

REVISION OF AUSTRALIAN *CAMPYLOMMA* REUTER (HEMIPTERA: MIRIDAE: PHYLINAE)

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Abstract

All Australian species of *Campylomma* were re-examined with emphasis on male genitalia. *C. liebknechti* (Girault) is resurrected for the Australian material previously identified as *C. livida* Reuter, a species restricted to the Oriental Region. *Ragnus pulcher* Girault, *R. argenteus* Girault and *Rhinacloa queenslandana* Ghauri are synonymised with *C. liebknechti*. *C. austrina* sp.n., *C. kununurraensis* sp.n. and *C. fusciantennata* sp.n. are described from northern Australia. A key to Australian species of *Campylomma* is given.

Introduction

The Old World genus *Campylomma* Reuter contains over 50 described species in the Indo-Pacific region excluding Australia (Schuh 1984). One species of the genus in Australia was known as *Campylomma livida* Reuter, commonly called the "apple dimpling bug". According to Schuh (1984), *C. livida* was originally described from India and later recorded from Sri Lanka and the Philippines. Girault described *Ragnus liebknechti* and *R. pulcher* in May 1934 (Girault 1934a) and *R. argenteus* and *R. seminigricaput* in December 1934 (Girault 1934b) from south-east Queensland. Carvalho (1974) synonymised the first three species with *livida* and transferred the last-named species to *Campylomma*. Ghauri (1961) described *Rhinacloa queenslandana*, which was transferred to *Campylomma* (see Schuh 1984). Schuh (1984) in his revision of the Indo-Pacific Phylinae, stressed the value of male genitalia in species level classification of this group, as he was able to separate the species only on the basis of male genitalia. Because the male genitalia (particularly vesica) of Australian *Campylomma* have not previously been studied, I examined the available Australian material, including the types of *C. livida* and the above-named Australian species, with emphasis on male genitalia. I found that the Australian material that has been identified as *C. livida* is not true *livida* but a distinct species. However this Australian material is conspecific with the types of *liebknechti*, *pulcher*, *argenteus* and *queenslandana*, the first three of which, as noted above, have been treated as synonyms of *livida*. The name *liebknechti* has priority over the other names and is resurrected from synonymy to accommodate the Australian species. *C. livida* does not occur in Australia.

All Australian species of *Campylomma*, except *C. seminigricaput*, may be diagnosed by the following combination of character states: distal half of dorsal surface of hindfemur with a row of tiny dark spicules (e.g. Fig. 17); vesica with two apical, blade-like structures (e.g. Fig. 4) and roughly S-shaped; parempodia setiform (e.g. Fig. 23); proximal end of 2nd antennal segment with fuscous ring (e.g. Figs 6, 7). *C. seminigricaput* lacks the dark spicules on hind femur and the parempodia are indistinctly setiform.

Schuh (1984) noted under the genus *Sejanus* Distant that, on the basis of genitalic structure and coloration, six taxa of Carvalho and Gross (*S. leai*, *S. occidentalis*, *S. ruber*, *S. rubricatus*, *S. unicolor unicolor*, *S. unicolor webbi*), appear not to belong to that genus but to other genera, including *Campylomma*. I have examined the types and the male genitalia of these species. All have the following non-*Campylomma* character states: proximal area of 2nd antennal segment lacking fuscous ring; hind femur rather long, with neither fuscous spots nor dorsal row of dark spicules; vesica not S-shaped. None of these species belongs to the genus *Campylomma*.

Methods

Abdomens for detailed examination were cleared in cold 10% potassium hydroxide usually overnight and dissected in glycerol. All genitalia illustrations were made from temporary slide mounts in glycerol.

Measurements are in millimetres and were made using an ocular micrometer.

Abbreviations of collections: AM, Australian Museum, Sydney; ANIC, Australian National Insect Collection, CSIRO, Canberra; MV, Museum of Victoria, Melbourne; NSWDA, New South Wales Agriculture & Fisheries, Rydalmere; NTDPFI, Northern Territory Department of Primary Industry and Fisheries; NTM, Northern Territory Museum, Darwin; QDPI, Queensland Department of Primary Industries, Indooroopilly; QM, Queensland Museum, Brisbane; SAM, South Australian Museum, Adelaide; VAIC, Victorian Agricultural Insect Collection, Department of Food & Agriculture, Burnley; WADA, Western Australian Department of Agriculture, Perth; WAM, Western Australian Museum, Perth.

Campylomma Reuter

Campylomma Reuter, 1878: 52. Type species: *Campylomma nigronasuta* Reuter, 1878, designated by Distant, 1904: 483.

Key to Australian species of *Campylomma*

1. Head black except for narrow basal area dorsally between eyes (Fig. 12) *seminigricaput* (Girault)
- Head not black as above 2
2. Male with entire 2nd antennal segment fuscous or black (Fig. 16) *fusciantennata* sp.n.
- Male without entire 2nd antennal segment fuscous or black 3
3. Distal area of 2nd antennal segment usually fuscous (more commonly in ♂ than in ♀); anterior and posterior blades of vesica similarly shaped (Fig. 4); widely distributed in southern, mainland Australia *liebkechti* (Girault)
- Distal area of 2nd antennal segment as pale as rest of segment; anterior and posterior blades of vesica dissimilarly shaped, anterior blade sinuate (e.g. Fig. 8); northern Australia 4
4. Male with head width across eyes ca 2.2x interocular space; anterior vesical blade with spicules on dorsal surface, posterior blade with glassy spicules (Fig. 11) *kununurraensis* sp.n.
- Male with head width across eyes 2.5-2.7x interocular space; anterior and posterior vesical lobes without spicules (Fig. 8) *austrina* sp.n.

