Records of the Australian Museum (2002) Vol. 54: 313–324. ISSN 0067-1975

Bandella, A New Hilarine Fly Genus from Australia (Diptera: Empididae)

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ABSTRACT. *Bandella* n.gen. (Diptera: Empididae: Empidinae: Hilarini) is described from mainland Australia and Tasmania, and comprises nine new species: *B. albitarsis, B. cerra, B. allynensis, B. costalis, B. duvalli, B. maxi, B. montana, B. noorinbee*, and *B. tasmanica*. *Bandella* is distinguished from other genera in the Hilarini by the following combination of characters: mesonotum glabrous, without pruinosity, but with diagnostic colour patterns; mesonotal vestiture highly reduced, comprising only short setulae; male tarsus I unmodified; and male abdominal terga 7 and 8 reduced or modified to form flaps so that hypopygium can be flexed forward. The genus is distinctive in having an almost fully formed vein CuP running lengthwise across the centre of cell cup. Although vein CuP is part of the wing groundplan in Diptera, it has variable expression in the lower Brachycera. In other Empididae, this vein is either residual and positioned closely posteriad of vein CuA_2, or totally absent. Also, *Bandella* has a divided and sclerotised male cercus, a character also shared by the endemic Tasmanian hilarine genus *Cunomyia* Bickel. *Bandella* has a predominately temperate Bassian distribution: Tasmania, southeastern and southwestern Australia, with an outlying species in submontane rainforest of tropical Queensland.

BICKEL, DANIEL J., 2002. *Bandella*, a new hilarine fly genus from Australia (Diptera: Empididae). *Records of the Australian Museum* 54(3): 313–324.

This is the third contribution to a revision of the Australian Hilarini (Diptera: Empididae: Empidinae) (see Bickel, 1996, 1998). This tribe is taxonomically rich in Australia, with hundreds of species awaiting description, especially in the complex of genera similar to the cosmopolitan genus *Hilara*.

This short paper describes *Bandella*, a distinctive new genus comprising nine new species: eight are from temperate Australia and one is from submontane rainforest in the Queensland wet tropics. It is distinguished by a strongly developed vein CuP, a thorax almost totally devoid of major setae but with shining patterned cuticle, an unswollen (i.e., unmodified) male basitarsis I, and by a tendency to curl the distal tarsomeres on all legs (dried specimens). *Bandella* is morphologically isolated with respect to other genera in the Hilarini, although it possibly is closest to the Tasmanian hilarine genus *Cunomyia* Bickel, as both genera share a divided male cercus.

Materials and methods

This study is based on material housed in major Australian and overseas collections (see Acknowledgements for list of repositories and their abbreviations). Morphological terminology follows McAlpine (1981) except that of the male terminalia, which follows Cumming *et al*. (1995). Measurements are in millimetres and based on representative dry specimens. The position of features on elongate structures such as leg segments is given as a fraction of the total length, starting from the base. The relative lengths of the podomeres are representative ratios and not measurements, and are presented in the following formula and punctuation: trochanter + femur; tibia; tarsomere 1/ 2/ 3/ 4/ 5.

The following abbreviations and terms are used (museums and other collections are listed in Acknowledgments): FSSC, female secondary sexual character(s), the

non-genitalic characters found only on female body; MSSC, male secondary sexual character(s), the non-genitalic characters found only on male body; I, II, III: pro-, meso-, metathoracic legs; C, coxa; T, tibia; F, femur; ac, acrostichal setae; ad, anterodorsal; av, anteroventral; dc, dorsocentral setae; dv, dorsoventral; pd, posterodorsal; pv, posteroventral; t, tarsus; $t_{1–5}$, tarsomeres 1 to 5. Geographical abbreviations: FR, Flora Reserve; NP, National Park; NR, Nature Reserve; SF, State Forest.

Genus *Bandella* n.gen.

Type species. *Bandella allynensis* n.sp.

Diagnosis. Flies in the tribe Hilarini; mesonotum glabrous, without pruinosity, but with species diagnostic colour patterns present; mesonotum with ac and dc reduced to setulae, and posterior slope covered with field of scattered setulae; tibia I without distinct anteroapical comb; male basitarsus not swollen; costa circumambient, although reduced in thickness along posterior margin; Sc incomplete; R_{4+5} branched, with R_4 diverging at 45° angle and slightly sinuate, and R_5 ending behind wing apex; CuA_2, strongly recurrent; vein CuP present as distinct vein across cell cup; abdomen terga without strong marginal setae; tergum 7 often with U-shaped median excavation; tergum 8 usually with lateral flaplike projections; hypopygium can flex anteriad at rest; male cercus divided into short basal plate and digitiform clasping cercus.

Description. Rather large, body length 7.0–11.5.

Head spheroidal, with convex post-cranium; post-cranium sometimes with distinctive pruinosity, vertex and frons usually shining with little pruinosity; major setae absent; postcranium with scattered pale ventral hairs, postorbitals short; postvertical setae very short, black; ocellar triangle not distinctly raised; ocellar setae reduced to short hairs; frons slightly narrower than ocellar triangle, and with very short hairs along lateral margins; eyes notched laterad of antennae; face as wide as frons and slightly expanded apically, often covered with pruinosity; palp yellow with white setae, curved and slightly clavate; labrum tapering and heavily sclerotised, about one and a half head height in length, and projecting ventrally; labellum separated from and subequal with labrum; antenna (Fig. 3c) scape about twice as long as pedicel; first flagellomere tapering, longer than scape and pedicel combined, and with short 2–articled apical style.

Thorax. Mesonotum glabrous, without pruinosity, but pleura with pruinosity; mesonotum with species diagnostic colour patterns present, usually similar in both sexes, but sometimes sexually dimorphic; mesonotum with only short setulae and apart from following major setae: 2 posterior notopleural (npl) setae, 1 short postalar (pa) seta, and 1 short posterior intra-alar seta: ac band 3–4 setulae wide, with bare cuticle each side of this band; remainder of mesonotum, including posterior slope covered with field of scattered short setulae; prothoracic collar (pronotum) with some short setae; proepisternum with field of 8–10 pale hairs; scutellum rather weakly developed and with pair of median marginal setae and some adjacent short lateral setae; laterotergite bare; postnotum broad and bulging.

Legs. All tarsi with strong black claws and large yellowish pulvilli; tarsi often curled in repose in dried specimens; FI and TI mostly with short vestiture; TI without distinct anteroapical comb, although some species have irregular setal row of variable length; male It_1 not swollen; TI and each tarsomere $It_{1–3}$ with 2–3 pairs of subapical av-pv setae, and $It_{1–3}$ with dense ventral vestiture; TII with pair strong av-pv setae; each tarsomere $IIt_{1–3}$ with apical setae; $IIt_{2–5}$ each slightly flattened with pale ventral pile; FIII weakly expanded in distal third; TIII without strong setae.

Wing (Fig. 3b); membrane hyaline; costa circumambient, although reduced in thickness along posterior margin; Sc distinctly incomplete; R_1 slightly swollen near join with costa, and brownish stigma present under distal R_1; costa haired, but other veins bare; R_{4+5} branched, with R_4 diverging at 45° and slightly sinuate, and R_5 ending behind wing apex; M_1, M_2, and CuA_1 all joining margin; CuA_2, which closes cell cup, strongly recurrent; vein CuP present as almost fully formed vein across cell cup; A_1 present distally only as fold, and arising midway along cell cup; A_2 present as trace; anal angle weak to absent; lower calypter yellowish with yellow setae; halter yellow.

Abdomen. Cuticle glabrous, with little pruinosity; tergum 1 with some pale setae laterally, otherwise abdomen with only short yellowish vestiture, without strong marginal setae; tergum 1 relatively short with membranous median window; abdominal plaques present on terga 2–5; tergum 7 often with U-shaped median excavation; tergum 8 usually with lateral flaplike projections (e.g., 4b,c); hypopygium can flex anteriad at rest; male cercus distinct and divided into sclerotised short basal cercal plate and digitiform clasping cercus; hypandrium keel-like; aedeagus elongate and conforming to curvature of hypandrium, epandrium broad, with distal curved projection; distinct surstylus not evident.

