.46× as long as hind tibia; basitarsus 9.1× as long as wide, slightly

bowed at proximal end; fore basitarsus short, length 0.3× head width; posterior margin of hind basitibial area with carina not reaching apex. Genital capsule generally similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with very long posterior projections, small lateral lobes and rounded basal teeth (Fig. 61).—*Labrum*, ventral rim of clypeus, mandible medially translucent amber; tibiae, tarsi, anterior face of fore femur, distal ends mid and hind femora orange-brown; flagellum and remainder of legs dark brown. T1–5 with brilliant, metallic gold bands, narrow on T1, wide on T2–5; T7 red-brown.—*Scutum* dull with close, fine punctures.—*Face* with dense, plumose, pale orange hair, stiffly erect on clypeus, frons with longer, golden-orange hair. Scutum closely covered with long, plumose, orange hair; fore basitarsus with fringe of moderate length orange hair.

Female (AM K.316522).—*Head* width 4.20 mm, body length 13.0 mm. Relative dimensions: HW 50, HL 37, UID 28, UFW 32, LID 32, DMA 32, HVO 4, WOC 12, MOD 3, OOD 8, IAD 9, ASD 3, AOD 10, ML 22, BMW 7, MSL 0.8, SL 16, SW 3, FL c. 36.—*Eyes* not hairy; face approximately quadrate, inner orbits parallel; malar space short (length c. 0.1× basal mandibular width); clypeus gently convex; labrum uniformly convex except for slight medial depression; flagellum moderately short; middle flagellomeres 1.25× as long as wide; inner hind tibial spur with c. 6 widely spaced teeth; basitibial area without distinct margins, not elevated above surroundings; tarsal claws cleft; pygidial plate weakly emarginate.—*Labrum*, mandible medially, flagellum ventrally and most of legs dark brown. T1–4 with wide, bright metallic gold bands.—*Clypeus* dull with pit-reticulation on basal half, densely punctate becoming open apicolaterally, supraclypeal area with dense small punctures, scutum dull, pit-reticulate with close, fine punctures.—*Face* with long, plumose, white hair becoming golden brown near ocelli, dense in paraocular areas and on frons, open on clypeus and supraclypeal area. Scutum openly covered with long, plumose, dark grey hair; mesepisternum, propodeum laterally and T1 with dull white hair.

Distribution. Rainforest areas of eastern Australia (NNC, SB, SEQ) (Fig. 98).

Trichocolletes lacaris n.sp.

Figs 27, 62, 99

Type. Holotype ♂, Lake Callabonna, South Australia, 1 Aug. 1969, H. Mincham, in SAM 32-024564.

Specimens examined. The holotype and the following. **South Australia:** ♀, data as for holotype, SAM (32-024565); 3♂, Lake Palankarinna, 28–31 Jul. 1984, D. Lacin, SAM (32-024560–62); ♀, NE edge Lake Puntawolona Tirari Desert, 21 Aug. 1971, M. Archer, WAM (13798); ♂, Tirari Desert Lake Ngapakaldi, eastern shore, 6 Aug. 1984, D. Lacin, SAM (32-024563). **Western Australia:** ♂, 7♀, 7 mi E Carnarvon, 21 Aug. 1971, T. F. Houston, on *Swainsona occidentalis*, SAM (32-024671–78); ♀, off Kendrew Island (20.5889°S 116.5639°E), 26 Jul. 1999, S. M. Slack-Smith & M. Hewitt, at sea, WAM (27144).

Diagnosis

Length c. 12–13 mm; eyes hairy; metasomal bands wide, silver, ferruginous across anterior margins; legs black. Male S7 with broad, rounded lateral lobes and short posterior projections (Fig. 62). Female hind tarsal claw without an inner ramus.

Variation

Specimens from Western Australia had noticeably darker pubescence than those from South Australia, but were otherwise indistinguishable. The solitary male from Western Australia was smaller (length 10 mm) and had fore and hind basitarsi that were shorter and hence stouter by c. 25% than males from South Australia, but otherwise differed only in colour. As leg shape may vary allometrically and colour variation might be environmentally induced (Rayment, 1929), the species was not divided based on a small number of available specimens.

Descriptions

Male (holotype).—*Head* width 4.50 mm, body length 12.8 mm. Relative dimensions: HW 50, HL 33, UID 33, UFW 34, LID 31, DMA 31, HVO 5, WOC 14, MOD 4, OOD 10, IAD 9, ASD 3, AOD 9, ML 21, BMW 6, MSL 1.0, SL 14, SW 3, FL c. 44.—*Eyes* hairy; face almost quadrate; length malar space c.0.2× basal mandibular width; length flagellum less than head width, middle flagellomeres c. 1.5× as long as wide. Legs slender; fore basitarsus thickened strongly near calcar; hind tarsus 1.1× as long as hind tibia; hind basitarsus 4.9× as long as wide; hind basitibial area with strong posterior carina extending well past apex. In the specimen from Carnarvon, the carina is complete and the basitibial area distinctly elevated above the surrounding area (Fig. 27). Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with broad, rounded lateral lobes and short posterior projections (Fig. 62).—Distitarsi and flagellum (partly or wholly) ventrally orange-brown; labrum, mandible and remainder of tarsi dark brown. T1–5 with broad, silver bands, ferruginous across anterior margins.—*Scutum* pit-reticulate with dull sheen and close, small punctures.—*Face* with dense, long, erect, finely-branched, pale orange hair. Scutum closely covered with long, finely-branched, pale orange hair; fore basitarsus with long white plume; mid trochanter and hind femur with very long, white, plumose hair.

Female (SAM 32-024565).—*Head* width 4.60 mm, body length 13.9 mm. Relative dimensions: HW 50, HL 35, UID 31, UFW 34, LID 32, DMA 32, HVO 5, WOC 14, MOD 4, OOD 9, IAD 8, ASD 3, AOD 10, ML 24, BMW 7, MSL 1.0, SL 15,

SW 3, FL c. 33.—*Eyes* hairy; face broad, inner orbits parallel; length malar space c. 0.2× basal mandibular width; clypeus gently convex transversely; middle flagellomeres c. 1.4× as long as wide; inner hind tibial spur with c. 8 long teeth; tarsal claws simple; pygidial plate entire with flat or slightly upturned margin.—Integument black, except distitarsi orange-brown, legs occasionally, mandible, labrum apically and pygidial plate dark brown. T1–4 with wide silver bands, ferruginous across anterior margin.—*Clypeus* weakly reticulate, closely to densely punctate; scutum dull with moderately strong pit-reticulation and close to dense, small punctures.—*Face* with long, plumose, white hair, open or close on clypeus and supraclypeal area, dense in paraocular areas and on frons; vertex with long, plumose, cream or pale brown hair. Scutum and scutellum with plumose, cream or pale brown hair of moderate length; prepygidial fimbria white or very pale brown.

Remarks. Similar to *T. brunilabrum* n.sp., from which males may be distinguished by the shape of S7 and females by the absence of an inner ramus on the hind tarsal claw and the larger size. This species also resembles *T. micans* n.sp. and *T. tuberatus* n.sp. (see below).

Etymology. The specific name is a Latin adjective meaning of a lake referring to several of the collection sites.

Distribution. Arid regions of South Australia and coastal Western Australia north of Shark Bay (CAR, FLB, PIL, SSD) (Fig. 99).

Trichocolletes latifrons (Cockerell)

Figs 34, 63, 100

Paracolletes latifrons Cockerell, 1914b, p. 41.

Trichocolletes (Trichocolletes) latifrons.—Michener, 1965, p. 80.

Specimens examined. The holotype ♀, Coolangatta, Queensland, BMNH (Hym 17.a.486) and the following. **New South Wales:** ♂, Wooloweyah (29.5172°S 153.3678°E), 28 Aug. 2007, M. Batley, ex *Gompholobium virgatum*, AM (K.316502); 3♀, Yamba, 29 Aug. 1992, N. W. Rodd, AM (K.316697–99). **Queensland:** ♂, 5♀, Burleigh, 25 Sep. 1958 and 3–15 Sep. 1965, A. N. Burns, MV (16550–55); ♀, Coolangatta, 11 Sep. 1913, QM (HY/2393).

Diagnosis

Length 12–13 mm; eyes not hairy; metasomal bands indistinct; clypeus short. Male clypeal hair relatively short, stiffly erect; mid basitarsus unmodified; ventral surface of hind femur with hair. Female tarsal claws with inner rami; T2–4 with white hair.

Descriptions

Male (AM K.316502), not previously described.—*Head* width 4.0 mm, body length 12.0 mm. Relative dimensions: HW 50, HL 36, UID 29, UFW 30, LID 32, DMA 30, HVO 3, WOC 12, MOD 4, OOD 9, IAD 9, ASD 4, AOD 7, ML 20, BMW 6, MSL 3, SL 12, SW 5, FL c. 55.—*Eyes* not hairy; face broad, inner orbits strongly divergent ventrally; length malar space c. 0.6× basal width mandible; clypeus short (length 0.35× width); scape mildly swollen (width 0.42× length); flagellum long, middle flagellomeres c. 1.7×

as long as wide. Legs slender; distitarsi moderately broad; mid basitarsus short, broad, 2.9× as long as wide; hind tarsus 1.30× as long as hind tibia; hind basitarsus 5.6× as long as wide; posterior carina of basitibial area almost reaching apex. Gonoforceps broad apically with sparse hair (Fig. 34); S7 with very wide rectangular lateral lobes and small posterior projections (Fig. 63).—*Labrum* and ventral rim of clypeus, scape, mandible medially, tibiae, tarsi and distal ends of femora, orange-brown, with darker suffusions on posterior faces of femora, fore and mid basitarsi; flagellum ventrally, dark brown (with some orange-brown suffusions). T2–5 with indistinct golden brown bands, sterna black.—*Scutum* dull with weak pit-reticulation.—*Face* with dense, plumose, bright orange hair, stiffly erect on clypeus and supraclypeal area, longer and dorsally directed on frons, basal margin of clypeus bare. Scutum closely covered with long, finely-branched, orange hair; fore basitarsus with weak plume; mid and hind trochanters with dense plumes of white hair; hind basitarsus with fringe of sparse, sinuous, white hair on anterior margin. T1,2 with sparse cover of long, finely-branched, golden hair; T3–6 with relatively long, semi-adpressed hair matching underlying integument, but with golden reflections.

Female (AM K.316697).—*Head* width 4.35 mm, body length 12.9 mm. Relative dimensions: HW 50, HL 36, UID 27, UFW 31, LID 32, DMA 32, HVO 3, WOC 7, MOD 4, OOD 8, IAD 8, ASD 3, AOD 9, ML 21, BMW 8, MSL 1.5, SL 15, SW 3, FL c. 33.—*Face* longer than wide; inner orbits ventrally divergent; length malar space c. 0.3× basal width mandible; clypeus transversely convex, with short, shallow sagittal concavity basally; frontal carina strong ending as small tubercle on supraclypeal area; middle flagellomeres c. as long as wide; inner hind tibial spur with c. 12 strong teeth; tarsal claws with strong inner rami; pygidial plate entire with upturned margin and moderately strong medial elevation.—*Labrum*, ventral margin clypeus dark red-brown; mandible medially deep amber. T1,2 with apical margins brownish; legs dark brown.—*Clypeus* weakly reticulate, densely punctate except apically; scutum weakly reticulate, punctures open to close; T1–4 with change of texture on apical margins.—*Clypeus* and supraclypeal area with open, long, finely-branched, white hair, close in apicolateral corners of clypeus and paraocular areas; frons with close, long, plumose, white hair; vertex with dark brown, plumose hair.—*Scutum* openly covered with short, plumose hair, white across anterior margin, dark brown elsewhere; metanotum closely covered with longer, plumose, white hair. T1 sparsely covered with finely-branched, white hair; T2–4 with short, adpressed, white hair forming apical fringes, complete on T4, interrupted medially on T3 and restricted to lateral margins of T2; prepygidial fimbria mid brown.

Remarks. Although there was no coincident collection, two separate locations yielded both sexes on different days but at similar times of the year. Their distinctive morphology makes it unlikely that they belong to different species.

Similar to *T. burnsi* from which male may be distinguished by clypeal hair, unmodified mid basitarsus and hair beneath hind femur. Female may be distinguished from *T. burnsi* by inner rami on tarsal claws and white hair on T2–4.

Distribution. Coastal areas of southern Queensland and northern New South Wales (NNC, SEQ) (Fig. 100).

Trichocolletes leucogenys n.sp.

Figs 64, 101

Type. Holotype ♂, Dryandra State Forest c. 27 km NW Narrogin, Western Australia, 3 Oct. 1982, C. A. Howard & T. F. Houston, on flowers of *Gastrolobium*, in WAM 13580.

Specimens examined. The holotype and the following. **Western Australia:** ♂, 5♀, same data as holotype, WAM (13579, 81–85); 2♂, 2♀, Bolgart, 8 Aug. 1949 & 12 Jan. 1950, ANIC; ♀, Broomehill, WAM (13777); ♀, Busselton, 25 Jun. 1943, O. Dawson, ANIC; 12♂, 7♀, Cottesloe, WAM (13681–93, 13718, 21, 28–29, 14011–12); ♀, 37 km E Crampthorne (31.7847°S 118.9533°E), 20 Oct. 2009, M. Batley, AM (K.344730); ♀, Darlington-Helena Valley, 21 Jul. 1987, M. Lyons, on flowers of *Muris* sp. & *Daviesia*, WAM (13623); ♀, Deepdene, 4 Sep. 1963, L. M. O'Halloran, WAM (13799); 2♀, Dryandra State Forest 27 km NW Narrogin, 12 Oct. 1991, T. F. Houston, on flowers of *Gastrolobium parviflorum*, WAM (13586–87); 2♂, Dryandra, Sep. 1977, WAM (13790–91); ♂, 16 km NE Dumbleyung (33.2200°S 117.8486°E), 9 Oct. 2009, M. Batley, AM (K.344734); 8♀, 166 km W Esperance, 16 Oct. 1974, C. A. & T. F. Houston, SAM (32-024612–19); ♂, ♀, 12 mls N Geraldton, 12 Jul. 1973, N. McFarland, WAA (45289–91); 2♂, Gooseberry Hill, 20 Aug. 1993, T. F. Houston, patrolling flowers of *Daviesia*, WAM (13593–94); ♂, Helena Valley, 4 Aug. 1987, R. Peakall, on flowers of *Isopogon*, WAM (13857); ♀, Kalbarri, 29 Aug. 1970, K. T. Richards, WAA (80845); ♀, Kanowna, 21 Aug. 1974, A. M. & M. J. Douglas, on *Mesembryon*, WAM (13892); ♂, 2♀, 17 km N Kellerberrin, 12 Sep. 1986, T. F. Houston, on flowers of *Gastrolobium*, WAM (13588–90); ♀, Lake Biddy, WAM (13714); 5♀, 7.5 km WSW Lake Cronin, 19–26 Sep. 1978, T. F. Houston, *Daviesia aphylla* & *Gastrolobium*, WAM (13618–22); ♀, 15 km S Lake King (33.2217°S 119.7147°E), 8 Oct. 2009, M. Batley, ex *Daviesia benthamii*, AM (K.344731); 11♀, 5.5–6.5 km SW McDerimid Rock, 27 Sep.–3 Oct. 1978, T. F. Houston, on flowers of *Daviesia costata* & *D. aphylla*, WAM (13604–07, 09, 10, 13–17); 5♂, ♀, Merredin, 30 Aug. 1951, C. Jenkins, WAA (80826, 27, 30, 32, 33); ♀, Moora, 21 Aug. 1940, G.F.H.J., WAA (80822); 3♂, 3♀, Mt Jackson, 5–11 Sep. 1979, T. F. Houston *et al.*, on flowers of *Jacksonia compressa*, WAM (13591–92, 13894–96, 14013); ♂, Mullewa, September, L. J. Newman, WAA (80823); ♀, c. 2 km SW Mundaring Weir, 1 Aug. 1999, T. F. Houston, on flowers of *Daviesia decurrens*, WAM (27181); ♀, 14 km NW Narrogin (32.8761°S 117.0425°E), 9 Oct. 2009, M. Batley, AM (K.344733); ♀, 10 km S Nerren Nerren HS, 19 Aug. 1980, C. A. Howard & T. F. Houston, on flowers of *Chorizema ericifolium*, WAM (13969); ♀, 6 km W Newdegate (33.1011°S 118.9639°E), 8 Oct. 2009, M. Batley, AM (K.344732); 6♂, 11 mi N of New Norcia, 18 Aug. 1971, T. F. Houston, SAM (32-024620–25); ♀, Norseman area of Lake Cowan, 6 Sep. 1990, R. P. McMillan, WAM (13970); ♀, North Tarin Rock Reserve (32.98°S 118.23°E), 16–18 Oct. 1985, T. F. Houston, on flowers of *Gastrolobium* sp., WAM (13899); ♂, Sixty Foot Falls near Gosnells, 5 Sep. 1998, E. McCrum, WAM (19117); ♀, Southern Cross, September, L. J. Newman, WAA (80825); ♂, 2♀, Swanbourne, WAM (13708–10); ♂, Tallering Stn, Aug. 1976, R. P. McMillan, WAM (13789); 2♀, Tutanning Reserve 18–25 km E Pingelly, 30 Oct.–3 Nov. 1980, T. F. Houston, on flowers of *Daviesia brevifolia*, WAM (13897–98); 5♂, 13♀, Wamensking, WAM (13694–99, 13701–07, 13762, 65–68); ♂, Ynin Stn NE of Mullewa, 7 Aug. 1954, A. Snell, ANIC.

Diagnosis

Eyes hairy; metasomal bands narrow, silver; ocellar-ocular area frequently with weak coppery colour. Male gena with dense white pubescence. Female clypeus sagittally flattened; lateral epistomal suture curved; clypeus coplanar with supraclypeal area.

Descriptions

Male (holotype).—*Head* width 4.20 mm, body length 12.5 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 31, LID 30, DMA 28, HVO 4, WOC 14, MOD 3, OOD 9, IAD 7, ASD 3, AOD 9, ML 19, BMW 5, MSL 2.0, SL 12, SW 3, FL c. 47.—*Eyes* hairy; face broad, inner orbits subparallel; length malar space c. 0.3× basal mandibular width; middle flagellomeres c. 1.6× as long as wide. Legs slender; fore basitarsus short and gently bowed; hind tarsus c. 1.2× as long

as hind tibia; hind basitarsus 4.6× as long as wide; posterior carina of basitibial area reaches apex. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with rectangular lateral lobes, large basal teeth and posterior projections (Fig. 64).—*Labrum*, mandible medially, scape, tarsi and tibiae orange-brown; scape often with dark suffusions, occasionally entirely dark brown; tibiae with variable amounts of dark brown; flagellum brown ventrally. T1–5 with narrow silver bands, narrowly tinted brown across anterior margin; T7 reddish.—*Clypeus* densely punctate basally, apical 20% polished, impunctate. Scutum shining with moderately strong pit-reticulation and close punctures.—*Face* with dense, finely-branched, long, orange hair; gena densely covered with white plumose hair. Scutum openly covered with long, erect, plumose, pale orange hair; fore basitarsus with plume of long, minutely branched hair on proximal half; anterior margin of hind tibia with row of openly spaced, long, white hair.

Female (AM K.344732).—*Head* width 4.40 mm, body length 12.9 mm. Relative dimensions: HW 50, HL 39, UID 29, UFW 31, LID 32, DMA 30, HVO 4, WOC 13, MOD 3, OOD 8, IAD 9, ASD 3, AOD 9, ML 21, BMW 7, MSL 2.0, SL 15, SW 3, FL c. 32.—*Eyes* hairy; face broad, inner orbits divergent ventrally; malar space c. 0.3× basal mandibular width; clypeus convex, flattened sagittally; basal suture concave; width supraclypeal area more than twice length subantennal suture; base of clypeus and supraclypeal area approximately coplanar; epistomal suture between base of clypeus and base of mandible distinctly concave; distance from anterior tentorial pit to base mandible 3× distance between pit and base of clypeus; labrum uniformly convex, length 0.6× width; middle flagellomeres c. 1.2× as long as wide; hind tibial spur with c. 9 strong teeth; tarsal claws simple; pygidial plate entire, flat or with slight medial elevation.—*Labrum*, mandible medially, tarsi, hind tibia, extremities of fore and mid tibiae, distal ends of femora orange-brown; remainder of legs and flagellum ventrally, dark brown. T1–4 with narrow silver bands, weakly stained brown across anterior margin.—*Clypeus* weakly reticulate basally, punctures large and dense medially, sparse laterally, fine and dense in apicolateral corners. Scutal sculpture as for male.—*Face* with long, plumose, white or pale orange-brown hair, sparse on clypeus and supraclypeal area, dense in paraocular areas and on frons. Scutum closely covered with moderately short, plumose, dark-tipped, dull orange hair; prepygidial fimbria dark brown; scopal hair orange-brown laterally, darker medially.

Remarks. Similar to several other species. May be distinguished from *T. albigenae* n.sp. by the strongly protuberant clypeus and longer malar space; from *T. grandis* n.sp. by smaller size and longer malar space; from *T. capillosus* n.sp. by dense genal hair (male) and broader supraclypeal area (female); and from *T. dundasensis* n.sp. (female) by curvature of the epistomal suture and coplanarity of clypeus and supraclypeal area.

This species is referred to as F249/M223, F272/M239, F270 and F252 (part) in Houston (2000).

Etymology. The specific name is a transliteration of the Greek adjective meaning with white cheeks, referring to the dense genal hair of the male.

Distribution. Southwestern Australia (AW, COO, ESP, GS, JF, MAL, SWA, WAR, YAL) (Fig. 101).

Trichocolletes luteorufus n.sp.

Fig. 102

Type. Holotype ♀, 13 km NE Warriedar, Western Australia, 28 Aug. 1981, T. F. Houston, on flowers of *Cassia chatelainiana*, in WAM 13656.

Specimens examined. The holotype and the following. **Western Australia:** 2♀, same data as holotype, WAM (13657–58); ♀, 12 km ESE Mt Magnet, 3 Sep. 1981, T. F. Houston, on flowers of *Ptilotus obovatus*, WAM (13660).

Diagnosis

Female (male unknown) robust; eyes not hairy; metasomal bands wide, orange-gold; posterior half of metasoma with conspicuous orange hair.