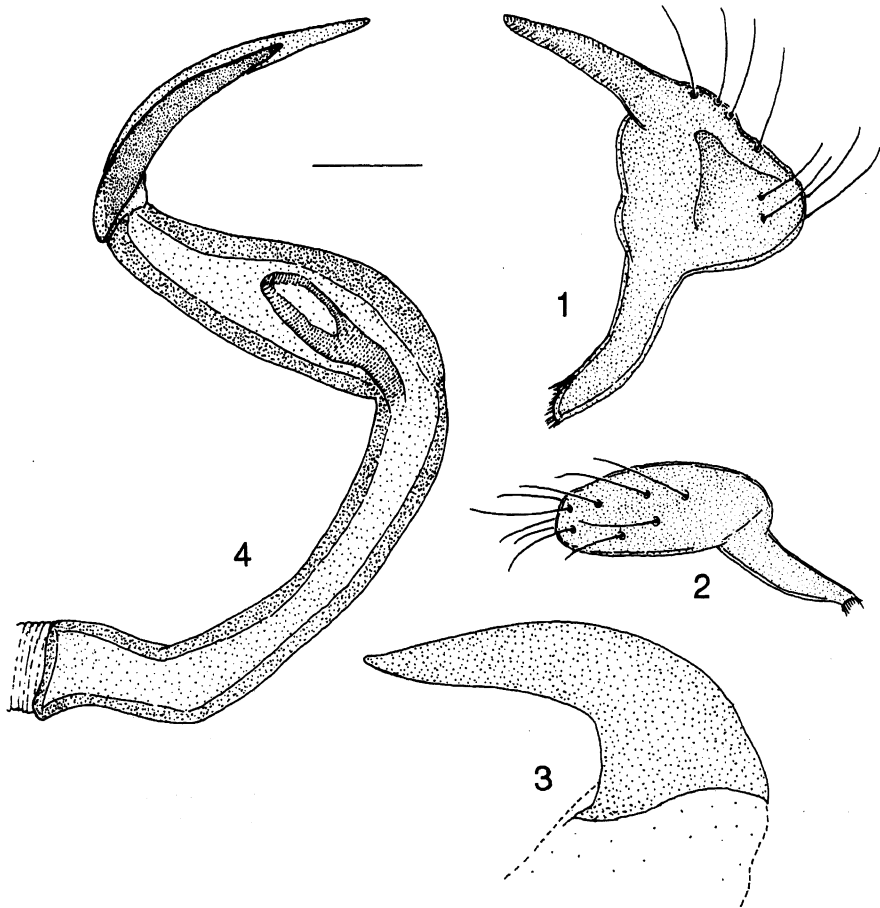
Campylomma liebkechti (Girault) comb.n. (Figs 1-4, 21-25)

Ragmus liebkechti Girault, 1934a: 1.
Ragmus liebkechti Girault: Carvalho, 1974: 44.
Ragmus pulcher Girault, 1934a: 1. Syn.n.
Ragmus argenteus Girault, 1934b: 4. Syn.n.
Rhinacloa queenslandana Ghauri, 1961: 77-78. Syn.n.
Rhinacloa queenslandana: Schuh, 1984: 423.

Types—QUEENSLAND: *Lectotype* ♂, 2 *paralectotypes* ♂♂ (designated by Carvalho 1974, but redesignated here, see Notes below) of *Ragmus liebkechti* Girault, labelled “*Ragmus importunitas* Dist. det E. B. cotton squares Gattton, Q, 9.ii.1926, E. Ballard”, “*Ragmus liebkechti* Gir. Types”, in QM. *Lectotype* ♂, 2 *paralectotypes* ♂♂ (all glued on same card) of *Ragmus pulcher* Girault (designated by Carvalho 1974), labelled “Stanthorpe, 23.ix.1928, E. Sutton”, “*Ragmus pulcher* Gir. Types”, in QM; 4 *paralectotypes* ♂♂ (1 represented by abdomen and legs only), all glued on same card, same labels as lectotype except “cotypes JCMC”, in QDPI. *Lectotype* ♀ (designated by Carvalho 1974), glued on card, only abdomen and hemelytra remaining, of “*Ragmus argenteus* Gir. Type”, underside of label “on silver wattle iv.1934, A. R. Brimblecombe, Brisbane”, in QM. *Holotype* ♂ (dissection in vial but abdomen and genitalia missing) of *Rhinacloa queenslandana* Ghauri, labelled “Gattton College, 9.xi.1948, A. W. S. May”, “T.5873”, “cabbage seedheads”, “2060”, “C. I. E. Coll No 17044”, “Pres by Com. Inst. Ent. BM 1961-6”, “*Rhinacloa queenslandana* Ghauri M. S. K. Ghauri det.”, in QM; 1 ♀ *paratype*, same data as holotype, in QDPI.

Other material examined—[Because of the large number of specimens examined (585), only the locality, month collected and host plants are listed]—QUEENSLAND: Biloela Res Stn, vii, on mango flowers and broadleaf bottle-tree (*Brachychiton australe* (Schott) C. T. White) flowers; Carnarvon Ra, Upper Bullaroo Ck, vi; Angellala E. of Charleville, viii, on *Acacia*; Beerwah, viii; Bell-Bunya Rd, viii; Wilson's Peak, xi, *Acacia*; Bribie I., viii; Brisbane, viii-x, some at light; Gattton, x, in lucerne; Ipswich, vii; Aratula, vii, sweeping *Acacia*; Killarney, xi; Yelarbon, x; Stanthorpe, ix-xi; Applethorpe, x, apple, sticky & pan traps; Cotton Vale, xi, on apples, sticky & pan traps. NEW SOUTH WALES: Fowlers Gap Res Stn, 31.05S 141.42E, xi-xii, on flowers of *E. camaldulensis* Dehnh.; Gnalta Stn nr Broken Hill, xii; Nr Broken Hill, viii; Nyngan dist., ii; Orange, xi-x, on apple blossom; Bathurst, x, apple blossom; Condobolin, x, ex Burr medic; Rydalmere, xii, M. V. Light; Royal N. Pk, ix, on *Angophora*; Hunter Valley, x; Finley, 50 km E of Deniliquin, xi; Wellington, x, on potato leaves; Wee Jasper, i. AUSTRALIAN CAPITAL TERRITORY: Cotter Dam, i, on *Leptospermum*; Ginninderra, i, on potato leaves. VICTORIA: Irymple, xi; Mildura, xii, grapes; Red Cliffs, ix, on native *Acacia*; Tatura, xi, in apple flowers; Numurkah, i, on sunflower heads; Harcourt, x, apple; Bacchus Marsh, xi, apple; Warrandyte, i, x, xii, apple; Burnley, i, ii, xi, xii, in lucerne and sunflower

