A Pictorial Guide to the species of *Encarsia* (Hymenoptera: Aphelinidae) parasitic on whiteflies (Homoptera: Aleyrodidae) in North America.

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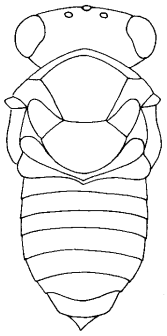

KEY

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Abstract.-- The 27 species of *Encarsia* (Hymenoptera: Aphelinidae) occuring in North America (including Mexico) and attacking whiteflies (Homoptera: Aleyrodidae) are treated. Each species is keyed and illustrated. A separate diagnosis, list of hosts, and summary of distribution are provided.

Keywords: Biological Control, Aphelinidae, Aleyrodidae, *Encarsia*, parasite.

Various species of whiteflies (Aleyrodidae) are among the most serious of agricultural pests, causing millions of dollars of damage each year to various crops. In 1991, one species (*Bemisia argentfolii* Bellows and Perring) caused damage in excess of $500 million in the U.S. alone (Perring, et al., 1993). Among the most common and effective parasitoids of whiteflies are parasitic wasps in the genus *Encarsia* (Hymenoptera: Aphelinidae). These tiny wasps are primary parasites of whitefly species as well as species of scale insects (Coccoidea). Worldwide, over 170 *Encarsia* species have been described (Hayat, 1989). In spite of their abundance and usefulness, there are still very few well illustrated keys and diagnoses, and in North America, no recent identification aids exist. Because of their small size, identification of the various species is difficult under even the best of circumstances and requires the intervention of a specialist in aphelinid taxonomy.

In this paper, we treat the 27 species of *Encarsia* known to occur in North America that are parasitic on whiteflies. It is important, therefore, to be reasonably sure that the species being keyed has been reared from a whitefly and not a scale insect. It is best if parasites are reared from individually segregated whitefly placed in small gel caps or some similar container. Several of these species were imported from various foreign countries into the region in prior biological control programs (e.g. *E. lahorensis*, Nguyen and Sailer, 1979; *E. partenopea (=E. inaron)*, Gould et al., 1992). Importations are continuing against pests such as *Bemisia argentifolii* and at least one species has been recently introduced into the U.S. (*E. lutea*, J. Goolsby, pers. comm.). It is widely recognized that several undescribed species of *Encarsia* are extant in North America and that other species, described from areas such as the Caribbean and Central America, may be present here but have not yet been discovered. This paper represents a starting point from which to continue our discovery and study of this important part of the fauna.

This pictorial key has been designed for non-specialists having limited access to collections and literature. It is intended to key out female specimens, but males will sometimes key through the same couplets. Special characters of males are also noted in the species diagnosis. However, given that males are not known for some species, constructing a key for that sex is problematic at this time. Although some of the characters may be assessed in point-mounted specimens using a high quality dissecting micrsocope, it is unlikely that many species can be accurately identified unless specimens are cleared and mounted on slides. The dorsal habitus illustrations have been simplified and somewhat stylized to portray basic information about color patterns. They are not meant accurately to reflect specific characters (e.g., the relative length of the metasoma to the mesosoma). When specific characters are used, separate illustrations are provided. Caution should be used in assessing color patterns since they are known to show variation. We have tried to take this into consideration. While it would be unlikely to find all yellow specimens of a predominantly dark colored species it is more likely that a species portrayed as having only a yellow scutellum might also show light brown coloration on adjoining sclerites. Males, in particular, tend to be more darkly colored than females.

Common names used in the text are from Stoetzel (1989).

Encarsia americana (DeBach and Rose)

Figs. 1-3

Aleurodiphilus americanus DeBach and Rose, 1981:660.

Diagnosis: Body mostly yellow (Fig. 1), except for some small ventral brown areas; midtarsus 5-segmented; forewing with asetose area under stigmal vein (Fig. 3); marginal fringe nearly equal in length to width of wing; F1 conspicuously shorter than F2 (Fig. 2); mesoscutal midlobe with only

2 pairs of setae (as in Fig. 28). This species is very similar to *basicincta* which shares the presence of only two pairs of mesoscutal setae. However, *basicincta* has pronounced areas of dark coloration on the metasoma and some color on the pronotum and axillae (Fig. 4). *E. americana* is uniformly yellowish.

This species is most similar to *basicincta* and *pergandiella* (which were also previously placed in *Aleurodiphilus* by DeBach and Rose, 1981). It is easily separated from those two species by the almost entirely yellow body (body with dark markings on mesosoma and metasoma in *basicincta* and *pergandiella*).

Hosts: *Aleurothrixus floccosus* (Maskell) (woolly whitefly).

Distribution. U.S. (CA), Mexico. Also recorded from Brazil, Honduras, Puerto Rico, and El Salvador.

Encarsia basicincta Gahan
Figs. 4-6

Encarsia basicincta Gahan, 1927: 20.

Diagnosis: Body mostly yellow, except for dark brown band on anterior metasoma and some faint coloration on anterior mesosoma (Fig. 4); midtarsus 5-segmented; forewing narrow, with asetose area adjacent to stigmal vein (Fig. 5), marginal fringe nearly equal in length to width of wing; F1 conspicuously shorter than F2 (Fig. 6). Males unknown.

This species is most simliar to *pergandiella* and *americana*. *E. pergandiella* has an inverted triangular infuscation on the mesoscutum (mesoscutum uniformly yellow except at anterior margin in *basicincta* and wholly yellow in *americana*); metasoma uniformly yellow in *americana* (with anterior brown band in *basicincta*); F1 subequal in length to F2 (F1 noticeably shorter than F2 in *bascicinta* and *americana*); and mesoscutum with more than 2 pairs of setae in *pergandiella* (only 2 pairs in *basicincta*).

Hosts: *Aleurothrixus floccosus* (Maskell) (woolly whitefly), *Tetraleurodes ursorum (*Cockerell).

Distribution: U.S. (FL).

Encarsia citrella (Howard)
Figs. 7-9

Prospaltella citrella Howard, 1908: 282.

Diagnosis: Body mostly yellow, except for brown stripes on middle of metasoma (Fig. 7) ; mid tarsi 5-segmented; forewing without asetose area adjacent to stigmal vein and with a lightly infuscate area under marginal vein (Fig. 9); antennal club 3-segmented (Fig. 8); scutellar sensilla only separated about 2X their diameter or less (as in Fig. 70).

This species is quite distinct among the species treated here but might be confused with either *strenua* or *transvena*, both of which, however have mostly yellow bodies and lack any infuscation on the forewing. The brown stripes on the metasoma of *citrella* set it apart from these two species.

Hosts: *Aleuroplatus coronata* (Quaintance); *A. liquidambaris* Russell (cited as *A. elemerae* Mound and Halsey); *Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly).

Distribution: US (AZ, CA, FL).

Encarsia clypealis Silvestri
Figs. 10-12

Prospaltella clypealis Silvestri, 1927: 20.

Diagnosis: Body generally brown to dark brown except for scutellum (Fig. 10); midtarsus 5 segmented; forewing without asetose area at stigmal vein (Fig. 11); antenna with F1 quadrate, much shorter than F2 (Fig. 12); ovipositor appearing to be distinctly exserted beyond tip of metasoma; last metasomal tergite as long as wide and dark. This species is most similar to. *opulenta* which also has the ovipositor distinctly exserted beyond the tip of the metasoma. It can be differentiated from *opulenta* by color of the body (much of mesosoma and anterior gaster lightly colored in *opulenta* as well as last metasomal tergum).

Hosts: *Aleurocanthus woglumi* Ashby (citrus blackfly).

Distribution: U.S. (FL), Mexico. Originally described from Vietnam and known from much of southeast Asia.

Encarsia coquilletti Howard
Figs. 13-14

Encarsia coquilletti Howard, 1895: 29.

Diagnosis: Body entirely brown to dark brown except for small transverse yellow area on anterior metasoma (Fig. 13); midtarsus 5-segmented; forewing without asetose area at stigmal vein (Fig. 14); ovipositor not obviously exserted beyond tip of metasoma; scutellar sensilla separated more than 2-3X their diameter (as in Figs. 25, 28). This species is fairly distinctive because it is almost entirely dark colored (including the sctuellum). The other species which share most of the characters above have at least either the scutellum or most of the metasoma yellow or white (e.g. *formosa*, *inaron*, *luteola*).

Hosts: *Aleyrodes* sp.

Distribution: U.S. (CA, ID, AZ, WA).

Encarsia cubensis Gahan
Figs. 15-17

Encarsia cubensis Gahan, 1931: 121.

Diagnosis: Body mostly dark colored except scutellum and antero-median metasoma (Fig. 15); midtarsus 4-segmented; forewing with asetose area around stigmal vein (Fig. 16); F1 of antenna

short, less than 1/2 length of F2 (Fig. 17). This species is most similar to *quantancei* except that the latter species has a uniformly dark metasoma and F1 of the female antenna is subequal to F2.

Hosts: *Aleurothrixus floccosus* (Maskell) (woolley whitefly) (also cited as *A. howardi* (Quaintance), a junior synonym).

Distribution: U.S. (FL). Also recorded from the Caribbean and Brazil.

Encarsia divergens (Silvestri)
Figs. 18-21

Prospaltella divergens Silvestri, 1926: 182

Diagnosis: Body generally light brown except for the posterior mesoscutum and scutellum which are orangish or yellow (Fig. 18); midtarsus 5-segmented; forewing hyaline without asetose area at stigmal vein (Fig. 19); ovipositor not obviously exserted beyond tip of metasoma (Fig. 21); scutellar sensilla separated more than 2-3X their diameter (as in Fig. 25); F1 short, F2 about 2.5X as long as F1 (Fig. 20). In some specimens, the midlobe of the mesoscutum is brown, contrasting with the yellow scutellum. This species is very similar to *smithi*. It can be separated from that species by the hyaline front wing (infuscate under venation in *smithi*), the coloration of the metasoma (very dark brown to black in *smithi*) and the relative lengths of F1 to F2 (F2 about 2X as long as F1 in *smithi*).

Hosts: *Aleurocanthus citriperdus* Quaintance and Baker, *A. longispinus* Quaintance and Baker, *A. spiniferus* (Quaintance) (orange spiny whitefly), *A. woglumi* Ashby (citrus blackfly).

Distribution: Mexico, Cuba. Oringally described from Indonesia, and also known from India and Singapore.

Encarsia formosa Gahan
Figs. 22-25

Encarsia formosa Gahan, 1924: 14.

Diagnosis: Head (except antennae) and mesosoma brown to black, metasoma pale yellowish except at anterior edge (Fig. 22); midtarsus 4-segmented; forewing uniformly setose around stigmal vein (Fig. 23); distance between scutellar sensilla greater than 2X their diameter; number of reticulate cells along long axis of axilla usually more than 6; interior of mesoscutal areolae generally without fine striations (Fig. 25); antenna with F1 subequal to F2 (Fig. 24). Males uncommon (this species is usually uniparental); similar to the female, but with the metasoma dark. When present, males are very similar to those of *luteola* except the following: scutellum dark (pale in *luteola*), funicles about 2.4 X as long as wide (only about 2X as long as wide in *luteola*). Like the females, they lack fine striations within the interior of the mesoscutal areolae.

The characters that have been used to differentiate the two *formosa* and *luteola* have been shown to vary, and it is possible that the two species represent only population differences among one widespread species. However, since no formal synonymy has yet been published, we have kept the two species separate. There is also some evidence (A. Polaszek, pers. comm.) that males of these two species possess additional character differences (males of *formosa* are rare, but not

unknown, unlike *luteola* in which males are common) and this may indicate that there are indeed two species.

Hosts: *Aleuroglandulus malangae* Russell, *Aleurotrachelus trachoides* (Back), *Aleyrodes lonicerae* Walker, *A. proletella* (L.), *A. spiraeoides* Quaintance, *Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly), *Crenidorsum sp.*, *Dialeurodes chittendeni* Laing (rhododendron whitefly), *D. citri* (Ashmead) (citrus whitefly), *Tetraleurodes mori* (Quaintance) (mulberry whitefly), *Trialeurodes abutiloneus* (Haldeman) (bandedwinged whitefly), *T. vaporariorum* (Westwood) (greenhouse whitefly), *T. variabilis* (Quaintance).

Distribution: Widespread throughout North America. Has been introduced into many areas of the world for biological control.

Encarsia inaron (Walker)
Fig. 26

Aphelinus inaron Walker, 1839: 10.
Aphelinus idaeus Walker, 1839: 10.
Encarsia partenopea Masi, 1909: 32.
Trychaporus aleyrodis Mercet, 1930: 196.

Diagnosis: Head and mesosoma dark brown, metasoma yellow (sometimes with light infuscation laterally) (Fig. 26); midtarsus 5-segmented; forewing uniformly setose around stigmal vein (as in Fig. 23) ; distance between scutellar sensilla greater than 2X their diameter; female antennal club 2-segmented. This species is similar in body color to *formosa and luteola* (both with midtarsus 4-segmented) with a light metasoma contrasting with dark head and mesosoma. This color pattern also separates it from other similar species such as *coquilletti* (metasoma mostly dark) and *merceti* or *peltata* (at least scutellum lightly colored).

Hosts: *Acaudaleyrodes citri* (Priesner and Hosny), *Aleyrodes lonicerae* Walker, *A. proletella*, *A. singularis* Danzig, *Asterobemisia carpini* (Koch), *A. Paveli* (Zahradnik), *Bemisia argentifolii* (sweetpotato whitefly) (formerly *B. tabaci* (Bellows, et al., 1994), *Bemisia* sp., *Bulgarialeurodes cotesii* (Maskell), *Siphoninus immaculatus* (Heeger), *S. phillyreae* (Haliday), *Trialeurodes vaporariorum* (Westwood) (greenhouse whitefly).

Distribution: U.S. (CA, FL), introduced. Europe, Africa, Asia.

Encarsia lahorensis (Howard)
Figs. 27-28

Prospaltella lahorensis Howard, 1911: 132.

Diagnosis: Body uniformly yellow (Fig. 27); midtarsus 5-segmented; forewing without asetose area under stigmal vein; mesoscutum with 2 pairs of setae (Fig. 28); scutellar sensilla separated more than 2x their diameter, setae laterad of sensilla reduced. This species is somewhat distinctive because of the reduced anterior scutellar setae, but might be confused with *strenua* or *transvena* which are also uniformly yellow. However, those two species have the scutellar sensilla close together and the setae laterad of the sensilla are of normal size.