Description

Female (holotype).—*Head* width 4.65 mm, body length 15.2 mm. Relative dimensions: HW 50, HL 35, UID 30, UFW 33, LID 32, DMA 29, HVO 5, WOC 14, MOD 3, OOD 9, IAD 7, ASD 4, AOD 9, ML 20, BMW 8, MSL 0.5, SL 15, SW 3, FL c. 36.—*Eyes* not hairy; face broad, inner orbits parallel; malar space short (length c. 0.1× basal mandibular width); clypeus gently convex; middle flagellomeres c. 1.2× as long as wide; inner hind tibial spur with c. 7 strong teeth; tarsal claws with large inner ramus; pygidial plate broad, entire with coarse sculpture.—*Labrum*, mandible, anterior faces of fore femur and tibia orange-brown; remainder of legs dark brown. T1–4 with wide, deep gold bands.—*Clypeus* reticulate, densely covered with large punctures; supraclypeal area with smaller, contiguous punctures.—*Face* with long, white plumose hair, becoming pale orange on frons, close on clypeus and supraclypeal area, dense in paraocular areas and on frons; vertex with long, plumose, pale orange hair. Scutum closely to densely covered with tightly branched, pale orange hair with dark brown tips; metasomal terga with open covering of short, semierect, bright orange-gold hair progressively longer and denser posteriorly; prepygidial fimbria bright orange-gold; hind tibial scopa dark brown.

Remarks. This species is referred to as F253 in Houston (2000).

Etymology. The specific name is a Latin adjective referring to the bright orange colour of the female metasoma.

Distribution. Known from two locations in Western Australia near Mount Magnet (MUR, YAL) (Fig. 102).

Trichocolletes macrognathus n.sp.

Figs 16–18, 35, 65, 103

Type. Holotype ♂, 13 km S Wanoo, Western Australia [26.49S, 114.37E], 24–28 Aug. 1984, T. F. Houston & B. P. Hanich, on flowers of *Baeckea*, in WAM 13671. The co-ordinates on the label refer to the location of Wanoo at 26°49'S 114°37'E.

Specimens examined. The holotype and the following. **Western Australia:** ♀, 11 km ENE Anketell, 4–6 Sep. 1981, T. F. Houston, on flowers of *Cassia phyllodinea* or *charlestoniana*, WAM (13659); ♂, Denham-Hamelin Rd NW

Tamala turnoff, 28 Aug. 1997, T. F. Houston & P. Mathiasen, on flowers of *Malleostemon roseus*, WAM (13680); 4♂, ♀, East Yuna Reserve, 34 km WNW Mullewa, 16–29 Aug. 1984, T. F. Houston & B. P. Hanich, on flowers of *Thryptomene hyporhytis*, WAM (13673–77); 3♀, 10 mi E of Meekatharra, 31 Aug. 1971, T. F. Houston, SAM (32-024663–65); 2♀, 8 km N Nerren Nerren HS, 25 Aug. 1985, R. P. McMillan, on *Prostanthera wilkeana*, WAM (13678–79); 3♂, 9♀, 13 km S Wanoo, 24–28 Aug. 1984, T. F. Houston & B. P. Hanich, on flowers of *Baeckea* & burrowing into walls of freshly dug pit in sand, WAM (13661–70,72).

Diagnosis

Eyes not hairy; metasomal bands wide, gold; malar space very long. Male S3 with distinctive hair plume. Female scutum with transverse band of dark hair. Unlike any other species.

Descriptions

Male (WAM 21597).—*Head* width 4.35 mm, body length 12.0 mm. Relative dimensions: HW 50, HL 39, UID 36, UFW 35, LID 32, DMA 22, HVO 5, WOC 15, MOD 4, OOD 10, IAD 10, ASD 3, AOD 8, ML 20, BMW 6, MSL 7.5, SL 13, SW 3, FL c. 59.—*Eyes* not hairy, much shortened leaving malar area almost twice as long as wide (Fig. 17); flagellum longer than head width; all flagellomeres c. 1.5× as long as wide. Legs slender; hind tarsus 1.3× as long as hind tibia; hind basitarsus 5.4× as long as wide; posterior carina of basitibial area extends past apex. Gonoforceps transversely truncate with long apical hairs (Fig. 35); lateral lobes of S7 fused with posterior projections and basal teeth (Fig. 65).—*Mandible*, scape, tarsi, fore and hind tibiae, anterior faces of mid tibia and all femora, flagellomeres F2–8 ventrally, orange-brown; remainder of flagellum brown. T1–5 with wide, deep gold bands; T7, S6 laterally, orange-brown.—*Scutum* with dull sheen and moderately strong pit-reticulation. Scutum closely and face densely covered with bright orange hair, erect on clypeus, fore basitarsus with brush of relatively short golden hair; S3 with dense medial plume of long white hair (Fig. 18).

Female (WAM 13661).—*Head* width 4.85 mm, body length 13.6 mm. Relative dimensions: HW 50, HL 37, UID 31, UFW 34, LID 32, DMA 27, HVO 4, WOC 14, MOD 3, OOD 9, IAD 8, ASD 3, AOD 10, ML 19, BMW 8, MSL 5.0, SL 13, SW 3, FL c. 36.—*Eyes* not hairy; face quadrate; length malar space c. 0.7× basal mandibular width (Fig. 16);

clypeus uniformly convex transversely; middle flagellomeres c. 1.5× as long as wide; inner hind tibial spur with c. 5 well-spaced teeth; tarsal claws with sharp inner ramus about half length of outer; pygidial plate broad with truncate, upturned margin.—*Mandible* medially orange-brown; legs dark brown. T1–4 with wide, bright gold bands.—*Clypeus* polished with open to close large punctures; scutum polished with close punctures.—*Lower face* with long, plumose, white hair, dense in paraocular areas, sparse to open on clypeus and supraclypeal area; frons densely covered with plumose, orange-brown hair, darker towards ocelli. Scutum covered with close to dense, plumose hair, anterior 20% and thin line around lateral and posterior margins pale orange-brown, remainder dark brown; semi-erect hair on terga strongly reflective giving metasoma a golden sheen, more pronounced apically.

Remarks. This species is referred to as F247/M220 in Houston (2000).

Etymology. The specific name, used as a noun in apposition, is derived from the Greek words for large and jaw, referring to the greatly elongated malar space of this species.

Distribution. Area around Geraldton, Western Australia (CAR, GS, MUR, YAL) (Fig. 103).

Trichocolletes marginatus (Smith)

Figs 19, 36, 66, 104

Paracolletes marginatus Smith, 1879, p. 4.

Trichocolletes (Trichocolletes) marginatus Michener, 1965, p. 80.

Specimens examined. The lectotype ♂, Australia, BMNH (Hym 17.a.417) and the following. **Western Australia:** ♂, Albany, 9 Nov. 1981, B. L. Dickenson, WAM (13904); ♀, Albany, L. J. Newman, WAA (80829); 2♀, Albany, 18 Nov. 1991, H. T. Mattner, WAM (13900–01); 8♂, Calgardup, WAM (13747–54); ♀, Cape Freycinet, 15–18 Nov. 1986, T. F. Houston, WAM (13903); 2♂, Denmark, WAA (45282–83); 12♂, Elleker near Albany (35.0167°S 115.9500°E), 1 Nov. 1998, A. Ferguson, WAM (21954–65); ♀, Margaret River, 29 Dec. 1970, G. A. Holloway, AM (K.316700); ♂, 25 km NE Nannup (33.8167°S 115.9500°E), 25 Nov. 1989, P. Jones, WAM



Figs 16–18. *Trichocolletes macrognathus* n.sp.: head showing long malar area of (16) female, (17) male; (18) ventral view of male metasoma, showing plume on S3.

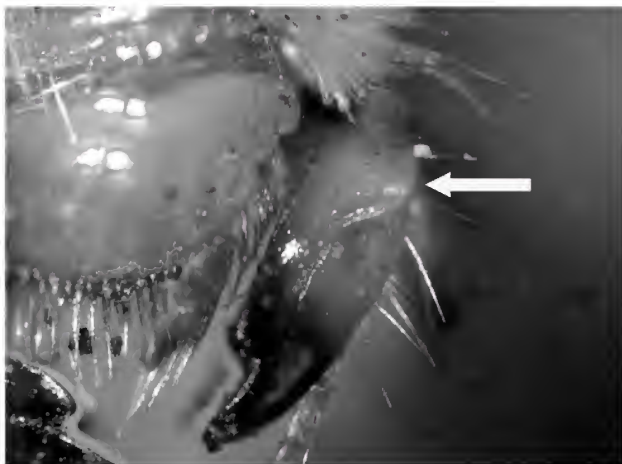


Fig. 19. *Trichocolletes marginatus* left mandible of male with horizontal projection arrowed.

(18565–67); 5♂, Pemberton, 24 Nov. 1958, W. Napier, WAA (45292–96); ♀, West Midland, 12 Nov. 1950, MV (16514); 2♀, West Midland (31.8833°S 115.9833°E), 26 Oct. 1952, MV (16526,30); ♀, 14 km WSW Witchcliffe, 14 Nov. 1986, T. F. Houston, on flowers of *Jacksonia*, WAM (13902); 2♂, 2♀, Yallingup, WAM (13755–58); ♂, Yallingup, 16 Nov. 1968, N. McFarland, SAM (32-024666).

Diagnosis

Length 15–16 mm; eyes not hairy; metasomal bands narrow, gold or silver; upper margin of mandible with horizontal projection, more pronounced in male. Male mid and hind tibiae incrassate; flagellum longer than head width; S2 with large, untidy hair tuft.

Descriptions

Male (WAM 21957).—*Head* width 4.70 mm, body length 16.0 mm. Relative dimensions: HW 50, HL 37, UID 28, UFW 29, LID 32, DMA 30, HVO 6, WOC 13, MOD 4, OOD 8, IAD 8, ASD 4, AOD 8, ML 19, BMW 9, MSL 1, SL 13, SW 3, FL c. 56.—*Eyes* not hairy; head broad; inner orbits divergent ventrally; malar space very short; clypeus strongly protuberant; basal $\frac{2}{3}$ mandible with horizontal projection from upper margin (Fig. 19); flagellum longer than head width, middle flagellomeres c. 1.6× as long as wide. Legs stout; mid tibia strongly swollen; hind tibia less so, concave on inner surface; length hind tarsus subequal to length hind tibia; hind basitarsus 3.7× as long as wide; basitibial area acarinate. Genital capsule (Fig. 36) somewhat like that for *T. orientalis* n.sp., but with larger projection on inner surface of gonoforceps; S7 with rectangular lateral lobes, very long posterior projections and small basal teeth (Fig. 66).—*Labrum* cream; ventral margin of clypeus yellow-brown; mandible medially amber; scape, tibiae, tarsi, anterior face fore femur, distal ends of mid and hind femora and flagellomeres F1–4 ventrally, orange-brown; remainder of flagellum dark brown. T1–5 with gold or silver bands, narrowly stained brown across anterior margin; wings darkened.—*Face* covered with long, plumose, orange hair, close and stiffly erect on the clypeus, dense elsewhere. Scutum closely covered with long, erect, finely-branched orange hair; fore basitarsus with tapered plume of long, orange hair; fore trochanter and

femur with thin cover of long orange hair; anterior margin hind basitarsus and distal half hind tibia with sparse, long, orange hair.

Female (AM K.316700).—*Head* width 4.90 mm, body length 15.3 mm. Relative dimensions: HW 50, HL 36, UID 26, UFW 31, LID 32, DMA 30, HVO 5, WOC 11, MOD 3, OOD 7, IAD 8, ASD 3, AOD 9, ML 19, BMW 8, MSL 0.5, SL 15, SW 3, FL c. 34.—*Eyes* not hairy; head broad; inner orbits divergent ventrally; malar space very short; mandibular projection less prominent than for male; clypeus transversely convex; inner hind tibial spur with c. 9 long teeth, outer spur pectinate; tarsal claws simple.—*Ventral* margin of clypeus medially, distitarsi orange-brown; legs dark brown. T1–4 with narrow gold or silver bands.—*Clypeus* weakly reticulate with large punctures, dense basally, open apically; supraclypeal area with punctures coalescing into irregular vertical channels; scutum and metasoma with dull sheen.—*Face* with long, white, plumose hair, dense in paraocular areas and on frons, open on supraclypeal area and dorsolateral margins of clypeus. Scutum densely covered with short, finely-branched, dark-tipped pale brown hair; hind tibial scopa dark brown with paler hair on anterior margin; prepygidial fimbria dark brown to black.

Remarks. In his original description, Smith reported that his specimens came from Queensland, leading Cockerell (1913a, 1914) to apply the name *T. marginatus* to the species here named *T. serotinus* n.sp.. As pointed out by Michener (1965), this has led to the misidentification of many specimens of *T. serotinus* n.sp. in Australian collections.

This species is referred to as F259/M231 in Houston (2000).

Distribution. Coastal southwestern Australia (JF, SWA, WAR) (Fig. 104).

Trichocolletes maximus (Cockerell)

Figs 10, 20, 24, 67, 105

Paracolletes maximus Cockerell, 1929b, p. 9 (female).

Trichocolletes (Trichocolletes) maximus.—Michener, 1965, p. 80.

Specimens examined. **New South Wales:** 6♀, 7 km W Walgett, 15 Sep. 1988, N. W. Rodd, ex *Swainsona procumbens*, AM (K.316701–06); 3♀, 10 km N Mungindi (28.9108°S 148.9461°E), 25 Aug. 2007, M. Batley, ex *Swainsona procumbens*, AM (K.316524–25, 31); 3♂, 2♀, 32 km NNW Mungindi (28.7092°S 148.8825°E), 25 Aug. 2007, M. Batley, ex *Swainsona procumbens*, AM (K.316526–30); ♀, 5 km E Condobolin (33.0770°S 147.1975°E), 26 Sep. 2010, M. Batley, ex *Swainsona procumbens*, AM (K.316532). **Victoria:** 2♀, Ellmore-Mitiano Road (36.2920°S 144.3130°E), 2009, A. H. Murphy, ex *Swainsona procumbens*, AM (K.316708–09); ♂, Terrick Terrick NP, (36.0920°S 144.2620°E), 24 Aug. 2009, A. H. Murphy, ex *Swainsona procumbens*, AM (K.316707).

Diagnosis

Length 13–14 mm; eyes hairy; scutal hair dense, ferruginous; metasomal bands silver-white; labrum black or dark brown; scape black in both sexes. Female clypeus weakly protuberant.

Descriptions

Male (AM K.316525), not previously described.—*Head* width 4.65 mm, body length 12.6 mm. Relative dimensions: HW 50, HL 35, UID 33, UFW 34, LID 31, DMA 29, HVO 7, WOC 13, MOD 3, OOD 10, IAD 9, ASD 3, AOD 9, ML 20, BMW 7, MSL 0.8, SL 16, SW 3, FL c. 46.—*Eyes* hairy; inner orbits ventrally convergent; length malar space c. 0.15× basal mandibular width; gena broad, almost as wide as eye viewed laterally; middle flagellomeres c. 1.5× as long as wide; hind tibia with angular, densely setose ridge from basitibial area to distal margin; hind tarsus as long as hind tibia; hind basitarsus 3.8× as long as wide; hind basitibial area with posterior carina to apex (Fig. 24). Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with rectangular lateral lobes and short posterior projections (Fig. 67). Distitarsi and flagellomeres F2–6 ventrally, orange-brown; mandible medially, dark brown. T1–5 with silver bands.—*Vertex* and scutum noticeably dull with strong pit-reticulation.—*Face* densely covered with long, erect, plumose, orange hair; gena closely covered with long, white hair. Scutum closely to densely covered with long, plumose, ferruginous hair; fore basitarsus and all trochanters with long plumes of white hair; anterior margin of hind tibia with fringe of close, long, white hair. T1,2 openly covered with long, erect, white hair, shorter on T2; T3–6 openly covered with short, semi-adpressed hair mostly matching underlying integument, but with some pale hair extending onto dark areas anterior to silver bands.

Female (AM K.316527).—*Head* width 4.90 mm, body length 13.8 mm. Relative dimensions: HW 50, HL 37, UID 32, UFW 34, LID 33, DMA 34, HVO 4, WOC 14, MOD 3, OOD 10, IAD 8, ASD 3, AOD 10, ML 20, BMW 9, MSL 1.5, SL 16, SW 3, FL c. 29.—*Face* broad; inner orbits subparallel; malar space short (length c. 0.2× basal mandibular width); gena about 2/3 as wide as eye, viewed laterally; vertex elevated; clypeus transversely convex laterally, but strongly flattened medially; middle flagellomeres c. 1.3× as long as wide; inner hind tibial spur with c. 6 strong teeth; basitibial area not elevated above surroundings (Fig. 20); tarsal claws simple; pygidial plate entire, without medial elevation, strongly sculptured.—*Labrum*, mandible medially dark brown; distitarsi orange-brown. T1–4 with narrow silver-white bands.—*Clypeus* and paraocular areas reticulate, closely punctate; supraclypeal punctures contiguous, merging to form irregular grooves.—*Clypeus* sparsely covered with long, finely-branched, white hair; paraocular areas and frons densely covered with long, plumose hair, white below antennal sockets, becoming pale orange above.—*Scutum* densely covered with short, erect, finely-plumose, bright ferruginous hair; hind tibial scopa white except dark brown near basitibial area; pubescence of metasomal terga as for male; prepygidial fimbria off-white or pale brown.

Remarks. In Cockerell's original description, it is clear from references to the pygidial plate and hind tibial scopa that he was describing a female, but erroneously reported that it was male. Dr Ascher of the American Museum of Natural History provided photographs of the holotype and has confirmed that the holotype is female and has the diagnostic features described above.

Distribution. Inland areas from southern Queensland to northern Victoria (DRP, NSS, RIV) (Fig. 105).

Trichocolletes micans n.sp.

Figs 68, 106

Type. Holotype ♂, Kinchega NP, New South Wales (32.4581°S 142.3525°E), 8 Sep. 2007, M. Batley, *ex Swainsona purpurea*, in AM K.344736.

Specimens examined. The holotype and the following. **New South Wales:** ♂, 5♀, same data as holotype, AM (K.344737–42); 4♂, Black Mountain, Gunnedah (31.0280°S 150.1346°E), ANIC; 2♂, 9♀, 3 mi E Legume, 25 Sep. 1964, T. F. Houston, SAM (32-024512–22); 7♂, 7♀, 6 km S Mungindi, 15 Sep. 1988, N. W. Rodd, AM (K.344441–53, K.316710). **Queensland:** ♀, 30 km N Mungindi (28.7586°S 148.8950°E), 14 Sep. 2005, M. Batley, *ex Swainsona* sp., AM (K.344735). **South Australia:** 2♀, 50 km S Leigh Creek, 18 Sep. 2010, M. Edwards, SAM.

Diagnosis

Length c. 11 mm; eyes hairy; scape black in both sexes; legs black; metasoma sericeous with moderately wide, silver-white bands, ferruginous across anterior margins; known only from eastern Australia.

Descriptions

Male.—*Head* width 3.75 mm, body length 11.0 mm. Relative dimensions: HW 50, HL 37, UID 31, UFW 32, LID 30, DMA 30, HVO 4, WOC 15, MOD 4, OOD 8, IAD 9, ASD 3, AOD 9, ML 20, BMW 8, MSL 2.0, SL 14, SW 3, FL c. 48.—*Eyes* hairy; face almost quadrate, inner orbits parallel; length of malar area c. 0.25× basal mandibular width; flagellum slightly shorter than head width, middle flagellomeres c. 1.6× as long as wide. Legs slender; length hind tarsus equal to length hind tibia; hind basitarsus 4.3× as long as wide; basitibial area with strong posterior carina to apex and sharp edge on anterior margin. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 with narrow rectangular lateral lobes and strong posterior projections (Fig. 68). Distitarsi and mandible medially orange-brown; labrum dark brown. T1–5 with broad, silver-white bands, ferruginous across anterior third.—*Clypeus*, other than apical margin, densely punctate with interspaces except basally, where a few punctures coalesce; scutum with dull sheen, moderately strong pit-reticulation and close small punctures.—*Face* with dense, long, finely-branched, white hair. Scutum closely covered with long, branched, white or pale brown hair; anterior margin of hind tibia with close fringe of long, white hair; metasomal terga with short, semi-adpressed, translucent hair, conspicuous only when illuminated obliquely.

Female.—*Head* width 3.90 mm, body length 11.6 mm. Relative dimensions: HW 50, HL 36, UID 31, UFW 33, LID 32, DMA 33, HVO 4, WOC 15, MOD 4, OOD 7, IAD 9, ASD 3, AOD 10, ML 20, BMW 7, MSL 1.5, SL 15, SW 3, FL c. 31.—*Face* wider than long, inner orbits diverging ventrally; length malar space c. 0.2× basal mandibular width; clypeus gently convex transversely; middle flagellomeres c. 1.1× as long as wide; inner hind tibial spur with c. 8 teeth; basitibial area with anterior and posterior carinae and apex elevated above surroundings; only hind tarsal claw with small inner ramus; pygidial plate with small emargination and slight medial elevation. Distitarsi orange-brown; remainder of legs and mandible dark brown; labrum dark brown or black, rarely suffused with orange-brown. T1–4 with broad, silver-white bands

ferruginous across anterior third.—*Clypeus* densely punctate on a strongly reticulate ground; scutal sculpture as for male.—*Face* covered with long, plumose, white hair, dense on frons and in paracocular areas, close on clypeus and supraclypeal area. Scutum closely covered with moderately short, plumose, pale brown hair; scopal hair off-white; golden brown setae in basitibial area; metasoma sericeous as for male; fimbria light brown.

Remarks. Similar to *T. brunilabrum* n.sp. and *T. lacaris* n.sp., from which males may be distinguished by the shape of S7. Females differ from *T. brunilabrum* n.sp. by the finer clypeal sculpture and from *T. lacaris* n.sp. by the presence of an inner ramus on hind tarsal claw. This species is superficially similar to *T. tuberatus* n.sp., with which it may be sympatric, but is easily distinguished by its smooth labrum.

Etymology. The specific name is a Latin adjective meaning glittering, referring to the metasoma which is conspicuously reflective when the insects forage in direct sunlight.

Distribution. Inland New South Wales and South Australia (BBS, DRP, FLB, SEQ) (Fig. 106).

Trichocolletes multipectinatus Houston

Fig. 107

Trichocolletes (Trichocolletes) multipectinatus Houston, 1990, p. 618.

Diagnosis

Eyes not hairy; proboscis relatively elongate, prementum length at least 3.5× eye width viewed laterally. Female lower clypeus dull, densely punctate; facial hair brown, simple; mid-tibial spur strongly curved with set of stout teeth medially; prepygidial fimbria orange or mostly so. Male with hair of clypeus very erect, of even length, appearing cropped; fore basitarsus expanded ventrally; fore calcar without teeth; T7 with only a medial spot yellow-brown.

Remarks. Exhibits a preference for flowers of *Eremophila*. Detailed descriptions can be found in Houston (1990). A more recently collected specimen (♀, Wilcannia [31.6742°S 143.4664°E], 28 Sep. 2003, M. Batley, ex *Eremophila sturtii*, AM [K.316532]) extends the known range eastward.

Distribution. Southern Western Australia (Mt Magnet – Kalgoorlie region), northern Eyre Peninsula, South Australia and western New South Wales (COO, DRP, GAW, MUR, YAL) (Fig. 107).

Trichocolletes nitens n.sp.

