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The Australian species of *Encarsia* Förster (Hymenoptera, Chalcidoidea: Aphelinidae), parasitoids of whiteflies (Hemiptera, Sternorrhyncha, Aleyrodidae) and armoured scale insects (Hemiptera, Coccoidea: Diaspididae)

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Abstract
The species of *Encarsia* Förster known from Australia are revised. This study is based mainly on material collected over the last 10 years. Ninety-four species are recognized, including 38 new species, and seven new records for Australia. All species are fully described or diagnosed, and illustrated by microphotographs. Seven new specific synonymies are proposed and two lectotypes are designated. A key to the females of Australian species of *Encarsia* is provided. The known hosts and distribution are summarized. The diversity of the Australian *Encarsia* fauna is discussed.

Keywords: *Aleyrodidae, Aphelinidae, Australia, Diaspididae, natural enemies, parasitoids*

Introduction

Encarsia Förster is a relatively large genus of Aphelinidae, currently containing 283 described species (Noyes 2003). *Encarsia* species are mostly primary parasitoids of whiteflies (Aleyrodidae) and armoured scale insects (Diaspididae), with four species known from aphids (Hormaphididae) (Evans et al. 1995). Males, however, are commonly hyperparasitoids of females (or males) of their own or other species (reviewed by Walter 1983a, 1983b, Williams and Polaszek 1996), and the males of certain species have been recorded as (probably facultative) hyperparasitoids of Psyllidae (Viggiani 1984; Polaszek et al. 1992), and obligate parasitoids of lepidopteran eggs (Polaszek 1991; Hunter et al. 1996). Species of *Encarsia* have been considered as the most efficacious group of biocontrol agents of whitefly pests on a broad range of agricultural crops. Recently their economic importance has been recognized worldwide and more attention has been given to their taxonomy. This is especially true of the *Encarsia* species parasitic on whiteflies (Huldén 1986; Rivnay and Gerling 1987; Polaszek et al. 1992; Krishnan and Vasantharaj David 1996; Trjapitzin et al. 1996; Schauff et al. 1996; Schmidt et al. 2001).

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Despite their importance, the identification of many *Encarsia* species is still very difficult, mainly because of their very small size necessitating laborious slide-mounting for taxonomic study, the poor condition of most of the early (and some recent) type material, and their apparent extreme diversity.

Materials and methods

This study was based mainly on material collected over a period of 10 years (1996–2006). Most of the specimens were reared from whitefly hosts. Each sample was given a unique code number and the host plant, host whitefly species, date, location, and collector were noted. Nymphs of parasitized hosts were kept in emergence chambers and the parasitoids transferred to gelatine capsules or 96% ethanol, where they remained at room temperature until further examination. In fact, storing alcohol material in the freezer for possible future DNA extraction would have been preferable. Whiteflies were identified to species level using the fourth instar pupal case from which the parasitoid had emerged (Martin 1987).

All specimens used in this study were slide-mounted as described by Noyes (1982) with the following modifications: specimens were placed in 10% KOH for 5–8 min (depending on whether the specimen was dry or preserved in ethanol) and incubated at 97°C using a block heater. Terminology follows Heraty and Polaszek (2000). All measurements of antennae and legs refer to the maximum length of the morphological structure in lateral view. Lengths of antennal segments were taken excluding the intersegmental membranes because they can vary depending on how much the antenna was extended during slide preparation. Fore wing length is the distance between its apical point (excluding the marginal fringe setae) and the proximal end of the submarginal vein, excluding the tegula (FWL in Figure 4). Gaster refers to the metasoma without the petiole (metasomal tergite 1). The length of the ovipositor was measured as the distance between the proximal margin of the basal ring to the extreme apex (cf. Huang and Polaszek 1998, p 1828, Figure 5; Heraty and Polaszek 2000, p 145, Figure 1B). This is different from Hayat (1998) who measured the ovipositor length as the combined lengths of second valvifer and third valvula (cf. Hayat 1998, p 272, Figure 8). Care should be taken if specimens are distorted because this can affect measurements, in particular measurements of the ovipositor (Heraty and Polaszek 2000). When taking measurements it is necessary that all reference points of the structure to be measured are equidistant from the objective of the microscope. Most of the photomicrographs were obtained using a digital camera (ProgRes® 3012 and C10^{plus}, Jenoptic Laser.Optik.Systeme GmbH) and processed using the AutoMontage® system, versions 2.04 and 4.03 (Synoptics Ltd). The digital images were enhanced and the final plates compiled using Adobe Photoshop®. For each species, mesosoma and metasoma, antenna, fore wing, and sometimes also stemmaticum, head in frontal view, and ovipositor tip are illustrated. The type specimens of species described by Girault are depicted even if in poor condition if they represent the only known specimen of that species. Girault did not clear his specimens prior to slide preparation so that characters of the mesosoma and metasoma are often hardly or not discernible, but antennae and wings often allow the examination of diagnostic characters.

Recent results of combined morphological and molecular analyses demonstrate the importance of the latter as an independent method to underpin the taxonomy of species, and cryptic species of *Encarsia* have been successfully separated using comparative partial 28S rDNA and COI sequence data (e.g. Babcock and Heraty 2000; Babcock et al. 2001;

Manzari et al. 2002; Polaszek et al. 2004; Schmidt et al. 2006). This technique has been applied to selected Australian species, for example in the *strenua*-, *inaron*- and *smithi* species groups.

Discussion

Until recently, the Australian *Encarsia* fauna was largely unknown and the few taxonomic treatments were almost exclusively based on the study of type specimens (e.g. Viggiani 1985c), most of which had been described by Alexandre Arsene Girault (Dahms 1978, 1983, 1984). After Girault's contribution, the genus *Encarsia* in Australia was largely ignored, and it was only after the establishment of the B-biotype of the silverleaf whitefly in 1994 that interest in *Encarsia* resurfaced. Australia has never before had a serious whitefly pest of outdoor crops and, as a consequence, there was very little research experience present in Australia capable of dealing with that pest. Subsequently a research programme was initiated because there were indications that agents capable of contributing significantly to the biological control of this pest may already be present in Australia. Until then only a single species attacking *B. tabaci* and *T. vaporariorum*, *Encarsia formosa*, was known from Australia (Wilson 1960). During this research project it became apparent that the genus *Encarsia* is particularly diverse in Australia. This observation was supported by the high species richness of host taxa, in particular whiteflies (Carver and Reid 1996; Martin 1999), and the high number of Australian species described by early authors: between 1913 and 1939 44 species of *Encarsia* were described, mostly by Girault. Nearly all of those species were insufficiently described and they are usually known only from the type specimen which is often in very poor condition. Only a small fraction (eight species) of the species described in the first half of the 20th century were described as *Encarsia*, the remaining species were originally treated as members of the genera *Coccophagus* (29 species), *Prospaltella* (six species), and *Aspidiotiphagus* (one species).

For Australia we treat 94 *Encarsia* species as valid, representing about one-third of the known world fauna of the genus. This is the highest number of species for any country, followed by China (76 species; Huang and Polaszek 1998) and India (52 species; Hayat 1998).

Many *Encarsia* species have a wide or even cosmopolitan distribution, complicating taxonomic revisions on a local scale. However, in Australia three-quarters of the species seem to be restricted in their distribution to Australia, indicating a high level of endemism. At least eight species occurring in Australia have either a wide geographical distribution embracing several major zoogeographical regions (*E. aseta*, *E. azimi*, *E. bimaculata*, *E. boswelli*, *E. brimblecombei*, *E. dispersa*, *E. elegans*, and *E. pergandiella*) or are virtually cosmopolitan (*E. citrina*, *E. formosa*, *E. perniciosi*, *E. lounsburyi*, *E. lutea*, *E. protransvena*, and *E. sophia*).

In Australia species richness of *Encarsia* is highest in Queensland with 65 species (70%; Table I), followed by Western Australia with 31 species (33%) and New South Wales with 15 species (16%). The remaining states or territories (excluding external territories) have between three (Australian Capital Territory) and nine species (South Australia; Table I).

Despite this high number of species in Australia, we believe that the number of species occurring in Australia is about two to three times higher than currently known. This estimate is to some extent based on the relatively high species diversity of whiteflies in Australia, comprising about 110 described species with estimates of the total number of

Table I. Number of described *Encarsia* species in Australian states and territories.

	Species
State or territory	
Australian Capital Territory	3
Queensland	65
New South Wales	15
Northern Territory	7
South Australia	9
Tasmania	3
Western Australia	31
Victoria	6
External territories	
Christmas Island	1
Norfolk Island	3

species being about three times as many (Martin 1999 and personal communication). Furthermore, about one-third of all *Encarsia* species with known host records parasitize armoured scale insects which are similarly diverse in Australia with about 240 species (Carver et al. 1991). In the present study species attacking armoured scale insects are somewhat underrepresented. This is partly because there has been more interest in parasitoids of whiteflies than in those species attacking diaspidids.

Acronyms for depositories

The following acronyms are used: ANIC, Australian National Insect Collection, Canberra, Australia; BMNH, Natural History Museum, London, UK; BPBM, Bernice P. Bishop Museum, Honolulu, Hawaii, USA; DEUN, Dipartimento di Entomologia e Zoologia agraria ''Filippo Silvestri''–Università degli Studi di Napoli ''Federico II'', Portici, Italy; INHS, Illinois Natural History Survey Insect Collection, Champaign, Illinois, USA; ISNB, Institut Royal des Sciences Naturelles de Belgique, Collections Nationales Belges d'Insectes et d'Arachnides, Brussels, Belgium; ISZA, Istituto Sperimentale per la Zoologia Agraria, Firenze, Italy; NIAS, National Institute of Agroenvironmental Sciences, Tsukuba, Japan; QDPI, Queensland Department of Primary Industries, Queensland, Australia; QMBA; Queensland Museum, Brisbane, Australia; UNLP, Universidad Nacional de La Plata, Argentina; USNM, United States National Museum of Natural History, Washington, DC, USA; WADA, Western Australia Department of Agriculture, Perth, Australia; ZDAMU, Zoology Department, Aligarh Muslim University, India; ZSMG, Zoologische Staatssammlung, Munich, Germany.

Genus *Encarsia* Förster

Encarsia Förster 1878, p 65–66. Type species: *Encarsia tricolor* Förster, designation by monotypy.

=*Aspidiotiphagus* Howard 1894a, p 229; *Prospalta* Howard 1894b, p 6; *Prospaltella* Ashmead 1904a, p 126; *Encarsiella* Hayat 1983, p 85. For a full list of generic synonyms see Schmidt and Polaszek 2007, p 85–86.

Revisionary studies of *Encarsia* for the Australian and other geographical regions: Australia: Schmidt et al. (2001); Viggiani (1985c); China: Huang and Polaszek (1998); Egypt: Polaszek et al. (1999); Europe: Ferrière (1965); India: Hayat (1989a, 1998); Israel: Rivnay and Gerling (1987); North America: Schauff et al. (1996); Russia and adjacent countries: Yasnosh (1989), Trjapitzin et al. (1996). *Encarsia* parasitoids of *Bemisia tabaci*: Polaszek et al. (1992).

Diagnosis

For a full generic description of *Encarsia* and a discussion of morphological characters of *Encarsia* and closely related genera see Schmidt and Polaszek (2007). The presence of the following character states is required for a positive diagnosis of *Encarsia* (females): fore and hind tarsi five-segmented; antenna eight-segmented (excluding radicle); scutellum always with two pairs of setae; marginal vein longer than submarginal vein; postmarginal vein absent; stigmal vein very short, always less than one-quarter of the length of the marginal vein. The closely related *Coccophagus* differs from *Encarsia* primarily in having six or more setae on the scutellum. However, the generic circumscriptions of the coccophagine genera are currently being reassessed, as are their phylogenetic relationships (P. A. Pedata, A. Polaszek and S. Schmidt, in preparation).

Key to the species of *Encarsia* (females) from Australia

The following key allows the identification of all *Encarsia* species currently known to occur on the Australian mainland and external territories. The key includes only females because males are known from only about 25% of the species, and in general they are extremely difficult to identify without conspecific females. Descriptions of males are provided where possible to aid identification of males in samples where males and females are present.

Measurements of quantitative characters given in the species descriptions are based on specimens which were available at the time this study was conducted. Additional material or abnormal specimens may reveal values which lie slightly outside the given ranges.

Furthermore, type specimens of species described by Girault are usually in a very poor condition and diagnostic characters are often not visible or distorted. Measurements of Girault species that are only known from the type specimen(s) should be regarded as approximations. We took this into account when creating the key and tried to be as general as possible and as specific as necessary. In cases when a character state is variable, or appears to be intermediate, the species will key out both ways. In critical cases, in particular when a couplet gives only a single character, both ways should be tried and the result should be scrutinized by checking the specimens against the diagnosis and the corresponding illustrations.

1 Mid tarsi four-segmented, tarsal formula 5-4-5 2
– Mid tarsi five-segmented, tarsal formula 5-5-5 3

2 Apical spur of midtibia less than half the length of the corresponding basitarsus. Head and mesosoma brown . . . . . *E. formosa*
– Apical spur of midtibia more than half the length of the corresponding basitarsus. Head and mesosoma yellow . . . . . *E. dispersa*

3 Fore wing with distinct asetose or sparsely setose area proximal to stigmal vein (e.g. Figures 78, 81, 91) 4
– Fore wing without asetose or sparsely setose area proximal to stigmal vein (e.g. Figures 65, 69) 13

4 F1 approximately quadrate (Figure 77). Metasoma yellow . . . *E. cappa* n. sp.
– F1 clearly longer than maximum width (e.g. Figure 80). Metasoma brown at base 5

5 Longest seta of fore wing fringe longer than maximum width of disc (*citrina* group) 6
– Longest seta of fore wing fringe as long as, or shorter than, maximum width of disc 7

6 Submarginal vein of fore wing with one seta, fringe two times as long as greatest width of disc. Ovipositor distinctly shorter than midtibia . . . *E. lounsburyi*
– Submarginal vein of fore wing with two setae, fringe only slightly longer than maximum width of disc. Ovipositor equal in length to midtibia . . *E. citrina*

7 Submarginal vein of fore wing with one seta. Midtibial spur as long as corresponding basitarsus . . . . . *E. clara*
– Submarginal vein of fore wing with two setae. Midtibial spur distinctly shorter than corresponding basitarsus 8

8 Mesoscutal midlobe with at least eight setae. Fore wing with dark band behind marginal vein . . . . . *E. pergandiella*
– Mesoscutal midlobe with at most six setae. Fore wing without dark band behind marginal vein 9

9 Mesoscutal midlobe without setae . . . . . *E. aseta*
– Mesoscutal midlobe with two to six setae 10

10 Mesoscutal midlobe with two setae. Axillae brown, metasoma laterally with dark longitudinal stripes (Figure 150). Ovipositor third valvulae apically truncate . . . . . *E. longifasciata*
– Mesoscutal midlobe with four to six setae. Axillae yellow. Metasoma laterally without dark longitudinal stripes. Ovipositor third valvulae apically rounded 11

11 Anterior scutellar setae minute, much smaller than posterior pair of setae. Third valvula laterally concave . . . . . *E. cassida* n. sp.
– Anterior scutellar setae similar in size to posterior setae. Third valvulae laterally straight or convex 12

12 Clava three-segmented (Figure 21). Midtibial spur half the length of the corresponding basitarsus . . . . . *E. aldrichi* n. sp.
– Clava two-segmented (Figure 181). Midtibial spur distinctly less than half the length of the corresponding basitarsus . . . . . *E. mineoi*

13 Scutellar sensilla close together, separated by a distance of about 1.0 times the greatest width of a sensillum. F1 at least two times as long as maximum width (mostly *strenua* group) 14

– Scutellar sensilla widely separated, distance at least 1.5 times the width of a sensillum. If closely placed, then F1 less than two times as long as its maximum width 35

14 Submarginal vein with four to six setae. Mesoscutal midlobe with at least 14 setae 15
– Submarginal vein with two or three setae. Mesoscutal midlobe with fewer setae (usually 8–10, rarely 13–14 setae) 17

15 Ovipositor distinctly longer than midtibia. T3 and T4 each with two setae laterally . . . . . *E. pulliclava*
– Ovipositor shorter than or equal in length to midtibia. T3 and T4 each with one seta laterally 16

16 Antenna yellow, F1 without longitudinal sensilla. Fore wing basal cell with 15 or 16 setae (Figure 201). Apical spur of midtibia longer than half the length of the corresponding basitarsus . . . . . *E. olgae* n. sp.
– Antenna brown, F1 with two longitudinal sensilla. Fore wing basal cell with five to seven setae (Figure 140). Apical spur of midtibia shorter than half the length of the corresponding basitarsus . . . . . *E. kalamundae* n. sp.

17 Clava two-segmented 18
– Clava three-segmented 23

18 Mesoscutal midlobe with six setae. Head and body completely yellow except stemmaticum with brown spot . . . . . *E. longivalvula*
– Mesoscutal midlobe with at least eight setae. Head and body more extensively brown 19

19 Metasoma yellow (Figures 232, 269) 20
– Metasoma partly brown (44, 295, 298) 21

20 F1 less than three times as long as its maximum width. F2 shorter than or equal in length to F3 (0.77–0.92; Figure 270). Ovipositor longer than midtibia (1.06–1.30) . . . . . *E. stirlingia* n. sp.
– F1 more than three times as long as its maximum width; F2 longer than F3 (1.11–1.15; Figure 233). Ovipositor shorter than midtibia (0.94–0.97) . . . . . *E. praecipua* n. sp.

21 Ovipositor 1.5 times as long as midtibia. Metasoma yellow except T2 and T3 brown (Figure 298). T3 and T4 laterally each with one seta . . . *E. whittieri*
– Ovipositor at most 1.2 times as long as midtibia. Metasoma predominantly brown (Figure 295). T3 and T4 laterally each with two setae 22

22 Mesoscutal midlobe with 10 setae. Ovipositor shorter than midtibia . . . . . *E. aurithorax*
– Mesoscutal midlobe with eight setae. Ovipositor longer than midtibia . . . . . *E. ustulata*

23 Fore wing with dark band behind marginal vein (Figures 179, 219). Metasoma mostly dark brown (Figures 177, 217) 24
– Fore wing without dark band behind marginal vein. Metasoma mostly or entirely pale 25

24 Flagellum with F4 and F5 brown (Figure 218). Ovipositor clearly longer than midtibia . . . . . *E. perpulchella*
– Flagellum entirely yellow (Figure 178). Ovipositor approximately equal in length to midtibia . . . . . *E. maura* n. sp.

25 T6 with two setae between cercal plates. Fore wing with a patch of longer, coarse setae near posterior margin (Figure 265). Stemmaticum with transversely strigose surface sculpture . . . . . *E. sophia*
– T6 with four setae between cercal plates. Fore wing with normal setae near posterior margin. Stemmaticum with rugose or reticulate surface sculpture . 26

26 Ovipositor shorter than midtibia 27
– Ovipositor longer than midtibia 28

27 Antenna very slender, each funicular segment three times longer than its maximum width; F1 without longitudinal sensilla (Figure 209). Third valvula one-third as long as second valvifer (Figure 208) . . . . . *E. pedana* n. sp.
– Antenna less elongate (Figure 74), longest funicular segment less than 2.5 times longer than its width. Third valvula half as long as second valvifer. F1 with one or two longitudinal sensilla (Figure 73) . . . . . *E. capensis* n. sp.

28 Stemmaticum and vertex with densely rugose surface sculpture (Figure 195). Marginal fringe of fore wing at most 0.2 times as long as width of disc . . . . . *E. oakeyensis*
– Stemmaticum and vertex with transversely strigose or reticulate surface sculpture. Marginal fringe of fore wing at least 0.2 times as long as width of disc . . 29

29 Metasoma with large brown spot on segments 2–6 (Figure 168) . . . . . *E. maculata* n. sp.
– Metasoma yellow, without large brown spot 30

30 Ovipositor less than 1.3 times as long as midtibia 31
– Ovipositor more than 1.3 times as long as midtibia 32

31 Mesoscutal midlobe anteriorly, and medially (sometimes faint), brown (Figure 55). Marginal fringe at least 0.35 times as long as width of disc (Figure 58) . . . . . *E. bimaculata*
– Mesoscutal midlobe yellow except anterior margin (Figure 202). Marginal fringe less than 0.35 times as long as width of disc (Figure 204) . . *E. papaceki* n. sp.

32 Head and body yellow without any dark pigmentation . . . . *E. protransvena*
– Head and body with extensive dark pigmentation 33

33 Maxillary palp two-segmented. Marginal fringe at most 0.20 times as long as width of disc . . . . . *E. adela* n. sp.
– Maxillary palp one-segmented. Marginal fringe more than 0.23 times as long as width of disc 34

34 Mesoscutal midlobe with five to six setae. Fore wing sparsely and unevenly setose, disc near posterior margin with sparsely setose area (Figure 207) . . . . . *E. paucisetosa* n. sp.
– Mesoscutal midlobe with 8–10 setae. Fore wing densely and evenly setose, disc near posterior margin without sparsely setose area (Figure 173) . . . . . *E. maria*

35 Clava obliquely truncate, sulcus between F5 and F6 oblique (Figure 197) . . . . . *E. obliqua*
– Clava not obliquely truncate, sulcus between F5 and F6 perpendicular . . . 36

36 Flagellomeres each with 8–10 longitudinal sensilla (Figures 142, 229) . . . 37
– Flagellomeres with fewer sensilla, basal flagellomeres with zero to two, apical with three to five sensilla 38

37 Midlobe of mesoscutum with about 60–70 setae (Figure 227). Antenna with two-segmented clava (Figure 228). Maxillary palp one-segmented . . . . *E. pilosa*
– Midlobe of mesoscutum with at most 12 setae (Figure 141). Antenna without clearly defined clava (Figure 142). Maxillary palp two-segmented . . . . . *E. leptosa* n. sp.

38 Submarginal vein with four setae. If, rarely, with three setae then mesoscutal midlobe with 50–70 setae 39
– Submarginal vein with two setae. If, rarely, with three setae then mesoscutal midlobe with fewer than 30 setae (usually 0–12) 40

39 Mesoscutal midlobe with 50–70 setae. Fore wing with two prominent transverse dark bands (Figure 54) . . . . . *E. bifasciata*
– Mesoscutal midlobe with fewer than 10 setae. Fore wing hyaline (Figure 276) . . . . . *E. swifti*

40 Antenna with very large clava, F5 about three times as broad as F2 (Figure 60) . . . . . *E. boswelli*
– Antenna with smaller clava, F5 distinctly less than three times as broad as F2 41

41 Anterior scutellar setae minute, less than 0.2 times as long as posterior setae . . . . . *E. cassida* n. sp.
– Anterior scutellar setae larger, usually similar in size to posterior setae . . 42

42 Ovipositor longer than combined length of midtibia and basitarsus . . . 43
– Ovipositor subequal to or shorter than combined length of midtibia and basitarsus 56

43 Mandible with a strongly enlarged ventral tooth . . . . *E. chauliodoa* n. sp.
– Mandible without a strongly enlarged ventral tooth, all teeth of approximately equal size 44

44 Midtibial basitarsus shorter than following two tarsal segments. Antennal clava with apical segment appearing conical. Marginal fringe of fore wing more than 0.31 times as long as width of disc, if rarely shorter (occasionally in *E. silvifilia*) then maxillary palp two-segmented 45
– Midtibial basitarsus longer than following two tarsal segments. Antennal clava with apical segment not appearing conical. Marginal fringe of fore wing at most 0.31 times as long as width of disc. Maxillary palp one-segmented . . . 52

45 Ovipositor more than two times as long as midtibia . . . . . *E. socratis*
– Ovipositor distinctly less than two times as long as midtibia 46

46 Metasoma entirely yellow . . . . . *E. picithorax*
– Metasoma brown or yellow with dark markings 47

47 Metasoma predominantly brown 48
– Metasoma yellow with brown markings 50

48 Fore wing narrow, 3.1 times as long as width of disc, marginal fringe more than half the width of disc. F1 approximately quadrate . . . . . *E. taciti*
– Fore wing broader, at most 2.5 times as long as width of disc, marginal fringe less than half the width of disc. F1 distinctly longer than broad 49

49 Ovipositor less than 1.3 times as long as midtibia. Fore wing with brown band behind marginal vein (Figure 257) . . . . . *E. silvifilia*
– Ovipositor 1.5 times as long as midtibia. Fore wing without brown band behind marginal vein (Figure 124) . . . . . *E. grotei*

50 F1 two times as long as its maximum width. Midtibial spur clearly shorter than corresponding basitarsus. Ovipositor 1.75 times as long as midtibia . . . . . *E. marxi*
– F1 less than 1.5 times as long as its maximum width. Midtibial spur approximately equal in length to corresponding basitarsus. Ovipositor less than 1.5 times as long as midtibia 51

51 Ovipositor at least 1.4 times as long as midtibia. F1 approximately equal in length to F2 (Figure 281) . . . . . *E. tennysoni*
– Ovipositor less than 1.3 times as long as midtibia. F1 shorter than F2 (Figure 255) . . . . . *E. silvifilia*

52 Ovipositor less than 1.5 times as long as midtibia (1.38–1.39) and shorter than combined length of midtibia and tarsus . . . . . *E. longicauda*
– Ovipositor more than 1.5 times as long as midtibia (1.50–2.17) and as long as or longer than combined length of midtibia and tarsus 53

53 Metasoma yellow. Mesoscutal midlobe with five or six setae . . *E. paucisetosa* n. sp.
– Metasoma brown. Mesoscutal midlobe with eight setae 54

54 F1 equal in length to F2 and with one or two longitudinal sensilla (Figure 18). Mesoscutal midlobe and axilla brown, the latter centrally with elongate cells. Basal cell medially with a single small seta (occasionally with a second seta nearby) . . . . . *E. albiscutellum*
– F1 distinctly shorter than F2 and usually without, rarely with one longitudinal sensillum. Mesoscutal midlobe and/or axilla posteriorly pale, the latter centrally with normal reticulation. Basal cell medially without a single small seta 55

55 Metasoma brown. Head predominantly brown. F1 1.3–1.5 times as long as its maximum width and distinctly longer than half the length of F2 (Figure 134) . . . . . *E. iris*
– Metasomal tergites one to three pale, remaining metasoma brown. Head pale with transverse brown band. F1 1.2 times as long as its maximum width and about half the length of F2 (Figure 274) . . . . . *E. subhyalina* n. sp.

56 Third valvula at least partly dark and contrasting with the pale second valvifer. Metasoma mostly or completely yellow, wings hyaline (*lutea* group) . . . 57

– Third valvula not distinctly darker than second valvifer. If occasionally third valvula dark, then metasoma entirely brown and wings with infuscation 59

57 Apices of third valvulae rounded. T5 and T6 without transverse band . . *E. lutea*
– Apices of third valvulae not rounded; either hook-shaped or appearing truncate. T5 and T6 with faint transverse brown band 58

58 Ovipositor with truncate apex. Third valvula less than 0.55 times as long as second valvifer (0.47–0.54) . . . . . *E. uncinata* n. sp.
– Ovipositor with rounded apex. Third valvula more than 0.55 times as long as second valvifer (0.57–0.85) . . . . . *E. armillata* n. sp.

59 Gaster yellow, with posterior half brown (Figures 66, 96) 60
– Gaster with different colour pattern 61

60 F1 as long as its maximum width, approximately triangular. Marginal fringe more than 0.3 times as long as width of disc (0.37–0.44). T2–T4 laterally each with two setae . . . . . *E. brimblecombei*
– F1 at least 1.5 times as long as broad, cylindrical. Marginal fringe at most 0.2 times as long as width of disc (0.19–0.20). T2–T4 laterally each with one seta . . . . . *E. craspedia* n. sp.

61 Ovipositor extremely short, distinctly shorter than mid tarsus. Both F2 and F3 quadrate . . . . . *E. tristis*
– Ovipositor not extremely short, not shorter than mid tarsus. F2 and/or F3 longer than broad 62

62 Fore wing with dark band or at least a slight infuscation behind marginal vein (remove any contrast enhancement such as phase contrast to recognize very faint infuscation) 63
– Fore wing hyaline throughout, without dark band behind marginal vein . . 79

63 Mesoscutum with four setae 64
– Mesoscutum with 8–11 setae 65

64 Submarginal vein with two setae. Ovipositor approximately equal in length to midtibia . . . . . *E. fasciola* n. sp.
– Submarginal vein with one seta. Ovipositor clearly shorter than midtibia *E. persea*

65 Mesoscutal side lobe with two setae *and* clava three-segmented. Midtibial spur as long as or longer than corresponding basitarsus. Longest setae of fore wing fringe longer than 0.2 times width of disc. Ovipositor as long as or longer than midtibia 66
– Mesoscutal side lobe with three setae, or if with two setae then clava two-segmented or not defined. Midtibial spur shorter than corresponding basitarsus, if as long as or longer, then either marginal fringe of fore wing shorter than 0.2 maximum width of disc (*E. ancora*, *E. seminigriclava*), or ovipositor shorter than midtibia (*E. spinosa*) 68

66 Maxillary palp two-segmented. F1 longer than broad; F2 slightly shorter than F3 (Figure 255). Mesosoma predominantly brown . . . . . *E. silvifilia*

– Maxillary palp one-segmented. F1 approximately quadrate. F2 slightly longer than F3. Mesosoma predominantly yellow 67

67 Ovipositor clearly longer than midtibia. Propodeum yellow, gaster only suffused with brown (Figure 245). Longest setae on mesoscutal midlobe shorter than maximum length of axilla. Axilla medially with elongate cells . . . . . *E. rentzi* n. sp.
– Ovipositor approximately equal in length to midtibia. Propodeum brown and gaster dark brown (Figure 153). Longest setae on mesoscutal midlobe longer than maximum length of axilla. Axilla medially without elongate cells . . . . . *E. longisetosa* n. sp.

68 Gaster yellow; brown only laterally (Figure 189). Marginal fringe of fore wing half as long as maximum width of disc (Figure 191) . . . . . *E. notha* n. sp.
– Gaster predominantly brown. Marginal fringe of fore wing clearly less than half maximum width of disc 69

69 Mesoscutal side lobe with two setae. Clava either not defined or if two-segmented, then F1 at least four times as long as its maximum width and approximately equal in length to F2 70
– Mesoscutal side lobe with three setae. Clava two- or three-segmented, F1 distinctly less than four times as long as its maximum width and shorter than F2 72

70 Clava two-segmented. F1 elongate, at least 4.0 times as long as its maximum width and subequal in length to F2 (Figure 236) . . . . . *E. prolata* n. sp.
– Clava undefined. F1 shorter, at most 1.5 times as long as its maximum width and distinctly shorter than F2 (*smithi* group) 71

71 Mesosoma yellow. Mesoscutum anteriorly fuscous. Marginal fringe of fore wing more than 0.3 times the width of disc. T3 and T4 laterally each with one seta . . . . . *E. nigriventris*
– Mesosoma brown. Mesoscutum lighter. Marginal fringe of fore wing less than 0.25 times the width of disc. T3 and T4 laterally each with two or more setae . . . . . *E. bunyae* n. sp.

72 Third valvula longer than half the length of the second valvifer 73
– Third valvula equal to or shorter than half the length of the second valvifer 74

73 Ovipositor approximately equal in length to midtibia. T3–T5 laterally each with one seta. Mesosoma predominantly yellow . . . . . *E. ancora* n. sp.
– Ovipositor distinctly longer than midtibia. T3–T5 laterally each with two setae. Mesosoma brown . . . . . *E. hapalia* n. sp.

74 Fore wing fringe very short, less than 0.20 times as long as width of disc . 75
– Fore wing fringe at least 0.25 times as long as width of disc 77

75 T5 medially with a pair of very long setae. Third valvula 0.2 times as long as second valvifer. F1 more than two times as long as maximum width . . . . . *E. chaetogastra* n. sp.

– T5 medially without a pair of very long setae. Third valvula at least 0.25 times as long as second valvifer. F1 less than two times as long as maximum width 76

76 Apical antennal segment brown. F1 less than two times as long as its maximum width . . . . . *E. seminigriclava*
– Apical antennal segment yellow. F1 nearly two times as long as its maximum width . . . . . *E. brahmsi*

77 Clava two-segmented, F6 darker than remaining flagellar segments . . *E. elegans*
– Clava three-segmented, F6 not darker than remaining flagellar segments . . 78

78 Ovipositor distinctly shorter than midtibia (about 0.7). F1 approximately quadrate. Midtibial spur slightly longer than corresponding basitarsus. Third valvula half as long as the second valvifer (0.48–0.53) . . . *E. spinosa* n. sp.
– Ovipositor approximately equal in length to midtibia. F1 distinctly longer than broad. Midtibial spur slightly shorter than corresponding basitarsus. Third valvula less than half the length the second valvifer (0.24–0.36) . . . . *E. perniciosi*

79 Midlobe of mesoscutum with six setae or fewer 80
– Midlobe of mesoscutum with eight setae or more 84

80 Longest setae of fore wing fringe at least 0.8 times as long as width of disc. Ovipositor 0.6 times as long as midtibia, or shorter . . . . *E. aldrichi* n. sp.
– Longest setae of fore wing fringe shorter, less than 0.6 times as long as width of disc. Ovipositor 0.9 times as long as midtibia, or longer 81

81 Body pale yellow except head and mesosoma anteriorly dark brown (Figure 76). Lengths of F1, F2, and F3 strongly increasing so that F3 is about two times as long as F1 . . . . . *E. cappa* n. sp.
– Body with different colour and F1–F3 different 82

82 Marginal fringe of fore wing clearly less than half the width of disc. F1 two times as long as its maximum width or longer (1.8–2.7). Fore wing 2.2–2.4 times as long as width of disc . . . . . *E. nitella* n. sp.
– Marginal fringe of fore wing half as long as the width of disc. F1 less than 1.6 times as long as its maximum width. Fore wing 2.9–3.0 times as long as width of disc 83

83 F1 approximately quadrate. Fore wing sparsely setose. Metasoma predominantly yellow . . . . . *E. unfasciata*
– F1 clearly longer than broad. Fore wing not sparsely setose. Metasoma predominantly dark brown . . . . . *E. leucippi*

84 Fore wing narrow, more than three times as long as width of disc 85
– Fore wing broader, less than three times as long as width of disc 86

85 T2–T4 each laterally with one seta. Ovipositor appearing truncate at apex . . . . . *E. farinaria* n. sp.
– T2–T4 each laterally with two setae. Ovipositor rounded at apex . . *E. justicia*

86 Head and body completely yellow. T6 with two setae between cercal plates . . . . . *E. insignis* n. sp.

– Head and body not completely yellow, if mostly pale (*aferi*), then T6 with four setae between cercal plates 87

87 Clava three-segmented. Mesoscutal midlobe and scutellum with indistinct reticulation and cells without distinct internal striations 88
– Clava two-segmented. Mesoscutal midlobe and scutellum with distinctive reticulation and cells with distinct internal striations (*inaron* group, partim) 92

88 Midtibial spur equal to or longer than corresponding basitarsus. Marginal fringe of fore wing at least 0.3 times as long as maximum width of disc 89
– Midtibial spur distinctly shorter than corresponding basitarsus. Marginal fringe of fore wing less than 0.3 times as long as maximum width of disc 90

89 Ovipositor shorter than midtibia. Mesosoma predominantly brown (Figure 41). Scutellar sensilla closely placed, two times the maximum width of a sensillum . . . . . *E. aureola*
– Ovipositor longer than midtibia. Mesosoma brown only anteriorly (Figure 156). Scutellar sensilla distantly placed, five times the maximum width of a sensillum . . . . . *E. longispina* n. sp.

90 F1 less than 1.5 times its maximum width (Figure 103). T6 with two setae between cercal plates. Ovipositor longer than midtibia (1.26–1.28). Stemmaticum with reticulate surface sculpture (Figure 104) . . . . . *E. despecta* n. sp.
– F1 more than 1.5 times its maximum width. T6 with four setae between cercal plates. Ovipositor shorter than midtibia (0.85–0.91). Stemmaticum with rugose surface sculpture 91

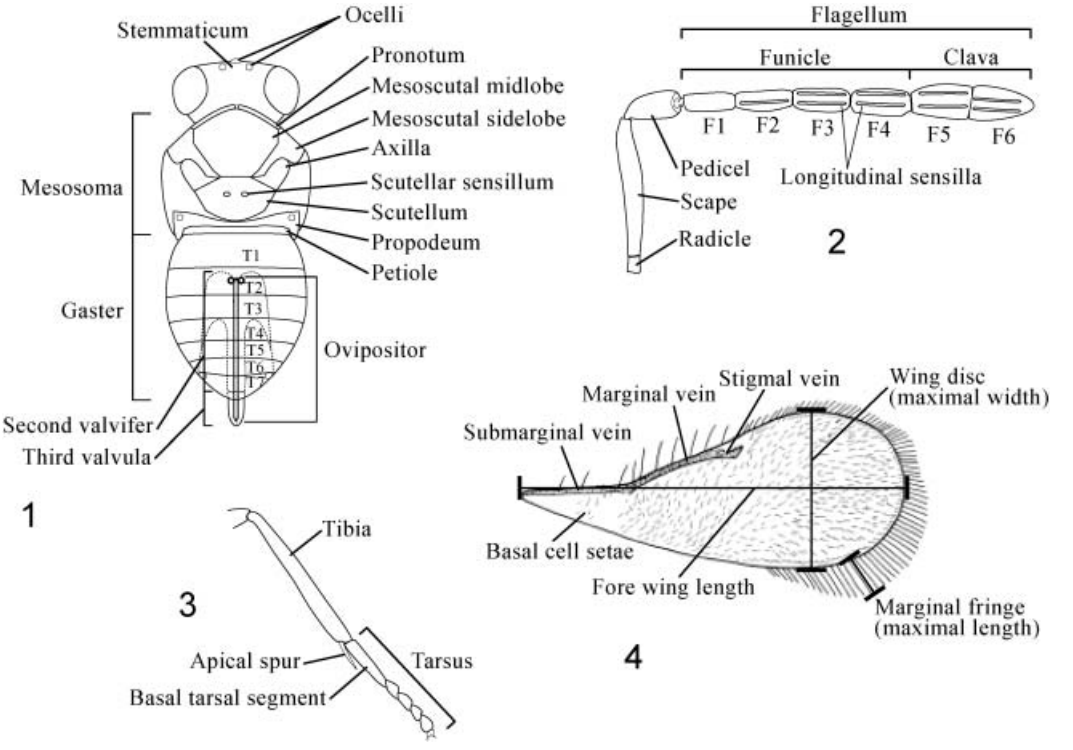
91 Third valvula at least 0.35 times as long as second valvifer (0.35–0.37). Wing densely setose (Figure 285) . . . . . *E. thoreauini*
– Third valvula less than 0.35 times as long as second valvifer (0.30–0.33). Wing less densely setose (Figure 16) . . . . . *E. aferi* n. sp.

92 Third valvula more than 0.5 times as long as second valvifer . . *E. scylla* n. sp.
– Third valvula less than 0.5 times as long as second valvifer 93

93 Metasomal T5 anterolaterally and T6 anteriorly (sometimes also T4 anterolaterally) with narrow fuscous bands (Figure 5) . . . . . *E. accenta*
– Metasoma T5 and T6 pale or dark, but without narrow fuscous bands . . 94

94 Ovipositor distinctly shorter than midtibia. Metasoma yellow with a lateral brown stripe from the base of metasoma to T7 (Figure 99) . . . . . *E. cybele*
– Ovipositor at least 0.9 times as long as midtibia. Metasoma either mostly yellow or brown, always without lateral brown stripe 95

95 Metasoma dark, basal two tergites laterally each with three to six (rarely only two) setae. Antennae shorter, F4 about two times as long as its maximum width; F1 less than two times as long as its maximum width (Figure 12) . . . . *E. adusta*
– Metasoma pale, basal two tergites laterally with zero to two (rarely four) setae. Antennae elongate, F4 distinctly longer than two times its maximum width; F1 at least two times as long as its maximum width (Figure 48) . . . . . *E. azimi*



Figures 1–4. *Encarsia* general morphology. (1) Mesosoma and gaster (female). (2) Antenna. (3) Mid leg. (4) Fore wing.

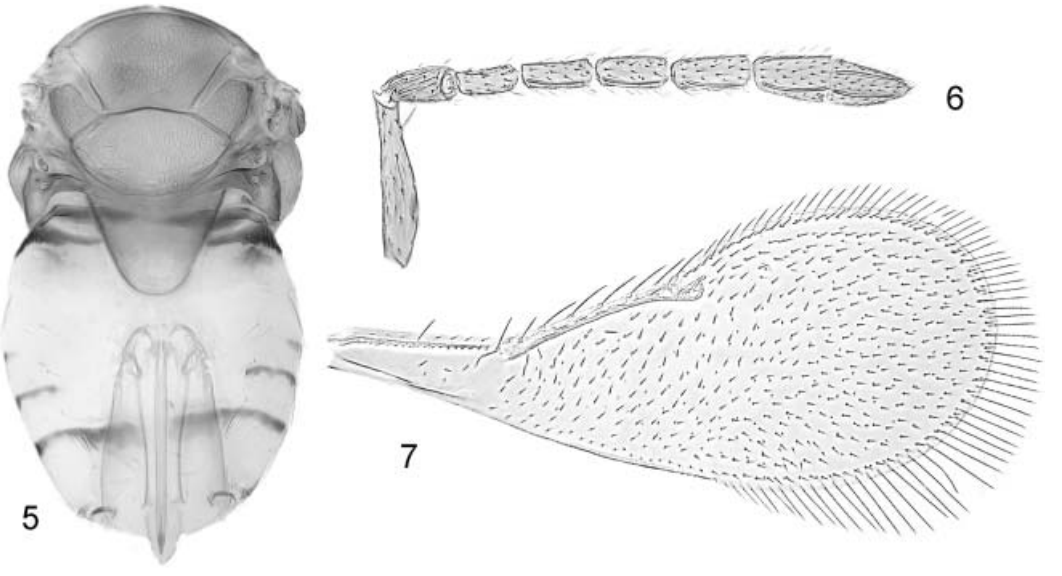
1. ***Encarsia accenta*** Schmidt and Naumann
(Figures 5–7)

Encarsia accenta Schmidt and Naumann in Schmidt et al. 2001, p 371. Holotype ♀, Australia, South Australia, Renmark, 4 January 1997 (P. De Barro), ex *Bemisia tabaci* on *Atriplex rhagodioides* F. Muell. (=*Atriplex amnicola* Paul G. Wilson) (Chenopodiaceae) (ANIC, examined).

Diagnosis

Female. Colour: head yellow, with transverse brown band between eyes in frontal view, sometimes head largely brown with vertex and lower head lighter. Mesosoma light brown, scutellum lighter and propodeum darker than rest of mesosoma. Metasoma largely pale yellow to white, at base with sharply defined narrow dark brown band, T4 laterally and T5 with complete narrow dark brown band anteriorly. Antenna yellow with scape, pedicel, and apical segments darker. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with rugose-reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel longer than F1 (1.26–1.30). F1 2.16–2.50 times as long as its maximum width, slightly shorter than F2 (0.83–0.93) and F3 (0.82–0.88). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with three setae each. Mesoscutal midlobe, axillae, and scutellum with rather fine but distinctive reticulation,



Figures 5–7. *Encarsia accenta* Schmidt and Naumann, female. (5) Mesosoma and gaster. (6) Antenna. (7) Fore wing.

cells with distinct internal striations. Scutellar sensilla widely separated (approximately seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing 2.4 times as long as width of disc. Marginal fringe 0.26–0.29 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven to nine setae. Basal cell with seven or eight setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly shorter than half the length of the corresponding basitarsus (0.27–0.36). Tergites laterally with the following numbers of setae: T1: 2, T2: 2–3, T3: 2, T4: 2, T5: 3, T6: 3, T7 with four setae. Ovipositor subequal in length to midtibia (0.99–1.04). Third valvula 0.32–0.34 times as long as second valvifer.

Male. Overall colour of mesosoma brown. Mesoscutal midlobe, side lobes, and scutellum lighter. Metasoma predominantly brown. Legs yellow except coxae brown and hind femur slightly darkened. Antennae yellow with pedicel darkened. Head predominantly brown, top of head lighter. Apical two segments of antenna fused and sensilla partly overlapping.

Species group placement. E. inaron group.

Distribution. Australia: New South Wales, South Australia.

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius).

Additional material examined

New South Wales: 1♀, Barrrington Tops, nr Moppy Lookout, 11 February 1984 (I. D. Naumann) (ANIC). 1♀, 100 km S by E Broken Hill (32°51′S, 141°37′E), 3–13 October 1988 (E. D. Edwards), Malaise trap/ethanol (ANIC). **South Australia:** 2♀, 1♂, Renmark,

4 January 1997 (P. De Barro), ex *Bemisia* sp. on *Atriplex rhagodioides* F. Muell. (Chenopodiaceae) (ANIC).

Comments

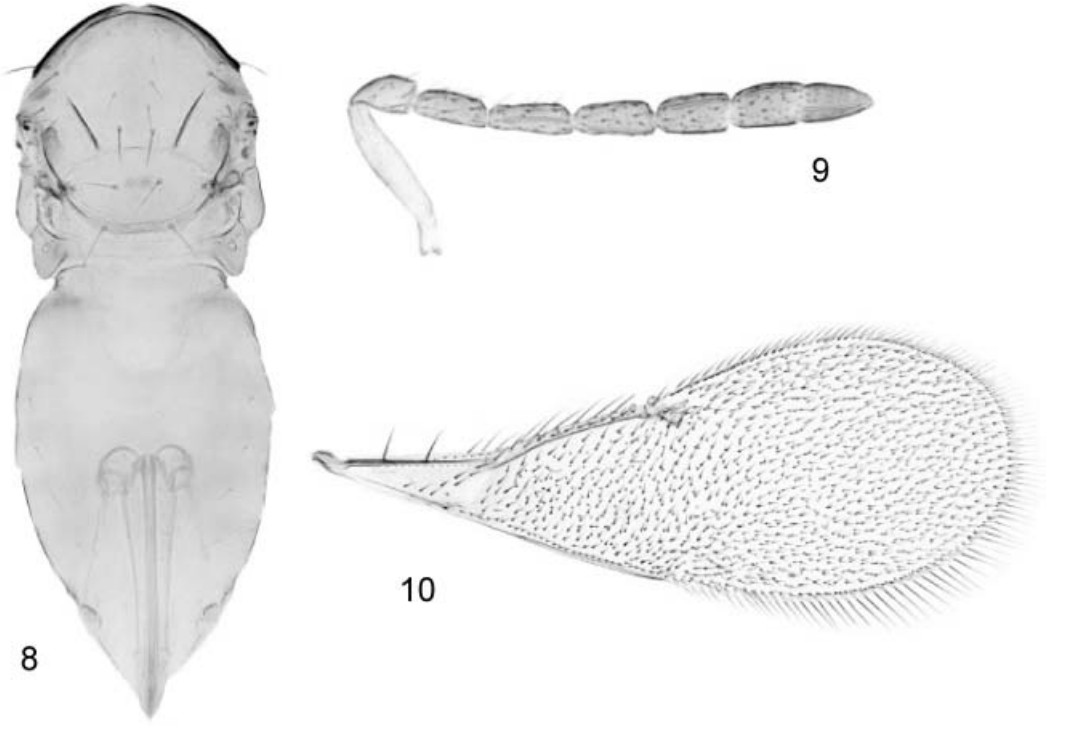
This species belongs together with *E. adusta* and *E. azimi* to the *E. inaron* species group and is characterized by the distinctive colour pattern of the gaster. For differentiating *E. accenta* from the similar species *E. adusta* and *E. azimi* see comments under *E. adusta*.

2. ***Encarsia adela*** n. sp.
(Figures 8–10)

Description

Female. Colour: head yellow, stemmaticum with three small brown marks adjacent to ocelli. Body entirely yellow except the following parts brown: pronotum, anterior margin of mesoscutal midlobe, a faint longitudinal stripe on midlobe, mesoscutal side lobes anteriorly, and axillae anteriorly. Gaster yellow. Antenna yellow, apex slightly darker. Fore wing hyaline. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose-reticulate surface sculpture. Maxillary palp two-segmented. Antennal formula 1,1,3,3. Pedicel slightly shorter than or subequal to F1 (0.81–0.96) [0.81]. F1 2.46–2.64 [2.46]



Figures 8–10. *Encarsia adela* n. sp., female. (8) Mesosoma and gaster. (9) Antenna. (10) Fore wing.

times as long as its maximum width, slightly shorter than F2 (0.85–0.94) [0.94] and F3 (0.81–0.94) [0.94]. F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 1–2, F4: 2–3, F5: 2–3, F6: 3. Midlobe of mesoscutum with 10 setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum or less. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.5–2.7 [2.5] times as long as width of disc. Marginal fringe 0.18–0.20 [0.20] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven or eight setae. Basal cell with 10–11 setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.78–0.81) [0.78]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.36–1.48) [1.36] and 2.03–2.21 [2.03] times as long as clava. Third valvula 0.32 times as long as second valvifer.

Male. Unknown.

Species group placement. E. strenua group.

Distribution. Australia: New South Wales, Tasmania.

Host. Unknown.

Material examined

Tasmania: Holotype: ♀, Claytons, Bathurst Harbour (43°22′S, 146°08′E), 15 January 1991 (Nielsen, Edwards), Malaise trap (ANIC). **New South Wales:** Paratype: 1♀, 3 km N Lansdowne nr Taree, 20–27 December 1990 (G. Williams), Malaise [trap], rainf[orest]/ wet sclerophyll (ANIC).

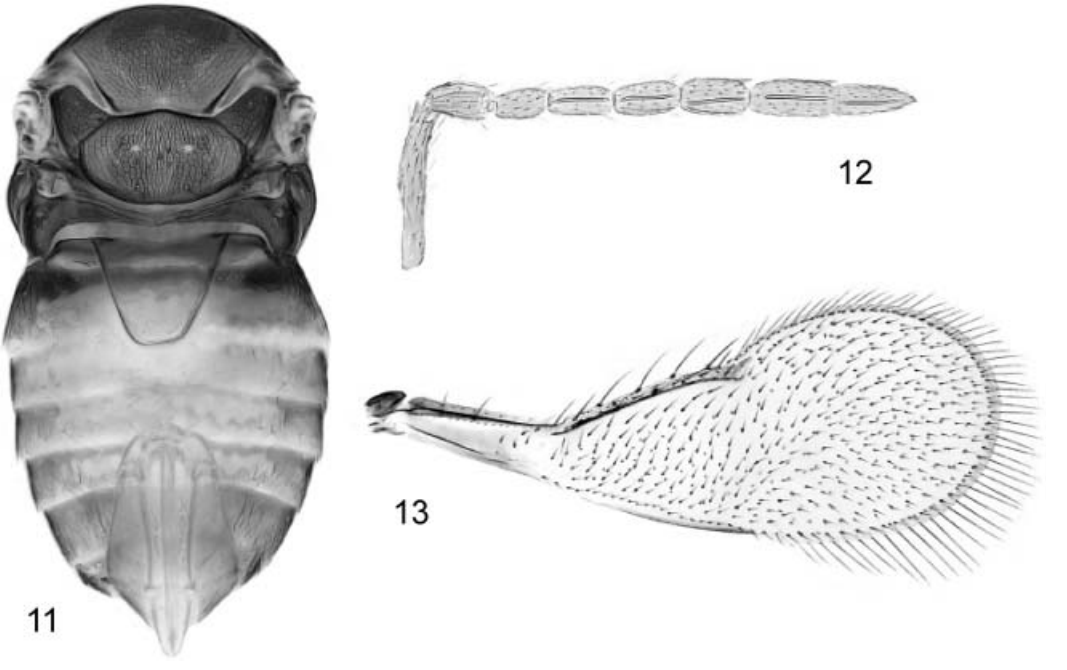
3. *Encarsia adusta* Schmidt and Naumann
(Figures 11–13)

Encarsia adusta Schmidt and Naumann in Schmidt et al. 2001, p 371, 376. Holotype ♀, Australia, Northern Territory, Darwin, 27 September 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* (Asteraceae) (ANIC, examined).

Diagnosis

Female. Colour: head predominantly brown, upper head partly lighter. Overall coloration of mesosoma light brown, scutellum slightly lighter and propodeum darker than rest of mesosoma. Metasoma predominantly brown, petiole brown, gaster at base with sharply defined narrow dark brown band. Antenna yellow with scape, pedicel and apical segments darkened. Fore wing hyaline. Legs yellow except coxa basally brown and hind femora darkened.

Morphology: stemmaticum with rugose-reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel longer than F1 (1.35–1.62). F1 1.44–1.80 times as long as its maximum width, shorter than F2 (0.72–0.85) and F3 (0.68–0.81). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 2, F4: 3, F5: 3, F6: 3. Mesoscutal midlobe with eight (or nine) setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla widely separated (approximately five to six times the maximum width of a sensillum).



Figures 11–13. *Encarsia adusta* Schmidt and Naumann, female. (11) Mesosoma and gaster. (12) Antenna. (13) Fore wing.

Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing 2.6 times as long as width of disc. Marginal fringe 0.35–0.38 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven setae. Basal cell with four to five setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal to half the length of the corresponding basitarsus (0.44–0.55). Tergites laterally with the following numbers of setae: T1: (2–)3–6(–8), T2: 3–6, T3: 3–6, T4: 4–6, T5: 4–6, T6: 3, T7 with four setae. Ovipositor slightly shorter than or subequal in length to midtibia (0.90–1.03). Third valvula 0.44–0.46 times as long as second valvifer.

Male. Body predominantly brown with mesoscutal midlobe posteriorly and scutellum lighter. Legs light brown except coxae brown, femora, in particular hind femur, lighter brown and tibiae slightly darkened. Apical two segments of antenna fused and sensilla partly overlapping.

Species group placement. E. inaron group.

Distribution. Australia: Northern Territory, Queensland, Western Australia.

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius), *Lipaleyrodes euphorbiae* David and Subramaniam, *Trialeurodes vaporariorum* (Westwood).

Additional material examined

Northern Territory: 2♀, Darwin, 27 September 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* L. (Asteraceae) (ANIC); 4♀, Darwin, 10 December 2002 (R. van Klinken),

ex *Lipaleyrodes euphorbiae* David and Subramaniam on *Euphorbia* sp. (Euphorbiaceae) (ZSMG). **Queensland:** 1♀, Mount Isa, 3 October 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* (ANIC). **Western Australia:** 1♀, 1♂, Kununurra, 24 September 1996 (P. De Barro), ex *Lipaleyrodes* sp. on *Euphorbia hirta* (Euphorbiaceae) (ANIC).

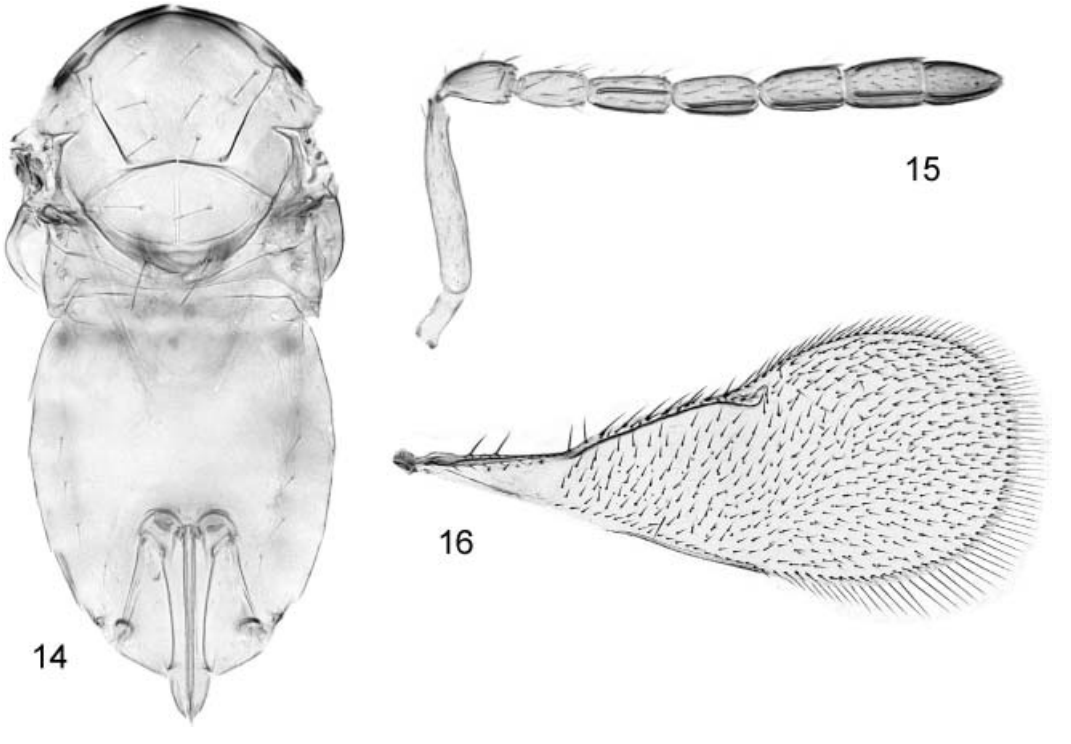
Comments

Encarsia adusta belongs together with *E. accenta* and *E. azimi* to the *E. inaron* species group. *Encarsia azimi* is sometimes difficult to distinguish from *E. adusta* but usually it has a pale gaster and only one or two (rarely three) setae on each side of T2 and T3. *Encarsia accenta* has a distinct colour pattern and differs morphologically by the short tibial spur of the middle leg, which is distinctly shorter than half the length of the corresponding basal tarsal segment.

4. *Encarsia aferi* n. sp.
(Figures 14–16)

Description

Female. Colour: head and mesosoma yellow except pronotum, anteromedial patch on mesoscutal midlobe, and propodeum partly brown. Gaster yellow, petiole and T1 with faint transverse brown band. Antenna yellow, apex brown. Fore wing hyaline. Legs yellow.



Figures 14–16. *Encarsia aferi* n. sp., female. (14) Mesosoma and gaster. (15) Antenna. (16) Fore wing.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose surface sculpture. Antennal formula 1,1,3,3. Pedicel subequal to, or slightly longer than, F1 (1.00–1.13) [1.12]. F1 (1.71–1.92) [1.92] times as long as its maximum width, shorter than F2 (0.73–0.83) [0.83], and shorter than F3 (0.75–0.81) [0.81]. F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with eight setae, arranged symmetrically. Scutellar sensilla widely separated, approximately five times the maximum width of a sensillum. Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing 2.3 times as long as width of disc. Marginal fringe 0.20–0.21 [0.21] times as long as width of disc. Basal cell with five or six seta. Submarginal vein with two (or three) setae, marginal vein anteriorly with seven setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly longer than half the length of the corresponding basitarsus (0.57–0.63) [0.63]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 3, T5: 3, T6: 3, T7 with four setae. Ovipositor slightly shorter than midtibia (0.85–0.91) [0.91] and 1.24–1.30 [1.30] times as long as clava. Third valvula 0.30–0.33 [0.32] times as long as second valvifer.

Male. Unknown.

Species group placement. E. inaron group.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Bemisia afer* (Priesner and Hosny).

Material examined

Queensland: Holotype: ♀, Bundaberg, 26 November 2002 (M. Coombs), ex *Bemisia afer* on *Breynia* sp. (Euphorbiaceae) (ANIC). Paratypes: 2♀, same data as holotype (ANIC, ZSMG).

Comments

The species is similar to *E. thoreauini* but has a different wing shape and the setation of the fore wing is more scattered than in the latter species (cf. Figures 16, 285). It also resembles *E. aleurochitonis* Mercet but can be separated by the reticulate surface sculpture of the stemmaticum, whereas in *aferi* the sculpture is rugose. Also, *aferi* has a much longer fore wing marginal fringe which is about 0.2 times as long as the maximum width of disc, whereas in *aleurochitonis* it is less than 0.1 times.

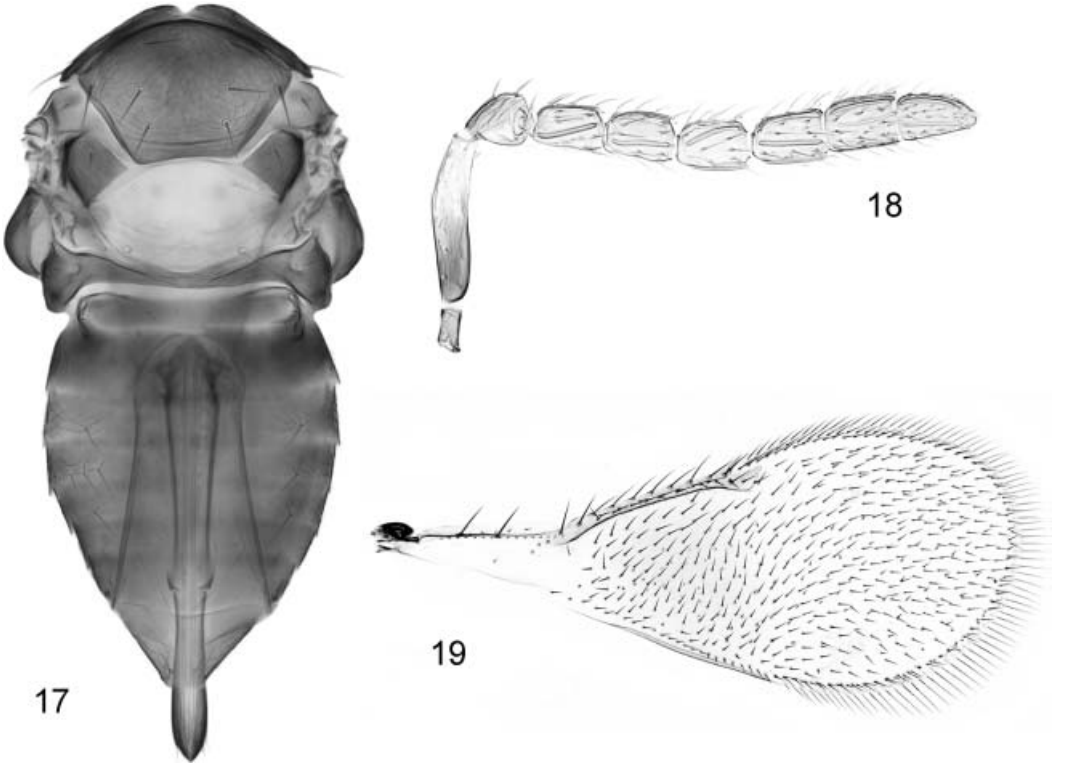
5. ***Encarsia albiscutellum*** (Girault)

(Figures 17–19)

Prospaltella albiscutellum Girault 1913[167], p 188. Holotype ♀, Australia, Queensland, Brisbane, 16 June 1913 (H. Hacker) (QMBA, type no. 1730, examined).

Coccophagus albiscutellum (Girault): Girault 1915[238], p 48. Change of combination.

Coccophagus albiscutellum schilleri Girault 1915[238], p 48. Syntypes 2♀, Australia, Queensland, Gordonvale (Cairns), 9 December 1913 and 17 June 1914 (A. A.



Figures 17–19. *Encarsia albiscutellum* (Girault), female. (17) Mesosoma and gaster. (18) Antenna. (19) Fore wing.

Girault). No type material existing (Girault 1915, p 48), but according to his description the species is ''extremely like the typical form''. **Syn. nov.**

Coccophagus perbellus Girault 1920[352], p 46. Australia, Queensland, Gordonvale, October. Type status unclear (see comments below) (QMBA, examined). **Syn. nov.**

Prospaltella albiscutellum (Girault): Compere 1931, p 11. Dahms 1983, p 34.

Prospaltella perbella (Girault): Compere 1931, p 11. Change of combination.

Encarsia albiscutellum (Girault): Viggiani 1985c, p 234.

Encarsia perbella (Girault): Viggiani 1985c, p 246. Change of combination.

Coccophagus perbellus Girault: Dahms 1986, p 399.

Encarsia albiscutellum longipalpa Hayat 1989a, p 34. Holotype ♀, India, U. P. Aligarh, March 1966 (M. Hayat), ex *Aleurolobus* sp. on *Eugenia jambolana* (BMNH, examined).

Encarsia albiscutellum longipalpa Hayat: K. C. Chou et al. 1996, p 196; Hayat 1998, p 193.