Female oviscapt relatively unmodified, with subequal terga and sterna on segments 9 and 10, and with pair elongate apical cerci (Fig. 3f).

Etymology. *Bandella* means “little Banda”, a diminutive derived from Mt Banda Banda, a New South Wales locality where the genus occurs. The gender is feminine.

Remarks

Bandella comprises nine species from mainland Australia and Tasmania. Species occur mostly in wet sclerophyll eucalypt forests and rainforests, and mostly at higher altitudes. Although the genus has an essentially temperate Australian or Bassian distribution of southeastern and southwestern Australia and Tasmania, one species occurs above 1000 m in submontane rainforest in tropical Queensland.

Bandella is best placed in the Hilarini, as discussed in the next section. It is confined to Australia, and is not close to any described genus from temperate Gondwanan regions: New Zealand (Collin, 1928), Patagonia (Collin, 1933) and southern Africa (Smith, 1969). However, based on a shared character, the divided sclerotised male cercus, *Bandella* possibly has a distant relationship with the endemic Tasmanian genus *Cunomyia* Bickel.

Bandella has a glabrous thorax with strong colour patterns, and almost all major dorsal thoracic setae are reduced to setulae. By contrast, most other hilarines have a pruinose thoracic surface, and at least some strong thoracic setae, especially the anterior dc. Variation is evident in the thoracic pattern of some *Bandella* species, which may reflect age, nature of preservation or intraspecific variation. For example, the strong contrast between yellow and dark brown on some specimens may be obscured by a general infuscation of the entire specimen, possibly a direct function of age (e.g., Figs. 2h,i). Although the thoracic patterns are usually the same in both sexes, they are sometimes strikingly dimorphic, as in *B. noorinbee* (Fig. 2d,e). However, the basic contrasting thoracic pattern as suggested by the figures remains diagnostic for each species and is useful in identifying females.

The male postabdomen is variously modified to receive the deflexed hypopygium. In all species except *B. maxi* tergum 7 is medially excavated, and in some species tergum 8 has lateral flap-like projections (Fig. 4b,c). In dried specimens of *Bandella*, particularly *B. costalis*, *B. duvalli*, *B. montana*, and *B. tasmanica*, the tarsi are distinctly curled in repose, as in Fig. 1.

There is good evidence of adult nectar feeding in the genus. *Bandella duvalli* was collected off the nectar-rich blossoms of *Leptospermum* (Myrtaceae) bushes in Tasmania, and *Leptospermum* pollen was found on the

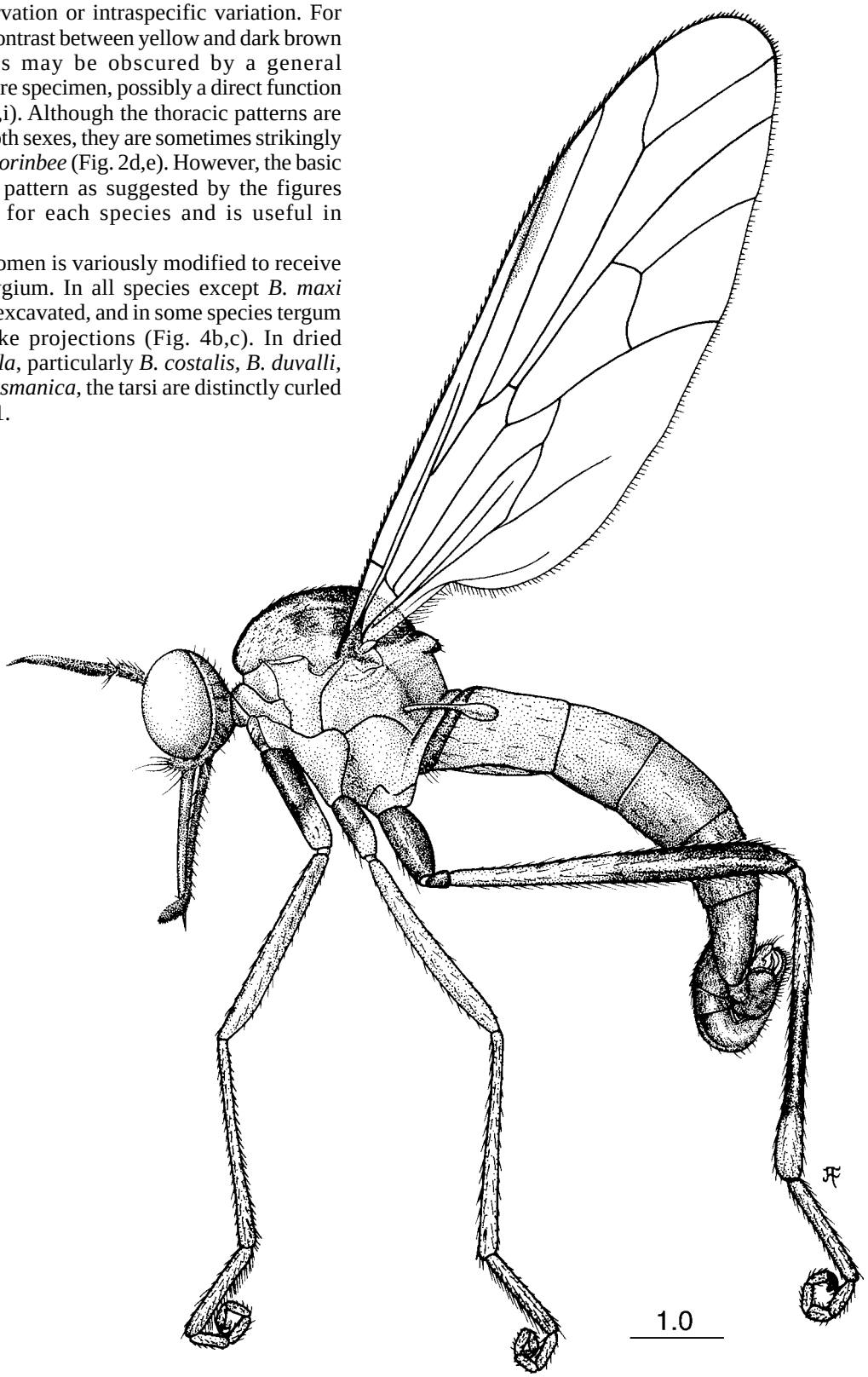

Figure 1. *Bandella duvalli*, ♂, habitus. Mt Pelion, Tasmania.