Hosts: *Aleurodicus dispersus* Russell, *Dialeurodes citri* (Ashmead) (citrus whitefly), *D. citrifolii* (Morgan) (cloudywinged whitefly), *D. kirkaldyi* (Kotinsky) (Kirkaldy whitefly). Also possibly a parasite of *Trialeurodes ricini* (Misra).

Distribution: U.S. (AL, AR, CA, FL, GA, LA, MS, NC, SC, TX). Also recorded from India, Israel, Italy, and Pakistan.

Encarsia lutea (Masi)
Figs. 29-32

Prospaltella lutea Masi 1909: 25.

Diagnosis: Body uniformly yellow except for black terminal valvulae (Fig. 30); midtarsus 5-segmented; forewing without asetose area around stimal vein; scutellar sensilla separated more than 2X their diameter; F1 quadrate and shorter than F2 (Fig. 31); ovipositor about half length of metasoma, third valvulae (terminal sheaths) dark in contrast to rest of body. This distinct coloration of the terminal valvulae sets this species apart from all others in North America.

Males of *E. lutea* have the first 3 funicular segments enlarged and club-like (Fig. 32).

Hosts: This species is very polyphagous and has been recorded from a large number of hosts including *Acuadaleyrodes citri* (Preisner and Hosny), *Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly), and *Trialeurodes vaporariorum* (Westwood) (greenhouse whitefly).

Distribution: U.S. (TX). Recorded from most other regions of the world.

Notes: *E. lutea* was released for the first time in the U.S. in Texas in 1995 (J. Goolsby, pers. comm.).

Encarsia luteola Howard
Figs. 33-34

Encarsia luteola Howard, 1895: 29.
Encarsia angelica Howard, 1895: 30
Encarsia deserti Gerling and Rivnay, 1984: 439.

Diagnosis: Head with occiput dark orange, rest of head (except antennae) and mesosoma dark brown to black, metasoma pale yellowish (Fig. 33); midtarsus 4-segmented; forewing uniformly setose around stigmal vein; distance between scutellar sensilla greater than 2X their diameter; interior of mesoscutal areolae with fine striations (Fig. 34). Males common (this species is usually biparental). Similar to the female, but with the whole head dark and scutellum pale. Males are very simliar to those of *formosa* except with funicles about 2.0X as long as wide (about 2.4 X as long as wide in *formosa*). Like the females, they have fine striations within the interior of the mesoscutal areolae.

Hosts: *Aleyrodes sp., Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly), *Dialeurodes sp., Aleurocybotus occiduus* Russell, *Trialeurodes abutiloneus* (Haldeman)(bandedwinged whitefly), *T. ferrnaldi* (Morill), *T. packardi* (Morill) (strawberry whitefly), *T. vaporariorum* (Westwood) (greenhouse whitefly), *T. variabilis* (Quaintance).

Distribution: U.S. (AZ, CA, CN, FL, MS, PA, DC). Also occurs in Central and South America and has been introduced into Israel.

Encarsia merceti Silvestri
Figs. 35-38

Encarsia merceti Silvestri, 1926: 187.

Diagnosis: Body mostly dark brown except yellow on vertex, scutellum (Fig. 35), and occasionally posterior mesoscutum; midtarsus 5-segmented; forewing without asetose area under stigmal vein, infuscate under marginal vein (Fig. 36); scutellar sensilla separated by more than 2X their own diameter; antenna with F1 and F2 small (quadrate) (Fig. 37); combined approximately equalling length of F3. This species is similar to *smithi* from which it may be separated by the length of F2 (F2 about 2X as long as F1 in *smithi* and F1 and F2 about equal in *merceti*). E. *merceti* might also be confused with *peltata* which is also mostly dark bodied. However, the forewing of *peltata* shows no infuscation under the marginal vein and does not have the smaller quadrate F1 and F2 present in *merceti.*

Males of *E. merceti* have a distinctive enlarged sensillum on the first funicular segment that extends, balloon-like, from the end of the segment (Fig. 38).

Hosts: *Aleurocanthus citriperdus* Quaintance and Baker, *A. spiniferus* (Quaintance), *A. woglumi* Ashby (citrus blackfly).

Distribution: Mexico, Cuba, Asia.

Encarsia meritoria Gahan
Figs. 39-40

Encarsia meritoria Gahan, 1927: 19.
Encarsia hispida DeSantis, 1948: 45.

Diagnosis: Body uniformly orange or orange-yellow (Fig. 39); midtarsus 4-segmented; forewing uniformly setose around stigmal vein (Fig. 40); distance between scutellar sensilla greater than 2X their diameter (as in Fig. 25). Among the group of species with 4-segmented midtarsi and no asetose area under the stigmal vein, *meritoria* is the only one that is mostly yellow bodied. The others (*variegata, formosa, luteola*) have extensive areas of the mesosoma brown to dark brown.

Hosts: *Aleuroglandulus malangae* Russell, *Aleurothrixus porteri* Quaintance and Baker, *Aleyrodes spiraeoides* Quaintance, *Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly), *Dialeurodes sp.*, *Siphoninus phillyreae* Haliday, *Tetraleurodes acaciae (*Quaintance), *Trialeurodes abutiloneus* (Haldeman) (bandedwinged whitefly), *T. floridensis* (Quaintance) (avocado whitefly), *T. vaporariorum* (Westwood) (greenhouse whitefly), *T. variabilis (*Quaintance).

Distribution: U.S. (CA, FL). Also occurs in most of Central and South America.

Notes: *Encarsia hispida* was first synoymized with *meritoria* by Viggiani (1989) and then resurrected by Polaszek et al. (1992). We now believe that the original synonymization was correct and have combined the two names.

Encarsia nigricephala Dozier
Figs. 41-44

Encarsia nigricephala Dozier, 1937: 129.

Diagnosis: Head and anterior mesoscutum dark brown (Fig. 41), rest of body yellow; midtarsus 4-segmented; F1 shorter than pedicel and club 3-segmented (Fig. 42); forewing with asetose area under stigmal vein (Fig. 43); mesoscutum with 2 pairs of setae (Fig. 44); distance between scutellar sensilla more than 2X diameter of sensilla. The dark head and anterior mesoscutum contrasting with the pale color of the rest of the body in combination with the 4-segmented midtarsi and asetose area on the forewing, make the female readily recognizable from other *Encarsia* species.

Males have the 1st and 2nd funicular segments enlarged and with large rounded sensilla. Likewise, the strangely swollen 1st and 2nd funicles of the male make it readily recognizable (male *quaintancei* also have F1 and 2 enlarged, but that species has 3-4 pairs of mesoscutal setae).

Hosts: *Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly)*; Trialeurodes abutiloneus* (Haldeman) (bandedwinged whitefly), *T. floridensis* (Quaintance) (avocado whitefly), *T. vaporariorum* (Westwood) (greenhouse whitefly).

Distribution: U.S. (FL, GA, TX). Also widespread in Mexico and Central and South America.

Encarsia opulenta Silvestri
Fig. 45

Encarsia opulenta Silvestri, 1928: 30.

Diagnosis: Area around occelli, posterior mesoscutum, scutellum, anterior and posterior tip of metasoma yellow, rest of body brown (Fig. 45); midtarsus 5-segmented; forewing uniformly setose around stigmal vein ; distance between scutellar sensilla greater than 2X their diameter (as in Fig. 25); ovipositor appearing distinctly exserted, last metasomal tergite as long as wide. This species is most similar to *clypealis* which shares the elongated last gastral tergum and ovipositor appearing exserted. However, *clypealis* differs from *opulenta* in being almost uniformly dark colored except for the yellow scutellum (Fig. 10).

Hosts*: Aleurocanthis citriperdus* Quaintance and Baker, *A. spiniferus (*Quaintance), *A. woglumi* Ashby (citrus blackfly*)*.

Distribution: U.S. (FL, TX), Mexico, Cuba. Also Asia, Pakistan.

Encarsia peltata (Cockerell)
Figs. 46-48

Mimatomus peltatus Cockerell, 1911: 464.

Diagnosis: Body dark brown to black with yellow scutellum (Fig. 46); midtarsus 5-segmented; forewing without asetose area under stigmal vein; antennae with F2 longer than F1 (Fig. 47); scutellar sensilla separated by more than 2X their own diameter and scutellum with 2 pairs of equal sized setae (as in Fig. 25); ovipositor short, less than 1/3 length of metasoma (Fig. 48). This species is similar to *merceti*, *townsendi*, and *divergens.* It is unusual in that it has a very short ovipositor compared to the other species (ovipositor usually at least half as long as metasoma and often as long as metasoma). Also, in most of the other species other parts of the mesosoma beside the scutellum are lighter colored than the surrounding dark areas.

Hosts: *Aleyrodes pruniosus* Bemis (cited as *A. pruinosa euphorbianum* Cockerell).

Distribution: U.S. (CA).

Encarsia pergandiella Howard
Figs. 49-51

Encarsia pergandiella Howard, 1907: 78.
Encarsia versicolor Girault, 1908: 53.
Encarsia bemisiae DeSantis, 1981: 37.
Encarsia tabacivora Viggiani, 1985: 82 (as replacement name for *bemisia* DeSantis).

Diagnosis: Body largely yellow except for pronotum, inverted triangular brown spot in central mesonotum and larger area on metasoma (Fig. 49); midtarsus 5-segmented; forewing narrow, with asetose area adjacent to stigmal vein (Fig. 51), marginal fringe long and membrane of wing generally lightly infuscated beneath venation; F1 about equal in length to F2 (Fig. 50). Males similar to females, with triangular mesonotal spot usually more heavily infuscated and axillae and metasoma dark brown. This species is most similar to *basicincta*. In that species, there is no triangular spot on the mesonotum (mesonotum uniformly yellow), and F1 is subequal to F2. Males of *basicincta* are unknown.

Hosts: *Aleyrodes sp., Aleurodicus dispersus* Russell, *Aleuroglandulus malangae* Russell, *Aleuroplatus coronata* (Back), *A. elemerae* Mound and Halsey, *Aleurothrixus floccosus* (Maskell) (woolly whitefly), *Aleurotrachelus trachoides* (Quaintance), *Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly), *Dialeurodes citri* (Ashmead) *(citrus whitefly), D. kirkaldyi* (Kotinsky) *(Kirkaldy whitefly), Trialeuordes abutiloneus* (Haldeman) (bandedwinged whitefly), *T. floridensis* (Quaintance) (avocado whitefly), *T. vaporariorum* (Westwood) (greenhouse whitefly), *T. variabilis* (Quaintance).

Distribution: U.S. (CA, DC, FL, GA, IL, MA, NY, PA, SC, TX). Also occurs in Mexico, most of Central and South America, and has been introduced into Italy.

Encarsia portoricensis Howard
Fig. 52

Encarsia portoricensis Howard, 1907: 77.

Diagnosis: Body with head orange brown, pronotum, anterior mesocutum, anterior axillae, propodeum and metasoma brown, posterior mesoscutum, scutellum and posterior axillae yellow (Fig. 52); midtarsus 5-segmented; forewing without asetose spot near stigmal vein; scutellar sensilla round and separated slightly less than 2X their own diameter (as in Fig. 69); ovipositor as

(Fig. 52); midtarsus 5-segmented; forewing without asetose spot near stigmal vein; scutellar sensilla round and separated slightly less than 2X their own diameter (as in Fig. 69); ovipositor as long as metasoma and slightly exserted. This species is very similar to *townsendi.* It can be separated from that species by the color of the mesosoma (*townsendi* has only the scutellum yellow) and the separation of the scutellar sensilla (sensilla separated about 3.5X their own diameter in *townsendi*).

Host: *Aleyrodes* sp., *Aleurodicus antillensis* Dozier.

Distribution: Mexico and Puerto Rico.

Notes: In his original description, Howard (1907) noted that he had a specimen of this species from Mexico (the types were from Puerto Rico). I have been unable to find this specimen in the USNM collection and this diagnosis is based upon the Puerto Rican specimens. Some specimens collected by Dozier (USNM) have the posterior metasoma fading to yellow and the head lighter orange than the types.

Encarsia protransvena Viggiani
Figs. 53-56

Encarsia protransvena Viggiani, 1985: 89.

Diagnosis: Body yellow in color (Fig. 53). Mid tarsi 5-segmented; forewing without an asetose area under the stigmal vein, membrane without infuscation below marginal vein and without lengthened setae along posterior wing margin (Fig. 54); scutellar sensilla close together, separated by less than 2X their diameter (as in Fig. 69); antenna with 3-segmented club (Fig. 56); ovipositor about as long as metasoma and appearing exserted (Fig. 55). This species is very similar to *strenua*. However, the ovipositor in *protransvena* is much longer (about equal to the length of the metasoma and appearing to be exserted) than in *strenua* (about 1/2 length of metasoma and not appearing exserted).

Hosts: *Aleurolobus subrotundus* Silvestri, *Dialeurodes citri* (Ashmead) (citrus whitefly), *D. citrifolii* (Morgan) (cloudywinged whitefly), *D. kirkaldyi* (Kotinsky) (Kirkaldy whitefly).

Distribution: U. S. (FL), Puerto Rico.

Notes: Several specialists believe that this species is the same as *Encarsia armata* (Silvestri), a species known only from Vietnam. However, to date no synonymy of the two names has been published.

Encarsia quaintancei Howard
Figs. 57-60

Encarsia quaintancei Howard, 1907. 79.
Prospaltella perspicuipennis Girault, 1910: 234.

Diagnosis: Generally dark brown contrasting with bright-yellow scutellum (Fig. 57); midtarsus 4-segmented; forewing with asetose area around stigmal vein (Fig. 59); antenna with F1 and F2 subequal (Fig. 60); mesoscutum with 3 or 4 pairs of setae (Fig. 58). This species is most similar

to *cubensis* but can be separated by the color of the metasoma (large anterior yellow spot in *cubensis*) and the antenna (F1 only about 1/2 as long as F2 in *cubensis*).

Male with F1 and F2 enlarged, F2 with rounded sensory structures. Males of this species are very similar to males of *nigricephala*, which also has the basal funicle segments enlarged. *E. nigricephala* males can be separated by the presence of only 2 pairs of mesoscutal setae (3-4 pairs in *quaintancei*) and F3 shorter than F2 (longer than F2 in *quaintancei*).

Hosts: *Aleurothrixus floccosus* (Maskell) (woolly whitefly), *Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly), *Trialeurodes abutlioneus* (Haldeman) (bandedwinged whitefly), *T. packardi* (Morill) (strawberry whitefly), *Trialeurodes* sp. Records of this species from *Aleyrodes* sp. are probably erroneous.