head, some at light. SOUTH AUSTRALIA: Nr Victory Well, Everard Pk Stn, xi, Malaise trap and at light; 4 ml [ca 6 km] SW Maynard's Bore, Everard Pk Stn, at light; Kingsmill Ck nr Arkaroola Hmst., x, Malaise trap; Nr Arkaroola Hmst., x, on flowering *Acacia*; 145 km N Cook, viii, sweeping *Dodonaea*; Mt Greenly, Eyre Pen., x; Granite Knoll, 20 ml [ca 32 km] SE Keith, xi, sweeping undershrubs; Naracoorte Cave Reserve, x, sweeping *Leptospermum myrsinoides* Schlechtendal in *Euc. obliqua* L'Herit. dry sclerophyll forest; Sinclair Flat, R Murray, ii, at light; Italowle Gorge, x; Owieandana, N Flinders Ra. WESTERN AUSTRALIA: 16 km SW of Tangadee Hmst., 24.25S 118.56E, viii; Bungabiddy Rockhole, Walter James Ra., 24.39S 128.45E, i; Billy Well Ck, 20 km NE of Mt Sandiman Hmst., v; 11 km SW Mt Leake, 25.47S 119.10E, viii; 29 km S Billabong Roadhouse, vii, on *Acacia* blossom; 13 km S of Wannoo, 26.49S 114.37E, vii-viii, on flowers of *Conospermum stoechadis* Endl. and *Hakea*; 8 km N of Nerren Nerren Hmst., ix, on *Prostanthera wilkieana* F. Muell.; 11 km NE of Eurandy Hmst., 27.34S 114.40E, viii, on flowers of *Grevillea commutata* F. Muell.; 21 km ENE of Cosmo Newberry Mission, 27.55S 123.05E, ix, on flowers of *Grevillea pterosperma* F. Muell.; 37 km SW Youanmi 28.45S 118.31E, iii, on flowers of *Acacia aneura* F. Muell.; Geraldton, v, on foliage of *Acacia*, ix, on *Grevillea* flowers; Burma Road Reserve, 30 km E Walkaway, ix; Coorow, x, Geraldton wax flowers; Miling, ii; Stoneville Res Stn, x, ex *Acacia*; Stoneville, ix, apple late pink bud; Moore River N.Pk, 31.10S 115.40E, i, xii, on flowers of *Melaleuca* (paperbark) and *Verticordia nitens* (Lindley) Schauer; Dowerin, x, on *Grevillea*; 1 km W of Boorabbin Rock, 31.12S 120.17E, i, on flowers of *Eucalyptus leptopoda* Benth.; Moorine Rock, x; Gingin, xii, mango flowers; 4 km S Eyre Hwy 40 km W of Eucla, i, on flowers of *Melaleuca lanceolata* Otto; 15 km N of Yanchep, xi, on flowers of *Jacksonia*; Greenmount, Perth, xii; Bold Park City beach, Perth, x, on *Chamaelaucium uncinatum* Schauer; 70-75 km ENE Norseman, xi, on flowers of *Myoporum*; 53 km E of Hyden, x, on flowers of *Grevillea pterosperma*; Hatter Hill, 40 km NE of Lake King PO, xii, on mallee flowers; 20 km E of Lake Grace PO, xii, on mallee flowers; Broomehill 33.51S 119.38E, ii, on flowers of sugar gum *Eucalyptus*; Karragullon, x; Mundaring, x, on apple flowers. NORTHERN TERRITORY: Arrutino Farm, Ti-Tree, vii; Ti-Tree, vii, on mango flowers; 38 ml [ca 50 km] N of Stuart Hwy Junction, viii, on *Acacia*.



FIGS 1-4—*Campylomma liebkechti*, male genitalia: (1) left paramere; (2) right paramere; (3) phallosome; (4) vesica. Scale = 0.05 mm.

Redescription

Colouration—Generally dirty yellow; eyes reddish yellow, distal $\frac{1}{3}$ of 1st and proximal end of 2nd antennal segments black; distal segment of labium, setae on abdominal dorsum dark brown; distal $\frac{1}{3}$ of 2nd antennal segment usually also dark brown (more commonly in ♂ than in ♀); femora with black spots at bases of spines and trichobothria, tibiae with black spines with small black bases.

Measurements (5 ♂♂, 5 ♀♀) are means followed by ranges in parentheses for both sexes.

Body—Elongate, oval, slightly wider in ♀ than in ♂. Dorsum smooth, dull or subshiny, covered with reclining setae and short scales. Total length 2.16 (1.90-2.50) ♂, 2.46 (2.44-2.49) ♀. Apex tylus-cuneal fracture 1.75 (1.55-2.05) ♂, 1.87 (1.80-1.97) ♀.

Head—Height 0.40 (0.39-0.42) ♂, 0.40 (0.39-0.40) ♀; width 0.63 (0.60-0.66) ♂, 0.62 (0.62-0.63) ♀, interocular space 0.27 (0.25-0.28) ♂, 0.32 (0.32) ♀; frons weakly rounded in dorsal view; clypeus small, elongate. Antennae with 1st segment narrow at proximal end, reaching beyond clypeus, with 2 hairs with dark round basal spots; 2nd segment at proximal end narrower than 1st, slightly more incrassate in ♂ than in ♀, length 0.54 (0.49-0.64) ♂, 0.53 (0.51-0.55) ♀; 3rd and 4th distinctly slender than 1st and 2nd, each shorter than 2nd; 4th subequal to 1st. Labium slender, reaching to between hind coxae.

Thorax—Pronotum with anterior margin almost equal to median length, length 0.41 (0.37-0.45) ♂, 0.42 (0.41-0.43) ♀, maximum width 0.88 (0.77-0.95) ♂, 0.95 (0.95) ♀. Metathoracic scent-gland evaporative area as in Figs 24 and 25. Legs well developed, femora particularly the hind ones incrassate, hind femora with uninterrupted row of dark brown to black spicules on dorsal surface; parempodia as in Fig. 23. Hemelytra well exceeding abdomen.

Male genitalia—Pygophore with a thumblike projection on its left side; left paramere as in Fig. 1, right paramere as in Fig. 2; phallosome as in Fig. 3; vesica with 2 similarly shaped, long, slender, gradually pointed blades, anterior blade about $\frac{1}{4}$ shorter than posterior blade (Fig. 4).

Distribution

The species is widely distributed in southern, mainland Australia (Fig. 21).

Notes

The species exhibits considerable colour variation even within one series, e.g. Wannoo and Bold Park (Perth), W.A., Stanthorpe, Qld. Often some or all males from a series are slightly darker in general body colour than the females from the same locality. The body may be almost uniformly pale to mostly fuscous, with varying shades in between. The areas of body which exhibit most colour variations are the posterior half of the head, posterior area of pronotum, posterior half of scutellum, corium (particularly posterior of cuneus), thoracic pleura and sternum between coxae and abdominal dorsum. The distal area of the second antennal segment is usually dark brown, more commonly in males than in females. However, the intensity varies considerably even between individuals of the same sex and from the same locality—from being very distinct to almost indistinct or absent. As in other mirids and heteropterans the age of the specimens may have some bearing on the intensity of colour, teneral specimens having less distinct markings.

C. liebknechti belongs to the “*livida* group” (*sensu* Schuh 1984) by virtue of the presence of the thumb-like process on the pygophore. However the vesica is not typical of the *livida* group as it lacks a “relatively stout sinuous anterior apical blade with a few spicules dorsally and glassy spicules associated with [the] lightly sclerotised elaboration of [the] posterior lobe” (Schuh 1984).

Carvalho (1974), while synonymising the *C. liebknechti* with *C. livida* designated one male as lectotype and three males as paralectotypes, all glued with a nymph to the same card, without specifying which male was the lectotype. I have examined all these males and find that one is not a *Campylomma*, but probably represents an undescribed phyline genus. Therefore I have redesignated the lectotype and paralectotypes excluding the above mentioned male. The types have now been remounted individually, except for one male and one nymph which are together, and relabelled.