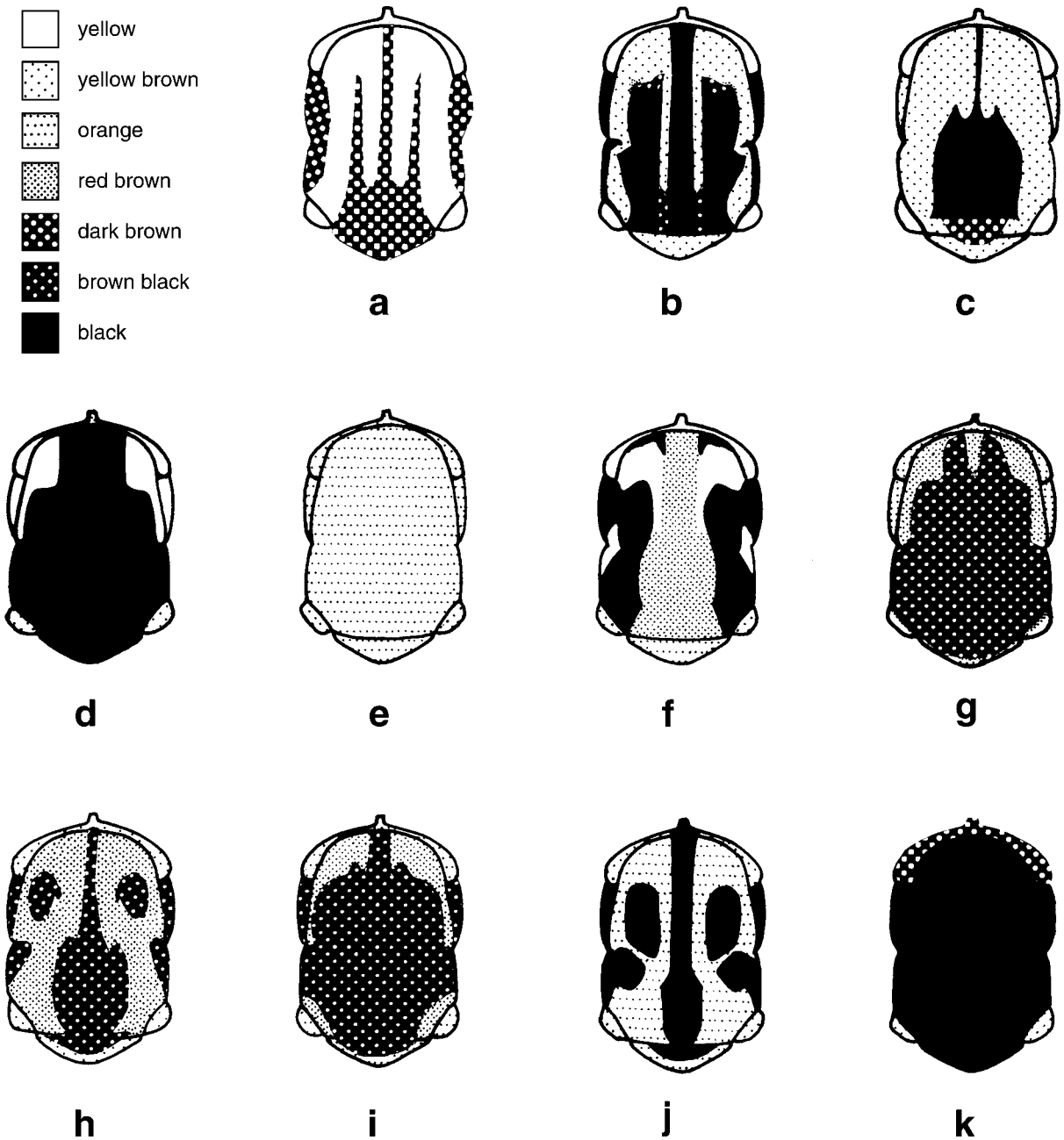

Figure 2. Dorsal thoracic colour pattern, *Bandella* spp. a, *B. allynensis* ♂; b, *B. cerra* ♂; c, *B. montana* ♂; d, *B. noorinbee* ♂; e, *B. noorinbee* ♀; f, *B. albitarsis* ♂; g, *B. maxi* ♂; h, *B. duvalli* ♂ (holotype); i, *B. duvalli* ♂ (variant); j, *B. tasmanica* ♂; k, *B. costalis* ♂.

proboscis of *B. albitarsis* in New South Wales. Nectar feeding is well known among the Empidinae (e.g., Chvála, 1976). Specimens of *B. allynensis* have also been taken on sticky traps placed on smooth barked *Eucalyptus* trunks, which indicates adults occasionally rest on tree trunks.

Mating behaviour is unknown. Males do not have swollen fore basitarsi producing silk for wrapping nuptial gifts characteristic of the complex of genera near *Hilara*. Of particular interest are the bright silvery pruinose patches present on the head, thorax and legs of both sexes of *Bandella albitarsis*. These silvery patches may facilitate sexual recognition in flight, especially since incident light would make them appear to "flash" while turning.

Morphological notes and systematic position of *Bandella*

I presented (Bickel, 1996) a set of characters useful in separating the two major tribes of the Empidinae, the Empidini and the Hilarini. Since many characters are variable in expression and must be qualified, higher level taxa have to be defined as a mosaic of characters, a "polythetic classification," no character necessarily being diagnostic for all members (Gauld & Mound, 1982). As so defined, *Bandella* has the following set of characters that place it in the Hilarini: laterotergite bare; hypandrium forming a curved convex hood over aedeagus; costa circumambient; vein R_1 distinctly swollen before it joins the costa. *Bandella* does not have the following hilarine characters: tibia I with anteroapical comb of 8–10 short even setae; male cercus small

and desclerotised, and fused laterally with the surstylus and epandrium; male basitarsus I enlarged or swollen.

With the large number of undescribed taxa in the Hilarini, both in Australia and throughout the world, it is premature to attempt any phylogenetic analysis of the tribe. However, two important morphological characters should be discussed—vein CuP and the male cercus.

Vein CuP. *Bandella* is distinctive in having an almost fully formed vein CuP running lengthwise across the centre of cell cup (Fig. 3b), and not posteriorly close to vein CuA_2 or vestigial as found in some other empidids (e.g., *Brachystoma* and some *Empis*, figures in Chvála, 1983). However vein CuP is absent in *Hilara*, most *Empis* spp. and the Trichopezinae. By contrast in *Bandella*, CuP is strongly developed in all species, although it looks almost like a *vena spuria*, and not carrying haemolymph. Vein CuP is plesiomorphic to the Diptera as a whole and part ground plan for the Diptera wing (McAlpine, 1981), but its expression is variable in the lower Brachycera. For example, it is variously developed in the Asiloidea, but usually weak and just behind vein CuA_2.

Cercus. Most male Hilarini have a cercus which is rather small, desclerotised, and fused laterally with the surstylus and epandrium (Cumming & Sinclair, unpubl. data). *Bandella*, by contrast, has an enlarged sclerotised male cercus, which is divided into a distinctive digitiform "clasping cercus" and smaller "cercal plate" (see Fig. 4b). This cercal form is similar to that of the monotypic Tasmanian genus *Cunomyia* Bickel (see Sinclair, 1995 and Bickel, 1998 for further discussion), and this shared character indicates a possible close phylogenetic relationship between these two Australian genera.

Key to species of *Bandella* (males)

1 Abdomen almost entirely shining black with violet reflections, with at most some lateral yellow colour on tergum 1 2

—— Abdomen with some red, brown or yellow terga 3

2 Large, length >10.0; thoracic pattern, mesonotum mostly orange, but black over posterior slope, scutellum mostly orange, Fig. 2c; legs mostly yellow; hypopygium (Fig. 3d) mostly yellow (NSW, Vic.) ..... *B. montana* n.sp.

—— Small, length <7.5; male mesonotum and scutellum black, Fig. 2d (female thorax completely orange, Fig. 2e); scutellum black; coxae yellow; remainder of legs dark brown to black; hypopygium (Fig. 3e) black (Vic., NSW) ..... *B. noorinbee* n.sp.

3 Post-cranium with silvery pruinose band around outer rim; thoracic pattern, Fig. 2f; pleuron with bright silvery pruinose areas; It_{2-5} white; $IIIt_{2-5}$ pale yellow; abdomen, including hypopygium mostly yellow (NSW) ..... *B. albitarsis* n.sp.

—— Head and thorax without silvery pruinosity; tarsus I yellow to black, but not white 4

4 TII and tarsus II with long anterior and posterior setae, Fig. 5e; mesonotum and scutellum almost entirely black, Fig. 2k; FIII slightly clavate in distal half; abdominal terga yellow with black posterior border (WA) ..... *B. costalis* n.sp.

—— Legs without long setae, only with normal short vestiture; mesonotum with some red, yellow or brown colouration; FIII and abdomen variously developed 5

5 TIII banded, with yellow apex and base, and dark brown median band (as in Fig. 1) (Tas.) 6

—— TIII either entirely yellow or yellow with dark brown apex (Aust. mainland) 7

6 Coxae dark brown/black; anterior mesonotum mostly red-brown; posterior mesonotum black with interdigitation of red anteriorly (Fig. 2h,i); FIII yellowish in basal half but distally dark brown; tarsus III dark brown; hypopygium (Fig. 4b,c) mostly black ..... *B. duvalli* n.sp.