Distribution: U.S. (DC, FL, IL, LA, MD, MS), Mexico, El Salvador, Venezuela, and the Caribbean.

Encarsia quercicola (Howard)
Figs. 61-63

Prospaltella quercicola Howard, 1908: 282.

Diagnosis: Body mostly dark brown except for yellow scutellum and surrounding area (Fig. 61); midtarsus 5-segmented; forewing without asetose area adjacent to stigmal vein and with a lightly infuscate area under marginal vein (Fig. 62); antennal club 2-segmented (Fig. 63); scutellar sensilla only separated by about 2X their diameter or less (as in Fig. 70). This species is closest to *citrella* and can be separated by the first antennal funicle (subequal to F2 in *quercicola* but only 1/2 length of F2 in *citrella*) and body color (mostly yellow in *citrella*).

Hosts: *Aleuroplatus coronata (*Quaintance), *A. gelatinosus* (Cockerell).

Distribution: U.S. (CA).

Encarsia smithi (Silvestri)
Figs. 64-66

Prospaltella smithi Silvestri, 1926: 179.

Diagnosis: Head and most of mesosoma light brown, most of mesoscutum and scutellum orangish, propodeum and metasoma dark brown to black (Fig. 64); midtarsus 5-segmented; forewing without asetose area under stigmal vein, with light infuscation under marginal vein (Fig. 65); scutellar sensilla separated by more than 2X their own diameter (as in Fig. 25); antenna with F1 about 1/2 length of F2 (Fig. 66); ovipositor not exserted beyond tip of abdomen. This species will key to near *divergens* which is very similar in coloration. However, *divergens* has no noticeable infuscation on the forewing and F2 of the antenna is longer (about 2.5X as long as F1).

Hosts: *Aleurocanthus citriperdus* Quaintance and Baker, *A. spiniferus* (Quaintance) (orange spiny whitefly), *A. woglumi* Ashby (citrus blackfly).

Distribution: Mexico, Cuba, Asia.

Encarsia strenua (Silvestri)
Figs. 67-70

Prospaltella strenua Silvestri, 1927: 34.

Diagnosis: Body yellow in color (Fig. 67); midtarsus 5-segmented; forewing without an asetose area under the stigmal vein, membrane without infuscation below marginal vein and without lengthened setae along posterior wing margin (Fig. 68); scutellar sensilla separated by less than 2X their diameter, often nearly touching (Fig. 70); vertex with reticulate sculpture (Fig. 67); metasoma with 2 pairs of setae medially between the cerci (Fig. 69); ovipositor only about half as long as metasoma and not appearing exserted. This species is very similar to both *transvena* and *protransvena*. *Encarsia protransvena* can be separated by the longer ovipositor (about equal in length to the metasoma and appearing exserted beyond the tip). *E. transvena* has striate sculturing on the vertex (difficult to assess in many specimens), only one pair of setae between the cerci (Fig. 75), and a patch of elongated setae on the hind margin of the wing.

Hosts: *B. argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly), *Bemisia giffardi* (Kotinsky) (Giffard whitefly), *Dialeurodes citri* (Ashmead) (citrus whitefly), *D. citrifolii* (Morgan) (cloudywinged whitefly), *D. kirkaldyi* (Kotinsky) (Kirkaldy whitefly), *Trialeurodes packardi* (Morrill) (strawberry whitefly).

Distribution: U.S. (CA, FL). Puerto Rico, Honduras, Asia

Notes: The limits of this group of species (*strenua, transvena, or protransvena*) are the subject of continuing debate and separating them can be difficult and requires properly cleared and mounted specimens. Some characters, such as the length of setae on the forewing require experience or exemplars of the other species for comparison. Assessment of the sculpture of the vertex requires specimens mounted in the proper position.

Encarsia townsendi Howard
Figs. 71-73

Encarsia townsendi Howard, 1907:78.

Diagnosis: Body brown with yellowish scutellum (Fig. 71). Mid tarsi 5-segmented; forewing without asetose area under stigmal vein; antennae with F2 longer than F1 (Fig. 72); scutellar sensilla separated by about 3.5X their own diameter and scutellum with 2 pairs of equal sized setae; ovipositor long, as long as metasoma and exserted (Fig. 73), terminal ovipositor sheaths about 1/2 length of midtibia. This species is very similar to *E. portoricensis* which shares the elongated terminal ovipositor sheaths of this species. It can be differentiated from that species by the color of the mesosoma (scutellum, posterior mesoscutum and part of axillae yellow in *portoricensis*) and the separation of the scutellar sensilla (sensilla separated slightly less than 2X their own diameter in *portoricensis*).

Hosts: *Aleyrodes* sp.

Distribution: Mexico.

Encarsia transvena (Timberlake)

Figs. 74-77

Prospaltella transvena Timberlake, 1926: 312.
Prospaltella sublutea Silvestri, 1931: 20
Prospaltella flava Shafee, 1973. 254. (preoc. by *flavus* Compere, 1936).
Encarsia shafeei Hayat, 1989: 72. (replacement name for *flava* Shafee)
Prospaltella bemisiae Ishii, 1938: 30.

Diagnosis: Body yellowish (Fig. 74); midtarsus 5-segmented; vertex with striate sculpture between ocelli (Fig. 74); forewing without asetose area under stigmal vein and with area of elongated setae near posterior edge of membrane (Fig. 76); antennae with F2 longer than F1; scutellar sensilla separated by less than 2X their own diameter, and scutellum with 2 pairs of equal sized setae; metasoma with a single pair of setae medially between the cerci (Fig. 75); ovipositor only about half as long as metasoma and not appearing exserted (Fig. 77). This species is very similar to *strenua* and it can be very difficult to tell the two apart. The wing character (group of longer setae in *transvena* and shorter setae in *strenua*) can be difficult to assess without specimens of both species for comparison. The presence of only a single pair of setae between the cerci on the dorsal metasoma separates *strenua* (two pairs of setae between cerci) and the pattern of sculpture on the vertex seems reliable (striate in *transvena* and reticulate in *strenua*) but is also often difficult to assess because in many mounted specimens the head is at the wrong angle or is incompletely cleared.

Hosts: *Aleurocybotus indicus* David and Subramaniam, *Aleurodicus dispersus* Russell, *Bemisia argentifolii* Bellows and Perring (formerly *B. tabaci* (Bellows, et al., 1994)) (silverleaf whitefly), *Parabemisia myricae* (Kuwana), *Trialeurodes vaporariorum* (Westwood) (greenhouse whitefly).

Distribution: U.S. (CA, FL). Mexico and occurs over almost all of the Old World.

Encarsia variegata Howard
Figs. 78-80

Encarsia variegata Howard, 1908: 64.

Diagnosis: Head, mesoscutum and anterior scutellum dark brown; scutellum and metasoma (except laterally) yellow (Fig. 78); midtarsus 4-segmented; forewing uniformly setose around stigmal vein (Fig. 79); distance between scutellar sensilla greater than 2X their diameter (as in Fig. 25), F1 only about 1/2 as long as F2 (Fig. 80). This species is quite close to *luteola* and *formosa* and can be separated by color (*luteola* and *formosa* have the entire mesosoma uniformly brown to dark brown).

Hosts: *Aleurodicus sp.*, *Aleurothrixus floccosus* (Maskell) (woolly whitefly), *Paraleyrodes perseae (*Quaintance), *P. naranjae* (Quaintance) (plumeria whitefly).

Distribution: U.S. (CA, FL). Also occurs in the Caribbean and Mexico.

Acknowledgements

We thank J. Woolley and M. Rose (Texas A & M University) for the loan of types of *E. americana*. S. Heydon, A. Polaszek, S. Nakahara, R. Hodges and an anonymous reviewer read

We thank J. Woolley and M. Rose (Texas A & M University) for the loan of types of *E. americana*. S. Heydon, A. Polaszek, S. Nakahara, R. Hodges and an anonymous reviewer read the manuscript and provided many helpful suggestions and corrections. Special thanks to John Heraty for help with several characters. We are also grateful to USDA's Animal and Plant Health Inspection Service, PPQ, Biological Control Laboratory, Mission, TX for providing funding for much of the work that resulted in the completion of this key.

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Table 1. List of whitefly species with North American *Encarsia* species that have been reared from them.

Whitefly species	*Encarsia* species
Acaudaleyrodes citri (Priesner and Hosny)	*inaron, lutea*
Aleurocanthus citriperdus Quaintance and Baker	*divergens, merceti, opulenta, smithi*
A. longispinus Quaintance and Baker	*divergens*
A. spiniferus (Quaintance)	*divergens, merceti, opulenta, smithi*
A. woglumi Ashby	*clypealis, divergens, merceti, opulenta, smithi*
Aleurocybotus occiduus Russell	*luteola*
Aleurocybotus indicus David and Subramaniam	*transvena*
Aleurodes sp.	*townsendi*
Aleurodicus antillensis Dozier	*portoricensis*
A. dispersus Russell	*lahorensis, pergandiella, transvena*
A. sp.	*variegata*
Aleuroglandulus malangae Russell	*formosa, meritoria, pergandiella*
Aleurolobus subrotundus Silvestri	*protransvena*
Aleuroplatus coronata (Quaintance)	*citrella, pergandiella, quercicola*
A. gelatinosus (Cockerell)	*quercicola*
A. elemerae Mound and Halsey	*pergandiella*
A. liquidambaris Russell	*citrella*
Aleurothrixus floccosus (Maskell)	*americana, basicincta, cubensis, pergandiella, quaintancei, variegata*
A. porteri Quaintance and Baker	*meritoria*
Aleurotrachelus trachoides (Back)	*formosa, pergandiella*
Aleyrodes lonicerae Walker	*formosa, inaron*
A. proletella (L.)	*formosa, inaron*
Aleyrodes pruniosus Bemis	*peltata*
A. singularis Danzig	*inaron*
A. spiraeoides Quaintance	*formosa, meritoria*
Aleyrodes sp	*coquilletti, luteola, pergandiella, portoricensis*
Asterobemisia carpini (Koch)	*inaron*
A. Paveli (Zahradnik	*inaron*
Bemisia argentifolii Bellows and Perring	*citrella, formosa, inaron, lutea, luteola, nigricephala pergandiella, quaintancei, strenua, transvena*
Bemisia giffardi (Kotinsky)	*strenua*
Bemisia sp.	*inaron*
Bulgarialeurodes cotesii (Maskell)	*inaron*

Crenidorsum sp.	*formosa*
Dialeurodes chittendeni Laing	*formosa*
D. citri (Ashmead)	*formosa, lahorensis, pergandiella, protransvena, strenua*
D. citrifolii (Morgan)	*lahorensis, protransvena, strenua*
D. kirkaldyi (Kotinsky)	*lahorensis, pergandiella, protransvena, strenua*
D. sp.	*luteola, meritoria*
Parabemisia myricae (Kuwana)	*transvena*
*Paraleyrodes perseae (*Quaintance)	*variegata*
P. naranjae (Quaintance)	*variegata*
Siphoninus immaculatus (Heeger)	*inaron*
S. phillyreae (Haliday)	*inaron, meritoria*
Tetraleurodes mori (Quaintance)	*formosa*
*T. ursorum (*Cockerell).	*basicincta*
Trialeurodes abutiloneus (Haldeman)	*formosa, luteola, nigricephala pergandiella, quaintancei*
T. ferrnaldi (Morill)	*luteola*
T. floridensis (Quaintance)	*nigricephala, pergandiella*
T. packardi (Morill)	*luteola, quaintancei, strenua*
T. ricini (Misra)	*lahorensis (*not confirmed)
T. vaporariorum (Westwood)	*formosa, inaron, lutea, luteola, nigricephala, pergandiella, transvena*
T. variabilis (Quaintance).	*formosa, luteola, pergandiella*
T. sp.	*quaintancei*

Figure Legends

Figs. 1-9. 1, Habitus, *Encarsia americana*. 2, Female antenna, *E. americana*. 3, Forewing, *E. americana*. 4, Habitus, *E. basicincta.* 5, Forewing, *E. basicincta.* 6, Female antenna, *E. basicincta*. 7, Habitus, *E. citrella.* 8, Female antenna, *E. citrella.* 9, Forewing, *E. citrella.* Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions.

Figs. 10-17. 10, Habitus, *Encarsia clypealis.* 11, Forewing, *E. clypealis.* 12, Female antenna, *E. clypealis.* 13, Habitus, *E. coquilletti*. 14, Forewing, *E. coquilletti*. 15, Habitus, *E. cubensis*. 16, Forewing, *E. cubensis*. 17, Female antenna, *E. cubensis*. Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions.

Figs. 18-26. 18, Habitus, *Encarsia divergens*. 19, Forewing, *E. divergens*. 20, Female antenna, *E. divergens*. 21, Metasoma, *E. divergens*. 22, Habitus, *E. formosa*. 23, Forewing, *E. formosa*. 24, Female antenna, *E. formosa*. 25, Dorsal mesosoma, *E. formosa*. 26, Habitus, *E. inaron*. Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions.

Figs. 27-32. 27, Habitus, *Encarsia lahorensis*. 28, Dorsal mesosoma, *E. lahorensis*. 29, Habitus, *E. lutea.* 30, Metasoma, *E. lutea.* 31, Female antenna, *E. lutea.* 32, Male antenna, *E. lutea*. Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions.

Figs. 33-40. 33, Habitus, *Encarsia luteola.* 34, Dorsal mesosoma, *E. luteola.* 35, Habitus, *E. merceti.* 36, Forewing, *E. merceti*. 37, Anterior portion of female antenna, *E. merceti*. 38, First funicular segment of male, *E. merceti*. 39, Habitus, *E. meritoria*. 40, Forewing, *E. meritoria*. Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions.