Figs 13, 69, 108

Type. Holotype ♂, 5.5–6.5 km SW McDermid Rock, Western Australia, 27 Sep.–3 Oct. 1978, T. F. Houston, on flowers of *Daviesia aphylla*, in WAM 13800.

Specimens examined. The holotype and the following. **Western Australia:** ♀, 10 km NE Kulin (32.6014°S 118.2158°E), 10 Oct. 2009, M. Batley, ex *Gastrolobium* sp., AM; 3♂, 7♀, 5.5–6.5 km SW McDermid Rock, 27 Sep.–3 Oct. 1978, T. F. Houston, on flowers of *Daviesia aphylla* & *Leptospermum erubescens*, WAM (13800–10); 6♀, Merredin, WAM (13509, 10, 13778–81); 2♀, Merredin (31.4594°S 118.3169°E), 19 Oct. 2009, M. Batley, ex *Gastrolobium* sp., AM (K.344745); ♀, Minnivale, WAM (13811); ♂, ♀, 6 km W Newdegate (33.1011°S 118.9639°E), 8 Oct. 2009, M. Batley, ex *Gastrolobium ilicifolium*, AM; ♂, ♀, 15 km N Westonina (31.1981°S 118.7586°E), 19 Sep. 2004, M. Batley, ex *Gastrolobium* sp., AM (K.344743–44); 2♂, ♀, Yelbeni, Sep., B. O'Connor, WAA (45277–78, 45303).

Diagnosis

Dark-coloured; eyes not hairy; metasomal bands wide, orange-gold. Male fore trochanter with blunt projection; mid femur incrassate. Female scutal hair dark brown; hind tibial scopa dark brown; hind tarsal claw simple.

Descriptions

Male—*Head* width 4.00 mm, body length 12.6 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 39, LID 30, DMA 30, HVO 2, WOC 14, MOD 4, OOD 8, IAD 8, ASD 3, AOD 7, ML 18, BMW 6, MSL 0.5, SL 13, SW 3, FL c. 50.—*Eyes* not hairy; face narrow; malar space short (length c. 0.1× basal mandibular width); flagellomeres c. 1.5× as long as wide. Legs slender; fore trochanter with triangular ventral projection; mid femur incrassate; hind tarsus as long as hind tibia; hind basitarsus 3.5× as long as wide. Genital capsule generally like that for *T. orientalis* n.sp. (Fig. 37); S7 (K.344743) with long, thin posterior projections and ligulate processes, rectangular lateral lobes with sinuate posterior margin in (Fig. 69).—*Labrum*, mandible and rim of clypeus amber; scape, tarsi, tibiae and femoral apices orange-brown; remainder of legs dark brown; flagellum brown, paler ventrally. T1–5 with wide, bright gold bands; T7 dull orange-brown.—*Clypeus* densely punctate; scutum with weak pit-reticulation, dull sheen and dense, small punctures.—*Face* densely covered with bright orange hair, stiffly erect on clypeus. Scutum closely covered with long, plumose orange hair; fore basitarsus with dense plume of long golden hair; hind femur with sparse fringe long hair on anterior margin; mid basitarsus with conspicuous brush of erect golden hair on anterior margin; metasoma sericeous with semi-adpressed golden pubescence.

Female (AM K.344744).—*Head* width 4.35 mm, body length 12.9 mm. Relative dimensions: HW 50, HL 37, UID 29, UFW 31, LID 30, DMA 27, HVO 2, WOC 13, MOD 3, OOD 8, IAD 13, ASD 3, AOD 9, ML 20, BMW 6, MSL 0.5, SL 14, SW 3, FL c. 31.—*Eyes* not hairy; inner orbits parallel; malar space short (length c. 0.1× basal mandibular width); clypeus transversely convex; middle flagellomeres as long as wide; inner hind tibial spur with c. 7 long, well-spaced teeth; tarsal claws simple; pygidial plate entire with broad medial elevation.—*Rim of clypeus* amber; labrum and mandible orange-brown; legs dark brown. T1–4 with wide, deep gold bands.—*Clypeus* polished apically, increasingly reticulate basally, with large punctures, sparse apically becoming close basally; scutal sculpture as for male.—*Face* with long white, plumose hair, becoming pale orange near ocelli,

dense in paracocular areas and on frons, sparse on clypeus and supraclipeal area. Scutum densely covered with short, plumose, brown hair, tipped with dark brown; metasoma sericeous with semi-adpressed golden pubescence; tibial scopa dark brown; prepygidial fimbria orange-gold.

Remarks. This species can usually be distinguished from *T. centralis* n.sp. by its darker colouration, but males also have features not found in *T. centralis* n.sp.: a projection on the fore trochanter, and mid femur incrassate and a conspicuous brush on the anterior margin the mid basitarsus. Females differ from *T. centralis* n.sp. mostly by colour but also by the simple hind tarsal claw.

This species is referred to as F256/M230 in Houston (2000).

Distribution. Inland parts of southwestern Australia (AW, MAL, COO) (Fig. 108).

Etymology. The specific name is a Latin adjective meaning brilliant or beautiful, referring to the conspicuous bright gold metasomal bands.

Trichocolletes orientalis n.sp.

Figs 37, 70, 109

Type. Holotype ♂, Wollar, New South Wales (32.3608°S 149.9214°E), 10 Sep. 2005, M. Batley, ex *Hardenbergia violacea*, in AM K.278553.

Specimens examined. The holotype and the following. **Australian Capital Territory:** 3♂, Black Mountain (35.2633°S 149.0875°E), 1 Oct. 2006, M. Batley, ex *Daviesia mimosoides* & *Hardenbergia violacea*, AM (K.334782–84); 2♂, 3♀, Black Mtn, 1 Nov. 1968, T. F. Houston, on *Daviesia mimosoides*, *Daviesia acicularis* & *Pultenaea procumbens*, UQIC. **New South Wales:** 3♂, same data as holotype, AM (K.334767–69); ♂, Austimmer, 1 Dec. 1951, Butcher, AM (K.344470); ♀, Bargo (34.2833°S 150.5833°E), 4 Oct. 2000, M. Batley, ex *Pultenaea villosa*, AM (K.334753); ♂, Bilpin (33.4814°S 150.5480°E), 9 Sep. 2005, M. Batley, ex *Daviesia mimosoides*, AM (K.334766); 4♂, Bilpin, 21 Sep. 1978, N. W. Rodd, AM (K.344475–78); 4♂, 6 km N Bilpin, 3 Aug. 1979, N. W. Rodd, AM (K.344482–86); 3♂, 6 km N Bilpin, 11–23 Aug. 1977, N. W. Rodd, AM (K.344472–74); 3♂, 6 km NE Bilpin, 23 Sep. 1992, N. W. Rodd, AM (K.344527–29); 2♂, ♀, 15 km NW Boorowa (34.3028°S 148.6708°E), 2 Oct. 2006, M. Batley, ex *Hardenbergia violacea*, AM (K.334785–87); 2♂, 15 km N Bulahdelah, 20 Aug. 1982, N. W. Rodd, AM (K.344494–95); ♀, Cheltenham, 14 Oct. 1951, AM (K.344469); ♀, Cheltenham, 22 Oct. 1949, AM (K.344464); 3♂, ♀, Cheltenham, 27 Aug. 1950, AM (K.344465–68); ♂, ♀, Commodore Heights (33.5936°S 151.2978°E), 11 Aug. 2006, M. Batley, ex *Hardenbergia violacea*, AM (K.334778–79); 10♂, 34 km NNE Coonabarrabran, 17 Sep. 1989, A. Sundholm & J. Bugeja, AM (K.344517–26); ♀, Cowan, 30 Aug. 1947, AM (K.344461); 3♂, Doyles Creek (32.5220°S 150.7972°E), 19–22 Aug. 2005, M. Batley, ex *Daviesia genistifolia*, AM (K.224613, K.334761); ♀, 30 km S Dubbo, 12 Nov. 1984, N. W. Rodd, AM (K.344497); ♀, Dundas, 12 Aug. 1945, AM (K.344458); ♂, 9 km NW Dunedoo (31.9489°S 149.3230°E), 3 Sep. 2006, M. Batley, AM (K.334781); ♂, Heathcote (34.0800°S 151.0222°E), 10 Aug. 2001, M. Batley, ex *Monotoca scoparia*, AM (K.334755); ♀, Kentlyn (34.0475°S 150.8842°E), 8 Sep. 2000, M. Batley, ex *Daviesia acicularis*, AM (K.334752); 2♀, Kentlyn (34.0475°S 150.8842°E), 31 Aug. 1999, M. Batley, ex *Hardenbergia violacea*, AM (K.334752); ♀, Lane Cove, 2 Sep. 1944, AM (K.344457); ♂, Lane Cove, 5 Sep. 1948, AM (K.344462); ♀, Lane Cove, 7 Oct. 1944, AM (K.344457); 2♂, Lane Cove, 27–30 Jul. 1944, AM (K.344454–55); 2♂, 2♀, Marramatta NP (33.5694°S 151.1272°E), 3–24 Aug. 2001, M. Batley, ex *Boronia ledifolia*, *Dillwynia retorta* & *Hardenbergia violacea*, AM (K.224182–83, K.334754, 56); ♀, Mellong Swamp, 18 Oct. 2002, J. Indsto, ex *Dillwynia glaberrima*, AM (K.224812); ♀, Mt Kuringai, 12 Sep. 1948, AM (K.344463); 5♂, Mullion Flora Res. (33.11°S 149.17°E), 1 Oct. 2005,

M. Batley, ex *Dillwynia* sp., AM (K.334773–77); ♂, ♀, Munmorah SRA, 8–27 Aug. 2003, J. Indsto, ex *Hardenbergia violacea*, AM (K.224813,23); 2♂, 2♀, Nadgee Reserve, 6 Sep. 1985, R. W. Thorp, ex *Daviesia* sp., AM (K.344498–501); ♀, Nadgee Reserve, 12 Oct. 1986, E.A Sugden, ex *Dillwynia sericea*, AM (K.344502); ♂, National Park, 10 Sep. 1955, D. K. McAlpine, AM (K.344471); 3♀, 5 km N Nullo Mtn turnoff, 21 Nov. 1978, N. W. Rodd, AM (K.344479–81); 2♂, North Ryde (33.7644°S 151.1055°E), 30 Aug. 2005, M. Batley, ex *Dillwynia retorta*, AM (K.334764–65); 3♀, Parramatta Park (33.7914°S 150.0100°E), 18 Aug. 1999, M. Batley, ex *Daviesia ulicifolia*, AM (K.334746–47,51); 2♂, 2♀, Parramatta Park, 14 Aug. 2009, M. Batley, AM (K.334800–02); ♂, Pearl Beach, C. Morris, AM (K.344530); ♂, Pennant Hills (33.7494°S 151.0878°E), 3 Sep. 1999, M. Batley, ex *Pultenaea stipularis*, AM (K.334750); 3♀, Pilliga NR (30.9364°S 149.4222°E), 13 Sep. 2005, M. Batley, ex *Pultenaea cinerascens*, AM (K.334770–72); 5♂, 6♀, Scheyville NP, 13–30 Aug. 2001, J. Indsto, ex *Hardenbergia violacea*, AM (K.224745–55); 5♂, 2♀, Scheyville NP, 30 Aug.–8 Sep. 2002, J. Indsto, AM (K.224786–89,92–94); ♀, Smithfield, 10 Aug. 1947, S. Stein, AM (K.344460); ♂, 2♀, Tomaree NP, 11–20 Sep. 2003, J. Indsto, ex *Hardenbergia violacea*, AM (K.224802,43,44); ♀, Turramurra (33.6864°S 151.1600°E), 30 Jul. 2004, M. Batley, ex *Boronia ledifolia*, AM (K.334760); 2♂, Turramurra (33.6864°S 151.1600°E), 29 Aug. 2005, M. Batley, ex *Dillwynia retorta*, AM (K.334762–63); ♂, 6 km SW Wyee, 19 Aug. 2005, M. Batley, ex *Daviesia squarrosa*, AM (K.224608). **Queensland:** 11♂, 5♀, Acacia Ridge, 21 Aug. 1966, T. F. Houston, on *Daviesia*, Hairy bush pea & False *Sarsparilla*, SAM (32-024457,61–64,66–75); ♂, ♀, Beerburum, 7 Sep. 1991, G. Maynard, off *Daviesia*, MV; ♀, 14 km W Beerburum (26.9420°S 152.8303°E), 25 Aug. 2008, M. Batley, AM (K.334793); 3♂, 7♀, Beerwah, 2–17 Sep. 1966, J. C. Cardale, *Daviesia*, UQIC; 2♂, Brisbane, 4 Sep. 1911, H. Hacker, QM; ♀, Brisbane, 13 Sep. 1921, H. Hacker, QM; Brisbane, 29 Aug. 1916, H. Hacker, QM; 3♂, Brisbane, 20 Aug. 1918, H. Hacker, QM; ♂, Brisbane, 14 Aug. 1966, F. R. Wylie, UQIC; 4♂, Brisbane, 19 Aug. 1956, K., J., MV (16556–59); ♀, Cooloola, 17–28 Aug. 1970, E. C. Dahms, QM; 2♂, S of Eukey, 26 Sep. 1967, T. F. Houston, *Daviesia and Hardenbergia*, SAM (32-024501, 03); 6♂, Glen Aplin, 11 Sep. 1966, J. C. Cardale, UQIC; ♂, ♀, Karawatha (27.6658°S 153.1072°E), 31 Aug. 2008, M. Batley, ex *Daviesia ulicifolia*, AM (K.334795–96); ♂, 5 mi S Mooloolaba, 10 Sep. 1968, T. F. Houston, on *Daviesia*, SAM (32-024460); ♂, Mount Coot-tha (27.5083°S 152.9625°E), 29 Aug. 2008, M. Batley, ex *Pultenaea villosa*, AM (K.334794); ♀, Redland Bay, 3 Sep. 1950, MV (16518); ♂, Redland Bay, 24 Aug. 1966, T. F. Houston, *Hairy bush pea*, SAM (32-024465); ♂, ♀, 69 km E St George (28.0308°S 149.3486°E), 24 Aug. 2008, M. Batley, ex *Leucopogon biflorus*, AM (K.334788–89); ♂, Tibrogargan, 15 Aug. 1966, T. F. Houston, SAM (32-024455); 3♀, Tin Can Bay, 4 Oct. 1987, N. W. Rodd, AM (K.344514–16); 4♂, 7♀, Tin Can Bay, 23–29 Aug. 1986, N. W. Rodd, AM (K.344503–13). **South Australia:** 3♀, Kangaroo Island (35.7869°S 136.8969°E), 21–22 Nov. 2002, M. Batley, ex *Dillwynia* sp., AM (K.334757–59); 3♂, 5 km E Hartley, 8 Sep. 1975, C. & T. F. Houston, on *Daviesia brevifolia*, SAM (32-024609–11); 4♂, 8 mi S Kingscote Kangaroo Is, 1 Oct. 1970, T. F. Houston, on *Dillwynia floribunda*, SAM (32-024600–03); ♂, Mt Lofty sum, T.F.H., *Daviesia*, SAM (32-024476); 5♂, Rocky River, Kangaroo Is, 4 Oct. 1970, T. F. Houston, on *Swainsona lessertifolia* & *Leucopogon*, SAM (32-024604–08); ♂, Bendigo, 10 Sep. 1922, Burns, Alec N., MV (16527); ♂, Heathmont, 23 Aug. 1930, Burns, Alec N., MV (16517); ♂, Merrijig, 30 Nov. 1971, MV (16564). **Victoria:** ♂, Bendigo, 10 Sep. 1922, Burns, Alec N., MV (16527); ♂, Heathmont, 23 Aug. 1930, Burns, Alec N., MV (16517); ♂, Merrijig, 30 Nov. 1971, MV (16564).

Diagnosis

Eyes hairy; metasomal bands narrow, silver. Male mid tibia with extensive areas of dark brown; fore basitarsus with distinct plume; S7 with narrow, rectangular lateral lobes. Female clypeus transversely convex, not flattened, with a straight basal margin; inner hind tibial spur with c. 9 teeth.

Variation

Both sexes sometimes have metasomal bands of moderate width and occasionally the bands are gold.

Descriptions

Male (holotype).—*Head* width 3.70 mm, body length 10.7 mm. Relative dimensions: HW 50, HL 39, UID 29,

UFW 30, LID 29, DMA 31, HVO 4, WOC 13, MOD 4, OOD 9, IAD 9, ASD 3, AOD 7, ML 19, BMW 7, MSL 1.8, SL 13, SW 3, FL c. 50.—*Eyes* hairy; face narrow, inner orbits parallel; length malar space c. 0.25× basal mandibular width; flagellum as long as head width; middle flagellomeres c. 1.5× as long as wide; hind tarsus as long as hind tibia; hind basitarsus 4.5× as long as wide; hind basitibial area carinate on posterior side only. Gonoforceps with long hair (Fig. 37); S7 with narrow, rectangular lateral lobes and strong posterior projections (Fig. 70).—*Scape*, labrum, mandible medially, tarsi, tibiae and distal ends of femora orange-brown, fore and mid tibiae medially suffused with dark brown; flagellum dark brown dorsally, mid brown ventrally. T1–5 with bands usually narrow, silver, sometimes of moderate width and occasionally gold.—*Clypeus*, excluding apex, densely punctate; scutum with dull sheen, pit-reticulate, close fine punctures.—*Face* densely and scutum closely covered with long, finely-branched, bright orange hair. Fore basitarsus with tapered plume of golden hair; femora and trochanters with much long pale hair.

Female (AM K.334760).—*Head* width 4.10 mm, body length 11.6 mm. Relative dimensions: HW 50, HL 37, UID 28, UFW 30, LID 30, DMA 31, HVO 5, WOC 13, MOD 4, OOD 8, IAD 8, ASD 3, AOD 9, ML 24, BMW 8, MSL 1.0, SL 15, SW 3, FL c. 33.—*Eyes* hairy; face slightly wider than long, inner orbits parallel; length malar space c. 0.2× basal mandibular width; clypeus transversely convex, basal suture horizontal, not bowed; flagellum shorter than head width, F1 1.6× as long as wide, F2–9 c. 1.2× as long as wide; inner hind tibial spur with c. 9 teeth; pygidial plate minutely emarginate, strongly elevated medially.—*Labrum* orange-brown; mandible medially amber; trochanters and femora dark brown; remainder of legs mid-brown. T1–4 with narrow silver, occasionally gold, bands.—*Clypeus* and supraclypeal area reticulate, densely punctate, scutum reticulate, weakly shining with close fine punctures.—*Head* with white to pale orange, plumose hair, dense in paraocular areas and on frons, open on clypeus and supraclypeal area. Scutum closely covered with very short, plumose, dull orange-brown hair; scopa brown; prepygidial fimbria brown.

Remarks. This species has commonly been misidentified in collections as *T. venustus* and the specimen used as the model for figs 198–200 in Michener (1965) was probably *T. orientalis* n.sp.

There are a number of sympatric species that are similar in appearance. Males may be distinguished from *T. venustus* by the extensive areas of dark brown on mid tibia and the shape of S7; from *T. aeratus* n.sp. by the presence of a plume on fore basitarsus; from *T. fuscus* n.sp. by paler colour and the shape of S7 and from *T. tenuiculus* by the shape of S7. Females may be distinguished from *T. venustus* by the narrow metasomal bands and straight basal margin of the clypeus; from *T. aeratus* n.sp. by unflattened clypeus; from *T. fuscus* n.sp. by the paler colour and number of teeth on inner hind tibial spur and from *T. tenuiculus* by the length of F1 and the number of teeth on inner hind tibial spur.

Distribution. Eastern Australia between Brisbane and Adelaide (BBS, CP, FLB, KAN, NET, NNC, NSS, SB, SCP, SEC, SEH, SEQ, VM) (Fig. 109).

Etymology. The specific name is a Latin adjective meaning eastern, referring to the distribution of this species.

Trichocolletes platyprosopsis n.sp.

Figs 38, 71, 110

Type. Holotype ♂, 18 km NW Eneabba, Western Australia, 9–12 Sep. 1987, T. F. Houston, on flowers of *Daviesia*, in WAM 13908.

Specimens examined. The holotype and the following. **Western Australia:** 4♂, ♀, same data as holotype, WAM (13905–07,09,10); 3♂, 6♀, 28 km 26° W of N Eneabba, 28 Aug. 1999, T. F. Houston, on flowers of *Daviesia divaricata*, WAM (27508–12,14–17); ♀, 12 mls N Geraldton, 12 Jul. 1973, N. McFarland, WAA (45290); ♂, Nabawa, 9 Jul. 1998, S. R. Patterson, WAM (21394); ♀, Watheroo National Park (30.20°S 115.83°E), 3–5 Oct. 1980, T. F. Houston, on flowers of *Daviesia divaricata*, WAM (13838).

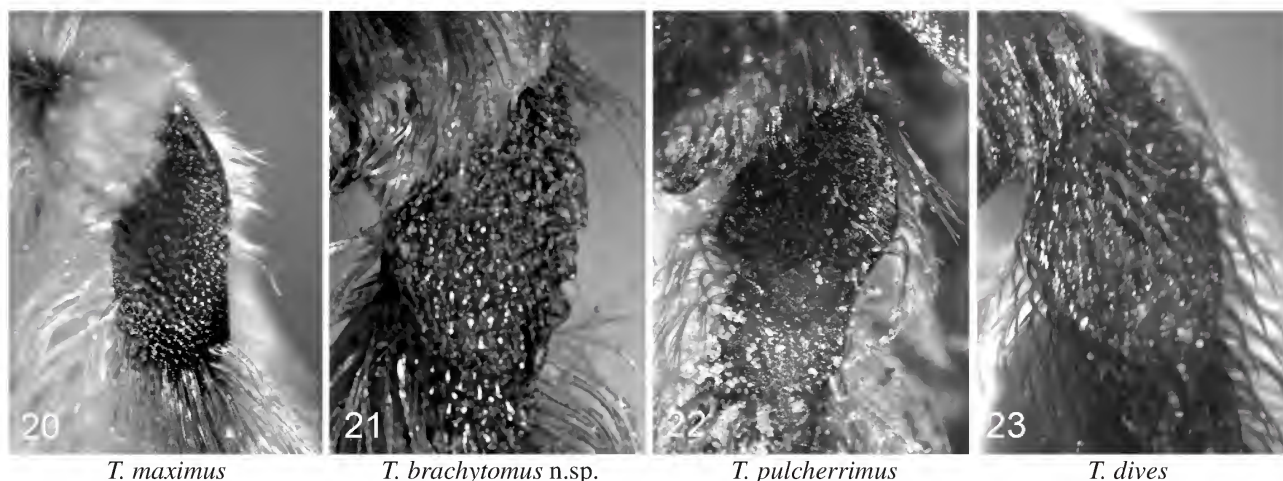
Diagnosis

Eyes not hairy; metasomal bands silver-white, ferruginous across anterior margin. Female clypeus polished and strongly flattened, almost spatulate; labrum tectiform. Male S7 distinctive (Fig. 71); legs slender, orange-brown; hind basitarsus gently bowed. Unlike any other species.