Host associations

Lloyd (1969) indicated that the species, known as *C. livida* and commonly as “apple dimpling bug” might be predacious only in the nymphal stages and phytophagous in the adult stage. However some more recent records of both nymphs

and adults as predators contradict this contention (e.g. Chinajariyawong and Walter 1990). There is evidence that the species is predacious on mites in orchards (Readshaw 1975), that adults and nymphs prey on eggs of *Helicoverpa* spp. in cotton fields (Room 1979a), that adults prey on young *Helicoverpa* caterpillars in laboratory (Room 1979b), and that nymphs and adults were bred in the laboratory on *Helicoverpa* eggs and cotton squares (Chinajariyawong and Walter (1990)).

The species, as *C. livida*, has been recorded from a range of plants from a diversity of families (Table 1). However, plants on which the damage by this bug has been well documented are apple, cotton, sunflower, lucerne, rose and other ornamentals.

Table 1. Plants on which *Campylomma liebkei* examined in present study have been collected. C&W (1990) = Chinajariyawong and Walter (1990).

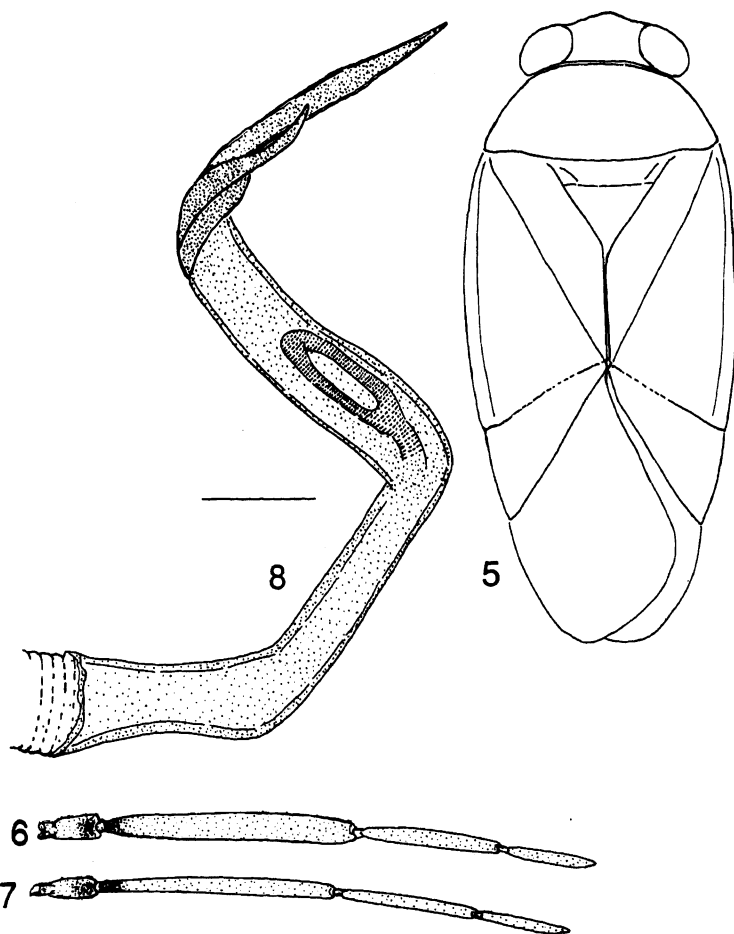
Plant Species	Common Name	Family	Remarks
<i>Mangifera indica</i> L. (flowers)	mango	Anacardiaceae	
<i>Brassica oleracea</i> L. (seed heads)	cabbage	Brassicaceae	
<i>Lepidium hyssopifolium</i> Desvauz	pepper cress	Brassicaceae	C&W (1990)
<i>Helianthus annuus</i> L.	sunflower	Compositae	C&W (1990)
<i>H. annuus</i> L. (heads)	sunflower	Compositae	
<i>Prostanthera wilkieana</i> F. Muell.		Lamiaceae	
<i>Jacksonia</i> sp. (flowers)		Leguminosae	
<i>Leucaena leucacephala</i> (Lam.) De Wit.		Leguminosae	C&W (1990)
<i>Medicago polymorpha</i> L.	burr medic	Leguminosae	
<i>M. sativa</i> L.	lucerne	Leguminosae	C&W (1990)
<i>Gossypium</i> sp. (squares)	cotton	Malvaceae	
<i>Acacia aneura</i> F. Muell. (flowers)	mulga	Mimosaceae	
<i>Acacia</i> sp. (foliage & flowers)		Mimosaceae	
<i>Myoporum</i> sp. (flowers)		Myoporaceae	
<i>Angophora</i> sp.		Myrtaceae	
<i>Chamaelaurium uncinatum</i> Schauer (flowers)	Geraldton waxflower	Myrtaceae	
<i>Eucalyptus camaldulensis</i> Dehnh. (flowers)	river red gum	Myrtaceae	
<i>E. cladocalyx</i> F. Muell. (flowers)	sugar gum	Myrtaceae	
<i>E. leptopoda</i> Benth. (flowers)	mallee	Myrtaceae	
<i>Leptospermum myrsinoides</i> Schlechtendal	heath tea-tree	Myrtaceae	
<i>Melaleuca lanceolata</i> Otto (flowers)	moonah	Myrtaceae	
<i>M. sieberi</i> Schauer		Myrtaceae	C&W (1990)
<i>Melaleuca</i> spp. (flowers)		Myrtaceae	
<i>Verticordia nitens</i> (Lindley) Schauer		Myrtaceae	
<i>Conospermum stoechadis</i> Endl. (flowers)		Proteaceae	
<i>Grevillea commutata</i> F. Muell. (flowers)		Proteaceae	
<i>G. pterosperma</i> F. Muell. (flowers)		Proteaceae	
<i>Grevillea</i> sp. (flowers)		Proteaceae	
<i>Hakea</i> sp.		Proteaceae	
<i>Malus pumila</i> Mill. (blossom)	apple	Rosaceae	C&W (1990)
<i>Photinia glabra</i> Maxim		Rosaceae	C&W (1990)
<i>Dodonaea</i> sp.		Sapindaceae	
<i>Solanum tuberosum</i> L. (leaves)	potato	Solanaceae	
<i>Brachychiton australe</i> (Schott) C. T. White (flowers)	bottle-tree	Sterculiaceae	
<i>Verbena bonariensis</i> L.	purple-top	Verbenaceae	C&W (1990)
<i>V. tenuisecta</i> Briq.	Mayne's pest	Verbenaceae	C&W (1990)
<i>Vitis vinifera</i> L.	grape	Vitaceae	

Campylomma austrina sp.n. (Figs 5-8, 21)

Types—WESTERN AUSTRALIA: *holotype* ♂, Kununurra, 20.viii.1991, G. R. Strickland, on mango (*Mangifera indica* L.) flowers, in WAM; *paratypes*: 10 ♂♂, 12 ♀♀, same data as holotype, in ANIC, VAIC, WADA; 13 ♂♂, 13 ♀♀, same data as holotype except on cashew (*Anacardium occidentale* L.) flowers, in ANIC, VAIC, WADA, WAM. NORTHERN TERRITORY: 3 ♂♂, 4 ♀♀, Wildman River Cashew Plantation, 12.vi.1989, W. Houston, transect A, cashew (*Anacardium occidentale*) blossom; 1 ♂, 2 ♀♀, same data as holotype except 2.viii.1990, Malaise trap 1 a.m., in NTDPF, NTM, VAIC; 5 ♂♂, 10 ♀♀, Manbulloo, Katherine, 2.viii.1991, J. Layland, on mango (*Mangifera indica*) flowers, in NTDPF, VAIC. QUEENSLAND: 1 ♂, Massy Ck, Silver Plains via Coen, 13.xii.1964, G. Monteith, in UQIC; 1 ♂, Kuranda, xii.1919, F. P. Dodd; 1 ♀, same locality and collector, 5.i.1921, in SAM; 2 ♂♂, 4 ♀♀, Greta Ck, 20 ml N of Proserpine, 1.i.1965, H. A. Rose, in UQIC.