Encarsia albiscutellum (Girault): Huang and Polaszek 1998, p 1839.

Diagnosis

Female. Colour: head brown. Mesosoma brown except scutellum yellow. Metasoma brown. Antenna yellow, radicle and basal half of scape brown. Fore wing hyaline or with slight infuscation behind marginal vein. Legs yellow except hind coxa and femur brown.

Morphology [measurements of holotype in square brackets]: stemmaticum with transversely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel 0.96–1.10 times as long as F1. F1 1.50–1.81 [1.72] times as long as its maximum width, subequal in length to F2 (1.03–1.07) [1.07] and slightly shorter than F3 (0.93–0.97) [0.94]. Flagellomeres with the following numbers of sensilla: F1: 1–2, F2: 2, F3: 3, F4: 3–4, F5: 3–4, F6: 3. Midlobe of mesoscutum with eight setae, side lobes with two to three setae each. Scutellar sensilla widely separated (approximately seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.3–2.4 [2.4] times as long as width of disc. Basal cell near base of marginal vein with two to three setae and medially with a single small seta (and occasionally with a second larger seta). Marginal fringe 0.17–0.20 [0.17] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six or seven setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly shorter than or subequal to length of corresponding basitarsus (0.89–0.96) [0.89], the latter proximally with three to four peg-like setae. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 2–3, T4: 1–3, T5: 2–3, T6: 2, T7 conically elongated and with four setae. Ovipositor longer than midtibia (1.69–1.87) [1.83] and 2.77–2.90 times as long as clava. Third valvula 0.62–0.72 [0.72] times as long as second valvifer.

Male. Head and body dark brown, mesoscutal midlobe largely, side lobes, scutellum, and metanotum lighter. Fore wing hyaline. Legs pale, coxae more or less and hind femur brown. Antenna with six funicular segments, apical two segments not fused, but sensilla partly overlapping.

Species group placement. *E. opulenta* group.

Distribution. Australia: Queensland. China, India.

Host. Aleyrodidae: *Aleuroduplidens* sp. The following additional host has been recorded (Huang and Polaszek 1998): *Aleurolobus* sp.

Additional material examined

Queensland: 2♀, 1♂, Brisbane, Chapel Hill, 25 October 2000 (P. De Barro) (ANIC, ZSMG); 1♀, 3 October 2000 (P. De Barro and D. Sands), ex *Aleuroduplidens* sp. on *Euodia* sp. (Rutaceae) (ANIC); 2♀, Heathlands (11°45′S, 142°35′E), 26–29 February 1992 and 1–21 March 1992 (P. Feehney), Malaise trap (ANIC, ZSMG).

Comments

The species is easily recognizable by the combination of long ovipositor, dark brown colour, elongate first funicular segment, and very long midtibial spur.

The type status of *E. perbella* is unclear. On a slide with a female, labelled ''*Coccophagus perbellus*'', Girault had crossed out the word ''type'' and replaced it with a ''?''. Therefore Dahms (1986, p 399) did not assign a type number. *Encarsia perbella* (Girault) is very similar to *albiscutellum* and shows only minor colour differences of head and mesoscutum. According to Girault's description *perbella* has, unlike *albiscutellum*, an orange vertex (except ocellar area) and an orange mesoscutal side lobe with a black spot, legs white except

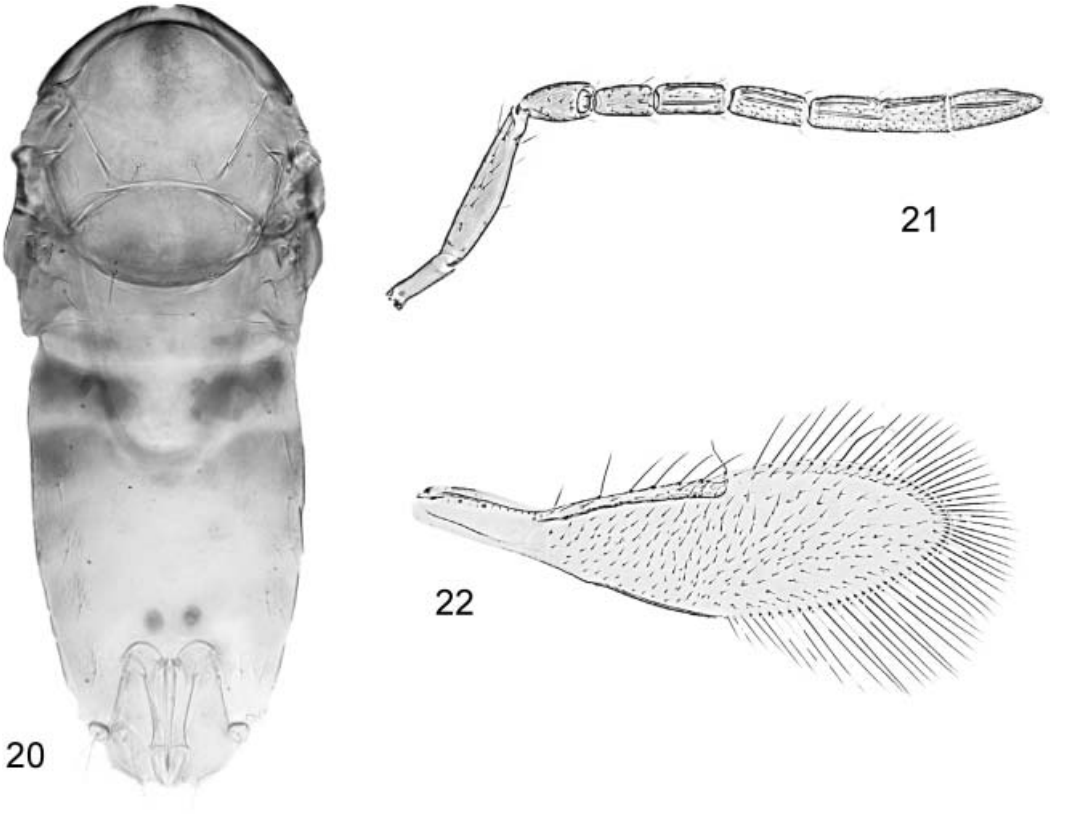
hind coxa. However, since there is no type specimen we are left with Girault's description which is not sufficient to characterize the species sufficiently. The identity of *perbella* remains unclear until more material of *perbella* is available that fits Girault's description and for the time being we regard *perbella* as a junior synonym of *albiscutellum*.

6. ***Encarsia aldrichi*** n. sp.
(Figures 20–22)

Description

Female. Colour: head and mesosoma yellow except pronotum, anteromedial patch on mesoscutal midlobe brown. Metasoma pale, T1 with transverse brown band and following tergites laterally more or less brown. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.14–1.29). F1 2.00–2.30 times as long as its maximum width, shorter than F2 (0.84–0.88), and shorter than F3 (0.80–0.84). F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 3–4, F3: 2–3, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with four (to six) setae, arranged symmetrically. Scutellar sensilla widely separated (approximately 10–15 times the maximum width of a sensillum).



Figures 20–22. *Encarsia aldrichi* n. sp., female. (20) Mesosoma and gaster. (21) Antenna. (22) Fore wing.

Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing 3.5–3.9 times as long as width of disc, occasionally with sparsely setose area near anterior margin proximal to stigmal vein. Marginal fringe 0.75–1.00 times as long as width of disc. Basal cell with one seta. Submarginal vein with two setae, marginal vein anteriorly with five setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal to half the length of the corresponding basitarsus (0.49–0.56). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1(–2), T4: 1(–2), T5: 1–2, T6: 3, T7 with four setae. Ovipositor very short and only slightly longer than half the length of the midtibia (0.55–0.60) and 0.64–0.66 times as long as clava. Third valvula 0.36–0.44 times as long as second valvifer.

Male. Similar in colour and morphology to female. Flagellum six-segmented, all segments with abundant sensilla.

Species group placement. E. lahorensis group.

Distribution. Australia: Northern Territory, Western Australia.

Host. Aleyrodidae: *Dialeuropora decempuncta* (Quaintance and Baker).

Material examined

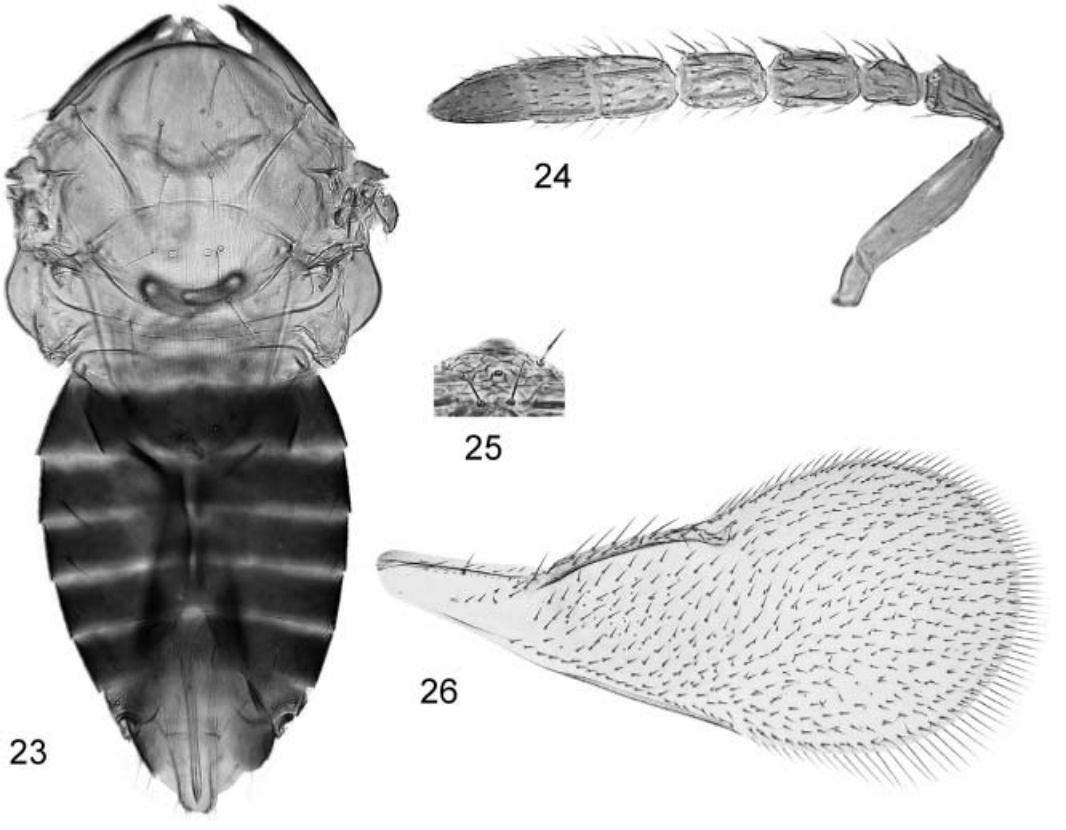
Western Australia: Holotype: ♀, Kununurra, 5 May 2000 (S. and O. Schmidt) (ANIC). **Northern Territory:** Paratypes: 4♀ (one slide with 2♀ each in BMNH and ANIC); 1♀, 1♂, Lake Dean, 40 miles N of Darwin, 4 July 1968 (J. Aldrich), ex *Dialeuropora decempuncta* (ZSMG); same location as holotype but collected in 1968 (S. Aldrich), ex aleyrodid on *Desmodium* sp. (Fabaceae) (ZSMG).

7. ***Encarsia ancora*** n. sp.
(Figures 23–26)

Description

Female. Colour: head yellow, postgenae with brown markings. Mesosoma yellow, pronotum and anterior margin of mesoscutal midlobe brown. Metasoma predominantly brown. Antenna yellow, apical segment of clava brown. Fore wing with dark band behind marginal vein. Legs yellow.

Morphology [measurements of holotype in square brackets]: maxillary palp two-segmented. Stemmaticum with reticulate surface sculpture (Figure 25). Antennal formula 1,1,3,3. Pedicel subequal to or longer than F1 (1.12–1.45) [1.12]. F1 longer than wide (1.20–1.56) [1.56], shorter than F2 (0.60–0.81) [0.81] and F3 (0.60–0.78) [0.78]. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2–3, F3: 3, F4: 3, F5: 2–3, F6: 2–3. Midlobe of mesoscutum with eight setae, side lobes with three setae each. Scutellar sensilla rather closely placed (approximately three times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.1–2.2 [2.2] times as long as width of disc. Marginal fringe 0.15–0.19 [0.15] times as long as width of disc. Basal cell with six to eight setae. Submarginal vein with two setae, marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of



Figures 23–26. *Encarsia ancora* n. sp., female. (23) Mesosoma and gaster. (24) Antenna. (25) Stemmaticum. (26) Fore wing.

midtibia subequal in length to corresponding basitarsus. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor shorter than midtibia (0.71–0.72) [0.71], subequal in length to clava. Third valvula about 0.6–0.7 [0.6] times as long as second valvifer, apically appearing truncate.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Xenaleyrodes timonii* Martin.

Material examined

Queensland: Holotype: ♀, Heathlands (11°45′S, 142°35′E), 22 March to 25 April 1992 (T. McLeod), Malaise #2, dump, open forest (ANIC). Paratype: 1♀, Bowen near Queens Beach, November 1999 (P. De Barro), ex *Xenaleyrodes timonii* on *Exocarpos latifolius* R.Br. (Cyperaceae) (ZSMG).

8. *Encarsia antiopa* (Girault)
(Figures 27–30)

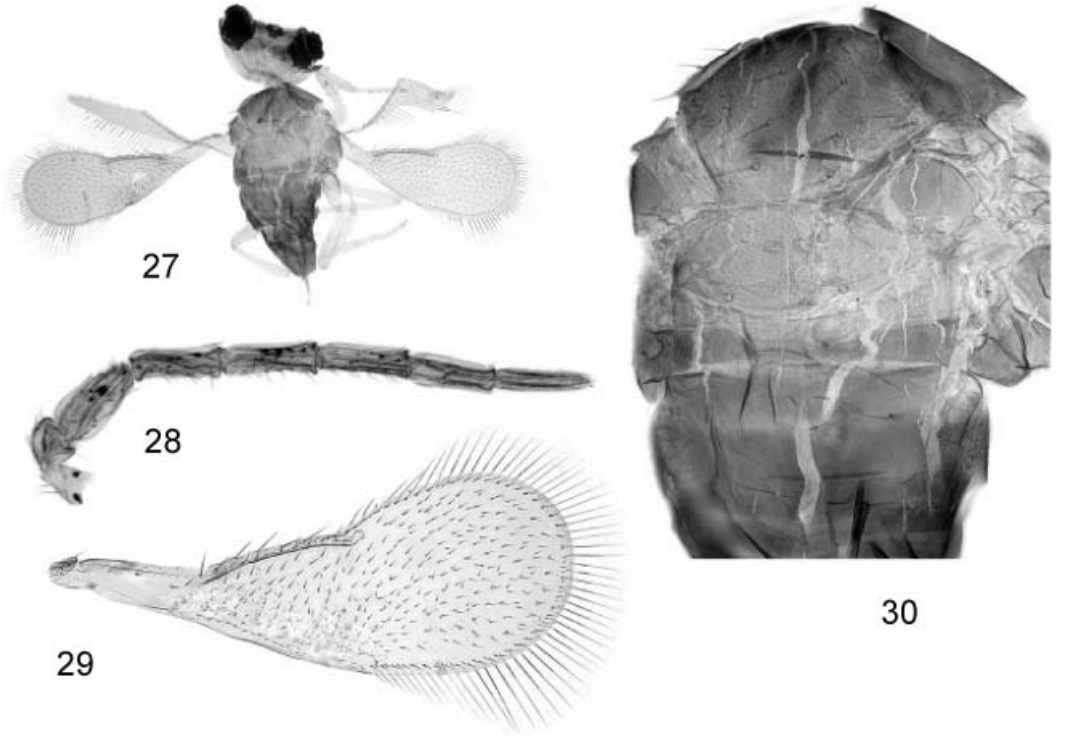
Prospaltella antiopa Girault 1913, p 188. Holotype ♂, Australia, Queensland, Babinda, 28 October 1912 (QMBA, type no. Hy. 1728, examined).
Coccophagus antiopa (Girault): Girault 1915, p 47. Change of combination.
Prospaltella antiopa Girault: Compere 1931, p 11; Dahms 1983, p 45.
Encarsia antiopa (Girault): Viggiani 1985c, p 235. Change of combination.

The male holotype of *Encarsia antiopa* (Girault) belongs to the *E. perflava* group and could be the male of *E. justicia*. However, the male has a dark infuscation behind the marginal vein which is missing in *E. justicia* and in the closely related *perflava* group males *E. bothrocera*, *E. cibcensis*, and *E. perflava*. The male also differs from *E. perflava* and *E. cibcensis* by having, similar to *E. bothrocera*, pit-like sensilla on F1. Unlike *E. cibcensis* and *E. perflava*, the male has at least one papillate sensillum on F4. The flagellum of the male holotype of *E. antiopa* is equipped with the following numbers of pit-like and papillate sensilla: F1 with five to seven pit-like and two papillate sensilla, F2 with about eight papillate sensilla, pit-like sensilla indiscernible, F3 with about seven papillate sensilla and F4 with at least one papillate sensillum.

Species group placement. *E. perflava* group.

Distribution. Australia: Queensland.

Host. Unknown.



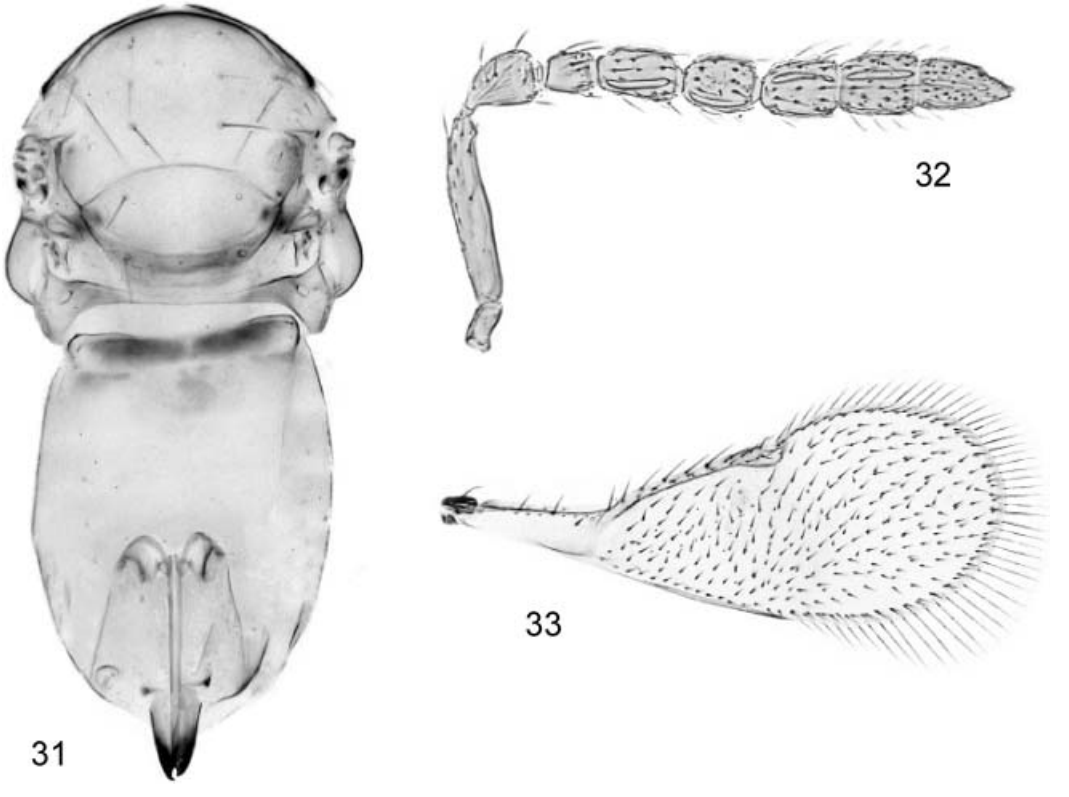
Figures 27–30. *Encarsia antiopa* (Girault), holotype female. (27) Overall view of type specimen. (28) Antenna. (29) Fore wing. (30) Mesosoma and base of gaster.

9. ***Encarsia armillata*** n. sp.
(Figures 31–33)

Description

Female. Colour: head yellow, mesosoma yellow except the following parts more or less brown: pronotum, mesoscutellar midlobe anteriorly and anteromedial stripe, axillae anteriorly, and propodeum. Gaster mostly pale, petiole, T1 and T5–T6 with brown band, T2–T4 with more or less distinct brown patch laterally. Third valvula brown, lighter at base than at apex. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugosely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.56–1.85) [1.71]. F1 slightly longer than its maximum width (1.14–1.44) [1.40], distinctly shorter than F2 (0.62–0.81) [0.67] and F3 (0.65–0.81) [0.70]. F2 subequal in length to, or slightly longer than, F3 (1.11–1.14) [1.05]. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1–2, F3: 1–2, F4: 2–3, F5: 2, F6: 2–3. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla very distantly placed (approximately eight or nine times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing 2.3–2.4 times as long as width of disc. Marginal fringe 0.22–0.35 [0.22] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with five or six



Figures 31–33. *Encarsia armillata* n. sp., female. (31) Mesosoma and gaster. (32) Antenna. (33) Fore wing.

setae. Basal cell with two to three setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.76–0.86) [0.86]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor subequal in length to midtibia and 1.38–1.48 [1.41] times as long as clava. Third valvula 0.57–0.69 [0.63] times as long as second valvifer, third valvulae appearing hook-shaped apically, with rounded apex.

Male. Unknown.

Species group placement. E. lutea group.

Distribution. Australia: Queensland, Western Australia.

Host. Aleyrodidae: *Aleurolobus* sp.

Material examined

Queensland: Holotype: ♀, Brisbane, Longpocket, 5 April 2001 (P. De Barro), ex hard-bodied whitefly on *Harpullia pendula* Planch. ex F. Muell. (ANIC). Paratype: ♀, same data as holotype (ZSMG). **Western Australia:** Paratypes: 6♀, Purnululu National Park, 8 May 2000 (S. and O. Schmidt) (ANIC, ZSMG), and 2♀, same locality as before, but ex *Aleurolobus* sp. on *Eucalyptus* sp. (Myrtaceae) (ANIC, ZSMG); 1♀, Keep River National Park, 4 May 2000 (S. and O. Schmidt) (ZSMG).

Comments

The species is close to *E. uncinata* n. sp., and both species are similar to *E. hamata* (Huang and Polaszek) and *E. udaipuriensis* (Shafee). For separating *E. armillata* from *E. hamata* and *E. udaipuriensis* see comments under *E. uncinata*.

10. *Encarsia aseta* Hayat and Polaszek
(Figures 34–37)

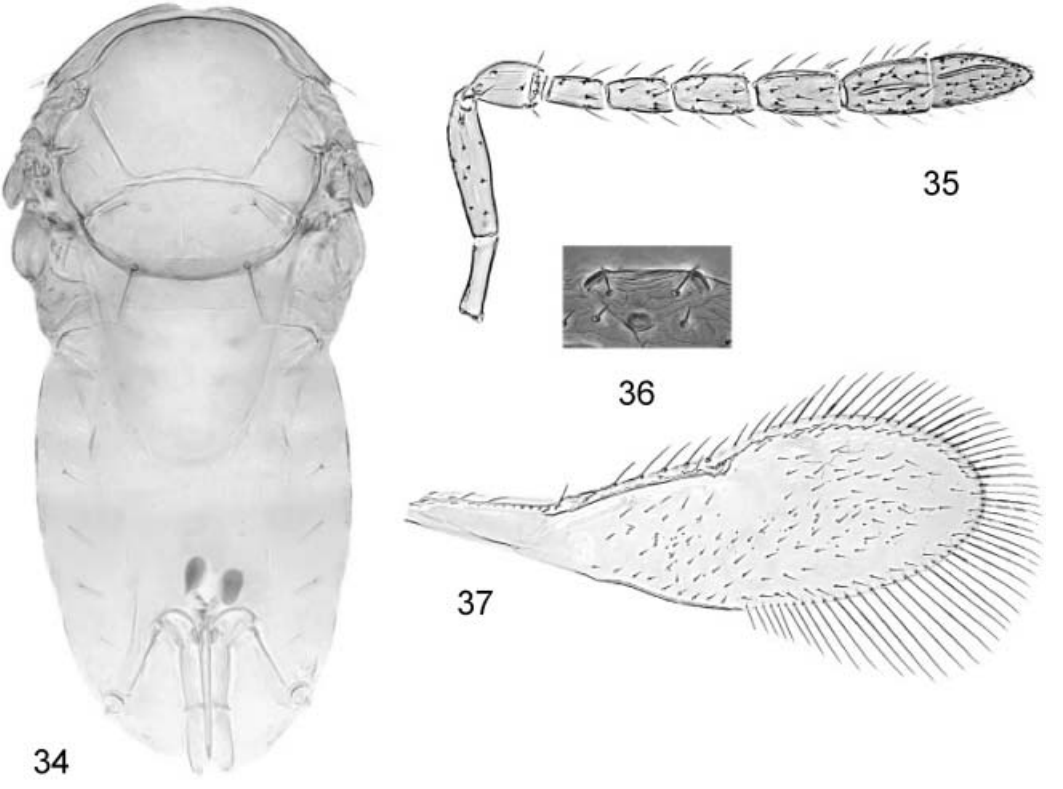
Encarsia aseta Hayat and Polaszek 1992, p 107. Holotype ♀, India, Maharashtra, Nagpur, 11 March 1987 (M. R. Lad), ex *Dialeurolonga elongata* Dozier on *Citrus* sp. (BMNH, examined).

Encarsia aseta Hayat and Polaszek: Hayat 1998, p 191–192, Huang and Polaszek 1998, p 1844–1845.

Diagnosis

Female. Colour: body entirely yellow. Fore wing hyaline.

Morphology: stemmaticum with reticulate surface sculpture (Figure 36). Antennal formula 1,1,3,3. Pedicel longer than F1 (1.40–1.47). F1 1.77–2.00 times as long as its maximum width, slightly shorter than F2 (0.85–0.91) and F3 (0.71–0.79). F2 shorter than F3 (0.82–0.89). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 2, F4: 2–3, F5: 3–4, F6: 3–4. Midlobe of mesoscutum without setae, side lobes with one seta each. Scutellar sensilla widely separated (approximately 11–12 times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing with bare area, 3.0–3.1 times as long as width of disc. Marginal fringe 0.59–0.66 times as long as width of disc. Basal cell with one seta or none.



Figures 34–37. *Encarsia aseta* Hayat and Polaszek, female. (34) Mesosoma and gaster. (35) Antenna. (36) Stemmaticum. (37) Fore wing.

Submarginal vein with two setae, marginal vein anteriorly with five setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.65–0.68). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. Ovipositor shorter than midtibia (0.61–0.67) and 0.68–0.83 times as long as clava. Third valvula 0.60–0.63 times as long as second valvifer.

Male. Unknown.

Species group placement. E. parvella group.

Distribution. Australia: Northern Territory, Western Australia. China, Hawaii, India.

Host. Aleyrodidae: *Aleuroplatus pectiniferus* Quaintance and Baker, *Aleurolobus* sp. The following additional hosts have been recorded: *Aleurotrachelus* sp. (Huang and Polaszek 1998), *Dialeurolonga elongata* Dozier (Hayat and Polaszek 1992).

Additional material examined

Northern Territory: 3♀, Keep River National Park, 3 May 2000 (S. and O. Schmidt), ex *Aleuroplatus pectiniferus* on *Hakea arborescens* (Proteaceae) (ANIC, ZSMG). **Western Australia:** 1♀, Barton Plains (14°10′S, 126°53′E), 18 June 1997 (G. Bellis), ex *Aleurolobus* sp. on *Eucalyptus bigalerita* (Myrtaceae) (ANIC).

11. ***Encarsia ashmeadi*** (Girault)
(Figures 38–40)

Coccophagus ashmeadi Girault 1915[238], p 50, 56. Holotype ♀, Australia, New South Wales, Chindera (Tweed River) (QMBA, type no. Hy. 2930, examined).
Prospaltella ashmeadi (Girault): Compere 1931, p 11. Change of combination.
Coccophagus ashmeadi Girault: Dahms 1983, p 59.
Encarsia ashmeadi (Girault): Viggiani 1985c, p 235. Change of combination.

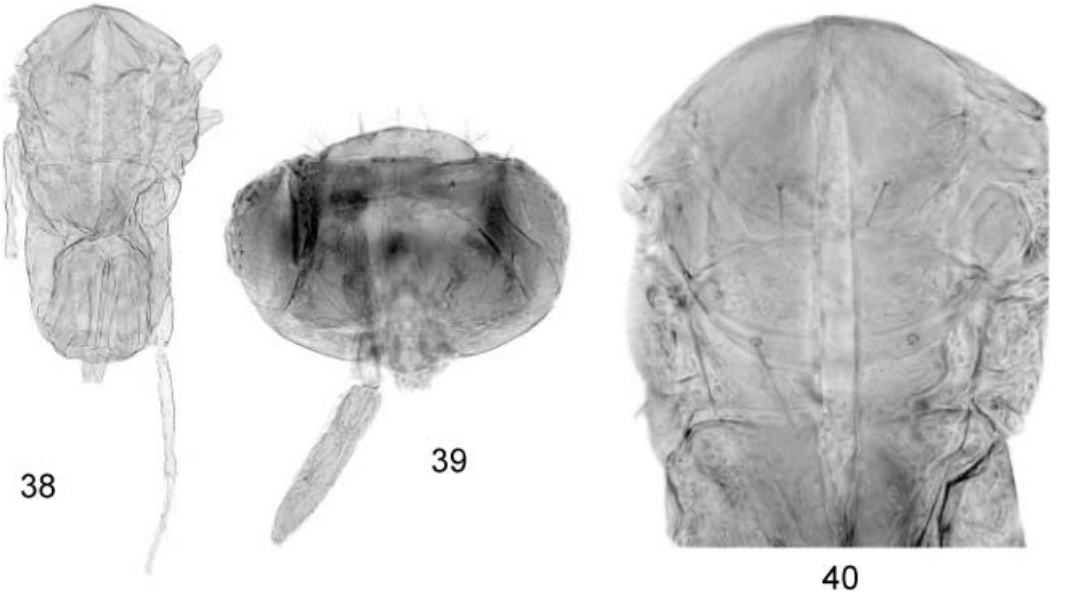
Redescription (holotype)

Female. Colour: head appearing brown. Body yellow. Antenna yellow and legs yellow.

Morphology: antennal formula 1,1,3,3. Pedicel subequal in length to F1. F1 subequal in length to F2 and F3, respectively. Midlobe of mesoscutum with four setae. Scutellar sensilla widely separated. Distance between anterior pair of scutellar setae slightly greater than between posterior pair. Tarsal formula 5-5-5. Ovipositor shorter than midtibia (0.89) and about 1.3 times as long as clava. Third valvula about 0.40 times as long as second valvifer.

Comments

The type specimen is in very poor condition and apparently has been remounted. Viggiani (1985c, p 235) provides a description of the holotype. However, all wings of the type specimen are missing and hence we cannot confirm the wing characters given by Viggiani. Moreover, the specimen differs considerably from the original description in that the whole body is completely yellow, whereas Girault describes it as similar to *E. nigriventris*, which has a dark brown gaster. Hence our investigation of the type remains inconclusive and we regard *E. ashmeadi* as a *nomen dubium*.



Figures 38–40. *Encarsia ashmeadi* (Girault), holotype female. (38) Body of type specimen. (39) Head and antenna. (40) Mesosoma and base of gaster.

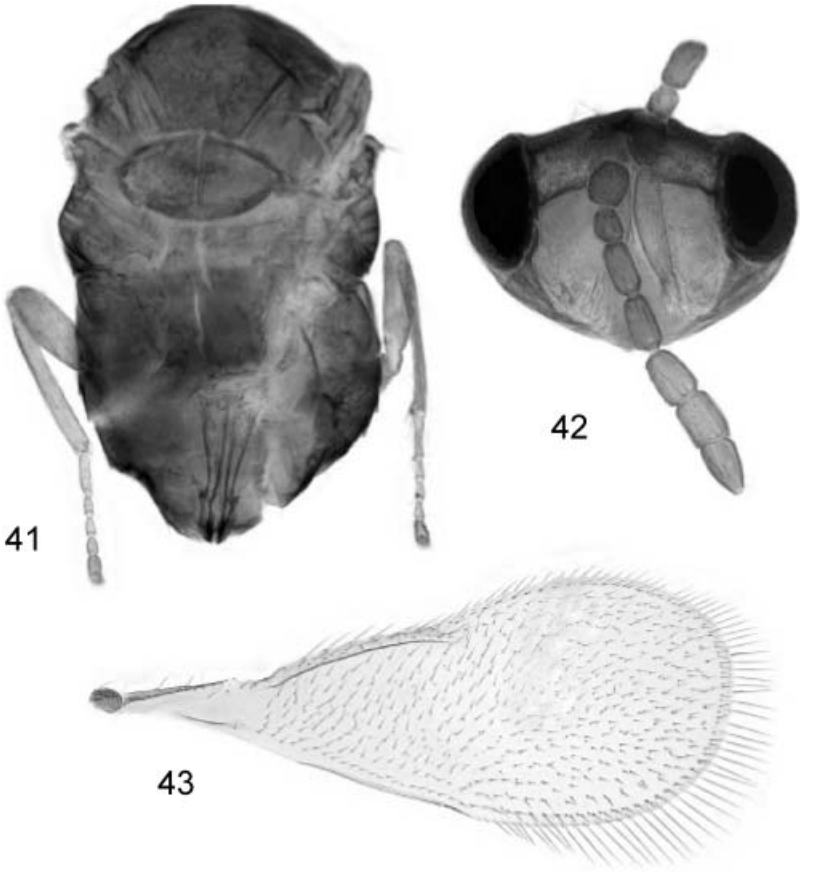
12. *Encarsia aureola* (Girault)
(Figures 41–43)

Prospaltella aureola Girault 1913[167], p 189. Lectotype ♀ [designated by Viggiani 1985c, p 237], Australia, Queensland, Brisbane (QMBA, type no. Hy. 1732, examined).
Coccophagus aureola (Girault): Girault 1915[238], p 53, 56. Change of combination.
Prospaltella aureola Girault: Compere 1931, p 11; Dahms 1983, p 76–77.
Encarsia aureola (Girault): Viggiani 1985c, p 236–237. Change of combination.

Redescription (lectotype)

Female. Colour: head and mesosoma orange-yellow, pronotum, mesoscutal midlobe anteriorly, axilla partly, mesopleuron and propodeum laterally brown. Metasoma brown. Antenna and legs dusky yellow. Fore wing hyaline.

Morphology: antennal formula 1,1,3,3. Pedicel longer than F1 (1.50). F1 only slightly longer than broad (1.15), shorter than F2 (0.60) and F3 (0.58). F2 subequal in length to F3. Midlobe of mesoscutum with eight visible setae. Scutellar sensilla rather closely placed, approximately twice the width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.5–2.6 times as long as width of disc.



Figures 41–43. *Encarsia aureola* (Girault), holotype female. (41) Body of type specimen. (42) Head and antennae. (43) Fore wing.

Marginal fringe 0.30 times as long as width of disc. Basal cell with four setae. Submarginal vein with two setae, marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to corresponding basitarsus. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, setae on T7 indiscernible. Ovipositor distinctly shorter than midtibia (0.77) and 1.13 times as long as clava. Third valvula about 0.36 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

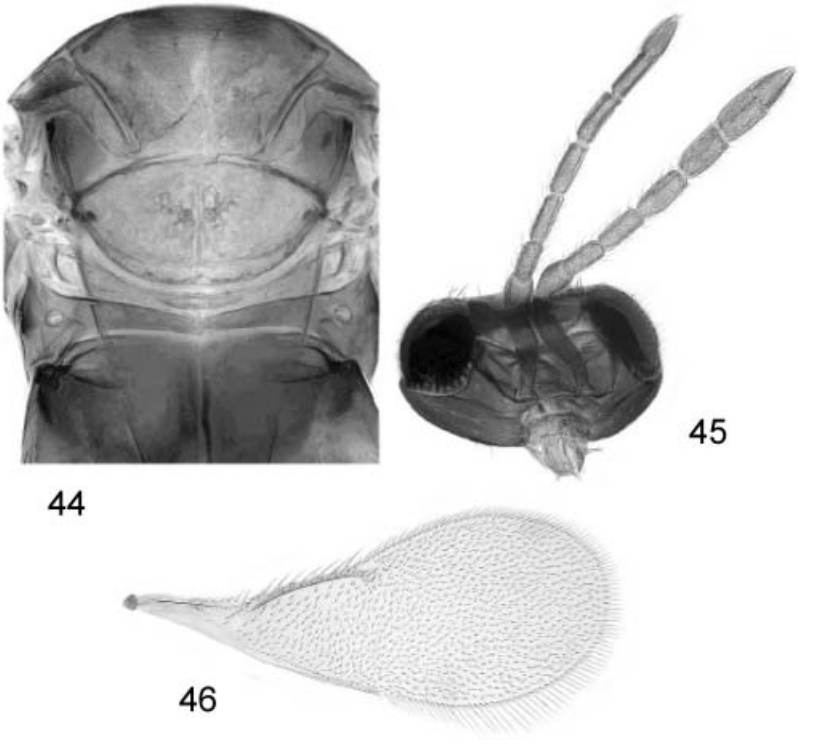
Host. Unknown.

13. ***Encarsia aurithorax*** Girault

(Figures 44–46)

Encarsia aurithorax Girault 1913[167], p 186–187. Syntypes 2♀, Australia, Queensland, Brisbane, 26 June 1913 (H. Hacker) (QMBA, type no. Hy. 1725, examined).

Encarsia aurithorax Girault: Dahms 1983, p 83; Viggiani 1985c, p 237.



Figures 44–46. *Encarsia aurithorax* (Girault), holotype female. (44) Mesosoma and base of gaster. (45) Head and antennae. (46) Fore wing.

Redescription (syntypes)

Female. Colour: head brown. Mesosoma orange-yellow except pronotum, mesoscutal midlobe anteriorly, axilla, mesopleuron, propodeum brown. Metasoma dark brown. Antenna and legs dusky yellow. Fore wing hyaline, slightly infuscate behind marginal vein, fading distally.

Morphology: antennal formula 1,1,3,3. Pedicel slightly shorter than F1 (0.90). F1 2.42–2.56 times as long as its maximum width, shorter than F2 (0.81–0.92) and F3 (0.83–0.85). F2 subequal in length to F3. Midlobe of mesoscutum with 10 setae. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.5–2.6 times as long as width of disc. Marginal setae 0.20–0.22 times as long as width of disc. Basal cell with seven or eight setae, costal cell distally with two setae. Submarginal vein with two setae, marginal vein anteriorly with 7–10 setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.61–0.64). Tergites laterally with the following numbers of setae: T1: 0, T2: 2, T3: 2, T4: 2, T5: 2–3, T6: 2–3, setae on T7 indiscernible. Ovipositor subequal in length to midtibia.

Male. Unknown

Species group placement. E. strenua group.

Distribution. Australia: Queensland.

Host. Unknown.

14. *Encarsia azimi* Hayat
(Figures 47–50)

Trichaporus indicus Azim and Shafee 1980, p 335. Holotype ♀, India, Tamil Nadu, Ootacamund, 24 June 1968 (S. A. Shafee), ex aleyrodid on *Nerium* (Apocynaceae) (ZDAMU, not examined). Preoccupied by *Prospaltella indica* Shafee 1973, p 255.

Encarsia azimi Hayat: Hayat 1986, p 160. Replacement name for *indicus* Azim and Shafee.

Encarsia azimi Hayat: Hayat 1989a, p 62; Chou et al. 1996, p 196; Huang and Polaszek 1998, p 1845–1847; Hayat 1998, p 202–203, Schmidt et al. 2001, p 376.

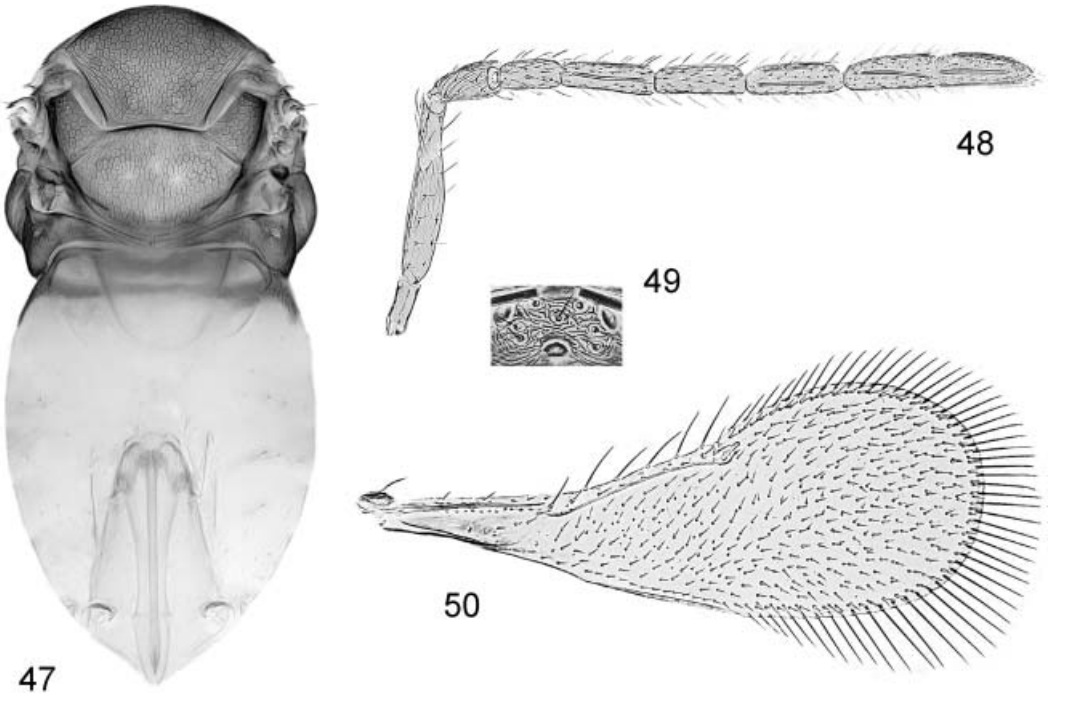
Encarsia adrianae Lopez-Avila 1987, p 425. Holotype ♀, Pakistan, Rawalpindi, April 1985, ex *Bemisia tabaci* on *Lantana camara* L. (Verbenaceae) [ex culture UK, Ascot, Silwood Park, 26 August 1986 (A. Lopez-Avila), ex *Bemisia tabaci* (BMNH, examined). Synonymy by Hayat 1998, p 202.

Encarsia adrianae Lopez-Avila: Polaszek et al. 1992, p 381; Booth and Polaszek 1996, p 72.

Diagnosis

Female. Colour: head predominantly brown, vertex and area around mouthparts lighter. Mesosoma brown. Metasoma pale yellow to white except with sharply defined narrow dark brown band at base. Antenna yellow with pedicel brown and apical segments slightly darkened. Fore wing hyaline. Legs yellow, coxae and femora slightly darkened.

Morphology: stemmaticum with rugosely strigose surface sculpture (Figure 49). Antennal formula 1,1,4,2. Pedicel longer than F1 (1.17–1.30). F1 2.00–2.30 times as



Figures 47–50. *Encarsia azimi* Hayat, female. (47) Mesosoma and gaster. (48) Antenna. (49) Stemmaticum. (50) Fore wing.

long as its maximum width, shorter than F2 (0.75–0.88) and F3 (0.63–0.79). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 2, F4: 2–3, F5: 2–3, F6: 3. Midlobe of mesoscutum with eight setae, side lobes with three setae each. Scutellar sensilla widely separated (approximately six to seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing 2.5–2.7 times as long as width of disc. Marginal fringe 0.30–0.36 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven or eight setae. Tarsal formula 5-5-5. Apical spur of midtibia shorter than half the length of the corresponding basitarsus (0.30–0.44). Tergites laterally with the following numbers of setae: T1: 0–2(–4), T2: 1–2(–3), T3: 1–2, T4: 1–2, T5: 2–3, T6: 3, T7 with 4(–5) setae. Ovipositor slightly shorter than or subequal in length to midtibia (1.91–1.00). Third valvula 0.36–0.46 times as long as second valvifer.

Male. Body brown with mesoscutal midlobe posteriorly and scutellum lighter. Legs brown, tibiae and tarsi light brown. Apical two segments of antenna fused and sensilla partly overlapping.

Species group placement. E. inaron group.

Distribution. Australia: New South Wales, Queensland, South Australia, Victoria, Western Australia. Taiwan, India, Pakistan, Japan, Italy, Spain.

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius), *Lipaleyrodes atriplex* (Froggatt), *Lipaleyrodes* sp., *Trialeurodes vaporariorum* (Westwood). The following additional hosts have been

recorded (Chou et al. 1996; Huang and Polaszek 1998): *Aleurolobus rhododendri* Takahashi, *Dialeurodes piperis* Takahashi, *Odontaleyrodes rhododendri* (Takahashi), *Parabemisia myricae* (Kuwana), *Rhachisphora fici* (Takahashi) (recorded as *Dialeurodes citri*).

Additional material examined

New South Wales: 5♀, 2♂, Narrabri, Pikes Lane, 8 February 1997 (P. De Barro), ex *Aleyrodes (=Lipaleyrodes) atriplex* on *Chenopodium trigonum* Schult. (Chenopodiaceae) (ANIC). **Queensland:** 3♀, 1♂, Ayr, 13 November 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* L. (Asteraceae) (ANIC, ZSMG); 1♀, Dalby, 17 April 1997 (D. R. Lea), ex *Bemisia tabaci* on *Gossypium hirsutum* L. (Malvaceae) (ANIC); 1♀, Warra, 25 June 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Anoda cristata* (L.) Schltdl. (Malvaceae) (ZSMG); 3♀, Mt Isa, 3 October 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* (ANIC); 3♀, Bundaberg, 18 March 1999 (G. Artlett), ex *Lipaleyrodes* sp. on *Convolvulus* sp. (Convolvulaceae) (ANIC, ZSMG); 2♀, Redland Bay, December 1998 (J. R. Hargreaves), ex *Bemisia tabaci* on *Lantana camara* L. (Verbenaceae) (ANIC, ZSMG); 1♀, Bunya Mts National Park (26°52′S, 151°35′E), 6 October 1984 (I. D. Naumann and J. C. Cardale) (ZSMG). **South Australia:** 1♀, Brookfield Cons. Park, 24 November 1992 (I. D. Naumann and J. C. Cardale) (ANIC). **Victoria:** 2♀, 2♂, Red Cliff, 28 April 1936 (ANIC). **Western Australia:** 1♀, CALM Site 4/3, 14 km S by E Kalumburu Mission (14°25′S, 126°40′E), 3–6 June 1988 (T. A. Weir), Malaise trap, closed forest (ANIC).

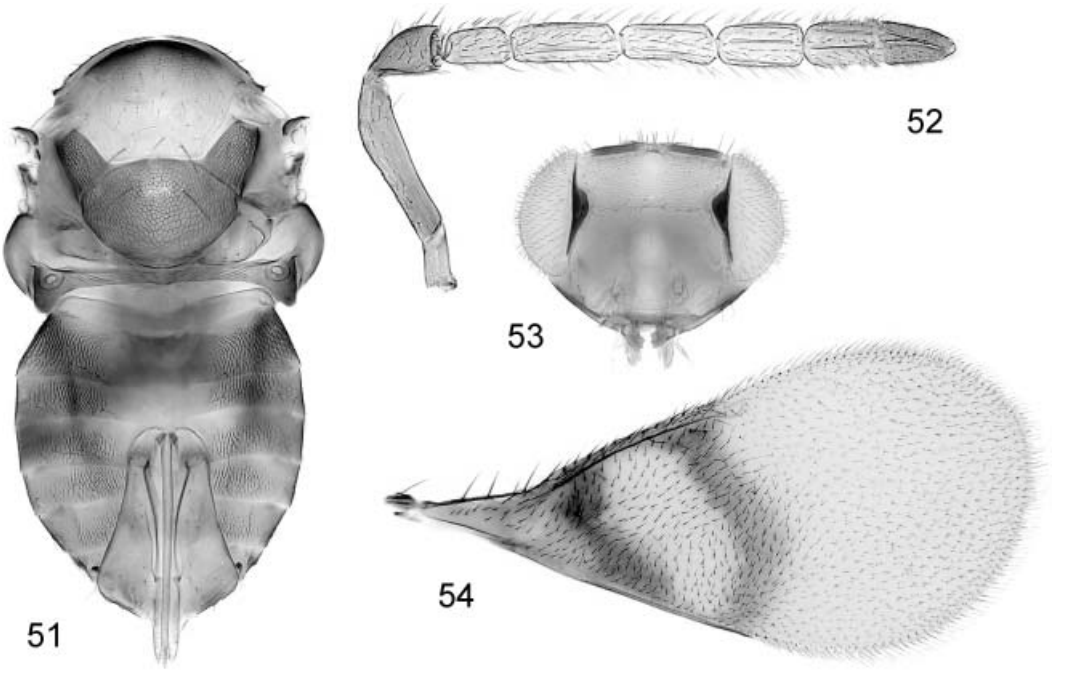
15. *Encarsia bifasciata* Schmidt and Polaszek
(Figures 51–54)

Encarsia bifasciata Schmidt and Polaszek 2007, p 86–87. Holotype ♀, Australia, Queensland, Forty Mile Scrub, 6 July 2000 (P. De Barro), ex *Aleurodicus* sp. on *Diospyros* sp. (Ebenaceae) (ANIC, examined).

Diagnosis

Female. Colour: head brown, vertex and lower face paler, or pale and malar space and central area more or less brown (Figure 53). Mesosoma brown except mesoscutum anteriorly brown, and metanotum paler. Metasoma brown. Antenna yellow, radicle, pedicel, scape, and clava more or less brown. Fore wing with two narrow dark bands behind marginal vein and base of wing brown. Legs yellow except coxae and base of femur brown.

Morphology: stemmaticum with rugosely strigose surface sculpture. Maxillary palp two-segmented. Antennal formula 1,1,4,2. F1–F5 cylindrical, F6 conical and slightly shorter than or subequal in length to preapical segment. Pedicel subequal in length to or slightly longer than F1 (1.00–1.28). F1 1.47–1.81 times as long as its maximum width, distinctly shorter than F2 (0.54–0.59) and F3 (0.58–0.65). F2 slightly longer than F3 (1.08–1.10). Flagellomeres with the following numbers of longitudinal sensilla: F1: 0, F2: 3, F4: 3, F4: 3–4, F5: 4–5, F6: 3. Midlobe of mesoscutum with about 50–70 setae, side lobes with three setae each. Posterior pair and lateral setae of mesoscutal midlobe larger than remaining setae of scutellum. Scutellum with distinct reticulate surface sculpture. Scutellar sensilla separated by approximately two to four times the maximum width of a sensillum. Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing 2.1 times as long as width of disc. Basal cell with 17–23 setae. Longest setae of



Figures 51–54. *Encarsia bifasciata* Schmidt and Polaszek, female. (51) Mesosoma and gaster. (52) Antenna. (53) Head. (54) Fore wing.

marginal fringe slightly less than one-tenth width of disc. Submarginal vein with three to four setae, marginal vein anteriorly with 10–15 setae. Upper wing surface with several long, downward pointing setae below marginal vein. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.72–0.73). Basitarsus of middle leg ventrally with stout setae with distinct bases. Metasoma with distinct longitudinally strigose surface sculpture. Tergites on each side with the following numbers of setae: T1: 3–4, T2: 4–7, T3: 5–6, T4: 5–6, T5: 2–7, T6: 3, T7 with three to four setae. Ovipositor subequal in length to midtibia (1.03–1.07). Third valvula very narrow, in addition to several apical setae with six to nine pairs of setae, some of them in its basal half, 0.50 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Aleurodicus* sp.

Additional material examined

Queensland: 3♀, same location and collector as holotype, but ex *Aleurodicus* sp. on *Diospyros* sp. (1♀ BMNH) and ex hard-bodied whitefly pupae on rainforest plant (ANIC, ZSMG).

16. *Encarsia bimaculata* Heraty and Polaszek
(Figures 55–58)

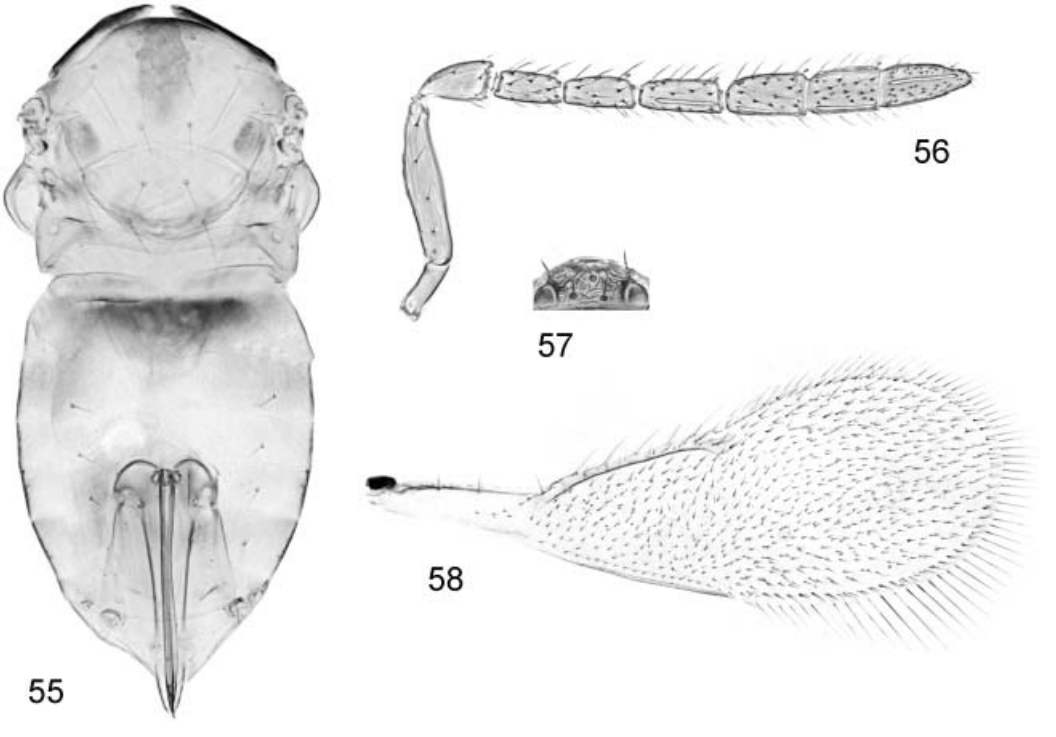
Encarsia bimaculata Heraty and Polaszek 2000, p 155–157. Holotype ♀, India, Tabarbhani 19 July 1994 [ex culture Gainesville, Florida, R. Nguyen, autoparasitoid, M92018] (USNM, examined).

Encarsia bimaculata Heraty and Polaszek: Schmidt et al. 2001, p 376–377.

Diagnosis

Female. Colour: mainly yellow except pronotum, a large anteromedial patch on middle lobe of mesoscutum, axillae, mesopleuron, propodeum, and petiole more or less brown. Head yellow with a transverse brown band. Metasoma mostly yellow except brown at base and occasionally with a faint brown patch on T4 and T5, or tergites more or less brown and petiole, T1, T3, and T4 basally with indistinct transverse brown band. Fore wing hyaline, slightly infuscate near base of marginal vein.

Morphology: stemmaticum with transversely strigose surface sculpture (Figure 57). Antennal formula 1,1,3,3. Pedicel slightly longer than F1 (1.05–1.21). F1 2.00–2.30 times as long as its maximum width, shorter than or subequal in length to F2 (0.79–1.00) and shorter than F3 (0.75–0.95). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 2, F4: 1–2, F5: 2–3, F6: 2. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum or less. Distance between anterior pair of



Figures 55–58. *Encarsia bimaculata* Heraty and Polaszek, female. (55) Mesosoma and gaster. (56) Antenna. (57) Stemmaticum. (58) Fore wing.

scutellar setae distinctly smaller than between posterior pair. Fore wing 2.6–2.9 times as long as width of disc. Marginal fringe 0.35–0.42 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with five or six setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.60–0.68). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.17–1.27) and 1.40–1.80 times as long as clava. Third valvula 0.32–0.38 times as long as second valvifer.

Male. Colour pattern similar to female but darker. Head with a dark transverse band. Apical two segments of flagellum fused.

Species group placement. E. strenua group.

Distribution. Australia: Australian Capital Territory, Northern Territory, Queensland, South Australia, Victoria. China, India, Philippines, Thailand, Indonesia, Papua New Guinea. USA (Florida, Texas?). Sudan, Mexico, Israel (possibly culture contaminations (Heraty and Polaszek 2000)).

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius), *Trialeurodes vaporariorum* (Westwood). The following host has been recorded (Heraty and Polaszek 2000): *B. argentifolii* Bellows and Perring.

Additional material examined

Australian Capital Territory: 1♀, 1♂, Canberra, 4 December 1996 (P. De Barro), ex *Bemisia tabaci* (non B-biotype) on *Euphorbia* sp. (Euphorbiaceae) (ANIC). **Northern Territory:** 6♀, 1♂, Darwin, 27 September 1996 (P. De Barro), ex *Bemisia tabaci* (ANIC); 4♀, Darwin, 25 October 1995 (P. De Barro), ex *Bemisia tabaci* on poinsettia (Euphorbiaceae) (ANIC). **Queensland:** 1♀, Cairns, 30 September 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* L. (Asteraceae) (ANIC); 1♀, Cairns, April 1999 (P. Garland) (ANIC); 1♀, Mt Isa, 3 October 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus*; 1♀, Townsville, 18 March 1997 (B. A. Franzmann), ex *Bemisia tabaci* on *Emilia sonchifolia* (L.) DC. (Asteraceae) (ANIC); 1♀, Townsville, 4 October 1996 (P. De Barro), ex *Bemisia tabaci* on *Hibiscus* sp. (Malvaceae) (ANIC); 2♀, Ayr, March 1997 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* (ANIC); 2♀, Bundaberg, ex *Bemisia tabaci* on *Euphorbia cyathophora* Murray (Euphorbiaceae) to laboratory culture (ANIC); 4♀, Mt Isa, 3 October 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* (ANIC). **South Australia:** 3♀, Teatree Gully, 25 October 1958 (R. V. Southcott) (BMNH). **Victoria:** 1♀, Red Cliffs, 2 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus* (ANIC). **Indonesia:** 1♀, West Java, Karawang, 14 September 1999 (A. Rauf), ex *Bemisia tabaci* on *Glycine max* Merrill. (Fabaceae) (ANIC). **Papua New Guinea:** 1♀, 1♂, Port Moresby, 27 April 1997 (P. De Barro), ex *Bemisia tabaci* on *Euphorbia heterophylla* L. (Euphorbiaceae) (ANIC).

Comments

Encarsia bimaculata has a distinctive colour pattern that is unique among the species of the *E. strenua* group, in particular the dark mesosomal colour pattern, although this is

sometimes very faint. The other species of the *E. strenua* group present in Australia are almost completely yellow (*E. protransvena*, *E. oakeyensis*, and *E. sophia*) or predominantly brown (*E. ustulata*).

17. *Encarsia boswelli* (Girault)

(Figures 59–62)

Coccophagus boswelli Girault 1915[238], p 49. Holotype ♀, Australia, Queensland, Cooktown (QMBA, type no. T. 2929, examined).

Coccophagus filius Girault 1915[238], p 48. Holotype ♀, Australia, Queensland, Gordonvale (Cairns) (QMBA, type no. T. 2924, examined). Synonymy by Polaszek and Hayat 1990, p 1.

Coccophagus boswelli Girault: Dahms 1983, p 145.

Prospaltella boswelli (Girault): Viggiani 1985c, p 237.

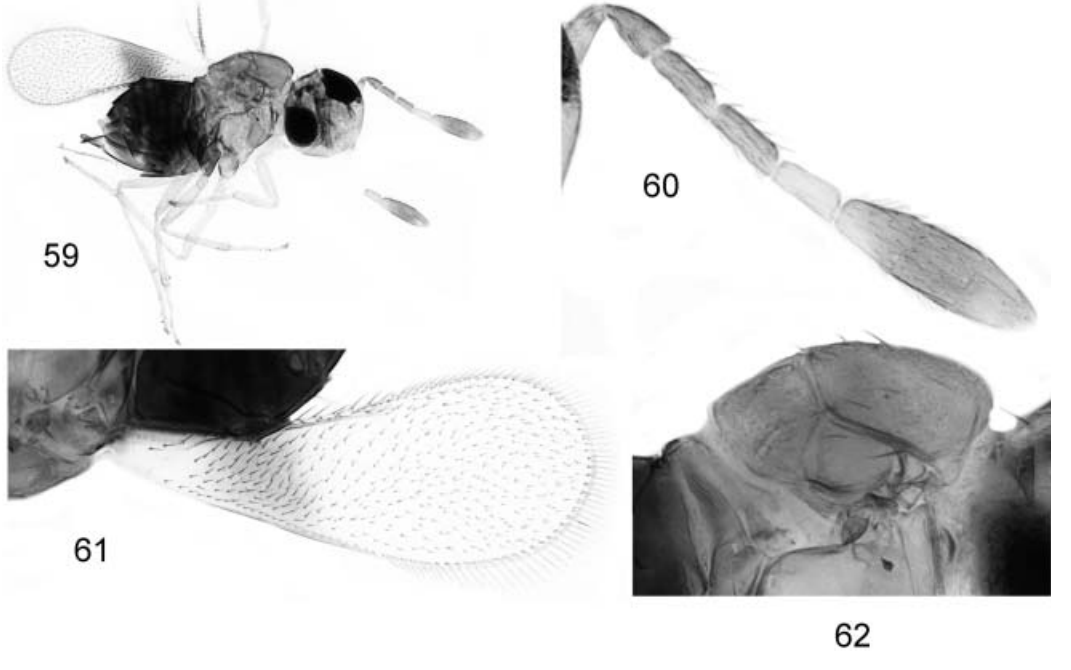
Dirphys boswelli (Girault): Hayat 1989b, p 288. Polaszek and Hayat 1990, p 1.

Encarsiella boswelli (Girault) Polaszek and Hayat 1992, p 181; Huang and Polaszek 1996, p 1652.

Encarsia boswelli (Girault): Schmidt and Polaszek 2007, p 81.

Diagnosis

Female. Colour: head brown. Mesosoma brown, metasoma dark brown. Antenna with radicle, scape, pedicel, and first and second funicle segments pale brown, contrasting with white third funicle; clava dark brown, paler at each end. Fore wing infuscate below marginal vein. Legs yellow-white except hind coxa which is dark brown.



Figures 59–62. *Encarsia boswelli* (Girault), holotype female. (59) Overall view of type specimen. (60) Antenna. (61) Fore wing. (62) Mesoscutum in lateral view.

Morphology [measurements of holotype in square brackets]: maxillary palp two-segmented. Antennal formula 1,1,3,3, clava very distinct. Pedicel slightly shorter than F1 (0.84–0.88) [0.84]. F1 (2.46–2.67) [2.67] times as long as its maximum width, subequal in length to F2 and F3. Flagellomeres with the following numbers of sensilla: F1: 2, F2: 2, F3: 2, F4: 3–4, F5: 4–5, F6: 4–5 and with sensory area. F1–F3 cylindrical and similar in shape and size, F4 conical and subequal in length to preapical and apical segment. Midlobe of mesoscutum with about 6–14 setae, side lobes with two to three setae each. Scutellar sensilla separated by approximately five times the maximum width of a sensillum. Distance between anterior pair of scutellar setae smaller than distance between posterior. Fore wing 2.7 times as long as width of disc. Basal cell with two to five setae. Submarginal vein with two setae, marginal vein anteriorly with 7–11 setae. Longest setae of marginal fringe 0.22–0.23 [0.22] times as long as width of disc. Apical spur of midtibia slightly longer than half the length of the corresponding basitarsus (0.59–0.64) [0.64]. Basitarsus of middle leg ventrally with stout setae. Tergites on each side with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. Ovipositor longer than midtibia (1.13–1.23) [1.23] and two times as long as clava. Third valvula about 0.36 times as long as second valvifer.