Descriptions

Male (holotype).—*Head* width 3.85 mm, body length 11.3 mm. Relative dimensions: HW 50, HL 38, UID 31, UFW 33, LID 30, DMA 29, HVO 0, WOC 14, MOD 4, OOD 8, IAD 7, ASD 3, AOD 8, ML 20, BMW 4, MSL 1.0, SL 13, SW 3, FL c. 54.—*Eyes* not hairy; face narrow; clypeus distinctly flattened though covered with dense pubescence; ocellar-ocular area strongly depressed; malar space short (length c. 0.2× basal mandibular width); flagellum longer than head width; all flagellomeres longer than wide. Legs very slender; hind tarsus 1.1× as long as hind tibia; hind basitarsus 5.7× as long as wide; gently bowed and tapering slightly towards distal end; basitibial area with pigmented posterior carina; fore tibial calcar with c. 5 short teeth. Gonoforceps transversely truncate with moderately short, stiff apical hairs (Fig. 38); S7 with small lateral lobes fused with posterior projections and basal teeth, approximately diamond-shaped (Fig. 71).—*Labrum* and mandible amber, scape, femora, tibiae and tarsi orange-brown, with darker suffusions on femora and hind tibia; coxae, trochanters and flagellum dorsally dark brown, ventrally mid-brown. T1–5 with moderately broad, white bands, distinctly ferruginous across anterior margin; T7 mid brown.—*Clypeus* densely punctate except ventral rim impunctate, polished; scutum strongly reticulate, obscuring punctures.—*Head* densely covered with long, orange hair, erect on clypeus. Scutum closely covered with long, densely-branched pale orange-brown hair; fore basitarsus without plume; hind femur with scattered white hair on anterior margin.

Female (WAM 27511).—*Head* width 4.20 mm, body length 12.8 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 31, LID 31, DMA 30, HVO 4, WOC 13, MOD 3, OOD 8, IAD 8, ASD 3, AOD 9, ML 21, BMW 5, MSL 0.5, SL 15, SW 3, FL c. 34.—*Eyes* not hairy; malar space short (length c. 0.1× basal mandibular width); labrum tectiform; clypeus strongly flattened, almost spatulate; supraclypeal area bulbous; middle flagellomeres c. 1.3× as long as wide; inner hind tibial spur with c. 8 long, well-spaced teeth; tarsal claws simple; pygidial plate broad, truncate, with medial elevation and wide, upturned margin.—*Labrum*, mandible medially, tarsi, tibiae and apical half femora orange-brown; coxae,



Figs 20–23. Basal area of hind tibia of *Trichocolletes* females: (20) *T. maximus*, (21) *T. brachytomus* n.sp., (22) *T. pulcherrimus*, and (23) *T. dives*. Setae were removed from the *T. maximus* and *T. brachytomus* n.sp. specimens, but shortened by wear in the other cases.

trochanters and basal half of femora dark brown. T1–4 with moderately wide, white bands distinctly ferruginous across anterior margins; wings darkened.—*Surface of clypeus* polished with very broad irregular depressions, dulled basally with pit-reticulation; labrum with longitudinal medial carina and weak, oblique rugae laterally.—*Apico-lateral corners of clypeus*, paracocular areas and frons densely covered with golden-brown, plumose hair. Scutum closely covered with densely-branched, pale orange-brown hair tipped with dark brown; prepygidial fimbria chocolate brown; hind tibial scopa pale orange.

Remarks. This species is referred to as F265/M236 in Houston (2000).

Distribution. Geraldton Sandplains, Western Australia (GS) (Fig. 110).

Etymology. The specific name is from the Greek adjective for flat-faced, referring to the clypeus, particularly of the female.

Trichocolletes pulcherrimus Michener

Figs 9, 22, 26, 111

Trichocolletes (Callocolletes) pulcherrimus Michener, 1965, p. 265.

Specimens examined. Holotype ♂, Narrogin, Western Australia, 1 Nov. 1935, WAM (65–727) and the following. **Western Australia:** ♀, Dumbleyung, 14 Nov. 1966, H. Udell, WAM (9007); 4♀, 75 km E Hyden, 24–27 Oct. 1985, T. F. Houston, on flowers of *Gastrolobium spinosum*, WAM (8997–9000); 2♂, 61 km E Hyden, 14 Oct. 1979, T. F. Houston, on flowers of *Burtonia hendersoni*, WAM (9001–02); ♀, Regans Ford Moore River, 11 Nov. 1976, S. M. Postmus, on *Jacksonia* sp., WAM (9006); ♀, 10 S Perenjori, 1 Nov. 1958, E. F. Riek, ANIC; 3♀, 19 km ESE Southern Cross, 28 Oct. 1978, T. F. Houston, on flowers of *Gompholobium viscidulum*, WAM (9003–05).

Diagnosis

Length 16–18 mm; eyes not hairy; metasoma orange-brown with indistinct metasomal bands; flagellum banded dorsally in both sexes. Male hind tibia strongly expanded, without spurs; apical segment of flagellum truncate, slightly expanded on one side; fore trochanter with large spine. Female scape and more than half clypeus orange-brown.

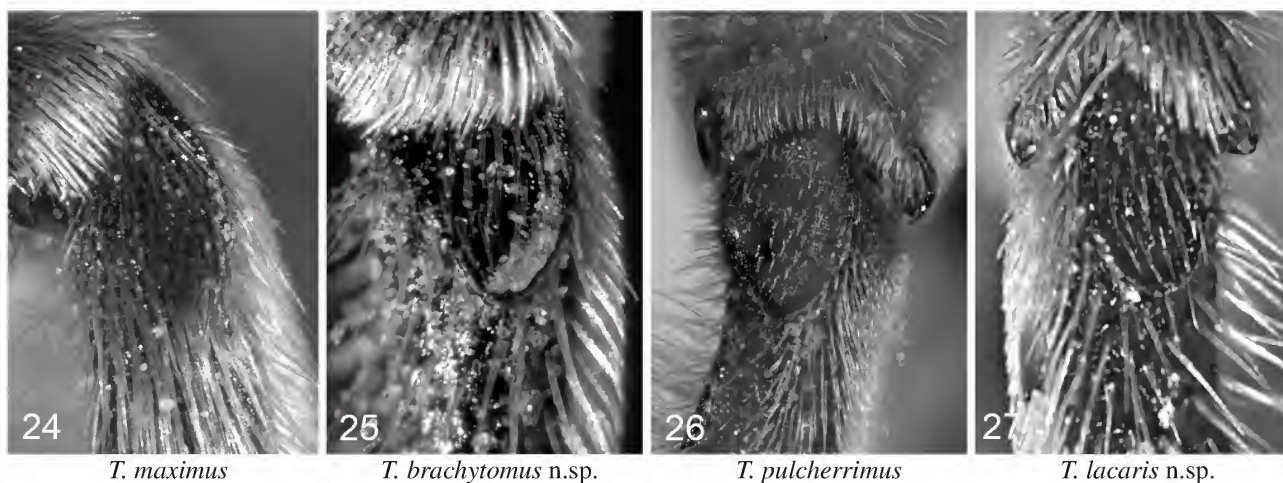
Remarks. Detailed descriptions can be found in Michener, 1965.

In 1965, Michener proposed division of the genus *Trichocolletes* into two subgenera, with this species as the sole member of the subgenus *Callocolletes*. At that time, the Colletidae family was regarded as a primitive lineage, but molecular evidence now indicates that it is one of the more derived (Danforth *et al.*, 2006) and that separation of *Trichocolletes* from other Australian colletids occurred relatively early (Almeida and Danforth, 2009). However, the premise on which the subgenus was based remains unaltered. If the hind basitibial area of *T. pulcherrimus* females is intermediate in nature between those found in the remaining *Trichocolletes* species and those of other colletids, it might indicate that *T. pulcherrimus* occupies a basal position within the genus.

The use of molecular evidence from fresh material to test this hypothesis was, unfortunately, not possible as attempts to recollect specimens were unsuccessful, but the increased number of species now available made possible reassessment of the morphological evidence. Although the male exhibits a number of striking modifications including the absence of hind tibial spurs, Michener (1965, 2007) chose to give greater weight to the hind basitibial area and details of wing venation.

The basitibial area of females is difficult to observe because of a dense cover of stiff setae. When the setae are removed, the contiguous depressions at the base of each seta form a coarsely areolate surface (Fig. 22). Interpretation of the resulting structure can be difficult. Frequently specimens are found with the setae worn down to the tops of the depressions making the actual surface difficult to detect and producing an apparent rim to the basitibial area. A second difficulty is that even when setae are removed cleanly, the edge of the basitibial area may be coarsely serrated where it intersects the depressions (as shown for *T. brachytomus* n.sp. in Fig. 21). It is unclear whether or not this state should be classified as carinate.

A better character to use may be the hind basitibial area of males. Comparison of the basitibial areas of males of eight species with those of conspecific females confirmed that the degree of elevation of the basal area from the surrounding surface of the tibia in males reflected that observed for the females after removal of the setae. Of the



Figs 24–27. Basal area of hind tibia of *Trichocolletes* males: (24) *T. maximus*, (25) *T. brachytomus* n.sp., (26) *T. pulcherrimus*, and (27) *T. lacaris* n.sp.

38 species for which males are known, five, *T. brachytomus* n.sp., *T. dives*, *T. lacaris* n.sp., *T. pulcherrimus* and *T. tuberatus* n.sp., were found to have basitibial areas at least as well developed as in *T. pulcherrimus* (Fig. 26).

The second criterion used by Michener (1965) was the ratio of the lengths of the pterostigma and prestigma. This measurement is difficult to make accurately and involves a degree of subjectivity. It was found (Table 1, Fig. 28) that the ratio for *T. pulcherrimus* lies in the middle of the range for all species. Using 10 specimens each of *T. orientalis* n.sp. and *T. venustus*, it was estimated that the standard deviation of the measurements was 0.1.

Trichocolletes pulcherrimus males are unique in having a combination of unusual characters, but with the exception

of the loss of the hind tibial spurs, similar characters occur separately or in other combinations in a number of species: projections are found on the fore trochanters of males of *T. avialis* n.sp. and *T. nitens* n.sp.; modified legs are found in *T. aureotinctus*, *T. avialis* n.sp., *T. burnsi*, *T. dives*, *T. dowerinensis*, *T. hackeri* and *T. macrogathus* n.sp.; and modified flagella occur in *T. dives* and *T. gelasinus* n.sp.. These male characters are not correlated with the female characters discussed above and it is concluded that the evidence presently available does not support recognition of the subgenus *Callocolletes*.

Distribution. Southwestern Australia (AW, MAL, SWA) (Fig. 111).

Table 1. Ratio of length stigma to length prestigma in forewing of females of some *Trichocolletes* species. Intraspecific variation was determined using 10 specimens each of *T. orientalis* n.sp. and *T. venustus*. The standard deviation of the measurements was 0.1.

species	length ratio stigma / prestigma	species	length ratio stigma / prestigma
<i>T. aeratus</i> n.sp.	1.50	<i>T. luteorufus</i> n.sp.	1.50
<i>T. albigenae</i> n.sp.	1.67	<i>T. macrogathus</i> n.sp.	1.64
<i>T. aureotinctus</i>	1.66	<i>T. marginatus</i>	1.69
<i>T. brachytomus</i> n.sp.	1.70	<i>T. maximus</i>	1.48
<i>T. brunilabrum</i> n.sp.	1.80	<i>T. micans</i> n.sp.	1.88
<i>T. burnsi</i>	1.85	<i>T. multipectinatus</i>	1.87
<i>T. capillosus</i> n.sp.	1.44	<i>T. nitens</i> n.sp.	1.73
<i>T. centralis</i> n.sp.	1.73	<i>T. orientalis</i> n.sp.	1.52
<i>T. chrysostomus</i>	1.66	<i>T. macrogathus</i> n.sp.	1.40
<i>T. dives</i>	1.73	<i>T. pulcherrimus</i>	1.60
<i>T. dowerinensis</i>	1.74	<i>T. rufibasis</i>	1.64
<i>T. dundasensis</i> n.sp.	1.50	<i>T. sericeus</i>	1.55
<i>T. erythrurus</i>	1.93	<i>T. serotinus</i> n.sp.	1.67
<i>T. gelasinus</i> n.sp.	1.54	<i>T. simus</i> n.sp.	1.60
<i>T. grandis</i> n.sp.	1.67	<i>T. soror</i> n.sp.	1.61
<i>T. hackeri</i>	2.00	<i>T. tenuiculus</i>	1.47
<i>T. lacaris</i> n.sp.	1.90	<i>T. tuberatus</i> n.sp.	1.93
<i>T. latifrons</i>	1.55	<i>T. venustus</i>	1.43
<i>T. leucogenys</i> n.sp.	1.71		

Trichocolletes rufibasis (Cockerell)

Figs 6, 39, 72, 112

Paracolletes rufibasis Cockerell, 1929a, p. 204 (male).

Trichocolletes (Trichocolletes) rufibasis.—Michener, 1965, p. 80.

Specimens examined. The holotype ♂, Eradu, Western Australia, Nicolson, AM (K.95635) and the following. **South Australia:** 8♀, Lake Gilles Natl Park (33.06°S 136.67°E), 13 Nov. 1975, T. F. Houston & J. A. Herridge, on *Daviesia nudula*, SAM (32-024523–30). **Western Australia:** 2♂, 22 km N Bullfinch, 7 Sep. 1979, T. F. Houston, on flowers of *Swainsona microphylla*, WAM (13990–91); 5♀, 22 km N Bullfinch, 2–3 Oct. 1981, T. F. Houston, on flowers of *Mirbelia depressa*, WAM (13992–96); ♂, ♀, Charles Darwin Reserve, Sep. 2009, R. Leys, AM (K.344826–27); ♂, 25 km S Cue, 31 Aug. 1981, G. A. Holloway, AM (K.344531); ♂, 18 km E Hyden (32.4170°S 119.0989°E), 10 Oct. 2009, M. Batley, AM (K.344825); 3♂, Kalamunda, WAM (13785–87); 4♀, Kalbarri, 29 Aug. 1970, K. T. Richards, WAA (80836.38.46.47); 7♂, 2♀, McDermid Rock, 27 Sep.–3 Oct. 1978, T. F. Houston et al., on flowers of *Daviesia costata*, WAM (13971–7, 13997, 19121); ♂, Mt Jackson, 5–11 Sep. 1979, T. F. Houston, on flowers of *Dryandra arborea*, WAM (13998); ♂, 14 km NW Narrogin (32.8761°S 117.0425°E), 9 Oct. 2009, M. Batley, AM (K.344824); ♂, 4♀, National Park, WAM (13769–72); 3♂, 2♀, Neerabup Nat. Park 15 km NW Wanneroo, 16 Oct. 1994, T. F. Houston et al., on flowers of *Daviesia*, WAM (13595–99); 8♀, Lake Gilles Natl Park (33.06°S 136.67°E), 13 Nov. 1975, T. F. Houston & J. A. Herridge, on *Daviesia nudula*, SAM (32-024523–30); ♂, 16 km S Norseman (32.3403°S 121.7575°E), 7 Oct. 2009, M. Batley, AM (K.344823); 30♂, 7♀, 7 km SSW Norseman, 19 Sep. 1981, I. D. Naumann & J. C. Cardale, ANIC; ♂, Tallering Stn, 1 Sep. 1976, R. P. McMillan, WAM (13788).

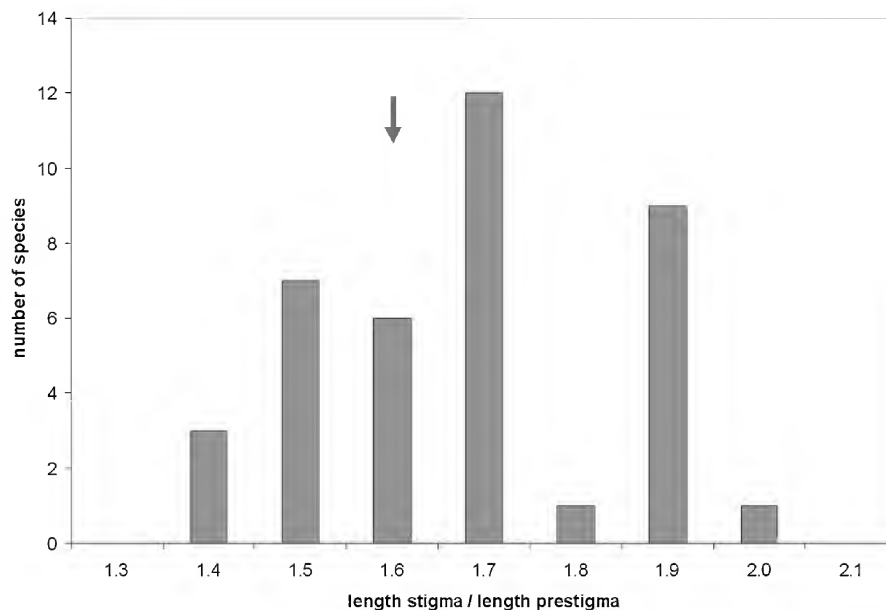


Fig. 28. Number of species versus ratio of length stigma to length prestigma in forewing of *Trichocolletes* females. The ratio for *T. pucherrimus* is indicated by the arrow.

Diagnosis

Eyes not hairy; metasomal bands gold; metasoma usually with large areas of orange-brown on T1,2; malar space very short. Male metasoma noticeably slender; S7 with sinuate posterior margin (Fig. 72). Female clypeus usually flattened sagittally.

Variation

The species is rather variable in colour. A long series of specimens collected near Norseman contained examples with and without orange-brown on the metasoma while all eight specimens collected at Kalamunda National Park were without orange-brown and had silver metasomal bands. The body lengths of the latter specimens were on average 1 mm greater than for the former. Females from Bullfinch and Lake Gilles had red-brown rather than orange-brown markings and the clypeus was not flattened. When associated males are available, the last two may warrant classification as a separate species or subspecies. Variation in the shape of the posterior margin of S7 of males was also observed between specimens having of the typical colour form.

Descriptions

Male (holotype).—*Head* width 3.65 mm, body length 11.6 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 31, LID 28, DMA 26, HVO 5, WOC 13, MOD 4, OOD 9, IAD 9, ASD 3, AOD 8, ML 19, BMW 7, MSL 0.5, SL 14, SW 3, FL c. 51.—*Eyes* not hairy; head broad, inner orbits converging ventrally; malar area short (length c. 0.1× basal mandibular width); flagellum as long as head width; middle flagellomeres c. 1.6× as long as wide. Legs slender; hind tarsus 1.2× as long as hind tibia; length basitarsus 4.8× width. Genital capsule like that for *T. orientalis* n.sp., but penis valves slightly shorter and broader (Fig. 39); S7 (WAM 13971) lateral lobes triangular with strongly rounded corners and sinuate posterior margin, basal teeth obsolete (Fig. 72).—*Labrum*, scape, large part of clypeus ventrally, mandible, anterior and posterior regions of T1, anterior half T2, anterior quarter of T3, distal ends of femora and all of tibiae and tarsi orange-brown; coxae,

trochanters and most of femora dark brown; flagellum mid to dark brown, F2–8 paler ventrally. T1–5 with gold bands; T7 red-brown medially.—*Scutum* dull with strong pit-reticulation almost obscuring punctures.—*Face* densely covered with long, erect, bright orange hair; scutum with thin cover of long, dull orange, finely-branched hair; fore basitarsus without plume; other legs with sparse hair.

Female (WAM 13975), not previously described.—*Head* width 3.85 mm, body length 11.5 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 32, LID 30, DMA 28, HVO 5, WOC 14, MOD 4, OOD 8, IAD 8, ASD 3, AOD 9, ML 19, BMW 7, MSL 0.5, SL 15, SW 3, FL c. 33.—*Eyes* not hairy; head broad, orbits slightly convergent ventrally; clypeus sagittally flattened; supraclypeal area prominent; malar space short (length c. 0.1× basal mandibular width); middle flagellomeres slightly longer than wide; inner hind tibial spur with c. 9 teeth; tarsal claws with large, triangular inner ramus; pygidial plate entire or with minute apical emargination and broad, low medial elevation.—*Labrum*, ventral rim of clypeus, most of mandible, anterior half of T1,2 orange-brown; posterior half T1,2 and legs dark brown; S2 yellow-brown; remaining sterna brown. T1–4 with pale gold bands.—*Clypeus* reticulate with close to dense, large punctures, supraclypeal area densely punctate; scutum with strong pit-reticulation obscuring punctures.—*Paraocular areas* and frons covered with long, plumose, orange hair, paler ventrally and tipped with dark brown near ocelli. Scutum openly covered with short, plumose, orange-brown hair with dark tips; hind tibial scopa brown to dark brown, with a little white along anterior margin; prepygidial fimbria dark brown.

Remarks. The holotype is smaller than average, with most males slightly over 12 mm in length. This species closely resembles *T. soror* (see below).

This species is referred to as F271/M237, F255/M229 and F263/M234 in Houston (2000).

Distribution. Southwestern Australia (AW, COO, GAW, GS, JF, MAL, MUR, SWA, YAL) (Fig. 112).

Trichocolletes sericeus (Smith)

Figs 5, 40, 42, 73, 113

Anthoglossa sericea Smith, 1862, p. 59 (female).*Trichocolletes (Trichocolletes) sericeus*.—Michener, 1965, p. 80.*Trichocolletes (Trichocolletes) marginatulus* Michener, 1965, p. 246. **n. syn.**

Specimens examined. The holotypes of *T. sericeus* ♀, Australia, BMNH Hym 17.a.395 and *T. marginatulus* ♂, Dunwich, Stradbroke Island, Queensland, 21 Aug. 1958, C. D. Michener, ANIC and the following. **New South Wales:** ♀, Kandos Weir, 10 Nov. 1981, N. W. Rodd, AM (K.344532); 3♂, 2♀, Mellong Swamp (33.0858°S 150.7058°E), 29 Sep.–3 Nov. 2000, M. Batley, ex *Dillwynia floribunda*, *Podolobium ilicifolium*, *Daviesia alata* & *Daviesia acicularis*, AM (K.224180–81; K.316504–06); ♀, Mellong Swamp, 6 Oct. 2001, M. Batley, ex *Podolobium ilicifolium*, AM (K.316507); 4♂, Mellong Swamp (33.0858°S 150.7058°E), 25 Sep. 2009, M. Batley, AM; 10♂, 5♀, Mellong Swamp, 12–21 Oct. 2001, J. Indsto, AM. **Queensland:** ♂, ♀, Dunwich, Stradbroke Is, 21–22 Oct. 1958, C. D. Michener, UQIC; ♂, ♀, Dunwich, Stradbroke Island, 21 Aug. 1958, C. D. Michener, ANIC. **South Australia:** ♀, 12 km S Monarto South Ferries Nat Pk, 8 Oct. 1973, P. B. McQuillan, on *Leptospermum* bloom, SAM (32-024667); ♂, Pinnaroo (35.5539°S 140.7614°E), 7 Oct. 2003, M. Batley, ex *Dillwynia* sp., AM (K.316508). **Victoria:** ♂, ♀, Hattah, 11 Oct. 1953, P.J., MV (16505, 48).