—— Coxae mostly yellow; anterior mesonotum mostly orange; with black ac band and black spot laterad of dc row (Fig. 2j); FIII mostly red-yellow; tarsus III entirely yellow; hypopygium (Fig. 4a) mostly yellow except for dark brown apex ..... *B. tasmanica* n.sp.

7 Antenna entirely dark brown; anterior mesonotum red-brown, interdigitating with black posterior mesonotum (Fig. 2g); scutellum black with reddish margin; postnotum black; abdominal terga 1 and 2 reddish, hypopygium (Fig. 4d) with hypandrium greatly expanded and keel-like (n. Qld) ..... *B. maxi* n.sp.

—— Antennal scape and pedicel yellowish, first flagellomere black; pleura and postnotum dark brown with yellowish areas; anterior mesonotum mostly yellow; postpronotum and postalar callus pale yellow; scutellum yellow but infuscated basally; hypopygium not expanded, similar to Fig. 3a 8

8 Coxae II and III dark brown; thorax with posterior slope of mesonotum dark brown and with thin brown strip extending anteriorly over dc band (Fig. 2a); TIII mostly yellow; It_1 yellow; hypopygium (Fig. 3a) entirely dark brown (NSW) ..... *B. allynensis* n.sp.

—— Coxae II and III mostly yellow; mesonotum with three brown bands extending to scutellum and with lateral dark brown areas (Fig. 2f); TIII yellow but with distal fifth brown; It_1 distinctly brown, in contrast to yellow TI and tarsomeres $It_{2–4}$; hypopygium with dark brown hypandrium and surstyli, but distinctly yellow epandrium (NSW) ..... *B. cerra* n.sp.

Bandella allynensis n.sp.

Figs. 2a, 3a–c

Type material. HOLOTYPE ♂ and PARATYPES, 2♂, 10♀ all New South Wales, Upper Allyn River, 1500 ft (410 m), 9.xi.1960, I.F.B. Common & M.S. Upton (ANIC).

Additional material. New South Wales: 3♂, 2♀, New England NP, Point Lookout, 1400 m, *Nothofagus* forest, 22.i.1967 (UQIC); Wilson River Reserve, 31°12'S 152°28'E, 240 m, wet sclerophyll/ subtropical rainforest: ♀, 26.xi.1966, & ♂, sticky trap on *Eucalyptus grandis*, 16–19.xi.1998; ♂, ♀ Carrai SF, Daisy Plains, 30°54'19"S 152°17'36"E, 1055 m, 11–16.i.1998, wet sclerophyll forest, sticky trap on eucalyptus trunk (AMS).

Description (male): length: 9.4–9.8; wing: 8.2×1.4. *Head*: post-cranium black, covered laterally and ventrally with grey pruinosity; dorsal post-cranium, vertex and frons black without pruinosity; postcranium with usual pale ventral hairs; dorsal postcranium bare; postorbital setae white ventrally, black dorsally; labrum dark brown but yellow at middle; labellum dark brown; antennal scape and pedicel yellowish to brown; first flagellomere black.

Thorax: pleura and postnotum dark brown with yellowish areas, and covered with grey pruinosity; anterior mesonotum mostly yellow with pale yellow postpronotum and postalar callus; ac band dark brown, and dark brown stripe present from postpronotum to postalar callus; posterior slope of mesonotum dark brown, with thin brown strip extending anteriorly over dc band, but fading out near mesonotal suture (Fig. 2a); scutellum yellow but infuscated at base; posterior slope of mesonotum with some short setulae.

Legs: CI yellow and trochanter I yellow with dark brown apical rim; coxae and trochanters II and III distinctly dark brown; remainder of leg I yellow except distal tarsomeres infuscated; FII and FIII basally yellow; but infuscated distally; TII and TIII mostly yellow, but TIII infuscated apically; tarsi II and III brown; leg vestiture brownish; coxae with only short pale vestiture, no strong setae; all tarsi with strong black claws and large yellowish pulvilli; I: 11.0; 11.5; 6.0/ 3.5/ 1.5/ 1.2/ 1.3; FI and TI mostly with short vestiture; It_2 and It_3 each with two closely appressed subapical pv setae, which are distinctly longer than single corresponding single av seta.(MSSC); $It_{2–5}$ ventrally flattened with pale vestiture; II: 11.0; 11.5; 6.0/ 3.5/ 1.5/ 1.2/ 1.3; TII with pair strong av-pv setae; each tarsomere $IIt_{1–3}$ with apical setae; $IIt_{2–5}$ each slightly flattened with pale ventral pile; III: 15.0; 17.0; 7.0/ 3.0/ 1.3/ 1.8/ 1.6; FIII weakly expanded in distal third; TIII without strong setae; IIIt with short black vestiture.

Abdomen: tergum 1 dark brown; tergum 2 with basal third yellow and distally dark brown; terga 3–6 mostly yellow but each tergum with dark brown posterior marginal band (in darker specimens, marginal band larger and with dorsoanterior extensions on most terga); cuticle glabrous, without pruinosity; tergum 7 with U-shaped median excavation; tergum 8 unmodified; hypopygium (Fig. 3a); male cercus divided into short basal cercal plate and digitiform clasping cercus.

Female similar to male except as noted: thorax with similar colour; leg vestiture somewhat weaker than on male; It_2 and It_3 each with single subequal subapical av-pv setal pair.

Remarks. *Bandella allynensis* occurs in subtropical and temperate rainforests and wet sclerophyll eucalypt forests along the ranges of northeastern New South Wales. Specimens taken in sticky traps (sheets of clear plastic coated with sticky substance and attached to tree trunks) suggest the species occasionally rests on tree trunks. There is some variation in the extent of the dark brown area on the mesonotum (Fig. 2a).

Bandella cerra n.sp.

Fig. 2b

Type material. HOLOTYPE, ♂ (K 173134), PARATYPES, ♂ (K 173135), ♀ (K 173136), New South Wales: Barrington Tops NP, Gloucester Tops, 32°04'S 151°34'E, 1280 m, *Nothofagus moorei* forest along creek, 4–30.xii.1988, malaise trap, D.J. Bickel (all AMS).