Figs. 41-48. 41, Habitus, *Encarsia nigricephala.* 42, Female antenna, *E. nigricephala.* 43, Forewing, *E. nigricephala.* 44, Dorsal mesosoma, *E. nigricephala.* 45. Habitus, *E. opulenta.* 46, Habitus, *E. peltata.* 47, Female antenna, *E. peltata.* 48, Metasoma, *E. peltata.* Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions

Figs. 49-56. 49, Habitus, *E. pergandiella.* 50, Female antenna, *E. pergandiella.* 51, Forewing, *E. pergandiella.* 52, Habitus, *E. portoricensis*. 53, Habitus, *E. protransvena*. 54, Forewing, *E. protransvena*. 55, Metasoma, *E. protransvena*. 56, Female antenna, *E. protransvena*. Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions

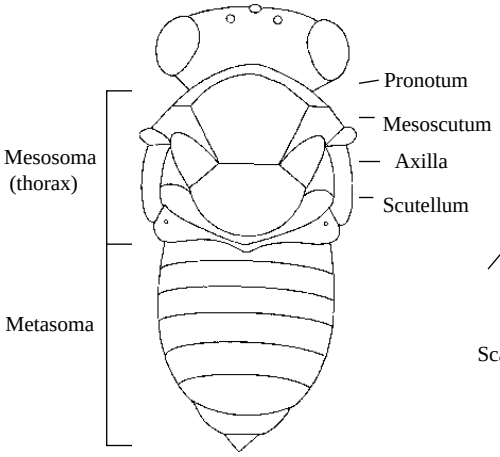
Figs. 57-66, 57, Habitus, *E. quaintancei*. 58, Dorsal mesosoma, *E. quaintancei.* 59, Forewing, *E. quaintancei.* 60, Female antenna, *E. quaintancei.* 61, Habitus, *E. quercicola.* 62, Forewing, *E. quercicola.* 63, Female antenna, *E. quercicola.* 64, Habitus, *E. smithi*. 65, Forewing, *E. smithi*. 66, Female antenna, *E. smithi*. Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions

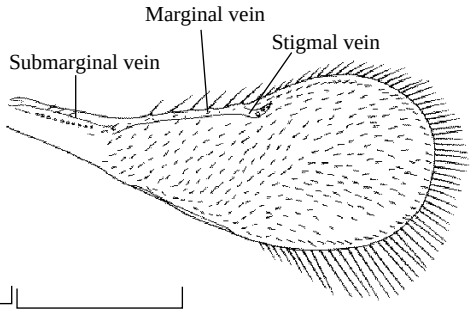
Figs. 67-75. 67, Habitus, *Encarsia strenua*. 68, Forewing, *E. strenua*. 69, Dorsal posterior metasoma, *E. strenua*. 70, Dorsal mesosoma, *E. strenua*. 71, Habitus, *E. townsendi*. 72, Female antenna, *E. townsendi*. 73, metasoma, *E. townsendi*. 74, Habitus, *E. transvena*. 75,

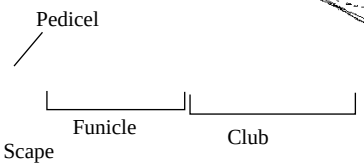
Dorsal posterior metasoma, *E. transvena*. 76, Forewing, *E. transvena.* 77, Metasoma, *E. transvena.* Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions

Figs. 78-80. 78, Habitus, *E. variegata.* 79, Forewing, *E. variegata.* 80, Female antenna, *E. variegata.* Note: Habitus drawings indicate general coloration patterns and may not accurately reflect other body proportions

Key to *Encarsia* Parasitic on Whiteflies in North America







1A

Midtarsus
4-segmented

Go to Couplet 2A

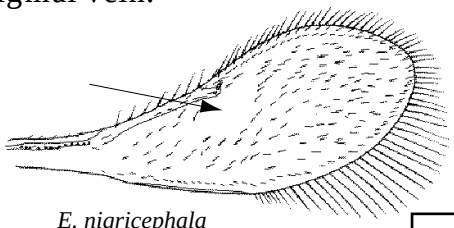
1B

Midtarsus
5-segmented

Go to Couplet 2B

2A

Forewing with an asetose area under stigmal vein.



E. nigricephala

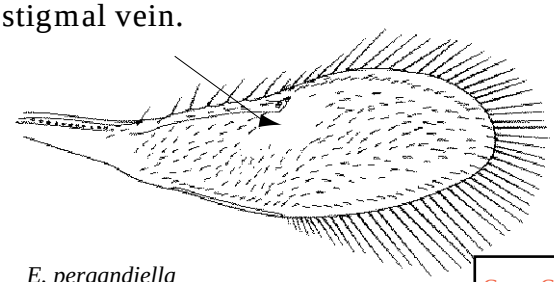
Go to Couplet 3

Forewing without an asetose area under sti

Go to Couplet 5

2B

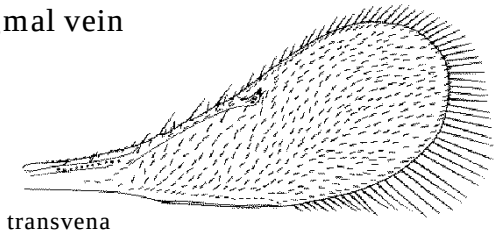
Forewing with an asetose area under stigmal vein.



E. pergandiella

Go to Couplet 8

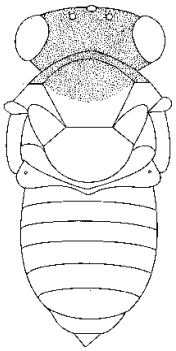
Forewing without an asetose area under stigmal vein



E. transvena

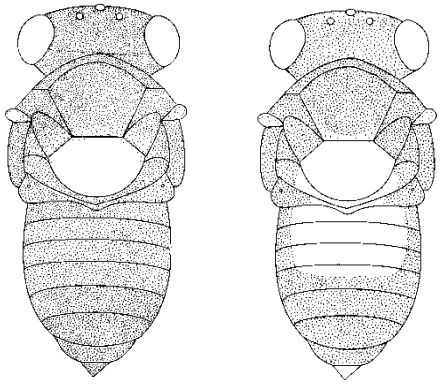
Go to Couplet 10

3A Body mostly yellow except head and anterior thorax.



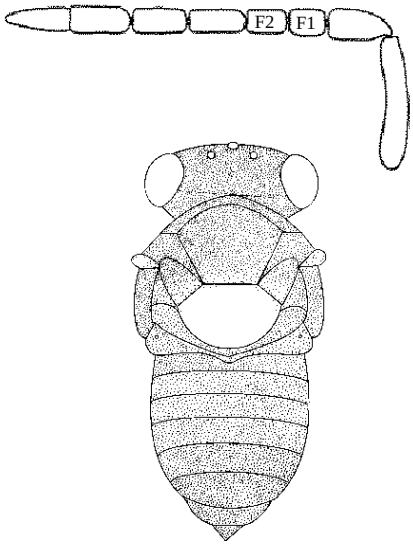
Encarsia nigricephala Dozier

3B Body mostly dark brown except scutellum and/or median metasoma.



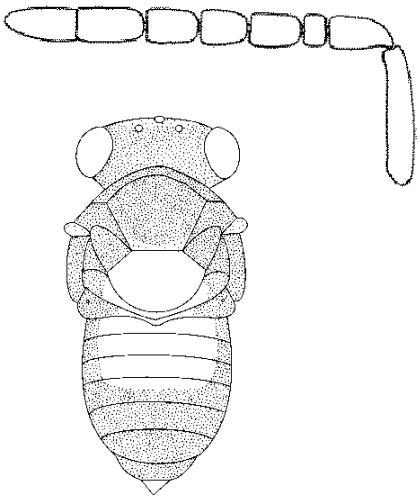
Go to Couplet 4

4A Body mostly dark brown except scutellum; female antenna with F1 about equal to F2.



Encarsia quaintancei Howard

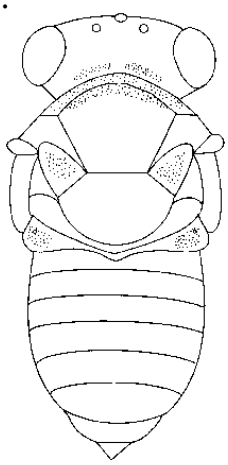
4B Body mostly dark brown to brown except median areas of thorax and anterior metasoma; female antenna with F1 about 1/2 length of F2.



Encarsia cubensis Gahan

5A

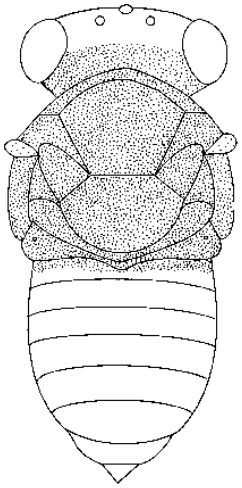
Body mostly yellow or orange-yellow.



Encarsia meritoria Gahan

5B

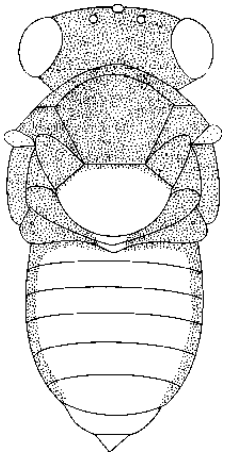
Body except metasoma mostly dark.



Go to Couplet 6

6A

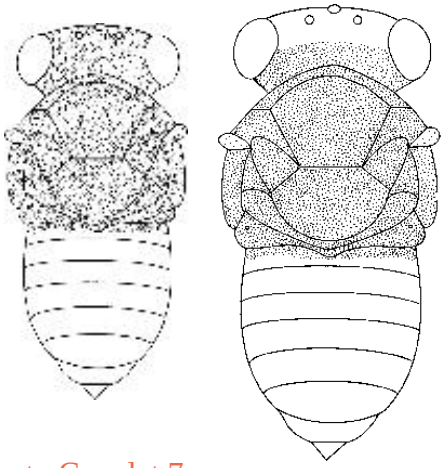
Scutellum yellow; metasoma laterally dark.



Encarsia variegata Howard

6B

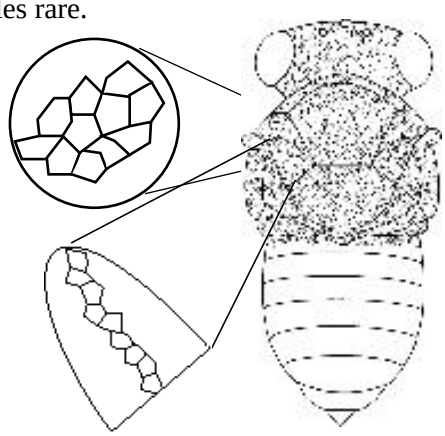
Body except metasoma mostly dark.



Go to Couplet 7

7A

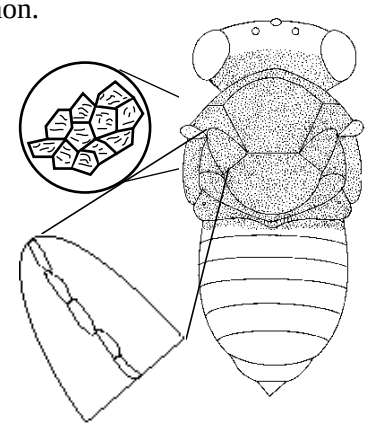
Occiput usually dark; reticulations on thorax without internal striations; number of cells along longitudinal axis of axilla usually more than 6. Males rare.



Encarsia formosa Gahan

7B

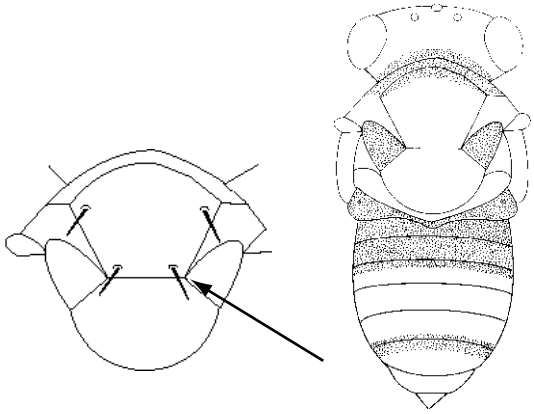
Occiput usually orange hued; reticulations on thorax with internal striations; number of cells along longitudinal axis of axilla usually less than 6. Males common.



Encarsia luteola Howard

8A

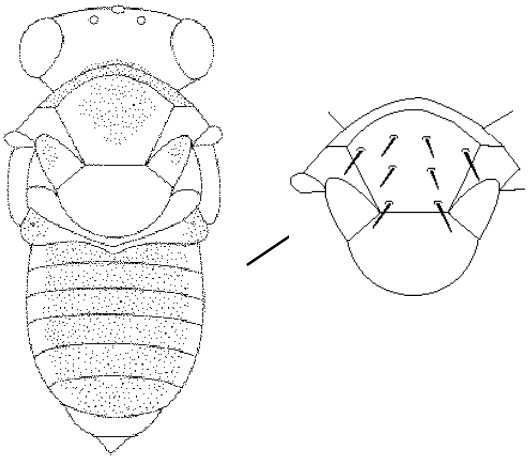
Midlobe of mesoscutum with 2 pairs of setae; metasoma either pale or with at least a pale band medially.



Go to Couplet 9

8B

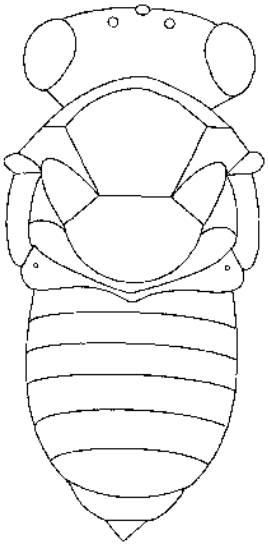
Midlobe of mesoscutum with more than 2 pairs of setae; metasoma mostly dark.



Encarsia pergandiella Howard

9A

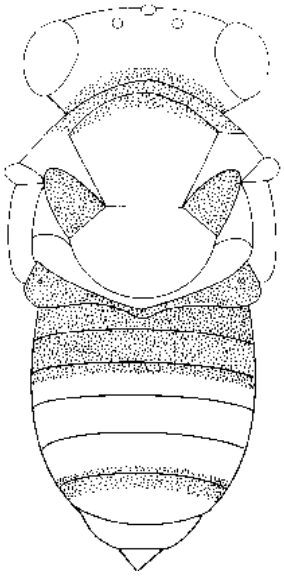
Body almost entirely yellow, there may be some small brown areas ventrally.



Encarsia americana (DeBach & Rose)

9B

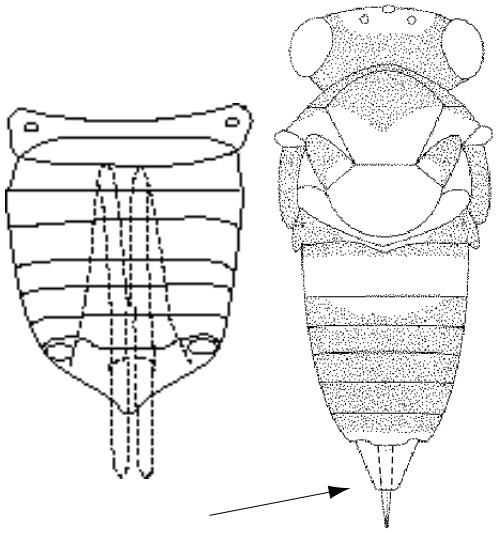
Body with darkened area on anterior thorax, axillae, and anterior and posterior metasoma.



