

## Three new, monolectic species of *Euryglossa* (*Euhesma*) from Western Australia (Hymenoptera: Colletidae)

Terry F. Houston\*

### Abstract

Three new species of *Euryglossa* (*Euhesma*) (*E. aureophila*, *E. morrisoni* and *E. semaphore*) are described and figured. All are endemic to the Swan Coastal Plain of Western Australia. *Euryglossa aureophila* and *E. morrisoni* are monolectic on closely related species of *Verticordia* and *E. semaphore* appears to be monolectic on *Pileanthus filifolius* (all Myrtaceae). Males of *E. semaphore* are remarkable for their highly modified, spatulate antennae.

### Introduction

The object of this paper is to make available names for three species of bees that have been the subject of investigation in Western Australia.

Interest in these species has centred around their strict plant preferences. Many species of bees are known to confine their foraging for pollen and often nectar to closely related species or genera of plants (oligolecty). However, cases of bees confining their foraging exclusively to one plant species (monolecty) are comparatively rare. Hence, it has been of interest to discover three species of euryglossine bees near Perth, Western Australia, which do just that.

Two of the species described here are monolectic on species of *Verticordia* with unusual anthers and appear to be the plants' prime pollinators. The pollination biology of the two *Verticordia* species (*V. aurea* George and *V. nitens* (Lindley)) has recently been investigated by myself and Dr Byron Lamont and names for their pollinating bees are required to facilitate publication of our findings.

The third species, discovered during our *Verticordia* studies, appears to be monolectic on *Pileanthus filifolius* Meisn. Description of this bee species is warranted because of the extraordinary form of the antennae of males and the likelihood of investigations into the species' ecology and behaviour.

Morphological terminology largely follows that of Michener (1965) and terminology of surface sculpturing largely follows Harris (1979).

Abbreviations of collections are ANIC, Australian National Insect Collection, CSIRO, Canberra; UQIC, University of Queensland Insect Collection, Brisbane; WAM, Western Australian Museum, Perth.

Abbreviations for certain measurements are as follows: *AOD* antennocular distance; *ASD* antennal socket diameter; *BMW* basal width of mandible; *CAD* clypeantennal distance; *CL* clypeal length; *CW* clypeal width; *FL* flagellum length; *HL* head length; *HW* head width; *IAD* interantennal distance; *LFW* lower width of face; *LPL* labial palp

---

\*Western Australian Museum, Francis Street, Perth, Western Australia 6000.

length; *ML* mandible length; *MOD* diameter of mid ocellus; *MPL* maxillary palp length; *MSL* malar space length; *OOD* ocellocular distance; *SL* scape length; *SW* scape width; *UCW* upper width of clypeus (distance between lower ends of subantennal sutures); *UFW* upper face width (maximum width of face above antennae); *WOC* width of ocellar cluster.

## Systematics

### Colletidae: Euryglossinae

#### Genus *Euryglossa* Smith, 1853

#### Subgenus *Euhesma* Michener, 1965

*Euhesma* is the largest and most diverse subgenus within *Euryglossa* and has yet to be revised. Revisionary studies of the group have been commenced by Dr Elizabeth Exley and she has confirmed the undescribed status of my species. Given that completion of her studies is some considerable time away, she has graciously consented to me describing them ahead of her revision.

#### *Euryglossa (Euhesma) morrisoni*, sp. nov.

Figures 1-3, 8, 9, 11, 12, 15, 16, 18-20

#### Holotype

In WAM (91/544), ♂, Melaleuca Park, 11 km NE of Wanneroo, Western Australia, 20 December 1990, T.F. Houston, on flowers of *Verticordia nitens*.

#### Paratypes

Western Australia: 6 ♂, 7 ♀, WAM 91/545-57, data as for holotype; 3 ♂, 1 ♀, WAM 91/540-3, ditto but 16 Dec.; 1 ♂, WAM 91/539, ditto but 22 December 1989; 1 ♂, 1 ♀, WAM 91/604-614, 12 km WNW Harvey, 4 Jan. 1991, T.F. Houston, on flowers of *Verticordia nitens*; (8 ♂, 9 ♀, WAM 91/522-38, 20 Dec. 1989; 1 ♂, 27 ♀, WAM 91/539, 91/577-603, 31 Dec. 1989) Moore River National Park, 31.10 S, 115.40 E, T.F. Houston, on flowers of *Verticordia nitens*.