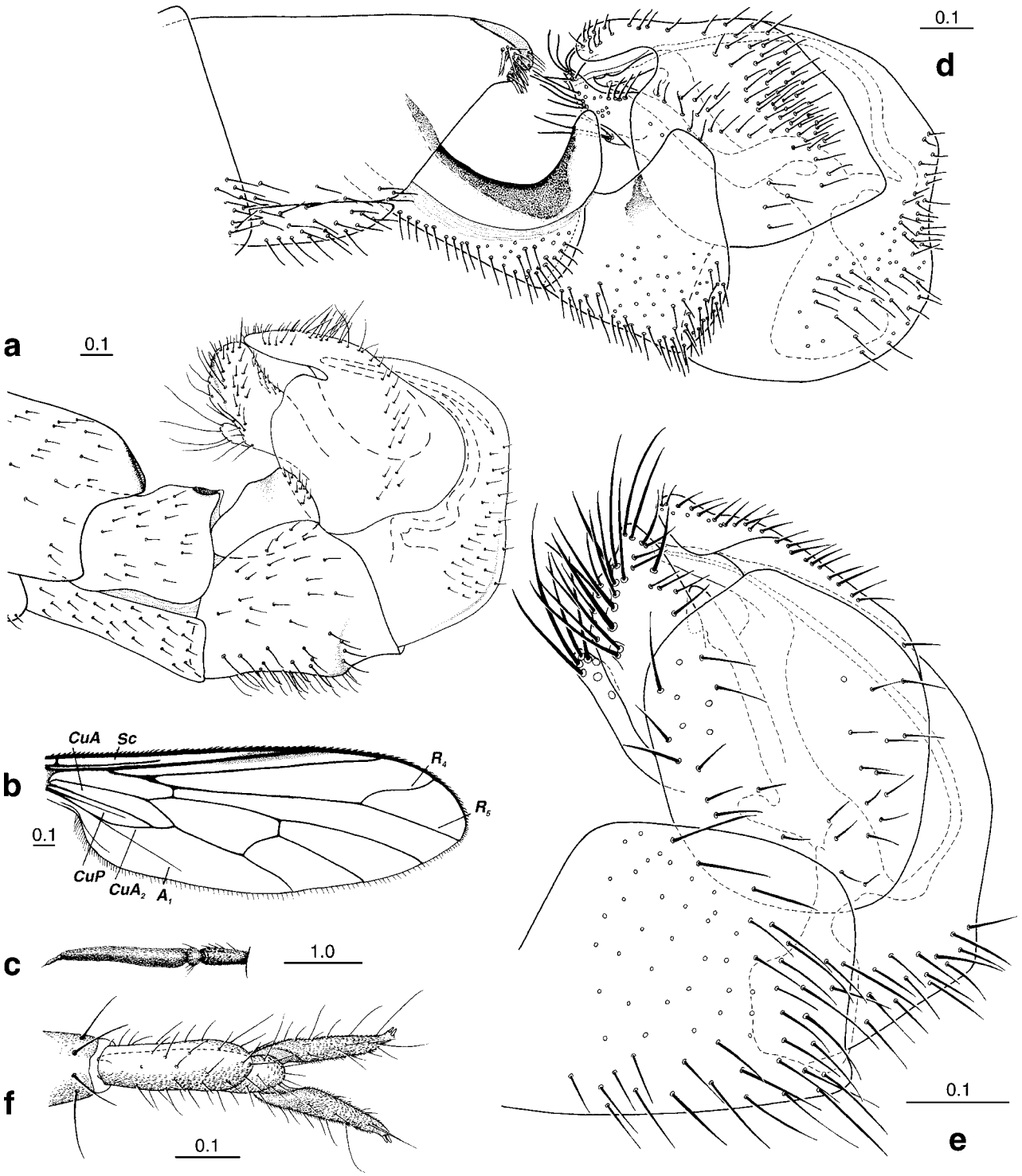

Figure 3. *Bandella allynensis*: a, male postabdomen; b, male wing, dorsal; c, male antenna, left lateral. *Bandella montana*: d, male postabdomen, left lateral. *Bandella noorinbee*: e, male postabdomen, left lateral; f, female oviscapt, dorsal.

Additional material. New South Wales: ♂, Barrington Tops, via Salisbury [no elevation], 28–30.xii.1965 (UQIC); ♂, Mt Banda Banda FR, 31°10'S 152°26'E, 1200 m, cool temperate rainforest, 14.i.1988 (AMS).

Description (male): length: 8.5–9.5; wing: 6.9×1.3; similar to *B. allynensis* except as noted. *Head*: scape black. *Thorax*: pleura and postnotum dark brown with yellowish areas, and covered with grey pruinosity; anterior mesonotum mostly yellow with pale yellow postpronotum and postalar callus; ac band dark brown and extending to scutellum, with yellow bands on either side, also extending to scutellum, and with brown areas laterad which extend from mesonotal suture back to scutellum (Fig. 2b); scutellum yellow but infuscated at base.

Legs: CI yellow; trochanter I yellow with dark brown apical rim; coxae and trochanters II and III yellowish with brown areas, and covered with grey pruinosity; FI and TI

yellow; It_1 distinctly brown, in contrast to yellow TI and distal tarsomeres; $It_{2–5}$ yellow; It_2 and It_3 each with two closely appressed subapical pv setae, which are distinctly longer than single corresponding single av seta.(MSSC); $It_{2–5}$ ventrally flattened with pale vestiture; FII and TII yellow; $It_{1–2}$ brown, and $It_{3–5}$ yellow; FIII yellow basally, grading to brown in distal third; TIII yellow with but distal quarter brown; IIIt dark brown.

Abdomen: tergum 1 dark brown; terga 2–6 mostly yellow but each tergum with dark brown apical ring and with dark brown dorsal band so that abdomen appears to have dorsal stripe; hypopygium (not figured, but similar to Fig. 3a) with dark brown hypandrium and surstyli, but distinctly yellow epandrium.

Female similar to male except as noted: thorax with similar colour; leg vestiture somewhat weaker than on male; It_2 and It_3 each with single subequal subapical av-pv setal pair; abdomen with similar pattern.

Remarks. *Bandella cerra* is known from *Nothofagus moorei* dominated cool temperate rainforest in the Barrington Tops and Mt Banda Banda, in northeastern New South Wales. These sites are in the Central Eastern Rainforest Reserves of Australia (CERRA) World Heritage Area, hence the specific epithet.

Bandella montana n.sp.

Figs. 2c, 3d

Type material. HOLOTYPE, ♂ (K 173137), PARATYPES, ♂ (K 173138), ♀ (K 173139), New South Wales: Barrington Tops NP, 5.xii.1976, G. Daniels (all AMS).

Additional material. NEW SOUTH WALES: NSW: Mt Wilson, Blue Mountains, 33°30'S 150°23'E, 950 m, ♀, 5.xii.1956, ♀, 1.xi.1975, ♂, 10.xi.1990 (AMS); ♂, New England NP, 5.xi.1981 (AMS); ♂,Mt Tomah, Blue Mtns, 33°33'S 150°25'E, x.1930 (MVM). VICTORIA: ♀, Thomson River, 6 km E of Mt Gregory, 24.xi.1976 (MVM).

Description (male): length: 11.0; wing: 8.8×2.7. *Head*: post-cranium laterally and ventrally with dusting of grey pruinosity; dorsal postcranium, vertex and frons shining black with no pruinosity; ventral postcranium with scattered pale setae; postorbitals present as short white setae ventrally, black dorsally; face covered with silvery pruinosity; labrum and labellum entirely yellow; antenna black but pedicel brownish in some specimens.

Thorax: pleura and mesonotum mostly red-yellow, except posterior mesonotum with black area extending almost to scutellum, but varying in extent from large area (Fig. 2c) to a small black dot, almost absent; scutellum yellow but brownish basally; pleura with some pruinosity, but mesonotum glabrous; scutellum with pair brownish median marginal setae, with some adjacent short setae.

Legs: coxae and remainder of legs yellow; coxae with only short pale vestiture, no strong setae; femora and tibiae with mostly short black vestiture; all tarsi with strong black claws and large yellowish pulvilli; I: 11.5; 11.5; 5.0/ 2.0/ 1.6/ 1.4/ 1.5; TI and each tarsomere $It_{1–3}$ with 2–3 pairs of subapical av-pv setae, and $It_{1–3}$ with dense ventral vestiture; II: 12.5; 12.0; 5.0/ 2.0/ 1.2/ 1.1/ 1.5; each tarsomere $IIt_{1–4}$ with dense ventral vestiture, and with some subapical av-pv setae; III: 18.0; 17.0; 6.3/ 2.1/ 1.8/ 1.5/ 1.8; FIII very slightly clavate in distal third; tarsomeres $IIIt_{1–2}$ ventrally swollen with dense vestiture.

Abdomen: segments 1–6 shining black with some violet reflections, although tergum 2 yellow in basolaterally; segments 7 and 8 yellowish; tergum 6 dorsally with median-posterior U-shaped excavation, and tergum 7 with lateral flaplike projections; hypopygium yellowish (Fig. 3d).

Female similar to male except as noted: post-cranium also with grey pruinosity; thorax with similar colour and black patch size variation; leg vestiture somewhat weaker than on male; abdominal tergum 1 with similar colour pattern.

Remarks. *Bandella montana* occurs along the Great Dividing Range from southern Victoria to the New England escarpment in northern New South Wales. The extent of the black area on the mesonotum appears to vary in size geographically. Specimens from the southern part of the range (Blue Mountains, N.S.W. and Thompson River, Vic.) have the black area reduced to a narrow median strip, whereas specimens from the New England escarpment have a more extensive black area, as in Fig. 2c.