Encarsia basicincta Gahan

10A

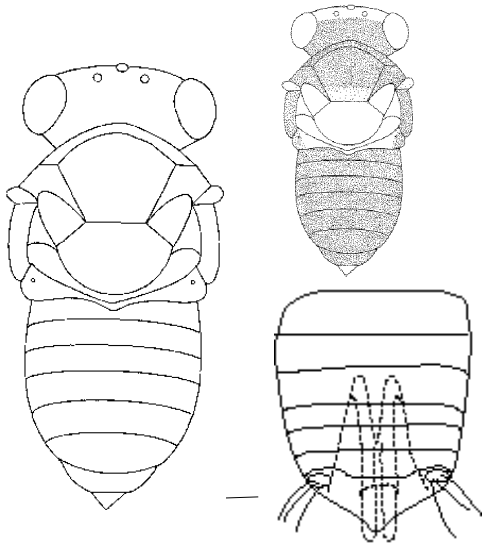
Ovipositor as long as the metasoma and distinctly exserted beyond tip; often covered dorsally by the enlarged last metasomal tergum which is longer than wide.



Go to Couplet 11

10B

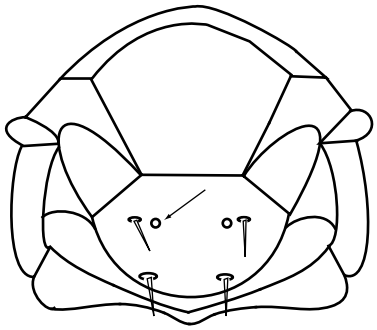
Ovipositor shorter than metasoma; not or only slightly exserted beyond tip; last metasomal tergum not enlarged and wider than long.



Go to Couplet 15

11A

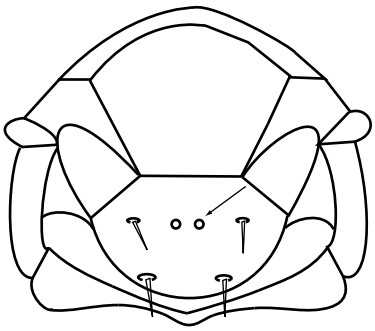
Scutellum with median sensilla separated by more than 2X their own diameter.



Go to Couplet 13

11B

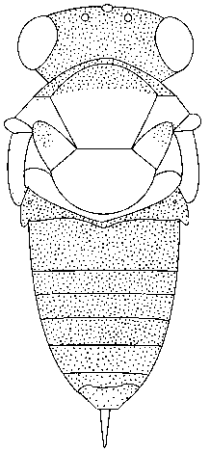
Scutellum with median sensilla close together (less than 2X their own diameter).



Go to Couplet 12

12A

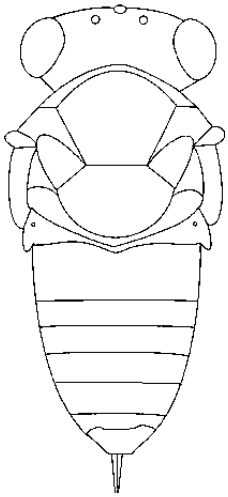
Body mostly dark except for parts of mesoscutum and scutellum yellow



Encarsia portoricensis (Howard)

12B

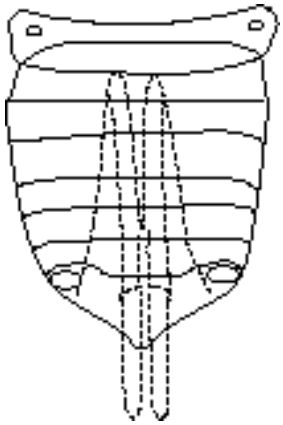
Body uniformly yellow.



Encarsia protransvena Viggiani

13A

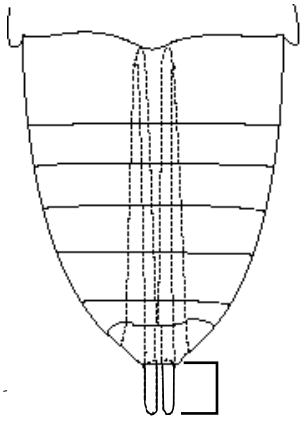
Terminal valve of sheaths 1/2 length of hind tibia.



Encarsia townsendi Howard

13B

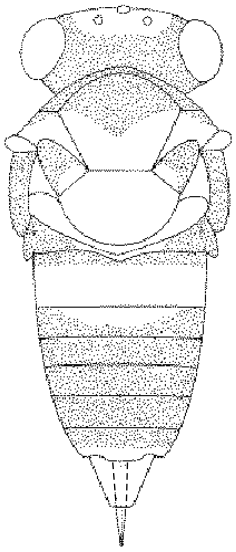
Terminal valve of sheaths less than 1/2 length of hind tibia.



Go to Couplet 14

14A

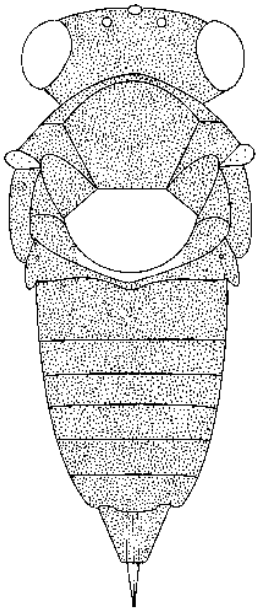
Anterior metasoma and last tergum yellow; much of dorsal thorax also yellow.



Encarsia opulenta Silvestri

14B

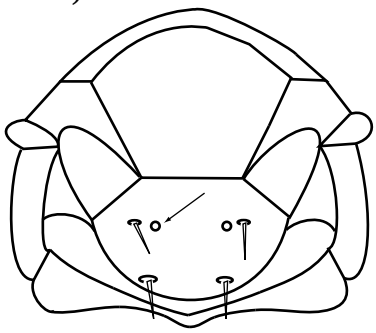
Entire metasoma dark, including last tergum; thorax with only scutellum yellow .



Encarsia clypealis (Silvestri)

15A

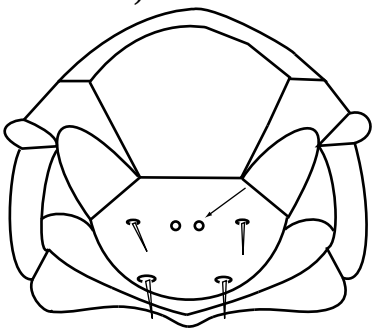
Scutellum with median sensilla far apart (more than 2X their own diameter).



Go to Couplet 19

15B

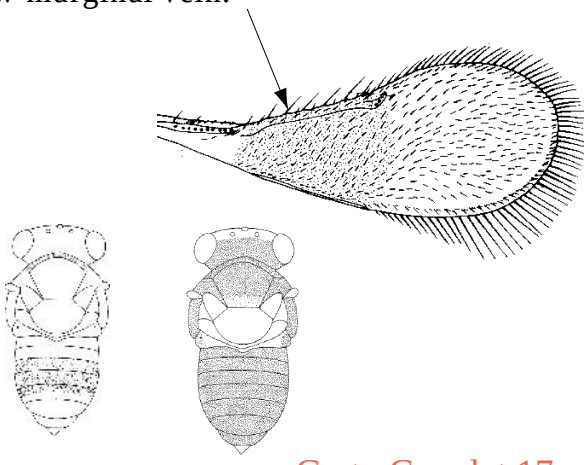
Scutellum with median sensilla close together (less than 2X their own diameter).



Go to Couplet 16

16A

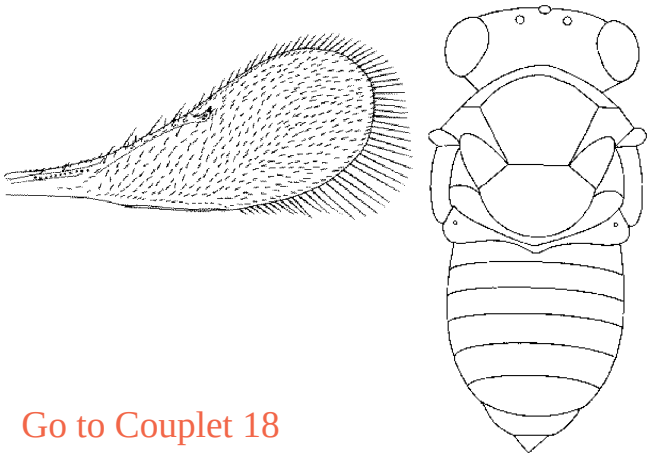
Body with at least some darkened areas on thorax or metasoma; forewing infuscate below marginal vein.



Go to Couplet 17

16B

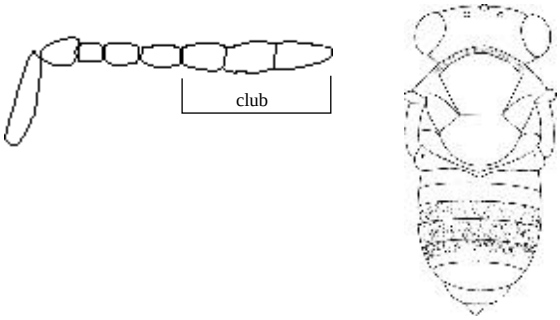
Body entirely yellow or with only small light-brown areas (eyes may be colored); forewing hyaline under marginal vein.



Go to Couplet 18

17A

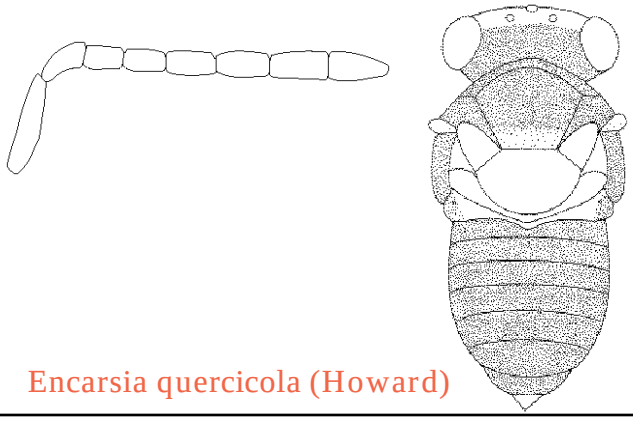
Color restricted mostly to dark band on metasoma; antennal club 3-segmented.



Encarsia citrella (Howard)

17B

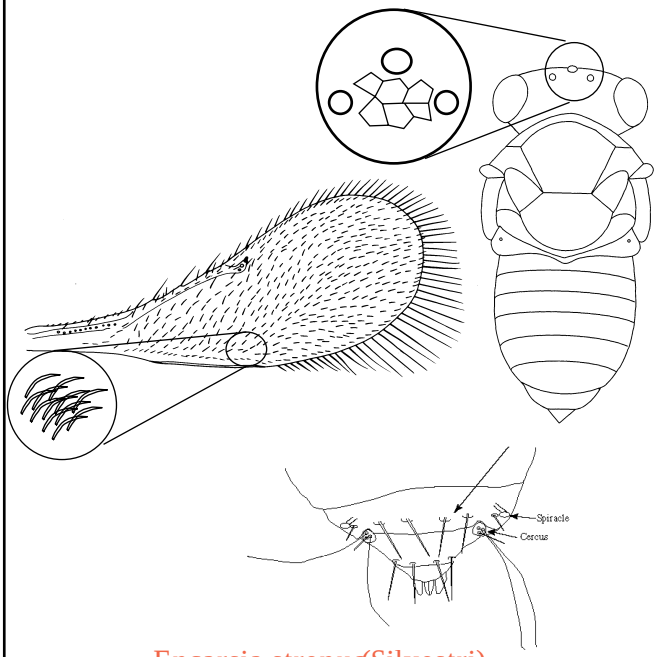
Most of body dark; antennal club 2-segmented or club not obvious.



Encarsia quercicola (Howard)

18A

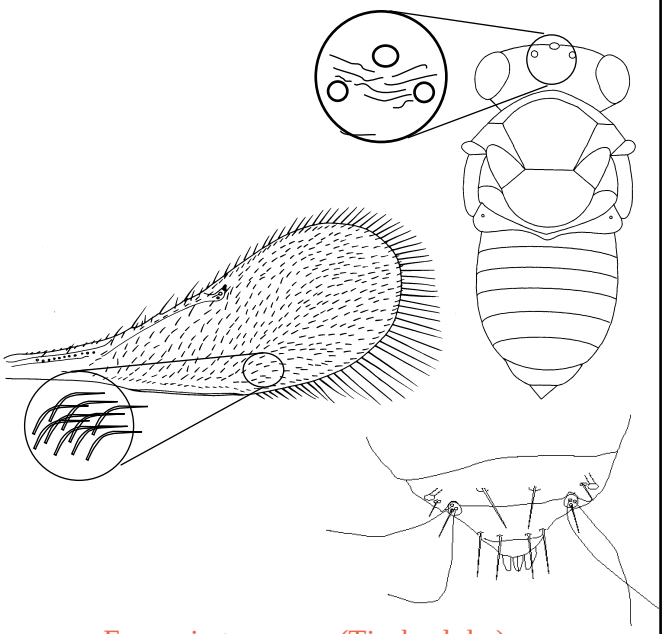
Metasoma with two pair of setae medial to cercus; forewing with normal setae near posterior margin; sculpture between ocelli reticulate.



Encarsia strenua (Silvestri)

18B

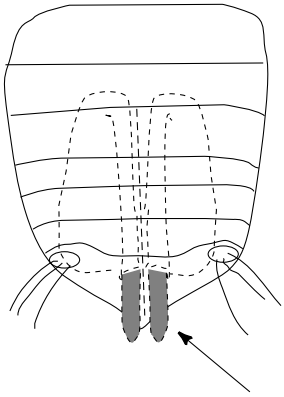
Metasoma with one pairs of setae medial to cercus; forewing with patch of longer, coarse setae near posterior margin; sculpture between ocelli striate.



Encarsia transvena (Timberlake)

19A

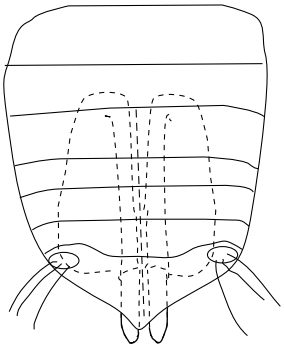
Terminal valvulae of ovipositor dark brown in contrast to yellow color of rest of body.