#### Diagnosis

A morphologically unspecialised *Euhesma* lacking pale maculations. Distinguishable from other *Euhesma* within its geographic range by combining a shining and distinctly punctate head and thorax, yellow-orange metasoma and appendages and slender, widely divergent hind tarsal claws in female.

Very close to *E. aureophila*, distinguished as follows: ventral margin of clypeus, labrum and mandibles yellow-brown; metasoma and legs almost wholly yellow-orange; wing veins uniformly mid-brown (male) or dark brown (female); legs relatively longer.

#### Description

##### Male (holotype)

Head width 1.3 mm; body length *ca.* 4.3 mm.

*Relative dimensions*: HW 100; HL 92; UFW 65; LFW 54; MOD 9; WOC 37; OOD 15; IAD 16; ASD 9; AOD 13; CAD 7.5; UCW 23; MCW *ca.* 51; MCL 33; MSL 0; BMW 13; ML 40; MPL 40; LPL 26; SL 29; SW 8; FL 71.

*Morphology:* Head fairly rounded in anterior view (Figure 1); vertex slightly elevated above level of ocelli medially only; facial foveae not evident; inner orbits converging only slightly ventrally; face gently convex in profile and transversely; genae about 0.5 X as wide as compound eyes viewed laterally; antennae inserted above middle of face, sockets separated by 1.8 X their own diameter; antennae simple; proximal articles of flagellum about half as long as wide, tenth nearly as long as wide; mandibles distinctly bidentate, posterior tooth exceeding anterior tooth (Figure 8); labium, maxilla and palpi unspecialized, palpus segments subequal; fore tarsi slender, simple, excluding claws 0.67 X as long as HW; hind tibiae 0.8 X and hind tarsi 1.2 X as long as HW; tarsal claws bifid, prongs subequal, divergent only distally (Figure 15).

*Colouration:* Head and mesosoma largely black; the following are dull orange-yellow — antennae (except pedicels and flagella dark brown dorsally), ventral margin of clypeus, labrum, mandibles (except dark red apices), legs (except blackish fore and mid coxae) and metasoma (except for dark brown suffusion on tergum I and fainter patches on others and large, black-brown, elliptical foveae); pronotal tubercles and medial edges of otherwise hyaline tegulae cream; wings clear but iridescent in incident light, venation mid-brown generally.

*Sculpture:* Head and thorax weakly shining, coriarius, with open to sparse, medium setigerous punctures (except propodeal enclosure which is smooth, shining to glossy); metasomal terga weakly shining, coriarius with sparse, minute setigerous punctures.

*Pubescence:* White generally; head and mesosoma with sparse, erect, white, plumose setae, on scutum about 1.5 X as long as an ocellar diameter, densest on lower face but not obscuring integument; metasomal terga almost bare, with sparse, short, simple setae admixed on more apical terga with a few longer slightly plumose setae; metasomal sterna with sparse, long simple setae, forming erect, loose, apical fringes on 4 and 5.

*Terminalia:* See figures 18-20.