Description

Colouration—Generally pale green to pale yellow; predistal area of 1st and proximal area of 2nd antennal segments, distal 1/3-1/2 of distal labial segment, setae on femora and tibiae and their proximal ends fuscous; setae on dorsum of body brown, scales golden yellow.



FIGS 5-8—*Campylomma austrina*: (5) body excluding antennae, legs and vestiture, holotype ♂; (6, 7) antennae, paratypes; (6) male; (7) female; (8) vesica, paratype ♂. Scale = 0.35 mm for 5; 0.17 mm for 6, 7; 0.05 mm for 8.

Measurements are of holotype ♂ first followed by ranges of 5 ♂♂ and 5 ♀♀ in parentheses.

Body—Elongate oval (Fig. 5), slightly wider in ♀ than in ♂. Dorsum smooth, subshiny, covered with reclining setae and scales. Total length 1.95 (2.12-2.20 ♂, 2.01-2.16 ♀). Apex tylus-cuneal fracture 1.48 (1.51-1.55 ♂, 1.40-1.60 ♀).

Head—Height 0.36 (0.36-0.37 ♂, 0.32-0.39 ♀), width 0.59 (0.59-0.63 ♂, 0.53-0.59 ♀), interocular space 0.22 (0.23-0.25 ♂, 0.26-0.27 ♀), frons rounded in dorsal view, clypeus small, elongate. Antennal segment 1 narrow at proximal end, slightly extending beyond clypeus; 2nd segment narrow at proximal end, almost uniformly incrassate throughout in ♂, indistinctly incrassate in ♀ (Figs 6, 7), length 0.49 (0.48 ♂, 0.43-0.48 ♀); 3rd and 4th slender, 3rd ca 1.5 x as long as 4th, each shorter than 2nd. Labium slender, reaching to about hind coxae.

Thorax—Length pronotum 0.34 (0.38-0.39 ♂, 0.36-0.46 ♀); maximum width pronotum 0.79 (0.82-0.84 ♂, 0.79-0.86 ♀). Legs and wings as in *C. liebknechti*.

Male genitalia—Pygophore and paramere as in *C. liebknechti*; vesica with anterior blade ca ½ as long as posterior blade which is long, acutely pointed, anterior blade distinctly sinuate as in Fig. 8.

Distribution

The species is widely distributed in northern Australia (northern regions of Western Australia, Northern Territory and Queensland) (Fig. 21).

Notes

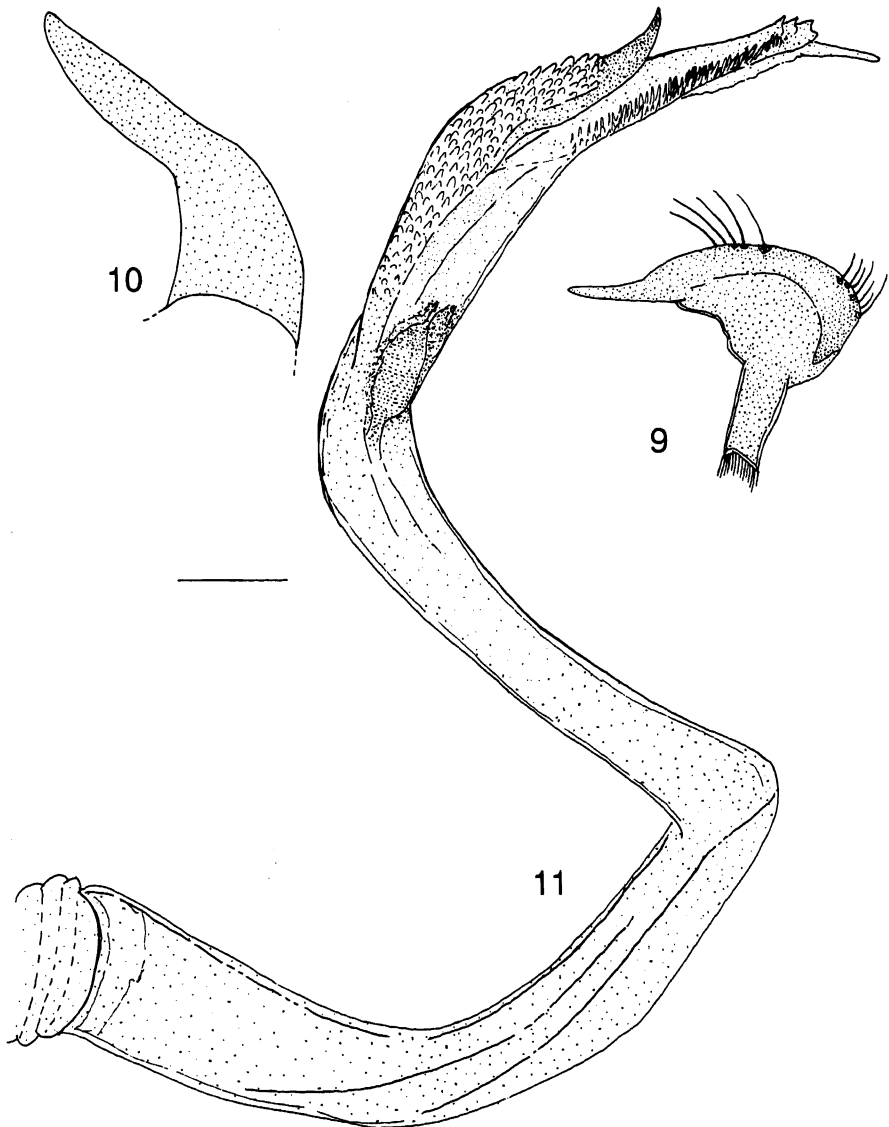
This species differs from *C. liebknechti* in lacking fuscous markings on the distal

area of the second antennal segment, possessing slightly larger eyes, having head width 2.5-2.7x interocular space in males and 2x in females (in *liebknechti* up to 2.4x in males and 1.9x in females), and in having a distinctly sinuate anterior blade of vesica.