Male. No males of the species were collected in the study area. For a description of *E. boswelli* males from elsewhere see Polaszek and Hayat (1990, p 3).

Species group placement. E. boswelli group.

Distribution. Australia: Queensland. Palaeotropical.

Host. Not reared in the study area, but elsewhere the species has been reared from the following hosts (Polaszek and Hayat 1990, 1992): Heteroptera: Plataspidae (eggs): *Brachyplatys vahlii* (F.), *Megacopta cribraria* (F.).

Comments

Unlike all other known *Encarsia* species, which have a three-toothed mandible, the mandible of *E. boswelli* has four teeth. This species is also unusual for an *Encarsia* because it is an egg parasitoid of black stink bugs (Heteroptera: Plataspidae), and it is the only known obligatory egg parasitoid in the Coccophaginae (Polaszek 1991), except for males of *E. porteri* which develop in eggs of Lepidoptera (Hunter et al. 1996). The generic placement of *E. boswelli* has long been debated and it has only recently been placed in *Encarsia* as part of a revisionary treatment of the *Encarsia noyesi* species group (formerly *Encarsiella*) based on molecular and morphological evidence (Schmidt and Polaszek 2007).

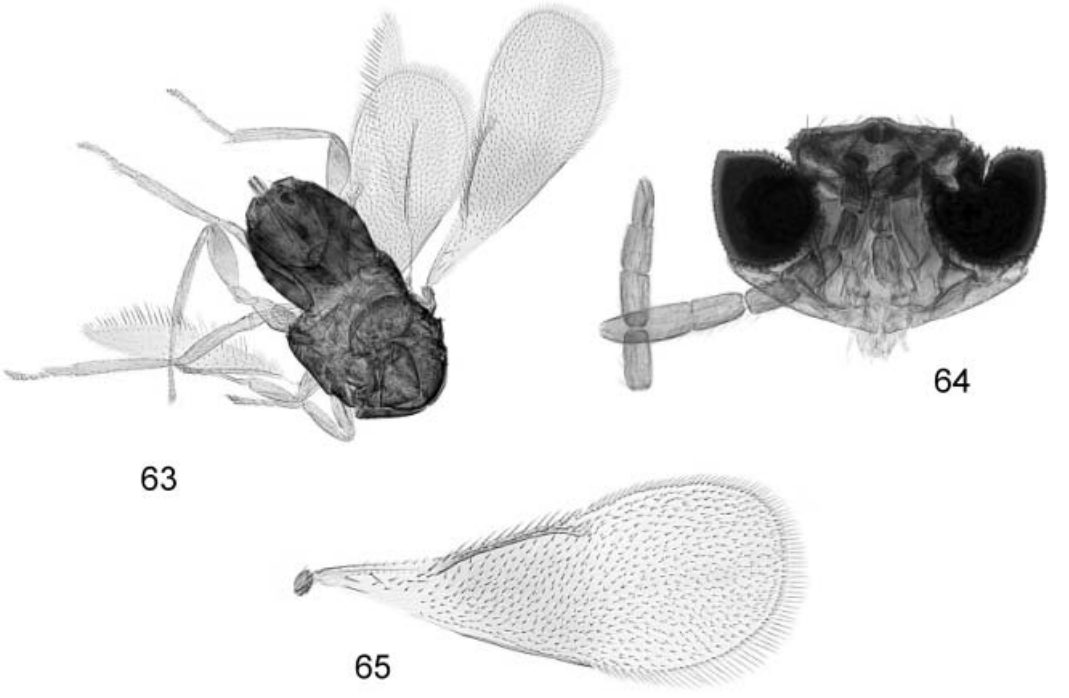
18. *Encarsia brahmsi* (Girault)

(Figures 63–65)

Coccophagus brahmsi Girault 1933[440], p 2[305]. Holotype ♀, Australia, Queensland, Indooroopilly (QMBA, type no. T. 8691, examined).

Coccophagus brahmsi Girault: Dahms 1983, p 148.

Encarsia brahmsi (Girault): Hayat 1989b, p 289. Change of combination.



Figures 63–65. *Encarsia brahmsi* (Girault), holotype female. (63) Body of type specimen. (64) Head and antennae. (65) Fore wing.

Redescription (holotype)

Female. Colour: head and body brown. Metasoma dark brown. Antenna yellow-brown. Fore wing with slight infuscation behind marginal vein. Legs yellow, hind coxa partly brown.

Morphology: maxillary palp two-segmented. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.3). F1 1.9 times as long as its maximum width, shorter than F2 (0.77) and F3 (0.71). F2 subequal in length to F3. Scutellar sensilla widely separated from each other. Fore wing about 2.5 times as long as width of disc. Marginal fringe 0.18 times as long as width of disc. Basal cell with nine setae. Submarginal vein with two setae, marginal vein anteriorly with nine setae. Tarsal formula 5-5-5. Ovipositor shorter than midtibia (0.87), about 1.2 times as long as clava. Third valvula 0.27 times as long as second valvifer.

Male. Unknown.

Species group placement. E. aurantii group.

Distribution. Australia: Queensland.

Host. Unknown.

19. *Encarsia brimblecombei* (Girault)
(Figures 66–69)

Prospaltella aurantii (Howard): Silvestri 1929, p 902; 1931b, p 49–51. Misidentification, discovered by Huang and Polaszek 1998: 1869.

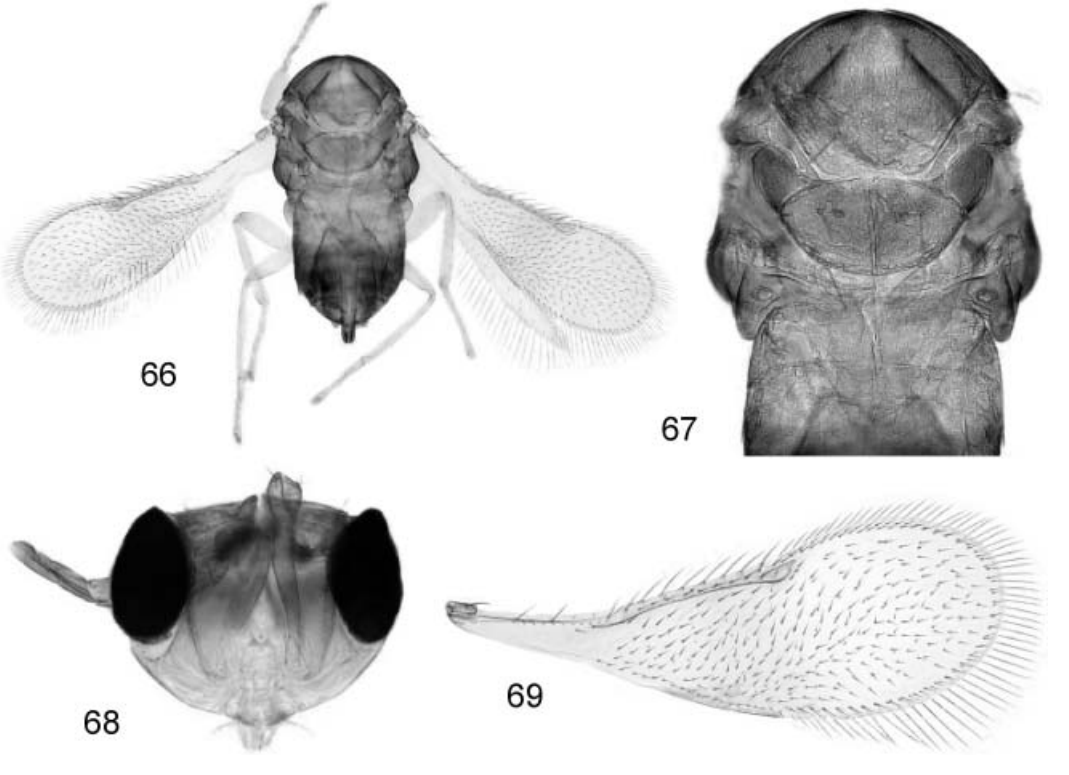
Coccophagus brimblecombei Girault 1933[440], p 4. Lectotype ♀, here designated, Australia, Forest Hill, March (A. R. Brimblecombe), ex *Chionaspis citri* (QMBA, type no. T. 8696, examined). Paralectotype 1♀, same data as lectotype. The lectotype is the specimen in the centre of the slide with the head attached to the body.

Coccophagus herndoni Girault 1935[445], p 3. Name proposed by Girault for material misidentified by Silvestri. Syntypes ♀, China, Foochow [Fuzhou], Changsha, Soochow [Suzhou] (DEUN, examined). Synonymy with *elongata* by Hayat 1989a, p 47–48. Hayat (1989a, p 48) regarded the name as not available because it was not accompanied by the selection and designation of a type. However, a type is not required by the *International Code of Zoological Nomenclature* for a name to be available (International Commission on Zoological Nomenclature (ICZN) 1999). **Syn. nov.**

Prospaltella elongata Dozier 1937, p 128–129. Holotype ♀, USA, New Orleans, 6 January 1926 (H. L. Dozier), ex *Lepidosaphes gloverii* (Packard) on *Euonymus* shrub (USNM, examined). Synonymy with *herndoni* by De Santis (1979). **Syn. nov.**

Prospaltella elongata Dozier: Compere 1961, p 267.

Prospaltella herndoni (Girault): De Santis 1979, p 133–136.



Figures 66–69. *Encarsia brimblecombei* (Girault), holotype female. (66) Body of type specimen. (67) Mesosoma and base of gaster. (68) Head and antennae. (69) Fore wing.

Coccophagus brimblecombei Girault: Dahms 1983, p 152.
Encarsia brimblecombei (Girault): Viggiani 1985c, p 238. Change of combination.
Encarsia herndoni (Girault): Viggiani 1986, p 64–66; Viggiani 1987b, p 147–149; Viggiani and Ren 1993, p 227.
Encarsia elongata (Dozier): Hayat 1989a, p 47–48; Hayat 1998, p 227–228; Huang 1994, p 215; Huang and Polaszek 1998, p 1869.

Diagnosis

Female. Colour: head yellow, face with transverse brown band. Mesosoma yellow except pronotum, mesoscutum anteriorly, axilla, mesopleuron and propodeum laterally brown. Gaster brown, T1–T3 (T4) and T7 yellow. Third valvula brown. Wings hyaline, fore wing slightly infuscate behind marginal vein. Legs yellow except hind coxa partly brown. Antenna brown.

Morphology [measurements of holotype in square brackets]: antennal formula 1,1,3,3. Pedicel distinctly longer than F1. F1 as long as its maximum width, slightly triangular, dorsal surface shorter than ventral surface. Scutellar sensilla distantly placed (approximately six times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than distance between posterior pair. Fore wing 2.7–2.8 [2.7] times as long as width of disc. Marginal fringe 0.37–0.44 [0.37] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with two setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus [0.82]. Tergites laterally with the following numbers of setae: T1: 0, T2: 2, T3: 2, T4: 2, following segments indiscernible. Ovipositor subequal in length to midtibia. Third valvula about 0.4 times as long as second valvifer.

Male. Unknown.

Species group placement. E. aurantii group.

Distribution. Australia: Queensland. China, India, Italy, Spain, USA, Puerto Rico.

Host. Diaspididae: *Chionaspis citri* (Comstock). The following additional hosts have been recorded (Huang and Polaszek 1998): *Aonidiella aurantii* (Maskell), *Chrysomphalus aonidum* (L.), *Cornuaspis beckii* (Newman), *C. gloverii* (Packard), *Fiorinia theae* Green, *Parlatoria zizyphi* Lucas.

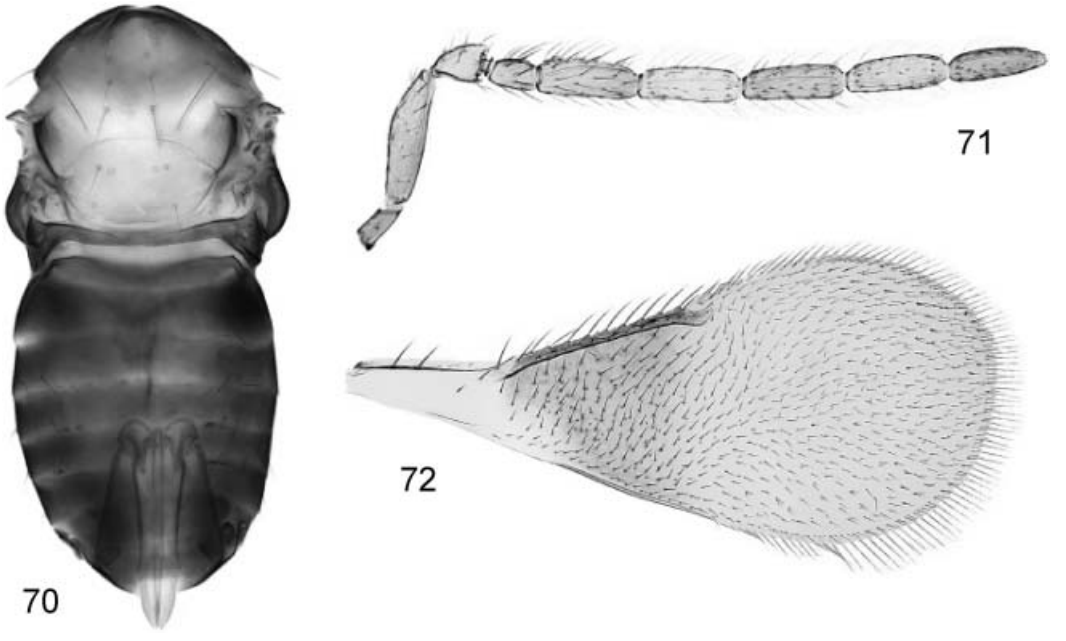
Comments

Encarsia brimblecombei is a widespread parasitoid of armoured scale insects (Diaspididae) and has previously been recorded (as *E. elongata*) in the Oriental region from India and China.

20. *Encarsia bunyae* n. sp.
(Figures 70–72)

Description

Female. Colour: head light brown except vertex posteriorly with dark bar, postgena, gena, malar space, and area around mouth brown. Mesosoma brown except mesoscutum



Figures 70–72. *Encarsia bunyae* n. sp., female. (70) Mesosoma and gaster. (71) Antenna. (72) Fore wing.

posteriorly, scutellum and metanotum lighter. Gaster brown except apex pale. Antenna light brown, apical segment slightly darker. Fore wing with dark band behind marginal vein. Legs pale except mid and hind coxae and hind femur brown.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,6,0, i.e. clava not defined. Pedicel longer than F1 (1.42–1.44). F1 1.39–1.50 times as long as its maximum width, distinctly shorter than F2 (0.40–0.44) and F3 (0.41–0.47). F2 subequal in length to F3. Antenna very slender, F2 and F3 each about three times as long as their maximum width. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2–3, F3:3–4, F4: 3, F5: 4–5, F6: 3–4. Midlobe of mesoscutum with (9–)10(–11) setae, side lobes with two setae each. Scutellar sensilla widely separated (approximately five times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than distance between posterior pair. Fore wing 2.3–2.5 times as long as width of disc. Marginal fringe 0.17–0.23 times as long as width of disc. Basal cell with two setae. Submarginal vein with two setae, marginal vein anteriorly with six or seven setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly longer than half the length of the corresponding basitarsus (0.60–0.68). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 2–4(–5), T4: 3–4(–7), T5: 4–8, T6: 4–5(–8), T7 with four setae. Ovipositor 1.23–1.30 times as long as midtibia. Third valvula 0.40–0.43 times as long as second valvifer.

Male. Unknown.

Species group placement. E. smithi group.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Aleurocanthus* sp.

Material examined

Queensland: Holotype: ♀, Bunya Mountains, 22 February 1997 (P. De Barro), ex *Aleurocanthus* sp. on *Ficus* sp. (Moraceae) (ANIC). Paratypes: 4♀, same data as holotype (ANIC, ZSMG).

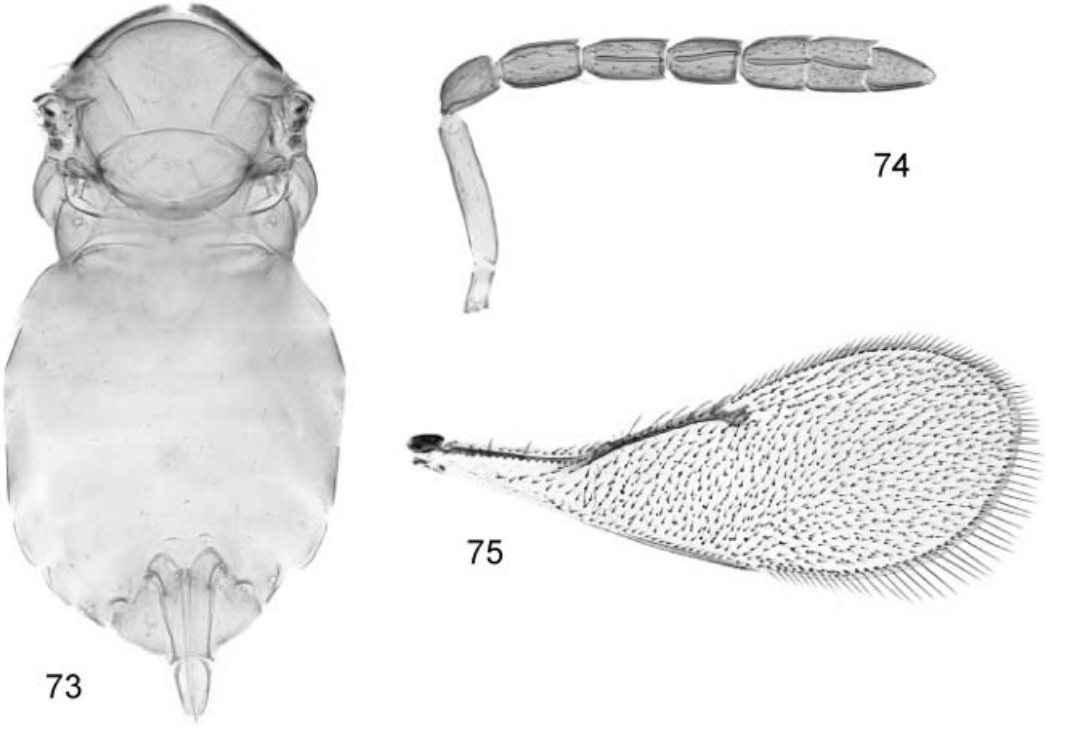
Comments

Encarsia bunyae is similar to *E. smithi* but can be separated by the weak sculpture of the propodeum, whereas the propodeum of *E. smithi* is distinctly reticulate. *Encarsia smithi* has not been recorded from Australia but was found by W. Liebregts on Truk Islands (Federated States of Micronesia) as a parasitoid of a black whitefly (possibly citrus blackfly, *Aleurocanthus woglumi* Ashby) on *Citrus aurantiifolia*.

21. ***Encarsia capensis*** n. sp.
(Figures 73–75)

Description

Female. Colour: head yellow, posterior head with faint brown transverse band, stemmaticum with three small brown spots adjacent to ocelli. Body yellow except pronotum, mesoscutal midlobe anteriorly, and axillae anteriorly slightly brown. Fore wing hyaline. Legs yellow.



Figures 73–75. *Encarsia capensis* n. sp., female. (73) Mesosoma and gaster. (74) Antenna. (75) Fore wing.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose surface sculpture. Antennal formula 1,1,3,3. Pedicel shorter than F1 (0.86–0.87) [0.86]. F1 2.0–2.14 [2.0] times as long as broad, subequal in length to F2 and slightly longer than F3 (1.07–1.10) [1.10]. Flagellomeres with the following numbers of sensilla: F1: 1–2, F2: 3, F3: 3, F4: 3, F5: 3, F6: 2–3. Midlobe of mesoscutum with 10 setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla very close together, separated by a distance of less than half the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.4–2.5 [2.4] times as long as width of disc, evenly and densely setose. Marginal fringe 0.19–0.21 [0.19] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with 8–11 setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.73–0.77) [0.77]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor distinctly shorter than midtibia (0.77–0.85) [0.77] and 1.34–1.39 [1.39] times as long as clava. Third valvula 0.51–0.53 [0.51] times as long as second valvifer.

Male. Unknown.

Species group placement. E. strenua group.

Distribution. Australia: Western Australia.

Host. Unknown.

Material examined

Western Australia: Holotype: ♀, Cape Arid National Park, Yokinup Bay area, 31 December 1986 to 3 January 1987 (J. S. Noyes) (ANIC); 1♀, same data as holotype (BMNH).

Comments

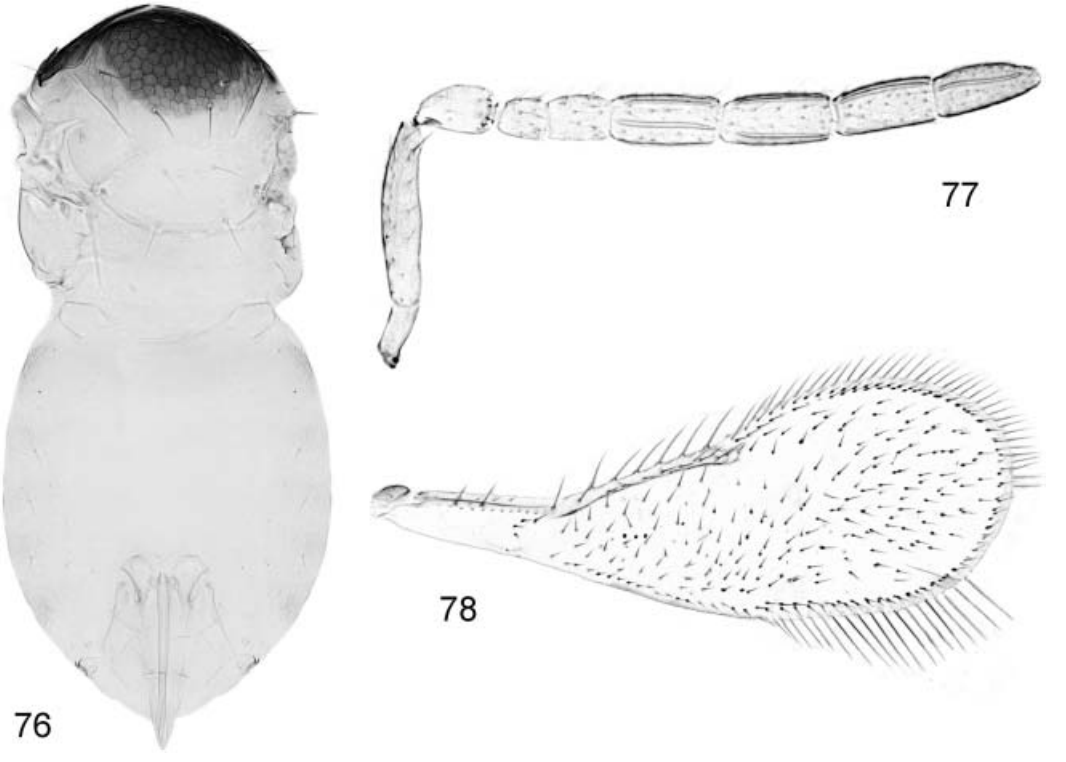
The species can be separated from other members of the *strenua* group by its relatively short ovipositor.

22. *Encarsia cappa* n. sp.
(Figures 76–78)

Description (holotype)

Female. Colour: head (except antennae) and anterior part of mesonotum dark brown, remaining body pale yellow. Fore wing hyaline.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,3,3, clava not very distinct. Pedicel longer than F1 (1.57). F1 subquadrate, shorter than F2 (0.70) and F3 (0.41). F2 only slightly longer than half the length of F3 (0.56). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 3, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with 4+1 setae, side lobes with two setae each. Scutellar sensilla



Figures 76–78. *Encarsia cappa* n. sp., holotype female. (76) Mesosoma and gaster. (77) Antenna. (78) Fore wing.

separated by a distance of approximately the maximum width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.6 times as long as width of disc. Marginal fringe 0.33 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with four setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly longer than half the length of the corresponding basitarsus (0.58). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with five setae. Ovipositor subequal in length to midtibia and to clava. Third valvula 0.61 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Unknown.

Material examined

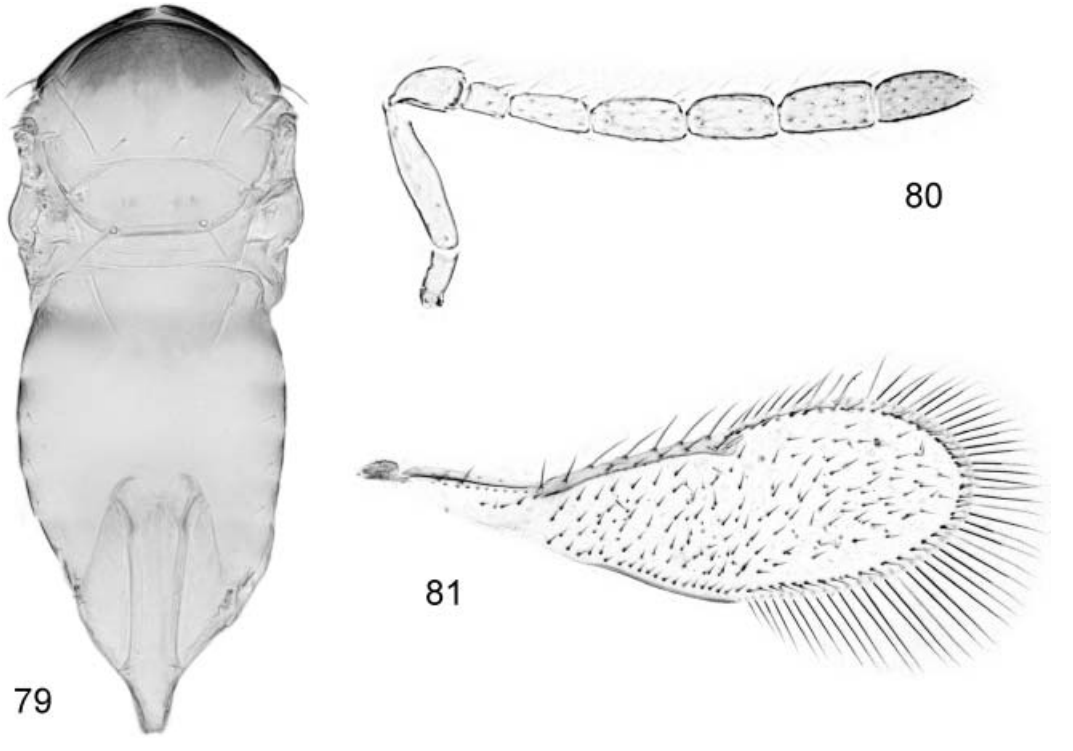
Queensland: Holotype: ♀, Cockatoo Crk. Xing, 17 km NW Heathlands, 25 April to 7 June 1992 (T. McLeod), open forest, Malaise #5 (ANIC).

23. ***Encarsia cassida*** n. sp.
(Figures 79–81)

Description (holotype)

Female. Colour: head brown. Mesosoma yellow except pronotum and anterior half of mesoscutellar midlobe brown. Antenna yellow except apical segment brown. Fore wing hyaline. Legs yellow. Metasoma yellow except T1 with transverse brown band and following tergites laterally with faint brown patches.

Morphology: antennal formula 1,1,4,2. Pedicel longer than F1 (1.57). F1 1.55 times longer than its maximum width, shorter than F2 (0.54) and F3 (0.47). F2 slightly shorter than F3 (0.87). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 2, F4: 3, F5: 3, F6: 3. Mid lobe of mesoscutum with two pairs of setae, side lobes with two setae each. Scutellar sensilla separated by approximately five times the maximum width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair, anterior setae minute, less than two times the maximum diameter of a sensillum. Fore wing 3.0 times longer than width of disc, with sparsely setose area near anterior margin proximal of stigmal vein. Marginal fringe 0.57 times as long as width of disc. Basal cell with four setae. Submarginal vein with two setae, marginal vein anteriorly with five setae. Tarsal formula 5-5-5. Apical spur of midtibia about half as long as the corresponding basitarsus (0.57). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. Ovipositor longer than midtibia (1.50) and 2.37 times



Figures 79–81. *Encarsia cassida* n. sp., holotype female. (79) Mesosoma and gaster. (80) Antenna. (81) Fore wing.

longer than clava. Third valvula apically truncate, external sides concave, 0.38 times as long as second valvifer.

Male. Unknown.

Species-group placement. E. longifasciata group (as defined by Pedata and Polaszek 2003).

Distribution. Australia: Queensland.

Host. Unknown.

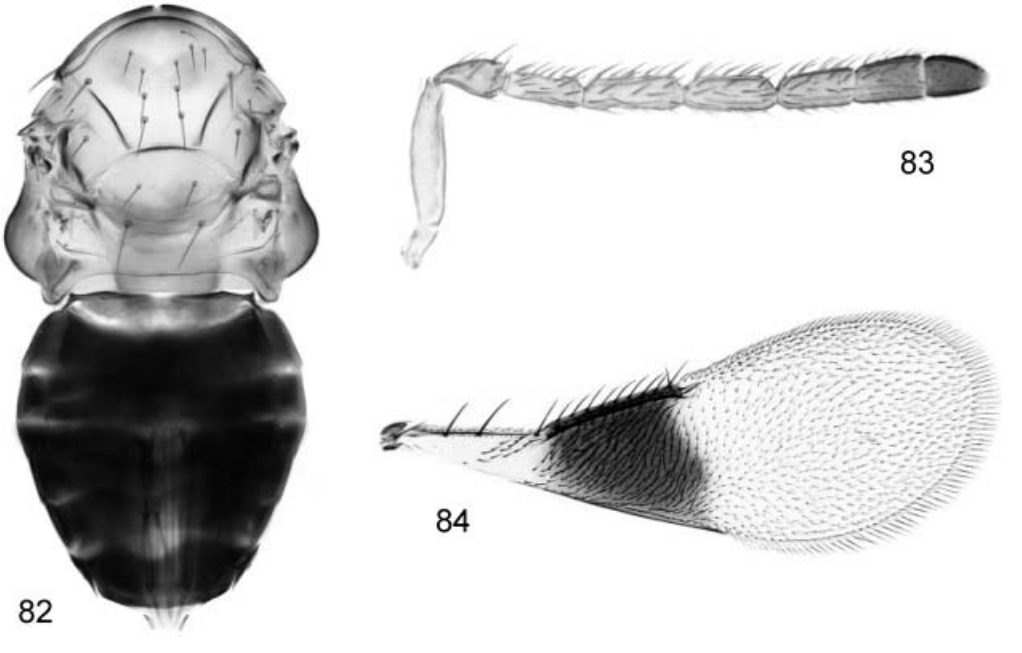
Material examined

Queensland: Holotype: ♀, SE Queensland Heathlands (11°45′S, 142°35′E) 25 January to 29 February 1992 (R. Feehney), Malaise #1 barracks (ANIC).

24. ***Encarsia chaetogastra*** n. sp.
(Figures 82–84)

Description

Female. Colour: head yellow, face with transverse brown band between eyes. Mesosoma yellow except pronotum, mesoscutal midlobe anteromedially, mesoscutal side lobes anteriorly, axilla laterally, mesepimeron, and propodeum laterally brown. Metasoma dark



Figures 82–84. *Encarsia chaetogastra* n. sp., female. (82) Mesosoma and gaster. (83) Antenna. (84) Fore wing.

brown except at extreme apex pale. Antenna yellow except F5 (mostly) and F6 brown. Fore wing hyaline with distinct dark band behind marginal vein. Legs yellow.

Morphology: stemmaticum with evenly reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel shorter than F1 (0.80–0.83). F1 2.4–2.5 times as long as its maximum width, slightly shorter than F2 (0.86–0.90) and F3 (0.94–0.97). F2 and F3 subequal in length. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1–2, F3: 1–2, F4: 2–3, F5: 2–3, F6: 2. Midlobe of mesoscutum with 10–12 setae, posterior and anterolateral pair of setae stronger than remaining setae on mesoscutal midlobe. Side lobes with three setae each. Scutellar sensilla separated by a distance of two to three times the maximum width of a sensillum. Distance between anterior pair of scutellar setae greater than distance between posterior pair. Fore wing 2.6–2.8 times as long as width of disc. Marginal fringe 0.14–0.17 times as long as width of disc. Basal cell with seven or eight setae. Submarginal vein with two setae and at its proximal end with a single long seta, marginal vein anteriorly with nine setae. Marginal vein at its proximal end with a single long seta. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus (0.79–0.86), the latter with row of six or seven strong pegs. T5 medially with a pair of very long setae reaching back as far as base of T7. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 1 (except long medial setae), T6: 2, T7 with four setae. Ovipositor shorter than midtibia (0.8). Third valvula very short, 0.2 times as long as second valvifer.

Male. Unknown.

Species group placement. Tentatively placed in *E. elegans* group.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Dumbletoniella* sp.

Material examined

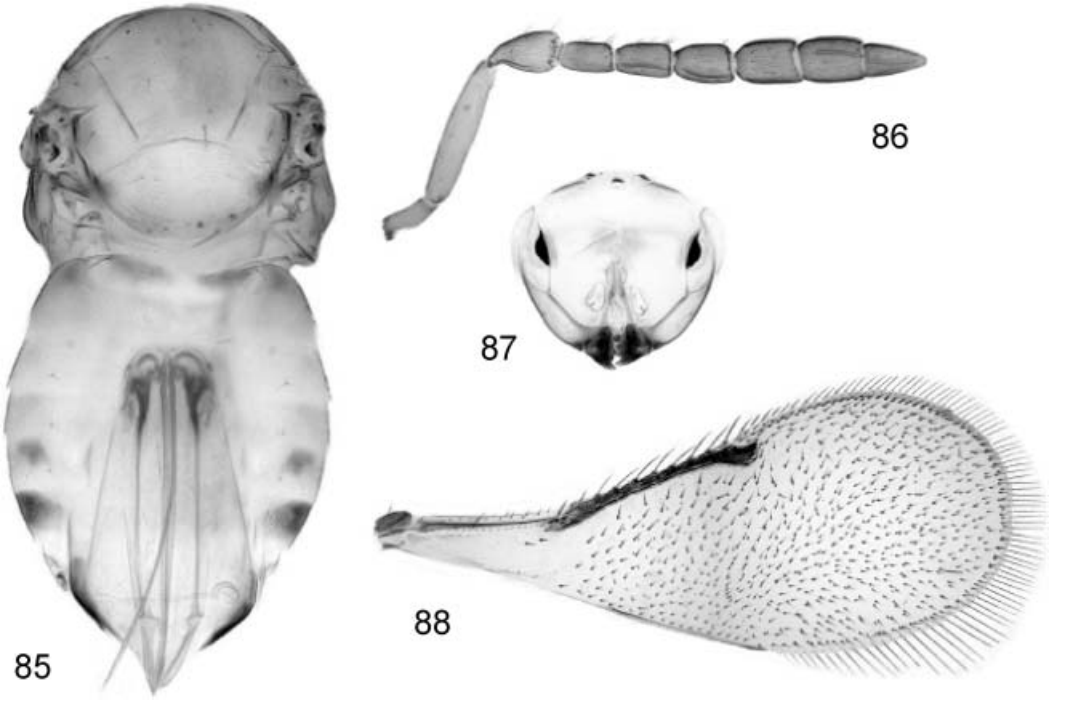
Queensland: Holotype: ♀, Brisbane, Brookfield, 9 July 2002 (M. Coombs), ex *Dumbletoniella* sp. on *Argyrodendron trifoliatum* F. Muell. (Sterculiaceae) (ANIC). Paratypes: 3♀, same data as holotype (ANIC); 2♀, 1♂, 24 June 2003, same locality as holotype (ANIC, ZSMG); 1♂, Brisbane, Rafting Ground Res., 20 April 2003, ex *Dumbletoniella* sp. on *Argyrodendron trifoliatum* (ANIC).

25. *Encarsia chauliodoa* n. sp.
(Figures 85–88)

Description (holotype)

Female. Colour: head and mesosoma yellow. Antenna brown. Metasoma yellow except T4 and T5 laterally with brown spot and outer plate of ovipositor posteriorly brown. Fore wing hyaline. Legs yellow.

Morphology: antennal formula 1,1,3,3. Pedicel longer than F1 (1.31). F1 almost two times as long as its maximum width (1.86), subequal in length to F2 and F3. Mandible



Figures 85–88. *Encarsia chauliodoa* n. sp., holotype female. (85) Mesosoma and gaster. (86) Antenna. (87) Head. (88) Fore wing.

with a strongly enlarged ventral tooth (Figure 87). Midlobe of mesoscutum with 12 setae. Scutellar sensilla widely separated (approximately six times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing about 2.4 times as long as width of disc. Marginal fringe 0.25 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with nine setae. Tarsal formula 5-5-5. Apical spur of midtibia clearly longer than half the length of the corresponding basitarsus (0.72). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 1, T6: 2, T7 with four setae. Ovipositor distinctly longer than midtibia (1.72), subequal in length to midtibia and tarsus together, and 2.85 times as long as clava.

Male. Unknown

Species group placement. Not established.

Distribution. Australia: Victoria.

Host. Unknown.

Material examined

Victoria: Holotype: ♀, 12 km N by W Hattah, 19 October 1983 (I. D. Naumann and J. C Cardale), ex ethanol (ANIC).

26. *Encarsia citrina* (Craw)
(Figures 89–91)

Coccophagus citrinus Craw 1891, p 26. Syntypes ♀, USA, California, San Gabriel Valley, 1889 [ex *Aspidiotus citrinus*], lost. Neotype ♀ designated by DeBach and Rose 1981, p 671, same data as syntypes (USNM, not examined).

Encarsia citrinus (Craw): Riley and Howard 1891, p 168.

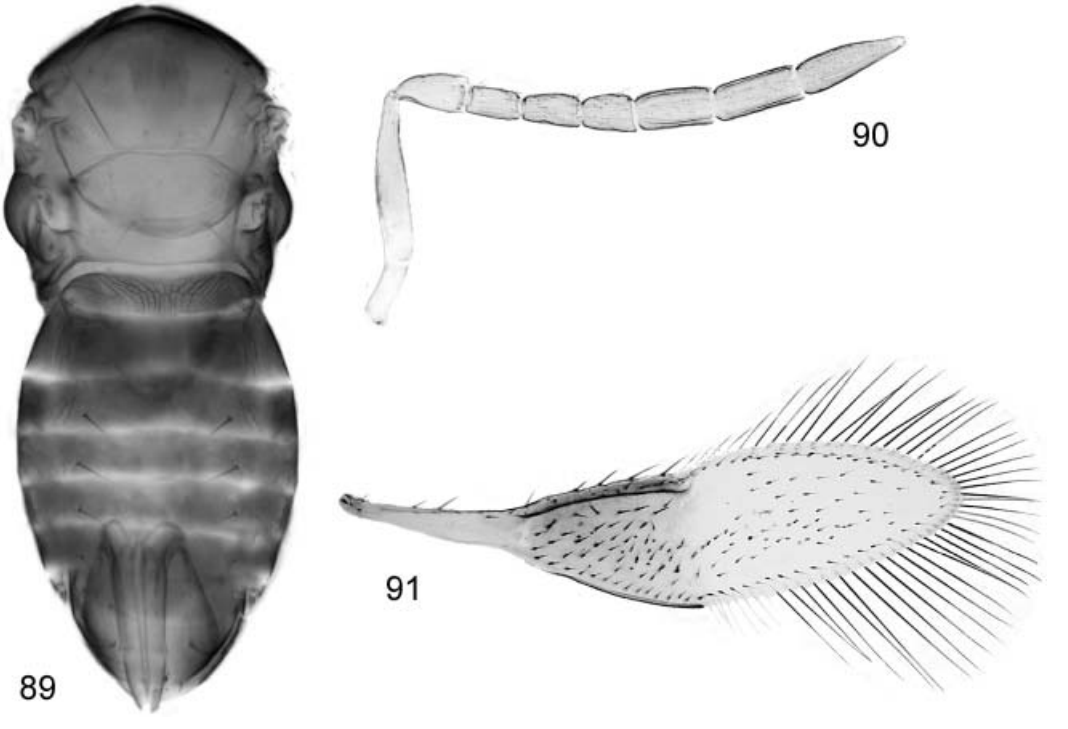
Aspidiotiphagus citrinus (Craw): Howard 1894a, p 229–231; 1895, p 31; 1898, p 134; Howard and Ashmead 1896, p 635; Ashmead 1904c, p 345; Mercet 1912, p 173–175; 1930, p 69; Ayyar 1925, p 251; Compere 1936, p 296; Mani 1938, p 122; Pruthi and Mani 1940, p 27; De Santis 1948, p 225–231; 1979, p 330; Peck 1963, p 288; Ferrière 1965, p 149; Nikol'skaya and Yasnosh 1966, p 259; Herting 1972, p 164ff; Kaul and Saraswat 1974, p 189; Yasnosh 1978, p 497; Gordh 1979, p 900; DeBach and Rose 1981, p 671; Liao et al. 1987, p 137; Sheng 1989, p 89.

Aspidiotiphagus australiensis Girault 1913[158], p 74. Holotype ♀, Australia, Queensland, Nelson (=Gordonvale, Cairns), 29 May 1913, 1500 feet (QMBA, type no. 1727, examined). Synonymy by Hayat 1989b, p 289.

Prospaltoides howardi Brèthes 1914, p 13. Syntypes ♀, Argentina, ex *Diaspis pentagona*. Synonymy by Brèthes 1916.

Aspidiotiphagus schoeversi Smits van Burgst 1915, p 293–295. Syntypes ♀, The Netherlands, Gouda, in greenhouse ex *Chionaspis aspidistrae* on *Aspidistra* sp. Synonymy by Mercet 1930.

Encarsia citrina (Craw): Malenotti 1917, p 20. Change of combination.



Figures 89–91. *Encarsia citrina* (Craw), female. (89) Mesosoma and gaster. (90) Antenna. (91) Fore wing.

Aspidiotiphagus severiniellus Ghesquière 1933, p 346–348. Holotype ♀, Belgium, Anhée (Namur province), November 1933 (R. Moseray), ex *Diaspis visci* (Schrank) Löw (ISNB, examined). Synonymy by Ferrière 1965, p 149.

Aspidiotiphagus silwoodensis Alam 1956, p 360–362. Holotype ♀, England, Ascot, Silwood Park, 31 May 1953, ex *Lepidosaphes ulmi* (Linnaeus) on *Cornus* sp. (BMNH, examined). Synonymy by Ferrière 1965, p 149.

Aspidiotiphagus cyanophylli Alam 1956, p 362–363. Holotype ♀, England, London, Kew Gardens, 13 November 1953, ex *Aspidiotus cyanophylli* Sign on *Cereus peruvianus* (BMNH, examined). Synonymy by Ferrière 1965, p 149.

Encarsia citrina (Craw): Viggiani and Mazzone 1979, p 47; Viggiani 1987b, p 136–137; Hayat 1989a, p 27–28; 1998, p 189–190; Ren 1988, p 396; Lu 1989, p 207; Liang and Chen 1990, p 1; Viggiani and Ren 1993, p 227; Huang 1994, p 196; Huang and Polaszek 1998, p 1858–1860.

Diagnosis

Female. Colour: head orange-brown, lower part of head and occiput darker. Mesosoma yellow except pronotum, mesoscutellar midlobe anteriorly, axilla, mesopleuron, and propodeum darker. Metasoma predominantly brown. Antenna brown with apex darkened (sometimes faint). Fore wing hyaline with dark band behind marginal vein. Legs yellow, hind coxa brown.

Morphology: stemmaticum with transversely strigose surface sculpture. Antennal formula 1,1,3,3, apical segment conical, strongly narrowed towards apex. Pedicel longer than F1 (1.33–1.50). F1 1.57–1.80 times as long as its maximum width, subequal in length or slightly longer than F2 (1.00–1.13), and slightly shorter than or subequal to F3 (0.88–1.06), third funicular segment distinctly broader than first and slightly broader than second. F2 slightly shorter than F3 (0.83–0.94). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 0, F4: 2, F5: 3, F6: 4. Midlobe of mesoscutum with four setae arranged symmetrically, side lobes with one seta each. Scutellar sensilla widely separated (approximately 9–10 times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing with bare area near stigmal vein, disc sparsely setose (particularly near margin), very narrow and about 4.0 times as long as width of disc. Marginal fringe 1.15–1.19 times as long as width of disc. Basal cell with one seta. Submarginal vein with two setae, marginal vein anteriorly with four (to six) setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.72–0.73). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. Ovipositor subequal in length to midtibia (0.94, 1.16 times in the holotype of *E. australiensis*) and 0.94 times as long as clava (1.20 times in holotype of *E. australiensis*). Third valvula 0.48–0.49 times as long as second valvifer.

Male. Unknown.

Species group placement. E. citrina group.

Distribution. Australia: Norfolk Island, Queensland. Cosmopolitan.

Host. Aleyrodidae: *Aleurocanthus* sp. The following additional whitefly host has been recorded (Huang and Polaszek 1998; Polaszek et al. 1999): *Aleurotrachelus micheliae*

Takahashi. *Encarsia citrina* has been recorded from a large number of hard scales (Diaspididae, see Huang and Polaszek (1998, p 1859) for a comprehensive list of host records). Recent rearing records of *E. citrina* from Coccidae (M. Copland, personal communication) are being investigated.

Additional material examined

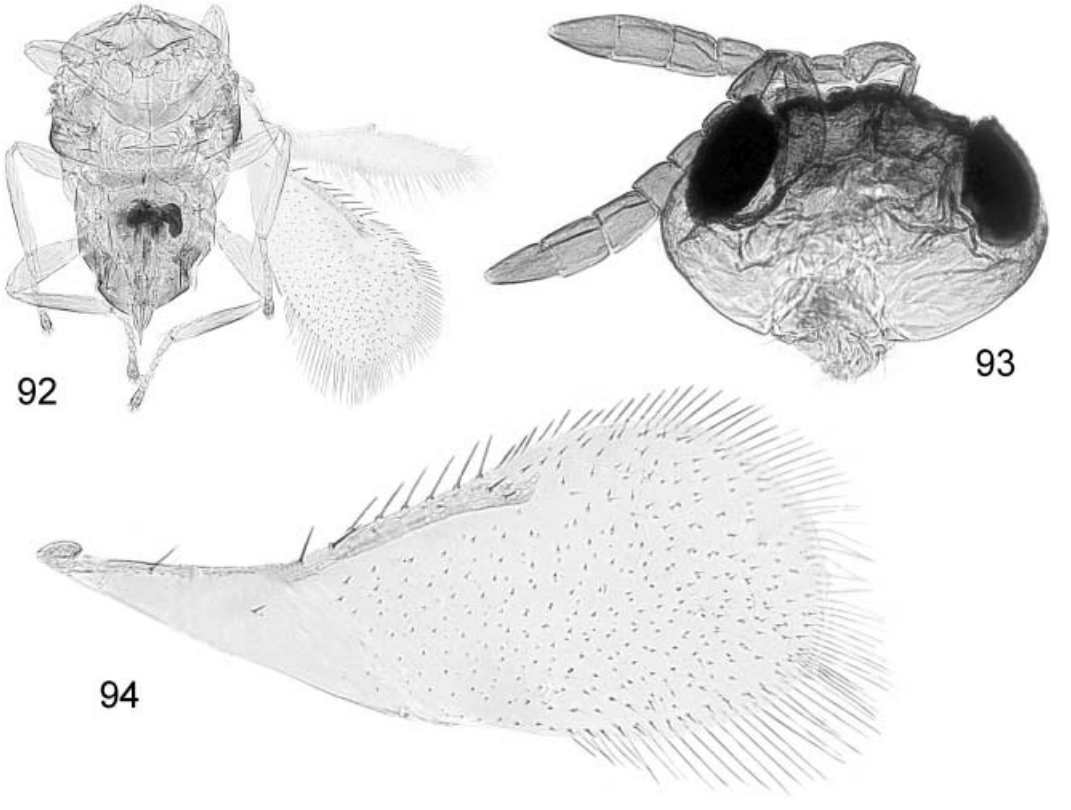
Norfolk Island: 1♀, nr Highlands Guesthouse (29°02′S, 167°57′E), 20–26 March 1984 (D. C. F. Rentz), Stop 1, pan trap (ANIC); 1♀, Red Road Track, NINP (29°01′S, 167°57′E), 14 November to 2 December 1984 (I. D. Naumann) Malaise trap/ethanol (ANIC). **Queensland:** 2♀, Bundaberg, Tafe, 10 August 2000 (P. De Barro), ex *Aleurocanthus* sp. on *Cupaniopsis* sp. (Sapindaceae) (ANIC, ZSMG); 1♀, Cairns, April 1999 (P. Garland) (ANIC).

27. ***Encarsia clara*** (Dodd)

(Figures 92–94)

Coccophagus clarus Dodd 1917, p 352–353. Holotype ♀, Australia, Northern Territory, Darwin, ex *Aspidiotus* on *Eucalyptus miniatus* (Myrtaceae), 6 July 1915 (G. F. Hill) (QMBA, type no. 3899, examined).

Encarsia clara (Dodd): Viggiani 1985c, p 239–240. Change of combination.



Figures 92–94. *Encarsia clara* (Dodd), holotype female. (92) Body of type specimen. (93) Head and antennae. (94) Fore wing.

Redescription (holotype)

Female. Colour: head yellow, vertex brown. Body lemon-yellow, mesopleuron brown. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology: antennal formula 1,1,3,3. Pedicel longer than F1 (1.67). F1 1.4 times as long as its maximum width, slightly shorter than F2 and F3. F2 subequal in length to F3. Midlobe of mesoscutum with eight visible setae. Scutellar sensilla widely separated (approximately seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing with small bare area near stigmal vein, 2.3 times as long as width of disc. Marginal fringe about 0.3 times as long as width of disc. Basal cell with one seta. Submarginal vein with one seta, marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to corresponding basitarsus. Ovipositor longer than midtibia (1.3) and twice as long as clava. Third valvula about 0.25 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Northern Territory.

Host. Diaspididae: *Aspidiotus* sp.

Comments

The species is characterized by the single seta on the submarginal vein in combination with the long midtibial spur and the asetose area in the fore wing near the stigmal vein.

28. ***Encarsia clariscutellum*** (Girault)

(Figure 95)

Coccophagus clariscutellum Girault 1915[238], p 51, 57. Holotype ♀, Australia, Queensland, Gordonvale along Mulgrave, 12 May 1914 (QMBA, type no. Hy. 2932, examined).

Coccophagus clariscutellum fasciafacies Girault 1939, p 16. Holotype ♀, Australia, Queensland, Stanthorpe, February 1927 (J. H. Smith), reared from *Aspidiotus perniciosus* on plum (QMBA).

Prospaltella clariscutellum Girault: Compere 1931, p 11. Change of combination.

Coccophagus clariscutellum Girault: Dahms 1983, p 183.

Encarsia clariscutellum Girault: Viggiani 1985c, p 240. Change of combination.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Diaspididae: *Quadraspidiotus perniciosus* (Comstock).

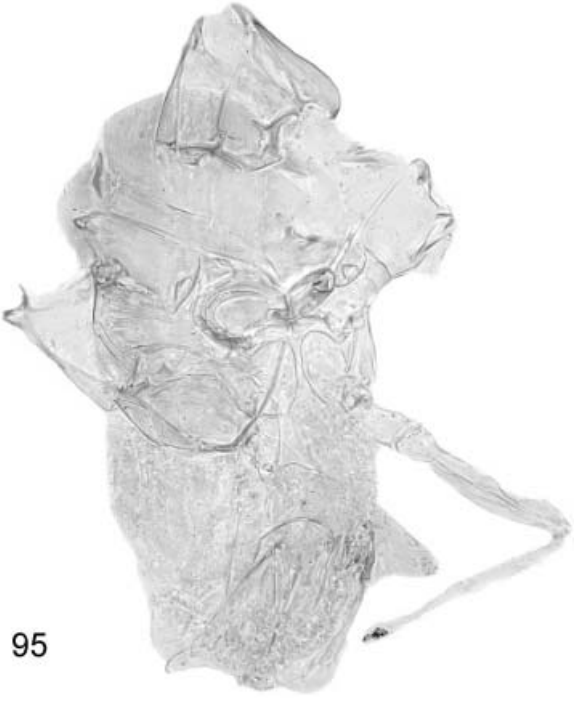


Figure 95. *Encarsia clariscutellum* (Girault), female holotype.

Comments

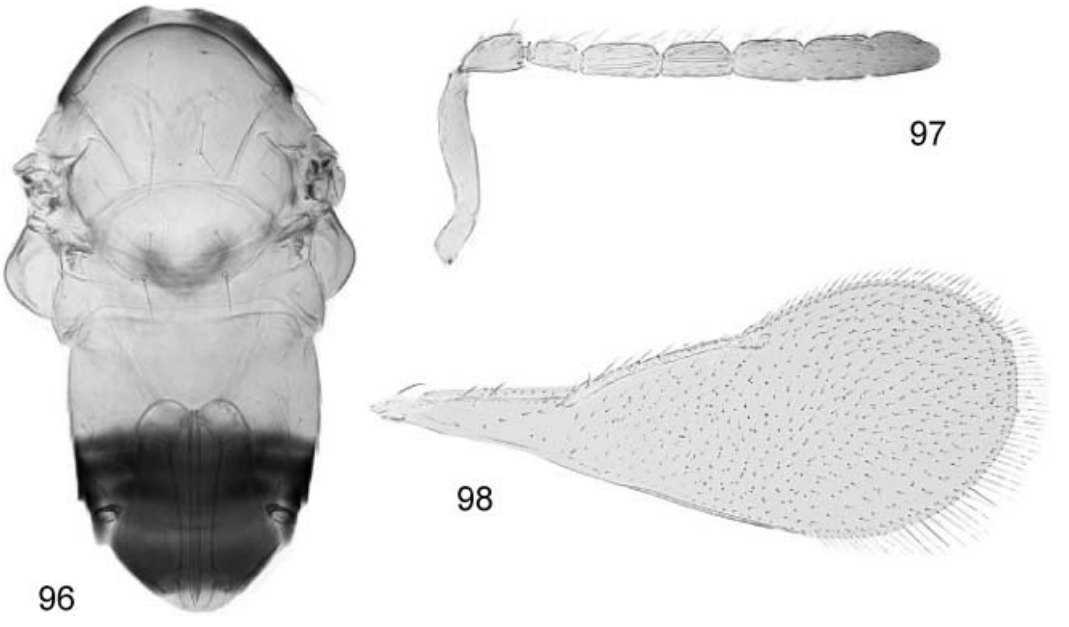
The slide-mounted holotype is in very bad condition and no diagnostic characters are recognizable. The specimen is crushed and wings and antenna are missing. Apparently the specimen has been remounted and the antennae were lost during that process since one antenna was illustrated by Viggiani (1985c, p 239).

29. *Encarsia craspedia* n. sp.
(Figures 96–98)

Description

Female. Colour: head yellow, stemmaticum with three small brown spots adjacent to ocelli. Mesosoma yellow except pronotum and mesoscutal midlobe anteriorly brown. Basal half of gaster (T1–T3) yellow, apical half (T4–T7) dark brown. Fore wing hyaline. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.42–1.44) [1.44]. F1 1.50–1.73 [1.50] times as long as broad, about half as long as F2 (0.55–0.59) [0.55], and 0.62–0.66 [0.62] times as long as F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1–2, F3: 1–2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with 10 setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla



Figures 96–98. *Encarsia craspedia* n. sp., holotype female. (96) Mesosoma and gaster. (97) Antenna. (98) Fore wing.

separated by a distance of about three to four times the maximum width of a sensillum. Distance between anterior pair of scutellar setae slightly smaller than between posterior pair. Fore wing 2.4 times as long as width of disc. Marginal fringe 0.19–0.20 [0.19] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven or eight setae. Basal cell with four setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus (0.77–0.83) [0.83]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. Ovipositor shorter than midtibia (0.85–0.86) [0.86] and 1.50–1.51 [1.50] times as long as clava. Third valvula 0.21–0.22 [0.22] times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Western Australia.

Host. Unknown.

Material examined

Western Australia: Holotype: ♀, Cape Arid National Park, Yokinup Bay area, 31 December 1986 to 3 January 1987 (J. S. Noyes) (ANIC); 1♀, same data as holotype (BMNH).

30. ***Encarsia cybele*** Girault
(Figures 99–101)

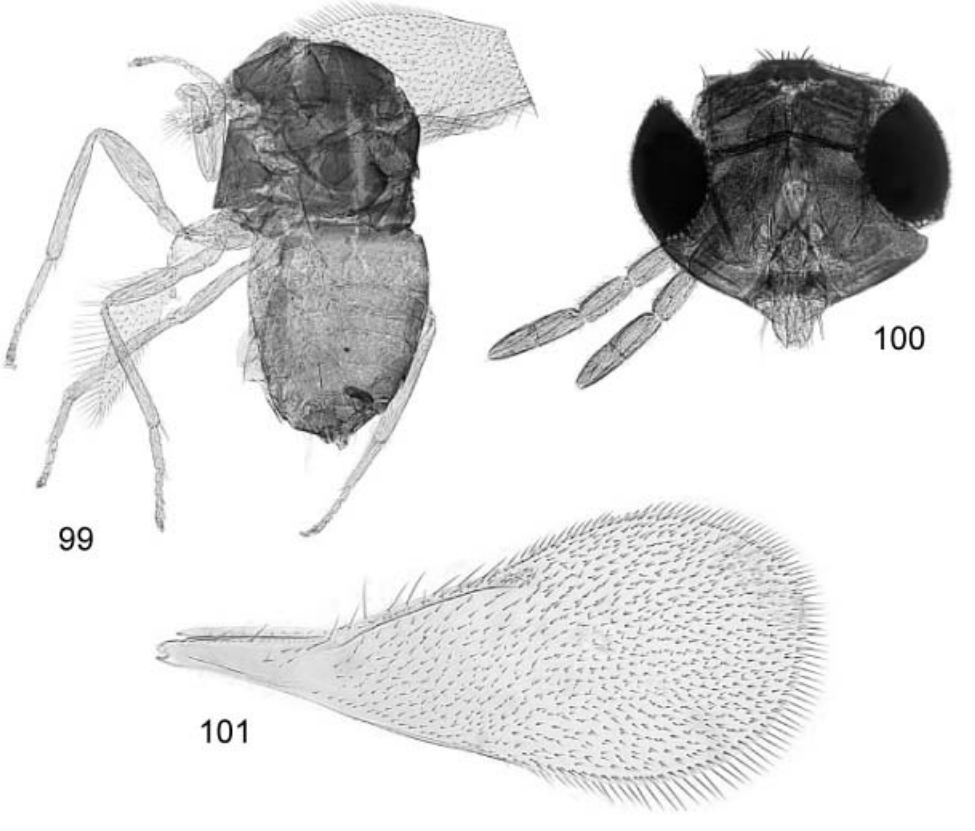
Encarsia cybele Girault 1913[167], p 186. Holotype ♀, Australia, Queensland, Nelson [=Gordonvale] (Cairns), 17 June 1913 (A. P. Dodd) (QMBA, type no. Hy. 1724, examined).

Encarsia cybele Girault: Girault 1915[238], p 60 (correction to 1913 description), Dahms 1983, p 207–208, Viggiani 1985c, p 240.

Redescription (holotype)

Female. Colour: head predominantly brown. Mesosoma brown. Metasoma yellow, at base with narrow brown band and with lateral brown band reaching back to T6. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology: antennal formula 1,1,4,2. Pedicel subequal in length to F1. F1 about two times as long as its maximum width, shorter than F2 (0.85) and F3 (0.86). Flagellomeres with the following numbers of sensilla: F1: 1, F2: 2, F3: 2–3, F4: 3, F5: 3, F6: 3. Mesoscutal midlobe with 10 strong setae, side lobes with three setae each. Scutellar sensilla widely separated (approximately six times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing 2.4 times as long as width of disc. Marginal fringe 0.31 times as long as width of disc.



Figures 99–101. *Encarsia cybele* Girault, holotype female. (99) Body of type specimen. (100) Head and antennae. (101) Fore wing.

Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with eight setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal to half the length of the corresponding basitarsus (0.47). Tergites laterally with the following numbers of setae: T1: 1, T2: 1–2, T3: 2–3, T4: 2, T5: 2, T6: 3, setae on T7 indiscernible. Ovipositor distinctly shorter than length of the midtibia (0.70). Third valvula 0.47 times as long as second valvifer.

Male. Unknown.

Species group placement. *E. inaron* group.

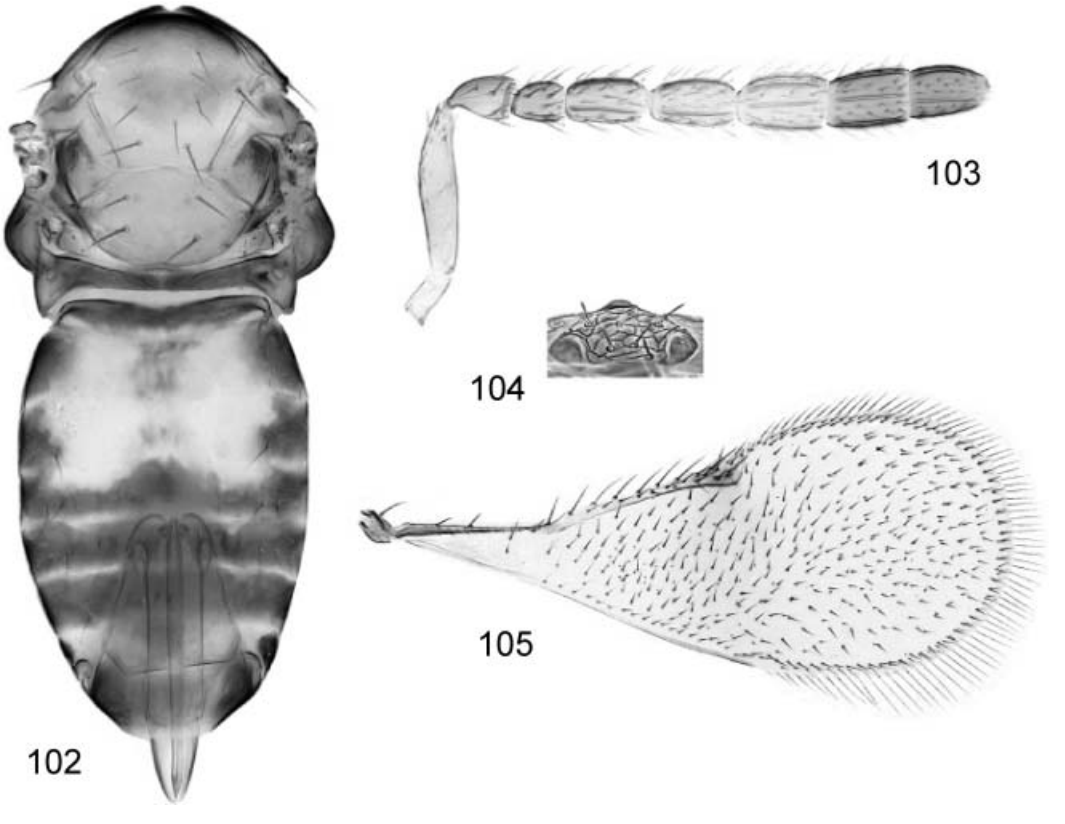
Distribution. Australia: Queensland.

Host. Unknown.