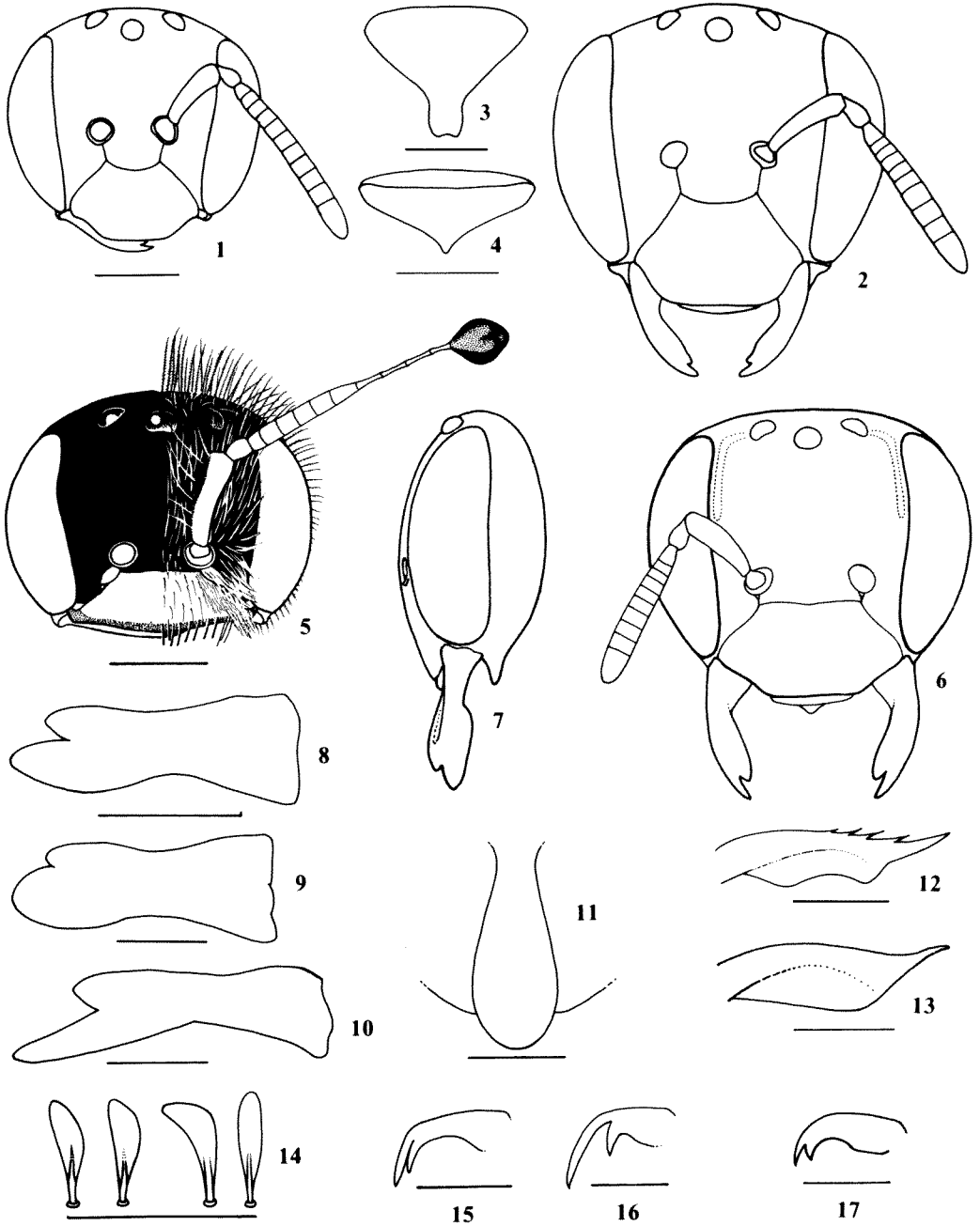
**Female:** (paratype WAM 91/553)

Head width 1.7 mm; body length *ca.* 6.2 mm.

*Relative dimensions:* HW 100; HL 92; UFW 62; LFW 56; MOD 9; WOC 34; OOD 14; IAD 16; ASD 9; AOD 14; CAD 8; UCW 22; MCW *ca.* 50; MCL 35; MSL 0; BMW 17; ML 40; MPL 34; LPL 22; SL 27; SW 7; FL *ca.* 50.

*Morphology:* Much as in male except as follows — flagella relatively shorter (Figure 2); labrum flat, rather triangular with a median process (Figure 3), 0.78 X as long as wide, basal elevation almost obsolete; mandibles fairly straight, bidentate, posterior tooth rounded-obtuse (Figure 9); genae about 0.5 X as wide as compound eyes viewed laterally; basitarsi straight, slender; hind tarsi 0.92 X as long as HW; fore tibial calcars serrated along outer margins, simple apically (Figure 12); basitibial plates scarcely defined but apices marked by tubercle at 1/3 length of tibia; hind tibial spurs simple, finely serrate; tarsal claws bifid with short inner ramus diverging strongly from long, slender, outer ramus (Figure 16); pygidial plate flat, spatulate (Figure 11), 1.4 X as wide as median ocellus.

Three new species of colletid bees



*Colouration:* As in male but metasoma with progressively less dark brown suffusion apicomediaally on terga 1-4; pygidial plate dark red.