Encarsia lutea (Masi)

19B

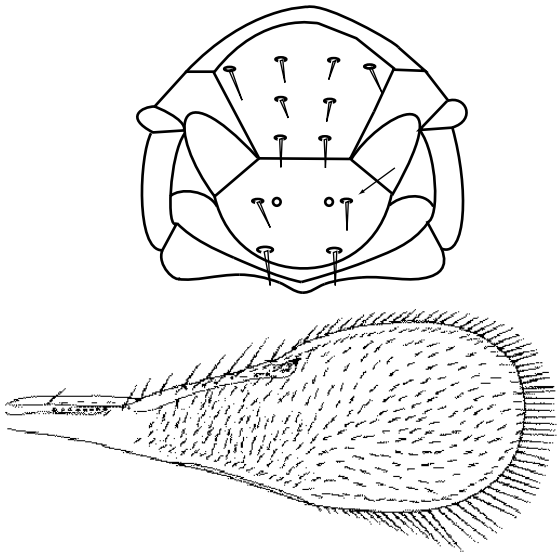
Terminal valvulae of ovipositor same color as rest of body.



Go to Couplet 20

20A

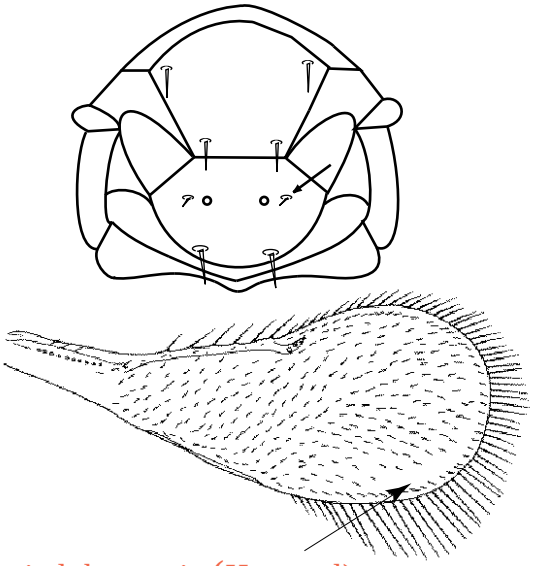
Mesoscutum with more than 2 pairs of setae; anterior scutellar setae about as large as posterior pair; posterior margin of forewing with scattered setae.



Go to Couplet 21

20B

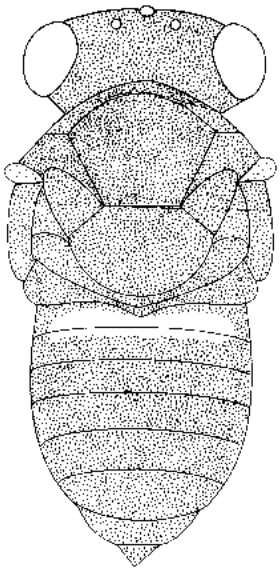
Mesoscutum with 2 pairs of setae; anterior scutellar setae small, not much longer than width of sensillae, much smaller than posterior pair; posterior margin of forewing with area lacking setae.



Encarsia lahorensis (Howard)

21A

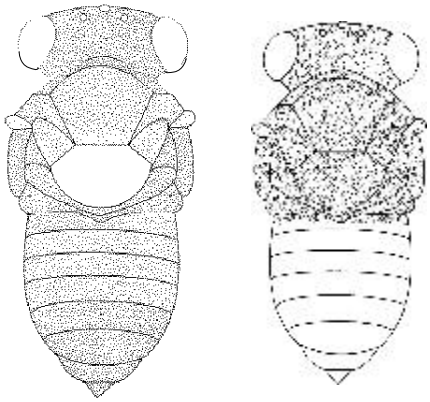
Entire body dark brown except for small yellow band on anterior metasoma.



Encarsia coquilletti Howard

21B

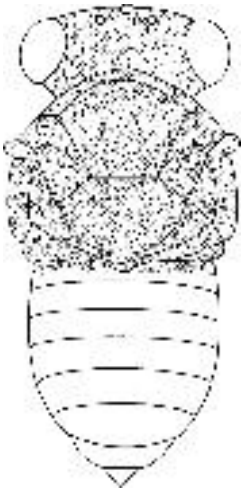
At least scutellum or metasoma and often other parts of body yellow or white.



Go to Couplet 22

22A

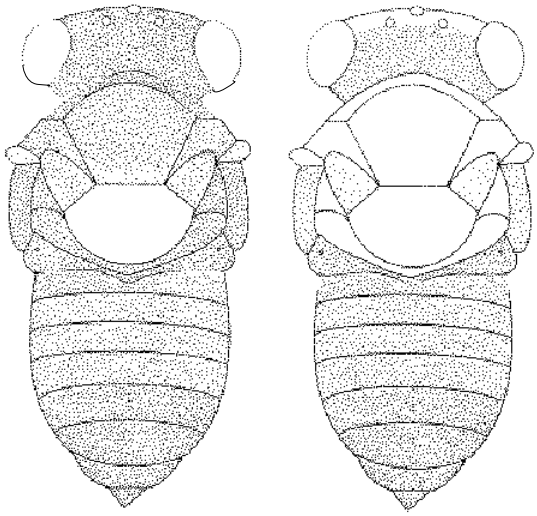
Head and thorax (and anterior margin of metasoma) entirely dark brown, contrasting with yellow metasoma.



Encarsia inaron (Walker)

22B

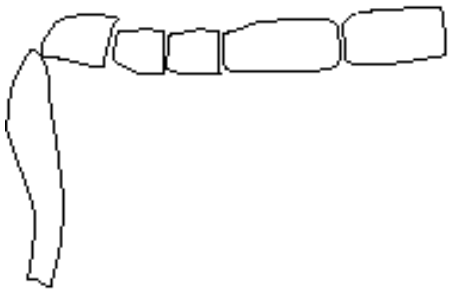
At least scutellum and often posterior margin of mesoscutum and median propodeum yellow; metasoma usually at least partly dark.



Go to Couplet 23

23A

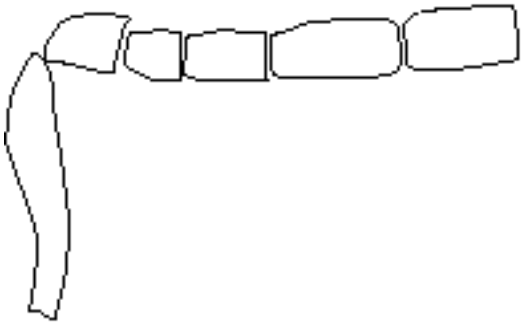
Funicles 1 and 2 small (each only about as long as wide) and together about equal in length to F3.



Encarsia merceti Silvestri

23B

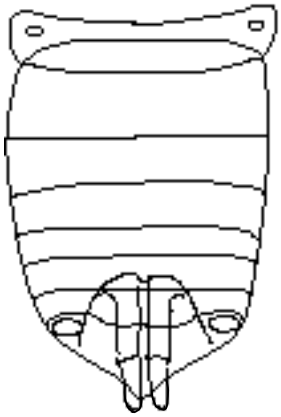
F2 longer than F1, together F1 & F2 noticeably longer than F3.



Go to Couplet 24

24A

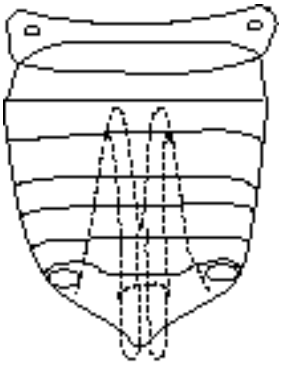
Ovipositor short, only about 1/4 length of metasoma; body black except for scutellum.



Encarsia peltata (Cockerell)

24B

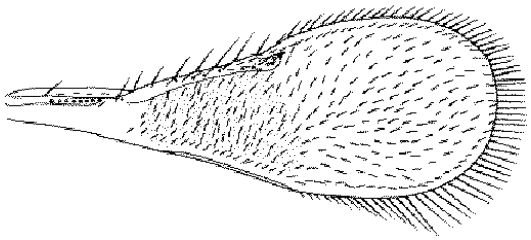
Ovipositor longer, from 1/2 to about equal length of metasoma; body lighter, usually brown except for scutellum or scutellum and surrounding areas of thorax.



Go to Couplet 25

25A

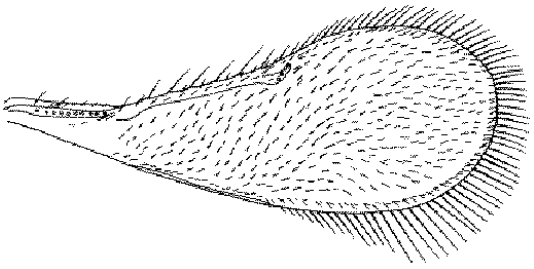
Forewing lightly infuscate below marginal vein; mesoscutum generally orange to whitish and scutellum whitish.



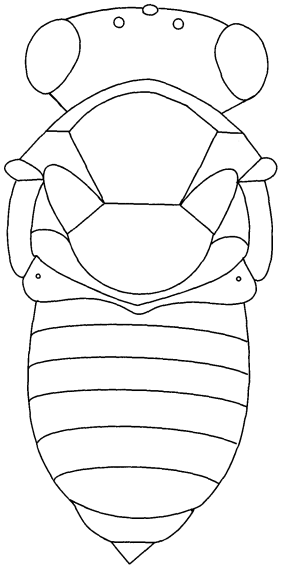
Encarsia smithi (Silvestri)

25B

Forewing hyaline; mesoscutum mostly dark brown except at lateral edges, scutellum white or yellow.



Encarsia divergens (Silvestri)



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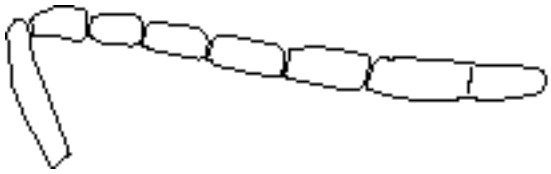

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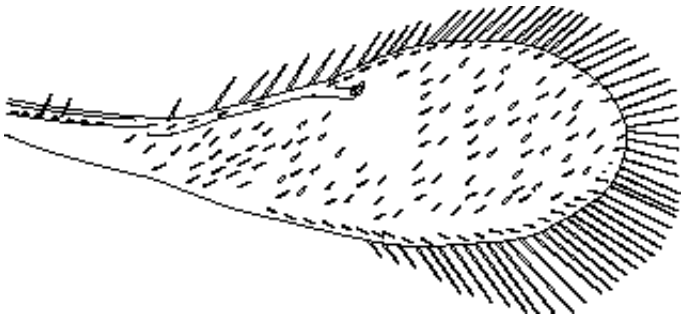

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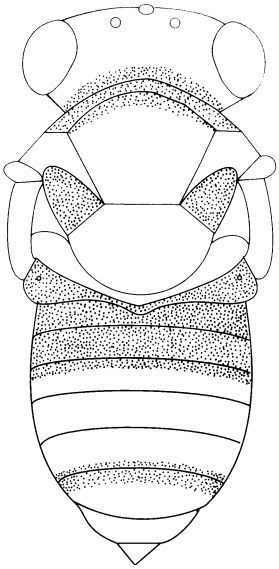

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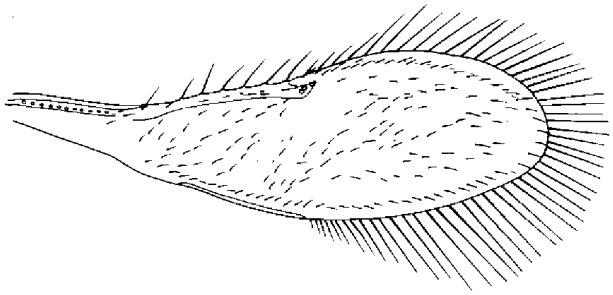

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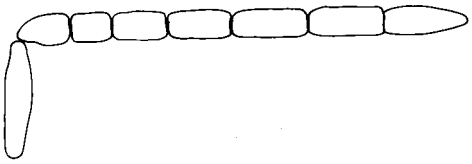

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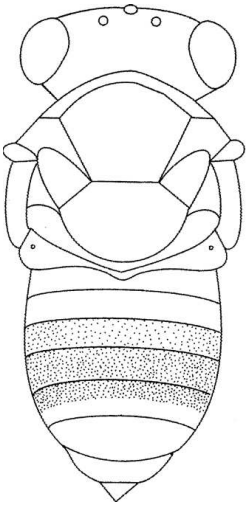

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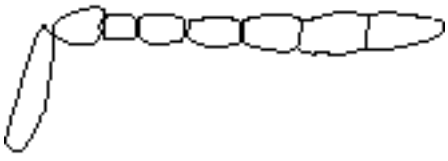

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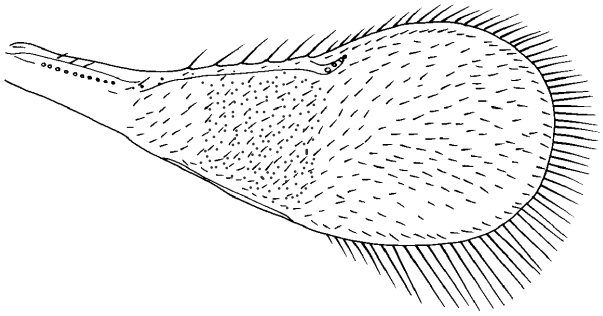

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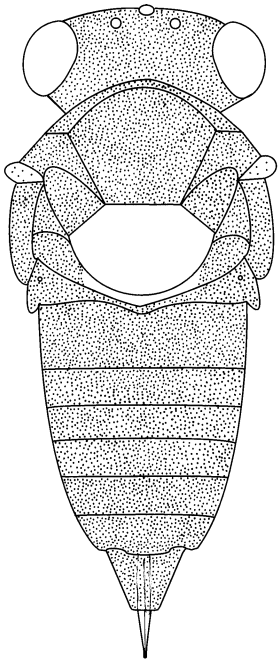

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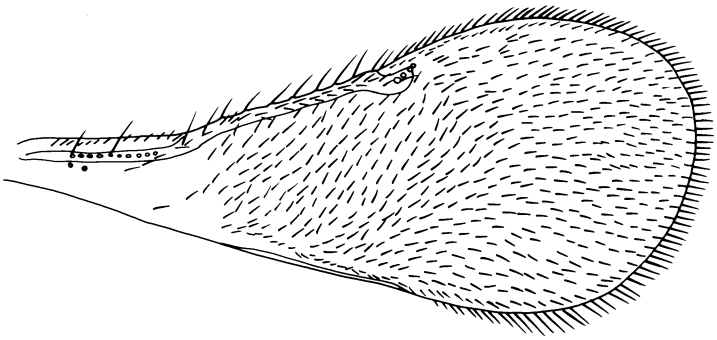