C. austrina is similar to *C. lividicornis* Reuter (India, Philippines and Papua New Guinea) in the body size and the general structure of the vesica, but can be distinguished by its larger eyes, head width 2.5-2.7x interocular space in males (in *lividicornis* < 2.5x), and the narrower blades and the longer anterior blade of the vesica (in *lividicornis* the blades are wider and the anterior blade shorter).

The specimens from Katherine (N. T.) and Queensland are generally lighter and almost yellow.

I suspect that the species is more widely distributed in northern Australia than is presently known and occurs on a more diverse range of host plants (particularly native), than the two introduced species recorded at present.



FIGS 9-11—*Campylomma kununurraensis* holotype ♂: (9) left paramere; (10) phallosome; (11) vesica. Scale = 0.10 mm for 9, 10; 0.05 mm for 11.

Campylomma kununurraensis sp.n. (Figs 9-11, 21)

Types—WESTERN AUSTRALIA: *holotype* ♂, Kununurra, 11.viii.1976, ex kenaf (*Hibiscus cannabinus* L.), P. J. Michael, in WAM; *paratypes*: 3 ♀, same data as holotype, in VAIC, WADA and WAM.

Description

Colouration—Generally pale greenish yellow, head dorsally bright yellow except for narrow basal area between eyes; distal area of 1st and proximal ring-like area of 2nd antennal segments, distal part of labium, distal area of hind femur fuscous; setae and scales on body mostly golden yellow (some setae in holotype brown); setae on tibiae and trichobothrial bases on femora fuscous.

Measurements are of holotype ♂, followed by ranges of 2 paratype ♀ in parentheses.

Body—Generally as in *C. austrina*. Total length 2.20 (2.35-2.40). Apex tylus-cuneal fracture 1.65 (1.57-1.59).

Head—Height 0.43 (0.42), width 0.57 (0.56-0.57), interocular space 0.25 (0.24-0.27). Length 2nd antennal segment 0.55 (0.57-0.59). Labium slightly exceeding hind coxae.

Thorax—Length pronotum 0.39 (0.38-0.41), maximum width pronotum 0.89 (0.92-0.94). Row of dark spicules present on dorsal surface of hind femur, parempodia setiform, weakly curved, convergent apically.

Male genitalia—Left paramere as in Fig. 9; phallosome as in Fig. 10; vesica as in Fig. 11, anterior blade distinctly short, sinuate, with many spicules on dorsal surface, posterior blade with glassy spicules associated with less heavily sclerotised elaboration.

Distribution

Known only from the type locality (Fig. 21).

Notes

There is some variation in colouration. In the holotype the basal area of the scutellum and the apical $\frac{1}{3}$ of the pronotum are also more or less yellow, whilst in one paratype the yellow on the head is indistinct.

The male of *C. kununurraensis* differs from that of *C. austrina* in the smaller eyes, head width across eyes which is ca 2.2x interocular space (2.5-2.7x in *austrina*), and the morphology of the vesica.

C. kununurraensis has some similarities with the New Ireland species, *C. novoirlandense* Schuh, and the Philippines species, *C. luzonica* Schuh, in the characters of the vesica, but differs from both by its smaller body size (apex tylus-cuneal fracture 1.59-1.65 in *kununurraensis*; 2.00-2.25 in *novoirlandense* and *luzonica*), and from the former also in the markedly shorter spicules on the posterior blade of the vesica.

Campylomma seminigricaput (Girault) (Figs 12-15, 21)

Ragmus seminigricaput Girault, 1934b: 4.

Campylomma seminigricaput: Carvalho, 1974: 44.

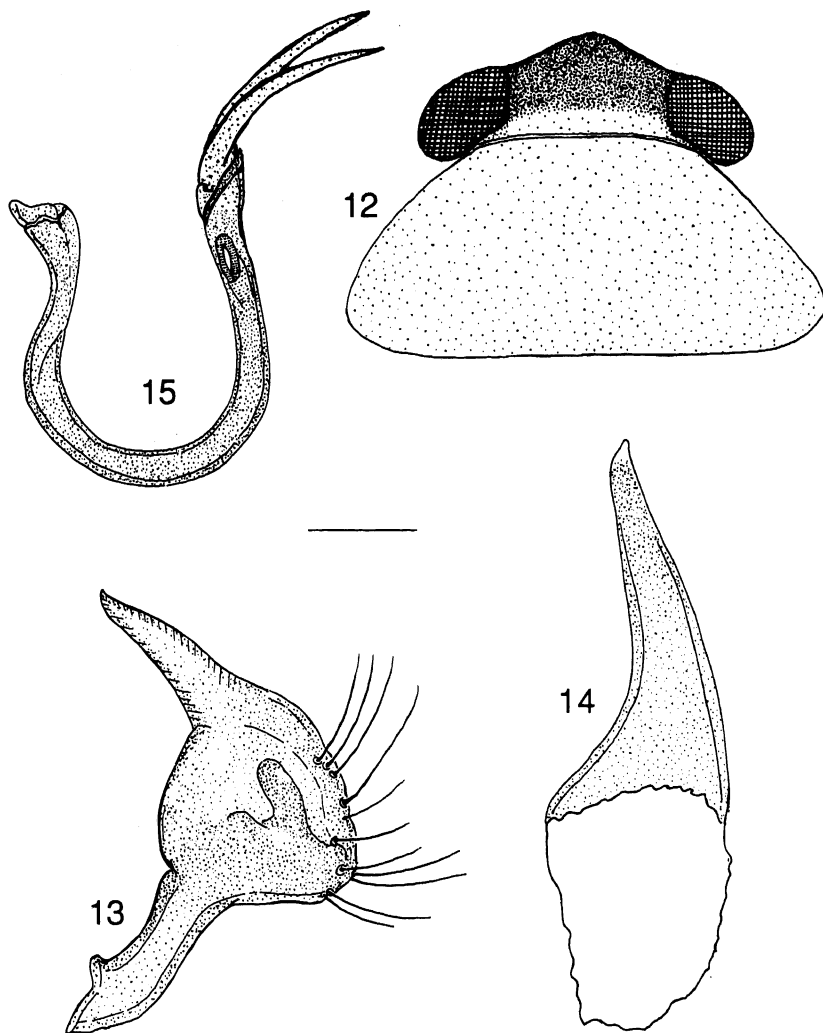
Types—According to Girault (1934b) "Four spms., light, Indoeroopilly, Sep. 30, 1934". No specimens located, although in QDPI according to Carvalho (1974).