*Sculpture:* As in male.

*Pubescence:* Much as in male; labrum densely setose, setae long, tapering, mostly simple; fore tarsi with short, simple brush-hairs ventrally (straight on basitarsi, curved on distitarsi) and longer setae laterally; hind tibiae with numerous short, stiff, curved, distally plumose bristles on outer surfaces and equally numerous long, fine plumose setae on dorsal and ventral margins; setae on metasomal terga 5 and 6 sparse, not obscuring integument.

#### Variation

Head widths of males range from 1.2-1.5 mm (n 21) and of females from 1.5-1.8 mm (n 56).

#### Etymology

The specific epithet is derived from the common name of the forage plant (Morrison Feather Flower).

### *Euryglossa (Euhesma) aureophila*, sp. nov.

#### Holotype

In WAM (91/500), ♂, 10.5 km S Eneabba (29.49 S, 115.16 E), Western Australia, 14-15 November 1990, T.F. Houston, on flowers of *Verticordia aurea*.

#### Paratypes

8 ♂, 10 ♀, WAM 91/501-518, data as for holotype (except for 1 ♀, on flowers of *Pileanthus filifolius*), in ANIC, UQIC, WAM.

#### Diagnosis

Very close to *E. morrisoni*, distinguished as follows: clypeus, mandibles and labrum wholly black, metasoma chiefly brown dorsally, wing veins (except on costal margin) pale brown in female and colourless in male; legs relatively shorter.

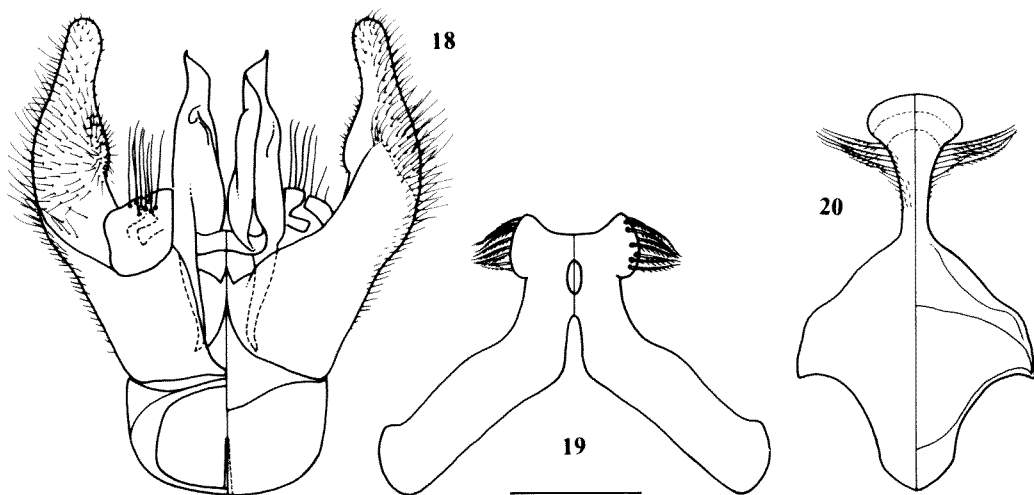
#### Description

Very similar to *E. morrisoni* except as noted in the diagnosis and with the following additional differences.

#### Male (holotype)

Head width 1.35 mm; body length ca. 4.5 mm.

- ◀ **Figures 1-17** *Euryglossa (Euhesma)* spp.: (1, 2) heads of male and female of *E. morrisoni* (to same scale); (3) labrum of *E. morrisoni* female, anterior view; (4) same of *E. semaphore* female; (5, 6) heads of male and female of *E. semaphore* (to same scale); (7) profile of head of *E. semaphore* female; (8-10) mandibles of male and female of *E. morrisoni* and male of *E. semaphore*, respectively (outer views); (11) pygidial plate of *E. morrisoni* female; (12-13) fore tibial calcars of females of *E. morrisoni* and *E. semaphore*; (14) highly modified setae from fore basitarsus of *E. semaphore* female; (15-17) hind tarsal claws of male and female of *E. morrisoni* and female of *E. semaphore*. Pubescence not indicated except in Figure 5. Scale lines: (1, 5) 0.5 mm; (3, 4, 8-11) 0.25 mm; others 0.1 mm.