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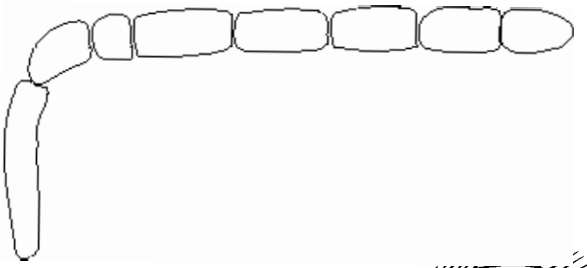

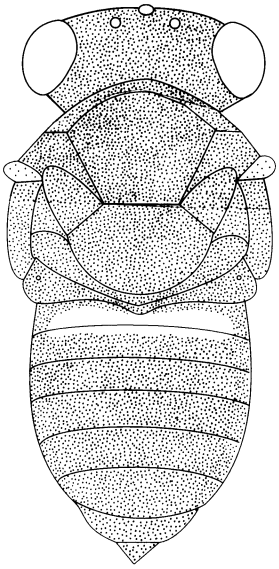

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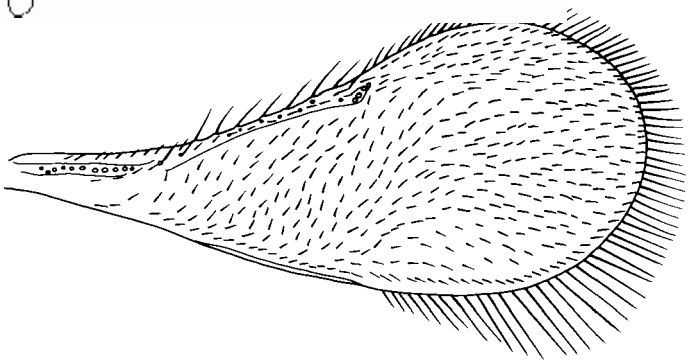

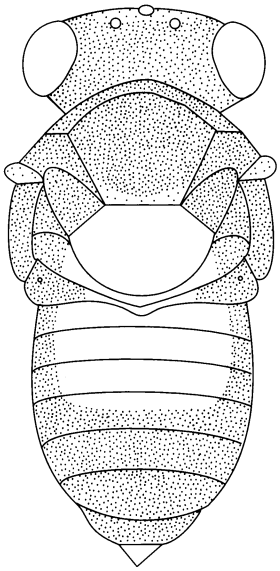

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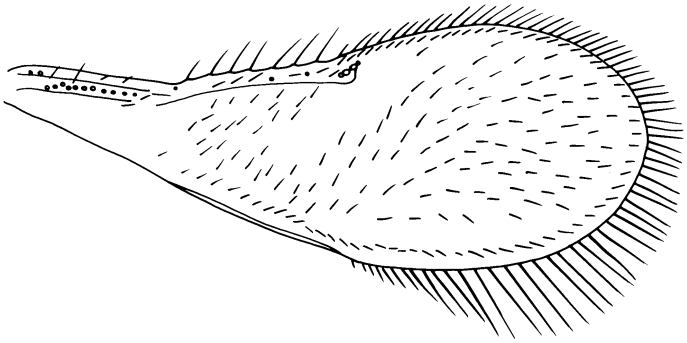

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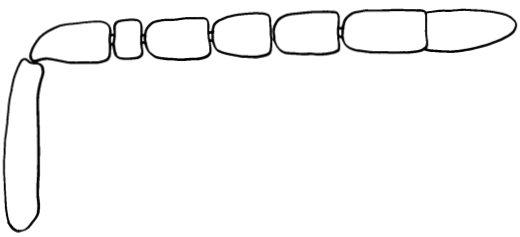

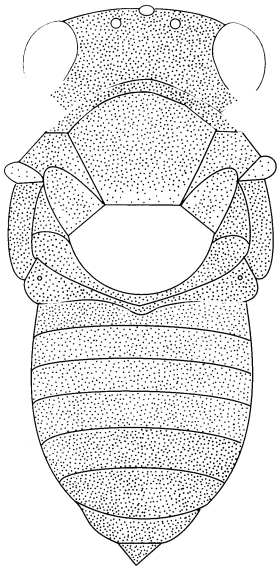

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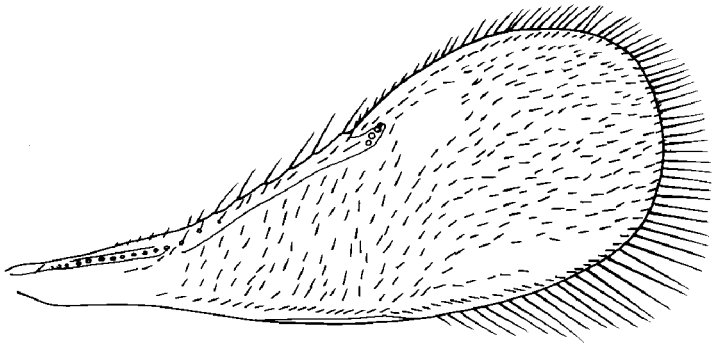

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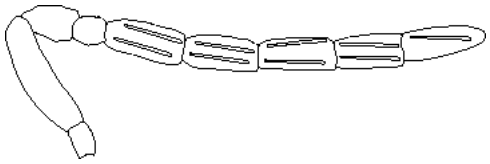

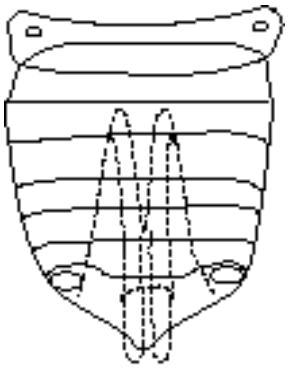

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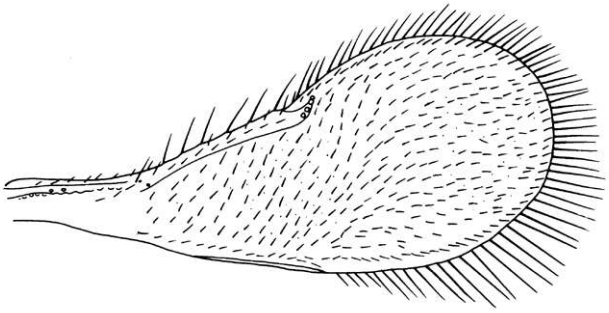

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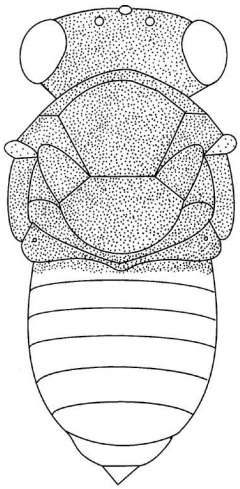

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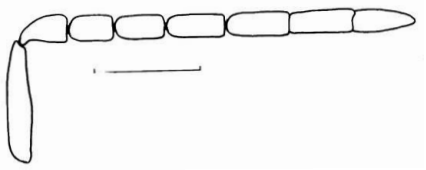

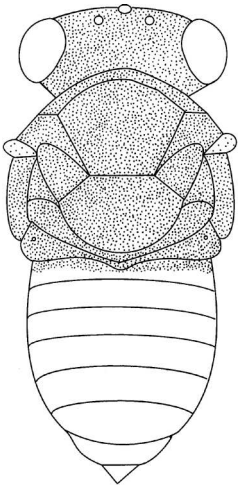

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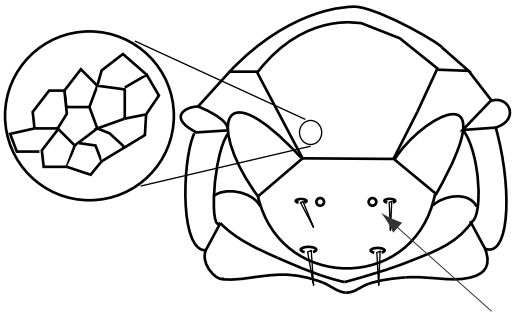

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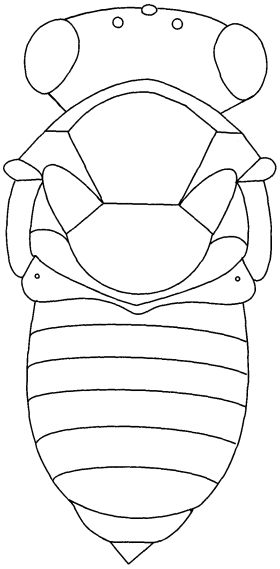

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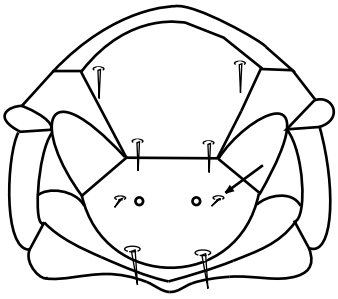

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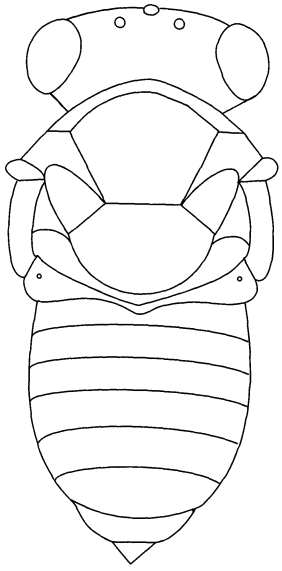

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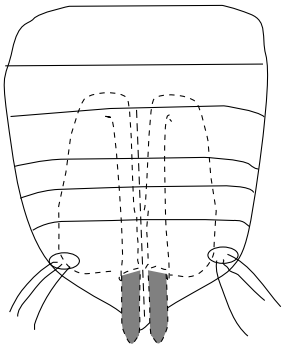

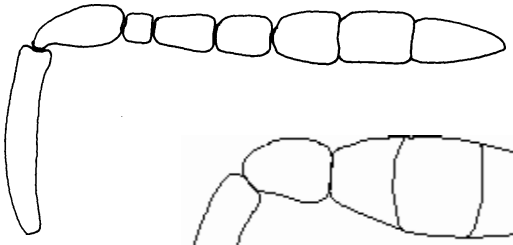

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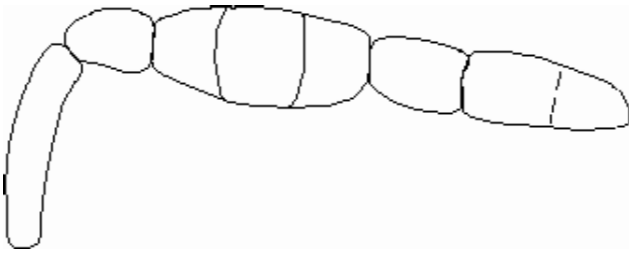

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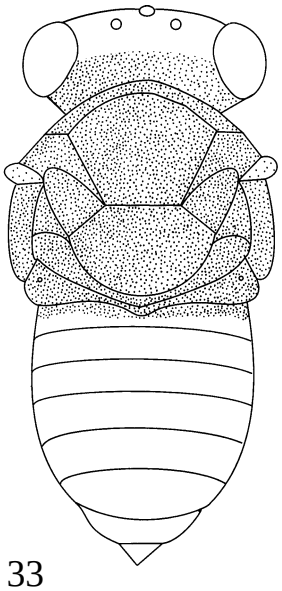

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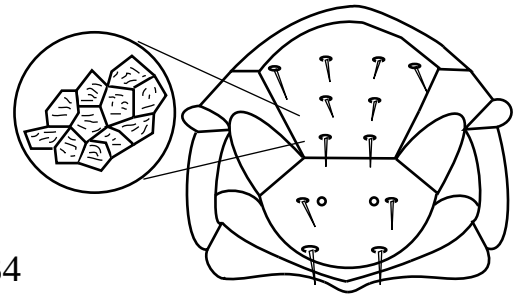

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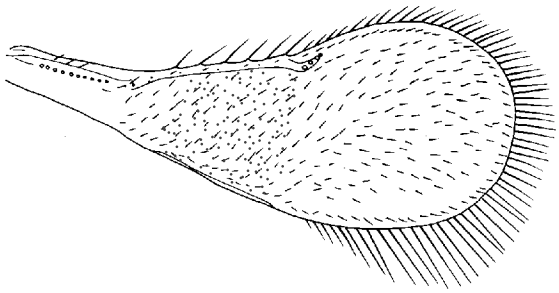

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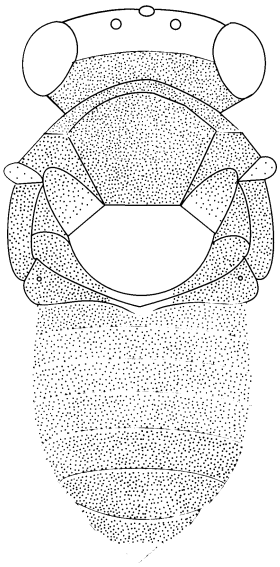

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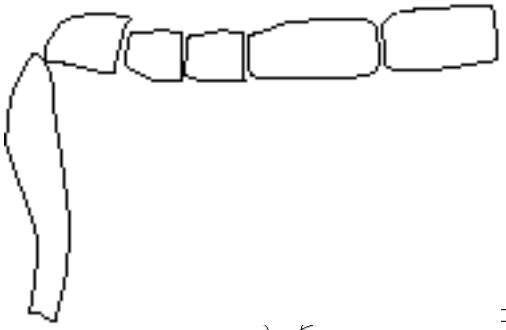

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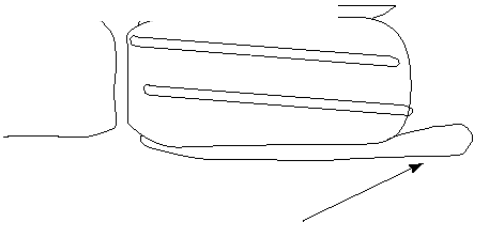