Material examined—QUEENSLAND: 1 ♂, Cunnamulla, x.1943, N. Geary, in AM. NEW SOUTH WALES: 1 ♂, Dawsons Spring, 30.17S 150.10E, Mt Kaputar N. Pk, 5-11.xii.1987, G. R. Brown, Moericke trap under flowering *Dillwynia retorta* (J. Wendl.) Druce, in NSWDA; 2 ♂♂, 2 ♀♀, Broken Hill, iii.1924, F. W. Shepherd, "K49319", "compared with type by Carvalho 1972", "*Ragmus seminigricaput* Girault det. J. C. M. Carvalho 1973", in AM; 8 ♂♂, 5 ♀♀, same locality, in AM; 1 ♀, nr Broken Hill, viii.1963, in SAM. SOUTH AUSTRALIA: 1 ♀, Between Lyndhurst and Lake Eyre, 2-5.xii.1951, G. F. Gross, in SAM; 1 ♂, Whywhyana Pk, Arkaroola, 19.x.1969, G. F. Gross, in SAM; 1 ♀, Owieandana, N. Flinders Ra., Hale and Tindale, in SAM; 1 ♂, Murbko, Murray R., 20.ii.1973, G. F. Gross, in SAM; 1 ♂, Belair, 28.iii.1971, A. Kowanko, in SAM; 1 ♀, Adelaide, A. H. Elston, in SAM; 1 ♀, in SAM.

Redescription

Colouration—Generally pale green; scutellum ochraceous; frons, 1st antennal segment and proximal $\frac{1}{3}$ - $\frac{1}{2}$ of 2nd antennal segment black; setae and their bases on femora and tibiae, most of distal segment of labium fuscous; bases of antennae and broad basal area on dorsum of head (Fig. 12) also pale green; membrane hyaline.

Measurements (5 ♂♂, 5 ♀♀) are means followed by ranges in parentheses for both sexes.



FIGS 12-15—*Campylomma seminigricaput* ♂: (12) head and pronotum, dorsal view; (13) left paramere; (14) phallosome; (15) vesica. Scale = 0.20 mm for 12; 0.05 mm for 13, 14; 0.10 mm for 15.

Body—General shape as in other species, subshiny, dorsum with dark reclining setae and golden yellow scales as in other species. Total length 2.05 (1.90-2.19) ♂, 2.11 (2.01-2.23) ♀; apex tylus-cuneal fracture 1.30 (1.25-1.38) ♂, 1.48 (1.43-0.51) ♀.

Head—Height 0.35 (0.34-0.39) ♂, 0.36 (0.33-0.38) ♀, width 0.51 (0.47-0.53) ♂, 0.54 (0.51-0.57) ♀; interocular space 0.32 (0.29-0.33) ♂, 0.33 (0.31-0.35) ♀. Length 2nd antennal segment 0.46 (0.44-0.50) ♂, 0.45 (0.43-0.48) ♀.

Thorax—Length pronotum 0.33 (0.31-0.35) ♂, 0.31 (0.29-0.33) ♀; maximum width pronotum 0.71 (0.68-0.73) ♂, 0.78 (0.69-0.83) ♀. Hind femora without a row of dark spicules on dorsal surface.

Male genitalia—Left paramere (Fig. 13) with fine setal hairs; phallosome as in Fig. 14; vesica generally as in *C. liebkei*, but both blades slender, gradually pointed, subequal in length (Fig. 15).

Distribution

The species is distributed in dry, inland areas of Queensland, N.S.W. and S.A. (Fig. 21).

Notes

The generic placement of the species is tentative as it lacks a row of dark spicules

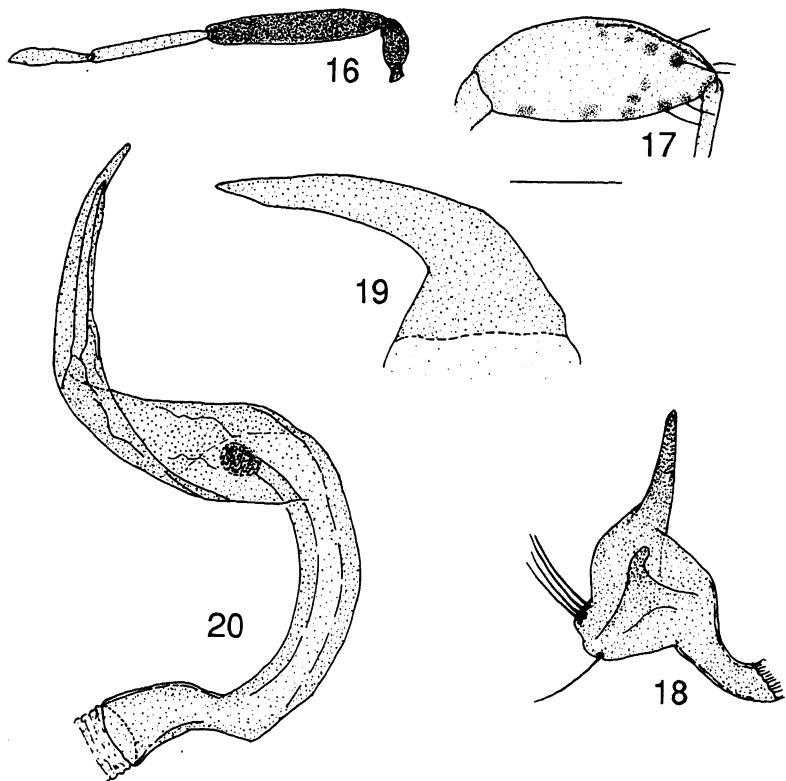
on the dorsal surface of the hind femur (all species of *Campylomma sensu* Schuh 1984 possess these spicules). However it has vesica typical of *Campylomma*. The species has a thumb-like process on the pygophore, a character which all species of the *livida*-group possess (Schuh 1984).

Campylomma fusciantennata sp.n. (Figs 16-21)

Types—QUEENSLAND: holotype ♂, Cairns district, A. M. Lea, attracted to light, in SAM; *paratypes*: 3 ♀, same data as holotype, in SAM. NORTHERN TERRITORY: 1 ♂, Wildman River cashew plantation, 2.viii.1990, W. Houston, Malaise 1 a.m., in VAIC; 2 ♀, Eldo, 8 ml [ca 13 km] S of Gove Airport, 12.16.i.1971, T. Weir and A. Allwood, in NTDFIF.

Description

Colouration—Generally pale green to pale yellow; distal end of labium, 1st and 2nd antennal segments uniformly in ♂, 1st and proximal area of 2nd antennal segments in ♀, and femoral spots and tibial spurs, fuscous or black.



FIGS 16-20—*Campylomma fusciantennata* paratype ♂: (16) antenna; (17) hind femur; (18) right paramere; (19) phallosome; (20) vesica. Scale = 0.25 mm for 16; 0.10 mm for 17; 0.05 mm for 18-20.

Measurements are of holotype ♂ first, followed by those of ranges of 3 paratype ♀ in parentheses.

Body—General shape as in *C. liebkechti*. Dorsum shiny, body and appendages covered with shiny, golden yellow reclining setae and scales. Total length 2.00 (1.80-2.00). Apex tylus-cuneal fracture 1.42 (1.22-1.50).