31. ***Encarsia despecta*** n. sp.
(Figures 102–105)

Description

Female. Colour: head yellow except postgena brown. Mesosoma yellow except the following brown: pronotum, mesoscutum anteriorly and anteromedially, axilla anteriorly,



Figures 102–105. *Encarsia despecta* n. sp., female. (102) Mesosoma and gaster. (103) Antenna. (104) Stemmaticum. (105) Fore wing.

mesopleuron, and propodeum. Antenna yellow, apical two segments brown. Gaster brown except T1 and T2 pale and only laterally brown, T3 anteriorly pale, and T6 pale but medially and laterally with brown spot. Fore wing hyaline with very slight, often hardly discernible infuscation behind distal end of stigmal vein. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with reticulate surface sculpture (Figure 104). Antennal formula 1,1,3,3. Pedicel longer than F1 (1.18–1.35) [1.18]. F1 1.25–1.38 [1.38] times as long as its maximum width, distinctly shorter than F2 (0.59–0.65) [0.65] and F3 (0.59–0.69) [0.65]. F2 subequal in length to F3. Midlobe of mesoscutum with 10–11 [11] setae, arranged symmetrically. Scutellar sensilla widely separated by a distance of about five to six times the width of a sensillum. Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing about 2.3 times as long as width of disc. Marginal fringe 0.22–0.24 [0.22] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six or seven setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly longer than half the length of the corresponding basitarsus (0.65–0.67) [0.67]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1–2, T3: 3–4, T4: 3–4, T5: 3–5, T6: 2, T7 with four setae. T6 with two setae between cercal plates. Ovipositor 1.26–1.28 [1.26] times as long as midtibia and 1.80–1.84 [1.80] times as long as clava. Third valvula 0.38–0.42 [0.40] times as long as second valvifer.

Male. Morphology and colour similar to female except that the brown colour is more extensive so that the axillae are almost completely brown and the hind femur is brown. Petiole with distinct, coarse reticulation.

Species group placement. Tentatively placed in *E. elegans* group.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Aleurocanthus* sp.

Material examined

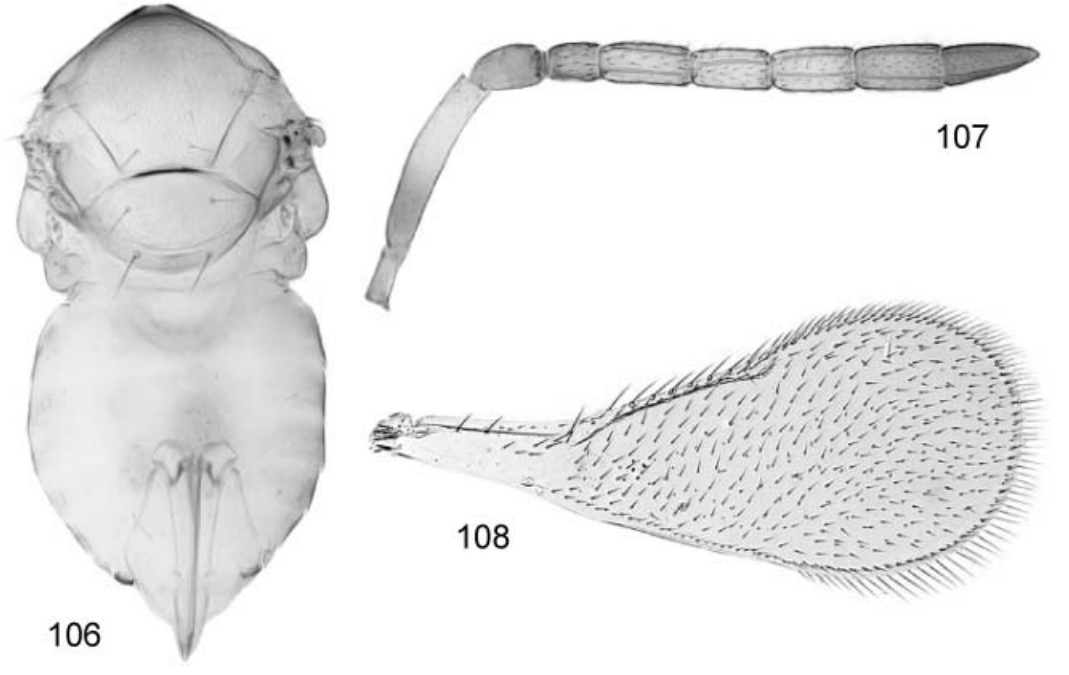
Queensland: Holotype: ♀, Brisbane, Longpocket, 5 April 2001 (P. De Barro), ex *Aleurocanthus* sp. on *Aphanante pilippensis* Planch. (ANIC). Paratypes: 3♀, 1♂, same data as holotype (ANIC, ZSMG).

32. *Encarsia dispersa* Polaszek
(Figures 106–108)

Encarsia dispersa Polaszek 2004, p 412–414. Holotype ♀, Malaysia, Sabah, Tawau, 2 July 1988, ex *Psidium guajava* QH 397 CIE A20033 (BMNH, examined).
Encarsia ?haitiensis: Kumashiro et al. 1983; Chien et al. 2000.
Encarsia haitiensis: Mani and Krishnamoorthy 2000; Babcock et al. 2001.
Encarsia sp. nr *haitiensis*: Ramani 2000.

Diagnosis

Female. Colour: head and body completely yellow. Antenna and legs yellow. Fore wing hyaline.



Figures 106–108. *Encarsia dispersa* Polaszek, female. (106) Mesosoma and gaster. (107) Antenna. (108) Fore wing.

Morphology: stemmaticum with rugose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.28–1.46). F1 1.38–1.50 times as long as its maximum width, distinctly shorter than F2 (0.59–0.64) and F3 (0.63–0.69). F2 and F3 subequal in length. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2–3, F3: 2–3, F4: 3–4, F5: 3–4, F6: 3. Midlobe of mesoscutum with 12–16 setae, side lobes with three setae each. Scutellar sensilla widely separated (approximately seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly larger than distance between posterior pair. Fore wing 2.2–2.3 times as long as width of disc. Marginal fringe 0.15–17 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six or seven setae. Tarsal formula 5-4-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.64–0.66). Tergites laterally with the following numbers of setae: T1: 0, T2: 0–1, T3: 1–2, T4: 1–2, T5: 2–3, T6: 3, T7 with four setae. Ovipositor subequal in length to midtibia and 1.4 times as long as clava. Third valvula 0.55–0.56 times as long as second valvifer.

Male. No males of the species were collected. For a description of *E. dispersa* males from elsewhere see Polaszek et al. 2004, p 414.

Species group placement. E. luteola group.

Distribution. Australia: Queensland. Belize, Benin, Brazil, Fiji, Guam, Hawaii, India, Kiribati, Malaysia, Maldives, Philippines, Taiwan, Trinidad, USA (Florida), Venezuela.

Host. Aleyrodidae: *Aleurodicus dispersus* Russell.

Additional material examined

Queensland: 6♀, Cairns, April 1999 (P. Garland), ex *Aleurodicus dispersus* (ANIC, ZSMG).

Comments

The species has become very widespread since its introduction from Trinidad into Hawaii in 1979 (Cock 1985). In Australia *E. dispersa* has been released (as *E.* nr *haitiensis*) to control the spiralling whitefly, *Aleurodicus dispersus* Russell, which was for the first time detected in Australia on Boigu Island, Torres Strait, Queensland, in 1991 (Lindsay and Grimshaw 1993).

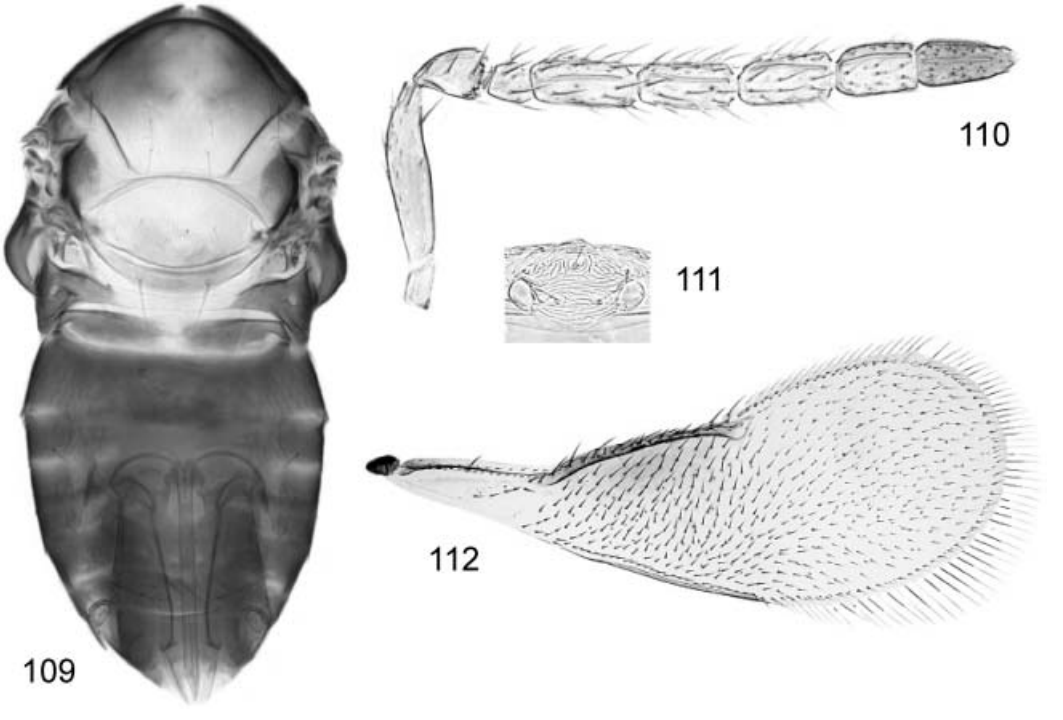
33. ***Encarsia elegans*** Masi

(Figures 109–112)

Encarsia elegans Masi 1911, p 147. Holotype ♀, Italy, Catanzaro, May, ex *Aleurolobus* [as *Aleyrodes*] *olivinus* (Silvestri) (DEUN, examined).

Encarsia elegans Masi: Mercet 1912, p 156–158; Viggiani 1985b, p 84–85; 1987b, p 140.

Encarsia bifasciafacies Hayat 1989a, p 58–59. Holotype ♀, India, Uttar Pradesh, Aligarh, 23 June 1984 (M. Hayat and S. S. Islam), ex *Aleurolobus* sp. (BMNH, examined). Synonymized with *E. elegans* by Huang and Polaszek 1998, p 1867.



Figures 109–112. *Encarsia elegans* Masi, female. (109) Mesosoma and gaster. (110) Antenna. (111) Stemmaticum. (112) Fore wing.

Encarsia bifasciafacies: Huang 1994, p 207; Chou et al. 1996, p 196; Hayat 1998, p 216–217.
Encarsia elegans: Huang and Polaszek 1998, p 1867–1869.

Diagnosis

Female. Colour: head yellow, face with transverse brown band between eyes, postgena and gena partly brown. Mesosoma brown, mesoscutum posteriorly, posteromesal corners of axilla, and scutellum pale. Gaster brown. Antenna yellow except pedicel and F6 brown. Fore wing hyaline with faint dark band behind marginal vein. Legs yellow.

Morphology: stemmaticum with rugose surface sculpture. Antennal formula 1,1,4,2. Pedicel longer than F1 (1.63–1.69). F1 1.06–1.40 times as long as its maximum width, distinctly shorter than F2 (0.54–0.57) and F3 (0.56–0.58). F2 and F3 subequal in length. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2–3, F3: 2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with 10 setae, side lobes with three setae each. Scutellar sensilla widely separated (approximately three to four times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing 2.5–2.6 times as long as width of disc. Marginal fringe 0.25–0.26 times as long as width of disc. Basal cell with six to eight setae. Submarginal vein with two setae, marginal vein anteriorly with seven or eight setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.69–0.92). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four to seven setae. Ovipositor subequal in length to midtibia. Third valvula 0.29–0.36 times as long as second valvifer.

Male. No males of the species were collected in the study area. For a description of *E. elegans* males from elsewhere see Huang and Polaszek 1998, p 1868.

Species group placement. E. elegans group.

Distribution. Australia: Queensland, Western Australia. China, Egypt, India, Italy (Masi 1911), Pakistan.

Host. Aleyrodidae: *Aleurolobus marlatti* (Quaintance), *Tetraleurodes* sp. The following additional hosts have been recorded: *?Aleurocanthus husaini* (Hayat 1989a, as *A. hussini*) (Chou et al. 1996), *A. niloticus* Priesner and Hosny, *A. olivinus* (Silvestri) (Masi 1911), *A. rhododendri* Takahashi, *Siphoninus* sp.

Additional material examined

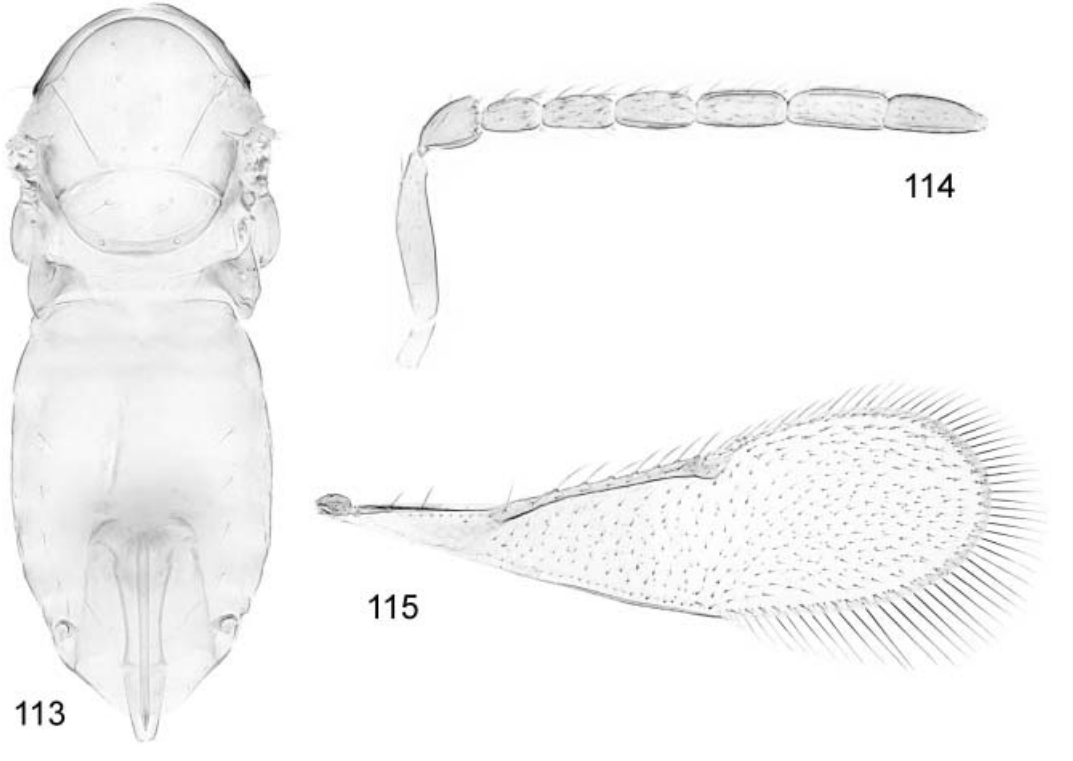
Queensland: 1♀, Bundaberg, 10 August 2000 (P. De Barro), ex *Aleurolobus marlatti* on *Callistemon citrinus* (Myrtaceae) (ANIC). 1♀, 50 km south of Bowen, 20 April 2001 (P. De Barro), ex *Aleurolobus* sp. on *Acacia* sp. (Mimosaceae) (ZSMG); 1♀, Horseshoe Bay, Bowen, Whitsunday Sands, 19 April 2001 (P. De Barro), ex *Tetraleurodes* sp. on *Glochidion* sp. (ZSMG). 1♀, Split Rock (15°39′S, 144°31′E), 27 April to 28 May 1993 (P. Zborowski and A. Roach), flight interception trap (ANIC); 1♀, Heathlands dump (11°45′S, 142°35′E), 7 June to 25 July 1992 (P. Zborowski, E. Nielsen), Malaise #2, open forest (ANIC). **Western Australia:** 1♀, Kununurra, 3 May 2000 (S. and O. Schmidt), ex *Aleurolobus* sp. on *Bridelia tomentosa* Blume (Euphorbiaceae) (ANIC).

34. ***Encarsia farinaria*** n. sp.
(Figures 113–115)

Description (holotype)

Female. Colour: head and body yellow, pronotum and axilla partly brown. Metasoma yellow, third valvula suffused with brown. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology: antennal formula 1,1,4,2. Pedicel slightly longer than F1 (1.1). F1 longer than its maximum width (1.83), shorter than F2 (0.77) and F3 (0.79). F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 1, F4: 1, F5: 1, F6: 1. Midlobe of mesoscutum with nine setae (usually probably eight or 10), side lobes with two setae each. Scutellar sensilla distantly placed (approximately five times the maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly smaller than distance between posterior pair. Fore wing narrow, 3.2 times as long as width of disc. Marginal fringe 0.45 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with two setae. Tarsal formula 5-5-5. Apical spur of midtibia more than half as long as corresponding basitarsus (0.71). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four or five setae. Ovipositor subequal in length to midtibia. Third valvula half as long as second valvifer, third valvulae appearing truncate at apex.



Figures 113–115. *Encarsia farinaria* n. sp., female. (113) Mesosoma and gaster. (114) Antenna. (115) Fore wing.

Male. Unknown.

Species group placement. *E. perflava* group.

Distribution. Australia: Queensland.

Host. Unknown.

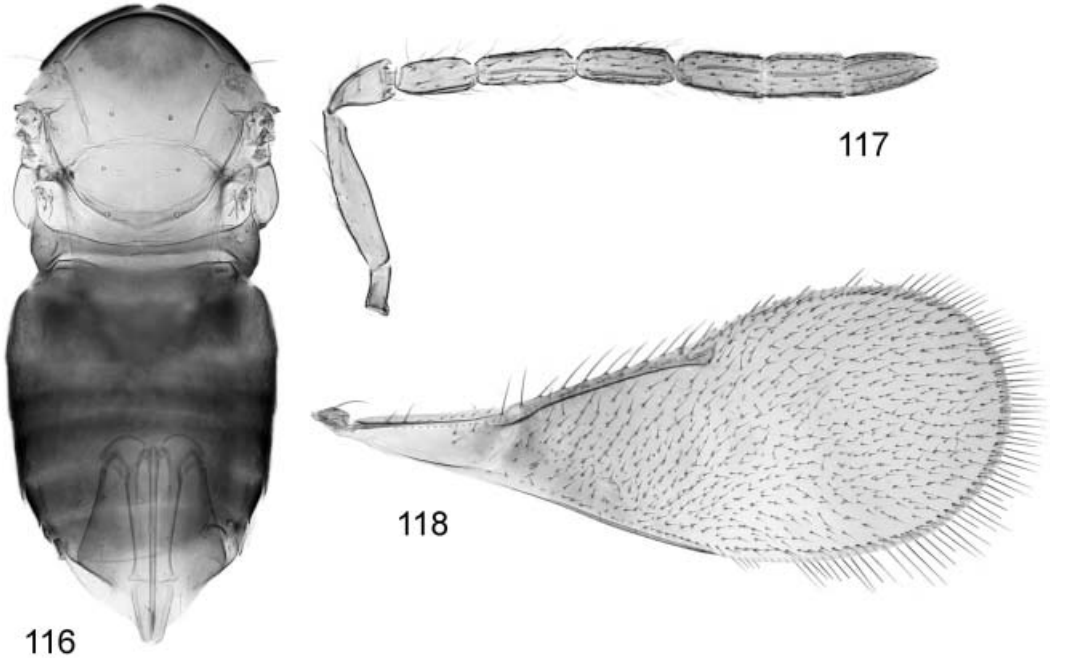
Material examined

Queensland: Holotype: ♀, Cockatoo C[ree]k Crossing, 17 km NW Heathlands, 7 June to 25 July 1992 (P. Zborowski, E. Nielsen), Malaise #5, open forest (ANIC).

35. *Encarsia fasciola* n. sp.
(Figures 116–118)

Description (holotype)

Female. Colour: head brown, darker below antennal toruli. Mesosoma light brown except pronotum, mesoscutum anteriorly, and propodeum darker. Metasoma predominantly brown. Antenna yellow. Fore wing slightly brown with dark band behind marginal vein which is proximally darker and getting lighter distally, basal cell distally infuscate. Legs pale, hind coxa and femur darker.



Figures 116–118. *Encarsia fasciola* n. sp., female. (116) Mesosoma and gaster. (117) Antenna. (118) Fore wing.

Morphology: stemmaticum with rugose-reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel subequal in length to F1. F1 2.2 times as long as its maximum width, shorter than F2 (0.80) and F3 (0.82). F2 and F3 subequal in length. Flagellomeres with the following numbers of sensilla: F1: 1, F2: 2, F3: 3, F4: 4–5, F5: 4–5, F6: 4. Midlobe of mesoscutum with four setae, arranged symmetrically, side lobes with two setae each. Scutellar sensilla widely separated (approximately five times the maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly greater than between posterior pair. Fore wing 2.4 times as long as width of disc. Marginal fringe 0.21 times as long as width of disc. Basal cell with four setae. Submarginal vein with two setae, marginal vein anteriorly with eight setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.78). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2–3, T6: 3, T7 with four or five setae. Ovipositor subequal in length to midtibia and 1.20 times as long as clava. Third valvula 0.41 times as long as second valvifer.

Male. Unknown.

Species group placement. E. smithi group.

Distribution. Australia: New South Wales.

Host. Unknown.

Material examined

New South Wales: Holotype: ♀, Tooloom Plateau, 14 km W Urbenville, 14 February 1984 (I. D. Naumann) (ANIC).

Comments

This species resembles *E. smithi* but can be separated by the three-segmented clava, fewer setae on the mesoscutum and different wing infuscation.

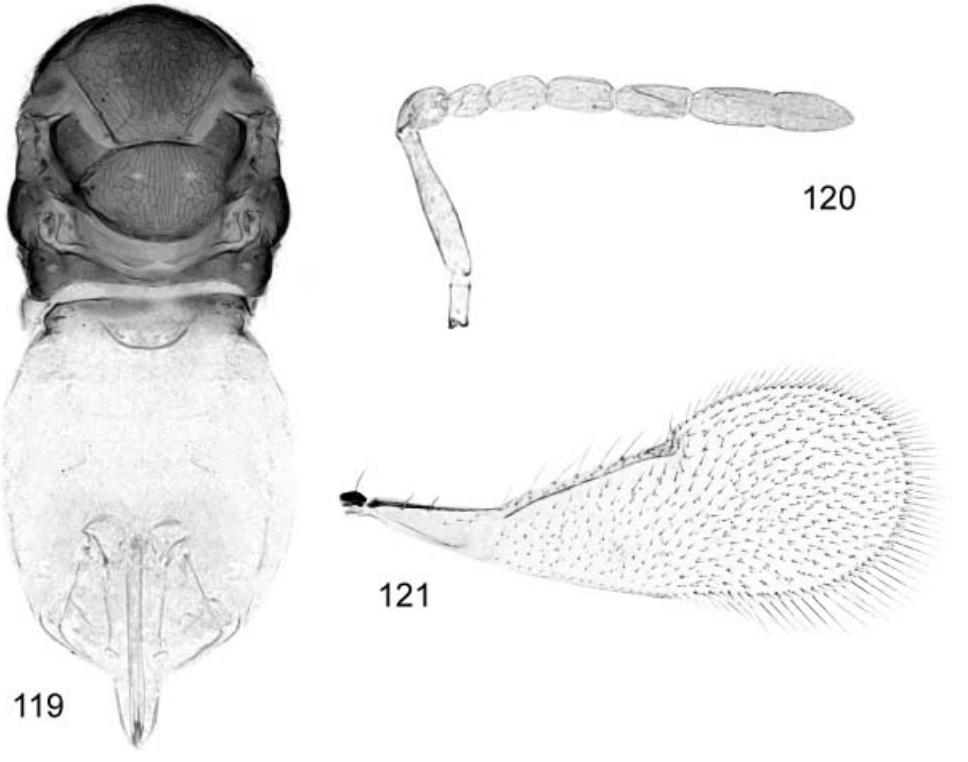
36. *Encarsia formosa* Gahan

(Figures 119–121)

Encarsia formosa Gahan 1924, p 14. Syntypes, USA: Idaho, Twin Falls (USNM, examined).
Encarsia formosa Gahan: Ferrière 1965, p 137; Nikol'skaya and Yasnosh 1966, p 266; Viggiani and Mazzone 1979, p 45; Huldén 1986, p 18; Rivnay and Gerling 1987, p 465; Viggiani 1987b, p 144; Liao et al. 1987, p 151; Jiang and Petzold 1988, p 494; Yasnosh 1989, p 110; Polaszek et al. 1992, p 382; Viggiani and Ren 1993, p 226; Liu and Stansly 1996, p 386; Huang and Polaszek 1998, p 1881; Polaszek et al. 1999, p 146; Schmidt et al. 2001, p 377.

Diagnosis

Female. Colour: head and mesosoma brown, contrasting with yellow remainder of body. Antenna yellow with petiole and antennal tip slightly darker. Metasoma yellow except brown at base. Fore wing hyaline. Legs pale, coxae more or less brown at base.



Figures 119–121. *Encarsia formosa* Gahan, female. (119) Mesosoma and gaster. (120) Antenna. (121) Fore wing.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel longer than F1 (1.09–1.32). F1 2.40 times as long as its maximum width, distinctly shorter than F2 (0.69–0.86) and F3 (0.66–0.83). F2 and F3 subequal in length or F2 slightly shorter than F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 2, F4: 2–3, F5: 2–3, F6: 3. Midlobe of mesoscutum with 18–20 setae, side lobes with three setae each. Scutellar sensilla widely separated (approximately seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing about 2.4 times as long as width of disc. Marginal fringe 0.25–0.33 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with eight setae. Tarsal formula 5-4-5. Apical spur of midtibia shorter than half the length of the corresponding basitarsus (0.30–0.40). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. Ovipositor slightly shorter than or subequal in length to midtibia (0.88–1.00). Third valvula 0.41–0.66 times as long as second valvifer.

Male. Body predominantly brown, legs lighter. Lower half of head, vertex partly and ocellar area brown.

Species group placement. E. luteola group (Gahan 1924; Polaszek et al. 1992).

Distribution. Australia: Australian Capital Territory, New South Wales, Queensland, South Australia, Victoria, Western Australia. Pacific Islands: Tonga, Fiji, French Polynesia. Cosmopolitan.

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius), *Trialeurodes vaporariorum* (Westwood). The following additional hosts have been recorded (Huang and Polaszek 1998): *Aleuroglandulus malangae* Russell, *Aleurotrachelus trachoides* (Back), *Aleyrodes lonicerae* Walker, *A. proletella* (Linnaeus), *A. spiraeoides* Quaintance, *Dialeurodes chittendeni* Laing, *D. citri* (Ashmead).

Material examined

Australian Capital Territory: Wombat Creek, 6 km E Piccadilly Circus (35°19′S, 148°51′E), March 1985 (Lawrence, Weir, Johnson) (ANIC). **New South Wales:** 1♀, Griffith, 8 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus* L. (Asteraceae) (ANIC); 1♀, Lake Tandou, 6 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Xanthium occidentale* Bertol. (Asteraceae) (ANIC). **Queensland:** 1♀ Warra, 25 June 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Verbena bonariensis* L. (Verbenaceae) (ANIC); 1♀, Dalby, 3 May 1997 (P. De Barro), ex *Bemisia tabaci* on *Gossypium hirsutum* L. (Malvaceae) (ANIC); 1♀, Dalby, 17 May 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus* (ANIC); 2♀, Oakey, 3 April 1997 (B. A. Franzmann), ex *Bemisia tabaci* on *Sonchus oleraceus* and *Amaranthus spinosus* L. (Cheno-podia-ceae) (ANIC); 1♀, Oakey, 20 March 1997 (B. A. Franzmann), ex *Trialeurodes vaporariorum* on *Anoda cristata* (L.) Schltdl. (Malvaceae) (ANIC); 2♀, Oakey, 13 May 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Verbena bonariensis* and *Sonchus oleraceus* (ANIC); 4♀, Oakey, 29 May 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus*, *Malvastrum coromandelianum* (L.) Garcke (Malvaceae), *Urtica* sp. (Urtica-ceae), and *Datura* sp. (Solanaceae) (ANIC); 1♀, 1♂, Oakey, 29 May 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Verbena bonariensis* (ANIC); 3♀, Oakey, 25 June 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus*, *Verbena bonariensis*, and *Urtica* sp. (ANIC); 1♀, 1♂, Highfields, 10 March 1996 (B. A. Franzmann), ex *Trialeurodes vaporariorum* on *Verbena* sp. (ANIC); 3♀, 1♂, Brisbane, 17 April 2000 (P. De Barro), ex *Bemisia tabaci* on *Hibiscus* sp. (Malvaceae) (ZSMG). **South Australia:** 2♀, McLaren Vale, 2 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Euphorbia peplus* L. (Euphorbiaceae) (ANIC); 3♀, 1♂, Cavan, 2 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus* (ANIC). **Victoria:** 1♀, Red Cliffs, 2 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus* (ANIC); 2♀, Red Cliffs, 2 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Euphorbia peplus* (ANIC). **Western Australia:** 3♀, 1♂, Wanneroo, Boogards Nursery, 1 October 1996 (P. De Barro), ex *Bemisia tabaci* on *Hibiscus* sp. (Malvaceae) (ANIC).

Comments

Encarsia formosa was released into Australia between 1934 and 1936 as a biological control agent of the greenhouse whitefly, *Trialeurodes vaporariorum* (Wilson 1960). Males are rare in this species.

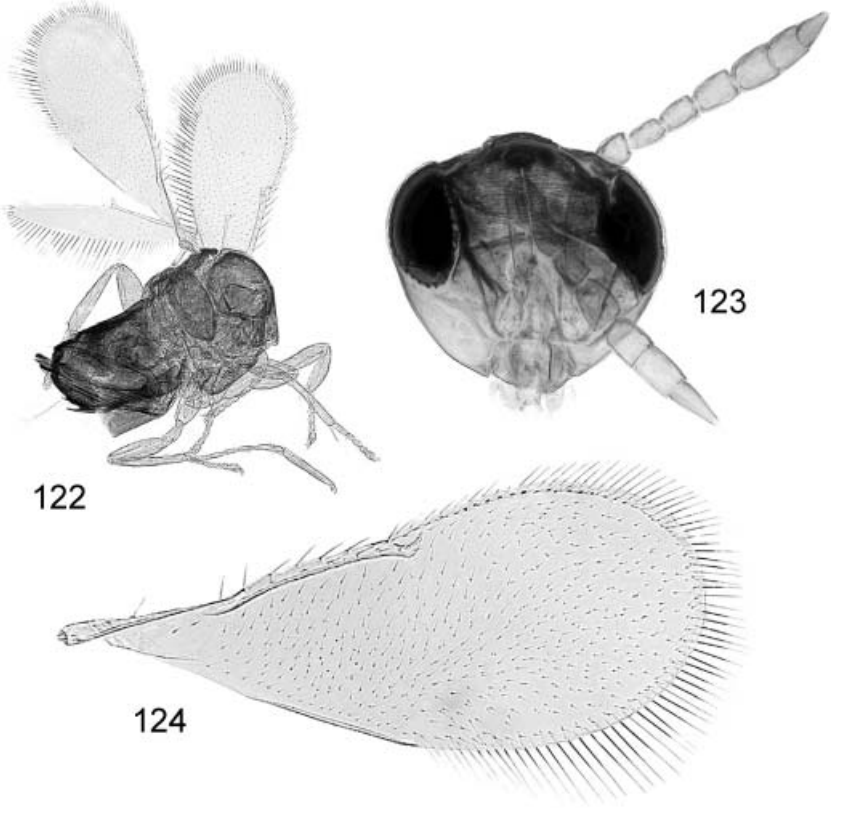
37. *Encarsia grotei* (Girault)
(Figures 122–124)

Coccophagus grotei Girault 1931[435], p 1. Holotype ♀, Australia, Queensland, Brisbane, Indooroopilly (QMBA, type no. T. 4193, examined).
Coccophagus grotei Girault: Dahms 1984, p 663.
Encarsia grotei Girault: Viggiani 1985c, p 240–241. Change of combination.

Redescription (holotype)

Female. Colour: head and mesosoma yellow except following parts dark brown: upper parts of head, pronotum, axilla, mesopleuron. Metasoma predominantly dark brown. Fore wing hyaline. Legs pale.

Morphology: maxillary palp two-segmented. Antennal formula 1,1,3,3, F6 appearing conical. Pedicel slightly longer than F1 (1.21). F1 1.56 times as long as its maximum width, subequal in length to F2 and slightly shorter than F3 (0.82). Scutellar sensilla distantly placed. Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing about 2.5 times as long as width of disc. Marginal fringe 0.34 times as long as width of disc. Basal cell with two setae. Marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to basitarsus.



Figures 122–124. *Encarsia grotei* (Girault), holotype female. (122) Body. (123) Head and antennae. (124) Fore wing.

Ovipositor distinctly longer than midtibia (1.55) and 2.41 times as long as clava. Third valvula about 0.3 times as long as second valvifer.

Male. Unknown.

Species group placement. E. inquirenda group sensu Hayat (1989a).

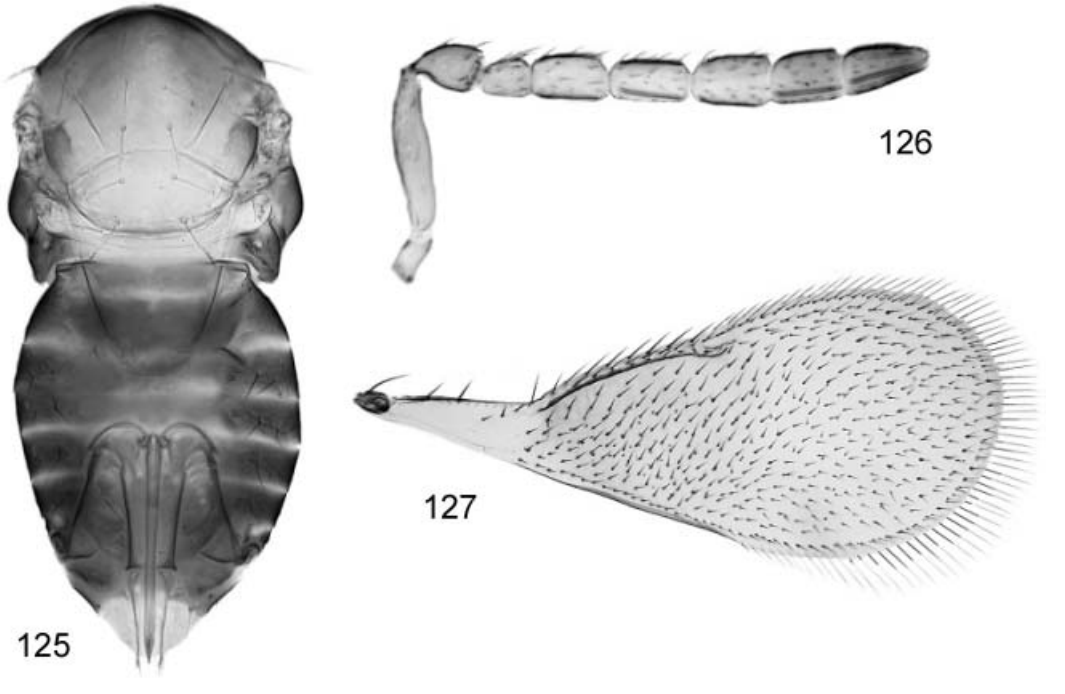
Distribution. Australia: Queensland.

Host. Unknown.

38. *Encarsia hapalia* n. sp.
(Figures 125–127)

Description (holotype)

Female. Colour: head yellow, postgena brown. Mesosoma brown, mesoscutum (except anteriorly), axillae posteromesally, scutellum, metanotum, and propodeum medially lighter. Metasoma predominantly brown except apex of T7 pale. Antenna yellow, apical segment of clava brown. Fore wing with dark band behind marginal vein. Legs yellow except hind coxa brown.



Figures 125–127. *Encarsia hapalia* n. sp., holotype female. (125) Mesosoma and gaster. (126) Antenna. (127) Fore wing.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.54). F1 only very slightly longer than wide (1.18), shorter than F2 (0.65) and F3 (0.59). F2 slightly shorter than F3 (0.87). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 3, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with eight setae, side lobes with three setae each. Scutellar sensilla rather closely placed (approximately 1.5 times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.3 times as long as width of disc. Marginal fringe 0.26 times as long as width of disc. Basal cell with four setae. Submarginal vein with two setae, marginal vein anteriorly with seven setae. Tarsal formula 5-5-5. Apical spur of midtibia shorter than corresponding basitarsus (0.80). Tergites laterally with the following numbers of setae: T1: 0, T2: 2, T3: 2, T4: 2, T5: 3, T6: 3, T7 with four setae. Ovipositor slightly longer than midtibia (1.16) and 1.6 times as long as clava. Ovipositor apically modified with several setae. Third valvula 0.7 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Aleyrodidae.

Material examined

Queensland: Holotype: ♀, Forty Mile Scrub, 6 July 2000 (P. De Barro), ex hard-bodied whitefly on *Carissa ovata* (R.Br.) (Apocynaceae) (ANIC).

39. *Encarsia horatii* (Girault)

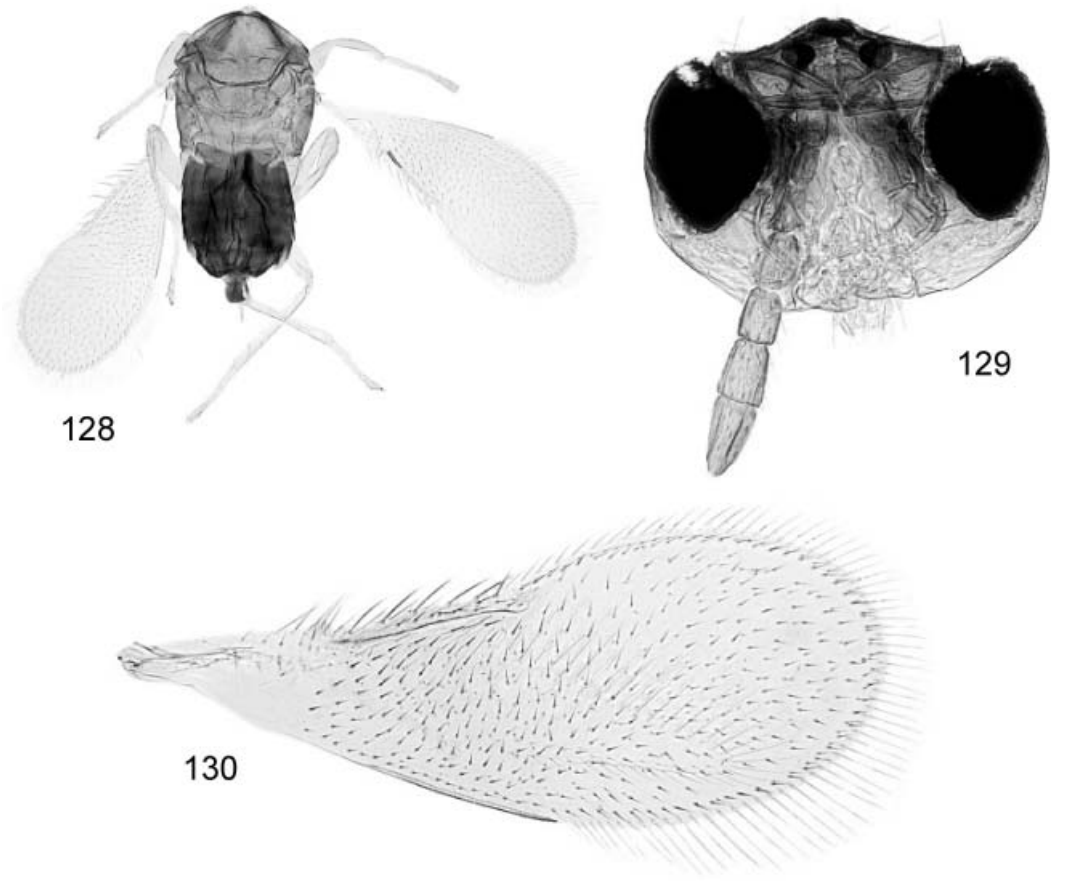
(Figures 128–130)

Coccophagus horatii Girault 1939[453], p 18. Syntypes 2♀, Australia, Queensland, Brisbane, Indooroopilly, January 1932, "reared from *Eriococcus* on *Eucalyptus*" (QMBA, type no. T. 9082, examined).
Coccophagus horatii Girault: Dahms 1984, p 695.
Encarsia horatii: Hayat 1989b, p 289. Change of combination.

Redescription (syntypes)

Female. Colour: head and mesosoma yellow except pronotum, axilla, and mesopleuron more or less brown. Metasoma dark brown. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology: antennal formula 1,1,3,3. Pedicel slightly longer than F1. F1 slightly shorter than F2 and F3. Only two posterior setae on midlobe of mesoscutum discernible. Scutellar sensilla widely separated (approximately 10 times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing about 2.6 times as long as width of disc. Marginal fringe 0.30 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with three setae. Tarsal formula 5-5-5. Apical spur of midtibia almost as long as the length of the corresponding basitarsus (0.86). T2–4 laterally apparently each with one



Figures 128–130. *Encarsia horatii* (Girault), holotype female. (128) Body. (129) Head and antennae. (130) Fore wing.

seta, setation of remaining tergites indiscernible. Ovipositor subequal in length to midtibia, about 1.5 times as long as clava. Third valvula about 0.3 times as long as second valvifer.

Male. Unknown.

Species group placement. *E. aurantii* group.

Distribution. Australia: Queensland.

Host. There is only the very questionable host record of the type specimens (Eriococcidae).

Comments

Girault's original description differs from the type specimens in that they do not have a dark band behind the marginal vein. It is possible that Girault described the species when they were still card mounted before he mounted them on a slide with the wings folded over the dark brown gaster, erroneously assuming that they have a dark band (and there are indications in the text, e.g. colour characters which are easier to see in card- than in

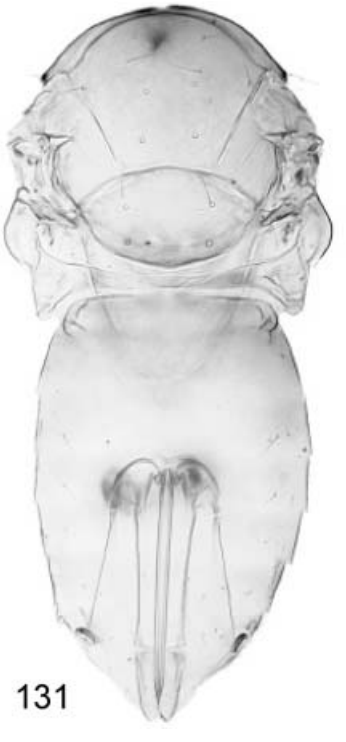
slide-mounted specimens). No lectotype was designated because the heads of the two females on the slide are separated from the body and no unequivocal assignment is possible.

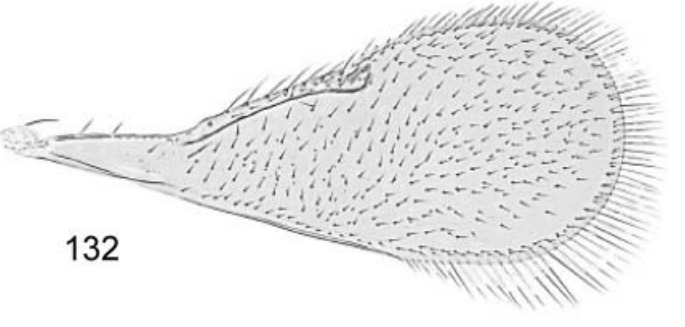
40. ***Encarsia insignis*** n. sp.
(Figures 131, 132)

Description (holotype)

Female. Colour: head and mesosoma yellow except pronotum partly and anterior margin of mesoscutal midlobe narrowly brown. Gaster yellow, T1 and T4–T5 with very faint and indistinct brown bands and also laterally very faintly brown. Antenna yellow, apical segment slightly brown. Fore wing hyaline. Legs yellow.

Morphology: antennal formula 1,1,4,2. Pedicel slightly longer than F1. F1 about 1.7 times as long as its maximum width, distinctly shorter than F2 (0.7), and F3 (0.7). Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with two setae each. Scutellar sensilla widely separated (approximately seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing 2.3 times as long as width of disc. Marginal fringe 0.26 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven setae. Basal cell with one to three setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly longer than half the length of the corresponding basitarsus (0.67). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 2, T4: 2, T5: 3–4, T6: 2, T7 with four





Figures 131, 132. *Encarsia insignis* n. sp., holotype female. (131) Mesosoma and gaster. (132) Fore wing.

setae. Ovipositor subequal in length to midtibia (1.04). Third valvula 0.38 times as long as second valvifer.

Male. Unknown.

Species group placement. E. inaron group.

Distribution. Australia: Western Australia.

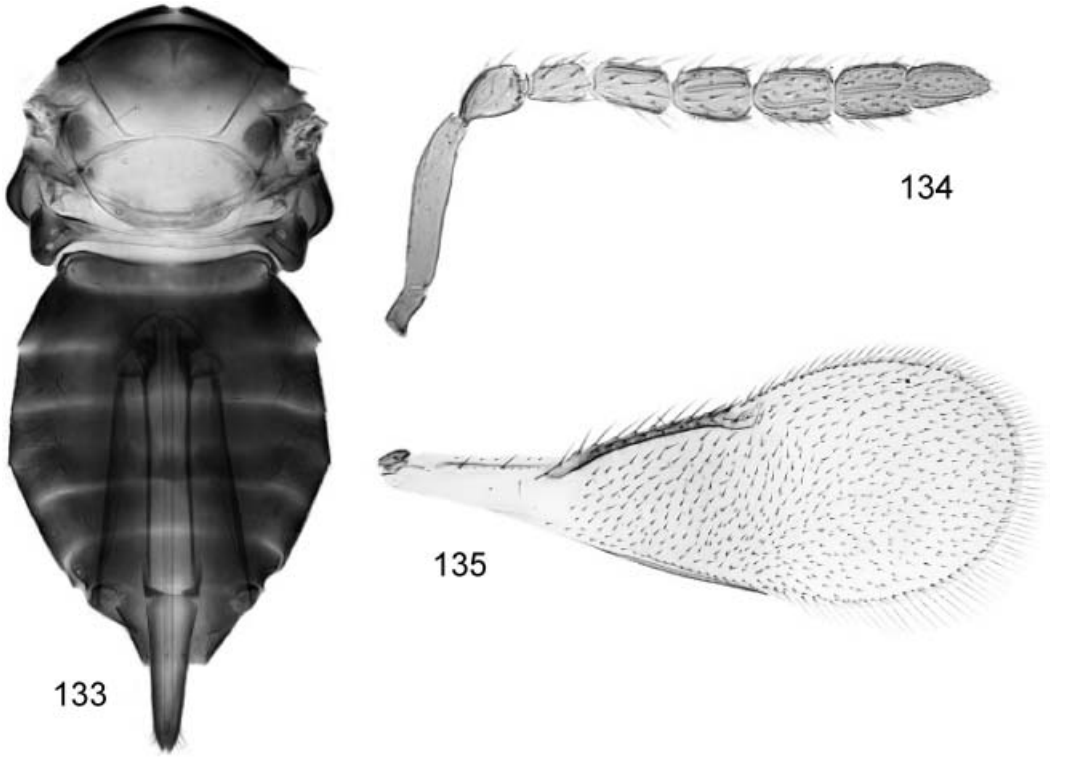
Host. Aleyrodidae: *Bemisia afer* group.

Material examined

Western Australia: Holotype: ♀, Purnululu National Park, 8 May 2000 (S. and O. Schmidt), ex *Bemisia afer* group on *Terminalia platyphylla* F. Muell. (Combretaceae) (ANIC).

41. *Encarsia iris* (Girault)
(Figures 133–135)

Coccophagus iris Girault 1930[432], p 4. Holotype ♀, Australia, Queensland, Brisbane, Indooroopilly, 24 November 1929 (QMBA, type no. 4012, examined).
Coccophagus iris Girault: Dahms 1984, p 730.
Encarsia iris (Girault): Viggiani 1985c, p 241–242. Change of combination.



Figures 133–135. *Encarsia iris* (Girault), female. (133) Mesosoma and gaster. (134) Antenna. (135) Fore wing.

Redescription

Female. Colour: head brown. Mesosoma brown except following parts yellow: mesoscutum posteriorly, posteromesal corner of axilla, scutellum, and metanotum. Gaster predominantly brown or basal tergites paler. Antenna yellow. Fore wing with dark band behind marginal vein. Legs yellow except mid and hind coxae and occasionally hind femur brown.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugosely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.14–1.26). F1 1.31–1.53 times as long as its maximum width, shorter than F2 (0.72–0.88) and F3 (0.72–0.77). F2 slightly shorter than or subequal in length to F3 (0.88–1.00). (In holotype antennae damaged/distorted, resulting in different measurements for left and right antenna, as follows: pedicel longer than F1 (1.33/1.58), F1 1.19/1.43 times as long as its maximum width and 0.61/0.65 times as long as F2.) Flagellomeres with the following numbers of sensilla: F1: 0(–1), F2: 2, F3: 3–4, F4: 3–4, F5: 3–4, F6: 3–4. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla widely separated (approximately five to six times the maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly smaller than, or subequal to, distance between posterior pair. Fore wing 2.3–2.4 times as long as width of disc. Marginal fringe 0.17–0.23 [0.21] times as long as width of disc. Basal cell with three to seven [four] setae. Submarginal vein with two setae, marginal vein anteriorly with six to seven setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus (0.81–0.90) [0.90], the latter distally with four to five pegs. Ovipositor longer than midtibia (1.72–2.17) [1.95] and 2.90–3.46 [3.30] times as long as clava. Third valvula 0.51–0.66 [0.51] times as long as second valvifer.

Male. Body dark brown except mesoscutellar midlobe posteriorly and scutellum lighter. Legs pale, coxae and hind femur brown. Antenna light brown (radicle, scape, and pedicel slightly darker). Flagellum six-segmented with apical two segments partially fused and sensilla overlapping.

Species group placement. E. opulenta group.

Distribution. Australia: New South Wales, Queensland, Western Australia.

Host. Unknown.

Additional material examined

New South Wales: 1♀, O'Sullivans Gap Reserve, 11 km NE Buladelah, 11 June to 27 August 1982 (S. and J. Peck) (ANIC). **Western Australia:** 1♀, Serpentine National Park, 17 November 1999 (S. and O. Schmidt) (ANIC); 1♀, Beedelup National Park, 15 November 1999 (S. and O. Schmidt) (ZSMG); 1♀, Pemberton, 14 November 1999 (S. and O. Schmidt) (ANIC); 1♀, Eagle Bay, 16 November 1999 (S. and O. Schmidt) (ZSMG); 2♀, 1♂, Walpole-Nornalup National Park, 13 November 1999 (S. and O. Schmidt) (ANIC, ZSMG); 1♀, Dwellingup, 10 October 2005 (A. Polaszek, S. and O. Schmidt), ex whitefly (ZSMG); 1♀, Bremer Bay, Little Boat Harbour Rd, 9 October 2005 (A. Polaszek, S. and O. Schmidt), ex hard-bodied whitefly (BMNH).

42. ***Encarsia justicia*** Girault
(Figures 136, 137)

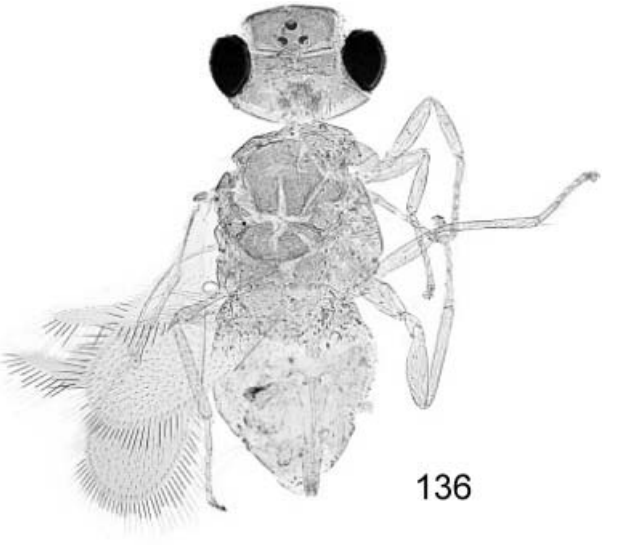
Encarsia justicia Girault 1913[167], p 187. Holotype ♀, Australia, Queensland, Nelson [=Gordonvale] (Cairns), 9 July 1913 (A. P. Dodd) (QMBA, type no. Hy. 1726, examined).

Encarsia justicia Girault: Dahms 1984, p 734. Girault: Viggiani 1985c, p 242.

Redescription (holotype)

Female. Colour: body orange yellow, head pale yellow green, antenna and legs pale yellow. Wings hyaline.

Morphology: stemmaticum with rugose-reticulate strigose surface sculpture. Antennal formula 1,1,4,2, clava not very distinct. Pedicel longer than F1 (1.24). F1 almost two times as long as its maximum width (1.89), shorter than F2 (0.85) and F3 (0.71). F2 slightly shorter than F3 (0.83). F1 and F2 without longitudinal sensilla, F3 with one or two, F4 with three distinct, and each claval segment with three distinct sensilla. Scutellar sensilla rather closely placed (approximately three to four times the maximum width of a sensillum). Distance between anterior pair of scutellar setae appearing less than distance between posterior pair. Fore wing about 3.1 times as long as width of disc. Marginal fringe about half as long as width of disc (0.52). Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with two setae. Tarsal formula 5-5-5. Apical spur of



Figures 136, 137. *Encarsia justicia* Girault, holotype female. (136) Overall view of type specimen. (137) Antenna.

midtibia slightly longer than half the length of the corresponding basitarsus (0.60). Tergites laterally with the following numbers of setae: T1: 0, T2: 2, T3: 2, T4: 2, following segments indiscernible. Ovipositor slightly longer than midtibia (1.15). Third valvula relatively long, half as long as second valvifer.

Male. Unknown.

Species group placement. E. perflava group.

Distribution. Australia: Queensland.

Host. Unknown.

Comments

The species is similar to *E. bothrocera* from Taiwan and *E. perflava* from China and India, and perhaps is conspecific with one of the two. Females of several species in the *perflava* group are very similar but males are strikingly different. However, for many species in this species group males have not been associated with females. See also comments on *E. antiopa* which could represent the male of *E. justicia*.

43. ***Encarsia kalamundae*** n. sp.
(Figures 138–140)

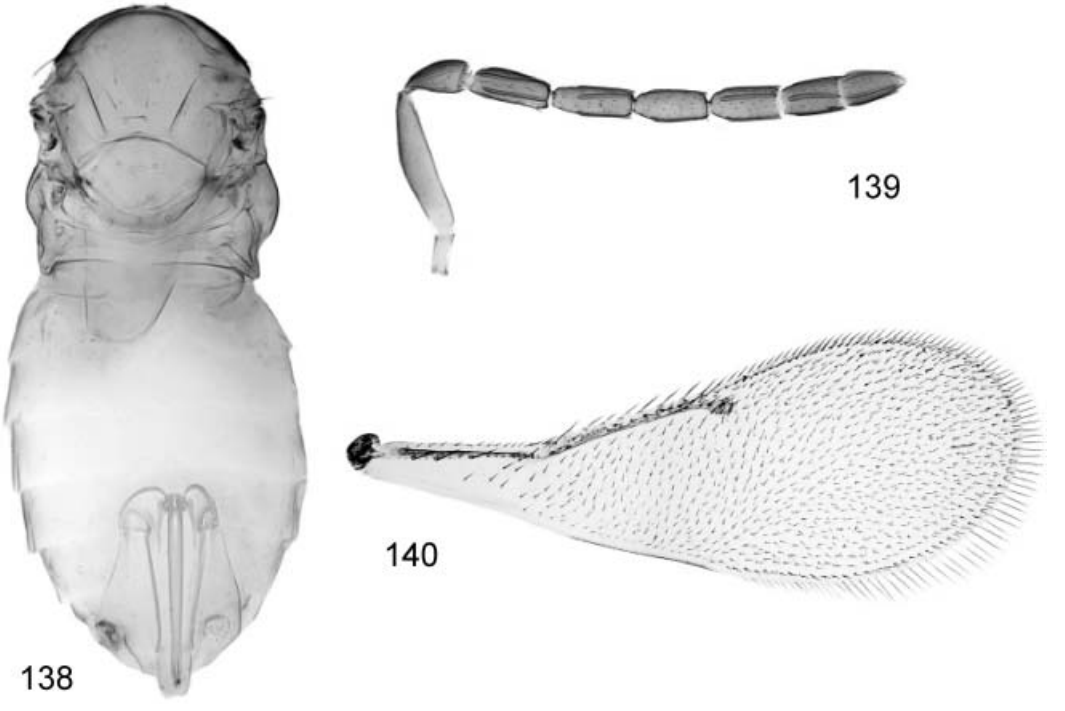
Description (holotype)

Female. Colour: head and body entirely yellow except pronotum partly brown, mesoscutal side lobe anteriorly with brown spot, and stemmaticum with small brown spots adjacent to ocelli. Fore wing hyaline. Antenna brown except radicle yellow. Legs yellow.

Morphology: antennal formula 1,1,3,3. Pedicel shorter than F1 (0.72). F1 2.7 times as long as its maximum width, subequal in length to F2 and F3. Flagellomeres with the following numbers of sensilla: F1: 1, F2: 3, F3: 2, F4: 3, F5: 3, F6: 4. Maxillary palp two-segmented. Midlobe of mesoscutum with 16 setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of less than the width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.66 times as long as width of disc. Marginal fringe 0.19 times as long as width of disc. Basal cell with six or seven setae. Submarginal vein with five setae, marginal vein anteriorly with seven or eight setae. Tarsal formula 5-5-5. Apical spur of midtibia shorter than half the length of the corresponding basitarsus (0.37). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor slightly shorter than midtibia (0.89) and 1.33 times as long as clava. Third valvula 0.28 times as long as second valvifer.

Male. Unknown.

Species group placement. E. strenua group.



Figures 138–140. *Encarsia kalamundae* n. sp., holotype female. (138) Mesosoma and gaster. (139) Antenna. (140) Fore wing.

Distribution. Australia: Western Australia.

Host. Unknown.

Material examined

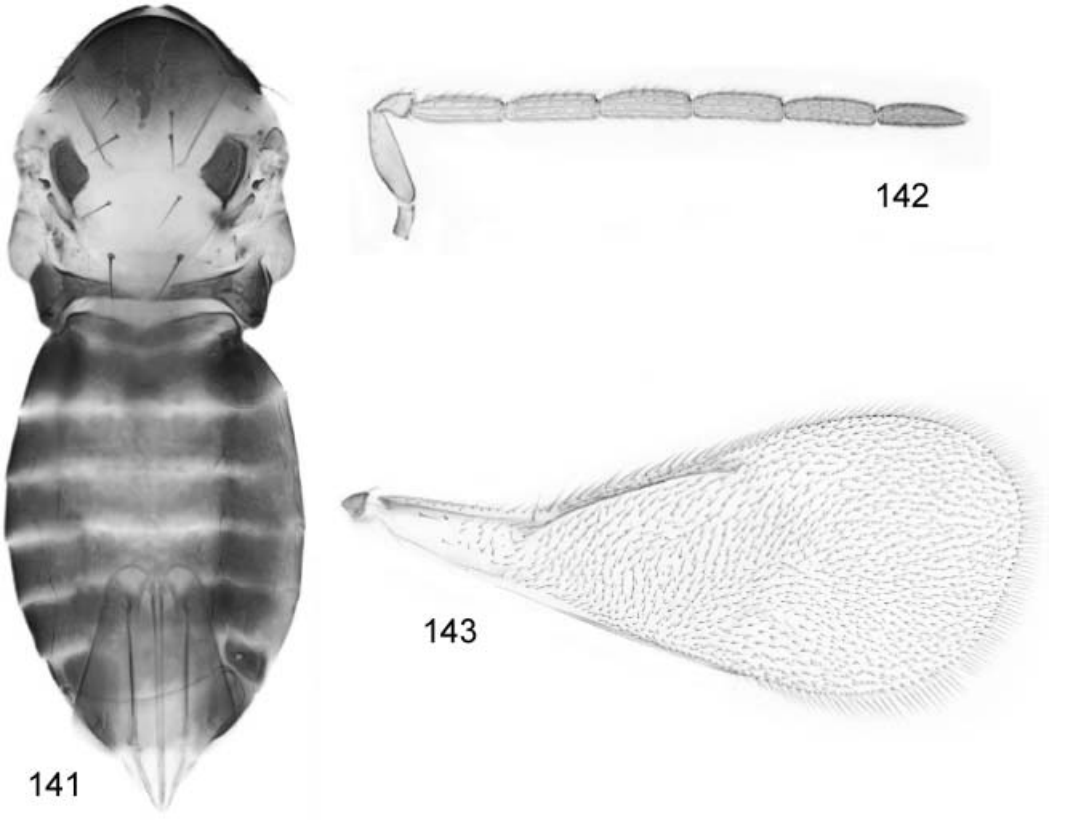
Western Australia: Holotype: ♀, Kalamunda National Park, ca 30 km E Perth, 26 December 1986 (J. S. Noyes) (ANIC).

44. ***Encarsia leptosa*** n. sp.
(Figures 141–143)

Description (holotype)

Female. Colour: head brown, upper half paler. Mesosoma brown except the following parts yellow: mesoscutal midlobe posteriorly, mesoscutal side lobes largely, inner angles of axillae, scutellum, and propodeum. Gaster brown. Antenna light brown. Fore wing with dark band behind marginal vein. Legs yellow except hind coxa brown.

Morphology: maxillary palp two-segmented. Antennal formula 1,1,6,0, i.e. clava not defined. Pedicel distinctly shorter than F1 (0.20). F1 3.1 times as long as its maximum width, subequal in length to F2 and F3. All flagellomeres with numerous (six to nine)



Figures 141–143. *Encarsia leptosa* n. sp., holotype female. (141) Mesosoma and gaster. (142) Antenna. (143) Fore wing.

sensilla. Midlobe of mesoscutum with 11 setae, side lobes with two setae each. Scutellar sensilla widely separated (approximately five times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing about 2.3 times as long as width of disc, in particular the latter densely setose. Marginal fringe short, 0.13 times as long as width of disc. Basal cell with about 20 setae. Submarginal vein with three setae, marginal vein anteriorly with 12 setae. Tarsal formula 5-5-5. Apical spur of midtibia about half the length of the corresponding basitarsus (0.46). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 1–2, T6: 3, T7 with four setae. Ovipositor subequal in length to midtibia. Third valvula 0.37 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Unknown.

Material examined

Queensland: Holotype: ♀, 14 km W by N of Hope Vale Mission (15°16′S, 144°59′E), 7–10 May 1981 (I. D Naumann), ex ethanol (ANIC).

Comments

Encarsia leptosa is similar to *E. pilosa* but can be separated by having fewer setae on the mesoscutal midlobe, presence of a medial furrow on the scutellum, lack of a clava, and two-segmented maxillary palp.

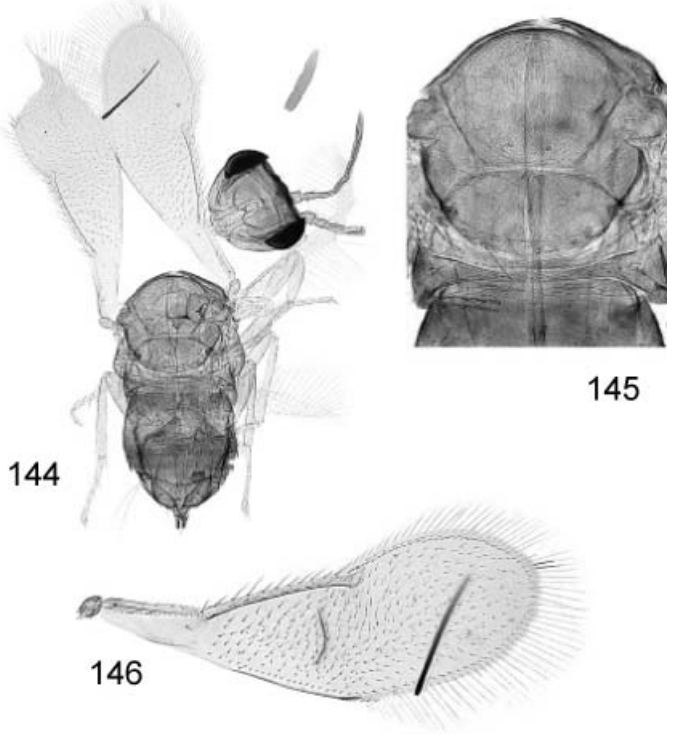
45. *Encarsia leucippi* (Girault)

(Figures 144–146)

Coccophagus leucippi Girault 1936[447], p 2. Holotype ♀, Australia, Queensland, Brisbane, Indooroopilly (QMBA, type no. T. 9163, examined).