**Figures 18-20** *Euryglossa (Euhesma) morrisoni* male: genital capsule, 7th and 8th metasomal sterna (dorsal views on right, ventral views on left). Scale line 0.25 mm.

*Relative dimensions:* HW 100; HL 84; UFW 63; LFW 56; MOD 9.5; WOC 29; OOD 14; IAD 18; ASD 9; AOD 12; CAD 4; UCW 26; MCW *ca.* 54; MCL 30; MSL 0; BMW 16; ML 40; MPL 34; LPL 23; SL 24; SW 8; FL 60.

*Morphology:* Head relatively shorter; genae 0.3 X as wide as compound eyes viewed laterally; facial foveae faintly indicated as shallow grooves along inner orbits; antennal sockets separated by twice their own diameter; antennae relatively shorter; legs relatively shorter — fore tarsi (excluding claws) 0.54 X, hind tarsi 0.96 X, and hind tibiae 0.72 X as long as HW.

*Colouration:* The following are black — head and mesosoma, scapes and pedicels, labrum, mandibles, coxae, trochanters and bases of femora; eyes dark brown; metasomal terga chiefly mid-brown with narrow sinuous subapical cream bands widening laterally; foveae of tergum 2 large, black, rather elliptical; tergal margins hyaline, colourless; the following are creamy yellow-brown — terga 6 and 7, metasomal sterna (with lighter subapical bands), flagella (suffused with dark brown dorsally), and legs more distally; tegulae hyaline, colourless with creamy brown spots medially; wings colourless but milky in incident light; costal venation and pterostigma light brown (subcosta dark brown), venation progressively more colourless posteriorly.

*Sculpture:* Head and mesosoma shining, obscurely coriarius or smooth with (except propodeal enclosure) open to sparse, distinct medium-sized setigerous punctures; metasomal terga dulled (except peripherally) by strong fine pitted-imbricate sculpturing (each 'cell' with a concavity).

**Female** (paratype WAM 91/512)

Head width 1.57 mm; body length *ca.* 5.3 mm.

*Relative dimensions:* HW 100; HL 81; UFW 64; LFW 57; MOD 7; WOC 35; OOD 14; IAD 18; ASD 7.5; AOD 14; CAD 4; UCW 27; MCW *ca.* 50; MCL 32; MSL 0; BMW 16; ML 39; MPL 30; LPL 21; SL 23; SW 6.5; FL 49.

*Morphology:* Compound eyes scarcely converging ventrally; genae about 0.4 X as wide as compound eyes viewed laterally; hind tarsi (excluding claws) 0.83 X HW; basitibial plates not defined.

*Colouration:* As in male except as follows — wing veins light brown generally; femora black-brown except for yellowish apices; metasomal terga 1-4 largely dark brown, yellow-brown posterolaterally, with only traces of creamy yellow subapical bands; terga 5 and 6 yellow-brown with pygidial plate dark red-brown; metasomal sterna wholly yellow-brown.

*Sculpture:* Much as in male.

**Variation**

Head widths of males range from 1.25-1.37 mm (n 9), of females from 1.45-1.60 mm (n 10). Extent of creamy yellow-brown colouration on metasomal terga varies considerably: in some males it extends to tergum 6 or even tergum 5 (in these lighter males, a pair of dark spots is evident in scallops of cream subapical band of each tergum); in one female, metasoma is largely yellow-brown dorsally, terga 1-4 having progressively less dark-brown suffusion; in some females, tergum 5 is also suffused with dark brown.

**Etymology**

The specific epithet is Latin for lover of gold and alludes to the species' preference for the rich yellow flowers of *Verticordia aurea*.

***Euryglossa (Euhesma) semaphore*, sp. nov.**

Figures 4-7, 10, 13, 14, 17

**Holotype**

In WAM (91/487), ♂, 10.5 km S Eneabba (29.49 S, 115.16 E), Western Australia, 14-15 November 1990, T. F. Houston 763-3, on flowers of *Pileanthus filifolius*.

**Paratypes**

5 ♂, 7 ♀, WAM 91/488-499, same data as for holotype, in ANIC, UQIC, WAM.