Bandella noorinbee n.sp.

Figs. 2d, 2e, 3e, 3f

Type material. HOLOTYPE ♂, PARATYPES 2♂, 11♀, Victoria: Noorinbee, 12.xi.1969, A. Neboiss (all MVM).

Additional material. New South Wales: 3♂, 6.4 km N of Batemans Bay, 14.x.1952, 22.x.1952, 14.x.1959; ♂, Macquarie Falls, 14.xi.1960, 2♀, Warrell Creek, 11.x.1962 (ANIC). ♂, Mt Royal SF, nr Pieries Ridge, 600–700 m, 15.xi.1986; ♀, 30 km N of Taree, 23.xi.1985 (AMS); ♂, Royal NP, Couranga Trail, 7.xi.1993 (CNC).

Description (male): length: 7.2–7.3; wing: 5.0×1.5. *Head*: post-cranium, vertex and frons shining black with no pruinosity; ventral postcranium with scattered pale setae; postorbitals reduced to short hairs, white ventrally, black dorsally; face covered with silvery pruinosity; labrum yellowish with dark brown base and apex, labellum black; antenna black brown; scape and pedicel setose.

Thorax: pleura and humeral areas of mesonotum red-yellow; mesonotum mostly black posteriorly, narrowing step like anteriorly, to become black stripe over ac band and pronotum (Fig. 2d); scutellum black; postnotum black but covered with grey pruinosity; setulae pale; scutellum with pair short median marginal setae, and with some adjacent short setae.

Legs: coxae yellow; trochanters and remainder of legs dark brown to black; coxae with only short pale vestiture, no strong setae; all tarsi with strong black claws and large yellowish pulvilli; I: 6.7; 7.0; 3.6/ 1.2/ 1.0/ 0.9/ 0.8; FI and TI mostly with short vestiture; TI without anteroapical comb; TI, It_1, and It_2 each with 2 pairs of av-pv setae, and It_3 each with single pair of av-pv setae; II: 6.7; 7.0; 3.0/ 1.4/ 1.0/ 0.9/ 0.7; TII with pair strong apical av-pv setae setae; each tarsomere $IIt_{1–3}$ with apical av-pv setae; IIt_1 with black

ventral pile; remainder of tarsus II with dense pale ventral pile; III: 11.0; 10.0; 3.0/ 1.3/ 1.0/ 0.8/ 0.8; FIII gradually expanding apically, and weakly clavate in distal third; TIII without strong setae; IIIt with short black vestiture.

Abdomen entirely shining black, with metallic blue-violet reflections; without pruinosity; tergum 7 with distal U-shaped excavation; tergum and sternum 8 unmodified; hypopygium (Fig. 3e); male cercus divided into short basal cercal plate and rather broad clasping cercus.

Female similar to male except as noted: face and clypeus both wider; thorax including scutellum and postnotum entirely yellow, without any black markings (Fig. 2e); vestiture of tarsus I and II not as strongly developed; oviscapt Fig. 3f.

Remarks. *Bandella noorinbee* is known from coastal and lowland sites from the northern coast of New South Wales to East Gippsland, Victoria. All specimens were collected in October and November. This species shows strong sexual dimorphism in mesonotal pattern: males have an extensive black area (Fig. 2d), whereas females have an entirely yellow mesonotum (Fig. 2e).

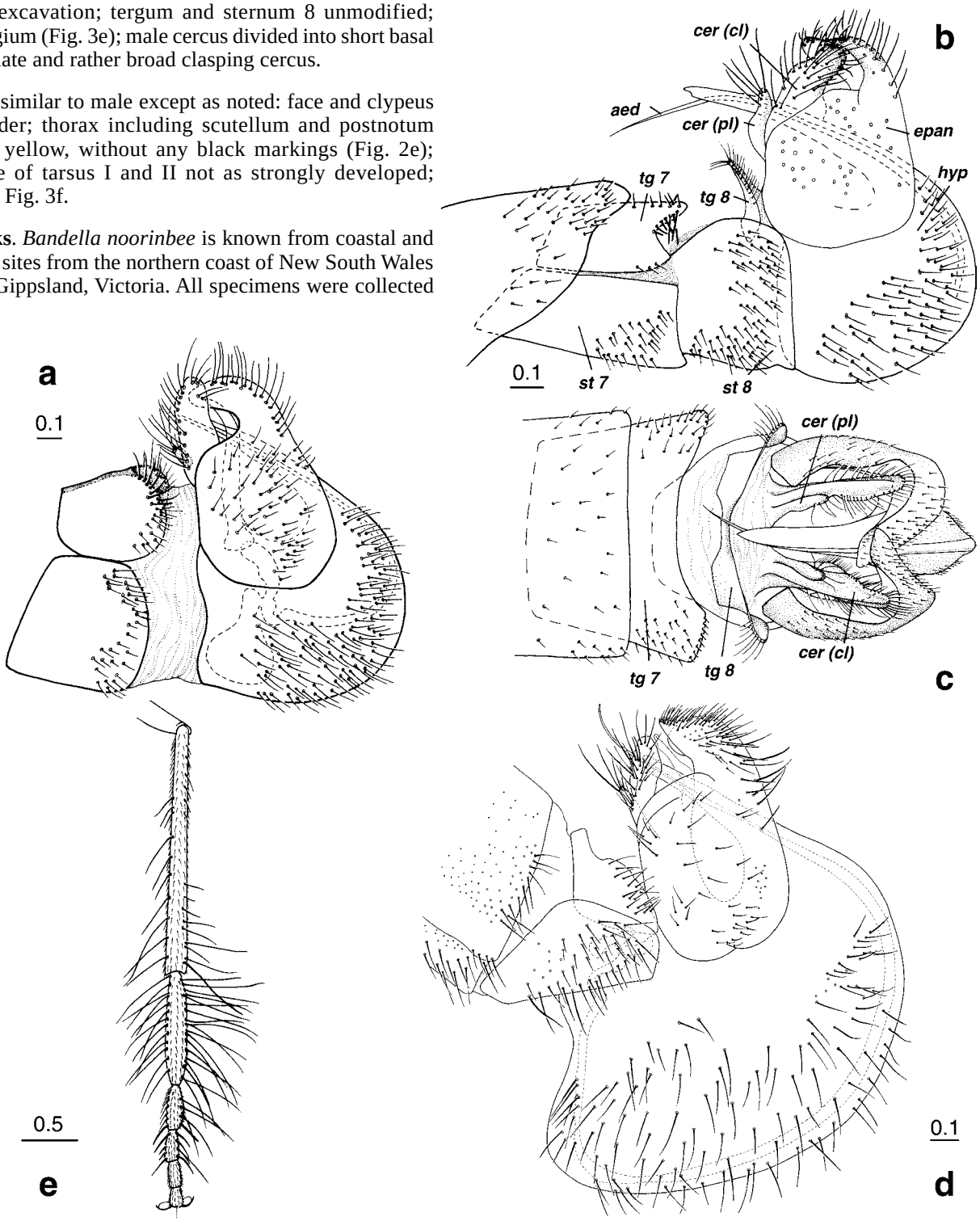

Figure 4. *Bandella tasmanica*: a, male postabdomen, left lateral. *Bandella duvalli*: b, male postabdomen, left lateral; c, male postabdomen, dorsal. *Bandella maxi*: d, male postabdomen. *Bandella costalis*: e,. male right tibia and tarsus II, dorsal. Legend: aed, aedeagus; cer (cl), clasping cercus; cer (pl), cercal plate; epan, epandrium; hyp, hypandrium; tg, tergum; st, sternum.

Bandella maxi n.sp.

Figs. 2g, 4d

Type material. HOLOTYPE ♂ (K 173140), Queensland: Mt Lewis, Mt Lewis Rd nr forestry hut, 1100 m, 10.xii.1974, at light, M.S. Moulds (AMS).