Diagnosis

Eyes not hairy; metasomal bands broad; prominent supraclypeal area inclined relative to clypeus. Male scapes swollen (Fig. 5); supraclypeal area with dense hair. Female clypeus with coarse, dense punctures.

Remarks. Michener (1965) gave detailed descriptions of this species as *T. marginatulus*. Similar to *T. chrysostomus* from which it is distinguished by slightly smaller size (length male c. 11 mm, female c. 11.5 mm), the presence of hair on supraclypeal area of male and the density of punctures on the clypeus of female. Male genitalia and hidden sterna (Figs 40, 42, 73) are almost identical to those of *T. chrysostomus*.

Distribution. Southeastern Australia between Brisbane and Adelaide (MDD, SB, SEQ) (Fig. 113).

Trichocolletes serotinus n.sp.

Figs 43, 74, 114

Type. Holotype ♂, Mount Hay Road (33.6389°S 150.3983°E), 17 Oct. 1998, M. Batley, ex *Dillwynia floribunda*, in AM K.344806.

Specimens examined. The holotype and the following. **Australian Capital Territory:** ♂, Hill W side Condor Ck bridge, 6 Nov. 1993, G. J. Davis & G. V. Maynard, *Daviesia mimosoides*, MV (930642). **New South Wales:** ♀, Aaminaby-Kiandra Road (35.9011°S 148.5794°E), 31 Dec. 2008, M. Batley, ex *Mirbelia platylobioides*, AM (K.344813); 2♂, Blue Mountains, 3–4 Oct. 1915, A. Musgrave, ANIC; 12♂, Blue Mtns, 3 Oct. 1915, A. Musgrave, AM (K.344534–45); 6♂, 2♀, Clarence,

28–31 Oct. 1979, N. W. Rodd, AM (K.344550–57); ♀, 9 km E Kiandra (35.9125°S 148.5794°E), 31 Dec. 2008, M. Batley, AM (K.224900); ♂, 2♀, 12 km SE Kiandra (35.9356°S 148.5928°E), 31 Dec. 2008, M. Batley, ex *Mirbelia platylobioides*, AM (K.224904–06); ♂, ♀, Mt Canobolas (33.3181°S 148.9817°E), 9 Nov. 2005, M. Batley, ex *Mirbelia oxylobooides*, AM (K.344814–15); ♂, Mt Kaputar NP, 2 Oct. 1976, E. M. Exley & T. Low, UQIC; 2♂, ♀, Mt Kaputar NP, 12 Nov. 1979, N. W. Rodd, AM (K.344558–60); ♀, Mount Wilson (33.5417°S 150.3414°E), 25 Oct. 2002, M. Batley, ex *Boronia microphylla*, AM (K.344811); 3♀, Mount Wilson (33.5400°S 150.3442°E), 12 Nov. 1999, M. Batley, ex *Daviesia alata*, AM (K.344807–09); ♀, Napoleon Reef (33.4167°S 149.7497°E), 7 Nov. 2005, M. Batley, ex *Pultenaea setulosa*, AM (K.344812); 2♂, 2♀, Nullo Mtn, 21 Nov. 1978, N. W. Rodd, AM (K.344546–49); 3♂, Wentworth Falls, 27 Oct. 1930, Burns, Alec N., MV (16561–63). **South Australia:** 4♂, ♀, Kyeema Nat Pk nr Meadows, 9 Oct. 1972, T. F. Houston, on *Daviesia corymbosa*, SAM (32-024657–61); ♂, ♀, Mt Lofty summ, 26 Oct. 1964, T.F.H., on *Platylobium*, SAM (32-024453–54); ♂, Mt Lofty summit, 4 Oct. 1963, ex *Daviesia*, SAM (32-024450); ♀, Rocky River, Kangaroo Is, 31 Oct. 1964, S. Barker, SAM (32-024452); ♂, Rocky River, Kangaroo Is, 4 Oct. 1970, T. F. Houston, on *Leucopogon*, SAM (32-024662); ♂, Waitpinga, 3 Oct. 1965, T. F. Houston, on *Daviesia*, SAM (32-024451). **Tasmania:** ♀, Bridport, 28 Oct. 1913, F. M. Littler, AM (K.44076); 11♂, 4♀, Bridport, 26–30 Oct. 1913, F. M. Littler, SAM (32-024433–47); ♀, Hobart, 24 Oct. 1917, G. H. Hardy, AM (K.95636); 3♂, Hobart, 22 Oct. 1916, G. H. Hardy, QM; ♂, Hugel River (42.1000°S 146.1500°E), 6 Dec. 1974, Neboiss, Arturs, MV (16497). **Victoria:** ♂, ♀, Bright, H. W. Davey, QM; ♂, Buckland River, 30 Nov. 1964, MV (16503); ♂, Caulfield, MV (16560); 7♂, ♀, Dartmouth Dam, 31 Oct. 1976, Calder, Andrew A., MV (16565); ♂, Dromana, 3 Nov. 1931, F. E. Wilson, MV (16498); ♀, 2 km S Falls Creek (36.8756°S 147.2861°E), 2 Jan. 2009, M. Batley, ex *Mirbelia platylobioides*, AM (K.224931); ♂, Ferntree Gully, 28 Sep. 1930, Burns, Alec N., MV (16525); ♂, Frankston, 18 Oct. 1932, Burns, Alec N., MV (16545); ♂, Grampians, 1 Oct. 1928, F. E. Wilson, ANIC; 3♂, Grampians, Oct. 1928, Wilson, F.E., MV (16489,90,99); 2♂, 3♀, Grampians, 10 Nov. 1930 & 23 Oct. 1932, Burns, Alec N., MV (16515,19,16543–44); 2♂, ♀, Halls Gap, 1 Nov. 1928, CB, SAM (32-024448–49); ♂, Melbourne, R. E. Turner, BM; 2♂, ♀, 15 km E Mount Hotham (37.0283°S 147.2717°E), 3 Jan. 2009, M. Batley, ex *Mirbelia platylobioides*, AM (K.224948–49,56); ♂, Mt Buffalo, 18 Dec. 1933, A. Musgrave, AM (K.95638); ♂, Mount Buffalo, 13 Jan. 1955, Neboiss, Arturs, ANIC; 2♂, Mount Buffalo, 13 Jan. 1955, Neboiss, Arturs, MV (16487–88); ♂, Upwey, 22 Feb. 1930, Wilson, F.E., MV (16522).

Diagnosis

Eyes not hairy; metasomal bands gold; scutal hair dull orange-brown. Active in late spring and summer in Eastern Australia.

Descriptions

Male (holotype).—*Head* width 3.65 mm, body length 11.3 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 30, LID 27, DMA 28, HVO 4, WOC 15, MOD 5, OOD 8, IAD 10, ASD 4, AOD 7, ML 20, BMW 7, MSL 0.5, SL 14, SW 3, FL c. 53.—*Eyes* not hairy; face almost quadrate, inner orbits converge ventrally; length malar space c. 0.1× basal mandibular width; flagellum as long as head width; middle flagellomeres c. 1.3× as long as wide. Legs slender; hind tarsus 1.1× as long as hind tibia; hind basitarsus 5.15× as long as wide; basitibial area indistinct. Gonoforceps broadened apically, hairs relatively sparse; S7 lateral lobes obliquely triangular with posterior margin rounded, posterior projections obsolete (Fig. 74).—*Labrum*, tarsi,



29

T. aureotinctus



30

T. burnsi



31

T. dives



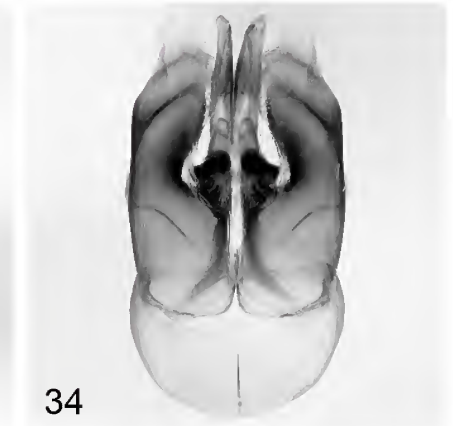
32

T. dowerinensis



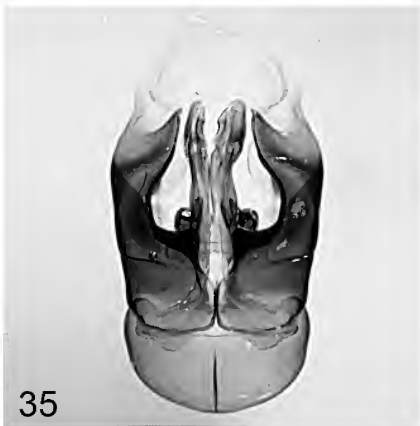
33

T. gelasinus n.sp.



34

T. latifrons



35

T. macrognathus n.sp.



36

T. marginatus



37

T. orientalis n.sp.



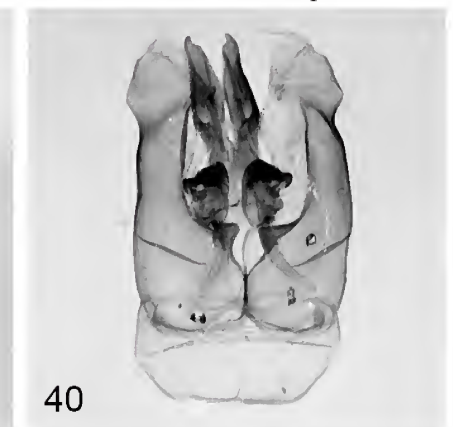
38

T. platyprosopis



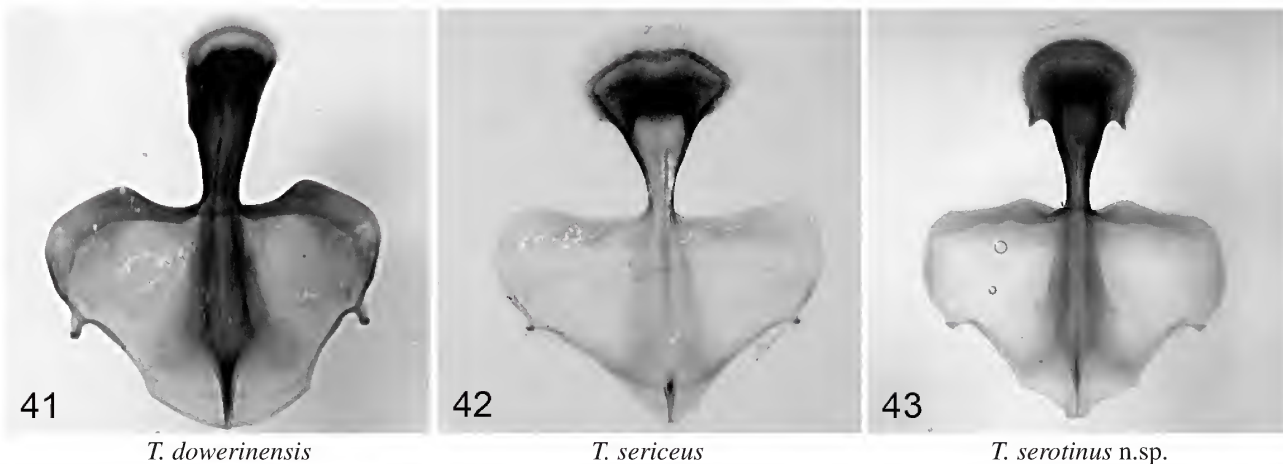
39

T. rufibasis



40

T. sericeus



Figs 41–43. Eighth sternum of *Trichocolletes* males, ventral view: (41) *T. dowerinensis*, (42) *T. sericeus*, and (43) *T. serotinus* n.sp.

distal ends of femora, fore and mid tibiae and scape orange-brown; scape often with dark suffusions, occasionally black; fore and mid tibiae with dark suffusions medially; mandible amber medially; flagellum (other than F1) brown ventrally. T1–5 with moderate width gold bands.—*Clypeus* densely punctate basally, apical 20% impunctate, basal suture indistinct; scutum dull with strong pit-reticulation obscuring close punctures.—*Face* densely covered with long, plumose, orange hair. Scutum closely covered with plumose dull orange hair; fore basitarsus with weak fringe of pale hair; anterior margin of hind tibia with close fringe of erect pale hair.

Female (AM K.334811).—*Head* width 4.00 mm, body length 11.5 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 33, LID 30, DMA 31, HVO 3, WOC 7, MOD 4, OOD 8, IAD 8, ASD 3, AOD 9, ML 22, BMW 9, MSL 0.8, SL 16, SW 3, FL c. 29.—*Eyes* not hairy; face wider than long, inner orbits slightly convergent ventrally; malar space short (length c. 0.1× basal mandibular width); clypeus transversely convex, basal suture straight; flagellum short; middle flagellomeres c. 1.1× as long as wide; inner hind tibial spur with c. 11 long teeth; tarsal claws with short basal ramus; pygidial plate entire with distinct medial elevation.—*Labrum* and mandible deep amber; flagellum brown ventrally; legs dark brown. T1–4 with gold bands of moderate width.—*Clypeus* polished, weakly reticulate basally, with close, large punctures, supraclypeal area impunctate medially; scutum dull with moderately strong pit-reticulation and close to dense small punctures.—*Face* with long, plumose hair, white, sparse to open on clypeus, white, dense in paraocular areas and close, dull orange-brown on frons. Scutum closely covered with short, plumose dark-tipped orange-brown hair; hind tibial scopa white, becoming brown towards posterior margin; pre-pygidial fimbria pale brown.

Remarks. See remarks about misidentification of *T. marginatus*.

Distribution. Cooler regions of southeastern Australia including Tasmania (AA, FLB, FLI, KAN, NAN, SB, SCP, SEC, SEH, TSR, VM) (Fig. 114).

Etymology. The specific name is a Latin adjective meaning late in coming, referring to the flight phenology.

Trichocolletes simus n.sp.

Figs 75, 115

Type. Holotype ♂, Eneabba, Western Australia, 18 May 1979, R. P. McMillan, on *Daviesia*, in WAM 13982.

Specimens examined. The holotype and the following. **Western Australia:** ♀, same data as holotype WAM (13981); ♂, 10♀, Cockleshell Gully (30.09°S 115.06°E), 28 May 1987, M. Lyons, on flowers of *Daviesia*, WAM (13624–33, 13983).

Diagnosis

Length 11–12 mm; eyes not hairy; clypeus strongly deflexed and weakly protuberant; palpi very short; metasomal bands silver-white; scutal hair orange. Male T1,2 with large orange-brown areas.

Descriptions

Male (holotype).—*Head* width 3.80 mm, body length 11.3 mm. Relative dimensions: HW 50, HL 36, UID 29, UFW 30, LID 28, DMA 28, HVO 6, WOC 15, MOD 4, OOD 7, IAD 7, ASD 4, AOD 7, ML 16, BMW 7, MSL 0.5, SL 12, SW 3, FL c. 48.—*Eyes* large, not hairy; face narrow, inner orbits converge ventrally; clypeus transversely convex, strongly deflexed near base so that lower margin protrudes only slightly; malar space short (length c. 0.1× basal width mandible); palpi short, labial palpus < ½ as long as post palpal part of galea; ocellocular area strongly depressed; flagellum moderately short, middle flagellomeres c. 1.5× as long as wide; fore basitarsus short; hind legs very long, slender; tarsus as long as hind tibia; hind basitarsus 5.4× as long as wide; posterior margin basitibial area with strong, pigmented carina reaching apex. Genital capsule like that for *T. macrognathus* n.sp. (Fig. 35); S7 lateral lobes rounded, posterior projections and basal teeth obsolete (Fig. 75).—*Labrum*, mandible, scape and most of flagellum ventrally, most of T1,2 and 7, tarsi, mid and hind femora and tibiae, inner surface fore tibia orange-brown; remaining areas of legs, flagellum dorsally, small medial suffusions on T1,2 and large lateral spots on T2 dark brown. T1–5 with silver bands, ferruginous across anterior margin.—*Scutum* dull, strongly reticulate.—*Face* below ocelli densely covered with long, erect, bright orange hair.

Scutum openly covered with long, finely-branched, orange hair; fore trochanter and femur with long, orange hair; fore basitarsus with long golden hair; hind femur with weak hair tuft at distal end. Semi-adpressed hair on T3–6 somewhat paler than underlying integument.

Female (WAM 13981).—*Head* width 3.55 mm, body length 11.5 mm. Relative dimensions: HW 50, HL 42, UID 30, UFW 32, LID 30, DMA 29, HVO 5, WOC 14, MOD 4, OOD 8, IAD 9, ASD 3, AOD 9, ML 20, BMW 7, MSL 0.5, SL 14, SW 3, FL c. 36.—*Eyes* not hairy; face approximately quadrate, inner orbits slightly convergent ventrally; clypeus, malar space and palpi as for male; middle flagellomeres c. 1.1× as long as wide; inner hind tibial spur with c. 8 long slender teeth; tarsal claws with minute inner rami; pygidial plate large, truncate, with broad medial elevation and narrow margin.—*Labrum* and mandible orange-brown; flagellum dorsally dark brown, paler ventrally; legs dark brown; pygidial plate red-brown. T1–4 with moderate width white bands, ferruginous across anterior margin.—*Clypeus* polished with weak reticulation, closely covered with large punctures; supraclypeal area densely punctate.—*Face* with long, plumose, pale orange hair, sparse on clypeus and supraclypeal area, dense in paraocular areas and on frons. Scutum closely covered with plumose, dark-tipped orange hair; prepygidial fimbria very pale to mid brown.

Remarks. Association of the sexes is based morphological similarities, including length of palpi and shape of clypeus and on two coincident collection events. This species is referred to as F251 (part), F264/M235 in Houston (2000).

Distribution. Geraldton Sandplains, Western Australia (GS) (Fig. 115).

Etymology. The specific name is a Latin adjective meaning sub-nosed, referring to the shape of the clypeus.

Trichocolletes soror n.sp.

Figs 76, 116

Type. Holotype ♂, East Yuna Reserve 34 km WNW Mullewa, Western Australia, 13–16 Sep. 1984, T. F. Houston, on yellow and red pea flowers, in WAM 14002.

Specimens examined. The holotype and the following. **Western Australia:** 2♀, same data as holotype, WAM (14003–04); ♀, East Yuna Reserve 34 km WNW Mullewa, 23–24 Sep. 1983, C. & T. Houston, on flowers of *Dampiera* near pea flowers, WAM (13999); ♀, East Yuna Reserve 34 km WNW Mullewa, 28–29 Aug. 1984, T. F. Houston & B. P. Hanich, on flowers of *Comesperma*, WAM (14000); ♀, East Yuna Reserve 34 km WNW Mullewa, 24–28 Aug. 1985, T. F. Houston, on flowers of *Comesperma scoparium*, WAM (14001); ♀, 9 km 13° N of W from Eurardy HS (27.6722°S 114.7167°E), 25 Aug. 1999, T. F. Houston, on flowers of *Mirbelia spinosa*, WAM (27493); ♀, 13 km 35° S of W Eurardy HS (27.7611°S 114.5694°E), 25–26 Aug. 1999, T. F. Houston, on flowers of *Jacksonia velutina*, WAM (27494); 3♂, 10 km S Nerren Nerren HS, 19 Aug. 1980, C.A.Howard & T. F. Houston, on flowers of *Chorizema ericifolium*, WAM (14005–07); ♀, 14 km S Nerren Nerren HS, 28 Aug. 1984, T. F. Houston & B. P. Hanich, on yellow pea flowers, WAM (14008); ♀, 8 km NE Tamala HS (c. 27°S 114°E), 21–23 Aug. 1980, C. A. Howard & T. F. Houston, on flowers of *Mirbelia ramulosa*, WAM (14009).

Diagnosis

Eyes not hairy; metasoma partly or wholly orange or red-brown; metasomal bands gold. Male metasoma slender; T1,2 usually with large areas of orange-brown; posterior margin of S7 not sinuate (Fig. 76). Female robust; metasoma red-brown with broad tergal bands, occasionally indistinct; pygidial plate with deep emargination; clypeus uniformly convex.

Descriptions

Male (holotype).—*Head* width 3.80 mm, body length 13.6 mm. Relative dimensions: HW 50, HL 40, UID 32, UFW 32, LID 30, DMA 29, HVO 3, WOC 15, MOD 4, OOD 9, IAD 10, ASD 3, AOD 8, ML 18, BMW 6, MSL 0.5, SL 13, SW 3, FL c. 53.—*Eyes* not hairy; face wider than long, inner orbits slightly convergent ventrally; malar space short (length c. 0.1× basal mandibular width); length of flagellum greater than head width; middle flagellomeres c. 1.5× as long as wide. Legs slender; mid tibia slightly incrassate; hind tarsus 1.2× as long as hind tibia; length basitarsus 3.6× width; basitibial area short, posterior margin with angular edge but no carina. Genital capsule like that for *T. rufibasis* (Fig. 39); S7 lateral lobes triangular with strongly rounded corners and smooth posterior margin, basal teeth obsolete (Fig. 76).—*Head* and mesosoma predominantly black; labrum and ventral half clypeus cream; mandible, scape, flagellum ventrally, tarsi, fore tibia, both ends mid and hind tibiae and distal ends of femora orange-brown; flagellum dorsally dark brown. T1 orange-brown with broad, transverse dark brown band; T2 orange-brown with narrow, transverse brown band ending in large patches laterally; lateral margin with large black oval mark. T1–5 with wide, gold bands; T7 dull orange-brown; S2,3 mostly yellow-brown; remaining sterna dark brown with yellow-brown areas basally.—*Scutum* dull with strong pit-reticulation obscuring punctures.—*Face* densely covered with strongly branched, orange hair, erect on clypeus. Scutum and scutellum openly covered with long plumose dull orange hair; fore basitarsus without plume.

Female (WAM 14003).—*Head* width 3.95 mm, body length 12.6 mm. Relative dimensions: HW 50, HL 39, UID 30, UFW 32, LID 31, DMA 30, HVO 4, WOC 14, MOD 4, OOD 8, IAD 8, ASD 3, AOD 9, ML 20, BMW 7, MSL 0.5, SL 15, SW 3, FL c. 27.—*Eyes* not hairy; face wider than long, inner orbits almost parallel; malar space short (length c. 0.1× basal mandibular width); clypeus transversely convex; middle flagellomeres c. 0.85× as long as wide; inner hind tibial spur with c. 8 long teeth; tarsal claws with large, triangular inner ramus; pygidial plate with deep, narrow emargination.—*Head* and mesosoma predominantly black; mandible, labrum, tarsal segments 4 and 5 and extreme ventral margin of clypeus orange-brown; ventral half of clypeus and remainder of legs dark brown; metasomal terga red-brown with variable dark suffusions; T2 with large black oval marks laterally. T1–4 with broad, gold bands, sometimes indistinct.—*Clypeus* polished, weakly reticulate basally, with dense, large punctures; supraclypeal area densely covered with smaller punctures; scutal sculpture as for male.—*Paraocular areas* and frons with long, dense, plumose, orange hair; clypeus, supraclypeal area and gena with sparse, long, orange hair. Scutum and scutellum openly covered with moderately short, plumose, dull orange hair; hind tibial scopa honey-brown; T1 laterally with sparse, long, pale hair; prepygidial fimbria pale brown.