**Diagnosis**

Male immediately recognizable by its unique antennal form: articles 9-12 of flagellum constricted to about one quarter diameter of more proximal articles; article 13 greatly expanded, flattened, disc-like; antennae set very low on face, only two socket diameters from ventral margin of clypeus; mandibles with apical teeth divergent, posterior tooth very long.

Female wholly black and dark brown; immediately recognizable by having postgenal protrusions (usually visible from front when mandibles folded) and spatulate setae on

fore tibiae and tarsi; antennal sockets situated below middle of face and separated by 2.5 socket diameters.

### **Description**

#### **Male** (holotype)

Head width 1.55 mm; body length *ca.* 5 mm.

*Relative dimensions:* HW 100; HL 80; UFW 66; LFW 57; MOD 11; WOC 41; OOD 13; IAD 15; ASD 10; AOD 12; CAD 1; UCW 26; MCW *ca.* 55; MCL 20; MSL 0.5; BMW 16; ML 50; MPL 33; LPL 25; SL 32; SW 9; FL 93.

*Morphology:* Head distinctly broader than long (Figure 5); face broadest above antennal insertions; compound eyes converging little ventrally; vertex produced above and behind ocelli; antennae inserted well below middle of face, sockets virtually in contact with clypeus; clypeus over 2.5 X wider than long; malar spaces virtually absent; facial foveae represented by ill-defined depression lateral to each lateral ocellus contiguous with shallow groove extending down eye margin to widest part of face; antennae relatively long; flagella highly modified — articles 7-10 markedly constricted, stalk-like, lacking setae, article 11 expanded, flattened in vertical plane, disc-like; mandibles long, bidentate, teeth divergent, posterior tooth very much longer than anterior tooth (Figure 10); labium and maxillae unspecialised, palpi ordinary but distal segment of each twice as long as penultimate segment; legs unmodified, fore tarsi (excluding claws) 0.42 X, hind tarsi 0.8 X and hind tibiae 0.64 X as long as HW; claws bifid with prongs subequal, divergent only at tips (Figure 17).

*Colouration:* Head and mesosoma chiefly black with the following white — clypeus, two small spots on lower paraocular areas, mandibles (except dark red apices), labrum, lower genae, antennae (except dorsal edges of scape, pedicel and articles 1-6 of flagellum black-brown, articles 7-10 light brown and article 11 black posteriorly, suffused with cream anteriorly), pronotal tubercles and spots on tegulae; compound eyes pale grey in life, pink-brown in dried condition; metasoma chiefly dark brown dorsally, white ventrally, terga 1-6 each with a narrow subapical cream band; wings colourless but appearing milky in incident light, pterostigma pale brown; venation light to dark brown on costa grading to colourless more posteriorly, wing bases white with dark brown sclerites; legs predominantly white, becoming brown distally on tarsi and with a black-brown patch posteriorly on each femur and tibia.

*Sculpture:* Face, vertex, scutum and scutellum weakly shining to dull, mostly coriarius with weakly defined, medium-sized setigerous punctures, punctures separated by 1-2 diameters; propodeal enclosure dull, coriarius; metasomal terga feebly shining, much more finely coriarius with minute indistinct setigerous punctures.

*Pubescence:* White generally; head, mesosoma and legs with a sparse cover of long, erect, slightly plumose setae (about 1.5-2.0 X as long as ocellar diameter), densest on lower paraocular areas and lateral margins of clypeus, otherwise not obscuring integument; clypeus sparsely setose medially with transverse row of stiff, blunt, hyaline bristles arising



close to and protruding over ventral margin; metasomal terga with very short, simple setae admixed on terga 4-7 with very long plumose setae; metasomal sterna 4 and 5 with weak apical fringes of plumose setae.

**Female** (paratype WAM 91/499)

Head width 1.65 mm; body length *ca.* 5.8 mm.

*Relative dimensions:* HW 100; HL 89; UFW 63; LFW 56; MOD 8.5; WOC 36; OOD 11; IAD 22; ASD 9; AOD 9; CAD 4; UCW 29; MCW *ca.* 53; MCL 30; MSL 2; BMW 15; ML 45; MPL 31; LPL 26; SL 26; SW 8; FL 47.