Coccophagus leucippe Girault: Dahms 1984, p 754. Misspelling of specific epithet.

Encarsia leucippi (Girault): Viggiani 1985c, p 243–244. Change of combination.



Figures 144–146. *Encarsia leucippi* Girault, holotype female. (144) Overall view of type specimen. (145) Mesosoma. (146) Fore wing.

Redescription (holotype)

Female. Colour: head and body yellow, pronotum, mesopleuron, axilla, and propodeum darker. Gaster dark brown except T2 and apex paler. Antenna yellow-white. Fore wing hyaline. Legs white.

Morphology: antennal formula 1,1,3,3. Pedicel longer than F1 (1.3). F1 1.55 times as long as its maximum width, shorter than F2 (0.77) and F3 (0.77). F2 and F3 subequal in length. Midlobe of mesoscutum with four setae. Scutellar sensilla widely separated (approximately eight times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing about 2.9 times as long as width of disc. Marginal fringe 0.54 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with 11 setae. Basal cell with a single seta. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.71). Basitarsus of middle leg apically with distinct spine. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1 (setation of following tergites indiscernible). Ovipositor subequal in length to midtibia and 1.24 times as long as clava. Third valvula approximately 0.43 times as long as second valvifer.

Male. Unknown.

Species group placement. E. inquirenda group.

Distribution. Australia: Queensland.

Host. Unknown.

Comments

The species is similar to *E. unfasciata*, but can be separated by the denser setation of the fore wing, the longer F1 (1.55 times as long as its maximum width, whereas it is subquadrate in *unfasciata*), and the dark brown gaster (in *unfasciata* the gaster is mainly yellow).

46. *Encarsia longicauda* Hayat

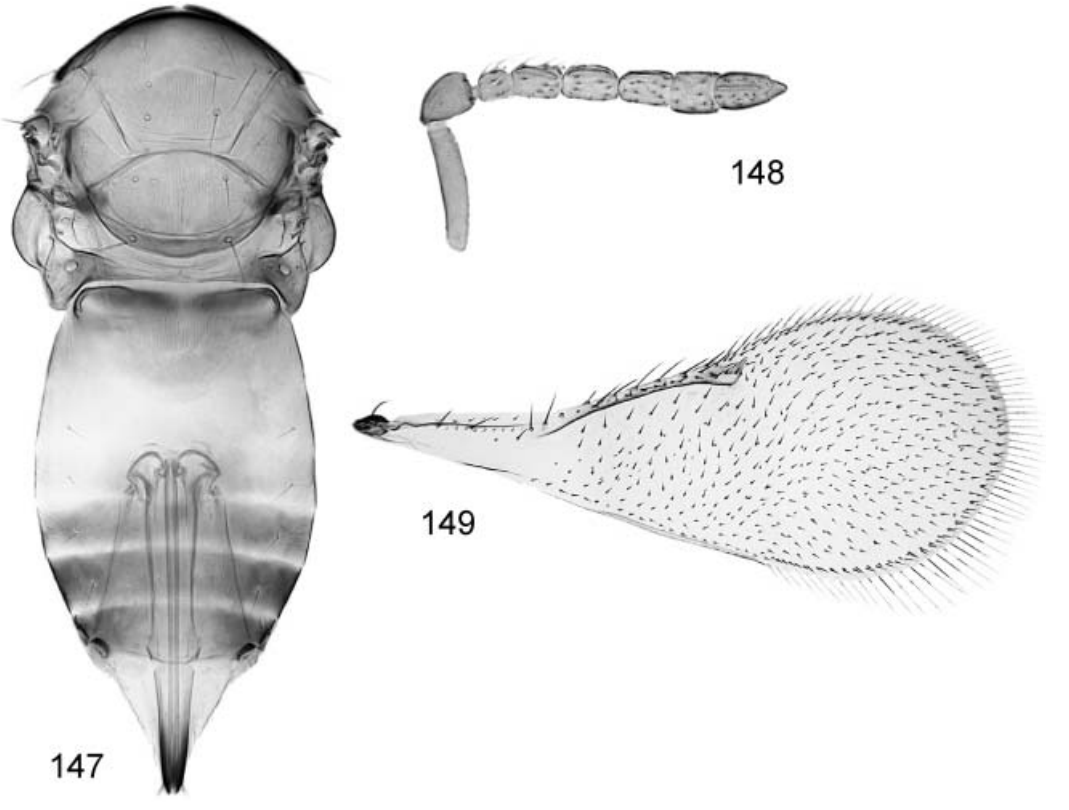
(Figures 147–149)

Encarsia longicauda Hayat 1989a, p 33. Holotype ♀, India, Tamil Nadu, Sri Rangam, February 1967 (M. Hayat), ex aleyrodids (BMNH, examined).

Encarsia longicauda Hayat: Hayat 1998, p 196–197, Huang and Polaszek 1998, p 1904–1906.

Diagnosis

Female. Colour: head yellow with light brown markings. Mesosoma yellow except following parts brown: pronotum, mesoscutum anteriorly, axillae slightly except posteromesal corner, mesopleuron and propodeum laterally. Gaster yellow, petiole brown, T1 anteriorly slightly brown, T4–T6 brown. Antenna pale. Fore wing yellow, very slightly infuscate behind marginal vein. Legs yellow.



Figures 147–149. *Encarsia longicauda* Hayat, female. (147) Mesosoma and gaster. (148) Antenna. (149) Fore wing.

Morphology: stemmaticum with transversely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel distinctly longer than F1 (1.60–1.71). F1 short, 1.30–1.31 times as long as its maximum width, subequal to half the length of F2 (0.54) and distinctly shorter than F3 (0.61–0.62). F2 slightly longer than F3 (1.14–1.19). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 3, F3: 2–3, F4: 2–3, F5: 3, F6: 3. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla widely separated (approximately six to seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly smaller than or subequal to distance between posterior pair. Fore wing about 2.3 times as long as width of disc. Marginal fringe 0.20–0.24 times as long as width of disc. Basal cell with two to four setae. Submarginal vein with two setae, marginal vein anteriorly with seven setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.67). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 conically elongated, with four setae. Ovipositor longer than midtibia (1.38–1.39) and 2.27–2.36 times as long as clava. Third valvula 0.65 times as long as second valvifer.

Male. Body dark brown except mesoscutellar midlobe posteriorly and scutellum lighter. Legs pale, coxae, and hind femur brown. Antenna light brown (radicle, scape, and pedicel slightly darker). Flagellum six-segmented with apical two segments fused and sensilla overlapping.

Species group placement. *E. opulenta* group.

Distribution. Australia: Western Australia. China, India.

Host. Aleyrodidae: *Dialeuropora decempuncta* (Quaintance and Baker) The following additional hosts have been recorded: *Aleurotuberculatus murrayae* (Singh) (Huang and Polaszek 1998), indet. aleyrodids on *Tephrosia purpurea* (L.) Pers. (Fabaceae) and indet. plants (Hayat 1998).

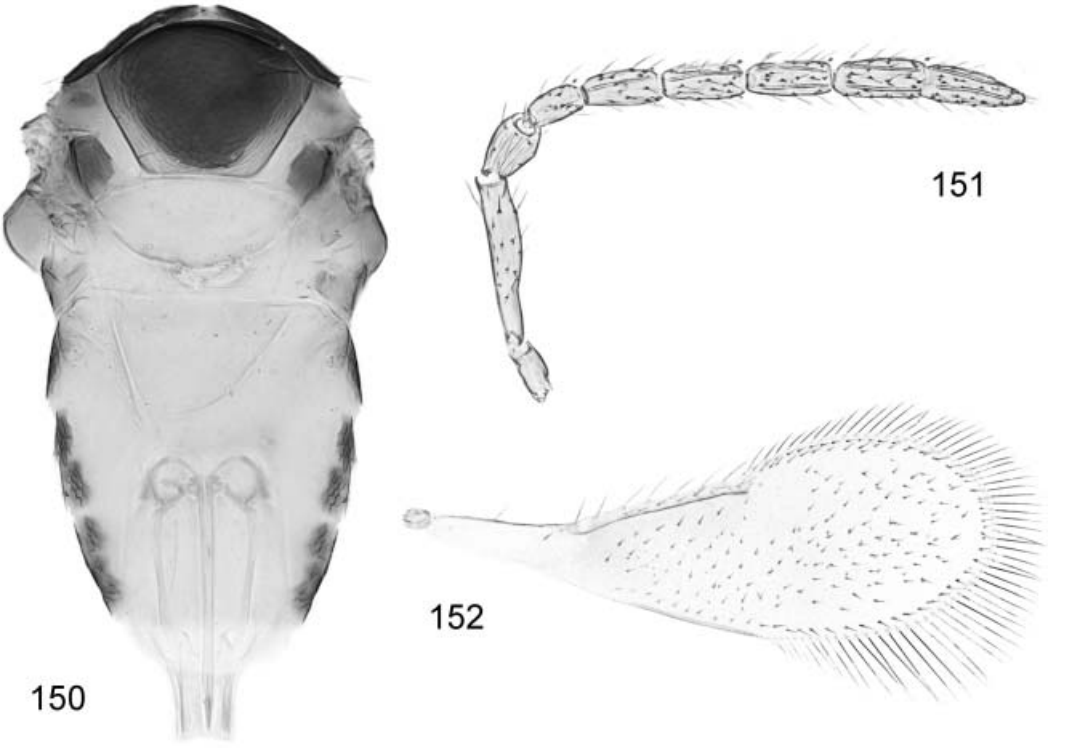
Additional material examined

Western Australia: 6♀, Purnululu National Park, Piccadinny car park, 9 May 2000 (S. and O. Schmidt), ex *Dialeuropora decempuncta* (ANIC, ZSMG).

47. ***Encarsia longifasciata*** Subba Rao
(Figures 150–152)

Encarsia longifasciata Subba Rao 1984: 260. Holotype ♀, India, Bangalore, 20 June 1983 (C. Peter), ex blackfly on *Murraya* (BMNH, examined).

Encarsia longifasciata Subba Rao: Hayat 1989a, p 29–30; Polaszek et al. 1992, p 384; Viggiani and Ren 1993, p 223; Chou et al. 1996, p 198; Hayat 1998, p 192; Huang and Polaszek 1998, p 1906–1907; Pedata and Polaszek 2004, p 371.



Figures 150–152. *Encarsia longifasciata* Subba Rao, female. (150) Mesosoma and gaster. (151) Antenna. (152) Fore wing.

Diagnosis

Female. Colour: head dark brown. Mesosoma yellow, following parts dark brown: pronotum, midlobe of mesoscutum posteriorly and posterolaterally, side lobes anteriorly, axillae except posteriorly, mesopleuron, and propodeum laterally. Gaster yellow, T1–T5 laterally with brown spots forming a narrow stripe. Antenna yellow. Fore wing hyaline, very slightly infuscate behind marginal vein. Legs yellow.

Morphology: antennal formula 1,1,4,2. Pedicel subequal in length to F1. F1 1.83 times as long as its maximum width, shorter than F2 (0.73) and F3 (0.71). F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 1, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum only with posterior pair of setae, side lobes with two setae each. Scutellar sensilla moderately separated (approximately three times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.7 times as long as width of disc, sparsely setose, with distinct bare area near anterior margin proximal of stigmal vein. Marginal fringe 0.47 times as long as width of disc. Basal cell with one to two setae. Submarginal vein with two setae, marginal vein anteriorly with five setae. Tarsal formula 5-5-5. Apical spur of midtibia about half as long as the corresponding basitarsus (0.54). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor slightly longer than midtibia (1.09) and 1.77 times as long as clava. Third valvula apically truncate, 0.53 times as long as second valvifer.

Male. Unknown.

Species group placement. E. longifasciata group.

Distribution. Australia: Western Australia. China, India, Indonesia, Japan, Pakistan, Taiwan, Thailand.

Host. Aleyrodidae: *Xenaleyrodes* sp. The following additional hosts have been recorded (Viggiani and Ren 1993; Huang and Polaszek 1998; Pedata and Polaszek 2004): *Aleurocanthus spiniferus* (Quaintance), *A. woglumi* Ashby, *Aleuroclava* sp., *Aleurolobus marlatti* (Quaintance), *A. niloticus* Priesner and Hosny, *A. setigerus* Quaintance and Baker, *A. rhododendri* Takahashi, *Bemisia tabaci* (Gennadius), *Dialeurodes citri* (Ashmead).

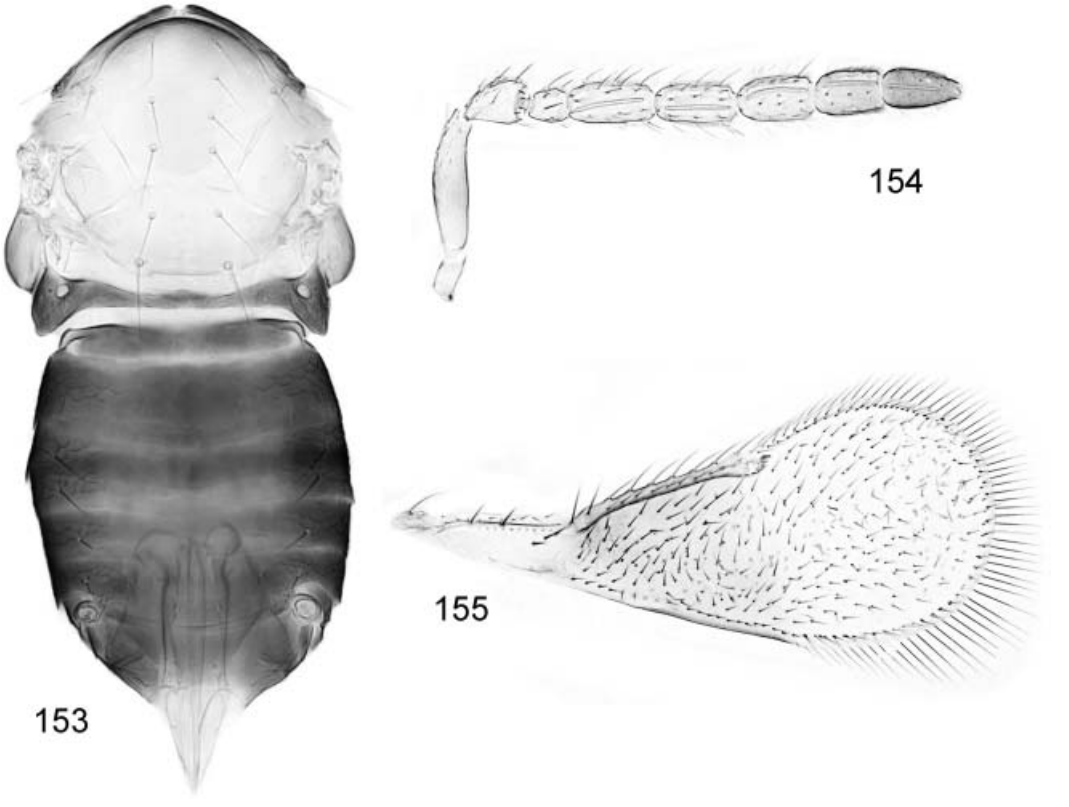
Additional material examined

Western Australia: 1♀, Purnululu National Park, 8 May 2000 (S. and O. Schmidt), ex *Xenaleyrodes* sp. on *Lophostemon grandiflorus* (Benth.) Peter G. Wilson and J. T. Waterh. (Myrtaceae) (ZSMG).

48. *Encarsia longisetosa* n. sp.
(Figures 153–155)

Description (holotype)

Female. Colour: head yellow except postgena largely brown. Mesosoma yellow except pronotum, mesoscutal midlobe anteriorly, and propodeum brown. Gaster brown, T7 pale



Figures 153–155. *Encarsia longisetosa* n. sp., holotype female. (153) Mesosoma and gaster. (154) Antenna. (155) Fore wing.

at apex. Antenna yellow, apical segment brown. Fore wing with dark band behind marginal vein. Legs yellow.

Morphology: stemmaticum with rugosely reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.33). F1 1.33 times as long as its maximum width, subequal to half the length of F2 (0.47) and F3 (0.52). F2 slightly longer than F3 (1.06). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with nine setae (usually probably eight or 10), setae very long, posterior setae longer than their distance to each other, side lobes with two setae each. Scutellar sensilla rather close together (approximately 1.5 times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than distance between posterior pair. Fore wing about 2.4 times as long as width of disc. Marginal fringe 0.32 times as long as width of disc. Basal cell with three setae. Submarginal vein with two setae, marginal vein anteriorly with seven setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to corresponding basitarsus. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with seven setae. Ovipositor subequal in length to midtibia and 1.46 times as long as clava. Third valvula about 0.6 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Unknown.

Material examined

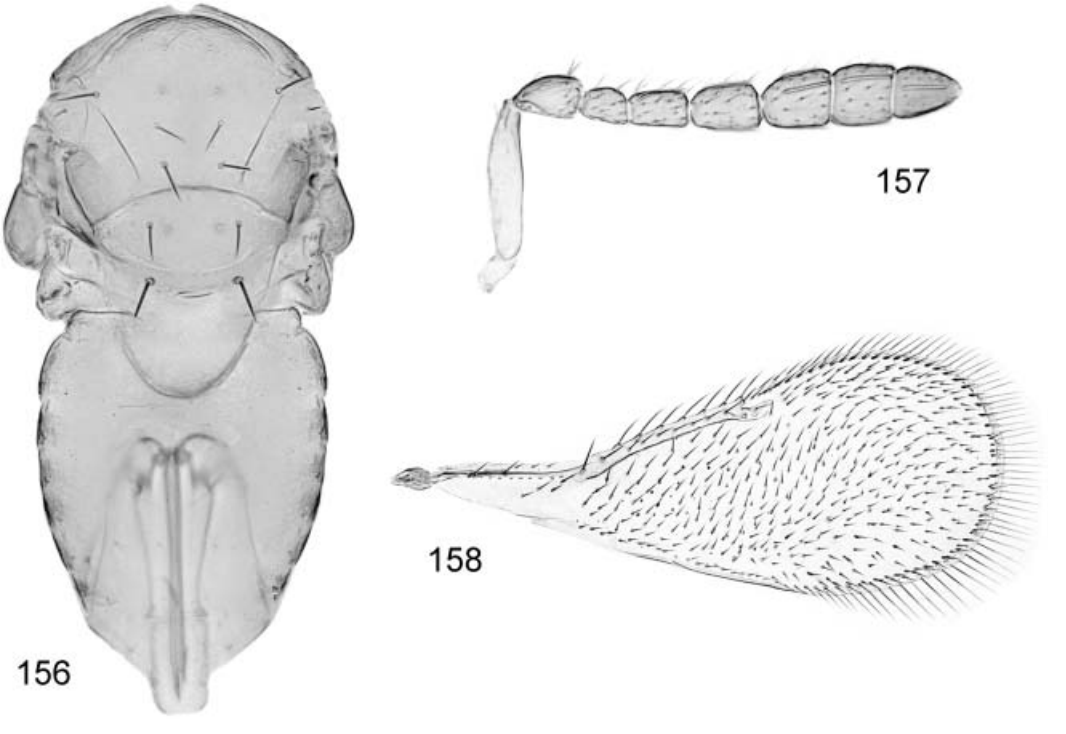
Queensland: Holotype: ♀, Heathlands (11°45′S, 142°35′E), 1–21 March 1992 (P. Feehney) Malaise #2 dump (ANIC).

49. *Encarsia longispina* n. sp.
(Figures 156–158)

Description (holotype)

Female. Colour: head and body yellow except pronotum, axillae, and mesopleuron brown. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.38). F1 1.33 times as long as its maximum width, shorter than F2 (0.80) and F3 (0.70). F2 slightly shorter than F3 (0.87). Flagellomeres with the following



Figures 156–158. *Encarsia longispina* n. sp., holotype female. (156) Mesosoma and gaster. (157) Antenna. (158) Fore wing.

numbers of sensilla: F1: 0, F2: 1, F3: 2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with 10 setae, arranged symmetrically. Scutellar sensilla widely separated (approximately five times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing 2.4 times as long as width of disc. Marginal fringe 0.31 times as long as width of disc. Basal cell with four setae. Submarginal vein with two setae, marginal vein anteriorly with seven setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than length of corresponding basitarsus (1.25). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.21) and 2.76 times as long as clava. Third valvula 0.50 times as long as second valvifer, appearing truncate at apex.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Unknown.

Material examined

Queensland: Holotype: ♀, Cockatoo Creek Xing, 17 km NW Heathlands (11°39′S, 142°27′E), 22 March to 25 April 1992 (T. McLeod), open forest, Malaise #5 (ANIC).

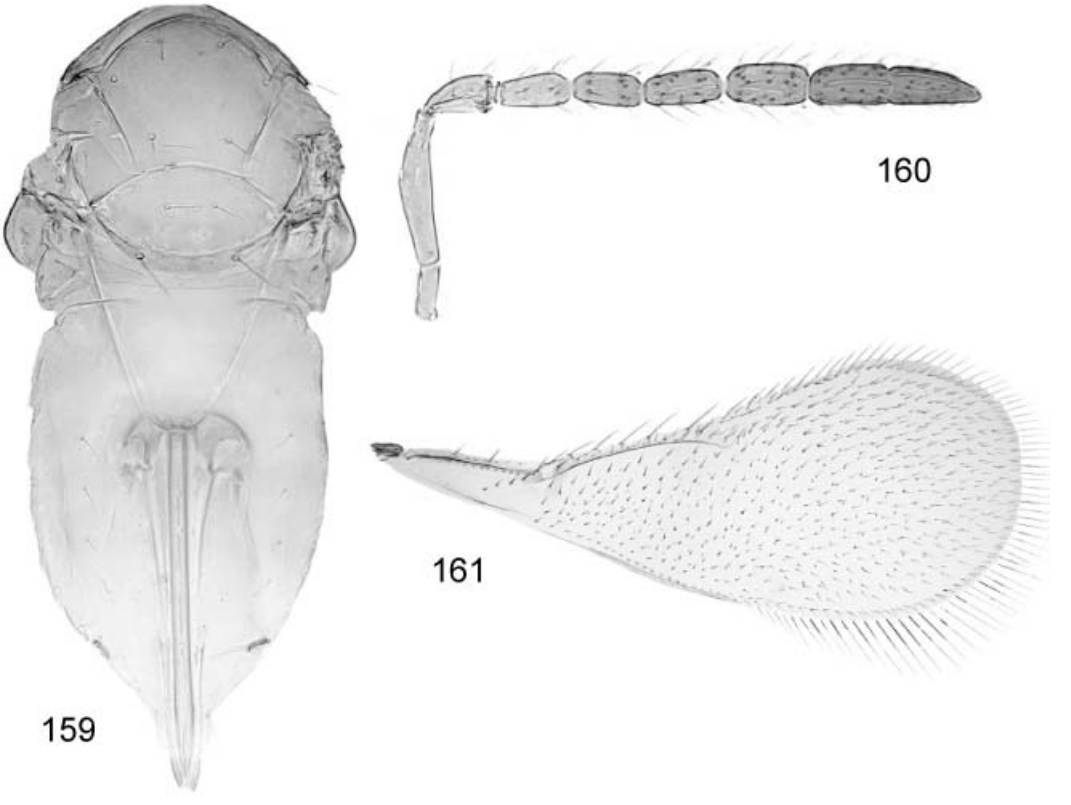
50. ***Encarsia longivalvula*** Viggiani
(Figures 159–161)

Encarsia longivalvula Viggiani 1985b, p 85–86. Holotype ♀, Pakistan, Peshawar, October 1981, ex *Dialeuropora decempuncta* on *Rosa indica* (Rosaceae) (DEUN, examined).
Encarsia longivalvula Viggiani: Hayat 1989a, p 74. Huang and Polaszek 1998, p 1907–1909.

Diagnosis

Female. Colour: head and body completely yellow except ocellar triangle with brown spot and antenna brown towards apex. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with indiscernible surface sculpture. Antennal formula 1,1,4,2. Pedicel subequal in length to F1. F1 2.17 times as long as its maximum width, subequal in length to F2 and F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 1, F4: 1, F5: 2, F6: 2. Midlobe of mesoscutum with six setae, four near anterior and two near posterior margin, setae with very distinct bases of equal diameter, side lobes with two setae each, placed in the centre of the anterior third of the axilla. Scutellar sensilla close together, separated by a distance of about half the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.4 times as long as width of disc. Marginal fringe 0.31 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with three or four setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to the corresponding basitarsus. Tergites laterally with the following numbers of setae: T1: 0, T2: 1,



Figures 159–161. *Encarsia longivalvula* Viggiani, female. (159) Mesosoma and gaster. (160) Antenna. (161) Fore wing.

T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than middle tibia (1.45) and 2.85 times as long as clava. Third valvula 0.6 times as long as second valvifer. Basal seta of third valvula removed from base about 0.4 along the length of the valvula.

Male. Unknown.

Species group placement. E. strenua group (placed in *coryli* group by Viggiani (1985b), and in the *strenua* group by Hayat (1989a, 1998)).

Distribution. Australia: Western Australia. Pakistan, Taiwan.

Host. Not reared in the study area, but elsewhere the species has been reared from the following hosts (Viggiani 1985b; Huang and Polaszek 1998): Aleyrodidae: *Bemisia tabaci* (Gennadius), *Dialeurodes citri* (Ashmead), *D. tetrastigmae* Takahashi, *Dialeuropora decempuncta* (Quaintance and Baker).

Additional material examined

Western Australia: Holotype: ♀, Purnululu National Park, 8 May 2000 (S. and O. Schmidt) (ZSMG).

51. *Encarsia lounsburyi* (Berlese and Paoli)
(Figures 162–164)

Prospaltella lounsburyi Berlese and Paoli 1916, p 305. Syntypes ♀, Madeira, ex *Chrysomphalus dictyospermi* Morgan (ISZA, not examined)

Aspidiotiphagus lounsburyi (Berlese and Paoli): Berlese 1917, p 12–13. Change of combination.

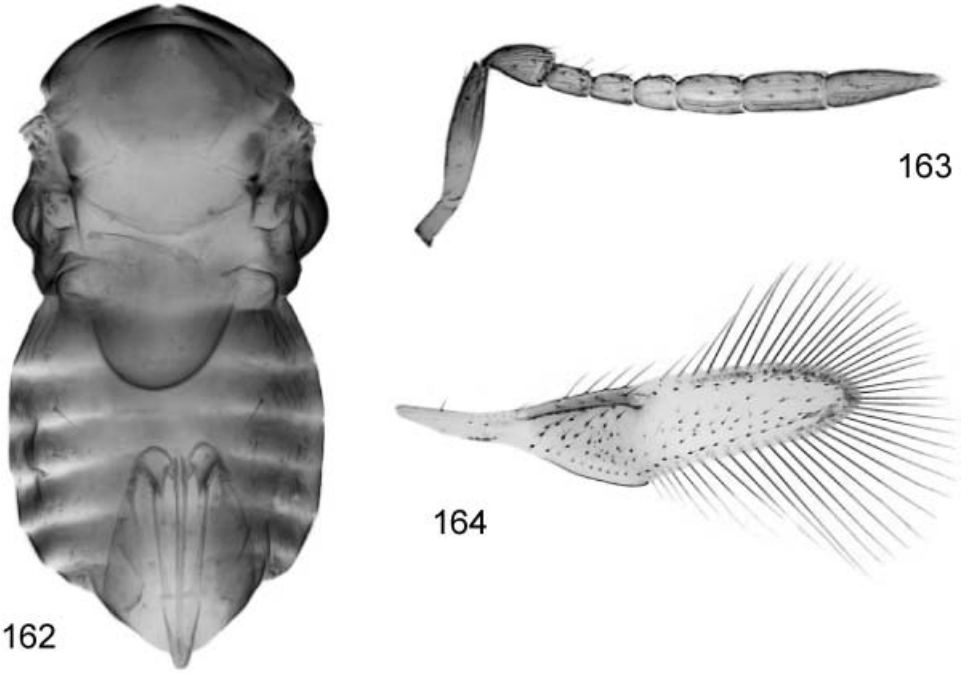
Aspidiotiphagus lounsburyi (Berlese and Paoli): Dozier 1926, p 275–277; Paoli 1926, p 97; Silvestri 1929, p 903; Mercet 1930, p 69; Compere 1936, p 294; De Santis 1948, p 231–233; Flanders 1953, p 268; Thompson 1953, p 9; 1956, p 18; Alam 1956, p 259; Ferrière 1965, p 147; Nikol'skaya and Yasnosh 1966, p 258; Herting 1972, p 163; DeBach and Rose 1981, p 673.

Hispaniella africana Hill 1970, p 97–99. Synonymy by Subba Rao 1984.

Encarsia lounsburyi (Berlese and Paoli): Viggiani and Mazzone 1979, p 47; Viggiani 1987b, p 153; Hayat 1989a, p 12; Viggiani and Ren 1993, p 227; Huang 1994, p 199; Polaszek et al. 1999, p 152.

Diagnosis

Female. Colour: head brown, vertex paler except two transverse stripes. Mesosoma yellow except pronotum, mesoscutum anteriorly, axillae partly, mesopleuron, and propodeum laterally brown. Metasoma predominantly brown. Antenna yellow-brown with apex slightly darkened. Fore wing with dark band behind marginal vein. Legs yellow.



Figures 162–164. *Encarsia lounsburyi* Berlese and Paoli, female. (162) Mesosoma and gaster. (163) Antenna. (164) Fore wing.

Morphology: stemmaticum with transversely strigose surface sculpture. Antennal formula 1,1,3,3, apical segment conical. Pedicel longer than F1 (1.50). F1 1.60 times as long as its maximum width, subequal to F2 and F3, third funicular segment broader than first and second. F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 0, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with four setae, arranged symmetrically, side lobes with one seta each. Scutellar sensilla widely separated (approximately seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly greater than between posterior pair. Fore wing with bare area near stigmal vein, about 4.5 times as long as width of disc. Marginal fringe 1.72 times as long as width of disc. Basal cell without setae. Submarginal vein with one seta, marginal vein anteriorly with four setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.70). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 0, T5: 2, T6: 2, T7 with four setae. Ovipositor slightly shorter than midtibia. Third valvula 0.60 times as long as second valvifer.

Male. Unknown.

Species group placement. E. citrina group.

Distribution. Australia: Australian Capital Territory, Norfolk Island. Cosmopolitan.

Host. Not reared in the study area, but elsewhere the species has been reared from the following hosts: Diaspididae: *Aonidiella aurantii* (Maskell) (Huang and Polaszek 1998), *Chrysomphalus dictyospermi* (Morgan) (Berlese and Paoli 1916), *Parlatoria zizyphi* (Lucas) (Silvestri 1929), *Carulaspis visci* (Schrank), *Chrysomphalus aonidum* L., *Chrysomphalus* sp., *Cornuaspis* (=*Lepidosaphes*) *beckii* (Peck 1963), *Hemiberlesia* sp. (Ren 1988).

Material examined

Australian Capital Territory: Blundell Creek, 3 km E of Piccadilly Circus (35°22′S, 148°50′E), 850 m, February 1984 (Weir, Lawrence, Johnson) (ANIC). **Norfolk Island:** 1♀, Rocky Point Reserve, 14 November to 2 December 1984 (I. D. Naumann) (ZSMG).

Comments

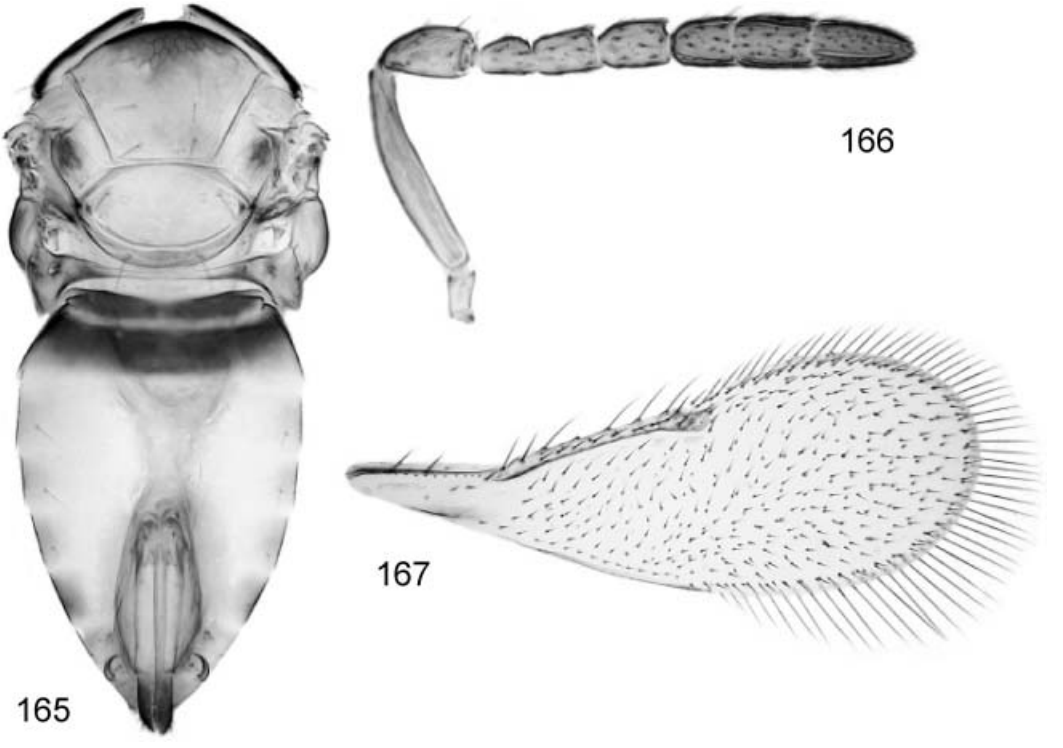
Similar to *E. citrina* but with only a single seta on the submarginal vein, whereas in *E. citrina* there are two.

52. *Encarsia lutea* (Masi)

(Figures 165–167)

Prospaltella lutea Masi 1909, p 25. Syntypes ♀, Italy, Campania, Portici (DEUN, examined).

Coccophagus sanctus Girault 1928[224], p 3. Holotype ♀, Australia, Queensland, Tingoora, 17 March 1923 (QMBA, type no. T. 3848, examined). **Syn. nov.**



Figures 165–167. *Encarsia lutea* (Masi), female. (165) Mesosoma and gaster. (166) Antenna. (167) Fore wing.

Encarsia sancta (Girault): Viggiani 1985c, 246–247. Change of combination.
Coccophagus sanctus Girault: Dahms 1986, p 500.
Encarsia lutea (Masi): Ferrière 1965, p 132; Viggiani and Mazzone 1979, p 46; 1980, p 51; Hayat 1981, p 466; 1986, p 162; 1989a, p 48–50; Viggiani 1987b, p 155–156; Ren 1988, p 396; Polaszek et al. 1992, p 384; 1999, p 154–156; Viggiani and Ren 1993, p 223; Schauff et al. 1996, p 21; Huang and Polaszek 1998, p 1912–1914; Schmidt et al. 2001, p 379.

Diagnosis

Female. Colour: head yellow with dark transverse band, vertex slightly darkened. Mesosoma yellow except pronotum, anteromedian patch on mesoscutum, axillae, and propodeum largely brown. Metasoma yellow except brown at base and laterally more or less darkened. Third valvula at least partly brown, contrasting with pale remaining ovipositor. Antenna yellow. Fore wing hyaline. Legs pale yellow.

Morphology: stemmaticum with rugosely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel distinctly longer than, and up to twice as long as, F1 (1.53–2.05). Antenna relatively stout, F1 almost quadrate and shorter than F2 (0.65–0.86) and F3 (0.68–0.86). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 1–2, F4: 2–3, F5: 2–3, F6: 2–3. Midlobe of mesoscutum with (4–)6–8 setae, side lobes with three setae each. Scutellar sensilla widely separated (approximately nine times the

maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly greater than between posterior pair. Fore wing 2.6–2.8 times as long as width of disc. Marginal fringe 0.37–0.47 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six to eight setae. Basal cell with one to two setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.73–0.87). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor slightly shorter than midtibia (0.80–0.84) and 0.92–1.25 times as long as clava. Third valvula 0.34–0.38 times as long as second valvifer.

Male. Body dark brown, mesoscutellar midlobe posteriorly, scutellum and legs lighter. Head brown except vertex with paler areas. Antenna pale, second and third funicular segments with distinct glandular complex (Pedata et al. 1995), apical two segments fused.

Species group placement. E. lutea group.

Distribution. Australia: Queensland, Western Australia. Cosmopolitan.

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius). The following additional hosts have been recorded (Chou et al. 1996; Hayat 1989a; Huang and Polaszek 1998; Ren 1988; Viggiani 1987b; Yasnosh 1989): *Acaulaleyrodes citri* (Priesner and Hosny), *Aleurocanthus cinnamomi* Takahashi, *A. zizyphi* Priesner and Hosny, *Aleurolobus marlatti* (Quaintance), *A. niloticus* Priesner and Hosny, *A. rhododendri* Takahashi, *A. setigerus* Quaintance and Baker, *A. wunni* (Ryberg), *Aleuroplatus pectiniferus* Quaintance and Baker, *Aleurotrachelus jelineki* (Frauenfeld), *A. rubi* (Takahashi), *Aleurotuberculatus acubae* (Kuwana), *A. ficicola* Takahashi, *A. gordoniae* Takahashi, *A. jasmini* Takahashi, *A. malloti* Takahashi, *A. mellastomae* Takahashi, *A. psidii* (Singh), *Aleyrodes lonicerae* Walker, *A. proletella* (Linnaeus), *Asterobemisia carpini* (Koch), *A. atraphaxinus* (Danzig), *Bemisia ovata* (Goux), *B. porteri* Corbett, *B. salicaria* Danzig, *Bulgarialeurodes cotesii* (Maskell), *Dialeurodes citri* (Ashmead), *D. formosoanensis* Takahashi, *D. kirkaldyi* (Kotinsky), *Pealius mori* (Takahashi), *P. setosus* Danzig, *Singhius hibisci* (Kotinsky), *Siphoninus phillyreae* (Haliday), *Taiwanaleyrodes meliosmae* Takahashi, *Tetralicia* sp., *Trialeurodes abutiloneus* (Haldeman), *T. vaporariorum* (Westwood).

Additional material examined

Queensland: 1♀, Ayr, 13 September 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* L. (Asteraceae) (ANIC, ZSMG); 1♀, Dalby, 3 April 1997 (B. A. Franzmann), ex *Bemisia tabaci* on *Gossypium hirsutum* L. (Malvaceae) (ANIC). **Western Australia:** 2♀, Wanneroo, 1 October 1996 (P. De Barro), ex *Bemisia tabaci* on *Hibiscus* sp. (Malvaceae) (ANIC).

Comments

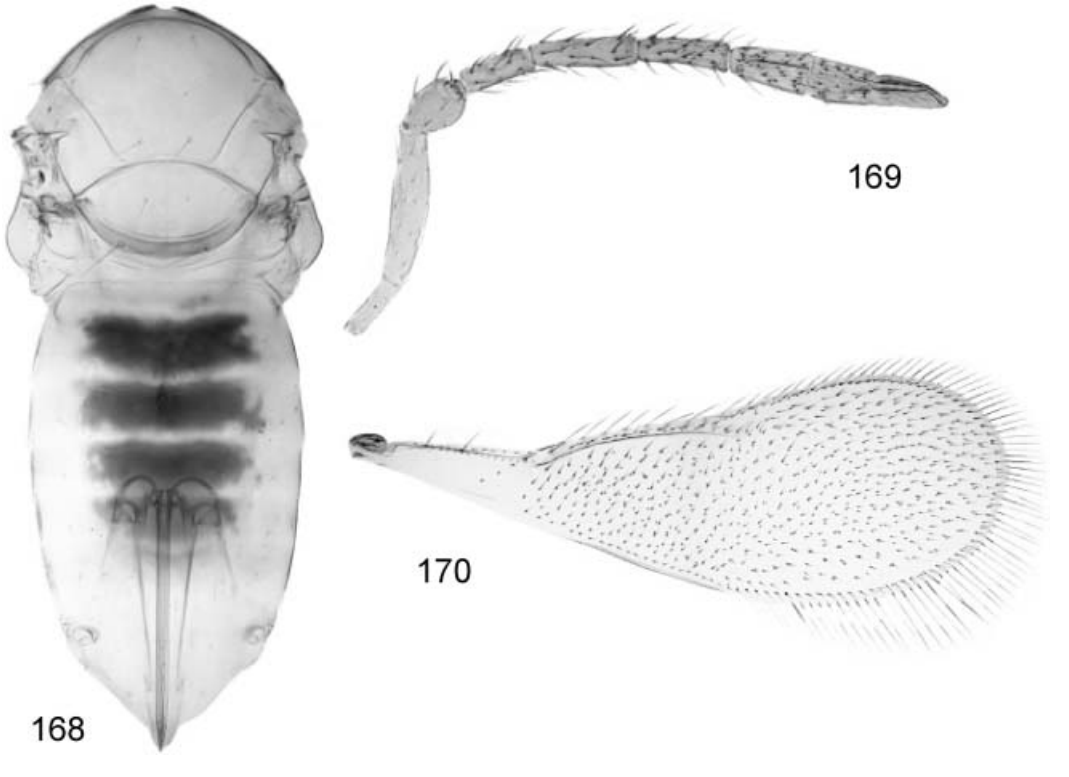
Although morphologically rather uniform in the Australian and Pacific regions, *E. lutea* exhibits large colour variation in other regions (Viggiani and Ren 1993; Huang and Polaszek 1998). The morphology and colour pattern of *E. sancta* fall clearly within the range of variation observed in *E. lutea*.

53. *Encarsia maculata* n. sp.
(Figures 168–170)

Description (holotype)

Female. Colour: head yellow except stemmaticum with small brown spots adjacent to ocelli. Mesosomal yellow, pronotum slightly brown. Gaster yellow except T1–T5 with transverse brown band forming a large spot. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel subequal in length to F1. F1 2.72 times as long as its maximum width, distinctly shorter than F2 (0.67) and F3 (0.76). F2 longer than F3 (1.13). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 2, F4: 2, F5: 2, F6: 2–3. Midlobe of mesoscutum with seven setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of slightly more than the width of a sensillum (1.2). Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.8 times as long as width of disc, disc near posterior margin with sparsely setose area. Marginal fringe 0.34 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven setae. Basal cell with three setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.83). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.2) and about 1.9 times as long as clava. Third valvula 0.30 times as long as second valvifer.



Figures 168–170. *Encarsia maculata* n. sp., holotype female. (168) Mesosoma and gaster. (169) Antenna. (170) Fore wing.

Male. Unknown.

Species group placement. Not established.

Distribution. Western Australia.

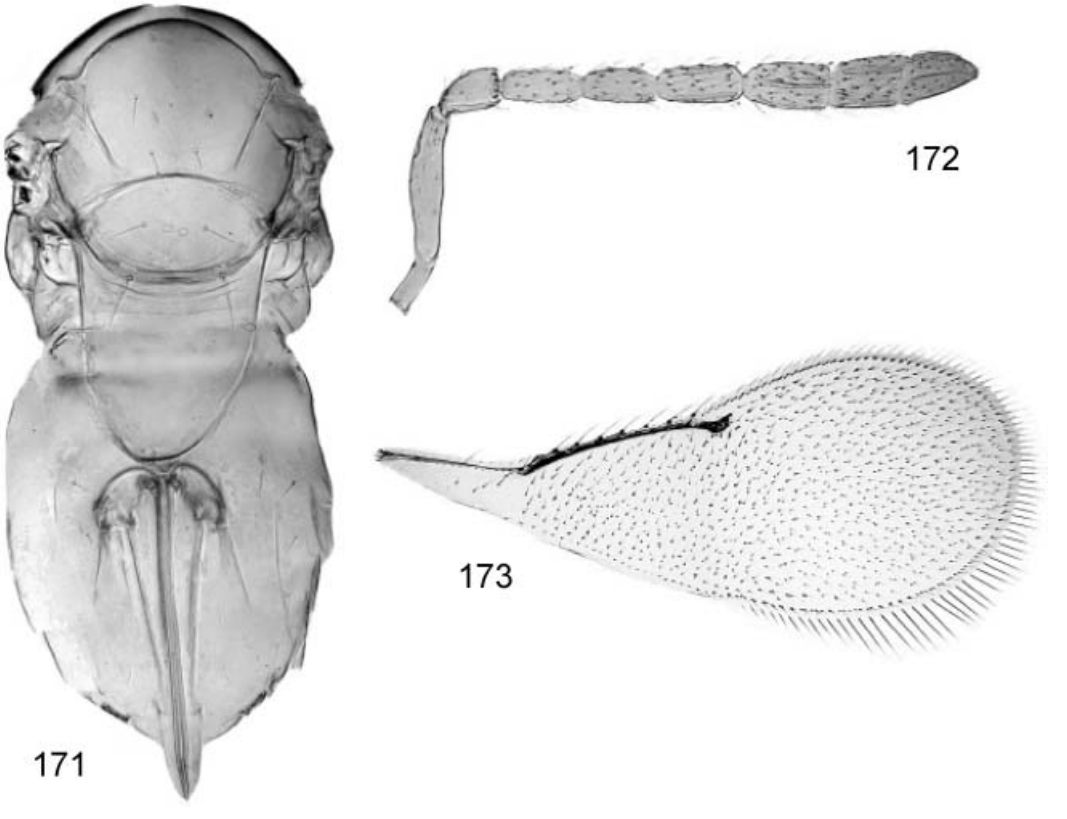
Host. Aleyrodidae: *Dialeurodes* sp.

Material examined

Western Australia: Holotype ♀, Purnululu National Park, 8 May 2000 (S. and O. Schmidt), ex *Dialeurodes* sp. (ANIC).

54. *Encarsia maria* (Girault)
(Figures 171–173)

Coccophagus maria Girault 1931[435], p 3. Lectotype ♀, **here designated**, Australia, Queensland, Miles, January 1924 (QMBA, type no. T. 4010, examined). Paralectotypes 2♀ and 3♂, same data as lectotype. According to Girault's unpublished collecting data they were ''reared from coccids on 'pine''' (Dahms 1984, p 794). All



Figures 171–173. *Encarsia maria* Girault, female. (171) Mesosoma and gaster. (172) Antenna. (173) Fore wing.

type specimens are on the same slide but under two different cover slips. The lectotype is the *maria* specimen further to the right under the cover slip in the centre of the slide, located between the other cover slip on the left and the label on the right.

Coccophagus maria Girault: Dahms 1984, p 794–795.

Encarsia maria (Girault): Viggiani 1985c, p 244. Change of combination.

Redescription

Female. Colour: head yellow except stemmaticum brown. Mesosoma yellow, pronotum, anterior margin of mesoscutal midlobe and T1 anteriorly more or less brown; following tergites laterally very slightly brown and T3–T6 with very faint transverse brown band. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology [in square brackets measurements of lectotype]: antennal formula 1,1,3,3. Pedicel subequal in length to F1 (0.80–1.00) [1.00]. F1 2.5–2.7 [2.7] times as long as its maximum width, subequal in length to F2 and slightly shorter than F3 (0.79–1.00) [1.00]. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 2–3, F4: 2–3, F5: 3, F6: 3. F6 dorsally at apex with indentation. Midlobe of mesoscutum with 8–10 setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.4 times as long as width of disc. Marginal fringe 0.26–0.28 [0.26] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six or seven setae. Basal cell with six to eight setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.73–0.86) [0.81]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.31–1.43) [1.31] and 2.06–2.37 [2.27] times as long as clava. Third valvula 0.33–0.39 [0.33] times as long as second valvifer.

Male. Darker than female, gaster mostly and pronotum brown. Flagellum five-segmented, F5 and F6 fused and longitudinal sensilla partly overlapping.

Species group placement. E. strenua group.

Distribution. Australia: Queensland, South Australia.

Host. Aleyrodidae: *Aleuromarginatus* sp.

Additional material examined

South Australia: 1♀, Teatree Gully, 25 October 1958 (R. V. Southcott) (ANIC); 1♀, Mt Ngungun, 2001 (P. De Barro), ex *Aleuromarginatus* sp. (ZSMG).

Comments

The species is similar to *E. protransvena*, but with broader fore wing (2.4 times as long as wing width, whereas it is 2.6–2.8 times in *protransvena*), setae on mesoscutal midlobe of similar size (in *protransvena* the anterolateral and posterior setae are much stouter than the medial setae), and body with brown colour pattern (*protransvena* is completely yellow).

55. ***Encarsia marxi*** (Girault)
(Figures 174–176)

Coccophagus marxi Girault 1936[446], p 1. Holotype ♀, Australia, Queensland, Brisbane, Indooroopilly, December 1929 (QMBA, type no. T. 9201, examined).
Coccophagus marxi Girault: Dahms 1984, p 796.
Encarsia marxi (Girault): Viggiani 1985c, p 244–245. Change of combination.

Redescription (holotype)

Female. Colour: head and body yellow, pronotum, axillae partly and mesopleuron darker. Gaster yellow except T3–T6 with dark transverse bands (according to Girault's description, indiscernible in type specimen). Antenna brown. Fore wing hyaline. Legs yellow.

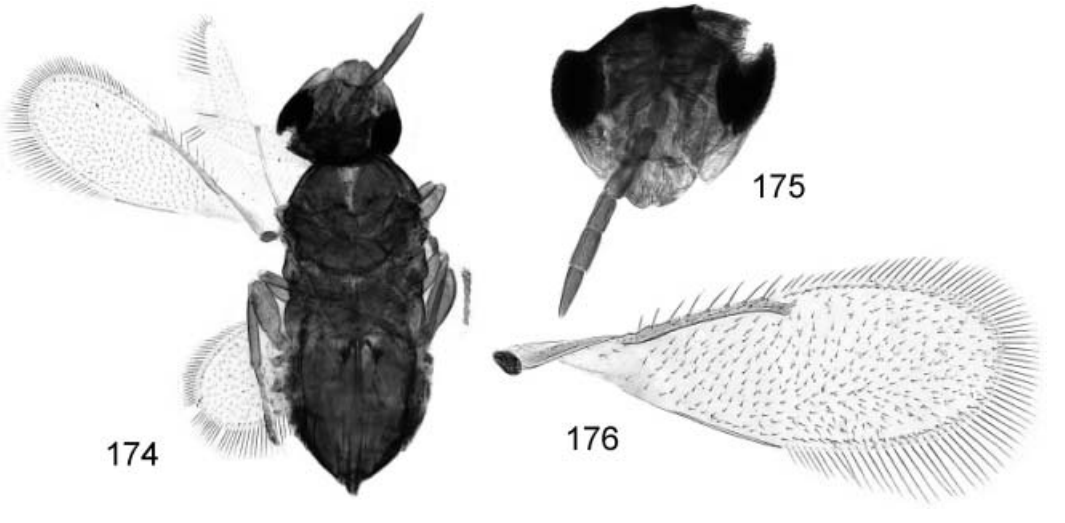
Morphology: antennal formula 1,1,3,3, apical segment appears conical. Pedicel subequal in length to F1. F1 about two times as long as its maximum width, subequal in length to F2, and slightly shorter than F3 (0.83). F2 slightly shorter than F3 (0.83). Scutellar sensilla widely separated. Fore wing about 2.8 times as long as width of disc. Marginal fringe 0.39 times as long as width of disc. Basal cell with three setae. Marginal vein anteriorly with eight setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus (0.75). Ovipositor longer than midtibia (1.75) and 2.17 times as long as clava. Third valvula 0.27 times as long as second valvifer.

Male. Unknown.

Species group placement. E. inquirenda group sensu Hayat (1989a).

Distribution. Australia: Queensland.

Host. Unknown.



Figures 174–176. *Encarsia marxi* Girault, female. (174) Overall view of type specimen. (175) Head and antenna. (176) Fore wing.

56. ***Encarsia maura*** n. sp.
(Figures 177–179)

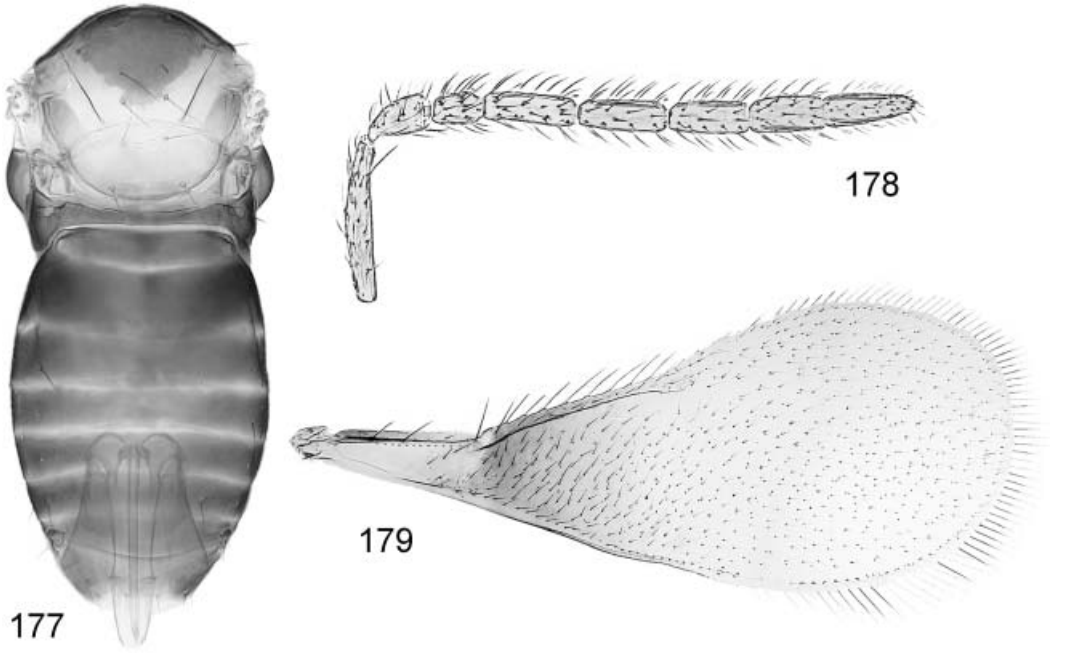
Description (holotype)

Female. Colour: head and mesosoma mostly brown except mesoscutal midlobe posteriorly and posterolaterally, axilla posteriorly, scutellum light brown. Antenna yellow. Metasoma dark brown, apex of last tergite pale. Fore wing hyaline with brown band behind marginal vein, becoming fainter proximally. Legs yellow.

Morphology: antennal formula 1,1,3,3. Pedicel longer than F1 (1.36). F1 1.69 times as long as its maximum width, distinctly shorter than F2 (0.54) and F3 (0.58). F2 slightly longer than F3 (1.08). Midlobe of mesoscutum with eight setae arranged symmetrically. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing about 2.3 times as long as width of disc. Marginal fringe 0.26 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven setae. Tarsal formula 5-5-5. Apical spur of midtibia clearly longer than half the length of the corresponding basitarsus (0.68). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 2, T7 with five setae. Ovipositor subequal in length to midtibia and 1.26 times as long as clava.

Male. Unknown

Species group placement. *E. strenua* group.



Figures 177–179. *Encarsia maura* n. sp., female. (177) Mesosoma and gaster. (178) Antenna. (179) Fore wing.

Distribution. Australia: New South Wales.

Host. Unknown.

Material examined

New South Wales: Holotype ♀, Point Lookout, New England National Park (30°29′S, 152°25′E), 12 February 1984 (I. D. Naumann), ex ethanol (ANIC). Paratype ♀, same data as holotype.

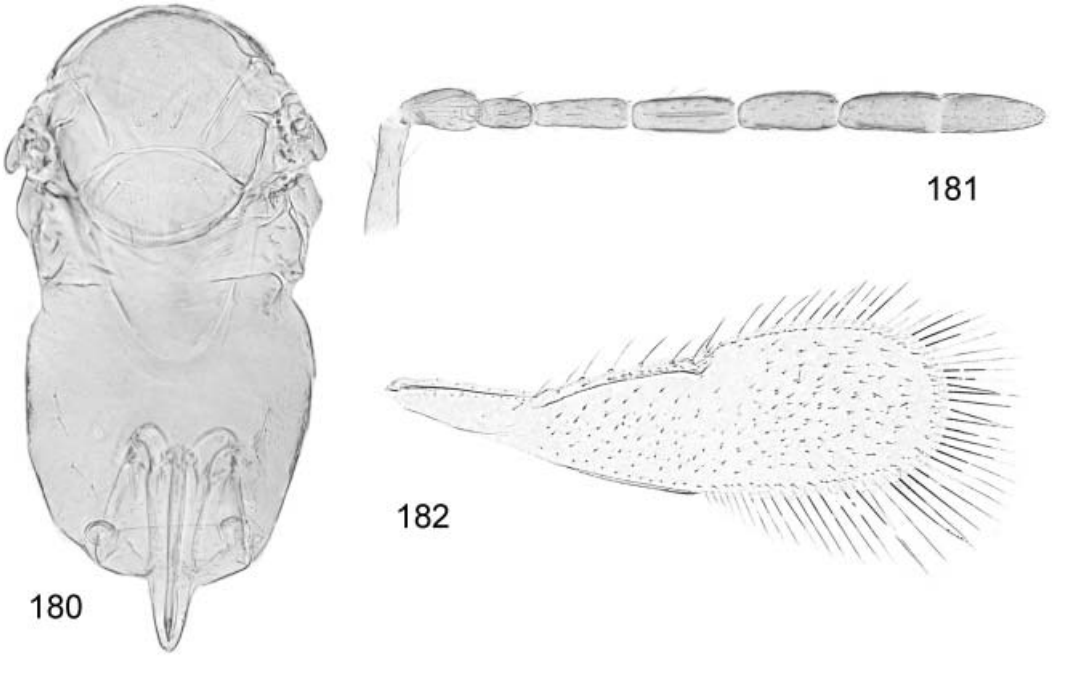
57. *Encarsia mineoi* Viggiani
(Figures 180–182)

Encarsia mineoi Viggiani 1982, p 27. Holotype ♀, Libya, Sidi Mesri, 10 June 1969 (G. Mineo), ex *Bemisia tabaci*. (DEUN, examined).

Encarsia mineoi Viggiani: Polaszek et al. 1992, p 386; 1999, p 156; Schmidt et al. 2001, p 379, 381.

Diagnosis

Female. Colour: head and body yellow except clypeus margin brown, pronotum and midlobe of mesoscutum anteriorly slightly darker. Antenna dark. Fore wing hyaline. Legs pale.



Figures 180–182. *Encarsia mineoi* Viggiani, female. (180) Mesosoma and gaster. (181) Head and antenna. (182) Fore wing.

Morphology: stemmaticum with transversely reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel longer than F1 (1.45). F1 2.10 times as long as its maximum width, shorter than F2 (0.61) and F3 (0.55). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 3, F4: 3, F5: 3. Midlobe of mesoscutum with four setae, arranged symmetrically, side lobes with one seta each. Scutellar sensilla widely separated (approximately five to six times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing sparsely setose and with bare area near leading edge, 3.2 times as long as width of disc. Marginal fringe about 0.6 times as long as width of disc. Basal cell with three setae. Submarginal vein with two setae, marginal vein anteriorly with five setae. Tarsal formula 5-5-5. Apical spur of midtibia very short and distinctly less than half the length of the corresponding basitarsus (0.27). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 1, T7 with four setae. Ovipositor slightly shorter than midtibia (0.88). Third valvula 0.57 times as long as second valvifer.

Male. No males of the species were collected. For a description of *E. mineoi* males from elsewhere see Polaszek et al. 1999, p 158. The males are hyperparasitoids (Pedata, personal communication).

Species group placement. E. parvella group sensu Hayat (1989a, 1998) (=*parvella* + *pergandiella* groups sensu Viggiani and Mazzone 1979, =*Aleurodiphilus* DeBach and Rose, 1981).

Distribution. Australia: Queensland. Egypt, Israel, Libya, Spain, Sudan.

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius). Additional host records (Polaszek et al. 1999): *?Acaulaleyrodes citri* (Priesner and Hosny), *Siphoninus phillyreae* (Haliday). Males presumably hyperparasitoids of *Trialeurodes vaporariorum* (Westwood) (Polaszek et al. 1999).

Material examined

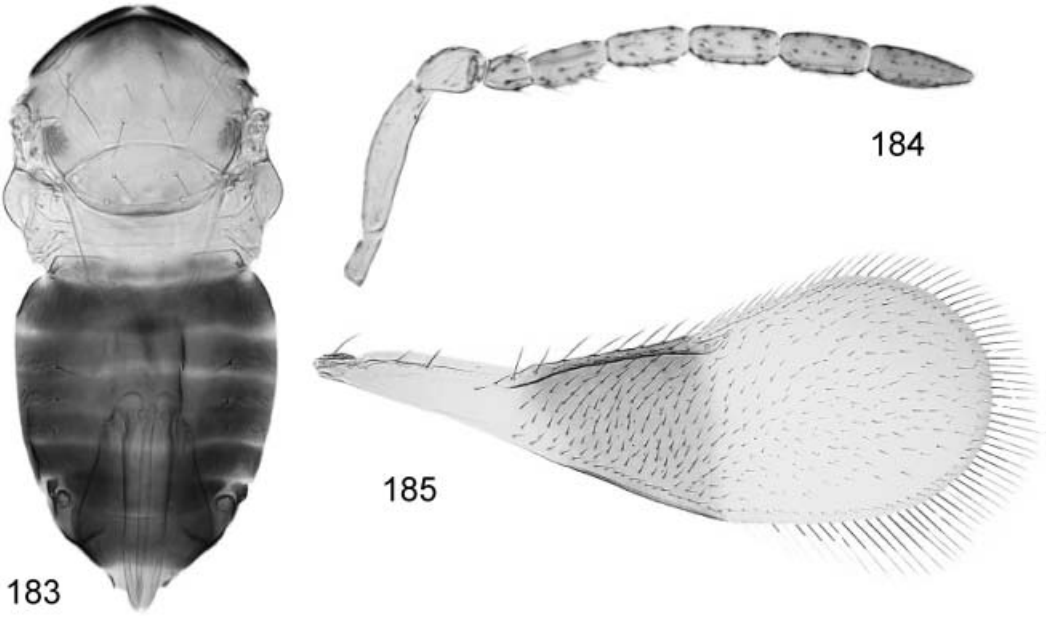
Queensland: 1♀, Redland Bay, December 1998 (J. R. Hargreaves), ex *Bemisia tabaci* on *Lantana camara* L. (Verbenaceae) (ANIC).

58. *Encarsia nigriventris* (Girault)
(Figures 183–185)

Prospaltella nigriventris Girault 1913[167], p 189. Holotype ♀, Australia, Queensland, Brisbane, 26 June 1913 (H. Hacker) (QMBA, type no. Hy. 1731, examined).
Coccophagus nigriventris (Girault): Girault 1915[238], p 47, 56. Change of combination.
Prospaltella nigriventris Girault: Compere 1931, p 11. Dahms 1986, p 347.
Encarsia nigriventris (Girault): Viggiani 1985c, p 245–246. Change of combination.

Redescription

Female. Colour: head yellow except postgena with transverse brown band on vertex partly, malar space and area around mouth brown. Mesosoma mostly yellow, pronotum, mesoscutal



Figures 183–185. *Encarsia nigriventris* Girault, female. (183) Mesosoma and gaster. (184) Antenna. (185) Fore wing.

midlobe anteriorly and axillae anteriorly more or less brown. Metasoma dark brown except petiole lighter and apex of T7 yellow. Antenna yellow with apical segments darker. Fore wing with dark band behind marginal vein. Legs yellow, hind coxa occasionally brown.