Remarks. There are many similarities between this species and *T. rufibasis*. Males may be distinguished from *T. rufibasis* by the stiffer hair clypeal hair, darker legs, colour of first flagellomere (paler ventrally than in *T. rufibasis*) and non-sinuate posterior margin of S7. Females may be distinguished from *T. rufibasis* by the deep emargination of the pygidial plate, the uniformly convex clypeus and the red, rather than orange, colour on areas of the metasoma.

This species is referred to as F262/M233 (part) in Houston (2000).

Distribution. Coastal Western Australia near Geraldton (GS, YAL) (Fig. 116).

Etymology. The specific name is a Latin noun meaning sister, referring to the similarity between this species and *T. rufibasis*.

Trichocolletes tenuiculus Rayment

Figs 77, 117

Trichocolletes tenuiculus Rayment, 1931, p. 162.

Trichocolletes (Trichocolletes) tenuiculus.—Michener, 1965, p. 80.

Specimens examined. The holotype ♂, Canowindra, New South Wales, Aug. 1930, M. Dwyer, ANIC and the following. **Australian Capital Territory:** ♂, 1.9 km S Condor Ck Bridge Rd, Brindabella Ra., 27 Sep. 1993, G. J. Davis & G. V. Maynard, off *Daviesia* and *Hardenbergia violacea*, MV; ♂, 2♀, Pierces Creek Forrest, 26 Sep. 1993, G. J. Davis & G. V. Maynard, off *Hardenbergia violacea*, MV; ♂, Uriara Crossing Rd Uriara Forest, 12 Aug. 1994, G. J. Davis & G. V. Maynard, MV (940553); 10♂, Vanitys Crossing Rd Uriara Forest, 25 Aug. 1994, G. J. Davis, *Hardenbergia*, MV (940545–52,54,55). **New South Wales:** ♂, 3♀, Doyles Creek (32.5219°S 150.7972°E), 19–22 Aug. 2005, M. Batley, AM (K.316543–46); 3♂, 3♀, Mount Canobolas (33.33°S 148.98°E), 24–25 Sep. 2005, M. Batley, AM (K.316552–57); 4♂, ♀, Mount Canobolas (33.3320°S 148.9850°E), 4–9 Sep. 2002, M. Batley, AM (K.316536–39,42); ♀, Mount Canobolas (33.3497°S 149.0164°E), 28 Sep. 2005, M. Batley, AM (K.316559); ♂, Mullion Flora Res. (33.11°S 149.17°E), 27 Sep. 2005, M. Batley, AM (K.316558); 2♀, Paling Yards (33.3570°S 148.9129°E), 7 Sep. 2002, M. Batley, AM (K.316540–41); ♀, Penrose State Forest (34.6589°S 150.2305°E), 4 Sep. 1999, M. Batley, AM (K.316533); ♀, Tallong (34.7194°S 150.5639°E), 30 Sep. 2000, M. Batley, AM (K.316535); ♂, 4♀, Wollar (32.3608°S 149.9214°E), 10 Sep. 2005, M. Batley, AM (K.316547–51); ♂, ♀, Mullion Range (33.1703°S 149.1828°E), 5 Sep. 2009, M. Batley, AM (K.316614); ♀, Willow Tree, 1 Sep. 1953, ANIC.

Diagnosis

Length c. 13 mm; eyes hairy; metasomal bands narrow, silver with brown anterior margins. Male fore basitarsus with a weak fringe rather than plume, S7 lateral lobes broadly triangular with truncated ends; scapes frequently with dark suffusions. Female flagellum with relatively long F1; frontal carina frequently ends in a small tubercle on the supraclypeal area.

Descriptions

Male (AM K.316557).—*Head* width 4.25 mm, body length 12.8 mm. Relative dimensions: HW 50, HL 41, UID 29,

UFW 29, LID 29, DMA 29, HVO 4, WOC 13, MOD 4, OOD 8, IAD 9, ASD 4, AOD 6, ML 19, BMW 7, MSL 2.0, SL 13, SW 3, FL c. 53.—*Face* narrow; length malar space c. 0.25× basal mandibular width; flagellum slightly longer than head width; middle flagellomeres c. 1.6× as long as wide. Legs slender; hind tarsus 1.25× as long as hind tibia; hind basitarsus 5.3× as long as wide; basitibial area slightly elevated above surroundings, pigmented posterior carina almost reaches apex. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 lateral lobes broadly triangular with truncated ends, posterior projections very small (Fig. 77).—*Scape*, tibiae, tarsi and distal ends femora orange-brown, with darker suffusions on fore and mid tibiae and faint suffusions on scape; labrum and mandible medially amber; flagellum dark brown. T1–5 with narrow silver bands stained brown across anterior margin.—*Clypeus* with contiguous punctures except at extreme apex; scutum with dull sheen, moderately strong pit-reticulation and small, close punctures.—*Face* densely covered with long, erect, finely-branched, dull orange hair. Scutum openly covered with similar plumose hair; fore basitarsus with weak fringe, length < 2× width basitarsus.

Female (AM K.316556).—*Head* width 4.20 mm, body length 13.3 mm. Relative dimensions: HW 50, HL 40, UID 29, UFW 31, LID 31, DMA 31, HVO 4, WOC 14, MOD 3, OOD 8, IAD 9, ASD 4, AOD 8, ML 23, BMW 8, MSL 2.0, SL 15, SW 3, FL c. 36.—*Face* almost quadrate; inner orbits parallel; length malar space c. 0.25× basal mandibular width; clypeus transversely convex, slightly flattened basomedially, basal margin weakly concave; supraclypeal area with small tubercle marking end of frontal carina; flagellomere F1 relatively long (length 2.0× width); inner hind tibial spur with c. 7 coarse teeth; tarsal claws simple; pygidial plate with small emargination.—*Labrum* and fore basitarsi orange-brown; remainder of legs dark brown; mandible medially brown. T1–4 with narrow silver bands stained brown across anterior margin.—*Clypeus* densely punctate on a reticulate ground except openly punctured near apex; supraclypeal area densely punctate, some punctures coalescing to form irregular grooves. Scutum with dull sheen, pit-reticulation and small, close punctures.—*Face* with long, off-white, plumose hair, becoming pale orange tipped with dark brown near ocelli, dense on frons and in paraocular area, sparse on clypeus and supraclypeal area. Scutum closely covered with short, plumose, pale orange hair tipped with dark brown; hair of hind tibial scopa orange-brown with golden reflections, dark in basitibial area; prepygidial fimbria mid-brown.

Remarks. The holotype male has abnormal wing venation as described by Rayment (1931) and a female in the same collection, labelled “TYPE”, Canowindra, NSW, agrees with Rayment’s description of a female “allotype”.

Similar to *T. fuscus* n.sp. and *T. orientalis* n.sp. from which males may be distinguished by the weak fringe rather than a plume on fore basitarsus and the shape of S7, while females may be distinguished from *T. fuscus* n.sp. and *T. orientalis* n.sp. by the relatively long F1 and the small tubercle on the supraclypeus.

Distribution. Tablelands and slopes of New South Wales (NSS, SB, SEH) (Fig. 117).

***Trichocolletes tuberatus* n.sp.**

Figs 78, 118

Type. Holotype ♂, 78 km S Bourke (30.8189°S 145.8828°E), 18 Aug. 2008, M. Batley, ex *Swainsona affinis*, in AM K.291004.

Specimens examined. The holotype and the following. **New South Wales:** ♂, ♀, 70 km N Bourke, New South Wales (29.5136°S 145.8247°E), 6 Sep. 2007, M. Batley, ex *Swainsona microphylla*, AM (K.344816); 2♂, 2♀, 78 km S Bourke (30.7806°S 145.8633°E), 31 Aug. 2009, M. Batley, ex *Swainsona affinis*, AM (K.344819–22); ♂, 21 km E Cobar (31.5639°S 146.0708°E), 17 Aug. 2008, M. Batley, ex *Glycine canescens*, AM (K.344817). **Queensland:** ♂, 75 km E Cunnamulla (28.0458°S 146.4894°E), 23 Aug. 2008, M. Batley, ex *Swainsona microphylla*, AM (K.344818).

Diagnosis

Length c. 11 mm; eyes hairy; legs black; moderately wide, silver-white metasomal bands, ferruginous across anterior margin. Male pubescence usually pale orange-brown, especially on face.

Descriptions

Male (holotype).—*Head* width 3.75 mm, body length 11.3 mm. Relative dimensions: HW 50, HL 39, UID 33, UFW 33, LID 30, DMA 28, HVO 5, WOC 14, MOD 4, OOD 9, IAD 8, ASD 3, AOD 9, ML 20, BMW 8, MSL 3.0, SL 14, SW 3, FL c. 42.—*Eyes* hairy; face broad, inner orbits converging ventrally; length of malar area c. 0.38× basal mandibular width; marginal area of clypeus elongated (laterally, 0.16× as long as medial length of clypeus); middle flagellomeres c. 1.2× as long as wide. Legs slender; hind tarsus as long as hind tibia; hind basitarsus 4.8× as long as wide; basitibial area strongly carinate on posterior margin, anterior margin with sharp edge. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 (K.344818) with narrow rectangular lateral lobes and strong posterior projections (Fig. 78).—*Distitarsi* orange-brown; mandible deep orange-brown; labrum and flagellum ventrally brown. T1–5 with wide, silver bands.—*Clypeus* dull, strongly pit-reticulate and densely punctate except apically; marginal area polished. Scutum dull with strongly pit-reticulation obscuring punctures.—*Face* densely covered with long, finely-branched, pale orange hair. Scutum closely covered with long, plumose, pale orange-brown hair; fore basitarsus with long, white plume; anterior margin of hind tibia with close to open fringe of long, white hair.

Female (K.344819).—*Head* width 3.90 mm, body length 11.0 mm. Relative dimensions: HW 50, HL 36, UID 31, UFW 33, LID 32, DMA 33, HVO 4, WOC 15, MOD 4, OOD 7, IAD 9, ASD 3, AOD 10, ML 20, BMW 7, MSL 1.5, SL 15, SW 3, FL c. 31.—*Eyes* hairy; face approximately quadrate, inner orbits parallel; length malar space c. 0.2× basal mandibular width; clypeus gently convex transversely; marginal area of clypeus as for male; middle flagellomeres as long as wide; inner hind tibial spur with c. 7 long teeth; apex of basitibial area not elevated above surrounding area; hind tarsal claw only with small inner ramus; pygidial plate entire, gently convex but without distinct medial elevation.—*Distitarsi* orange-brown; mandible deep amber. T1–4 with silver bands of average width.—*Clypeus* strongly reticulate and densely punctate except at extreme ventral margin; frontal carina terminating in a small tubercle on supraclypeal area; scutal sculpture as for male.—*Face* with long, plumose,

white hair, close on clypeus and supraclypeal area, dense in paraocular areas and on frons. Scutum closely covered with short, plumose, pale brown hair; metasoma sericeous; prepygidial fimbria pale brown.

Remarks. Sexes associated by unique presence of labral tubercle and two coincident collection events. Similar to *T. micans* n.sp. but distinguishable by tubercle on labrum.

Distribution. Western areas of southern Queensland and northern New South Wales (CP, ML) (Fig. 118).

Etymology. The specific name is a Latin adjective meaning with a tubercle, referring to the labrum.

***Trichocolletes venustus* (Smith)**

Figs 1–2, 12, 79, 119

Lamprocolletes venustus Smith, 1862, p. 57 (male).

Paracolletes venustus.—Cockerell, 1907, p. 229.

Trichocolletes venustus.—Cockerell, 1913a, p. 273 (female).

Trichocolletes daviesiae Rayment, 1931, p. 164. **n. syn.**

Trichocolletes nigroclypeatus Rayment, 1929, p. 162. **n. syn.**

Lectotype designation. The male specimen in BMNH, Hym 17.a 503 is here designated as the lectotype of *T. venustus* (see remarks below).

Specimens examined. The lectotype of *T. venustus*, the holotypes of *T. daviesiae* ♂, Heathmont, Victoria, 30 Aug. 1930, ANIC and *T. nigroclypeatus* ♀, Daylesford, Victoria, Oct. 1929, ANIC and the following. **Australian Capital Territory:** ♀, Bulls Head repeater station (35.2322°S 148.4836°E), 26 Nov. 1994, G. V. Maynard & G. J. Davis, *Pultenaea and Daviesia*, MV (950112); ♀, 1.9 km S Condor Ck Bridge Rd Brindabella Ra, 11 Nov. 1993, G. J. Davis, *Daviesia mimosoides*, MV (930737); 11♂, 4♀, 1.9 km S Condor Ck Bridge Rd Brindabella Ra, 27 Sep. 1993, G. J. Davis & G. V. Maynard, off *Daviesia* and *Hardenbergia violacea*, MV; ♂, Pierces Creek Forrest, 29 Sep. 1993, G. J. Davis & G. V. Maynard, off *Hardenbergia violacea*, MV; ♂, Warks Rd (35.21°S 148.50°E), 9 Dec. 1992, G. Maynard, off *Daviesia eulicifolia*, MV; 2♂, Uriara SF (35.3444°S 148.8328°E), 10 Oct. 2001, M. Batley, AM (K.316571–72). **New South Wales:** ♂, Anna Bay (32.7728°S 152.0481°E), 16 Jul. 2001, M. Batley, AM (K.316570); ♂, Armidale Road (30.7642°S 151.3692°E), 10 Oct. 1999, M. Batley, AM (K.316565); 3♀, Berambing, 3 Oct. 1979 & 12 Oct. 1978, N. W. Rodd, AM (K.344594–96); ♂, ♀, 5 km NE Bilpin, 4–5 Sep. 1977, N. W. Rodd, AM (K.344576–77); 6♂, ♀, 6 km NE Bilpin, 11 Aug. 1977, 9 Sep. & 11 Oct. 1988, N. W. Rodd, AM (K.344565–71); 4♂, 7 km NE Bilpin, 23 Aug. 1977, N. W. Rodd, AM (K.344572–75); 3♂, 3♀, Bilpin (33.4814°S 150.5480°E), 9–21 Sep. 2005, M. Batley, AM (K.316573,86–88,93,94); 7♂, 4♀, Clarence, 28–31 Oct. 1979 & 4 Oct. 1988, N. W. Rodd, AM (K.344600–06,16–20); 2♂, ♀, Clarence (33.478°S 150.250°E), 20 Oct. 2002, M. Batley, AM (K.316579–81); ♂, 34 km NNE Coonabarrabran, 17 Sep. 1998, A. Sundholm & J. Bugeja, AM (K.344625–26); 2♂, ♀, Gibraltar Range NP (29.595°S 152.269°E), 27 Aug. 2007, M. Batley, AM (K.316599–600,609); 2♂, 100 km W Grafton, 22 Aug. 1992, N. W. Rodd, AM (K.344623–24); ♀, Haystack Ridge, 7 Nov. 1977, N. W. Rodd, AM (K.344591); ♀, Hazelbrook, 1 Sep. 1984, M. Dingley, AM (K.344611); ♂, Kentlyn (34.0475°S 150.8842°E), 31 Aug. 1999, M. Batley, AM (K.316564); ♀, Lansdowne, 26 Sep. 1984, N. W. Rodd, AM (K.344612); ♀, Mountain Lagoon, 9 Aug. 1977, N. W. Rodd, AM (K.344564); 4♂, ♀, Mount Banks (33.5881°S 150.3686°E), 24 Sep. 2002 & 5 Sep. 2003, M. Batley, AM (K.316574–6,85,86); 4♂, Mount Canobolas (33.3497°S 149.0164°E), 28 Sep. 2005, M. Batley, AM (K.316595–98); ♀, Mount Hay Road (33.6389°S 150.3983°E), 17 Oct. 1998, M. Batley, AM (K.316560); ♂, Mt Kaputar NP, 12 Nov. 1979, N. W. Rodd, AM (K.344607); 6♂, ♀, Mt Tomah, 8–18 Sep. 1977, N. W. Rodd, AM (K.344578–84); ♀, Mt Tomah, 5 Oct. 1977, N. W. Rodd, AM (K.344588); 2♀, Mt Tomah, 20–21 Oct. 1977, N. W. Rodd, AM (K.344589–90); ♂, Mt Tomah, 10 Sep. 1978, N. W. Rodd, AM (K.344593); ♂, Mt Tomah, 22 Oct. 1978, N. W. Rodd, AM (K.344596);

♂, Mount Wilson (33.5450°S 150.3356°E), 5 Sep. 2003, M. Batley, AM (K.316585); ♂, Mt Victoria, Oct. 1930, Wilson, F E., MV (16500); 2♂, 3 km S Mt Wilson, 15 Sep. 1979, N. W. Rodd, AM (K.344597–98); 2♂, ♀, 10 km W Murwillumbah, 17 Aug. 1982, N. W. Rodd, AM (K.344608–10); 2♂, ♀, Nadgee Reserve, 9 Sep. & 14–28 Oct. 1985, E. A. Sugden, AM (K.344613–15); 2♂, 8 km SE Narrabri (30.3994°S 149.8144°E), 25 Aug. 2009, M. Batley, AM (K.316610–11); ♀, 12 km SE Narrabri (30.4233°S 149.8511°E), 25 Aug. 2009, M. Batley, AM; ♂, ♀, Narrow Neck (33.7492°S 150.2800°E), 27 Sep. 2002, M. Batley, AM (K.316577–78); ♀, Ourimbah SF (33.3211°S 151.3519°E), 18 Aug. 2003, M. Batley, AM (K.316582); 3♂, Parramatta Park (33.7914°S 150.0100°E), 18 Aug. 1999, M. Batley, AM (K.316561–63); ♂, ♀, Parramatta Park (33.7914°S 150.0100°E), 16 Aug. 2000, M. Batley, AM (K.316566–67); 2♂, Parramatta Park, 14 Aug. 2009, M. Batley, AM (K.316612–13); 3♀, Pilliga NR (30.9364°S 149.4222°E), 13 Sep. 2005, M. Batley, ex *Pultenaea cinerascens*, AM (K.316589–91); ♂, Stanwell Tops, 27 Aug. 1978, G. Daniels, AM (K.344592); ♂, Tallong (34.7194°S 150.5639°E), 30 Sep. 2000, M. Batley, AM (K.316569); 3♀, Wolgan Valley, 21 Sep. 1977, N. W. Rodd, AM (K.344585–87). **Queensland:** ♂, ♀, Bardon, 29 Aug. 1974, K. Lambkin, UQIC; 3♂, ♀, Beeburum-Woodford Rd (26.56°S 152.50°E), 8 Jul. 1991, G. V. Maynard, ex *Dillwynia*, UQIC; ♀, 14 km W Beerburum (26.9419°S 152.8303°E), 25 Aug. 2008, M. Batley, AM (K.316601); 4♂, 2♀, Brisbane, 18 Aug. 1914, H. Hacker, QM; ♂, S of Eukey, 26 Sep. 1967, T. F. Houston, *Daviesia*, SAM (32-024505); ♀, 5 mls E Pikedale, 1 Nov. 1966, T. F. Houston, *Daviesia*, SAM (32-024493); 2♀, Mt Tamborine, 5 Oct. 1966, T. F. Houston, SAM (32-024497,99); 2♀, 17 mls S Warwick, 4 Nov. 1966, T. F. Houston, *Jacksonia scoparia*, SAM (32-024496). **South Australia:** ♂, 11 km S of Clare, 29 Sep. 1973, T. F. Houston, on *Daviesia corymbosa*, SAM (32-024572); ♂, ♀, Cape St Albans Kangaroo Is, 2 Oct. 1970, T. F. Houston, on *Swaainsona lessertiiifolia*, SAM (32-024571,74); ♂, 2♀, 6 mi E Karatta Kangaroo, 3 Oct. 1970, T. F. Houston, on *Goodia lotifolia*, SAM (32-024573,78,85); 3♂, 6♀, 8 mi S Kingscote Kangaroo Is. 1 Oct. 1970, T. F. Houston, on *Daviesia ulcina*, SAM (32-024575–77,79–82,84,86); ♂, Kyeema Nat Pk nr Meadows, 7 Oct. 1972, T. F. Houston, on *Daviesia corymbosa*, SAM (32-024570); 3♂, Mt Lofty, 6 Oct. 1963, SAM (32-024486–87,92); ♂, Mt Lofty summit, 16 Oct. 1964, T.F.H., on *Platylobium*, SAM (32-024485); ♀, Mt Lofty, 26 Oct. 1964, T.F.H., on *Platylobium*, SAM (32-024489); ♂, Mt Lofty summ, 23 Sep. 1965, T. Houston, on *Daviesia*, SAM (32-024490); ♂, Rocky River, Kangaroo Is, 4 Oct. 1970, T. F. Houston, on *Leucopogon*, SAM (32-024583); 2♂, Warren Nat Pk nr Kersbrook, 7 Sep. 1975, T. F. Houston, on *Daviesia*, SAM (32-024568–69); ♂, Rev A. P. Burgess, SAM (32-024587). **Tasmania:** ♂, Hobart, 26 Aug. 1917, MV (16493). **Victoria:** ♀, Ararat, MV (16495); 5♂, Bendigo, 10 Sep. 1922, Burns, Alec N., MV (16538–42); ♂, Black Rock, WAA (45308); 2♂, ♀, Black Sands, 16 Oct. 1936, ANIC; ♀, Croydon, 6 Sep. 1961, MV (16507); 2♂, 2♀, Ferntree Gully, 28 Sep. 1930, Burns, Alec N., MV (16508,11,12,16); ♂, Ferntree Gully, 17 Sep. 1927, Burns, Alec N., MV (16520); ♀, Grampians, Oct. 1928, Wilson, F E., MV (16492); 4♂, Heathmont, 23 Aug. 1930, Burns, Alec N., MV (16513,28,32,36); ♂, Heathmont, 16 Sep. 1945, Burns, Alec N., MV (16524); 2♂, ♀, Heathmont, 30 Aug.–1 Sep. 1930, Rayment, ANIC; ♂, Ringwood, Oct. 1929, MV (16491); 2♂, ♀, Ringwood, 30 Sep. 1930, Burns, Alec N., MV (16506,10,21); 2♂, Ringwood, 5 Sep. 1931, Burns, Alec N., MV (16509,31); ♂, 4♀, Sandringham, Rayment, BMNH; ♂, Sandringham, MV (16494).