*Morphology:* Head, viewed anteriorly, slightly quadrate, inner orbits almost parallel, vertex elevated above level of ocelli (Figure 6); facial foveae as in male but better defined, grooves as long as antennal scapes; face gently convex in profile; clypeus and supraclypeal area rather flat; genae, viewed laterally, about half as wide as compound eyes; lower post-genae produced into rounded, ventrally directed spines each side of proboscival fossa (Figure 7); antennae relatively small, inserted below middle of face, sockets separated by *ca.* 2.5 X their diameter; flagella rather ordinary, all but terminal articles broader than long; mandibles bidentate, both teeth broad (Figure 7); labrum sub-triangular (Figure 4), 0.46 X as long as wide, concave in profile beneath transverse basal elevation, apron bearing numerous, stiff, sinuate, obtuse-tipped setae; labium and maxillae short and stout, palpi of ordinary form, terminal segment of each longest; fore tarsi slender; fore tibial calcaria simple, lacking teeth and serrations (Figure 13); basitibial plates not defined except by a carina posteriorly (a tubercle marks apex of plate on one side only; paratypes lack such tubercles); hind tibial spurs simple, ciliate; pygidial plate flat, spatulate (much as in Figure 11), about 1.6 X as wide as median ocellus.

*Colouration:* Head and mesosoma black, lacking pale maculations; metasoma brown, hind margins of terga colourless, only terga 3 and 4 with faint cream subapical bands; antennae, mouth-parts and legs black and brown, fore and mid tibiae slightly cream proximally; wings as in male although fore wing venation generally light brown.

*Sculpture:* Face with strong medium-sized puncturing, shining between punctures; punctures closest on mid frons (separated by one diameter or less), absent around median ocellus, sparse on interantennal area and clypeus (where each pit lies in a depression, creating an uneven surface); vertex, especially medially, dull with denser pitting, interspaces coriarius; scutum, scutellum and metanotum dull with close small puncturing, interspaces coriarius; mesopleura similar but puncturing becoming sparser and coarser more ventrally; otherwise as in male.

*Pubescence:* Much as in male but sparser on lower face and shorter on scutum (setae mostly about 1.5 X as long as ocellar diameter); clypeus with mostly fine, simple setae but a transverse row of flattened, hyaline bristles arises near and protrudes over ventral margin; inner surfaces of fore tibiae and ventral surfaces of fore tarsi covered with short, highly compressed, expanded, spatulate setae (Figure 14); hind tibiae with short, stiff, curved, simple bristles on outer surfaces and equally numerous long, fine, mostly simple

setae on dorsal and ventral margins; setae of metasomal terga 5 and 6 sparse, not obscuring integument.

#### Variation

Head widths of males range from 1.55-1.70 mm, of females from 1.55-1.65 mm. All paratype males have white spots on supraclypeus. Female paratypes vary in number and extent of cream subapical bands on metasomal terga, two having none and one having full bands on terga 1-5.

#### Remarks

The extraordinary characters of this species could warrant its placement in a new subgenus but I prefer to place it in *Euhesma* pending a review of this very diverse group.

Given the pronounced sexual dimorphism, it is unlikely that the sexes would have been associated had they not been collected together at flowers.

Observations over two days at the collection locality suggested that foraging is confined to flowers of *Pileanthus filifolius* (Myrtaceae). Petals of this species are brilliant pinkish or purplish red. Many kinds of flowers including those of other Myrtaceae were available to the bees but were not seen to be visited. *P. filifolius* is confined to white sandy soils on the coastal plain from Gin Gin to Geraldton and flowers from November to January.

#### Etymology

The specific epithet, which alludes to the flag-like apices of the male antennae, should be treated as a noun in apposition.

#### Acknowledgements

I am grateful to the following for their assistance: Dr Elizabeth Exley, University of Queensland (for confirmation of the undescribed status of the bees and for graciously agreeing to me describing them ahead of her revision of *Euhesma*); Mr Kevin Kenneally, Western Australian Herbarium (for information on forage plant distributions).

#### References

- Harris, R.A. (1979). A glossary of surface sculpturing. *Occasional Papers in Ent.*, Dept. of Food and Agric., California, no. 28, 1-31.
- Michener, C.D. (1965). A classification of the bees of the Australian and South Pacific regions. *Bull. Am. Mus. nat. Hist.* **130**: 1-362.