Description (male): length: 10.0; wing: 7.5×2.2. *Head*: post-cranium, vertex and frons shining black with no pruinosity; ventral postcranium with scattered pale setae; postorbitals reduced to short hairs, white ventrally, black dorsally; face as wide as frons and covered with silvery pruinosity; palp yellow with white setae, curved and slightly clavate; proboscis yellow with dark brown apex, elongate, length about one and a half head height, and projecting ventrally; antenna dark brown.

Thorax: pleura and anterior mesonotum mostly red-brown; anterior mesonotum red, interdigitating with black posterior mesonotum (Fig. 2g); scutellum black with reddish margin; postnotum black, posterior slope of mesonotum covered with field of short setulae.

Legs: coxae mostly reddish yellow; but CIII laterally infuscated; coxae with only short pale vestiture, no strong setae; all tarsi with strong black claws and large yellowish pulvilli; I: 9.0; 9.8; 5.0/ 2.1/ 1.5/ 1.8/ 1.4; leg I mostly red-yellow; FI and TI mostly with short vestiture; TI without anteroapical comb; TI and It_1 each with 2–3 pairs of apical av and pv setae, It_2 and It_3 each with single av-pv setal pair; all of tarsus I with pale ventral pile; II: 10.0; 10.5; 4.5/ 1.8/ 1.3/ 1.4/ 1.0; FII mostly reddish yellow but infuscated in distal half; TII and IIt_1 red-yellow; distal tarsomeres II dark brown; TII with pair strong av setae; each tarsomere $IIt_{1–3}$ with apical av-pv setae; IIt_3 and IIt_4 with dense pale ventral pile; III: 13.5; 13.0; 5.0/ 2.0/ 1.3/ 1.5/ 1.3; FIII yellowish in basal half but distally dark brown; TIII yellow in basal third, and with distal two-thirds of TIII, and all IIIt dark brown; FIII gradually expanding apically, and weakly clavate in distal third; TIII without strong setae; IIIt with short black vestiture.

Abdomen: terga 1 and 2 reddish, remainder of abdomen black; cuticle glabrous, without pruinosity; segment 7 with well-developed tergum and sternum, tergum 7 not excavated; nor differentiated from segments anteriad; tergum 8 reduced to narrow band; sternum 8 unmodified; hypopygium (Fig. 4d).

Female unknown.

Remarks. *Bandella maxi* is known only from submontane rainforest above 1000 m on Mt. Lewis, in the Queensland wet tropics. It has a greatly expanded and keel-like hypopygium.

However, male abdominal segments 7 and 8 are relatively unmodified, and therefore plesiomorphic with respect to the other *Bandella* species. This species is named for the collector, Max Moulds.

Bandella duvalli n.sp.

Figs. 1, 2h, 2i, 4b, 4c

Type material. HOLOTYPE ♂, Tasmania: 14 km SW by S of Wilmot, 41°30'S 146°05'E, 31.i.1983, I.D. Naumann & J.C. Cardale (ANIC).

Additional material. Tasmania: ♂, Arthur Plains, 18.ii.1965; ♀, Mt Bowes, NE slope, 11.ii.1965 (MVM); ♂, Mt Wellington, Hobart, 42°55'S 147°14'E, 1.ii.1992, 720 m, on *Leptospermum scoparia* (UQIC); ♀, Cradle Valley, 26.i.1923; ♂, Strahan, 6.ii.1923; ♀, Mt Farrel, 9.ii.1923; ♂, Mt. Field NP, 950 m, 22.ii.1963 (ANIC); ♂, Mt Barrow, 41°22'S 147°25'E, 900 m, 12.ii1988 (AMS).

Description (male): length: 10.0; wing: 7.5×2.2 (habitus, Fig. 1). *Head*: post-cranium black, covered laterally and ventrally with grey pruinosity; dorsal post-cranium, vertex and frons black without pruinosity; postcranium with usual pale ventral hairs and with black dorsal hairs; postorbital setae white ventrally, black dorsally; lateral frons with setulae more distinct than usual; palp yellow with white setae, curved and slightly clavate; labrum dark brown basally, yellow distally; labellum dark brown; antenna black; scape and pedicel with short black setulae.

Thorax: pleura mostly black but red-brown near sutures, and covered with grey pruinosity; anterior mesonotum red-brown, interdigitating with black posterior mesonotum, black lateral patches and black ac band, but in some specimens this pattern is obscured (Fig. 2h,i); scutellum red-brown with black base; postnotum black with grey pruinosity; posterior slope of mesonotum covered with field of short setulae.

Legs: coxae dark brown to black although CI and CII reddish brown distally; coxae with only short pale vestiture, no strong setae; all tarsi with strong black claws and large yellowish pulvilli; legs I and II mostly red-yellow; $It_{1–3}$, each with pairs of av setae; each tarsomere $IIt_{1–3}$ with some subapical av setae; FIII yellowish in basal two thirds, but dark brown and slightly clavate in distal third; TIII yellow at base, dark brown from ⅓–⅚, and yellow in distal sixth; distal sixth of TIII and $IIIt_1$ with pale yellow vestiture; $IIIt_{2–5}$ with black vestiture.

Abdomen: tergum 1 black; preabdomen translucent red-brown, with some specimens showing black areas laterally and dorsally on terga 4 and 5; cuticle glabrous, without pruinosity; tergum 7 only slightly excavated; tergum 8 with lateral flaplike projections; sternum 8 unmodified; hypopygium mostly black (Fig. 4b,c).

Female similar to male except as noted: frons wider, thorax with black markings smaller in extent; leg and vestiture colour similar; abdomen mostly orange in colour.

Remarks. *Bandella duvalli* is known from various locales in western Tasmania, mostly in upland areas. There is some intraspecific variation in the intensity of mesonotal infuscation among the specimens, as shown in Fig. 4b and 4c.

This species named in honor of Steven G. Duvall of California, who helped sponsor this research.

Bandella tasmanica n.sp.

Figs. 2j, 4a

Type material. HOLOTYPE, ♂, Tasmania: Pelion Gap, 2 km ENE of Mt Ossa, 41°52'S 146°03'E, 1120 m, 7.iii.1991–9.iv.1991, malaise trap, E. Edwards & J. Berry, ANIC. PARATYPES: 2♂, same data as holotype; 1♂, Pelion Hut, 3 km S of Mt Oakleigh, 41°50'S 146°03'E, 860 m, iii.1991, malaise trap; 1♂, Pelion Hut, same data but 6–11.iii.1991, pans (all ANIC).

Additional material. Tasmania: ♀, Derwent Bridge, 12.ii.1967 (ANIC).

Description (male): length: 11.0–11.5; wing: 8.0×2.2; similar to *B. duvalli*, except as noted. *Head* also with black hairs on dorsal postcranium, scape and pedicel.

Thorax: pleura and postnotum black and covered with dense grey pruinosity; anterior mesonotum mostly orange; but with black ac band which continues and is slightly wider across posterior slope to scutellum; large black spot laterad of dc row and posteriad of mesonotal suture, and black pa spot, which is sometimes only weakly developed (Fig. 2j); postpronotum and postalar callus pale yellow; scutellum orange but dark brown at base; dc band with short setulae extending to scutellum, and with some short setulae laterally.

Legs: coxae mostly reddish yellow; but CII and CIII infuscated at very base; trochanters yellow with dark brown apices; all femora and tibiae reddish yellow, except TIII with brown band from ⅗ to ¾ which varies somewhat in extent; It brownish, IIt mostly yellow, IIIt yellow; coxae with only short pale vestiture, no strong setae; all tarsi curled in repose; It_{1-3} each with pairs of ad-pd setae; $IIIt_1$ ventrally with dense pale pile and some short dark setulae.

Abdomen: tergum 1 black; segments 2–6 entirely orange-yellow; tergum 8 also with lateral flaplike projections; hypopygium (Fig. 4a) mostly yellow except for dark brown apex and edge of hypandrial keel and apices of epandrium and cercus.