Diagnosis

Eyes hairy; metasomal bands gold. Male mid tibia clear orange-brown; fore basitarsus with plume; anterior margin of hind tibia with open fringe of long hair (Fig. 2). Female clypeus with V-shaped basal margin; inner hind tibial spur with c. 8 teeth..

Descriptions

Male (AM K.316582).—*Head* width 3.90 mm, body length 12.5 mm. Relative dimensions: HW 50, HL 38, UID 28, UFW 29, LID 29, DMA 30, HVO 4, WOC 13, MOD 4, OOD 8, IAD 8, ASD 4, AOD 7, ML 19, BMW 7, MSL 1.5, SL 13, SW 4, FL c. 52.—*Eyes* hairy; face narrow, inner orbits parallel; length malar space c. 0.2× basal mandibular width; clypeus with V-shaped basal margin; flagellum as long as head width; middle flagellomeres c. 1.6× as long as wide. Legs slender; hind tarsus and hind tibia of equal

length; hind basitarsus 4.5× as long as wide; basitibial area not evelated but posterior margin defined by pigmented carina reaching apex. Genital capsule similar to that for *T. orientalis* n.sp. (Fig. 37); S7 lateral lobes triangular, fused to base of ligulate processes, basal tooth obsolete, posterior projections moderately long (Fig. 79).—*Labrum*, scape, mandible medially, tarsi, tibiae and distal ends of femora orange-brown; flagellum ventrally dark brown; T1–5 with medium to wide gold bands.—*Clypeus* densely punctate except apically; scutum strongly reticulate with indistinct, close, fine punctures.—*Face* densely and scutum openly covered with long, plumose orange hair; fore basitarsus with long pale gold plume; trochanters and femora with much long pale hair; hind tibia with open, but conspicuous fringe of long, sparsely-branched, pale gold hair along anterior edge.

Female (AM K.316567).—*Head* width 4.00 mm, body length 12.0 mm. Relative dimensions: HW 50, HL 37, UID 28, UFW 31, LID 31, DMA 33, HVO 5, WOC 13, MOD 3, OOD 8, IAD 7, ASD 4, AOD 9, ML 22, BMW 7, MSL 1.5, SL 15, SW 3, FL c. 36.—*Eyes* hairy; face slightly wider than long, inner orbits weakly divergent ventrally; length malar space c. 0.25× basal mandibular width; clypeus convex, basal margin V-shaped; middle flagellomeres c. 1.2× as long as wide. Tarsal claws simple; inner hind tibial spur with c. 8 strong teeth; pygidial plate emarginate, sculptured, with medial elevation.—*Labrum*, mandible medially, tarsi, tibiae and distal ends femora orange-brown, with darker markings medially on fore and mid tibiae; remainder of legs, flagellum dorsally dark brown; flagellum ventrally brown; T1–4 with wide, gold bands.—*Clypeus* densely punctate and dull basally, sparsely to openly punctate and polished towards apex. Scutum strongly reticulate, with indistinct close fine punctures.—*Face* with long, plumose, pale hair becoming darker near ocelli, dense in paraocular area and on frons, open to sparse on clypeus and supra-clypeal area. Scutum closely covered with short, plumose, dull orange hair; hair of hind tibial scopa orange except brown in basitibial area; prepygidial fimbria mid-brown.

Remarks. The original description of *Lamprocolletes venustus* (Smith, 1862) refers to dense pubescence covering the face and a ferruginous scape indicating unambiguously that the author was referring to a male specimen, not a female as stated. Baker (1993) located two possible syntypes of *Lamprocolletes venustus*, both males, one in the University Museum, Oxford, the other in the British Museum of Natural History. The British Museum specimen was examined and Mr James Hogan (OUM) confirmed that the Oxford specimen was the same species using photographs illustrating the diagnostic features.

Baker (1993) noted that his studies indicated that the designation “In the Collection of the British Museum” in Smith’s original description might mean no more than that the species was represented in the collection and concluded neither specimen could be eliminated from consideration and both had been in Smith’s possession at some time. He recommended that both specimens be regarded as syntypes and that the BMNH specimen be designated as the lectotype. Recognition that the male characteristics in the original description confirm that Smith misreported the sex of his specimen supports this view and accordingly we have adopted Baker’s suggestion.

There was a small discrepancy in the labelling of the holotype of *T. nigroclypeatus*. A male and a female specimen were found carrying red *Allotype* and *Type* labels, respectively, together with identification labels in Rayment's hand. Collection information on the labels corresponded with details given in Rayment's original descriptions (Rayment, 1929, 1931) except that the date attached to the holotype (Oct. 1929) did not match that given in the original description (12/10/27). It is possible that the holotype was (re)labelled by Rayment when he designated the allotype. Both specimens are *T. venustus*.

Rayment (1931) refers to specimens of *T. venustus* from Western Australia when discussing bees in the collection of the Department of Agriculture of Western Australia. The only specimen of *T. venustus* found in that collection was from Black Rock, Victoria and no specimens bearing the collection data referred to by Rayment were found in that or any other collection. It is unlikely that the species occurs in Western Australia.

Distribution. Southeastern Australia including Tasmania (BBS, FLB, KAN, NAN, NET, NNC, NSS, SB, SCP, SEH, SEQ, TSE, VM) (Fig. 119).

Discussion

Subgenera. Most of the interspecific differences between females are small and matters of degree, while male sexual characteristics such as modified legs may be an unreliable indicator of relatedness. The female characters used to define the subgenus *Callocolletes* (Michener, 1965), and most of the extraordinary modifications of the male, occur individually in some of the newly described species. For reasons given in the remarks for *T. pulcherrimus*, we have chosen not to recognize this subgenus.

A group of thirteen species have hairy eyes, females with simple tarsal claws (minute inner rami in 2 cases) and males with similarly shaped S7. The remaining species show considerably greater variation in the shape of the male S7 and it may be that the thirteen species represent a relatively recent radiation. Their designation as a subgenus would, however, leave the remaining 27 species as a paraphyletic group and one that included three hairy-eyed species.

None of the species known to Michener (1965) had indistinct metasomal bands and hairy eyes, so he proposed a species group based on the absence of metasomal bands. The material now available contains one species with hairy eyes and indistinct metasomal bands and others that display intraspecific variation in the visibility of the metasomal bands.

The species pairs *T. chrysostomus* / *T. sericeus*, *T. leucogenys* n.sp. / *T. albigenae* n.sp., *T. brunilabrum* n.sp. / *T. micans* n.sp. and possibly *T. lacaris* n.sp. / *T. aeratus* n.sp. appear to be examples of species that have diverged on either side of the continent. It is less obvious why the rather similar Western Australian species *T. rufibasis* and *T. soror* n.sp. should have separated.

As the similarities that unite the genus greatly outweigh differences between any possible species groups it was decided that no subgeneric division is appropriate.

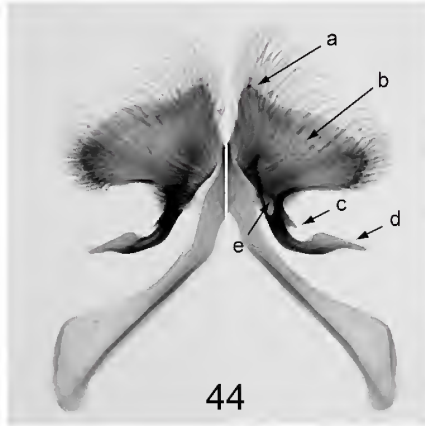
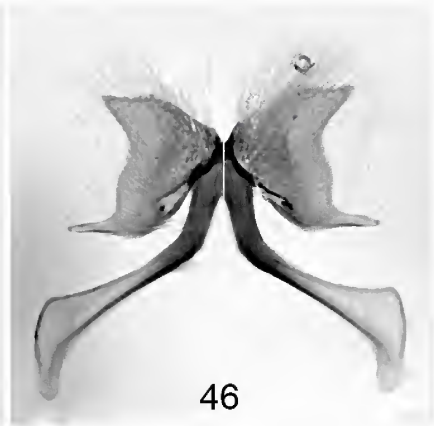
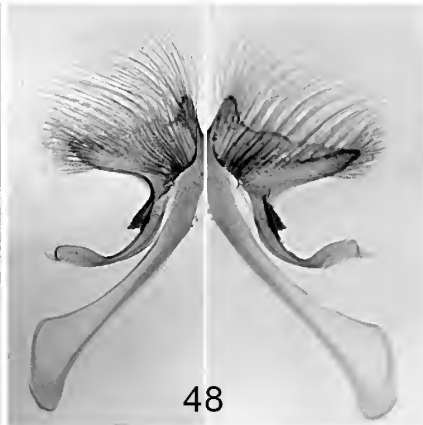
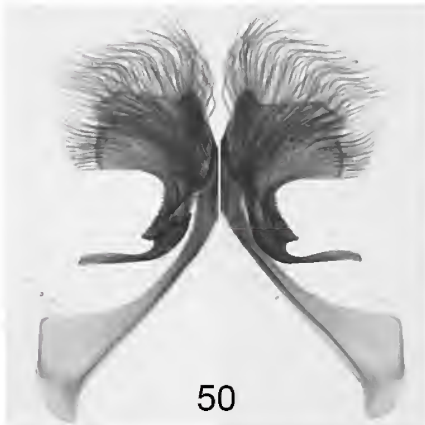
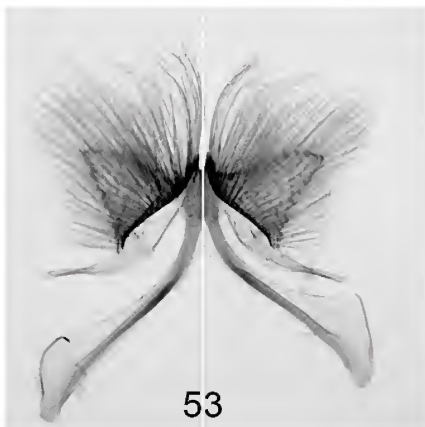
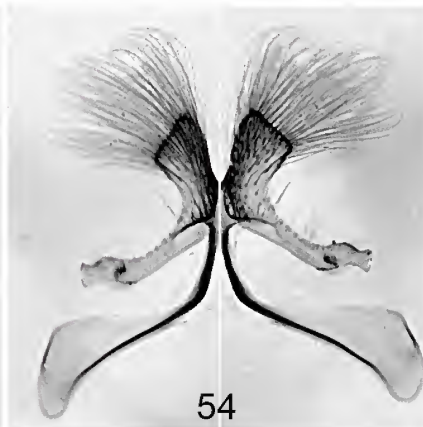
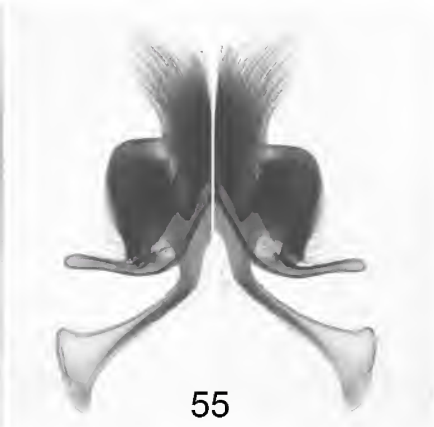
Flower visitation. Information about flower visitation (including that in Houston [2000]) was present on the labels of 53% of the specimens examined in this study. All but six species were recorded as visiting pea flowers (Fabaceae: Faboideae) and the number of recorded visits to other flower groups by these 34 species was 5% of all visits. This pattern is consistent with the idea that the bees are broadly oligolectic, but occasionally visit other flowers to obtain nectar, but no examination of pollen loads was performed. The other flower families visited were Aizoaceae, Amaranthaceae, Apocynaceae, Caesalpinioideae, Dilleniaceae, Ericaceae, Goodeniaceae, Lamiaceae, Myoporaceae, Myrtaceae, Polygalaceae and Rutaceae.

Only for two of the species, *T. centralis* n.sp. and *T. soror* n.sp., did visits to flowers other than peas exceed 15% of all records. *Trichocolletes centralis* n.sp., with 25% non-pea visits, has a wide distribution across arid areas, which might account for an increased dependence on alternative nectar sources. The number of records for *T. soror* n.sp. (13 versus 85 for *T. centralis* n.sp.) is fairly small and the 23% non-pea visits may be statistical variation.

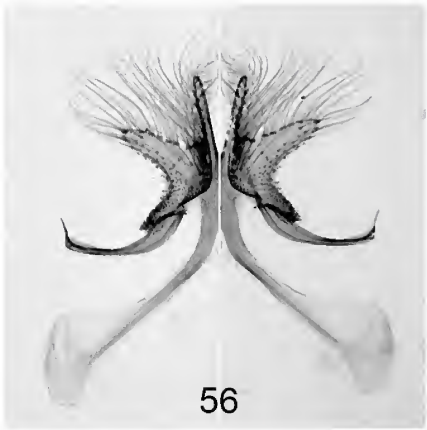
Host flowers were not recorded for the two known specimens of *T. avialis* n.sp., but the remaining five species may specialize in visiting other plant types. This is certainly true for *T. eremophilae* and *T. multipectinatus*, which have been found only on *Eremophila* species and have an elongated proboscis that would help them obtain nectar from these flowers (Houston, 1990). Whether they visit a limited number of flowers in order to obtain nectar (oligotropic) or pollen (oligolectic) or both, remains to be determined. The species *T. hackeri* has to date been collected in rainforest areas on the Eastern coast of Australia. Flower visits were recorded on only three occasions, each involving a different plant family, Apocyanaceae, Dilleniaceae and Myrtaceae. On one of those occasions, pollen collection from *Hibbertia scandens* was observed (MB pers. obs.). *Trichocolletes macrognathus* n.sp. has been observed visiting five different plant genera in three plant families or subfamilies, Fabaceae-Caesalpinioideae, Lamiaceae and Myrtaceae, but not pea flowers. There is no obvious relationship between the flowers visited and the unusual elongation of the malar area in this species. The final species, *T. luteorufus* n.sp., has been collected on only two occasions.

Rayment (1935) reported that *T. serotinus* n.sp. and *T. venustus* nest in the ground and gave brief descriptions of the nests. Three other species have been seen entering nests in the ground: *T. orientalis* n.sp. at Black Mountain, ACT (MB pers. obs.); *T. dowerinensis* at Boorabbin Rock, WA and *T. macrognathus* n.sp. at Wannoo, WA (TFH pers. obs.).

ACKNOWLEDGMENTS. The authors are greatly indebted to Mr David Notton (BMNH), Dr John Asher (AMNH) and Mr James Hogan (OUM) for their expert assistance with type material and wish to thank the following people who provided facilities for the examination of specimens or who loaned specimens for examination: Mr C. Brumley (WAA), Ms N. Fisher (ANIC), Mr B. Hanich (WAM), Dr P. Hudson (SAM), Mr D. Notton (BMNH), Dr K. L. Walker, Dr S. Winterton (UQIC) and Ms S. Wright (QM) and Dr K. Hogendoorn who provided helpful comments on the manuscript. One of us (MB) would like to thank Dr D. Britton and Dr D. K. McAlpine for helpful discussion and guidance.

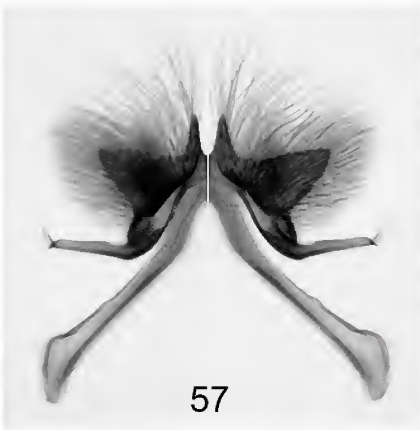
44
T. aeratus n.sp.45
T. albigenae n.sp.46
T. aureotinctus47
T. avialis48
T. brachytomus n.sp.49
T. brunilabrum n.sp.50
T. burnsi51
T. capillosus n.sp.52
T. centralis n.sp.53
T. chrysostomus54
T. dives55
T. dowerinensis

Figs 44–55. Seventh sternum of *Trichocolletes* males. The following features are labelled on Fig. 44: (a) posterior projection (b) lateral lobe (c) basal tooth (d) ligulate process (e) opening to hollow in lateral lobe.



56

T. erythurus



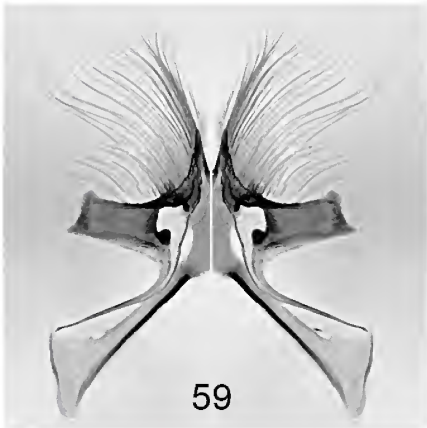
57

T. fuscus (extreme form A)



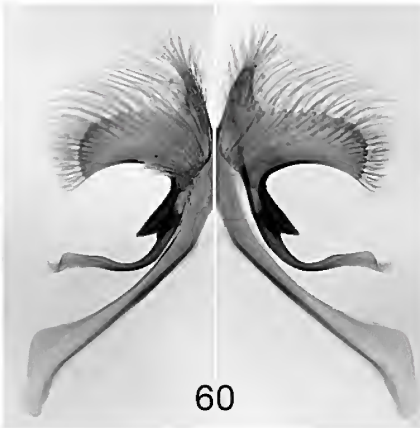
58

T. fuscus (extreme form B)



59

T. gelasinus n.sp.



60

T. grandis n.sp.



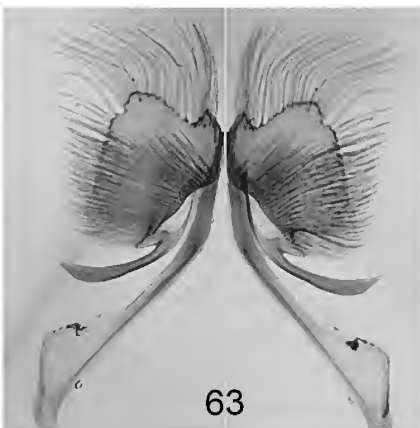
61

T. hackeri



62

T. lacaris n.sp.



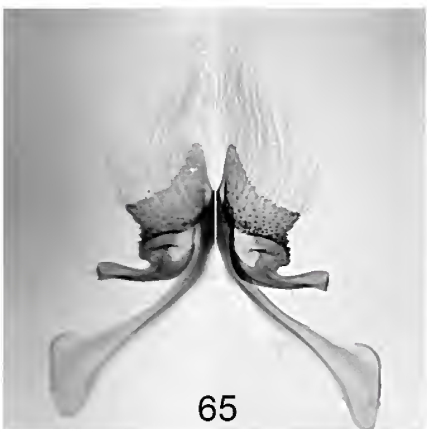
63

T. latifrons



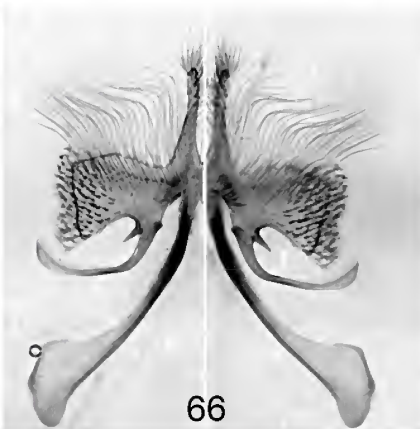
64

T. leucogenys n.sp.



65

T. macrognathus n.sp.



66

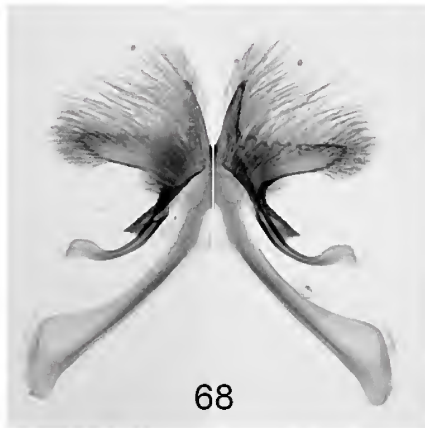
T. marginatus



67

T. maximus

Figs 56–67. Seventh sternum of *Trichocolletes* males.



68
T. micans n.sp.



69
T. nitens n.sp.



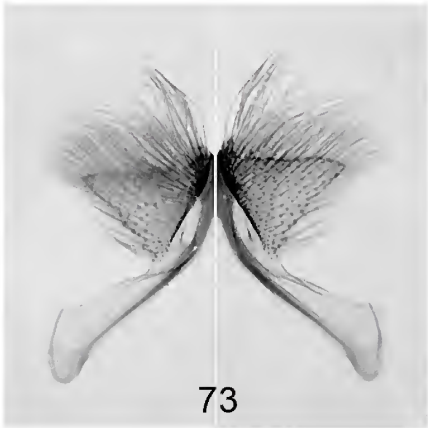
70
T. orientalis n.sp.



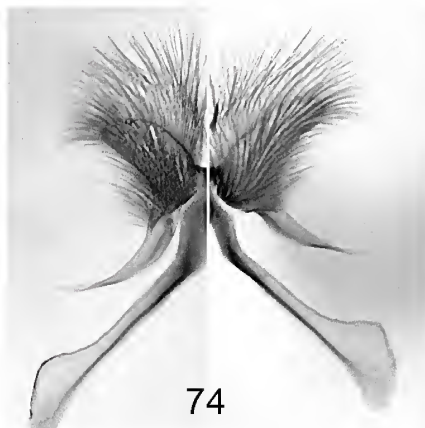
71
T. platyprosopis



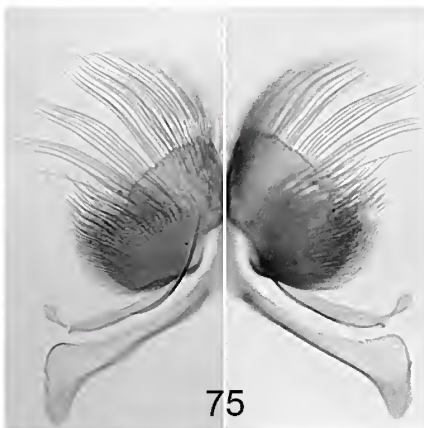
72
T. rufibasis



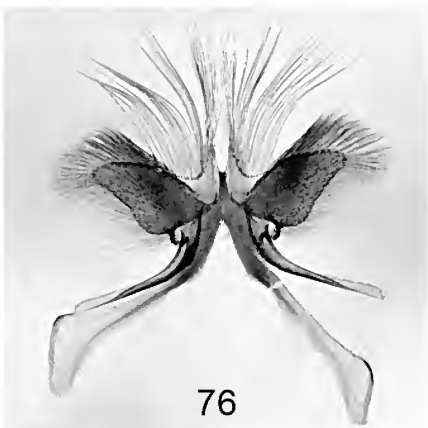
73
T. sericeus



74
T. serotinus n.sp.



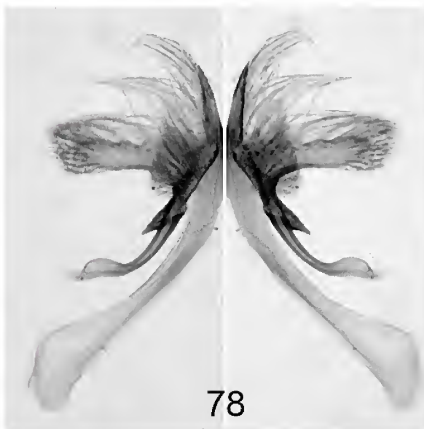
75
T. simus n.sp.