Morphology [measurements of holotype in square brackets]: stemmaticum with transversely strigose surface sculpture. Antennal formula 1,1,6,0, i.e. clava not defined. Pedicel longer than F1 (1.21–1.58). F1 1.40–1.53 [1.42] times as long as its maximum width, distinctly shorter than F2 (0.54–0.67) [0.64] and F3 (0.56–0.69) [0.60]. F2 subequal in length to, or slightly longer, than F3 (0.93–1.24) [0.93]. Flagellomeres with the following numbers of sensilla: F1: 0(–1), F2: 1–2, F3: 2–3, F4: 2–3, F5: 2–3, F6: 2. Midlobe of mesoscutum with 8(–11) setae, side lobes with two setae each. Scutellar sensilla widely separated (approximately three to four times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.4–2.7 [2.5] times as long as width of disc. Marginal fringe 0.33–0.44 [0.37] times as long as width of disc. Basal cell with two setae. Submarginal vein with two setae, marginal vein anteriorly with five or six setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.63–0.77) [0.75]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: (1–)2, T5: 3, T6: 2, T7 with four setae. Ovipositor subequal in length to midtibia. Third valvula 0.40–0.46 [0.42] times as long as second valvifer.

Male. Unknown.

Species group placement. E. smithi group.

Distribution. Australia: Queensland, Western Australia.

Host. Aleyrodidae: *Aleurocanthus* sp., *Aleuroduplidens* sp., *Aleurotrachelus* sp., *Pseudaleuroplatus litseae* (Dumbleton), *Tetralicia* sp., *Xenaleyrodes* sp.

Additional material examined

Queensland: 2♀, Mundubbera, 2 June 1997 and 6 November 1997 (D. Papacek), ex *Aleurocanthus* on *Citrus* sp. (Rutaceae) (ANIC); 2♀, Bundaberg, Kinkuna National Park, 4 November 1999 (P. De Barro), ex *Tetralicia* sp. on *Banksia* sp. (Proteaceae) (ANIC); 2♀, Bowen, November 1999 (P. De Barro), ex *Tetralicia* sp. (ANIC); 1♀, Brisbane, Mt Glorious, 29 October 2000 (P. De Barro), ex *Pseudaleuroplatus litseae* (ANIC); 1♀, Brisbane, 23 August 1999 (P. De Barro), ex *Aleurotrachelus* sp. on *Callistemon viminalis* (Sol. ex Gaertn.) G. Don (Myrtaceae) (ZSMG); 1♀, Brisbane, Longpocket, 5 April 2001 (P. De Barro), ex *Xenaleyrodes* sp. on *Eucalyptus major* (Maiden) Blakely (Myrtaceae) (ZSMG); 2♀, near Kinkuna National Park, 10 April 2001 (P. De Barro), ex *Aleuroduplidens* sp. on *Persoonia* sp. (Proteaceae) (ANIC, ZSMG); 1♀, Kuranda, dam road, 2 December 1982 (Z. Bouček) (BMNH). **Western Australia:** 1 ♀, Stirling Range National Park, 9 November 1999 (S. and O. Schmidt), ex whitefly on *Dryandra* cf. *blechnifolia* (ZSMG).

59. *Encarsia nitella* n. sp.
(Figures 186–188)

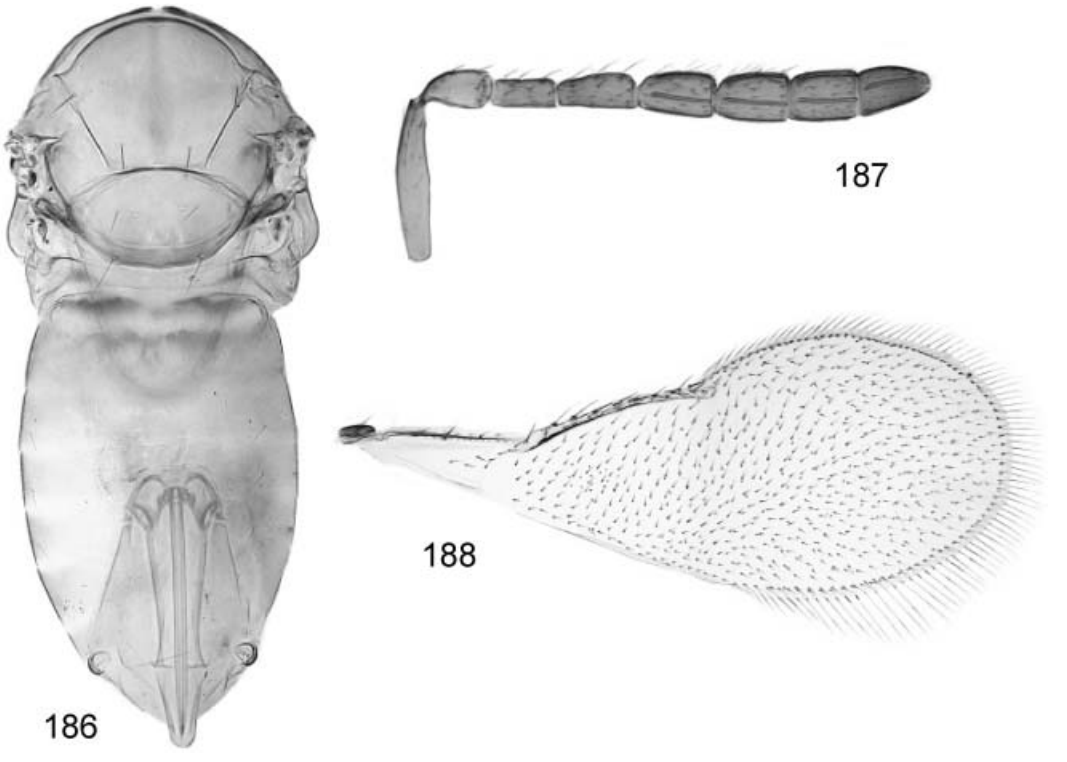
Description

Female. Colour: head yellow, stemmaticum with brown spot. Mesosoma yellow except pronotum medially brown, mesoscutal midlobe with faint anteromedial brown stripe, axilla anteriorly and propodeum laterally brown. Gaster pale or slightly brown, T1 and T2 sometimes with faint brown band, remaining tergites laterally and T5 and T6 sometimes slightly darker. Antenna yellow, apical segments brown. Fore wing hyaline. Legs yellow.

Morphology: antennal formula 1,1,3,3. Stemmaticum with reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel slightly longer than F1 (1.04–1.26). F1 1.83–2.67 times as long as its maximum width, shorter than F2 (0.70–0.88) and F3 (0.75–0.92). F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0–2, F3: 2–4, F4: 3–4, F5: 4–5, F6: 3. Midlobe of mesoscutum with four setae, side lobes with two setae each. Scutellar sensilla separated by a distance of approximately three to five times the maximum width of a sensillum. Distance between anterior pair of scutellar setae slightly smaller than between posterior pair. Fore wing 2.2–2.4 times as long as width of disc. Marginal fringe 0.23–0.27 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with (five to) six setae. Basal cell with five to eight setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.58–0.67). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. Ovipositor slightly longer than midtibia (1.07–1.18) and 1.49–1.81 times as long as clava. Third valvula 0.40–0.44 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.



Figures 186–188. *Encarsia nitella* n. sp., female. (186) Mesosoma and gaster. (187) Antenna. (188) Fore wing.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Viennotaleyrodes incomptus* Martin.

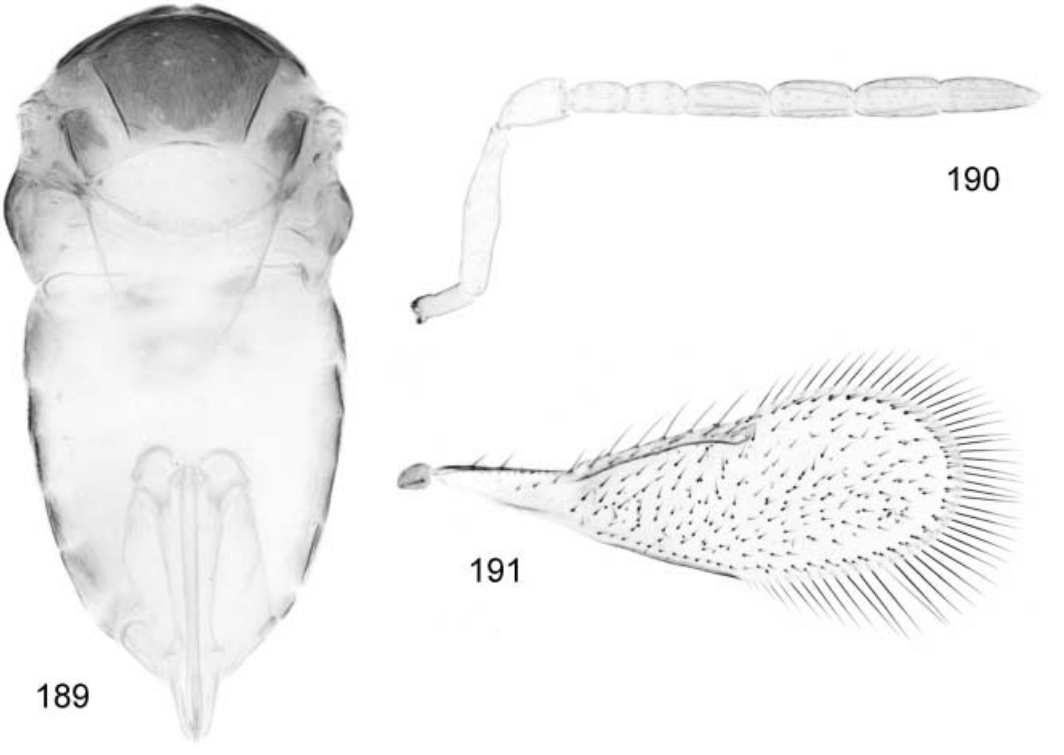
Material examined

Queensland: Holotype ♀, Bundaberg, 10 August 2000 (P. De Barro), ex *Viennotaleyrodes incomptus* on *Acacia* sp. (Mimosaceae) (ANIC). Paratypes 2♀, same data as holotype, and 2♀, Brisbane, Mt Glorious, 27 October 2000 (P. De Barro), ex soft-bodied whitefly (ZSMG); 1♀, Brisbane, Mt Coot-tha, 11 January 1999 (P. De Barro), ex soft-bodied whitefly on *Acacia* sp. (Mimosaceae) (ZSMG).

60. ***Encarsia notha*** n. sp.
(Figures 189–191)

Description (holotype)

Female. Colour: head largely brown. Mesosoma brown except mesoscutal side lobes posteriorly, scutellum, and propodeum medially yellow. Gaster yellow, laterally brown. Antenna yellow. Fore wing with dark band behind marginal vein. Legs yellow.



Figures 189–191. *Encarsia notha* n. sp., holotype female. (189) Mesosoma and gaster. (190) Antenna. (191) Fore wing.

Morphology: stemmaticum with rugosely reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel longer than F1 (1.44). F1 1.80 times as long as its maximum width, slightly shorter than F2 (0.90) and distinctly shorter than F3 (0.60). F2 shorter than F3 (0.67). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with eight setae, side lobes with two setae each. Scutellar sensilla rather distantly placed (approximately five times the maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly larger than distance between posterior pair. Fore wing about 2.8 times as long as width of disc. Marginal fringe half as long as width of disc. Basal cell with three setae. Submarginal vein with two setae, marginal vein anteriorly with five setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.71). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. Ovipositor longer than midtibia (1.29) and 2.1 times as long as clava. Third valvula 0.4 times as long as second valvifer.

Male. Unknown.

Species group placement. E. perflava group.

Distribution. Australia: Western Australia.

Host. Unknown.

Material examined

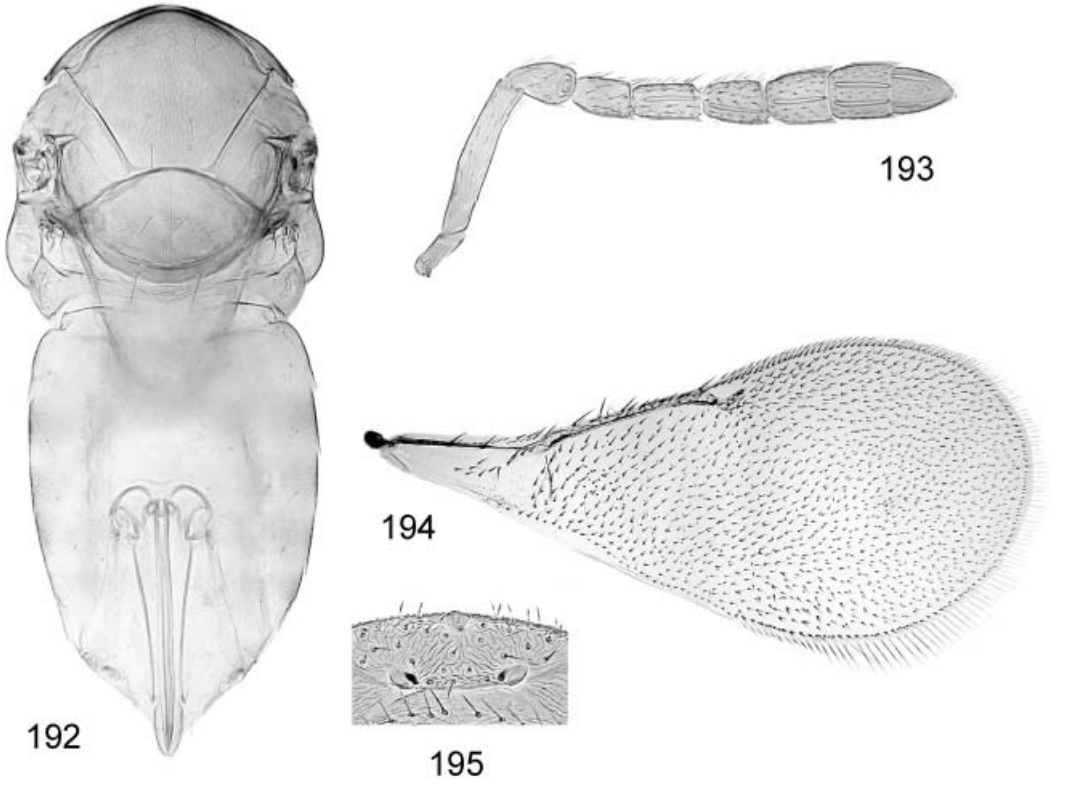
Western Australia: Holotype ♀, CALM Site 4/3 14 km S by E Kalumburu Mission (14°25′S, 126°40′E), 3–6 June 1988 (T. A. Weir), Malaise trap closed forest (ANIC).

Comments

The species is similar to *Encarsia synaptocera* Huang and Polaszek but has only two setae on the mesoscutal side lobe (*synaptocera* has three), the scutellar sensilla are further apart, and the gaster is only laterally brown, whereas in *synaptocera* the gaster is centrally brown. Females of several species in the *perflava* group are very similar but males differ strikingly from each other. However, males are unknown for this and many other species of the *perflava* species group.

61. ***Encarsia oakeyensis*** Schmidt and Naumann
(Figures 192–195)

Encarsia oakeyensis Schmidt and Naumann in Schmidt et al. 2001, p 381. Holotype ♀, Australia, Queensland, Oakey, 25 June 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Lactuca serriola* L. (Asteraceae) (ANIC, examined).



Figures 192–195. *Encarsia oakeyensis* Schmidt and Naumann, female. (192) Mesosoma and gaster. (193) Antenna. (194) Fore wing. (195) Stemmaticum.

Diagnosis

Female. Colour: head and body yellow except pronotum slightly darkened. Antenna and legs yellow. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with densely rugose surface sculpture (Figure 195). Antennal formula 1,1,3,3. Pedicel longer than F1 (1.25–1.41). F1 1.80–2.12 times as long as its maximum width, subequal in length to F2 (0.94–1.07) and slightly shorter than F3 (0.81–0.89). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0–1, F3: 1, F4: 2–3, F5: 2–3, F6: 2. Midlobe of mesoscutum with 13–14 setae arranged symmetrically, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.2–2.3 times as long as width of disc. Marginal fringe 0.16–0.20 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with eight to nine setae. Basal cell with six to seven, costal cell distally with two setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to corresponding basitarsus (0.93–1.04). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2–3, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.16–1.24) and 2.11–2.12 times as long as clava. Third valvula 0.25–0.28 times as long as ovipositor.

Male. Unknown.

Species group placement. E. strenua group.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Aleuromarginatus nigrus* (Martin), *Bemisia tabaci* (Gennadius), *Trialeurodes vaporariorum* (Westwood).

Additional material examined

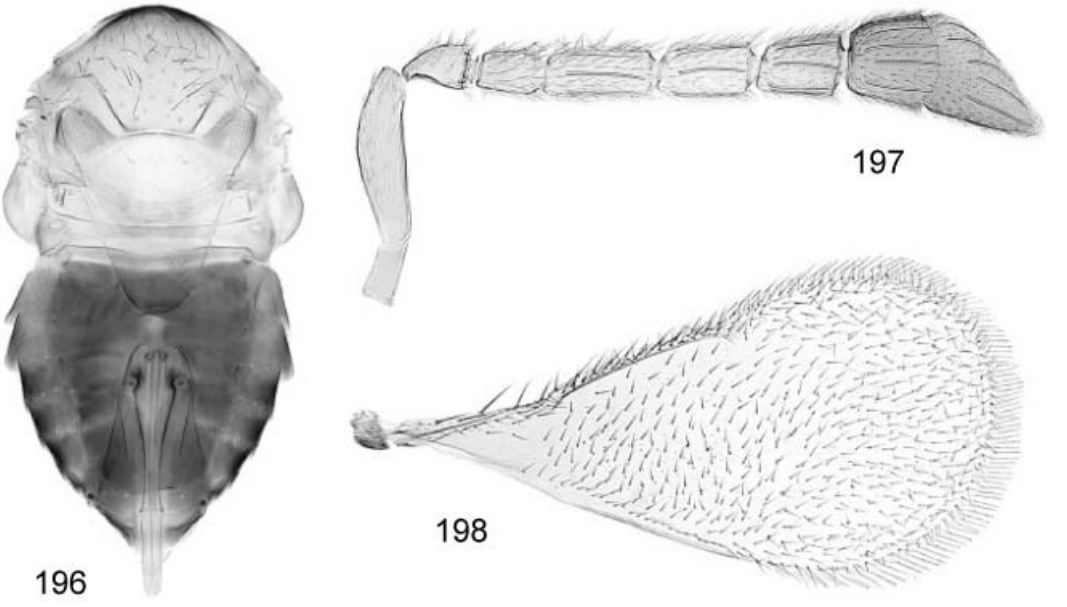
Queensland: 1♀, 1♂, Dalby, 17 April 1997 (D. R. Lea), ex *Bemisia tabaci* on *Sonchus oleraceus* L. (Asteraceae) (ANIC); 1♀, Emerald, 15 July 2001 (P. De Barro), ex soft-bodied whitefly on *Acacia* sp. (Mimosaceae) (ANIC); 2♀, Carnavon Gorge, 23 October 2001 (P. De Barro), ex *Aleuromarginatus nigrus* on *Acacia* sp. (ANIC, ZSMG).

Comments

This species is distinguished from other pale species of the *E. strenua* group by the stout antennae, the short marginal fringe of the fore wing and the densely rugose surface sculpture of the vertex.

62. *Encarsia obliqua* Schmidt and Polaszek
(Figures 196–198)

Encarsia obliqua Schmidt and Polaszek 2007, p 89–90. Holotype ♀, Papua New Guinea, Central District, Aroa ptn [plantation], 11 August 1959 (F. J. Simmonds and J. J. H. Szent-Ivany), C.I.E. coll. no. 16778, suspected parasitoid of aleyrodid damaging fronds of coconut (BMNH, examined).



Figures 196–198. *Encarsia obliqua* Schmidt and Polaszek, female. (196) Mesosoma and gaster. (197) Antenna. (198) Fore wing.

Diagnosis

Female. Colour: head yellow, vertex partly brown and occiput with brown spot. Mesosoma yellow except mesoscutal midlobe anteriorly and axilla brown. Posterior margin of mesoscutal midlobe and anterior margin of scutellum medially dark brown. Metasoma brown except petiole yellow. Antenna yellow, clava brown. Fore wing hyaline. Legs yellow.

Morphology: maxillary palp two-segmented. Antennal formula 1,1,4,2. F1–F3 cylindrical, F4 slightly and F5–F6 strongly widening towards apex, F6 obliquely truncate, sulcus between F5 and F6 oblique, F6 with sensory area. Pedicel subequal in length to F1. F1 1.44–1.60 times as long as broad, distinctly shorter than F2 (0.52–0.60) and F3 (0.59–0.70). F2 longer than F3 (1.09–1.13). Flagellomeres with the following numbers of longitudinal sensilla: F1: 0, F2: 4, F3: 4, F4: 5, F4: 6–7, F5: 8, F6: 6. F1–F5 apically with papillar sensilla. Mid lobe of mesoscutum with about 60 setae, evenly reticulate, side lobes with three setae each. Posterior pair and lateral setae of mesoscutal midlobe larger than remaining setae of mesoscutum. Scutellar sensilla separated by approximately three times the width of a sensillum. Distance between anterior pair of scutellar setae smaller than distance between posterior pair, anterior pair located on the same level as scutellar sensilla. Fore wing 2.1–2.2 times as long as width of disc. Basal cell with seven to eight setae. Longest setae of marginal fringe slightly longer than one-tenth the width of disc. Submarginal vein with four to five setae, marginal vein anteriorly with 10–11 setae. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.72–0.85). Basitarsus of mid leg ventrally with stout setae with distinct bases. Tergites on each side with the following numbers of setae: T1: 1, T2: 3, T3: 4, T4: 5, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than mid tibia (1.19–1.30). Third valvula very narrow and 0.50–0.59 times as long as second valvifer.

Male. Unknown.

Species group placement. E. noyesi group.

Distribution. Australia: Queensland. Papua New Guinea: Central District.

Host. Aleyrodidae: *Aleurodicus destructor* Mackie.

Additional material examined

Queensland: 1♀, Thursday Island, 1933 (H. J. Hockings), ex *Aleurodicus destructor* (BMNH); 1♀, Heathlands dump (11°45′S, 142°35′E), 18 August to 17 September 1992 (P. Zborowski, L. Miller), Malaise #2, open forest (ANIC).

Comments

Encarsia obliqua is one of the few known *Encarsia* species with an obliquely truncate clava and an oblique sulcus between F5 and F6, characters which are characteristic for members of the *E. noyesi* species group. Until recently it was included in *Encarsiella* (Schmidt and Polaszek 2007).

63. *Encarsia olgae* n. sp.
(Figures 199–201)

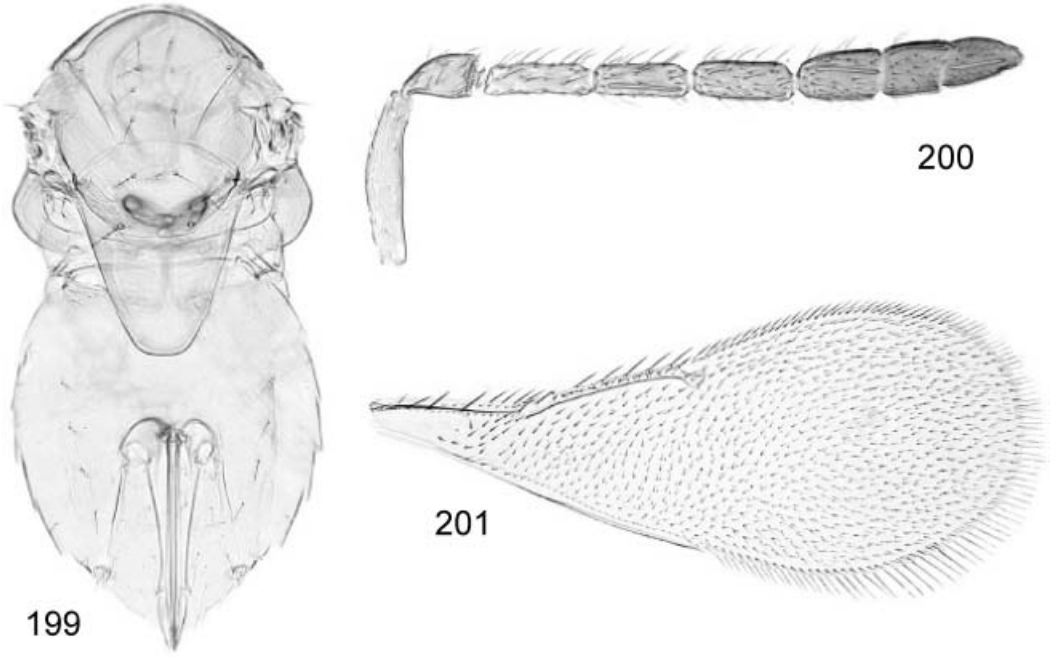
Description

Female. Colour: head and body entirely yellow except stemmaticum with small brown spots adjacent to ocelli and pronotum partly brown. Fore wing hyaline. Legs yellow.

Morphology: Maxillary palp two-segmented. Stemmaticum with rugose-reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel shorter than F1 (0.73). F1 3.6–3.8 times as long as its maximum width, longer than F2 (1.16) and slightly longer than F3 (1.10). F2 slightly shorter than F3 (0.95). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 1, F4: 2, F5: 2, F6: 2. Midlobe of mesoscutum with 14–16 setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.4–2.5 times as long as width of disc. Marginal fringe 0.15–0.16 times as long as width of disc. Basal cell with 15–16 setae, costal cell distally with two setae. Submarginal vein with five to six setae, marginal vein anteriorly with six to eight setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.77–0.83). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3(–4), T6: 3(–4), T7 with four setae. Ovipositor shorter than midtibia (0.88) and 1.85 times as long as clava. Third valvula 0.24–0.32 times as long as second valvifer.

Male. Unknown.

Species group placement. E. strenua group.



Figures 199–201. *Encarsia olgae* n. sp., holotype female. (199) Mesosoma and gaster. (200) Antenna. (201) Fore wing.

Distribution. Australia: Western Australia.

Host. Aleyrodidae.

Material examined

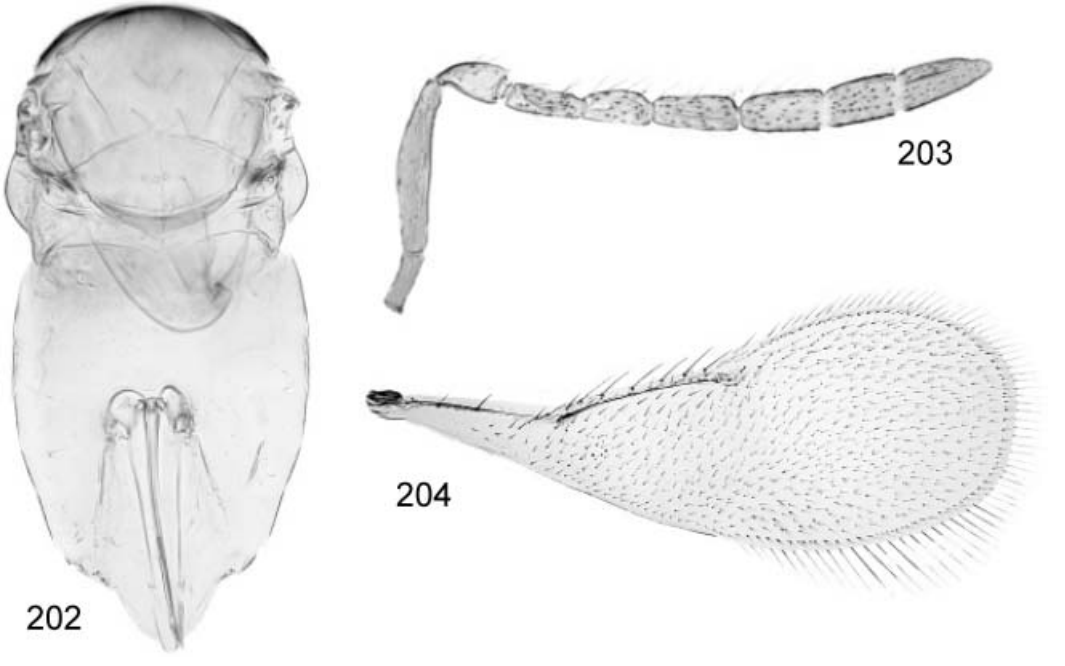
Western Australia: Holotype ♀, Beedelup National Park, 15 November 1999 (S. and O. Schmidt), ex soft-bodied whitefly (ANIC). Paratype 1♀, same data as holotype (ZSMG).

64. ***Encarsia papaceki*** n. sp.
(Figures 202–204)

Description

Female. Colour: head and mesosoma yellow except pronotum, anterior margin of mesoscutal midlobe, and most of the axillae, brown. Stemmaticum with three small brown marks adjacent to ocelli. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with weak and irregular rugose-reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel subequal in length to F1 (0.91–1.03). F1 2.00 times as long as its maximum width, subequal in length to F2 and slightly shorter than F3 (0.88–0.91). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 2, F4: 2, F5: 2–3, F6: 2. F6 dorsally at apex with indentation. Midlobe of mesoscutum with eight setae arranged symmetrically, side lobes with three setae each. Scutellar sensilla close together,



Figures 202–204. *Encarsia papaceki* n. sp., female. (202) Mesosoma and gaster. (203) Antenna. (204) Fore wing.

separated by a distance of about the width of a sensillum or less. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.4–2.5 times as long as width of disc. Marginal fringe 0.29–0.33 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with 5–10, costal cell distally with two setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.67–0.87). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.17–1.29) and 1.60–1.93 times as long as clava. Third valvula 0.35–0.40 times as long as second valvifer.

Male. Head pale, antennae light brown. Mesosoma yellow except pronotum, mesonotum anteriorly and axillae largely brown. Metasoma brown except pale at base and at apex. Legs pale. Apical two segments of antennae fused, but sensilla not or only very slightly overlapping.

Species group placement. E. strenua group.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Aleurocanthus* sp.

Material examined

Queensland: Holotype ♀, Mundubbera, 27 October 97 (D. Papacek), ex *Aleurocanthus* sp. on *Citrus* sp. (Rutaceae) (D. Papacek) (ANIC). Paratypes 1♂, same data as holotype (ANIC); 1♂, Mundubbera, 2 May 1997 (D. Papacek), ex *Aleurocanthus* sp. on *Citrus* sp.

Valencia (Rutaceae) (ZSMG); 1♀, Emerald, 15 July 2001 (P. De Barro), ex whitefly on *Acacia* sp. (Mimosaceae) (ZSMG).

Comments

This species is very close to *E. citri* (Ishii), but differs in having eight setae on the mesoscutal midlobe (*E. citri* usually has 10, rarely 12 setae), a shorter F1 (2.0 times instead of 2.4–3.0 times) and a longer marginal fringe (0.29–0.30 times, as compared to 0.18–0.25 times in *citri*).

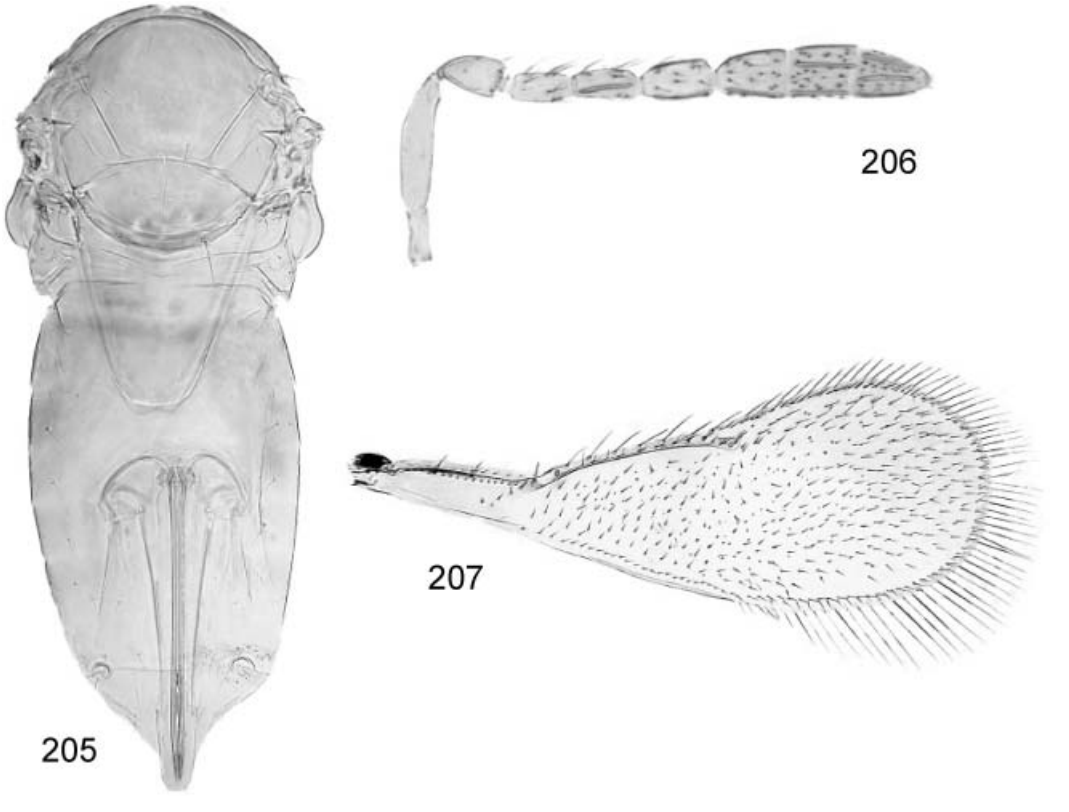
65. *Encarsia paucisetosa* n. sp.

(Figures 205–207)

Encarsia protransvena: Schmidt et al. 2001, p 383 (misidentification (partim) of *E. paucisetosa*).

Description

Female. Colour: head yellow except stemmaticum with small brown spots adjacent to ocelli. Mesosoma yellow, sometimes pronotum, anterior margin of mesoscutal midlobe,



Figures 205–207. *Encarsia paucisetosa* n. sp., female. (205) Mesosoma and gaster. (206) Antenna. (207) Fore wing.

base of T1 sometimes slightly brown and occasionally the following tergites laterally tinged with brown. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel subequal in length to F1. F1 2.33 [2.33] times as long as its maximum width, slightly shorter than or subequal in length to F2 (0.90–1.00) [1.00] and slightly shorter than F3 (0.80–0.88) [0.88]. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 2, F4: 2, F5: 2, F6: 2–3. Midlobe of mesoscutum with five to seven [five] setae, centrally without or with only one seta, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about two times the width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair, anterior setae small and about half as long as posterior ones. Fore wing 2.5–2.6 [2.6] times as long as width of disc. Marginal fringe 0.30–0.37 [0.30] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six to seven setae. Basal cell with three to six setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.68–0.73) [0.68]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.50–1.54) [1.50] and 2.25–2.33 [2.33] times as long as clava. Third valvula 0.30–0.31 [0.30] times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Western Australia.

Host. Aleyrodidae: *Aleurolobus* sp., *Aleuroplatus pectiniferus* (Quaintance and Baker), *Dialeurodes* (s.l.) sp.

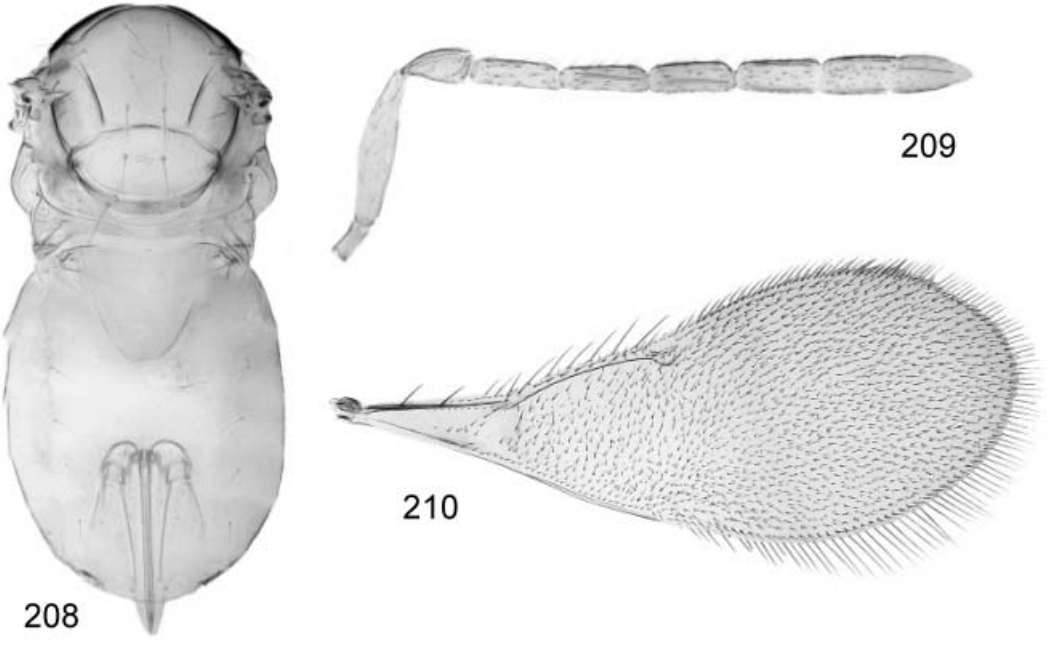
Material examined

Western Australia: Holotype: ♀, Purnululu National Park, 8 May 2000 (S. and O. Schmidt), ex *Dialeurodes* (s.l.) sp. on *Eucalyptus* sp. (Myrtaceae) (ANIC). Paratypes: 1♀, Kununurra, 3 May 2000 (S. and O. Schmidt), ex *Aleurolobus* sp. on *Bridelia tomentosa* Blume (Euphorbiaceae) (ZSMG); 1♀, Keep River National Park, 3 May 2000 (S. Schmidt), ex *Aleuroplatus pectiniferus* on *Hakea arborescens* R.Br. (Proteaceae) (ZSMG); 1♀, Barton Plain, 18 June 1997 (G. Bellis), ex *Aleurolobus* sp. on *Eucalyptus bigalerita* F. Muell. (Myrtaceae) (ANIC).

66. *Encarsia pedana* n. sp.
(Figures 208–210)

Description

Female. Colour: head yellow, stemmaticum with three small brown spots adjacent to ocelli. Body yellow except pronotum brown and axillae anteriorly slightly brown. Fore wing hyaline. Legs yellow.



Figures 208–210. *Encarsia pedana* n. sp., female. (208) Mesosoma and gaster. (209) Antenna. (210) Fore wing.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose surface sculpture. Antennal formula 1,1,3,3. Pedicel shorter than F1 (0.66–0.79) [0.79]. F1 elongate, 3.17–3.69 [3.17] times as long as broad. F1 subequal to or slightly longer than F2 (0.95–1.16) [0.95], and subequal to or longer than F3 (1.00–1.21) [1.00]. Flagellomeres with the following numbers of sensilla: F1: 0–2, F2: 1–2, F3: 1–2, F4: 2–3, F5: 2–3, F6: 3–4. Midlobe of mesoscutum with 10 setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla very close together, separated by a distance of less than half the width of a sensillum or less. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.5 times as long as width of disc, evenly and densely setose. Marginal fringe 0.18–0.22 [0.22] times as long as width of disc. Submarginal vein with two to three setae, marginal vein anteriorly with six to eight setae. Basal cell with 8–10 setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.63–0.71) [0.71], the latter with a row of three to four pegs. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor shorter than midtibia (0.82–0.89) [0.89] and 1.25–1.29 [1.29] times as long as clava. Third valvula 0.30–0.31 [0.30] times as long as second valvifer.

Male. Unknown.

Species group placement. E. strenua group.

Distribution. Australia: New South Wales, Western Australia.

Host. Aleyrodidae: *Synaleurodicus* sp.

Material examined

New South Wales: Holotype: ♀, Cobark For. Pk, Barrington Tops (31°54′S, 151°36′E), 11 February 1984 (I. D. Naumann), ex ethanol (ANIC). **Western Australia:** Paratype: 1♀, Stirling Range National Park (34°23.573′S, 117°48.628′E), 6 October 2005 (A. Polaszek, S. and O. Schmidt), ex *Synaleurodicus* sp. (ZSMG).

Comments

The species can be separated from other species of the *strenua* group treated in this study by the elongated F1 and the relatively short ovipositor.

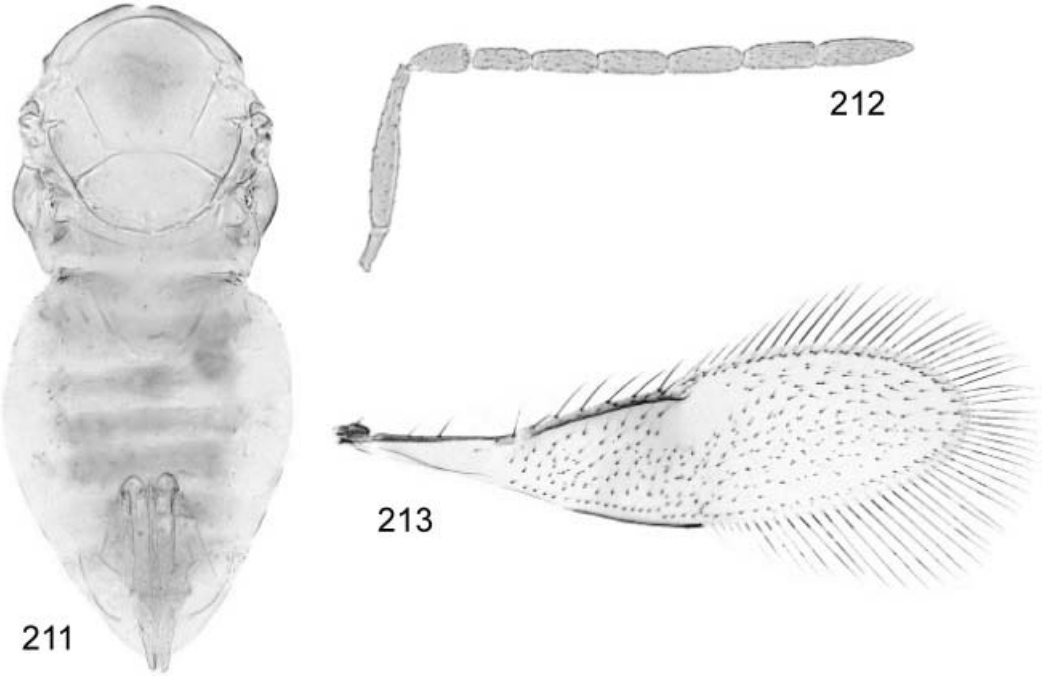
67. *Encarsia pergandiella* Howard
(Figures 211–213)

Encarsia pergandiella Howard 1907, p 78. Holotype ♀, USA, Washington, DC, 25 September 1900 (T. Pergande), ex "*Aleyrodes*" [probably *Trialeurodes* sp.] on *Xanthium strumarium* (USNM, not examined).

Encarsia versicolor Girault 1908, p 53. Syntypes ?, USA, Illinois, Urbana (greenhouse) (INHS, type no. 37474, not examined). Synonymy by Gahan (in Peck 1951, p 438).

Aleurodiphilus pergandiellus (Howard): DeBach and Rose 1981, p 666.

Encarsia bemisiae De Santis 1981, p 37. Preoccupied by *bemisiae* Ishii 1938. Holotype ♀, Brazil, Sao Paolo, Campinas, *Bemisia tabaci* (Lourençao) (UNLP, examined). Synonymy by Polaszek et al. 1992, p 387.



Figures 211–213. *Encarsia pergandiella* Howard, female. (211) Mesosoma and gaster. (212) Antenna. (213) Fore wing.

Encarsia tabacivora Viggiani 1985b, p 82. Replacement name for *bemisiae* De Santis. Synonymy by Polaszek et al. 1992, p 387.

Encarsia pergandiella (Howard): Viggiani 1987b, p 160–162; Polaszek et al. 1992, p 386–387; Schmidt et al. 2001, p 381–382.

Diagnosis

Female. Colour: head pale, with dark transverse band. Mesosoma predominantly pale, or brown (with pronotum, mesonotum, and axillae largely darkened). Petiole brown. Gaster predominantly brown. Third valvula pale. Antenna pale with apex more or less darkened. Fore wing with dark band behind marginal vein. Legs pale.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel longer than F1 (1.27–1.36). F1 2.50–3.00 times as long as its maximum width, slightly shorter than F2 (0.90–1.00) and shorter than F3 (0.77–0.85). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 1–2, F4: 2, F5: 3, F6: 2. Midlobe of mesoscutum with 8–11 setae, side lobes with two setae each. Scutellar sensilla widely separated (approximately six times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing with bare area, 3.4–3.6 times as long as width of disc. Marginal fringe 0.68–0.75 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with seven to nine setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly shorter than half the length of the corresponding basitarsus (0.37–0.41). Tergites laterally with the following numbers of setae: T1: 0–1, T2: 1, T3: 1, T4: 1, T5: 2(–3), T6: 2, T7 with four setae. Ovipositor almost as long as midtibia (0.84–0.91). Third valvula 0.54–0.70 times as long as second valvifer.

Male. Head and body predominantly brown, midlobe of mesoscutum, scutellum, and legs lighter.

Species group placement. E. parvella group. Placed in *E. pergandiella* group by Viggiani and Mazzone (1979) and Viggiani (1993), and in *E. parvella* group by Hayat (1989a, 1998) and Polaszek et al. (1992), which these authors consider encompasses the *E. pergandiella* group.

Distribution. Australia: New South Wales, Queensland, South Australia, Victoria. USA, Mexico, Brazil, Colombia, Costa Rica, El Salvador, Grenada, Guadeloupe, Guatemala, Honduras, Mexico, Venezuela, Israel, Italy.

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius), *Trialeurodes vaporariorum* (Westwood). The following additional hosts have been recorded (Polaszek et al. 1992; Schauff et al. 1996): *Aleyrodes* sp., *Aleurodicus dispersus* Russell, *Aleuroglandulus malangae* Russell, *Aleuroplatus coronata* (Back), *A. elemerae* Mound and Halsey, *Aleurothrixus floccosus* (Maskell), *Aleurotrachelus trachoides* (Quaintance), *Dialeurodes citri* (Ashmead), *D. kirkaldyi* (Kotinsky), *Trialeurodes abutiloneus* (Haldeman), *T. floridensis* (Quaintance), *T. variabilis* (Quaintance).

Material examined

New South Wales: 1♀, Griffith, 8 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus* L. (Asteraceae) (ANIC). **Queensland:** 2♀, 2♂,

Darling Downs 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Lactuca serriola* L. (Asteraceae) (ANIC); 2♀, Dalby, 7 and 29 May 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Verbena bonariensis* L. (Verbenaceae) (ANIC); 1♀, Dalby, 24 July 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Verbena bonariensis* (ANIC); 1♀, Dalby, 25 June 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Lantana* sp. (Verbenaceae) (ANIC); 1♀, Oakey, 3 April 1997 (B. Franzmann), ex *Bemisia tabaci* on *Sonchus oleraceus* (ANIC); 1♀, 3♂, Oakey, 25 June 1997 (D. R. Lea), ex *Bemisia tabaci* on *Sonchus oleraceus* and *Trialeurodes vaporariorum* on *Sonchus oleraceus*, *Verbena bonariensis*, and *Urtica* sp. (Urticaceae) (ANIC); 1♀, Oakey, 13 May 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Xanthium occidentale*. (Asteraceae) (ANIC); 1♀, Oakey, 24 July 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Urtica* sp. (ANIC); 3♀, Oakey, 29 May 1997 (D. R. Lea), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus*, *Xanthium occidentale*, and sunflower (Asteraceae) (ANIC). **South Australia:** 5♀, 2♂, McLaren Vale, 2 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on hollyhock (*Alcea rosea* L., Malvaceae), *Euphorbia peplus* L. (Euphorbiaceae), *Salvia* sp. (Lamiaceae), *Solanum lycopersicon* (Solanaceae), and *Sonchus oleraceus* (ANIC); 2♀, McLaren Vale, 2 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on *Hibiscus* sp. (Malvaceae) (ANIC). **Victoria:** 2♀, 1♂, Red Cliffs, 2 January 1999 (P. De Barro), ex *Trialeurodes vaporariorum* on *Sonchus oleraceus* and *Euphorbia peplus* (ANIC).

Comments

This species has, similar to *E. mineoi*, a five-segmented tarsus of the middle leg and a bare area near the leading edge of the fore wing, but unlike in *E. mineoi* the gaster is completely dark brown in all Australian specimens.

68. *Encarsia perniciosi* (Tower)

(Figures 214–216)

Prospaltella perniciosi Tower 1913, p 125–126. Syntypes, both sexes, USA, Massachusetts, Amherst, October 1912, [ex *Quadraspidiotus perniciosus* (Comstock)] (MSCA, USNM, examined).

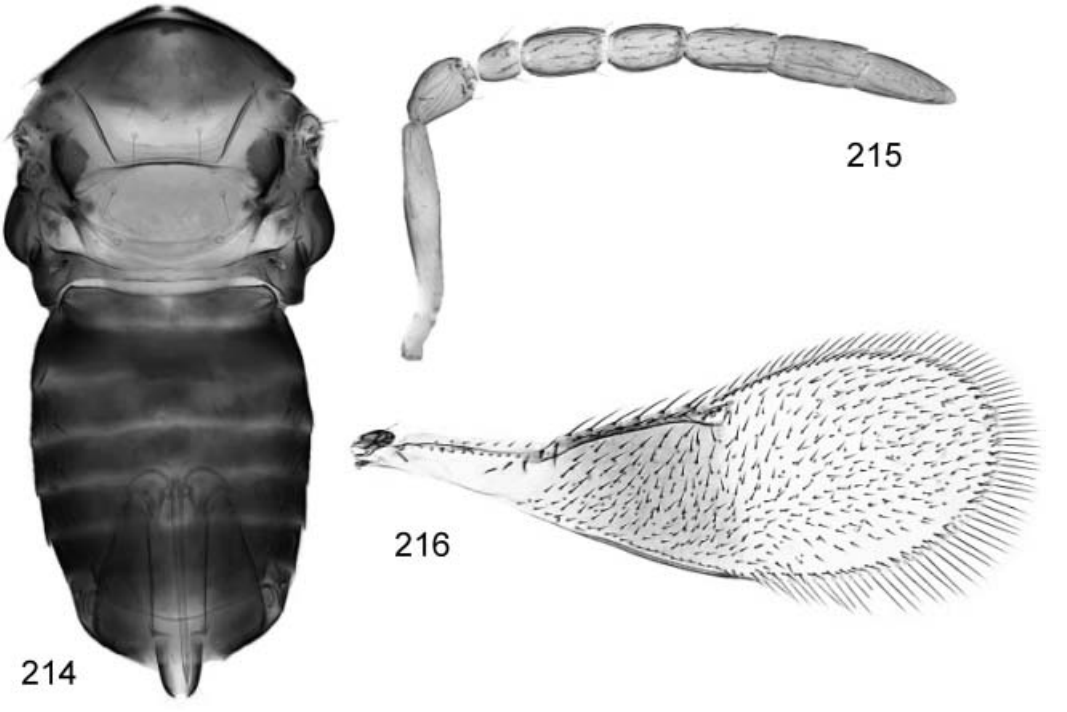
Prospaltella aurantii argentina De Santis 1948, p 238–241. Holotype ♀, Argentina, Fuerte General Roca, ex *Quadraspidiotus perniciosus* (UNLP, not examined). Synonymy by De Santis 1979, p 335.

Prospaltella perniciosi Tower: Gahan 1927, p 21; Peck 1951, p 437; Flanders 1953, p 92; Clausen 1956, p 12, 32, 124; 1978, p 123; Ferrière 1961, p 266–267; 1965, p 160; Peck 1963, p 280; Mathys and Guignard 1965, p 163; Nikol'skaya and Yasnosh 1966, p 281; Herting 1972, p 162; Yasnosh 1978, p 501; De Santis 1979, p 335; Gordh 1979, p 908.

Encarsia perniciosi (Tower): Hayat 1981, p 466; 1986, p 163; 1989a, p 53–54; 1998, p 222–224; Viggiani 1987b, p 162–163; Viggiani and Ren 1993, p 327; Huang and Polaszek 1998, p 1932–1933.

Diagnosis

Female. Colour: head brown, vertex yellow, face with more or less distinct transverse brown band between eyes. Mesosoma brown, mesoscutum posteriorly and axilla posteriorly, scutellum and metanotum yellow. Brown colour pattern of axilla posteriorly



Figures 214–216. *Encarsia perniciosi* (Tower), female. (214) Mesosoma and gaster. (215) Antenna. (216) Fore wing.

delimited by a more or less distinct dark brown line. Gaster predominantly brown. Antenna light brown. Fore wing with dark band behind marginal vein. Legs pale, hind coxa brown.

Morphology: stemmaticum with rugosely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.53–1.63). F1 1.23–1.47 times as long as its maximum width, shorter than F2 (0.50–0.58) and F3 (0.61–0.64). F2 slightly longer than F3 (1.07–1.26). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1–2, F3: 1, F4: 1–2, F5: 2–3, F6: 3. Midlobe of mesoscutum with eight setae, arranged symmetrically, anterolateral and posterior setae stouter than medial setae, side lobes with three setae each. Scutellar sensilla widely separated (approximately six to seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing 2.5–2.6 times as long as width of disc. Marginal fringe 0.30 times as long as width of disc. Basal cell with two to three setae. Submarginal vein with two setae, marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of midtibia almost as long as corresponding basitarsus (0.88–0.97). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor subequal in length to midtibia and 1.21–1.27 times as long as clava. Third valvula 0.37–0.41 times as long as second valvifer.

Male. No males were collected in the study area. For a description of males from elsewhere see Huang and Polaszek (1998).

Species group placement. E. aurantii group.

Distribution. Australia: New South Wales, Queensland. Virtually cosmopolitan, having been widely introduced.

Host. Diaspididae. *Aonidiella aurantii* (Maskell), *A. citri* (Maskell), *?Ceroplastes rubens* Maskell. The following additional hosts have been recorded by Huang and Polaszek (1998): *Parlatoria acalcarata* Maskell, *Quadraspidiotus gigas* (Thiem and Gerneck), *Q. perniciosus* (Comstock). Peck (1963) recorded the species additionally from *Lepidosaphes ulmi* (L.).

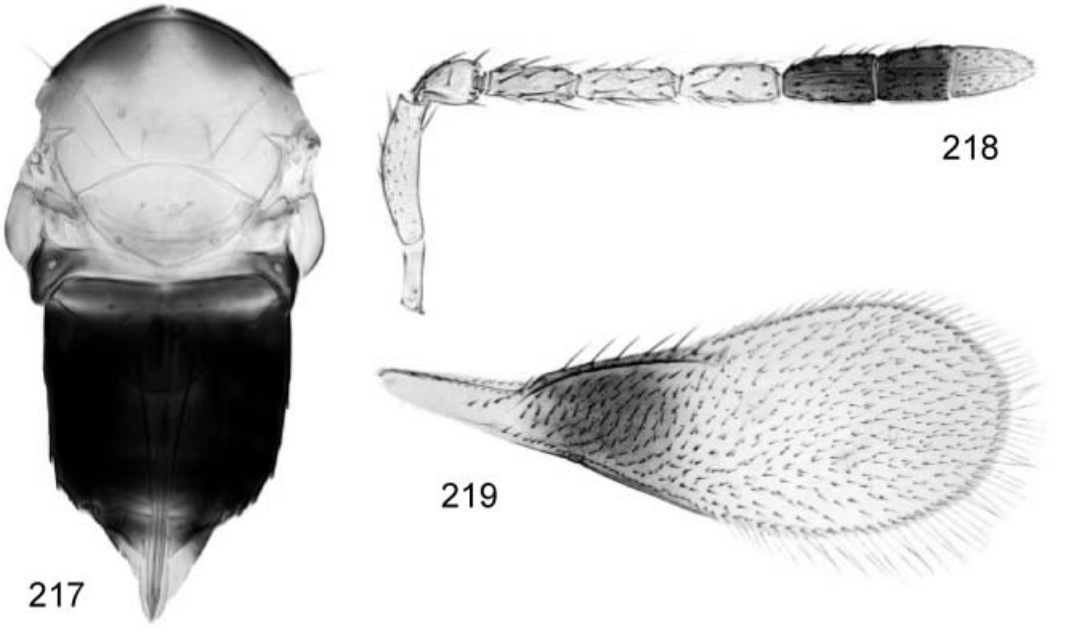
Material examined

New South Wales: 1♀, Kulnura, February 1967 (D. P. Annecke), ex scale (BMNH); 12♀, Kulnura, February 1967 (G. Snowball), ex *Aonidiella aurantii* and *A. citri* on citrus (Rutaceae) (BMNH). **Queensland:** 1♀, Mundubbera, 21 October 1998 (D. Papacek) (ANIC); 1♀, Palmwoods, 1 February 1978 (D. Smith) with *Ceroplastes rubens* (BMNH).

69. *Encarsia perpulchella* (Girault)

(Figures 217–219)

Coccophagus perpulchellus Girault 1915[238], p 53, 57. Holotype ♀, Australia, Queensland, Gordonvale (Cairns), 28 June 1914 (QMBA, type no. Hy. 2937, examined).
Prospaltella perpulchella (Girault): Compere 1931, p 11. Change of combination.
Encarsia perpulchella (Girault): Viggiani 1985c, p 246. Change of combination.
Coccophagus perpulchellus Girault: Dahms 1986, p 402–403.



Figures 217–219. *Encarsia perpulchellus* Girault, female. (217) Mesosoma and gaster. (218) Antenna. (219) Fore wing.

Redescription

Female. Colour: head and mesosoma yellow except pronotum, mesoscutum anteriorly and axillae, mesopleuron, and propodeum laterally brown. Antenna yellow except F4 and F5 brown, in striking contrast to yellow F6. Gaster dark brown, apex of last tergite and ovipositor tip pale. Fore wing hyaline with brown band behind marginal vein. Legs yellow.

Morphology [measurements of holotype in square brackets]: antennal formula 1,1,3,3. Pedicel shorter than F1 (0.75–0.76) [0.75]. F1 elongate, 2.6–3.1 [3.1] times as long as its maximum width, slightly shorter than F2 (0.86–0.91) [0.91] and F3 (0.82–0.85) [0.85]. F2 slightly shorter than or subequal in length to F3 (0.95–0.98) [0.95]. Midlobe of mesoscutum with six setae, arranged symmetrically. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing about 2.7–2.8 [2.7] times as long as width of disc. Marginal fringe 0.27–0.30 [0.27] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with five to six setae. Tarsal formula 5-5-5. Apical spur of midtibia clearly longer than half the length of the corresponding basitarsus (0.69–0.78) [0.78]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.34–1.39) [distorted in holotype, approximately 1.4 times] and 2.0–2.2 times [approximately 2.4 times in holotype] longer than clava.

Male. Unknown

Species group placement. Not established. While showing the closely placed scutellar sensilla typical for the species of the *strenua* group, *E. perpulchella* does not appear to belong to this group based on the other characters such as the shape of the stigmal vein. It shows a number of affinities with *E. quercicola* Howard, a Nearctic species.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Dialeurodes* sp.

Additional material examined

Queensland: 1♀, Blackdown Tablelands, November 2001 (P. De Barro), ex soft-bodied whitefly (ANIC); 2♀, Horseshoe Bay, Bowen, Whitsunday Sands, 19 April 2001 (P. De Barro), ex *Dialeurodes* sp. on *Terminalia* sp. #74 (ANIC, BMNH); 1♀, Brisbane, University of Queensland Campus, 18 October 2005 (O. Schmidt), ex whitefly (ZSMG).

70. *Encarsia perseus* (Girault)

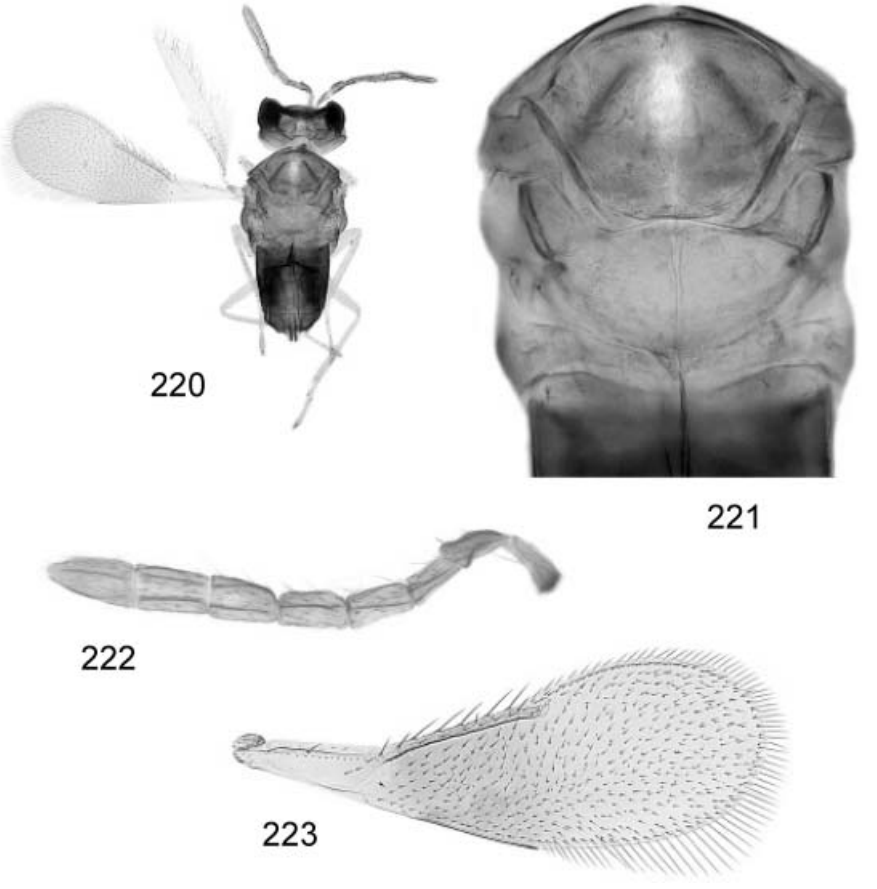
(Figures 220–223)

Coccophagus ashmeadi perseus Girault 1917a[312], p 29. Lectotype ♀ [designated by Viggiani 1986: 69], Australia, Western Australia, Swan River (USNM, type no. 20683, examined).

Prospaltella persea (Girault): Compere 1931, p 11. Change of status and combination.

Coccophagus ashmeadi perseus Girault: Dahms 1983, p 59

Encarsia persea (Girault): Viggiani 1986, p 69–70. Change of combination. (As Girault did not state whether the epithet "*perseus*" is an adjective or substantive, the latter is assumed, under ICZN 1999, Code Articles 31.2.2 and 34.2.1).



Figures 220–223. *Encarsia perseus* (Girault), holotype female. (220) Type specimen. (221) Mesosoma and base of gaster. (222) Antenna. (223) Fore wing.

Redescription (lectotype)

Female. Colour: head and mesosoma yellow, gaster dark brown. Antenna yellow. Fore wing with dark band behind marginal vein. Legs yellow.

Morphology: antennal formula 1,1,3,3. Collapsed antenna apparently with pedicel slightly longer than F1 and F1 slightly shorter than F2 and F3. F2 subequal in length to F3. Midlobe of mesoscutum with four setae. Scutellar sensilla indiscernible, but distance between anterior pair of scutellar setae greater than between posterior pair, indicating distantly placed sensilla. Fore wing about 2.7 times as long as width of disc. Marginal fringe 0.30 times as long as width of disc. Basal cell with three setae. Submarginal vein with one seta, marginal vein anteriorly with five setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus (0.81). Ovipositor shorter than midtibia (0.83). Third valvula slightly less than half the length of the second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Western Australia.

Host. Unknown.