Head—Globose, height 0.36 (0.33-0.34), width 0.57 (0.52-0.55), interocular space 0.23 (0.20-0.25). Eyes large as in *C. austrina*, in side view occupying entire length of head. Antenna with 1st segment narrow at proximal end, slightly extending beyond clypeus; 2nd segment narrow at proximal end, almost uniformly incrassate throughout; 1st and 2nd segments distinctly more incrassate than 3rd and 4th segments in ♂ (Fig. 16), only 1st segment distinctly more incrassate than distal 3 segments in ♀; 3rd and 4th slender, 2nd segment ca $1\frac{1}{2}$ x as long as 3rd and ca 2x as long as 4th, length 2nd segment 0.53 (0.43-0.51). Labium slightly exceeding hind coxae, 1st segment thickest.

Thorax—Length pronotum 0.34 (0.32-0.39); maximum width pronotum 0.75 (0.69-0.80). Hind femur dorsally with row of dark spicules as in *C. liebkechti* (Fig. 17).

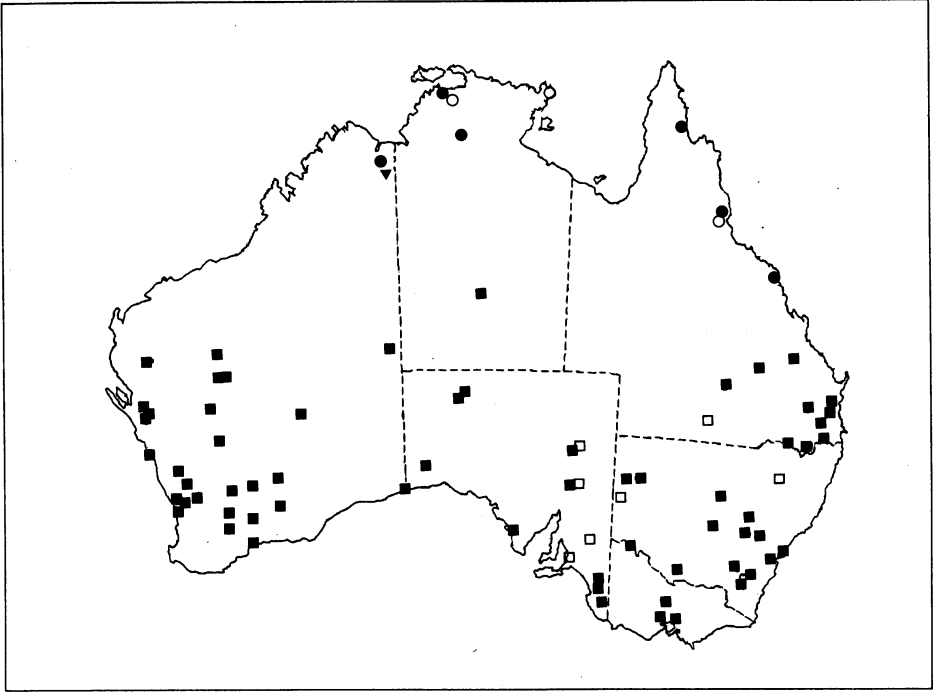
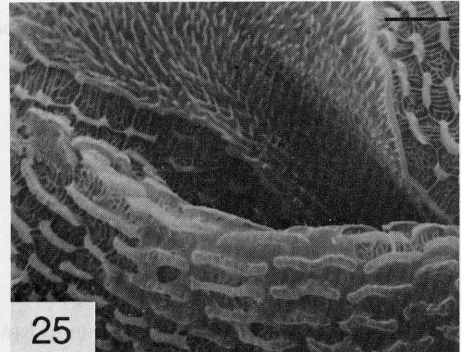
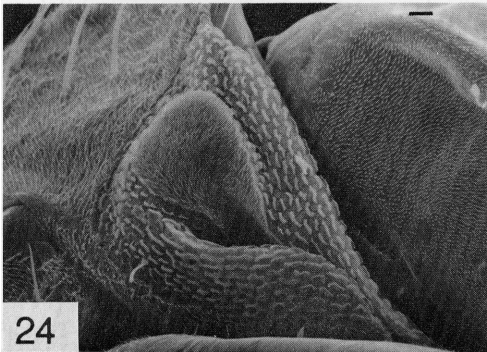
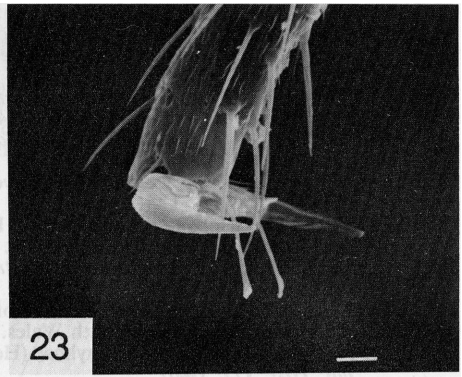
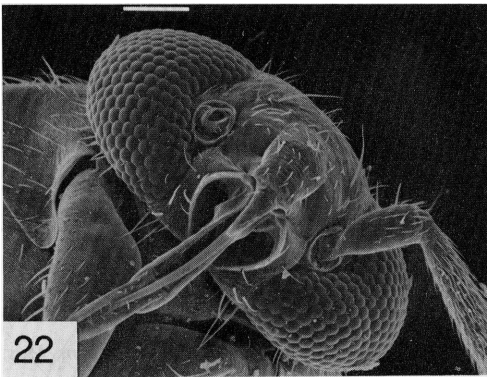


FIG. 21—Distribution of *Campylomma* spp: ● *austrina*; ○ *fusciantennata*; ▼ *kununurraensis*; ■ *liebkechti*; □ *seminigricaput*.



FIGS 22-25—*Campylomma liebkechti* ♂: (22) head, ventral view; (23) pretarsus; (24) metathorax, lateral view; (25) detail of metathoracic scent-gland evaporative area. Scale = 0.1 mm for 22; 0.01 mm for 23-25.

Male genitalia—Pygophore and paramere (Fig. 18) generally as in *C. liebkechti*; phallosome as in Fig. 19; vesica with 2 blades, dorsal (or upper) blade narrow and slender, ending slightly before apex of ventral (or lower) blade which is conspicuously robust and gradually narrowed to an acute point from base to apex (Fig. 20).

Distribution

Known only from the "Top End" of the N.T. and northern Qld (Fig. 21).

Notes

The holotype has the inner margins of the eyes fuscous or black. One of the paratypes from near Gove Airport has only the distal area of the first antennal segment fuscous, the remainder of the antenna is coloured as body.

C. fusciantennata occurs sympatrically with *C. austrina* on cashews at Wildman River (N.T.).

C. fusciantennata may be distinguished from all other Australian species of *Campylomma* by the colour of its second antennal segment which is entirely fuscous or black.

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