Female. Putative female specimen similar to male except as noted: thoracic pleura with mixed black and yellow patches, and with distal postnotum black; mesonotum entirely orange with only dark brown ac stripe present, thinner than that of male; leg colour similar and TIII also with brown band.

Remarks. *Bandella tasmanica* is known only from the Central Highlands of Tasmania, and most specimens were collected near Mt. Pelion. This species is close to *B. duvalli*, but the two species can be readily separated by the set of diagnostic key characters: the pattern of the mesonotum, and colour of coxae and abdomen. Both species have a similar banded tibia III and have a short flap like tergum 8, that rests against the hypopygium.

Bandella costalis n.sp.

Figs. 2k, 4e

Type material. HOLOTYPE, ♂, PARATYPE, ♀, Western Australia: 11 km S of Pemberton, 34°32'S 116°02'E, 6.x.1981, I. Naumann & J. Cardale (both ANIC).

Additional material: Western Australia: 3♂, 3♀, 10 km N of Walpole, 7.x.1970; 7♂, 6♀, Nornalup NP, 9.x.1970, coll. D.H. Colless, ANIC.

Description (male): length: 10.0; wing: 7.5×2.2. *Head*: vertex and frons shining black with no pruinosity; ventral postcranium with scattered pale setae; postorbitals as short hairs, white ventrally, black dorsally; face covered with silvery pruinosity; labrum yellow, labellum dark brown; antenna dark brown; scape and pedicel setose.

Thorax: pleura black, although meron and laterotergite with large yellowish areas, and covered with grey pruinosity; mesonotum and scutellum entirely black and shining with no pruinosity (Fig. 2k); postnotum black but covered with grey pruinosity; entire mesonotum with only setulae, no major setae present; ac band narrow, 2–3 setulae wide, with bare cuticle each side of this band extending to posterior slope, and with narrow dc row.

Legs: coxae mostly reddish yellow; remainder of legs yellow, except apex of trochanters and very base of femora black, and distalmost tarsomeres infuscated; coxae with only short pale vestiture, no strong setae, remainder of legs with black vestiture; TI with pair apical av-pv setae, It_1 with very long posterior setae, and with slightly longer than normal anterior setae; It_{2-3} each with 2–3 pairs of long anterior and posterior setae (MSSC); TII (Fig. 4e) in distal half with some long anterior and posterior setae, and apically with some strong av, pv and ventral setae (MSSC); IIt_1 with very long anterior and posterior setae, and It_{2-3} with long posterior setae only (both MSSC); IIt_{4-5} unmodified (MSSC); FIII slightly clavate in distal half; TIII with some irregular long setae, especially ventrally (MSSC); $IIIt_1$ with long posterior setae (MSSC), but not as long as those of IIt_1; $IIIt_2$ with 3–4 long posterior setae, and $IIIt_3$ with some long apical setae (MSSC); $IIIt_{4-5}$ unmodified.

Wing: stigma brownish and diffuse.

Abdomen: terga yellowish with dark-brown to black posterior borders, and with weak dorsal infuscation; postabdomen (not figured) with tergum 8 developed into lateral flap-like projection; hypopygium mostly yellow, with somewhat enlarged hypandrial keel which projects posteriorly.

Female similar to male except as noted: face slightly wider; tibiae and tarsi with only short unmodified vestiture, without long anterior and/or posterior setae.

Remarks. *Bandella costalis* is known from wet sclerophyll karri forests in southwestern Western Australia. Male tibiae and tarsi variously have long anterior and/or posterior setae, especially well developed on leg II (Fig. 4e).

Bandella albitarsis n.sp.

Figs. 2f

Type material. HOLOTYPE, ♂, New South Wales: New England NP, 13.x.1962, D.H. Colless (ANIC).

Additional material. New South Wales: ♀, Dorrigo NP, 15.x.1966 (ANIC); ♂, Blue Mountains, Blackheath, x.1930 (MVM).

Description (male): length: 8.0; wing: 7.5×2.2. *Head*: post-cranium shining black, with silvery pruinose band around outer rim except near vertex; frons shining black with no pruinosity; ventral postcranium with scattered pale setae; postorbitals entirely white, within silvery pruinose band; face covered with golden pruinosity; labrum and labellum yellow; scape and pedicel yellow-brown; first flagellomere dark brown.

Thorax: cuticle glabrous with little pruinosity; pleura and mesonotum mostly red-brown, but mesonotum with black areas laterally, and with pale yellow humeral, pronotal and notopleural areas (Fig. 2f); scutellum orange; postnotum mostly dark brown; distinct patches of orientated silvery pruinosity visible in posterolateral view on following thoracic areas: middle of postnotum, anatergite, meron, and area of anepisternum just anteriad of wind base; posterior slope of mesonotum with scattered short setulae.

Legs: coxae, trochanters and all femora reddish yellow except trochanters with black apices; leg vestiture mostly yellowish; coxae with only short vestiture, no strong setae; all tarsi with strong black claws and large yellowish pulvilli; TI and It_1 dark brown to black with reddish vestiture, in sharp contrast to the ivory white $It_{2–5}$; TI and each tarsomere $It_{1–3}$ with some short av-pv setae; TI without distinct anteroapical comb; It_1 slightly swollen (MSSC); TII and tarsus II red yellow; TII with ad row of 8–10 short yellowish setae along length; $IIt_{1–3}$ each with some short av-pv setae; IIt_3 and IIt_4 with dense pale ventral pile; TIII and $IIIt_1$ red yellow, and $IIIt_{2–5}$ distinctly pale yellow; FIII not clavate; IIIt with short vestiture.

Abdomen entirely red-brown, with some brownish infuscation distally; cuticle glabrous, without pruinosity; tergum 7 slightly excavated distally; hypopygium (not figured) almost entirely yellow.

Female similar to male except as noted: post-cranium also with silvery pruinose band around outer rim; thorax of similar colour and with similar pruinose patches; TI yellowish basally but dark brown in distal half; It_1 black but not swollen; tarsomeres $t_{2–5}$,on all three legs distinctly white; leg vestiture somewhat weaker than on male.

Remarks. *Bandella albitarsis* is known from the Dorrigo Escarpment in northeastern New South Wales, and the Blue Mountains west of Sydney, both at elevations above 750 m. All specimens were collected in October.

This species has several diagnostic characters, developed in both sexes: (*a*) Bright silvery pruinose areas are distinctly visible in oblique view on the following areas: a band around the rim of the postcranium, middle of the postnotum, the anatergite, most of the meron, and the area of anepisternum just anteriad of wing base. These silvery patches may facilitate mating in flight, especially since incident light would make them appear to "flash" while turning. (*b*) Leg I has tarsomeres 2–5 ivory white in both sexes. In males, tarsi II and III are mostly yellow, whereas in females, all tarsomeres 2–5 on legs III and III are distinctly white. The white distal tarsomeres are more strongly developed on females than males, and should be regarded as a female secondary sexual character (FSSC) that is only weakly developed in males.

The male from New England National Park had *Leptospermum* pollen on its proboscis, and probably was nectar feeding.

ACKNOWLEDGMENTS. I thank the following institutions and their curators for loan of specimens: AMS, Australian Museum, Sydney, M. Moulds; ANIC, Australian National Insect Collection, CSIRO, Canberra, P. Cranston; CNC, Canadian National Collection, Ottawa, J. Cumming; MVM, Museum of Victoria, Melbourne, K. Walker. B. Sinclair provided both sound advice and specimens (deposited CNC) for this project. S. Bullock drew the genitalic figures. The habitus of *Bandella duvalli* was drawn by H. Finlay. This research was supported by Australian Research Council grant A19232651, for study of the systematics of Australian Empidinae. Additional support was provided by S. Duvall through the Australian Museum "Immortals" programme.

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Manuscript received 23 April 2001, revised 11 October 2001 and accepted 29 October 2001.

Associate Editor: S.F. McEvey