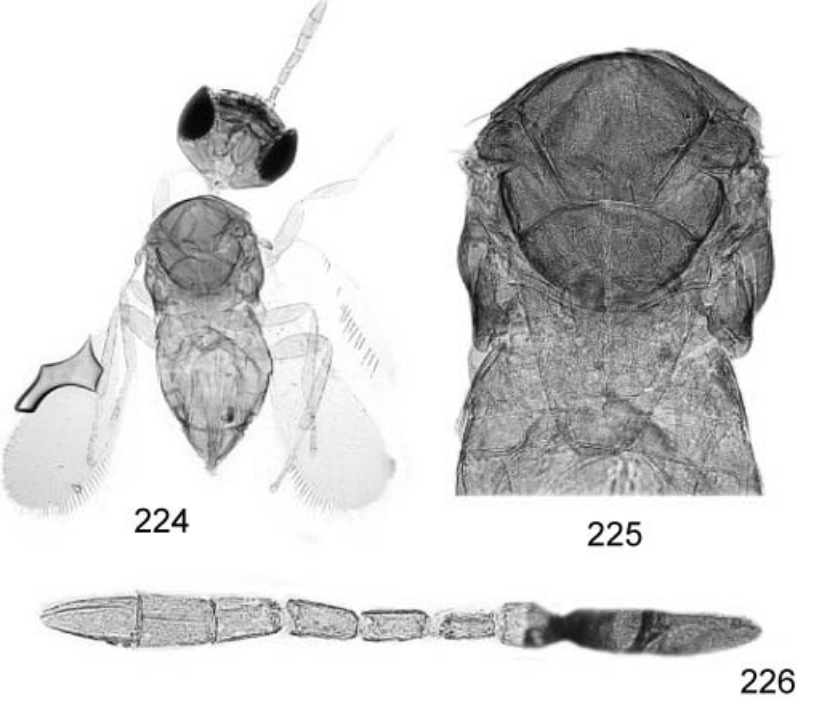
71. ***Encarsia picithorax*** (Girault)
(Figures 224–226)

Coccophagus picithorax Girault 1915[238], p 52, 57. Holotype ♀, Australia, Queensland, Gordonvale (Cairns), 4 April 1914 (QMBA, type no. Hy. 2934, examined).
Coccophagus lautus Girault 1915[238], p 52, 57. Holotype ♀, Australia, Queensland, Gordonvale (Cairns), 1 April 1914 (QMBA, type no. Hy. 2935, examined). **Syn. nov.**
Prospaltella lauta (Girault): Compere 1931, p 11. Change of combination.
Prospaltella picithorax (Girault): Compere 1931, p 11. Change of combination.
Coccophagus lautus Girault: Dahms 1984, p 750.
Encarsia lauta (Girault): Viggiani 1985c, p 242. Change of combination.
Coccophagus picithorax Girault: Dahms 1986, p 410.
Encarsia picithorax (Girault): Hayat 1989b, p 289. Change of combination.

Redescription (holotype)

Female. Colour: head and mesosoma dark brown, antenna and legs a little paler. Gaster yellow. Fore wing hyaline.

Morphology: antennal formula 1,1,3,3. Pedicel slightly longer than F1. F1 two times as long as its maximum width, subequal in length to F2 and slightly shorter than F3.



Figures 224–226. *Encarsia picithorax* (Girault), holotype female. (224) Type specimen. (225) Mesosoma. (226) Antenna.

Longitudinal sensilla present on flagellar segments 2–6. Midlobe of mesoscutum with eight setae, arranged symmetrically. Scutellar sensilla separated by about three times the maximum width of a sensillum. Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing about 3.0 times as long as width of disc. Marginal fringe 0.32 times as long as width of disc. Basal cell with four setae. Marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus (0.8). Ovipositor distinctly longer than midtibia (1.43) and twice as long as clava. Third valvula 0.28 times as long as second valvifer.

Male. Unknown.

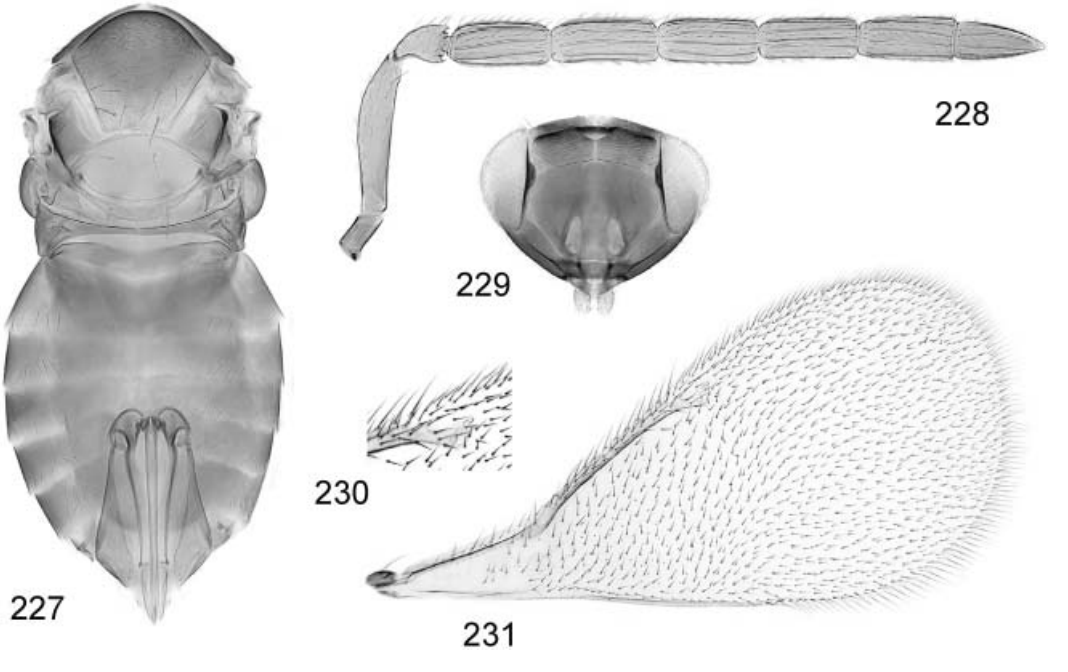
Species group placement. E. inquirenda group sensu Hayat (1989a).

Distribution. Australia: Queensland.

Host. Unknown.

72. ***Encarsia pilosa*** Schmidt and Polaszek
(Figures 227–231)

Encarsia pilosa Schmidt and Polaszek 2007, p 90–91. Holotype ♀, Cunningham's Gap via Aratula, 18 June 1998 (C. J. Burwell), ex *Aleurodicus destructor* on *Lomandra* sp. (ANIC, examined).



Figures 227–231. *Encarsia pilosa* Schmidt and Polaszek, female. (227) Mesosoma and gaster. (228) Antenna. (229) Head. (230) Stigmal vein. (231) Fore wing.

Diagnosis

Female. Colour: head brown. Mesosoma brown except mesoscutal midlobe posteriorly and laterally lighter, and mesoscutal side lobes posteriorly, scutellum, and metanotum yellow. Metasoma brown, apical tergite occasionally yellow. Antenna yellow, radicle brown. Fore wing hyaline, venation brown, occasionally with dark infuscation behind proximal half of marginal vein. Legs yellow except mid and hind coxae and hind femur brown.

Morphology: stemmaticum with rugosely strigose surface sculpture. Antennal formula 1,1,4,2. Pedicel half as long as F1. F1 2.22–2.46 times as long as broad, subequal in length to F2 and F3. Flagellomeres each with 8–10 longitudinal sensilla. F1–F5 cylindrical and similar in shape and size, F6 conical and slightly shorter than preapical segment. F1–F5 apically with papillar sensilla. Mid lobe of mesoscutum with about 60–70 setae, evenly reticulate, side lobes with three setae each. Posterior pair and lateral setae of mesoscutal midlobe larger than remaining setae. Scutellar sensilla separated by approximately three to four times the width of a sensillum. Distance between anterior pair of scutellar setae smaller than distance between posterior pair, anterior pair located at least slightly anterior to scutellar sensilla. Fore wing 2.1 times as long as width of disc, densely setose, setation of disc slightly more dense than area behind marginal vein. Basal cell with 14–16 setae. Longest setae of marginal fringe about one-tenth the width of disc. Submarginal vein with three to five setae, marginal vein anteriorly with 10–12 setae. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.77–0.89). Mid tarsus 0.6 times as long as mid tibia. Basitarsus of mid leg ventrally with stout setae with distinct bases, almost as long as combined length of three following tarsal segments. Tergites on each side with the following numbers of setae: T1: 2–4, T2: 4–6, T3: 5–7, T4: 7–8, T5: 12–16, T6: 3–4, T7 with four to six setae. Ovipositor slightly longer than midtibia (1.06–1.09). Third valvula 0.34–0.35 times as long as second valvifer.

Male. Colour and structural details similar to female, but brown colour more extensive.

Species group placement. Not established.

Distribution. Queensland.

Host. Aleyrodidae: *Aleurodicus destructor* Mackie.

Additional material examined

Queensland: 6♀, 2♂, same data as holotype (BMNH, ZSMG) and 1♀, 1♂, Maryborough, 11 May 1971 (P. J. Young), ex *Aleurodicus destructor*, C.I.E.A 5170/12550 (QDPI).

Comments

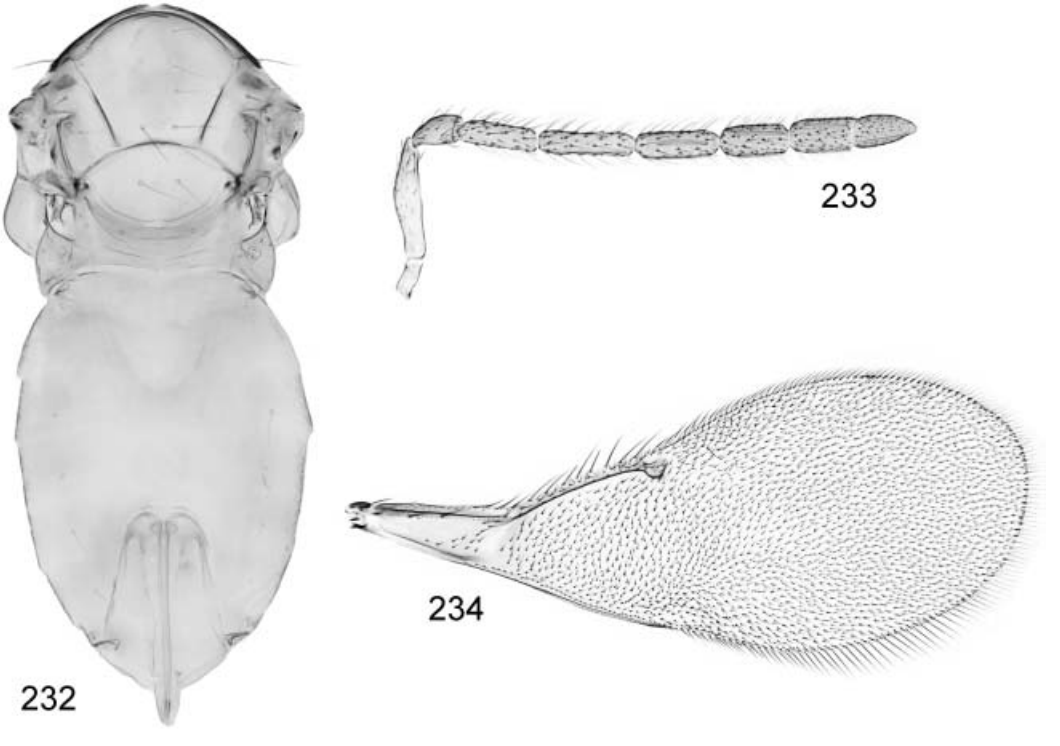
Encarsia pilosa is unusual for an *Encarsia* species because of the large number of setae on the mesoscutal midlobe, shape of the scutellum, lack of a medial furrow on the scutellum, large number of setae on the submarginal vein, and numerous sensilla on all flagellar segments.

73. *Encarsia praecipua* n. sp.
(Figures 232–234)

Description

Female. Colour: head yellow, stemmaticum brown. Body entirely yellow except the following parts brown: pronotum, anterior margin of mesoscutal midlobe, a faint longitudinal stripe on midlobe, mesoscutal side lobes anteriorly, and axillae anteriorly. Gaster yellow. Antenna yellow, apex slightly darker. Fore wing hyaline. Legs yellow.

Morphology [measurements of holotype in square brackets]: maxillary palp two-segmented. Antennal formula 1,1,4,2. Pedicel shorter than F1 (0.54–0.62) [0.62]. F1 3.25–3.50 [3.25] times as long as its maximum width, shorter than F2 (0.76–0.90) [0.76] and subequal to or shorter than F3 (0.88–1.00) [0.88]. F2 longer than F3 (1.11–1.15) [1.15]. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with 10–11 [10] setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of less than the width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.4–2.5 times as long as width of disc, evenly and densely setose. Marginal fringe 0.15–0.17 [0.15] times as long as width of disc. Basal cell with 12–13 setae, costal cell distally with three large setae. Submarginal vein with two setae, marginal vein anteriorly with eight to nine setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly longer than half the length of the corresponding basitarsus (0.59–0.63) [0.59]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae.



Figures 232–234. *Encarsia praecipua* n. sp., female. (232) Mesosoma and gaster. (233) Antenna. (234) Fore wing.

Ovipositor slightly shorter than midtibia (0.94–0.97) [0.94] and 2.28–2.41 [2.28] times as long as clava. Third valvula 0.30–0.36 [0.30] times as long as second valvifer.

Male. Unknown.

Species group placement. *E. strenua* group.

Distribution. Australia: Tasmania.

Host. Unknown.

Material examined

Tasmania: Holotype: ♀, Pelion Hut, 3 km S Mt Oakleigh (41°50′S, 146°03′E), closed forest (W.E.B.S), 11 February to 1 March 1990, Malaise 2 (ANIC). Paratype: ♀, 4 km S Mt Oakleigh (W.E.B.S.), 11 February to 1 March 1990 (41°51′S, 146°03′E), Malaise 3, closed forest (BMNH).

74. ***Encarsia prolata*** n. sp.
(Figures 235–237)

Description

Female. Colour: head and mesosoma yellow, gaster brown. Antenna yellow, clava brown (at least apical segment slightly brown). Fore wing with dark band behind marginal vein. Legs yellow.

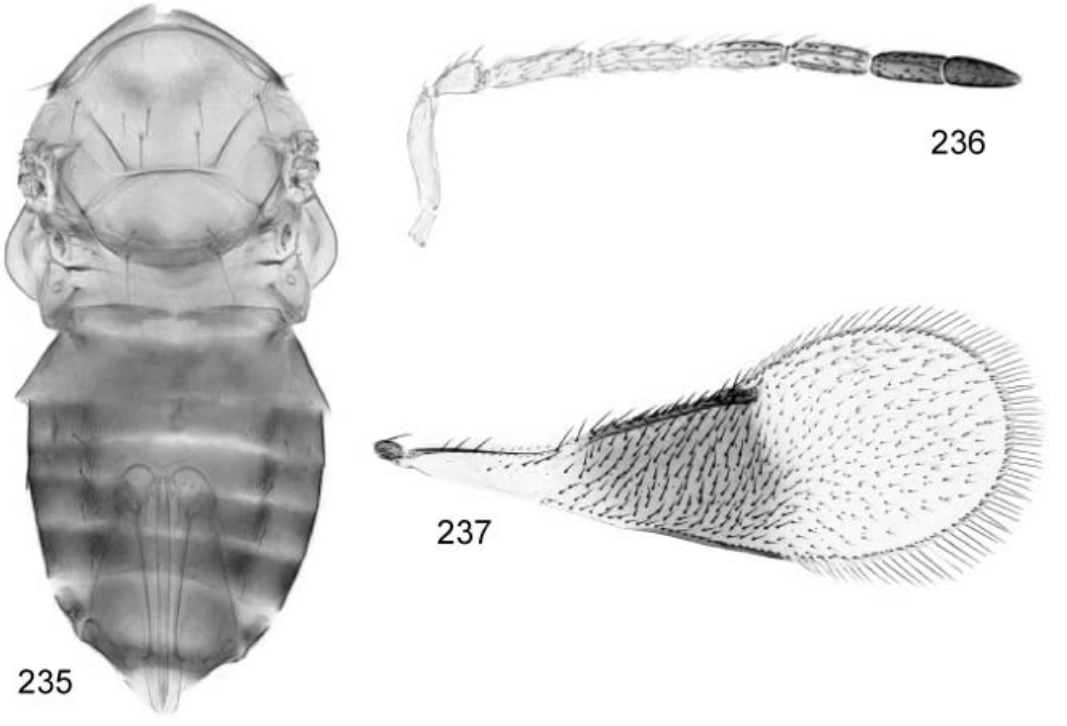
Morphology: stemmaticum with transverse, rugosely strigose surface sculpture. Antennal formula 1,1,4,2. Antenna slender, pedicel distinctly shorter than F1 (0.46–0.55). F1 4.0–4.4 times as long as its maximum width, subequal in length to F2 and F3. Flagellomeres with the following numbers of sensilla: F1: 0–1, F2: 2, F3:3, F4: 3–4, F5: 2, F6: 2. Midlobe of mesoscutum with (7–)8–10 setae, side lobes with two setae each. Scutellar sensilla widely separated (approximately four to five times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than distance between posterior pair. Fore wing 2.5–2.6 times as long as width of disc. Marginal fringe 0.17–0.25 times as long as width of disc. Submarginal vein with two or three setae, marginal vein anteriorly with seven or eight setae. Basal cell with five or six setae. Tarsal formula 5-5-5. Apical spur of midtibia about half as long as the length of the corresponding basitarsus (0.52–0.57). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor slightly shorter or subequal in length to midtibia (0.92–1.00). Third valvula 0.23–0.27 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Dialeurodes* sp.



Figures 235–237. *Encarsia prolata* n. sp., female. (235) Mesosoma and gaster. (236) Antenna. (237) Fore wing.

Material examined

Queensland: Holotype: ♀, Mossman, 1 September 2001 (P. De Barro), ex *Dialeurodes* sp. #105 (ANIC). Paratypes: 4♀, same data as holotype (ANIC, ZSMG).

75. *Encarsia protransvena* Viggiani
(Figures 238–241)

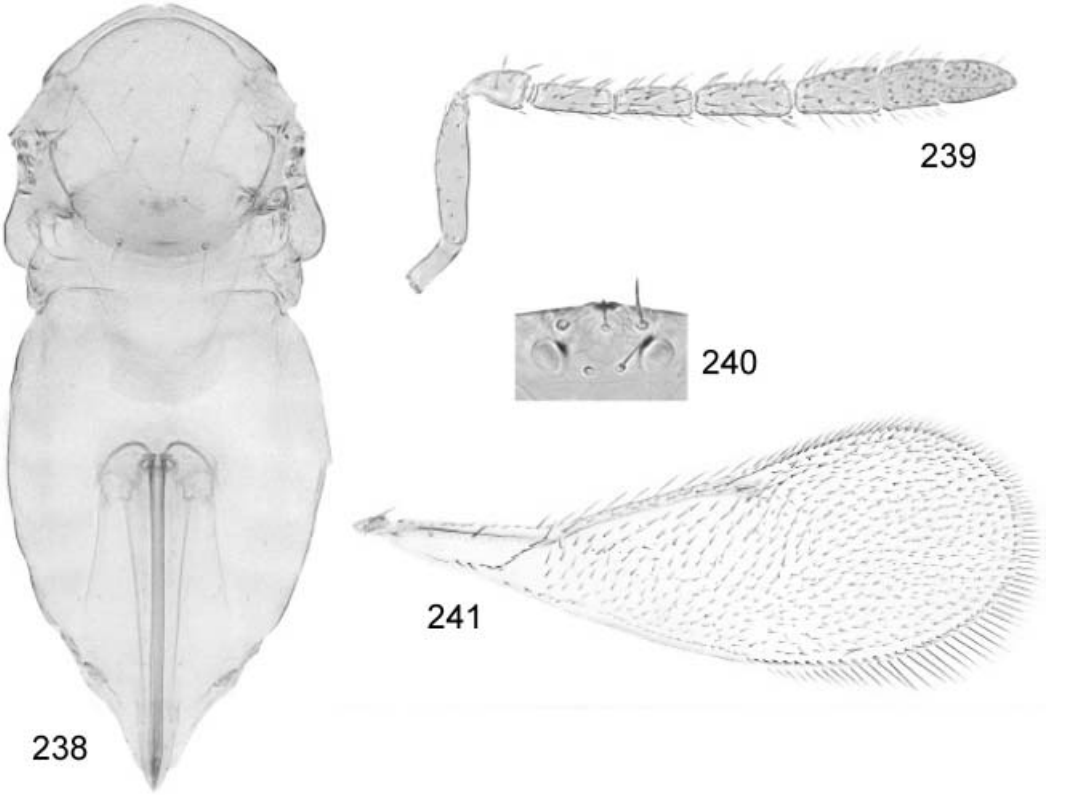
Encarsia protransvena Viggiani 1985b, p 89. Holotype ♀, USA: Florida, Broward Co[unty]. F[or]t. Lauderdale, September 1984 (C. R. R. Thompson), ex *Dialeurodes kirkaldyi* (DEUN, examined).

Encarsia strenua (Silvestri): Polaszek et al. 1992, p 388 (misidentification, in part, of *E. protransvena*), Booth and Polaszek 1996, p 73; Schauff et al. 1996, p 29 (misidentification of *E. protransvena*).

Description

Female. Colour: head yellow, body completely yellow without any dark pigmentation. Antenna yellow, apical one to two segments very slightly infuscate. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with reticulate surface sculpture (Figure 240). Antennal formula 1,1,3,3. Pedicel shorter than F1 (0.76). F1 3.09 times as long as its maximum



Figures 238–241. *Encarsia protransvena* Viggiani, female. (238) Mesosoma and gaster. (239) Antenna. (240) Stemmaticum. (241) Fore wing.

width, subequal to F2 (1.06) and shorter than F3 (0.85). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 1, F4: 2, F5: 2, F6: 2. Midlobe of mesoscutum with nine setae (in the single Australian specimen known one seta in an asymmetrical position, usually eight setae in specimens from elsewhere), side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum or less. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.6 times as long as width of disc. Marginal fringe 0.23 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with eight setae. Basal cell with nine setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.79). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.41) and 2.46 times as long as clava. Third valvula 0.30 times as long as second valvifer.

Male. No males of the species were collected in the study area. For a description of *E. protransvena* males from elsewhere see Heraty and Polaszek 2000, p 160.

Species group placement. E. strenua group.

Distribution. Australia: Christmas Island. Pacific Islands: French Polynesia, Fiji. USA: California, Florida, Georgia, Hawaii. China, Colombia, Cayman Islands, Honduras, Puerto Rico and Vieques Island, Spain.

Host. Not reared in the study area. The following hosts from elsewhere have been recorded (Huang and Polaszek 1998; Schmidt et al. 2001): *Aleurocanthus* sp., *Aleurolobus* sp., *Bemisia tabaci* (Gennadius), *Dialeurodes citri* (Ashmead), *D. citrifolii* (Morgan), *D. kirkaldyi* (Kotinsky), *Trialeurodes packardi* (Morrill), *T. vaporariorum* (Westwood).

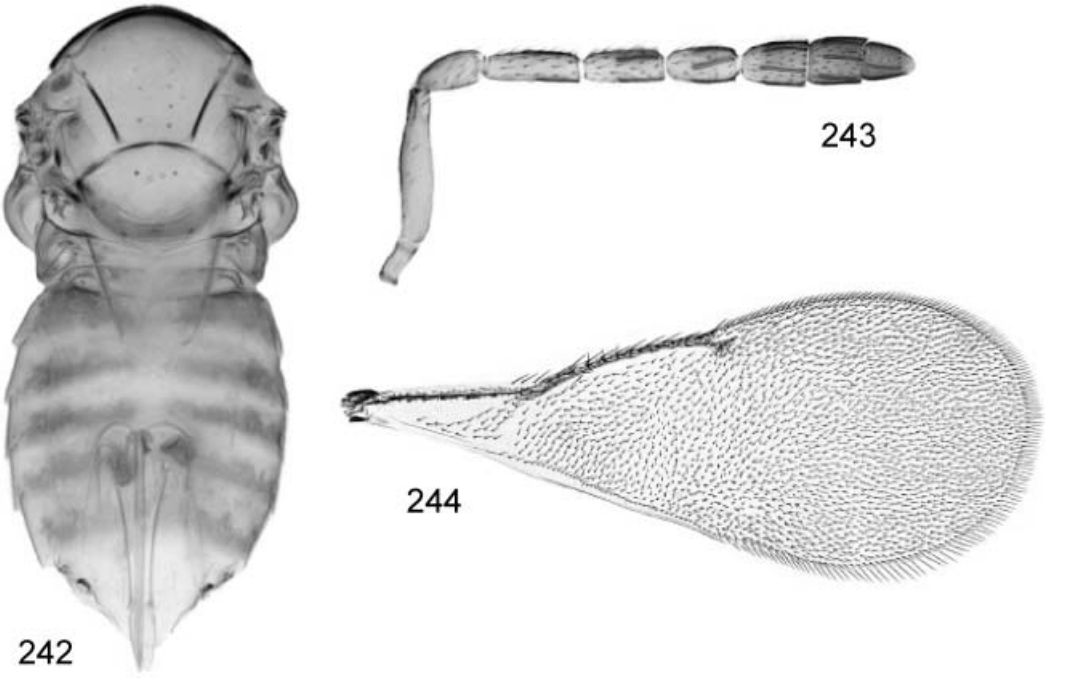
Material examined

Christmas Island: 1♀, Central Area Workshop (10°29′S, 105°38′E), 14 April 1989 (J. C. Cardale), ex ethanol (ZSMG).

76. *Encarsia pulliclava* (Girault)

(Figures 242–244)

Coccophagus pulliclavus Girault 1917b[320], p 93. Syntypes ♀, Western Australia, Perth (USNM, type no. 20669, examined). Syntype in QMBA.
Encarsia mozarti Girault 1932[439], p 3. Syntype ♂, Western Australia (A. A. Girault) from *Aspidiotus* (WADA, type no. 133702, examined). Syn. nov.
Prospaltella pulliclava (Girault): Compere 1931, p 11. Change of combination.
Coccophagus pulliclavus Girault: Dahms 1986, p 440.
Encarsia mozarti Girault: Dahms 1984, p 833.
Encarsia pulliclava (Girault): Hayat 1989b, p 289. Change of combination.



Figures 242–244. *Encarsia pulliclava* (Girault), female. (242) Mesosoma and gaster. (243) Antenna. (244) Fore wing.

Diagnosis

Female. Colour: head yellow or light brown, stemmaticum with three small brown spots adjacent to ocelli and posterior head with (sometimes faint) transverse brown band. Mesosoma light brown, pronotum, anterior margin of mesoscutellar midlobe, side lobes of mesonotum anteriorly, propodeum, and axilla at anterior corner more or less brown. Gaster light brown, T1–T5 with (sometimes faint) dark bands. Antenna brown, radicle, scape, and pedicel lighter. Fore wing hyaline. Legs light brown except last tarsal segment slightly darker.

Morphology: stemmaticum with reticulate surface sculpture. Maxillary palp two-segmented. Antennal formula 1,1,3,3. Pedicel shorter than or subequal in length to F1 (0.70–1.00). F1 3.00–3.60 times as long as its maximum width, subequal to or slightly longer than F2 (1.00–1.10) and slightly longer than F3 (1.10–1.20). F2 subequal to or slightly longer than F3 (1.00–1.10). Flagellomeres with the following numbers of sensilla: F1: 0–1, F2: 2–3, F3: 2–3, F4: 4–5, F5: 5–6, F6: 3–4. Midlobe of mesoscutum with 16–22(–27) setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.2–2.5 times as long as width of disc. Marginal fringe very short, 0.08–0.15 times as long as width of disc. Basal cell with 19–28 setae, costal cell distally with (2–)3–4 setae. Submarginal vein with six to seven setae, marginal vein anteriorly with 7–10 setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly setose, longer than half the length of the corresponding basitarsus (0.67–0.74). Midtibial basitarsus ventrally with rows of distinct pegs. Tergites laterally with the following numbers of setae: T1: (0–)1, T2: 2, T3: 2, T4: 2–3, T5: 3–4(–6), T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.12–1.35) and 2.20–2.52 times as long as clava. Third valvula 0.20–0.34 times as long as second valvifer.

Male. Colour similar to female except brown markings of mesosoma darker and more extensive. Gaster dark brown. Antenna with six flagellomeres, apical two segments partly fused and sensilla partly overlapping. Flagellar segments with abundant longitudinal sensilla.

Species group placement. E. strenua group.

Distribution. Australia: Queensland, South Australia, Western Australia.

Host. Aleyrodidae: *Aleuroclava* sp., *Synaleurodicus hakeae* (Solomon).

Additional material examined

Queensland: 1♀, 4 km NE Batavia Downs (12°39′S, 142°42′E), 22 August to 16 September 1992 (P. Zborowski and L. Miller), Malaise trap (ANIC). **South Australia:** 1♀, Brachina Gorge, 4–10 September 1987 (I. Naumann and J. Cardale) (ZSMG); 1♀, SA near Pine Hill (33°22′S, 137°03′E), 28 November 1992 (I. Naumann and J. Cardale) (ZSMG); 2♀, Carey Gully near Adelaide, 1 December 1986 (J. S. Noyes) (BMNH); 1♀, Morphett Vale, 1 March 1976 (P. Borrett and M. Carver), ex *Aleuroclava* sp. on *Eucalyptus globulus* Labill. (Myrtaceae) (ANIC); 1♀, Aldinga Scrub, 40 km S Adelaide, 5 December 1986 (J. S. Noyes) (BMNH); 1♀, near Pine Hill (33°22′S, 137°03′E), 28 November 1992 (I. D. Naumann and J. Cardale) (ANIC). **Western Australia:** 4♀, 3♂, Stirling Range National Park, 11 November 1999 (S. and O. Schmidt) (ANIC); 1♂, Yanchep National

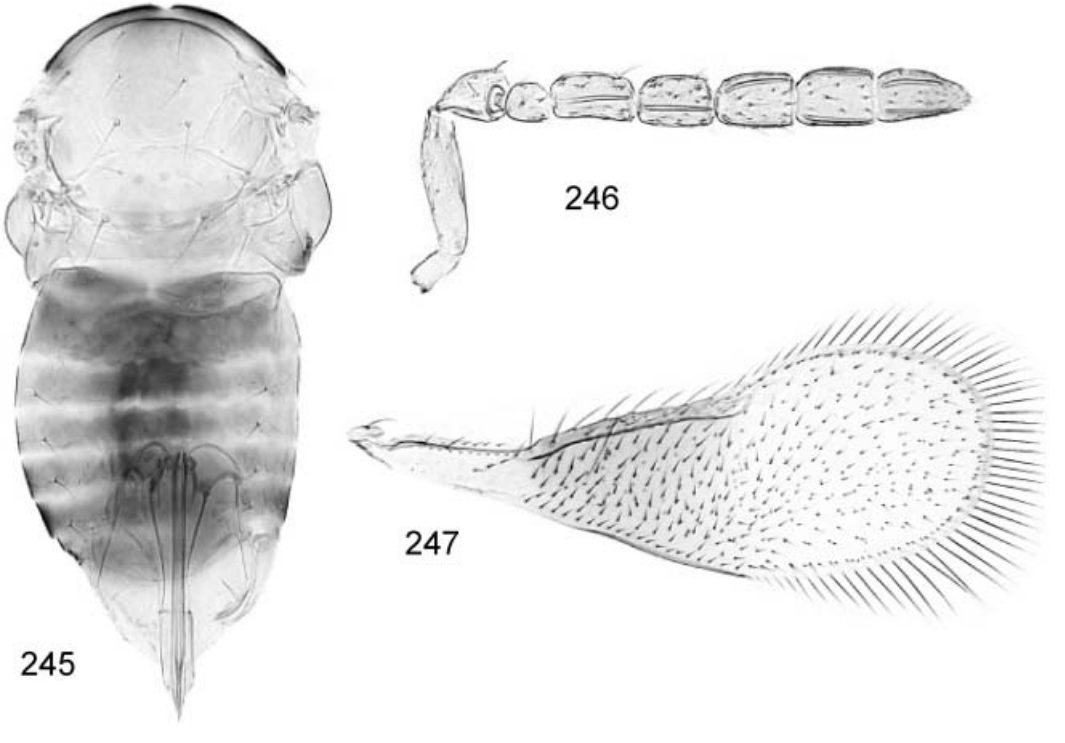
Park, 6 November 1999 (S. and O. Schmidt) (ANIC, ZSMG); 1♀, Kalbarri National Park, 650 km N of Perth, 12–18 December 1986 (J. S. Noyes) (BMNH); 2♀, Fitzgerald National Park, Quaalup area, 6–9 January 1987 (J. S. Noyes) (BMNH); 2♂, Yanchep National Park, ca 50 km N. Perth, 20 December 1986 (J. S. Noyes) (BMNH); 1♀, Highway 1, 30 km S Dongara, 19 December 1986 (J. S. Noyes) (BMNH); 1♀, 2♂,Yanchep National Park, 28 October 2002 (P. De Barro), ex *Synaleurodicus hakeae* #17 on *Hakea prostrata* R.Br. (Proteaceae) (ANIC, ZSMG).

77. ***Encarsia rentzi*** n. sp.
(Figures 245–247)

Description (holotype)

Female. Colour: head and mesosoma yellow except pronotum and mesoscutal midlobe anteriorly brown. Gaster suffused with brown. Antenna yellow. Fore wing with slight infuscation behind marginal vein. Legs yellow.

Morphology: antennal formula 1,1,3,3. Pedicel distinctly longer than F1 (1.62). F1 subquadrate, half as long as F2 and 0.57 times as long as F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 2, F4: 2, F5: 2, F6: 3. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with two setae each. Scutellar sensilla separated by the distance of 2.5 times the maximum width of a sensillum.



Figures 245–247. *Encarsia rentzi* n. sp., holotype female. (245) Mesosoma and gaster. (246) Antenna. (247) Fore wing.

Distance between anterior pair of scutellar setae smaller than distance between posterior pair. Fore wing 2.67 times as long as width of disc. Marginal fringe 0.38 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with three setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to corresponding basitarsus. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with five setae. Ovipositor 1.26 times as long as midtibia and 1.62 times as long as clava. Third valvula 0.45 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Unknown.

Material examined

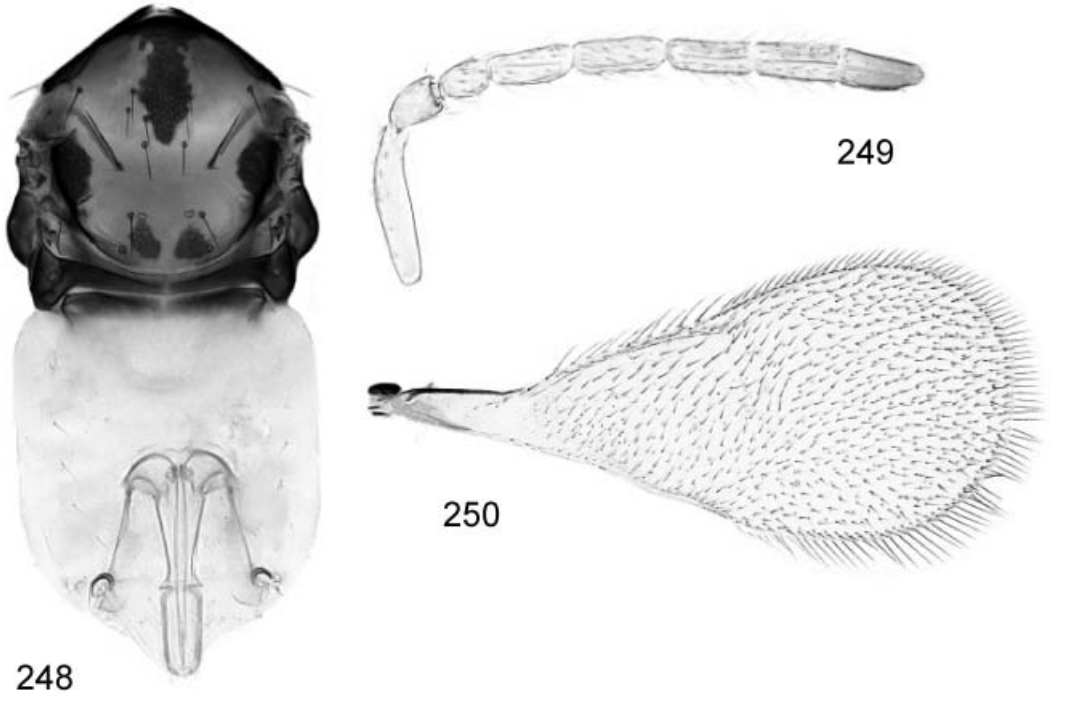
Queensland: Holotype ♀, Curtain Fig, 2 km SSW Yungaburra (17°17′S, 145°34′E), 2 February 1988 (D. C. F. Rentz), stop A-2, pan trap (ANIC).

78. ***Encarsia scylla*** n. sp.
(Figures 248–250)

Description (holotype)

Female. Colour: the holotype is clearly a teneral specimen and the dark colour pattern of the mesosoma is expected to be different in normal specimens. The type has a brown head and mesosoma with the following dark brown markings: pronotum, mesoscutal midlobe with a medial stripe, beginning broadly at the anterior margin, becoming constricted, dilated, and constricted again, and ending well before posterior margin, side lobes anteriorly and along mesal margin, axilla except posteromesal corner, scutellum with pair of dark maculae posterior of scutellar sensilla, within area enclosed by anterior and posterior pair of scutellar setae, mesopleuron and propodeum brown. Gaster pale except first tergite anteriorly brown. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel longer than F1 (1.22). F1 short, 1.6 times as long as its maximum width, distinctly shorter than F2 (0.60) and F3 (0.58). F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 4, F4: 4, F5: 4, F6: 1. Midlobe of mesoscutum with 10 setae plus two setae in an asymmetrical position on the left side of the midlobe near the centre which may be missing in other specimens, side lobes with three setae each. Axillary seta located at about one-third the length of the axilla from its anterior margin. Scutellar sensilla widely separated (approximately four times the maximum width of a sensillum). Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing about 2.2 times as long as width of disc. Marginal fringe 0.18 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with 9–10 setae. Basal cell with four to five setae. Stigmal vein very narrow,



Figures 248–250. *Encarsia scylla* n. sp., holotype female. (248) Mesosoma and gaster. (249) Antenna. (250) Fore wing.

without distinct constriction. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus (0.83). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor subequal in length to midtibia, with blunt apex. Third valvula relatively long, 0.68 times as long as second valvifer.

Male. Unknown.

Species group placement. *E. inaron* group.

Distribution. Australia: New South Wales.

Host. Aleyrodidae: *Aleuroduplidens wellsae* Martin.

Material examined

New South Wales: Holotype ♀, Coffs Harbour, 18 October 2000 (P. De Barro), ex *Aleuroduplidens wellsae* on rainforest plant (ANIC).

Comments

Teneral specimens with a similar colour pattern are known to occur in other *Encarsia* species, e.g. *E. formosa* (A. Polaszek, personal observation), in particular if the specimens

were reared. Apart from the unusual pattern of dark markings on the mesosoma, there are additional characters that indicate the presence of a teneral specimen, including the wings which are very pale (including the venation) and appear crumpled. Furthermore, the reticulation of the mesosoma is discernible only in dark coloured areas, suggesting that both the sculpture and the pigmentation develop in patches. Despite this abnormality, the species can be distinguished from closely related species of the *inaron* group by the relatively long third valvula.

79. *Encarsia seminigriclava* (Girault)

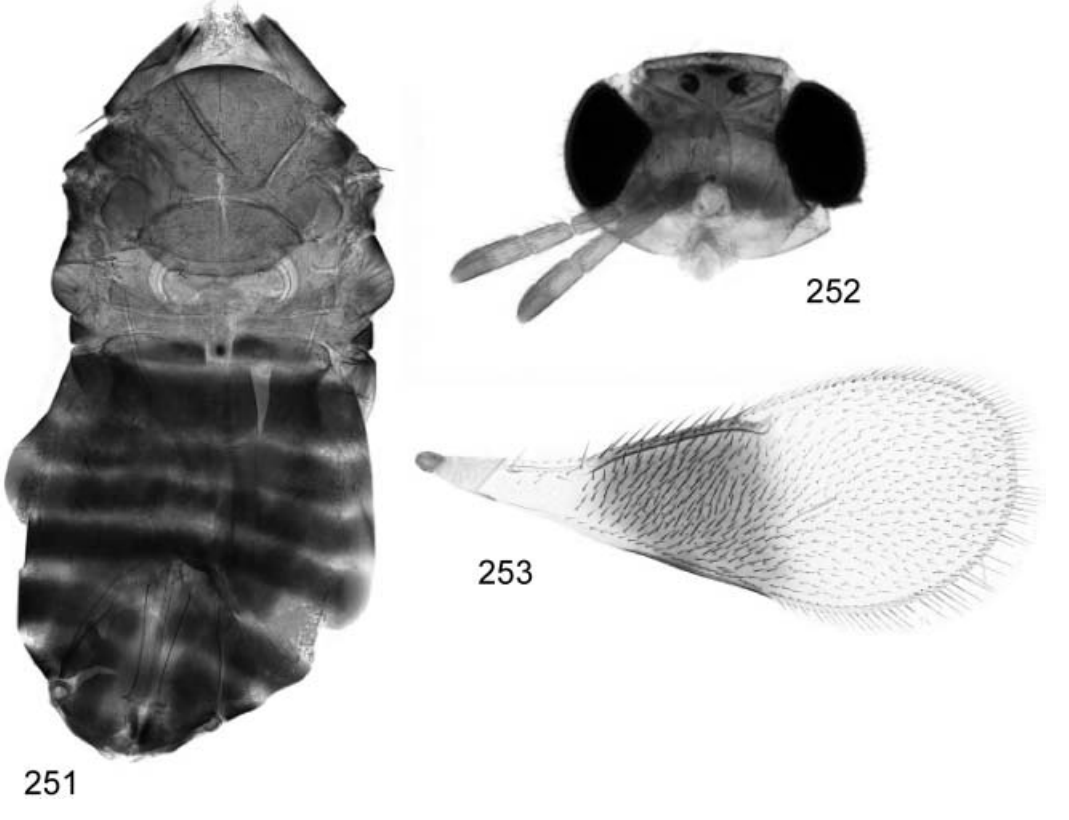
(Figures 251–253)

Prospaltella seminigriclavus Girault 1913[167], p 188. Holotype ♀, Australia, Queensland, Nelson [=Gordonvale] (Cairns), 14 June 1913 (A. P. Dodd) (QMBA, type no. Hy. 1729, examined).

Coccophagus seminigriclavus (Girault): Girault 1915[238], p 57. Change of combination.

Prospaltella seminigriclavus (Girault): Compere 1931, p 11. Dahms 1986, p 518–519.

Encarsia seminigriclava (Girault): Viggiani 1985c, p 248. Change of combination and species gender.



Figures 251–253. *Encarsia seminigriclavus* (Girault), holotype female. (251) Mesosoma and gaster. (252) Head and antennae. (253) Fore wing.

Redescription

Female. Colour: head brown, with indistinct and incomplete transverse brown band between eyes. Mesosoma brown, mesoscutum and axillae posteriorly, and scutellum lighter. Petiole light brown, laterally darker. Gaster predominantly brown. Antenna yellow, apical segment brown. Fore wing with dark band behind marginal vein. Legs yellow, hind coxa and femur brown.

Morphology [measurements of holotype in square brackets]: stemmaticum with reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel subequal in length to F1. F1 1.30–1.60 [1.60] times as long as its maximum width, shorter than F2 (0.65) and F3 (0.55–0.67 [0.67]). F2 slightly shorter than F3 or subequal (0.90–1.00 [1.00]). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 2, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with eight setae, side lobes with three setae each. Scutellar sensilla distantly placed (approximately three to four times the maximum width of a sensillum). Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.3–2.4 [almost 2.4] times as long as width of disc. Marginal fringe 0.17–0.18 [0.17] times as long as width of disc. Basal cell with five to nine [five] setae. Submarginal vein with two setae, marginal vein anteriorly with eight or nine setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to corresponding basitarsus. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor shorter than midtibia (0.85–0.86 [0.86]), about 1.2–1.34 [1.34] times as long as clava. Third valvula 0.29–0.31 [0.29] times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: New South Wales, Queensland.

Host. Unknown.

Additional material examined

New South Wales: 1♀, Tooloom Plateau, 14 km W Urbenville, 14 February 1984 (I. D. Naumann) (ANIC).

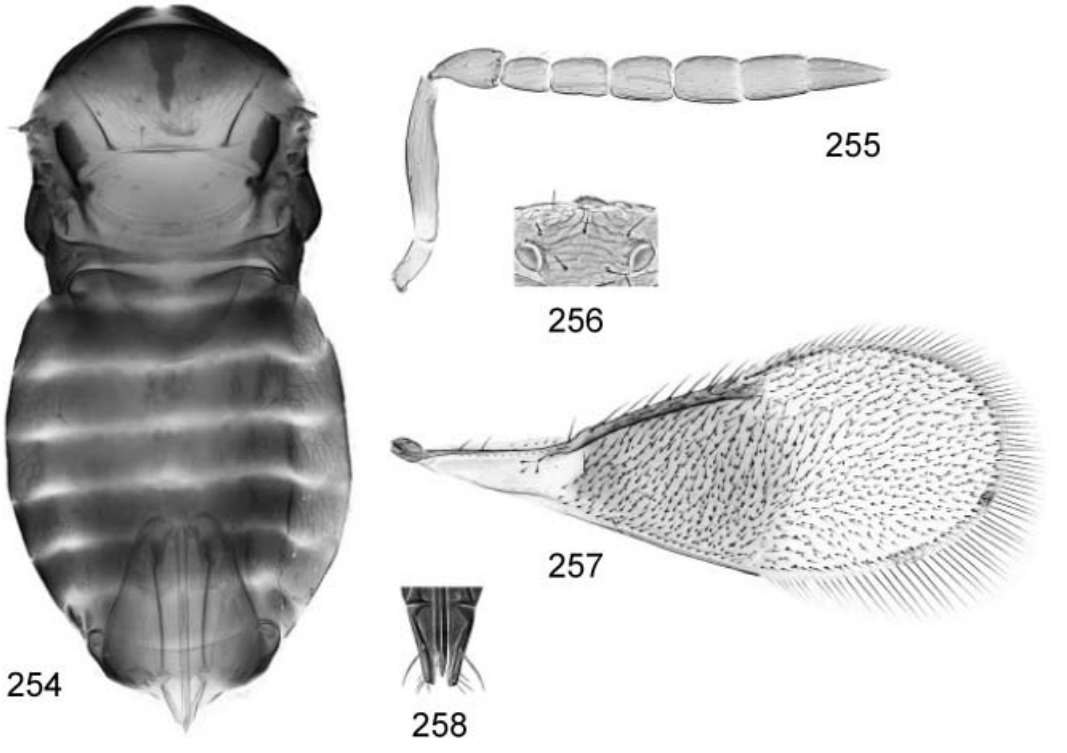
Comments

The maxillary palp appears to be two-segmented in the type which seems to contradict the condition in the second specimen from NSW which apparently has one-segmented maxillary palps. However, since both specimens otherwise show a great degree of similarity and since there is always the possibility of distortion of slide material mounted by A. A. Girault we regard the two specimens as being conspecific.

80. *Encarsia silvifilia* (Girault)

(Figures 254–258)

Coccophagus silvifilia Girault 1924[376], p 3. Holotype ♀, Australia, Queensland, Flaxton, Blackall Range, 4 July 1923 (QMBA, type no. T. 3845, examined).



Figures 254–258. *Encarsia silvifilia* (Girault), female. (254) Mesosoma and gaster. (255) Antenna. (256) Stemmaticum. (257) Fore wing. (258) Ovipositor apex.

Encarsia silvifilia (Girault): Viggiani 1985c, p 249. Change of combination.
Coccophagus silvifilia Girault: Dahms 1986, p 539–540.

Diagnosis

Female. Colour: head yellow except ventral parts brown. Mesosoma brown except the following parts more or less yellow: mesoscutal midlobe posteriorly and posterolaterally, inner angles of axillae, scutellum, and propodeum. Mesoscutal midlobe anteromedially with a longitudinal dark brown stripe. Gaster predominantly brown. Antenna light brown. Fore wing with dark band behind marginal vein (not apparent in holotype). Legs yellow except hind femur and remaining femora and tibiae partly brown.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose-reticulate surface sculpture (Figure 256). Maxillary palp two-segmented. Antennal formula 1,1,3,3, F6 conical. Pedicel longer than F1 (1.33–1.67) [1.55]. F1 1.22–1.60 [1.22] times as long as its maximum width, shorter than F2 (0.80–0.86) [0.85] and F3 (0.58–0.80) [0.58]. F2 slightly shorter than F3 (0.79–0.93). Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 2, F4: 2–3, F5: 2–3, F6: 2–3. Midlobe of mesoscutum with 8–10 [9] setae, arranged symmetrically, side lobes with two setae each. Scutellar sensilla widely separated (approximately six to nine times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to or slightly larger than distance between posterior pair. Fore wing about 2.4–2.6 [2.6] times as long as width of disc.

Marginal fringe 0.25–0.36 [0.36] times as long as width of disc. Basal cell with two to six [two] setae. Marginal vein anteriorly with seven to nine [nine] setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal to or longer than corresponding basitarsus (1.06–1.18). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor subequal to or longer than midtibia (0.94–1.26) [1.25] and 1.38–1.59 [1.38] times as long as clava. Valvulae 3 subtriangular and appearing truncate at apex (Figure 258). Third valvula about 0.33–0.40 [0.40] times as long as second valvifer.

Male. Colour and structure similar to female, but dark brown patch on mesoscutal midlobe more extensive.

Species group placement. E. aurantii group.

Distribution. Australia: Australian Capital Territory, Queensland, Tasmania.

Host. Unknown.

Additional material examined

Australian Capital Territory: 1♀, Piccadilly Circus, 1240 m, February 1984 (J. Lawrence, T. Weir, M.-L. Johnson), flight intercept window/through trap (Weir, Lawrence, Johnson) (ANIC); 7♀, 2♂, Blundells Creek, 3 km E of Piccadilly Circus (35°22′S, 148°50′E), 850 m, February and December 1984 (Weir, Lawrence, Johnson), flight intercept window/through trap (ANIC, ZSMG); 2♀, Wombat Creek, 6 km NE of Piccadilly Circus, 750 m, February 1984 (Weir, Lawrence, Johnson), flight intercept window/through trap (ANIC, ZSMG). **Tasmania:** 1♀, 14 km SW by S. Wilmot (41°30′S, 146°05′E), 31 January 1983 (I. D Naumann and J. Cardale), ex ethanol (ANIC); 3♀, 10 km NW by N St Helens (41°15′S, 146°10′E), 14 January 1983 (I. D Naumann and J. Cardale), ex ethanol (ANIC).

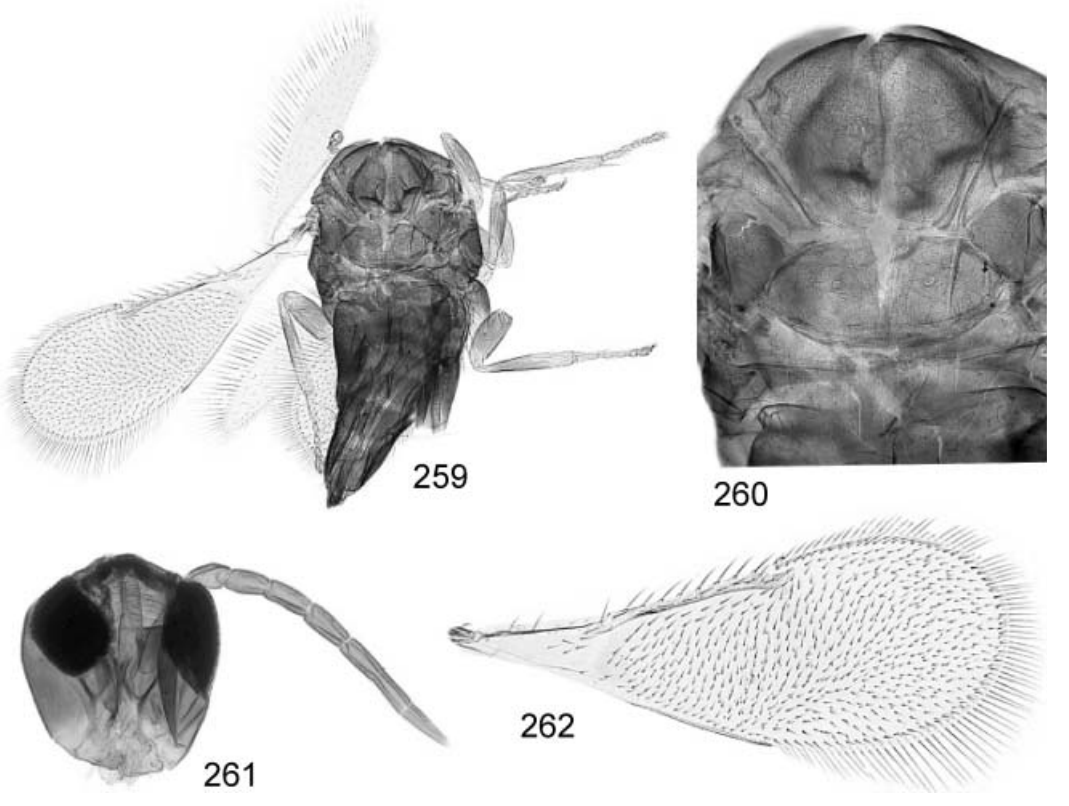
81. *Encarsia socratis* (Girault)
(Figures 259–262)

Coccophagus socratis Girault 1931[435], p 3. Holotype ♀, Australia, Queensland, Indooroopilly, October 1930 (QMBA, type no. T. 4950, examined).
Coccophagus socratis Girault: Dahms 1986, p 544–545.
Encarsia socratis (Girault): Viggiani 1986, p 74. Change of combination.

Redescription (holotype)

Female. Colour: head brown, lower face and area around mouthparts yellow. Mesosoma brown, pronotum, mesoscutal midlobe anteriorly, axilla, propodeum laterally, and mesopleuron dark brown. Gaster dark brown. Antenna yellow, apex slightly darker. Fore wing hyaline with a slight infuscation behind marginal vein. Legs pale except coxae, femora largely, and basal two-thirds of hind tibia brown.

Morphology: maxillary palp two-segmented. Antennal formula 1,1,3,3, apical segment appears conical. Pedicel subequal in length to F1. F1 0.81 times as long as its maximum width, with two longitudinal sensilla, subequal in length to F2 and F3. Scutellar sensilla



Figures 259–262. *Encarsia socratis* (Girault), holotype female. (259) Type specimen. (260) Mesosoma. (261) Head and antenna. (262) Fore wing.

widely separated. Fore wing about 2.6 times as long as its maximum width. Basal cell with six setae. Marginal fringe 0.33 times as long as width of disc. Marginal vein anteriorly with eight setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus (0.77). Ovipositor distinctly longer than midtibia (2.39) and 2.97 times as long as clava. Third valvula 0.34 times as long as second valvifer.

Male. Unknown.

Species group placement. E. opulenta group.

Distribution. Australia: Queensland.

Host. Unknown.

Comments

Encarsia socratis is characterized by its very long ovipositor which identifies it as belonging to the *E. opulenta* species group. *Encarsia socratis* can be separated from other Australian species of the *opulenta* group (*E. albiscutellum*, *E. iris*, *E. longicauda*, and *E. subhyalina* n. sp.) by its longer marginal fore wing fringe and the longer ovipositor.

82. *Encarsia sophia* (Girault and Dodd)
(Figures 263–265)

Coccophagus sophia Girault and Dodd 1915[238], p 49, 56. Syntypes ♀, Australia, Cairns (QM, Brisbane, type no. Hy. 2926, examined).

Prospaltella transvena Timberlake 1926, p 312–315. Holotype ♀, USA, Hawaii, Oahu, reared from *Trialeurodes* [as *Aleyrodes*] *vaporariorum* on tomato (BPBM, type no. 5690, examined). Synonymy by Heraty and Polaszek 2000, p 163.

Prospaltella sophia (Girault and Dodd): Compere 1931, p 11. Change of combination.

Prospaltella sublutea Silvestri 1931a, p 20–22. Syntypes ♀, Somalia, Duca [?] (DEUN, examined). Synonymy by Gerling and Rivnay in Viggiani 1985b, p 90.

Prospaltella bemisiae Ishii 1938, p 30. Syntypes ♀, Japan, Ikawa-cho, Mei-Ken, 25 August 1932 (Iino), ex *Parabemisia* [as *Bemisia*] *myricae* Kuwana (NIAT, examined). Synonymy with *transvena* by Polaszek et al. 1992, p 388–389.

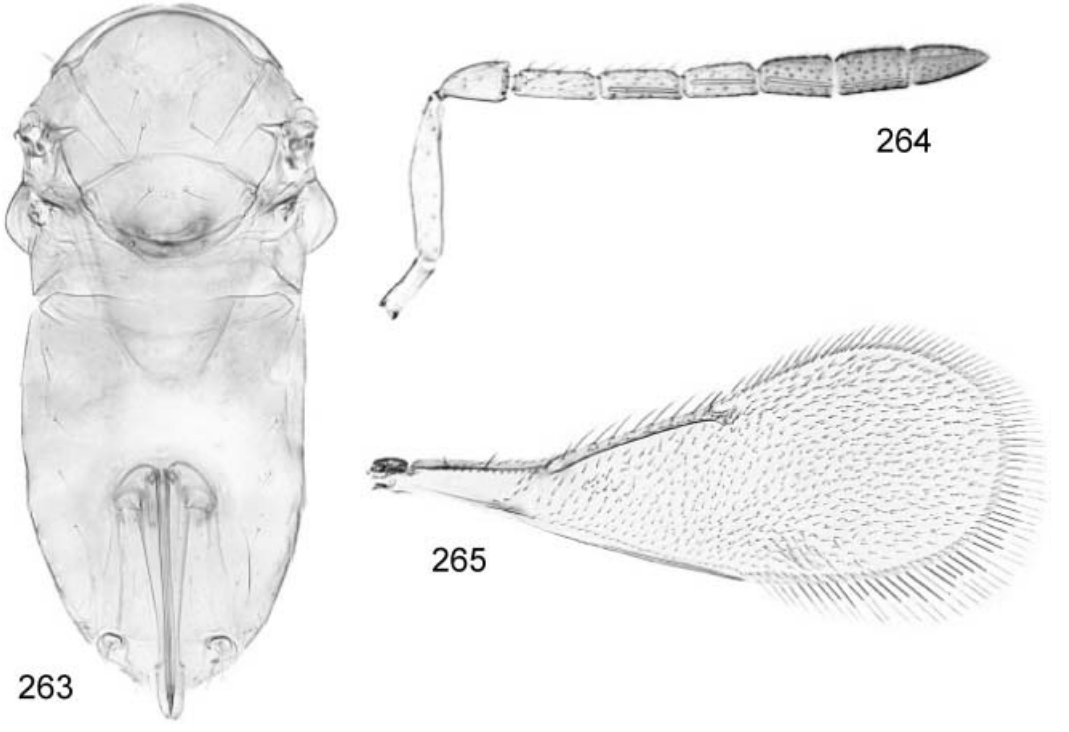
Prospaltella flava Shafee 1973, p 254. Holotype ♀, India, Uttar Pradesh, Aligarh. Synonymy by Hayat 1989a, p 72. Preoccupied by *flavus* Compere 1936, p 300. Synonymy questionable (Viggiani 1985c) because type material apparently reared from coccid.

Encarsia sophia (Girault and Dodd): Viggiani 1985c, p 249. Change of combination.

Encarsia transvena (Timberlake): Gerling and Rivnay in Viggiani 1985b, p 90–92. Change of combination.

Coccophagus sophia Girault and Dodd: Dahms 1986, p 546.

Encarsia shafeei Hayat 1986, p 163. Replacement name for *E. flava* (Shafee).



Figures 263–265. *Encarsia sophia* (Girault and Dodd), female. (263) Mesosoma and gaster. (264) Mesosoma. (265) Fore wing.

Encarsia transvena (Timberlake): Hayat 1989a, p 71–73; 1998, p 205–207; Polaszek et al. 1992, p 388–389; Schauff et al. 1996, p 31–33; Huang and Polaszek 1998, p 1954–1956.
Encarsia sophia (Girault and Dodd): Schmidt et al. 2001, p 383.

Diagnosis

Female. Colour: head and body yellow, pronotum and axillae anteriorly and gaster occasionally slightly darkened. Antenna yellow with apex slightly darkened (sometimes faint). Fore wing hyaline. Legs yellow.

Morphology: stemmaticum with transversely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel 0.87–1.18 as long as F1. F1 2.90 times as long as its maximum width, 0.86–1.07 times as long as F2, and 0.85–1.10 times as long as F3. F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 1, F4: 1–2, F5: 2–3, F6: 2. Midlobe of mesoscutum with 8–10 setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum or less. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing with patch of long setae near posterior margin. Marginal fringe 0.32–0.43 times as long as width of disc. Basal cell with five to six setae, costal cell distally with two setae. Submarginal vein with two setae, marginal vein anteriorly with six to nine setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.62–0.66). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7 with four setae. T6 with two setae between cercal plates. Ovipositor longer than midtibia (1.13–1.23) and 1.56–2.08 times as long as clava. Third valvula 0.24–0.33 times as long as second valvifer.

Male. Darker than female, gaster mostly, mesoscutal midlobe anteriorly and axillae brown. Flagellum six-segmented, apical segments not fused.

Species group placement. E. strenua group.

Distribution. Australia: Northern Territory, Queensland, Western Australia. Cosmopolitan.

Host. Aleyrodidae: *Aleuroduplidens eucalyptifolia* Martin, *Bemisia tabaci* (Gennadius), *Chitonaleyrodes* sp., *Dialeuropora decempuncta* (Quaintance and Baker), *Trialeurodes vaporariorum* (Westwood), *Xenaleyrodes* sp. The following additional hosts have been recorded (Huang and Polaszek 1998): *Aleurocybotus indicus* David and Subramaniam, *Aleurodicus dispersus* Russell, *Dialeurodes citri* Russell, *Parabemisia myricae* (Kuwana), *Pealius longispinus* Takahashi (with *Bemisia afer* (Priesner and Hosny)).

Additional material examined

Northern Territory: 2♀, Keep River National Park, 3 May 2000 (S. and O. Schmidt), ex *Dialeuropora decempuncta* (ANIC, ZSMG). **Queensland:** 1♀, Dalby, 17 April 1997, D. R. Lea), ex *Trialeurodes vaporariorum* on *Xanthium occidentale* Bertol. (Asteraceae) (ANIC); 2♀, Ayr, 13 November 1996 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* L. (Asteraceae) (ANIC); 2♀, Ayr, 21 March 1997 (P. De Barro), ex *Bemisia tabaci* on *Sonchus oleraceus* (ANIC); 1♀, Brisbane, Longpocket, September 1999 (P. De Barro), ex *Chitonaleyrodes* sp. on *Eucalyptus leucoxylon* F. Muell. (Myrtaceae) (ANIC); 2♀,

Bundaberg, Kinkuna National Park, 4 November 1999 (P. De Barro) (ANIC); 1♀, Brisbane, Sherwood, 27 April 2000 (J. Goolsby), ex *Bemisia tabaci*, biotype B, on *Hibiscus rosa-sinensis* L. (Malvaceae) (ANIC); 5♀, Cleveland, March 1999 (J. Hargreaves), ex *Bemisia tabaci* on sweet potato (Solanaceae) and cucumber (Cucurbitaceae) (ANIC); 1♀, Pt Douglas, 1 September 2001 (P. De Barro), ex *Dialeuropora decempuncta* (ANIC); 2♀, Goldsborough State Forest, Rd nr Gordonvale, 10 May 2003 (M. Coombs), ex *Aleurocybotus indicus* David and Subramaniam on sugarcane (ANIC, ZSMG); 1♀, Monkeywire, April 2003 (J. Goolsby), ex *Dialeuropora decempuncta* (ANIC). **Western Australia:** 2♀, Wanneroo, 1 October 1996 (P. De Barro), ex *Bemisia tabaci* on *Hibiscus* sp. (Malvaceae) (ANIC); 2♀, Pemberton, 11 November 1999 (S. and O. Schmidt), ex whitefly on *Hakea undulata* R.Br. (ANIC, ZSMG); 2♀, Kununurra, N Carr Boyd Ranges, 6 May 2000 (S. and O. Schmidt), ex whitefly of *Bemisia afer* group (ANIC); 2♀, Kununurra, 5 May 2000 (S. and O. Schmidt) (ANIC, ZSMG); 1♀, Kununurra, ex *Xenaleyrodes* sp. on *Eucalyptus grandifolia* Benth. (Myrtaceae) (S. and O. Schmidt) (ANIC); 6♀, 2♂, Purnululu National Park, 9 May 2000 (S. and O. Schmidt, J. Martin), ex *Dialeuropora decempuncta* (ANIC, ZSMG); 1♀, Purnululu National Park, 8 May 2000 (S. and O. Schmidt), ex *Aleuroduplidens eucalyptifolia* on *Eucalyptus* sp. (Myrtaceae) (ANIC); 2♀, Kununurra, Mirima National Park, 3 May 2000 (S. and O. Schmidt), ex *Dialeuropora decempuncta* on *Grevillea decurrens* Ewart (Proteaceae) (ANIC, ZSMG).