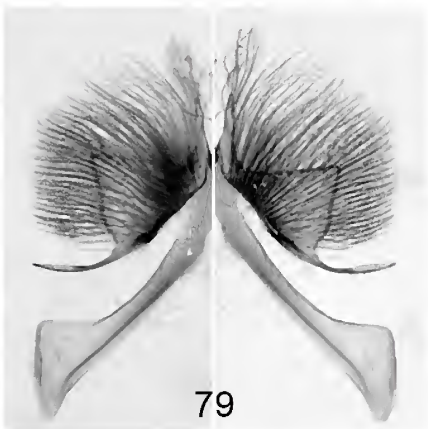
76
T. soror n.sp.



77
T. tenuiculus

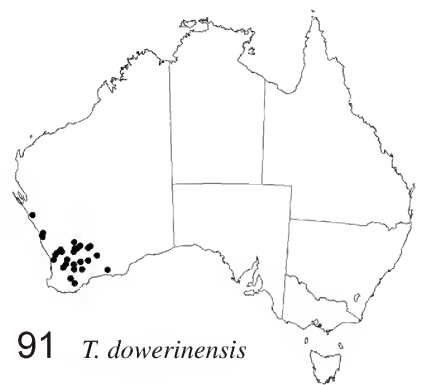
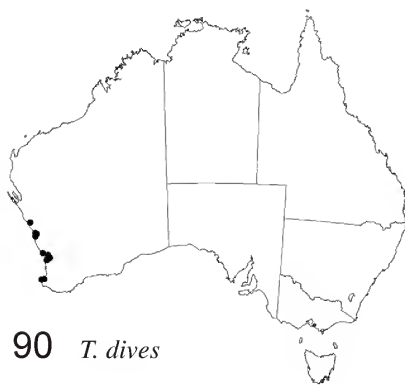
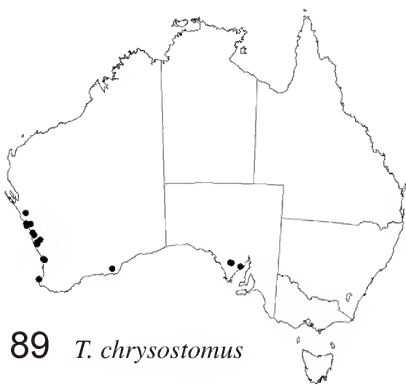
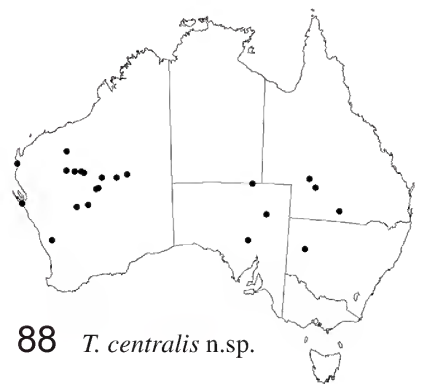
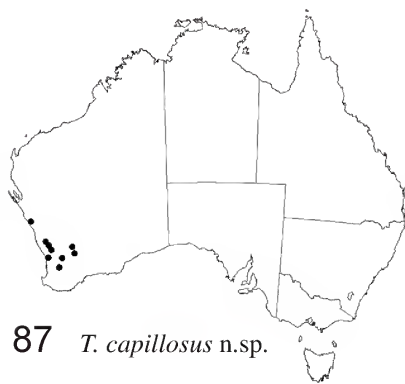
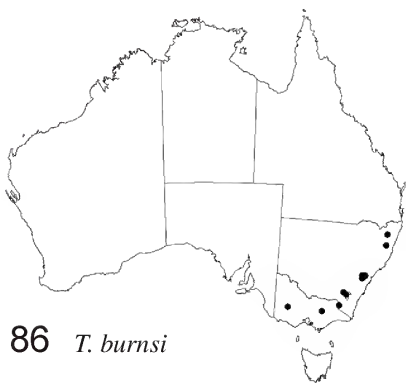
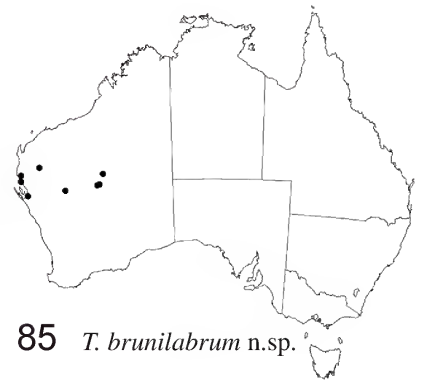
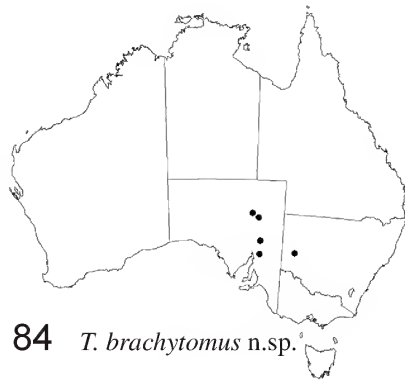
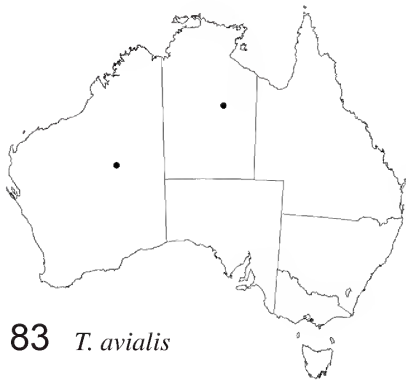
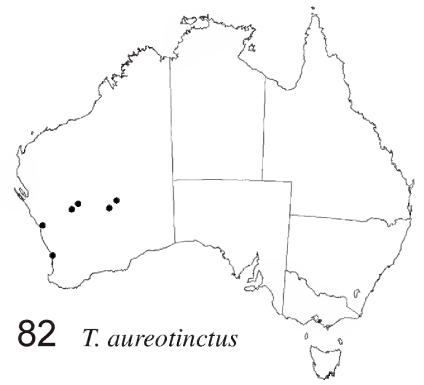
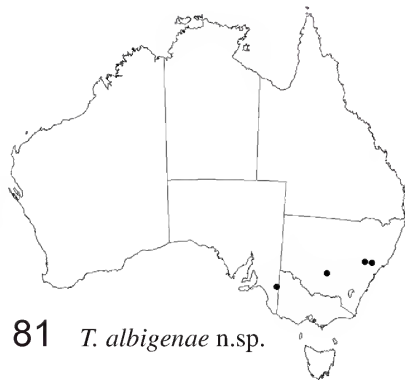
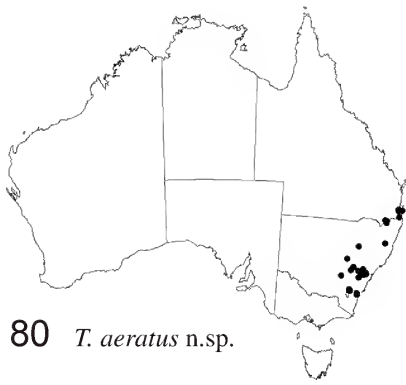


78
T. tuberatus n.sp.

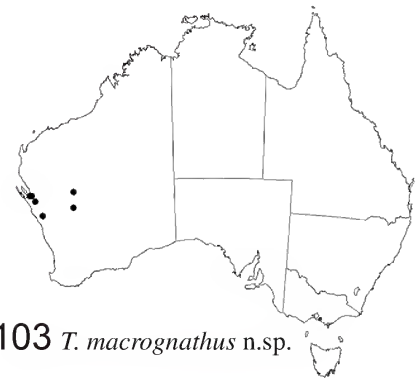
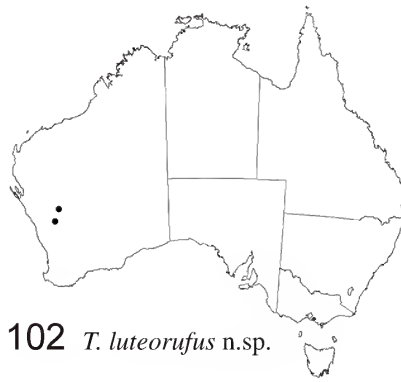
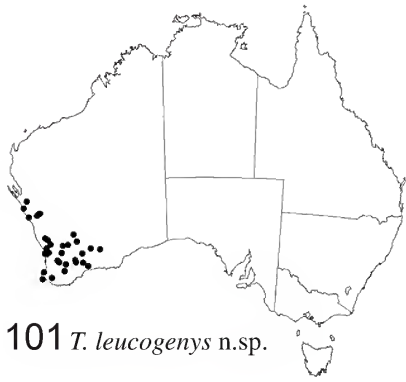
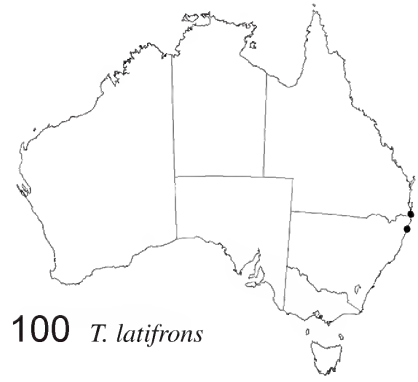
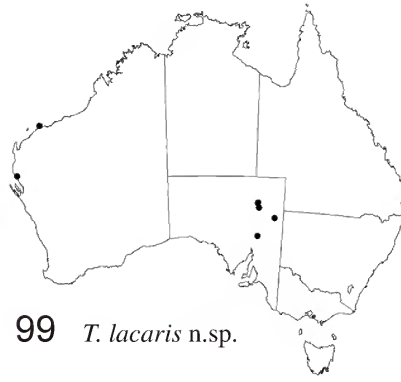
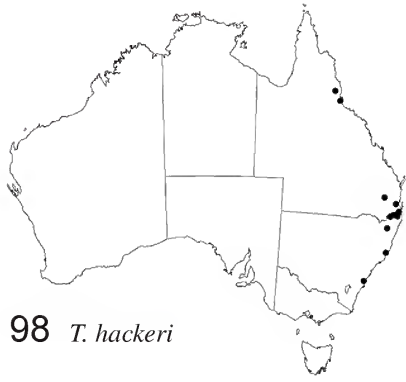
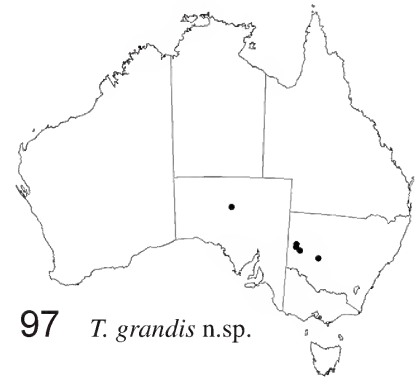
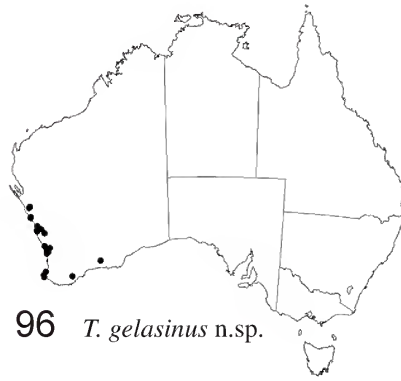
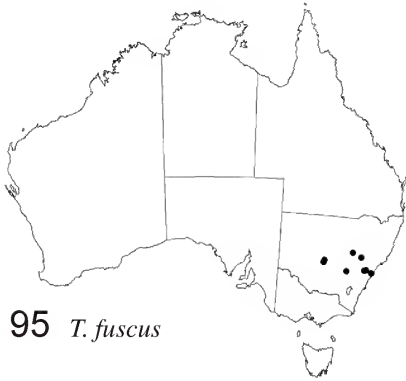
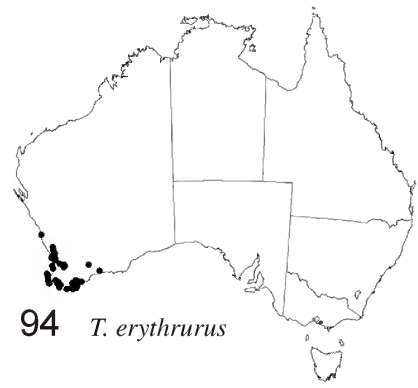
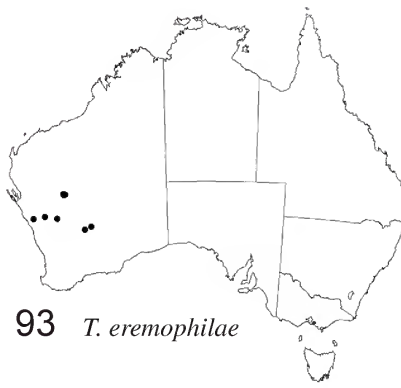
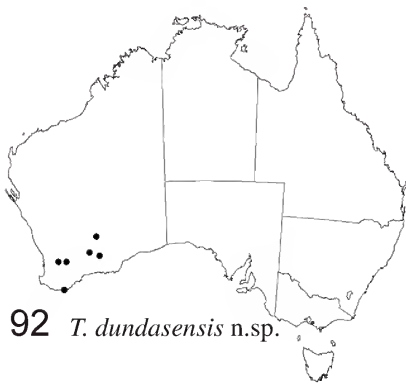


79
T. venustus

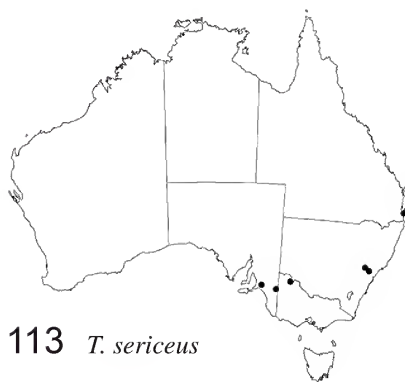
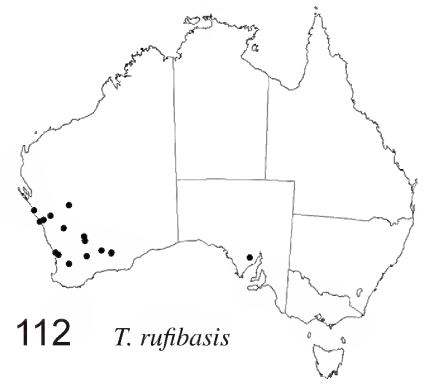
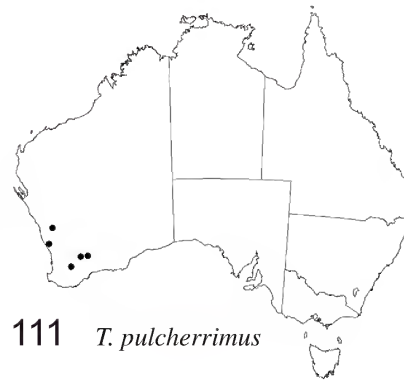
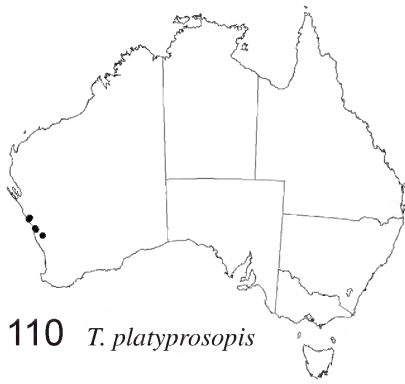
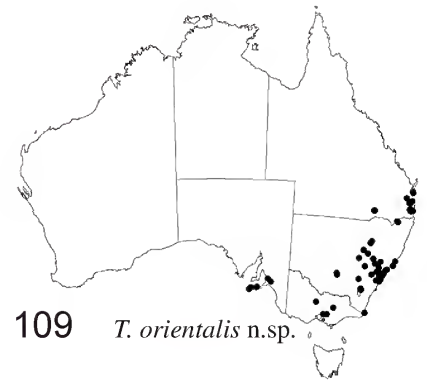
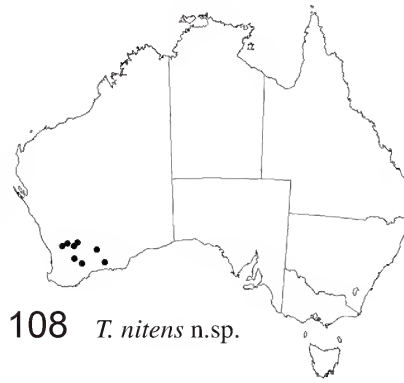
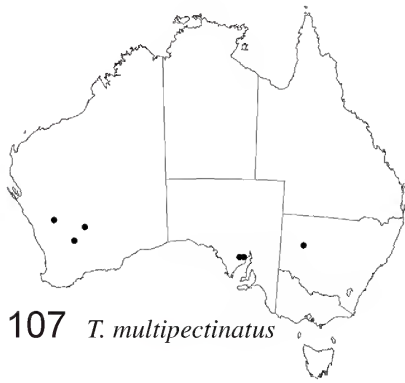
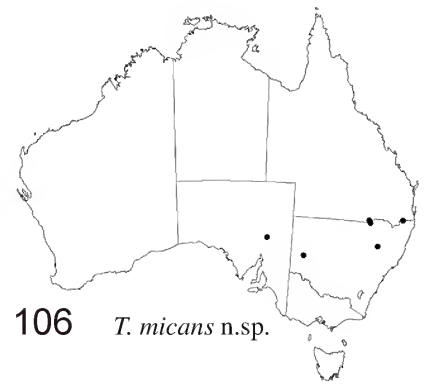
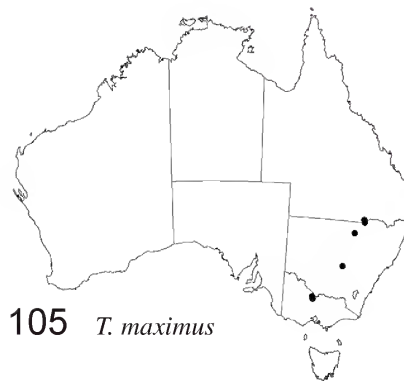
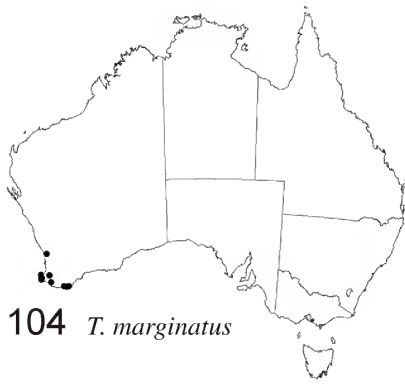
Figs 68–79. Seventh sternum of *Trichocolletes* males.



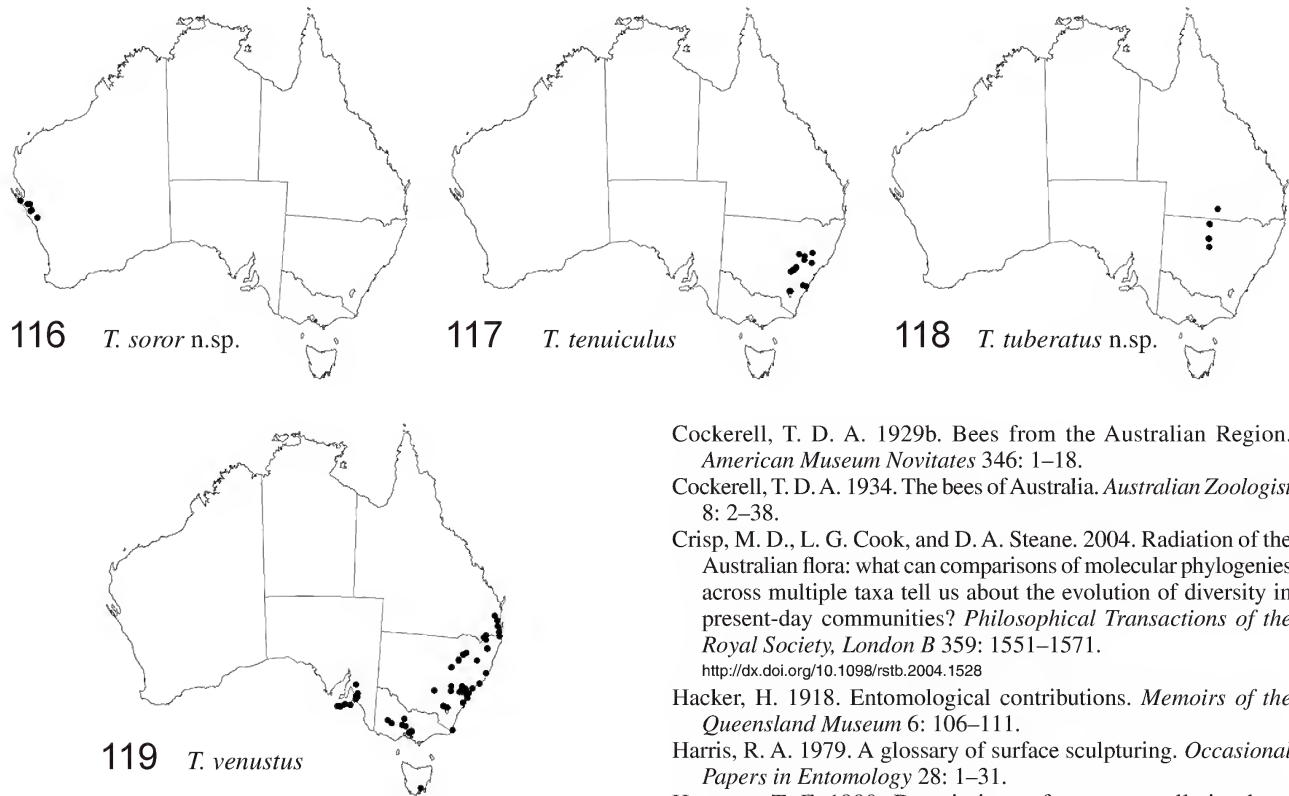
Figs 80–91. Known distribution of *Trichocolletes* species.



Figs 92–103. Known distribution of *Trichocolletes* species.



Figs 104–115. Known distribution of *Trichocolletes* species.



Figs 116–119. Known distribution of *Trichocolletes* species.

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