Comments

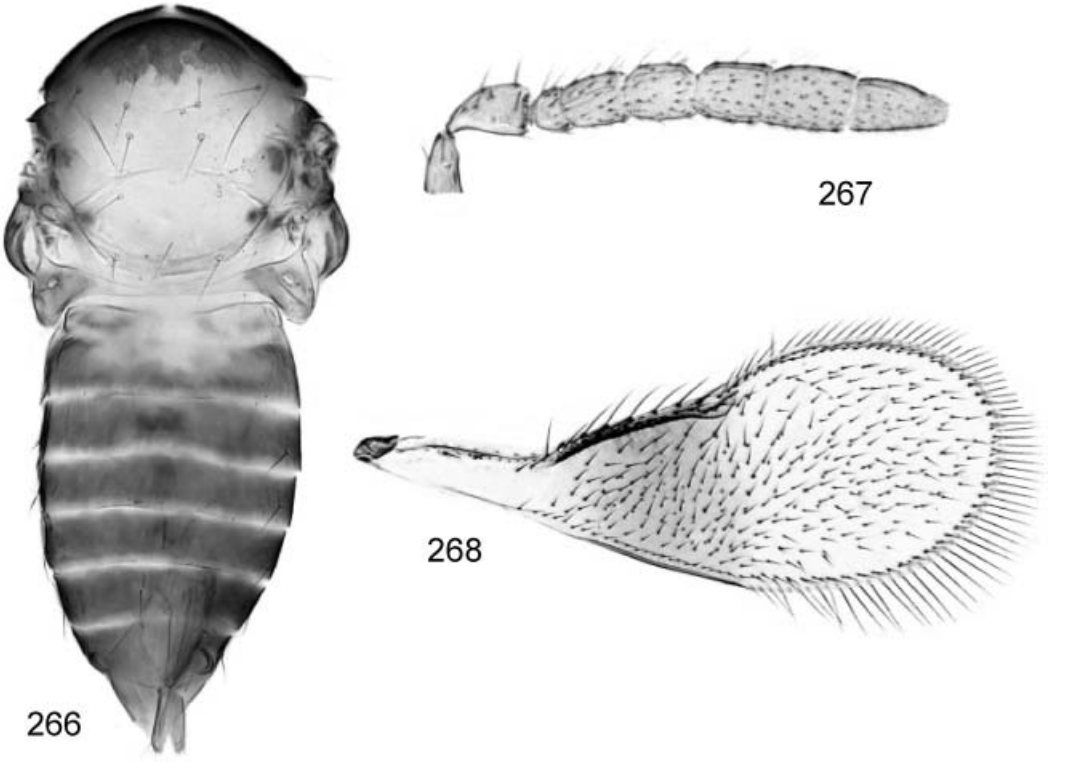
The species is characterized by the presence of two setae between the cercal plates on T6, the patch of long setae near the hind margin of the fore wing, and by the strigose surface sculpture of the stemmaticum.

83. *Encarsia spinosa* n. sp.
(Figures 266–268)

Description

Female. Colour: head yellow, with dark transverse band. Mesosoma light brown (pronotum, mesoscutum and axillae anteriorly and mesopleuron darker brown). Gaster predominantly brown. Third valvula brown. Antenna yellow. Fore wing with dark band behind marginal vein. Legs yellow.

Morphology: stemmaticum with rugosely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (2.09–2.40). F1 0.91–0.96 times as long as its maximum width, shorter than F2 (0.50–0.64) and F3 (0.50–0.64). F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2–3, F3: 2–3, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with 10 setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla widely separated (approximately six to seven times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing about 2.4 times as long as width of disc. Marginal fringe 0.29–0.30 times as long as width of disc. Basal cell with two or three setae. Submarginal vein with two setae, marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of midtibia slightly longer than corresponding basitarsus (1.15). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 2, T7



Figures 266–268. *Encarsia spinosa* n. sp., holotype female. (266) Mesosoma and gaster. (267) Antenna. (268) Fore wing.

with four setae. Ovipositor shorter than midtibia (0.71–0.73) and 1.03–1.13 times as long as clava. Third valvula 0.48–0.53 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Aleyrodidae: *Dialeuropora decempuncta* (Quaintance and Baker).

Material examined

Queensland: Holotype: ♀, Brisbane, Long Pocket, 22 October 1999 (P. De Barro), ex *Dialeuropora decempuncta* on *Callistemon viminalis* (Sol. ex Gaertn.) G. Don (Proteaceae) (ANIC).

Comments

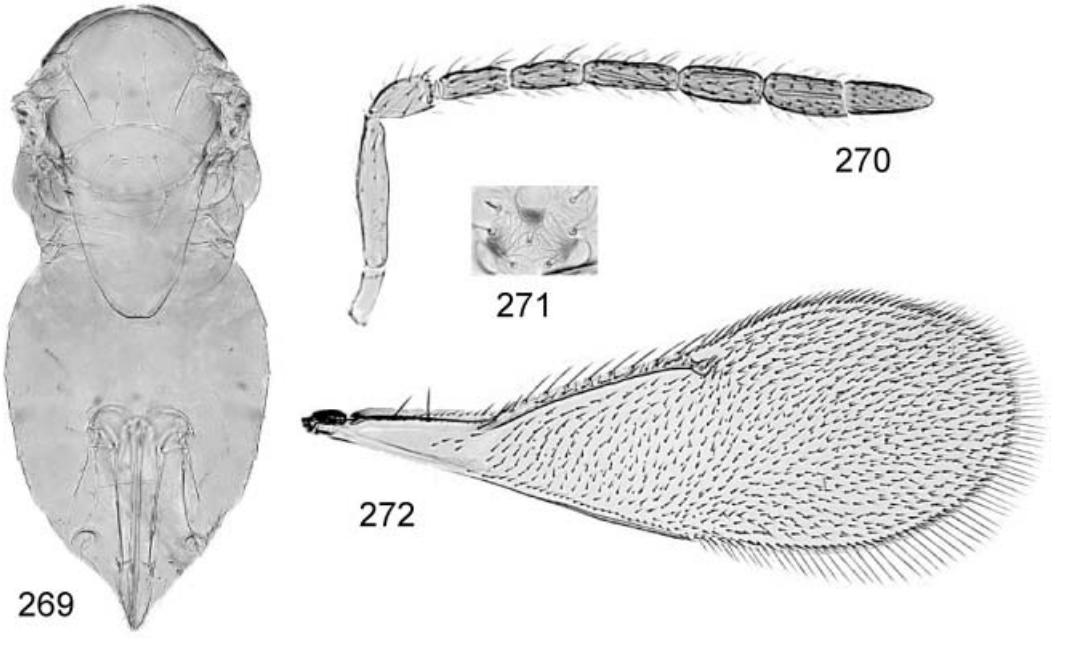
Characterized by the long midtibial spur, the short ovipositor, and the stout antenna with the first funicular segment quadrate.

84. *Encarsia stirlingia* n. sp.
(Figures 269–272)

Description

Female. Colour: head yellow, postgena with narrow dark transverse band (sometimes faint), stemmaticum with brown spots adjacent to ocelli, area around mouth dark. Body entirely yellow except more or less pronotum, anterior margin of mesoscutal midlobe, longitudinal stripe on midlobe, mesoscutal side lobes anteriorly, and axillae anteriorly slightly brown. Gaster on T1–T5 laterally slightly brown or with faint transverse brown bands. Antenna yellow with apex darker. Fore wing hyaline. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose-reticulate to rugose-strigose surface sculpture (Figure 271). Antennal formula 1,1,4,2. Pedicel subequal in length to F1. F1 2.13–2.72 [2.72] times as long as its maximum width, shorter than or subequal in length to F2 (0.83–1.00) [1.00] and shorter than F3 (0.77–0.81) [0.81]. F2 shorter than F3 (0.77–0.92) [0.81]. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0–1, F3: 2, F4: 2–3, F5: 3, F6: 3. Midlobe of mesoscutum with (9–)10–11(–12) [11] setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of approximately 1.0–1.3 times the maximum width of a sensillum. Distance between anterior pair of scutellar setae smaller than between posterior pair. Fore wing 2.5–2.7 [2.7] times as long as width of disc. Marginal fringe 0.20–0.27 [0.20] times as long as width of disc. Basal cell with five to seven setae, costal cell distally with one or two setae. Submarginal vein with two setae, marginal vein anteriorly with seven or eight setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.79–0.90) [0.79]. Tergites laterally with the following



Figures 269–272. *Encarsia stirlingia* n. sp., female. (269) Mesosoma and gaster. (270) Antenna. (271) Stemmaticum. (272) Fore wing.

numbers of setae: T1: 0(–1), T2: 1, T3: 1, T4: 1, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.06–1.30) [1.06] and 2.32–2.70 [2.32] times as long as clava. Third valvula 0.40–0.44 [0.44] times as long as second valvifer.

Male. Head yellow, postgena with transverse brown band. Mesosoma yellow except pronotum, mesoscutal midlobe anteriorly and medially, side lobes anteriorly, axillae largely, mesopleuron, and propodeum mostly brown. Metasoma brown, tergite 2 anteriorly darker. Legs pale. Antenna brown, radicle and base of scape paler, apical 2 segments fused, sensilla only very slightly overlapping.

Species group placement. *E. strenua* group.

Distribution. Australia: Western Australia.

Host. Aleyrodidae.

Material examined

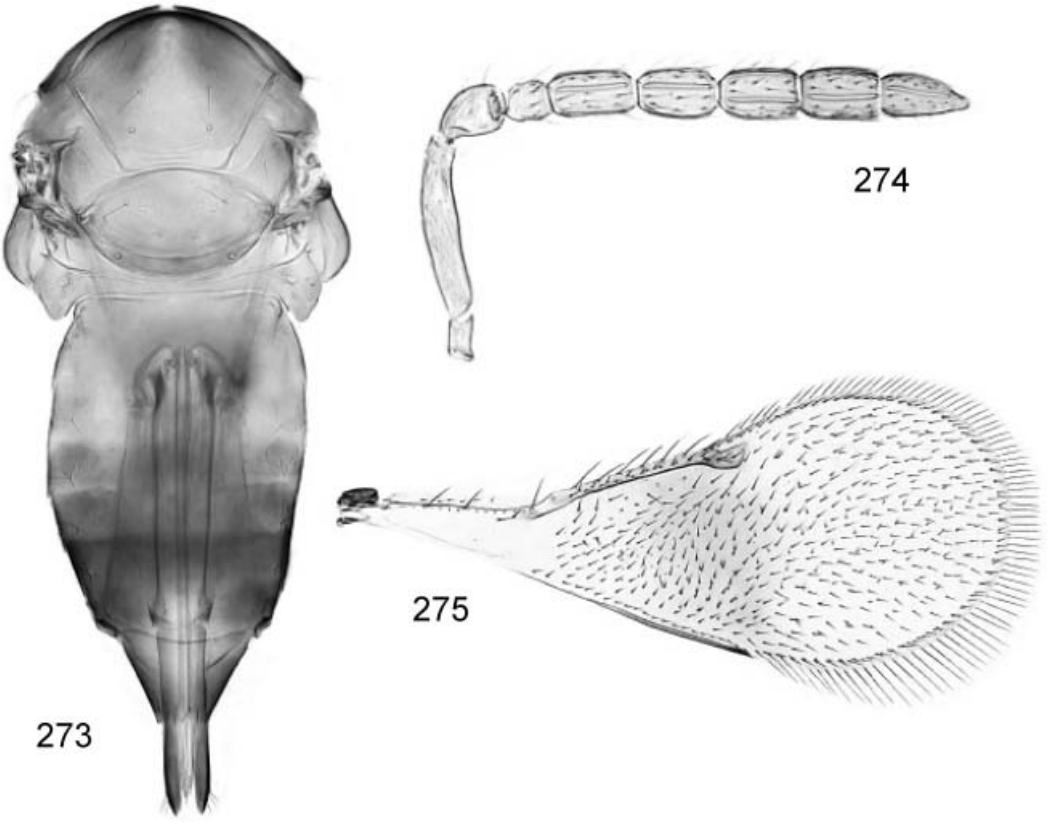
Western Australia: Holotype: ♀, Stirling Range National Park, Toolburup, 11 November 1999 (S. and O. Schmidt) (ANIC). Paratypes: 2♀, 1♂, same data as holotype (ANIC, ZSMG); 1♂, Walpole-Nornalup National Park, 13 November 1999 (S. and O. Schmidt) (ZSMG); 3♀ Pemberton, 14 November 1999 (S. and O. Schmidt) (ANIC, ZSMG); 1♀, 1♂, Eagle Bay, 16 November 1999 (S. and O. Schmidt) (BMNH), all reared from hard-bodied whitefly; 1♀, Walpole-Nornalup National Park, 17–21 January 1987 (J. S. Noyes) (BMNH); 1♀, Bremer Bay, Little Boat Harbour Rd, 9 October 2005 (A. Polaszek, S. and O. Schmidt), ex hard-bodied whitefly (ZSMG).

85. *Encarsia subhyalina* n. sp.
(Figures 273–275)

Description

Female. Colour: head yellow, posterior head with dark transverse band. Mesosoma yellow except pronotum, mesoscutum anteriorly, axilla largely, and mesopleuron brown. Propodeum laterally light brown. Gaster brown except basal tergites pale. Antenna yellow. Fore wing with a faint infuscation behind marginal vein. Legs yellow.

Morphology: stemmaticum with rugosely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.44–1.47). F1 1.15–1.20 times as long as its maximum width, slightly longer than half the length of F2 (0.55–0.56) and F3 (0.56–0.58). F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1–2, F3: 2–3, F4: 2–3, F5: 3–4, F6: 3. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla widely separated (approximately five to six times the maximum width of a sensillum). Distance between anterior pair of scutellar setae slightly smaller than distance between posterior pair. Fore wing 2.3–2.4 times as long as width of disc. Marginal fringe 0.21–0.25 times as long as width of disc. Basal cell with two setae. Submarginal vein with two setae, marginal vein anteriorly with eight or nine setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly



Figures 273–275. *Encarsia subhyalina* n. sp., female. (273) Mesosoma and gaster. (274) Antenna. (275) Fore wing.

longer than half the length of the corresponding basitarsus (0.83–0.84), the latter distally with three to four pegs. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 conically elongated, with four setae. Ovipositor longer than midtibia (1.77–1.89) and 2.57–3.07 times as long as clava. Third valvula 0.56–0.67 times as long as second valvifer.

Male. Unknown.

Species group placement. E. opulenta group.

Distribution. Australia: Queensland, Western Australia.

Host. Aleyrodidae: *Xenaleyrodes* sp.

Material examined

Western Australia: Holotype: ♀, Kununurra, 5 May 2000 (S. and O. Schmidt), ex *Xenaleyrodes* sp. on *Eucalyptus grandifolia* Benth. (Myrtaceae) (ANIC). **Queensland:** paratype: 1♀, Mareeba, Endeavour, 7 July 2000 (P. De Barro), ex hard-bodied whitefly on *Corymbia* sp. (Myrtaceae) (ANIC).

Comments

The species is similar to *E. perplexa*, but F1 is transverse in *perplexa* and quadrate in *subhyalina*, and the gaster has the T5 largely dark in *subhyalina* whereas it is pale in *perplexa*.

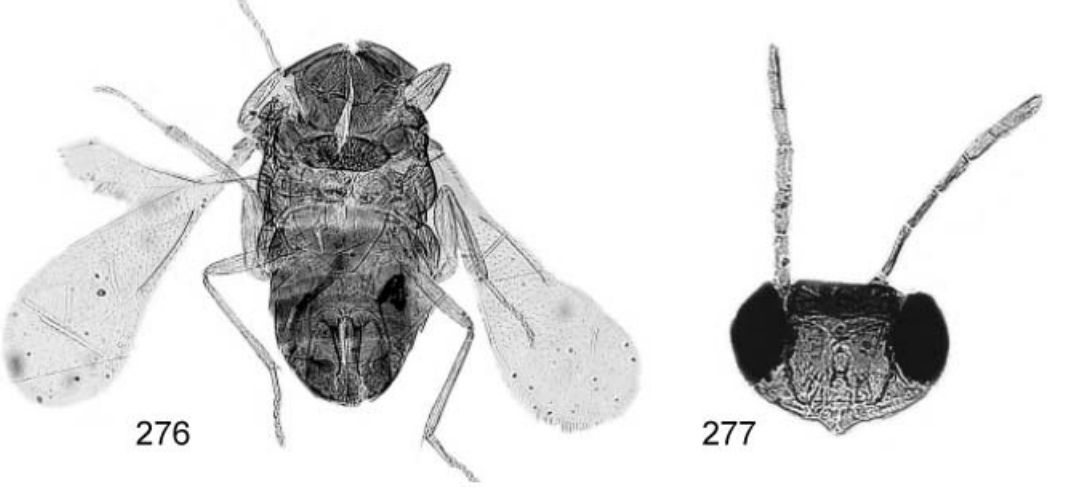
86. *Encarsia swifti* (Girault)
(Figures 276, 277)

Coccophagus swifti Girault 1915, p 50, 57. Holotype ♀, Australia, Queensland, Gordonvale (Cairns), 10 June 1914 (QMBA, type no. Hy. 2929, examined).
Prospaltella swifti (Girault): Compere 1931, p 11. Change of combination.
Encarsia swifti (Girault): Viggiani 1985c, p 249–250. Change of combination.
Coccophagus swifti Girault: Dahms 1986, p 576.

Redescription

Female. Colour: head pale brown, stemmaticum darker. Antennae pale. Mesosoma brown, the side lobes of the mesoscutum paler, scutellum white in striking contrast to the remainder of the mesosoma (though appearing dark under transmitted light because the specimen has not been cleared). Metasoma brown. Fore wing hyaline. Legs pale except the hind coxae which are brown.

Morphology: stemmaticum with striate/reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel shorter than F1 (0.66). F1 3.5 times as long as its maximum width, slightly longer than F2 (1.1) and F3 (1.25). F2 slightly longer than F3. Flagellomeres with the following numbers of sensilla: F1: 2, F2:2, F3: 2, F4: 3, F5: 4(?), F6: 3. Midlobe of mesoscutum with five setae, side lobes two or three setae each. Mid lobe with unusual longitudinally reticulate sculpture, becomes circular at the posterior margin. Scutellar sensilla separated by approximately three times the maximum width of a sensillum. Anterior pair of scutellar setae indiscernible, possibly absent. Fore wing about 2.5 times as long as width of disc. Marginal fringe 0.18 times as long as width of disc. Basal cell with one or two setae. Submarginal vein with four setae, marginal vein anteriorly with nine setae.



Figures 276, 277. *Encarsia swifti* (Girault), syntype female. (276) Overall view of type specimen. (277) Head.

Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of corresponding basitarsus. Ovipositor slightly shorter than midtibia (0.73) and twice as long as clava. Third valvula 0.5 times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: Queensland.

Host. Unknown.

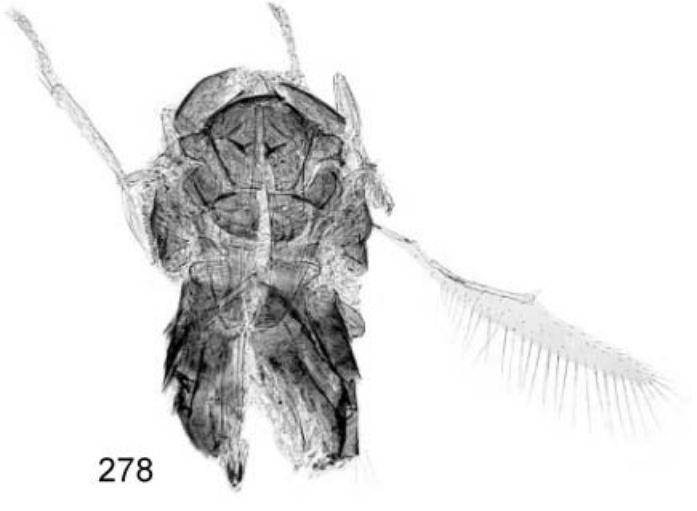
87. *Encarsia taciti* (Girault)
(Figures 278, 279)

Coccophagus taciti Girault 1930[432], p 3[272]. Holotype ♀, Australia, Queensland, Brisbane, Mt Cootha [=Coot-tha], 13 March 1929 (QMBA, type no. T. 4011, examined).
Coccophagus taciti Girault: Dahms 1986, p 576.
Encarsia taciti (Girault): Viggiani 1986, p 75. Change of combination.

Redescription (holotype)

Female. Colour: head yellow, face and posterior head brown. Mesosoma yellow except pronotum, axillae, mesopleuron, scutellum dark brown. Gaster dark brown except apex. Antenna brown. Fore wing hyaline with dark band behind marginal vein. Legs yellow, hind coxa and femur brown.

Morphology: antennal formula 1,1,3,3. Clava longer than funicle, F6 conical. Pedicel distinctly longer than F1. F1 slightly longer than broad, subequal in length to F2 and shorter than F3. F3 broader than F1 and F2. Scutellar sensilla rather closely placed,



Figures 278, 279. *Encarsia taciti* (Girault), holotype female. (278) Overall view of type specimen. (279) Mesosoma.

approximately three times the width of sensillum. Fore wing about 3.1 times as long as width of disc, sparsely setose. Marginal fringe 0.60 times as long as width of disc. Basal cell with three setae. Marginal vein anteriorly with five setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to corresponding basitarsus. Ovipositor longer than midtibia (1.33) and about 1.2 times as long as clava. Third valvula about 0.4 times as long as second valvifer.

Male. Unknown.

Species group placement. E. inquirenda group sensu Hayat (1989a).

Distribution. Australia: Queensland.

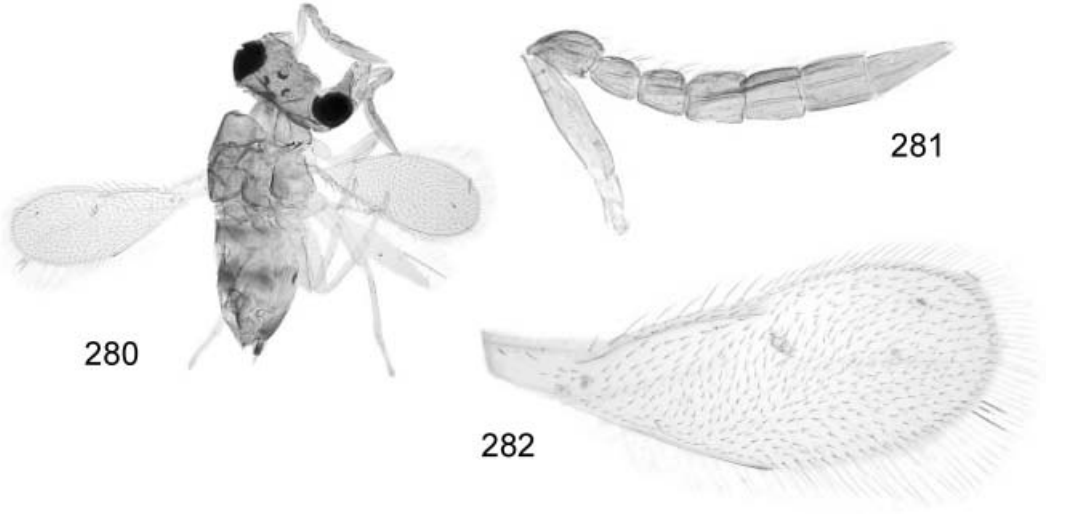
Host. Unknown.

88. *Encarsia tennysoni* (Girault)
(Figures 280–282)

Coccophagus tennysoni Girault 1931[435], p 3. Holotype ♀, Australia, Queensland, Nelson [=Gordonvale] (QMBA, T. 3876, examined).
Encarsia tennysoni (Girault): Viggiani 1985c, p 251–252. Change of combination.
Coccophagus tennysoni Girault: Dahms 1986, p 581.

Redescription (holotype)

Female. Colour: head and mesosoma yellow except pronotum, axilla, and mesopleuron brown. Gaster yellow with brown band at base and approximately in the middle of the gaster. Antenna yellow. Fore wing hyaline. Legs yellow.



Figures 280–282. *Encarsia tennysoni* (Girault), holotype female. (280) Overall view of type specimen. (281) Antenna. (282) Fore wing.

Morphology: antennal formula 1,1,3,3, F6 appearing conical. Pedicel longer than F1 (1.45). F1 1.33 times as long as its maximum width, subequal in length to F2 and shorter than F3 (0.85). Fore wing about 2.7 times as long as width of disc. Basal cell with five setae. Marginal fringe 0.37 times as long as width of disc. Marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to basitarsus. Ovipositor longer than midtibia (1.44) and 1.94 times as long as clava. Third valvula 0.33 times as long as second valvifer.

Male. Unknown.

Species group placement. E. inquirenda group sensu Hayat (1989a).

Distribution. Australia: Queensland.

Host. Unknown.

Comments

The species is close to *E. inquirenda* (Silvestri) and *Encarsia luoae* Huang and Polaszek, but can be separated from the former by the longer ovipositor (subequal in length to middle tibia in *inquirenda*) and the hyaline wings (fore wing of *inquirenda* with dark infuscation behind marginal vein), and from the latter by the shorter marginal fringe of the fore wing (0.64 times as long as the width of the disc) and the F1 which is subequal in length to F2 in *E. tennysoni*, but shorter than F2 in *E. luoae*. It also resembles *E. silvifilia* but has a longer ovipositor (1.44 times as long as midtibia, whereas in *silvifilia* it is 0.94–1.26 times).

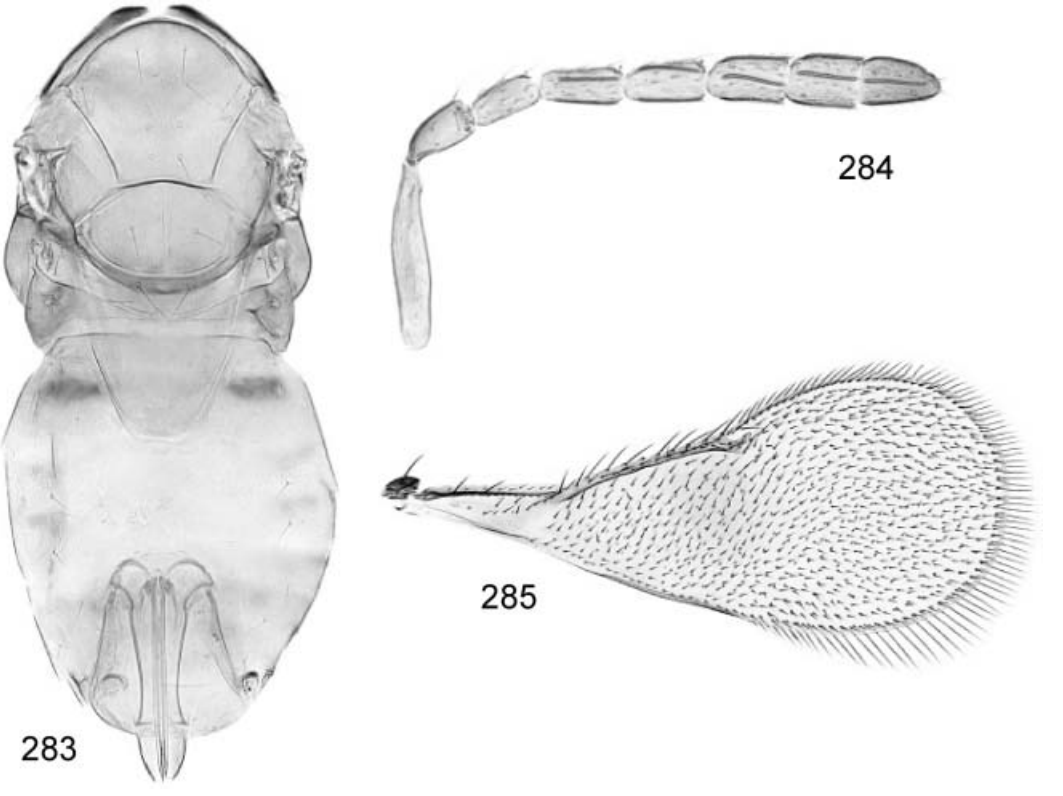
89. *Encarsia thoreauini* (Girault)
(Figures 283–285)

Coccophagus thoreauini Girault 1915, p 50–51. Holotype ♀, Australia, New South Wales, Tweed Heads, Tweed River, 3 May 1914 (A. P. Dodd) (QMBA, type no. Hy. 2931, examined).
Prospaltella thoreauini (Girault): Compere 1931, p 11. Change of combination.
Encarsia thoreauini (Girault): Viggiani 1985c, p 252. Change of combination.
Coccophagus thoreauini Girault: Dahms 1986, p 587.

Redescription

Female. Colour: head yellow with incomplete transverse brown band between eyes. Mesosoma yellow except mesoscutal side lobe with brown spot, midlobe anteriorly and axilla partly brown. Gaster yellow with transverse brown spot near base and a larger brown spot centrally. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.18–1.25) [1.2]. F1 2.00–2.22 [2.12] times as long as its maximum width, shorter than F2 (0.77–0.95) [0.77] and F3 (0.77–0.85) [0.77]. F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1–2, F3: 2, F4: 2–3, F5: 3, F6: 3.



Figures 283–285. *Encarsia thoreauini* (Girault), female. (283) Mesosoma and gaster. (284) Antenna. (285) Fore wing.

Midlobe of mesoscutum with about 8–10 [8] setae, side lobes with three setae each. Scutellar sensilla widely separated, approximately seven times the maximum width of a sensillum. Distance between anterior pair of scutellar setae greater than between posterior pair. Fore wing 2.2–2.3 [2.3] times as long as width of disc. Marginal fringe 0.19–0.22 [0.22] times as long as width of disc. Basal cell with 5–10 [6–7] setae. Submarginal vein with two setae, marginal vein anteriorly with seven to nine [seven] setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly shorter than corresponding basitarsus (0.46–0.58) [0.57]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four setae. Ovipositor slightly shorter than midtibia (0.88–0.91) [0.88] and 1.16–1.41 [1.16] times as long as clava. Third valvula 0.35–0.37 [0.35] times as long as second valvifer.

Male. Unknown.

Species group placement. Not established.

Distribution. Australia: New South Wales, Queensland, South Australia, Western Australia.

Host. Aleyrodidae: *Bemisia tabaci* (Gennadius).

Additional material examined

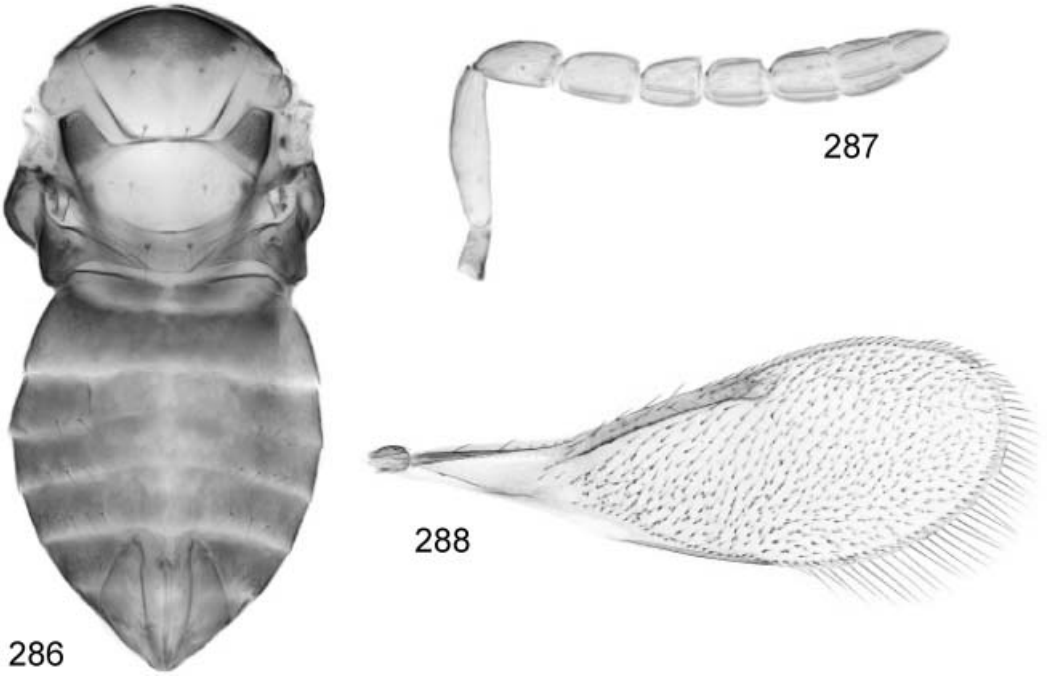
Queensland: 3♀, Bunya Mountains, 22 February 1997 (P. De Barro), ex soft-bodied whitefly nymphs on *Phyllanthus* sp. (Euphorbiaceae) (ANIC). **South Australia:** 1♀, Oraparinna Creek, Dingly Dell Camp, near water, 4–10 November 1987 (I. Naumann and J. Cardale), Malaise trap/ethanol (ANIC); 1♀ Wilpena Pound Camp, 5–10 November 1987 (I. Naumann and J. Cardale), Malaise trap/ethanol (ANIC). **Western Australia:** 1♀, Kununurra, 2 July 1997 (P. De Barro), ex *Bemisia tabaci* on *Adansonia gregorii* F. Muell. (Bombacaceae) (ZSMG); 1♀, Keep River National Park, 4 May 2000 (P. De Barro), ex whitefly on *Cochlospermum fraseri heteronemum* (F. Muell.) Poppend. (Cochlospermaceae) (BMNH).

90. *Encarsia tristis* (Zehntner)
(Figures 286–288)

Prospalta tristis Zehntner 1896, p 11. Syntypes ♀♂, Indonesia: Java (L. Zehntner), ex *Neomaskellia bergii* [presumed lost].

Aspidiotiphagus aleyrodis Ashmead 1904b, p 139. Syntypes ♀♂, Philippiines: Manila (USNM, not examined). Synonymy by Gahan 1932.

Limacis aleurodiphaga Risbec 1950, p 621. Lectotype ♀, Senegal: Bambey, ex *Neomaskellia bergii*. Synonymy by Huang and Polaszek, 1998: 1956 (includes full synonymy).



Figures 286–288. *Encarsia tristis* (Zehntner), female. (286) Mesosoma and gaster. (287) Antenna. (288) Fore wing.

Description

Female. Colour: head light brown, vertex and lower parts brown. Mesosoma brown with the following parts dark brown: pronotum, anteromedial patch on mesoscutal midlobe, axillae, mesopleuron, and metanotum. Gaster dark brown. Fore wing largely infuscate.

Morphology: stemmaticum with rugose-reticulate surface sculpture. Antennal formula 1,1,3,3. Pedicel subequal in length to F1. F1 1.44 longer than its maximum width, slightly longer than F2 (1.18) and F3 (1.18). F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 4, F2: 4, F3: 4, F4: 4, F5: 5, F6: 3. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla widely separated (approximately eight times the maximum width of a sensillum). Distance between anterior pair of scutellar setae larger than distance between posterior pair. Fore wing about 2.7 times as long as width of disc. Marginal fringe 0.32 times as long as width of disc. Basal cell with four setae. Submarginal vein with two setae, marginal vein anteriorly with six setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.67). Tergites laterally with the following numbers of setae: T1: 0, T2: 2, T3: 4, T4: 3–4, T5: 5–6, T6: 3–4, T7 with four setae. Ovipositor shorter than midtibia (0.57) and 0.95 times as long as clava. Third valvula 0.33 times as long as second valvifer.

Male. Not collected in the study area. Males from elsewhere are very similar to females in both colour and morphology. Antenna eight-segmented, slight fusion occurring between F5 and F6.

Species group placement. E. tristis group.

Distribution. Australia: Queensland, Western Australia. Asia: Bangladesh, India, Indonesia, Philippines. Africa: Senegal.

Host. Aleyrodidae: *Neomaskellia bergii* (Signoret). The following additional hosts have been recorded (Huang and Polaszek 1998): *Aleyrodes* sp. on grass (Shafee 1973), *Aleyrodes* sp., *Neomaskellia andropogonis*, indet aleyrodid, (?) scales (Hayat 1989a), *N. bergii* on *Saccharum sinensis* (Chou et al. 1996).

Material examined

Western Australia: 1♀, CALM Site 4/3, 14 km S by E Kalumburu Mission (14°25′S, 126°40′E), 3–6 June 1988 (T. A. Weir), Malaise trap, closed forest (ANIC).

Comments

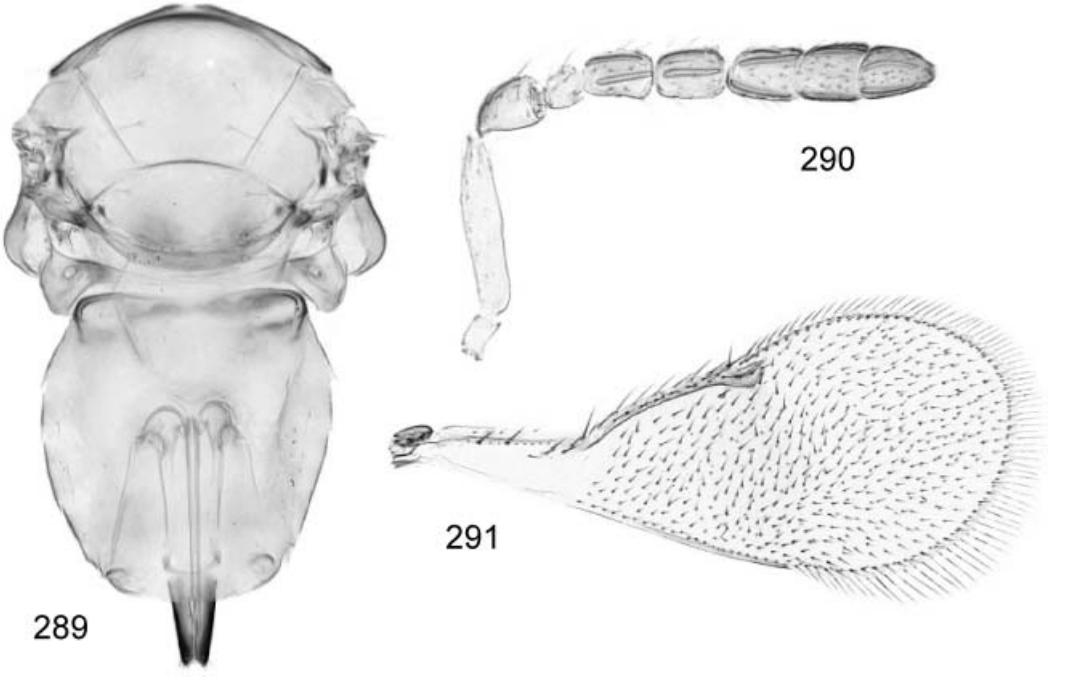
The species is recognized by the short ovipositor and the almost quadrate two distal funicular segments. Girault recorded the species from Australia in 1919 (Girault 1919, p 53) but his material could not be located. In his publication Girault writes that he reared three females from pupae of the sugarcane whitefly, *Aleyrodes bergi* (=*Neomaskellia bergii*), at Gordonvale, Queensland, on cane, on 9 December 1918. The species has a peculiar colour pattern in that it has two black spots on the mesosoma (i.e. the axillae are black) contrasting with the remaining yellow mesosoma. Also quite unusual are the stout antennae with segments two and three short to almost quadrate.

91. *Encarsia uncinata* n. sp.
(Figures 288–291)

Description

Female. Colour: head yellow, mesosoma pale, pronotum partly, anterior margin of mesoscutal midlobe brown. Gaster mostly pale, petiole and T1 anteriorly slightly darkened, T2–T4 slightly brown laterally and T5 and T6 with indistinct brown band. Third valvula brown, lighter at base than at apex. Antenna yellow. Fore wing hyaline. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with transversely strigose surface sculpture. Antennal formula 1,1,3,3. Pedicel longer than F1 (1.50–1.78) [1.71]. F1 subquadrate or slightly longer than its maximum width (1.00–1.14) [1.14], shorter than F2 (0.54–0.62) [0.54] and F3 (0.56–0.62) [0.56]. F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 2, F3: 2–3, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with 8–10 setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla very distantly placed (approximately eight to nine times the maximum width of a sensillum). Distance between anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing 2.2 times as long as width of disc. Marginal fringe 0.19–0.23 [0.19] times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six to seven setae. Basal cell with four to six setae. Tarsal formula 5-5-5. Apical spur of midtibia almost as long as or subequal in length to corresponding basitarsus (0.88–0.94). Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1, T5: 2, T6: 3, T7 with four or five setae. Ovipositor



Figures 289–291. *Encarsia uncinata* n. sp., female. (289) Mesosoma and gaster. (290) Antenna. (291) Fore wing.

subequal in length to midtibia and 1.68–1.80 [1.80] times as long as clava. Third valvula 0.47–0.54 [0.54] times as long as second valvifer, apex of third valvulae truncate.

Male. Unknown.

Species group placement. E. lutea group.

Distribution. Australia: Western Australia.

Host. Aleyrodidae.

Material examined

Western Australia: Holotype: ♀, Lake Argyle, 4 May 2000 (S. and O. Schmidt), ex whitefly on *Eucalyptus* sp. (Myrtaceae) (ANIC). Paratypes: 2♀, same data as holotype (ANIC, ZSMG) and 2♀, Purnululu National Park, 4 May 2000 (S. and O. Schmidt, J. Martin) (ANIC, ZSMG).

Comments

The species is similar to *E. hamata* (Huang and Polaszek) and *E. udaipuriensis* (Shafee), but has a longer ovipositor which is subequal in length to the middle tibia, but shorter in *hamata* and *udaipuriensis*. From *udaipuriensis* it differs also in not having a longitudinal sensillum on F1 and a shorter third valvula (0.65 times as long as the second valvifer in *udaipuriensis*). From *hamata* it differs by the symmetrical apices of the third valvulae (asymmetrical in *hamata*) and a less extensive brown colour.

92. *Encarsia unfasciata* (Girault)

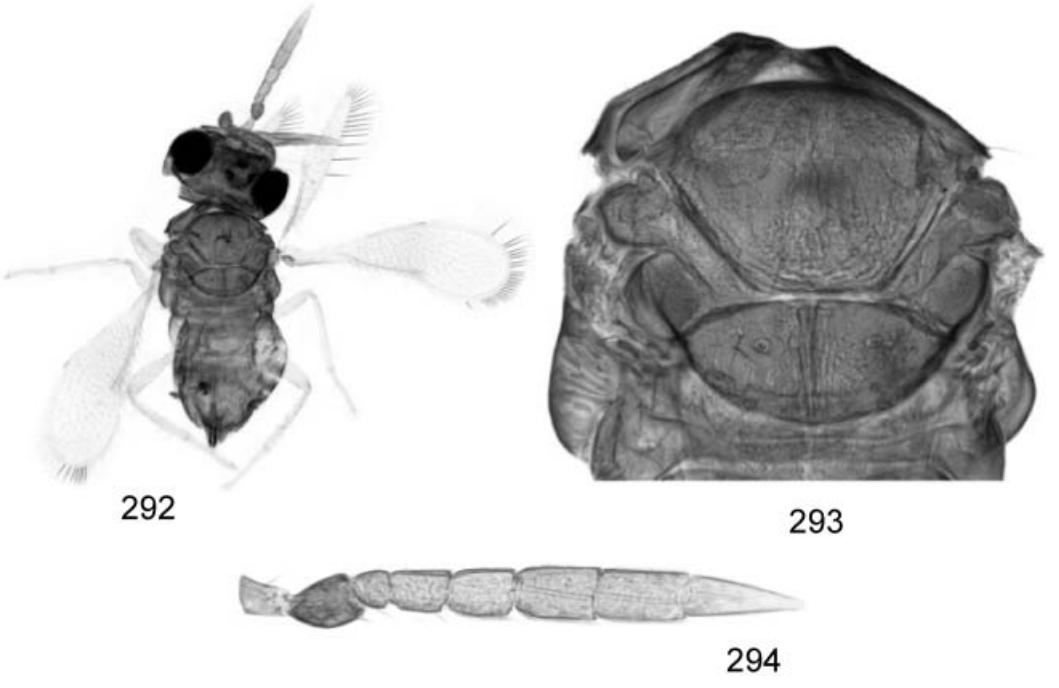
(Figures 292–294)

Coccophagus unfasciata Girault 1915, p 54, 56. Holotype ♀, Australia, Queensland, Gordonvale (Cairns), 18 May 1914 (QMBA, type no. Hy. 2941, examined).
Coccophagus unifasciata Girault: Girault 1928, p 3. Misspelling.
Prospaltella unifasciata (Girault): Compere 1931, p 11. Change of combination.
Encarsia unfasciata (Girault): Viggiani 1985c, p 253–254. Change of combination.
Coccophagus unfasciata Girault: Dahms 1986, p 609.

Redescription (holotype)

Female. Colour: head and body yellow, pronotum, anterior margin of mesoscutal midlobe, mesopleuron, axilla, and propodeum darker. T4 laterally brown, T1 and T5 with transverse brown bands. Antenna yellow-white. Fore wing hyaline, slightly infuscate behind marginal vein. Legs white.

Morphology: antennal formula 1,1,3,3, F6 conical. Pedicel distinctly longer than F1 (1.72). F1 subquadrate and distinctly shorter than F2 (0.69) and F3 (0.64). F2 and F3 subequal in length. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 1, F4: 3, F5: 3, F6: 3. Midlobe of mesoscutum with four setae. Scutellar sensilla widely separated (approximately six times the maximum width of a sensillum). Distance between



Figures 292–294. *Encarsia unfasciata* (Girault), holotype female. (292) Type specimen. (293) Mesosoma. (294) Antenna.

anterior pair of scutellar setae subequal to distance between posterior pair. Fore wing about 2.9 times as long as width of disc. Marginal fringe 0.59 times as long as width of disc. Submarginal vein with two setae, marginal vein anteriorly with six setae. Basal cell with two setae. Tarsal formula 5-5-5. Apical spur of midtibia subequal in length to the corresponding basitarsus. Basitarsus of middle leg apically with distinct spine. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 1 (setation of following tergites indiscernible). Ovipositor slightly longer than midtibia (1.10) and 1.26 times as long as clava. Third valvula approximately 0.35 times as long as second valvifer.

Male. Unknown.

Species group placement. E. inquirenda group sensu Hayat (1989a).

Distribution. Australia: Queensland.

Host. Unknown.

Comments

The species is characterized by the long marginal fore wing fringe, the sparse setation of the wings, and the conical F6. It is similar to *inquirenda* but differs by having the F1 subquadrate and distinctly shorter than F2 (longer than broad and subequal in length to F2 in *inquirenda*) and the ovipositor slightly longer than the middle tibia (subequal in *inquirenda*).

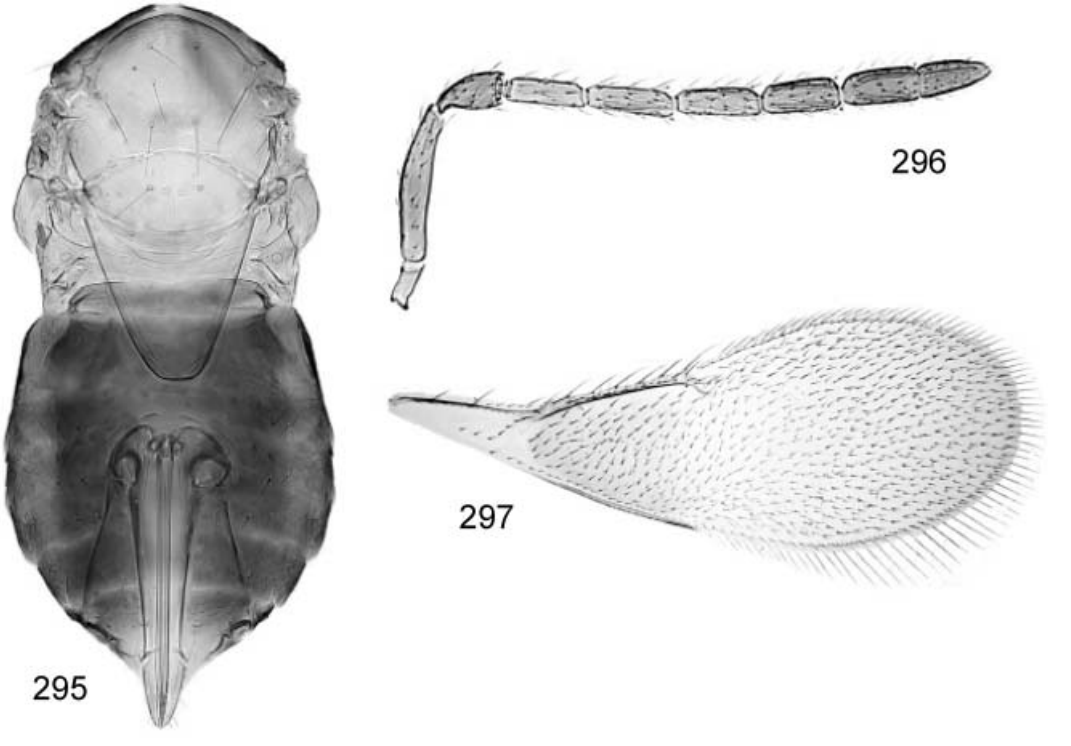
93. *Encarsia ustulata* Schmidt and Naumann
(Figures 295–297)

Encarsia ustulata Schmidt and Naumann in Schmidt et al. 2001, p 383–384. Holotype ♀, South Australia, Aldinga Scrub, 50 km S of Adelaide, December 1986 (J. S. Noyes) (BMNH, examined).

Diagnosis

Female. Colour: head yellow with dark transverse band, or lower half of head brown. Mesosoma yellow except pronotum, mesoscutal midlobe anteriorly and axilla partly brown. Gaster predominantly brown. Antenna yellow with scape, pedicel, and apex slightly darker. Fore wing with dark band behind marginal vein. Legs yellow.

Morphology: stemmaticum with rugose surface sculpture. Antennal formula 1,1,4,2. Pedicel 0.82–1.11 times as long as F1. F1 3.3–4.0 times as long as its maximum width, shorter than F2 (0.76–1.00) and 0.87–1.10 as long as F3. F2 subequal in length to F3. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 1, F3: 1, F4: 2, F5: 3, F6: 3. Midlobe of mesoscutum with eight setae, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.6–2.7 times as long as width of disc. Marginal fringe 0.21–0.30 times as long as width of disc. Basal cell with five to eight setae, costal cell distally with two setae.



Figures 295–297. *Encarsia ustulata* Schmidt and Naumann, female. (295) Mesosoma and gaster. (296) Antenna. (297) Fore wing.

Submarginal vein with two setae, marginal vein anteriorly with six or seven setae. Tarsal formula 5-5-5. Apical spur of midtibia longer than half the length of the corresponding basitarsus (0.61–0.74). Tergites laterally with the following numbers of setae: T1: 0, T2: 2, T3: 2, T4: 2, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.11–1.29). Third valvula 0.29–0.30 times as long as second valvifer.

Male. Colour similar to female, but mesosoma darker and predominantly brown except the following parts pale: mesoscutellar midlobe posteriorly and postero-laterally, inner posterior corner of axilla, scutellum, and propodeum. Legs pale, femora slightly darkened. Antenna light brown, segments of two-segmented club not fused, but sensilla slightly overlapping.

Species group placement. E. strenua group.

Distribution. Australia: South Australia, Tasmania, Western Australia.

Host. Aleyrodidae: *Trialeurodes vaporariorum* (Westwood).

Additional material examined

South Australia: 1♀, same data as holotype (BMNH). **Tasmania:** 1♀, Bronte Park, 15 January to 3 February 1983 (I. D. Naumann and J. C. Cardale) (ANIC); 1♀, 7 km SW by W Derwent Bridge, 16 January to 2 February 1983 (I. D. Naumann and J. C. Cardale), Malaise/ethanol (ANIC). **Western Australia:** 1♀, Pemberton, 22 January 1997 (P. De Barro), ex *Trialeurodes vaporariorum* on tamarillo (*Cyphomandra betacea* Sent., Solanaceae) (ANIC); 1♀, 3♂, Pemberton, 14 November 1999 (S. and O. Schmidt), ex whitefly (ANIC); 1♀, West Cape Howe National Park, 12 September 1999 (S. and O. Schmidt), ex whitefly (ZSMG); 2♀, 2♂, Stirling Range National Park, 9–11 September 1999 (S. and O. Schmidt), ex whitefly (ZSMG); 1♀, Walpole-Nornalup National Park, 13 November 1999 (S. and O. Schmidt), ex whitefly (ZSMG); 1♀, Walpole-Nornalup National Park, 17–21 January 1987 (J. S. Noyes) (BMNH); 1♀, Bremer Bay, Little Boat Harbour Rd, 9 October 2005 (A. Polaszek, S. and O. Schmidt), ex whitefly (ZSMG).

Comments

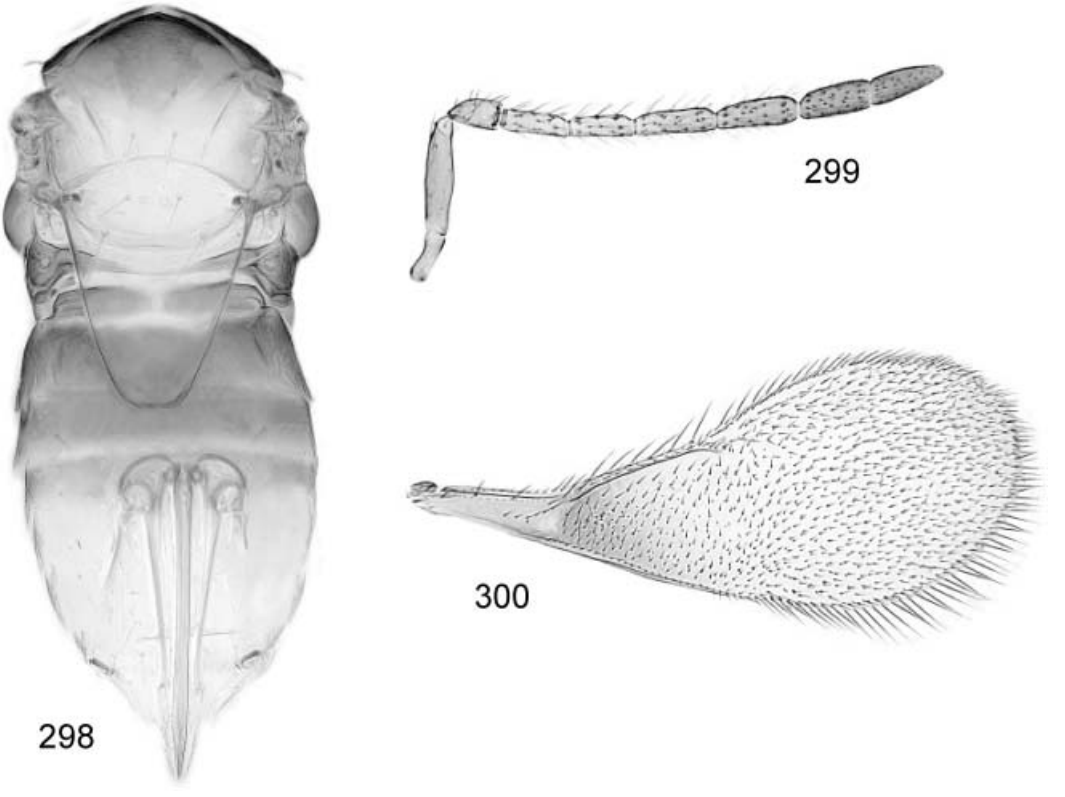
This species has been reared from tamarillo heavily infested with *Trialeurodes vaporariorum* in Pemberton, Western Australia. The vast majority of these were parasitized by *Eretmocerus warrae* Naumann and Schmidt (Chalcidoidea: Aphelinidae). The lack of additional specimens suggests that *E. ustulata* may not normally parasitize *Trialeurodes vaporariorum*.

94. *Encarsia whittieri* Girault

(Figures 298–300)

Encarsia whittieri Girault 1915[238], p 60. Holotype ♀, Australia, New South Wales, Tweed Heads (Tweed River), 2 May 1914 (A. P. Dodd), sweeping in jungle (QMBA, type no. Hy. 2950, examined).

Encarsia whittieri Girault: Viggiani 1985c, p 254; Dahms 1986, p 653.



Figures 298–300. *Encarsia whittieri* Girault, female. (298) Mesosoma and gaster. (299) Antenna. (300) Fore wing.

Diagnosis

Female. Colour: head yellow, postgena, gena, vertex, malar region, and area around mouth brown. Mesosoma brown except mesoscutum and axilla posteriorly, scutellum, and metanotum yellow. Gaster yellow, T1 brown and tergites T2–T3 each with transverse brown band. Antenna yellow, apical segments slightly darker. Fore wing hyaline with infuscation in distal part of basal cell and behind proximal part of marginal vein. Legs yellow.

Morphology [measurements of holotype in square brackets]: stemmaticum with rugose-reticulate surface sculpture. Antennal formula 1,1,4,2. Pedicel shorter than F1 (0.82–0.87) [0.87]. F1 3.09–3.46 [3.46] times as long as its maximum width, slightly shorter than or subequal in length to F2 (0.90–1.00) [0.95] and distinctly shorter than F3 (0.76–0.79) [0.79]. F2 shorter than F3 (0.79–0.83) [0.83]. Flagellomeres with the following numbers of sensilla: F1: 0, F2: 0, F3: 2, F4: 2, F5: 2, F6: 2. Midlobe of mesoscutum with eight setae, arranged symmetrically, side lobes with three setae each. Scutellar sensilla close together, separated by a distance of about the width of a sensillum. Distance between anterior pair of scutellar setae distinctly smaller than between posterior pair. Fore wing 2.4 [2.43] times as long as width of disc. Marginal fringe 0.21–0.23 [0.22] times as long as width of disc. Basal cell with 7–10 setae [10]. Costal cell distally with two to three setae. Submarginal vein with two setae, marginal vein anteriorly with six to seven setae. Tarsal formula 5-5-5. Apical spur of midtibia distinctly longer than half the length of the corresponding basitarsus

(0.81–0.87) [0.87]. Tergites laterally with the following numbers of setae: T1: 0, T2: 1, T3: 1, T4: 2, T5: 3, T6: 3, T7 with four setae. Ovipositor longer than midtibia (1.35–1.54) [1.54]. Third valvula 0.37–0.40 [0.40] times as long as second valvifer and 2.65–3.23 [3.23] times as long as clava.

Male. Colour similar to female. Head yellow, postgena, gena, vertex, malar region, and area around mouth brown. Mesosoma brown except mesoscutum posteriorly, posteromedial corner of axilla, scutellum and metanotum largely yellow. Legs yellow, hind coxa brown. Antenna brown except radicle yellow. F5 and F6 not fused and sensilla not overlapping.

Species group placement. E. strenua group.

Distribution. Australia: New South Wales, Queensland.

Host. Aleyrodidae: *Aleurodicus destructor* Mackie, *Chitonaleyrodes* sp.

Additional material examined

New South Wales: 3♀, Brindle Creek, Border Ras. National Park (28°22′S, 153°05′E), 14 February 1984 (I. D. Naumann) (ANIC, ZSMG). Dorrigo National Park (30°22′S, 152°45′E), 13 February 1984 (I. D. Naumann) (ANIC). **Queensland:** 1♀, 1♂, Cunninghams Gap via Aratula, 18 April 1998 (C. Burwell), ex *Aleurodicus destructor* on *Lomandra* sp. (Dasypogonaceae) (QMBA); 1♀, Brisbane, Longpocket, September 1999 (P. De Barro), ex *Chitonaleyrodes* sp. on *Eucalyptus leucoxylon* F. Muell. (Myrtaceae) (BMNH).

Nomina dubia

Coccophagus submetallicus Girault 1930, p 5. Holotype ♂, Australia, Brisbane, Indooroopilly, October 1929 (A. A. Girault) (QMBA, type no. T.4013, not examined).

Encarsia toticilia Girault 1936, p 1. Syntype(s) ♀, Australia, Brisbane, Indooroopilly, 4 January 1931 (A. A. Girault). Type material lost.

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Appendix 1. Hosts of *Encarsia* species in Australia

ALEYRODIDAE

Aleyrodidae (indet.)

E. hapalia
E. olgae
E. perpulchella

E. stirlingia
E. uncinata
Aleurocanthus sp.
E. despecta
E. nigriventris
E. papaceki
Aleuroclava sp.
E. pulliclava
Aleurodicus destructor Mackie
E. obliqua
E. pilosa
E. whittieri
Aleurodicus dispersus Russell
E. dispersa
Aleurodicus sp.
E. bifasciata
Aleuroduplidens eucalyptifolia Martin
E. sophia
Aleuroduplidens wellsae Martin
E. scylla
Aleuroduplidens sp.
E. albiscutellum
E. nigriventris
Aleurocanthus sp.
E. bunyae
E. citrina
E. despecta
E. papaceki
Aleurolobus marlatti (Quaintance)
E. elegans
Aleurolobus sp.
E. armillata
E. aseta
E. paucisetosa
Aleuromarginatus nigrus (Martin)
E. oakeyensis
Aleuromarginatus sp.
E. maria
Aleuroplatus pectiniferus Quaintance and Baker
E. aseta
E. paucisetosa
Aleurotrachelus sp.
E. nigriventris
Bemisia afer (Priesner and Hosny)
E. aferi
Bemisia afer group
E. insignis
Bemisia tabaci (Gennadius)
E. accenta
E. adusta

E. azimi
E. bimaculata
E. formosa
E. lutea
E. mineoi
E. oakeyensis
E. pergandiella
E. thoreauini
Chitonaleyrodes sp.
E. sophia
E. whittieri
Dialeurodes sp.
E. maculata
E. perpulchella
E. Prolata
Dialeurodes (s.l.) sp.
E. paucisetosa
Dialeuropora decempuncta (Quaintance and Baker)
E. aldrichi
E. longicauda
E. sophia
E. spinosa
Dumbletoniella sp.
E. chaetogastra
Lipaleyrodes euphorbiae David and Subramaniam
E. adusta
Lipaleyrodes atriplex (Froggatt)
E. azimi
Neomaskellia bergii (Signoret)
E. tristis
Odontaleyrodes rhododendri (Takahashi)
Pseudaleuroplatus litseae (Dumbleton)
E. nigriventris
Synaleurodicus hakeae (Solomon)
E. pulliclava
Synaleurodicus sp.
E. pedana
Tetralicia sp.
E. nigriventris
Tetraleurodes sp.
E. elegans
Trialeurodes vaporariorum (Westwood)
E. adusta
E. azimi
E. bimaculata
E. formosa
E. oakeyensis
E. pergandiella
E. sophia
E. ustulata

Viennotaleyrodes incomptus Martin
E. nitella
Xenaleyrodes timonii Martin
E. ancora
Xenaleyrodes sp.
E. longifasciata
E. nigriventris
E. sophia
E. subhyalina

DIASPIDIDAE

Aonidiella aurantii (Maskell)
E. perniciosi
Aonidiella citri (Maskell)
E. perniciosi
Aspidiotus sp.
E. clara
?Ceroplastes rubens Maskell
E. perniciosi
Chionaspis citri (Comstock)
E. brimblecombei
Quadraspidiotus perniciosus (Comstock).
E. clariscutellum

PLATASPIDAE

Brachyplatys vahlii (Fabricius)
E. boswelli
Megacopta cribraria (Fabricius)
E. boswelli