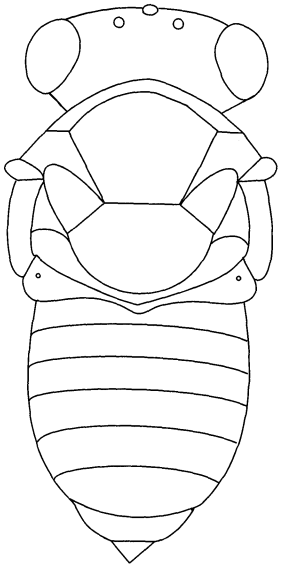

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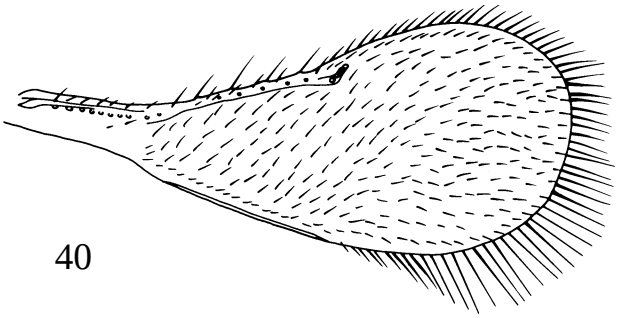

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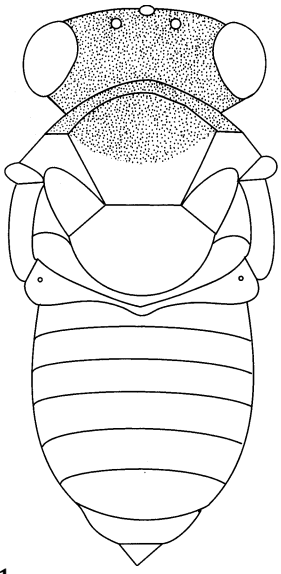

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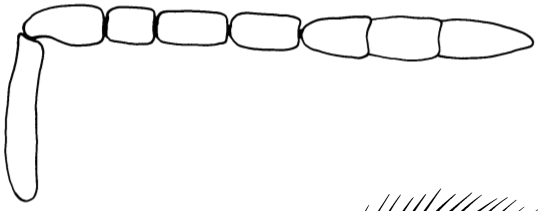

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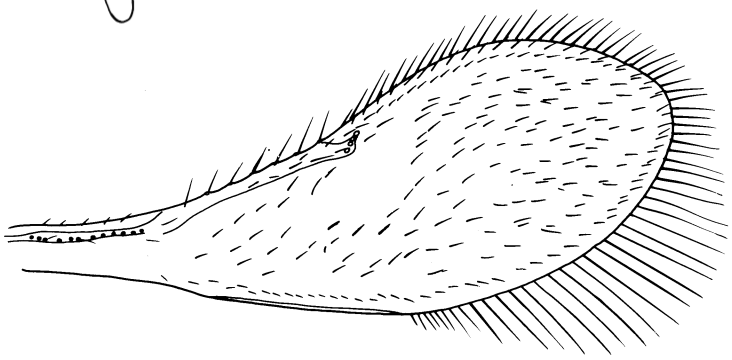

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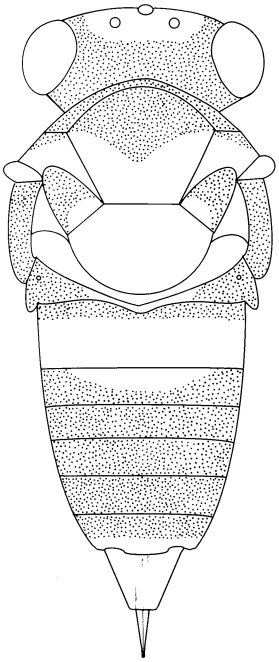

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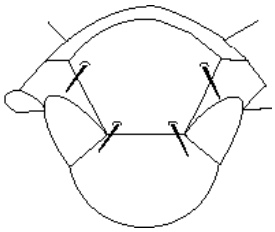

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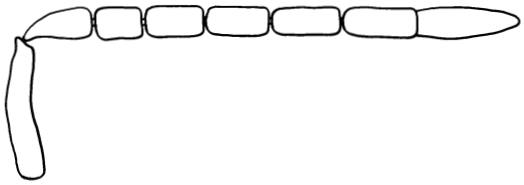

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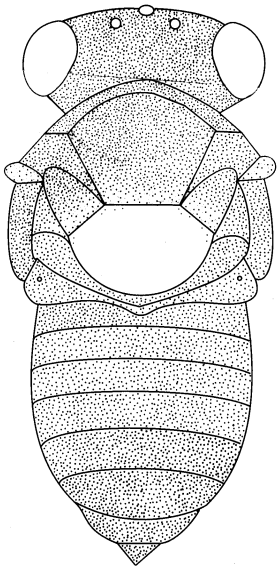

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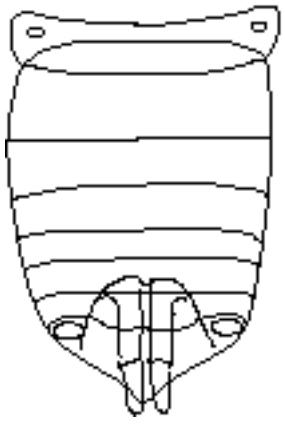

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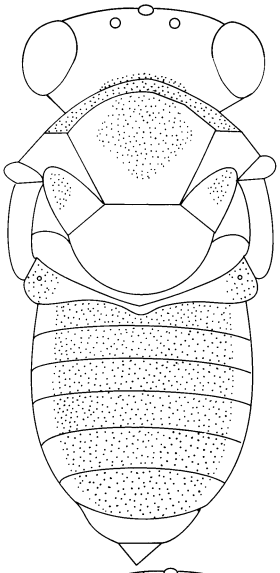

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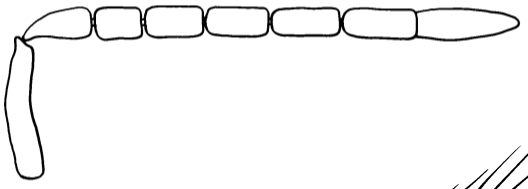

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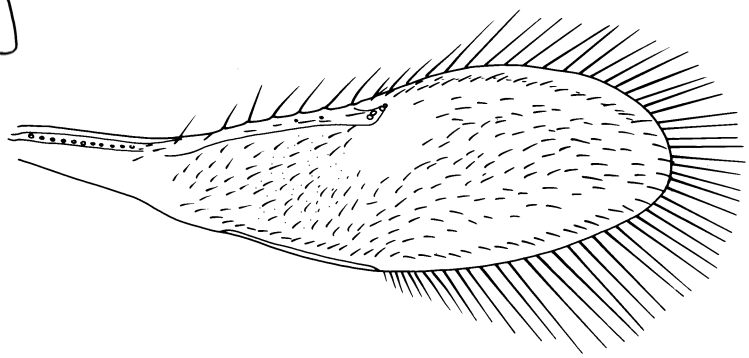

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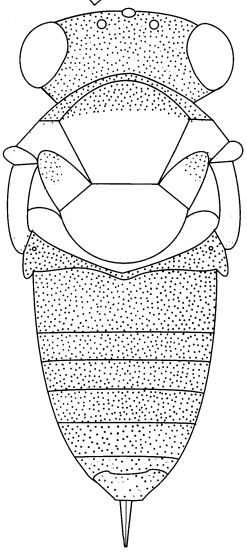

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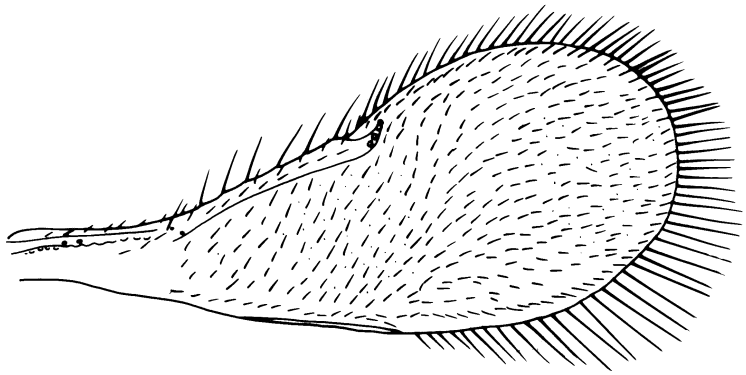

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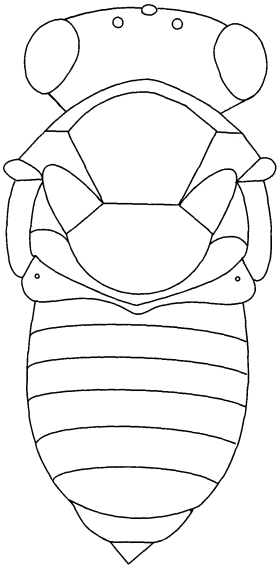

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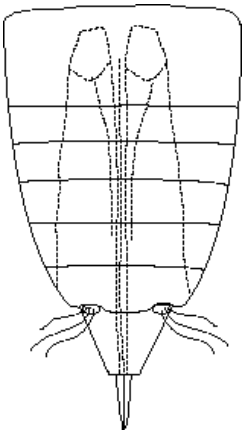

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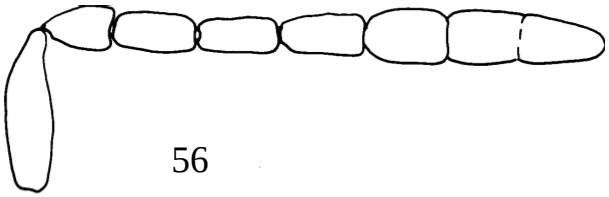

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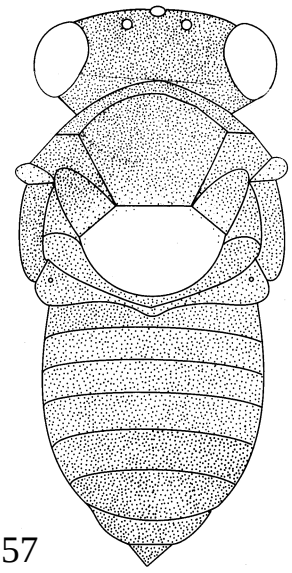

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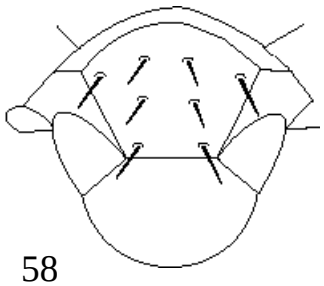

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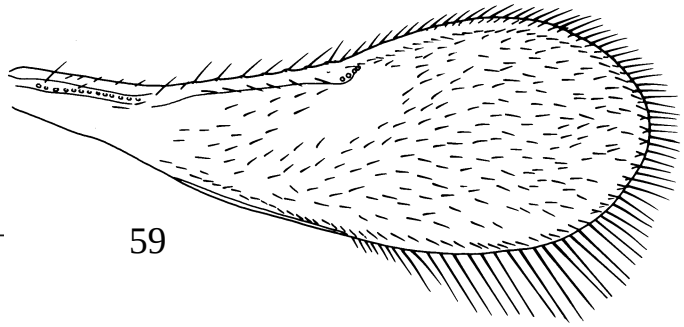

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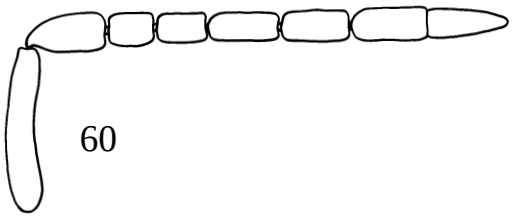

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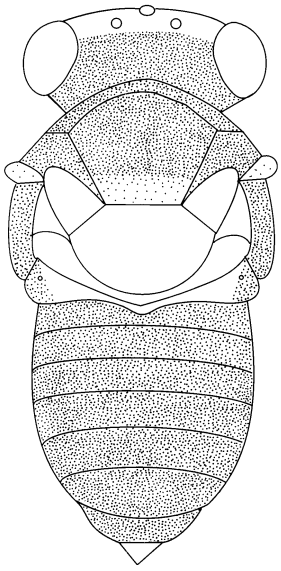

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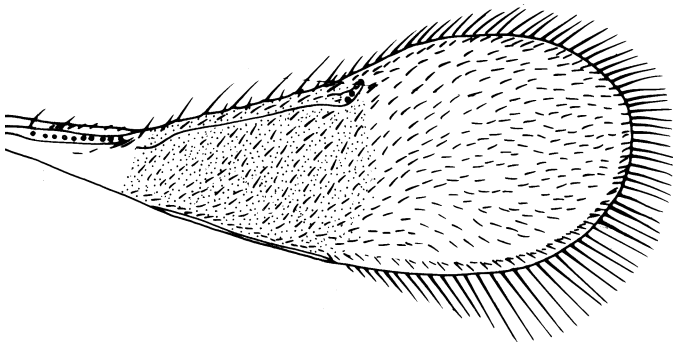

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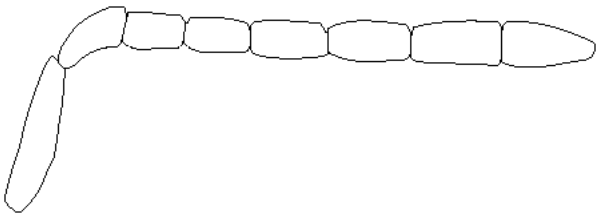

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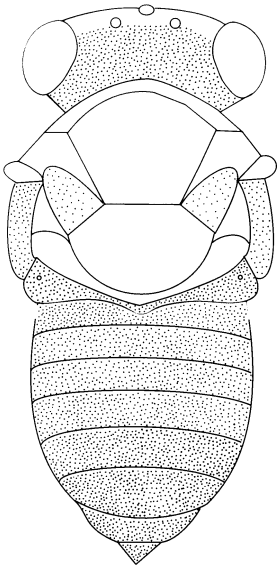

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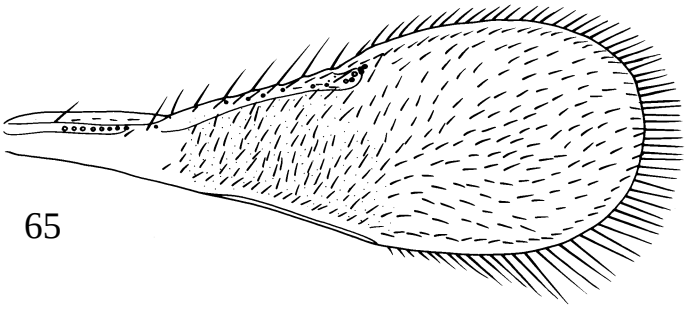

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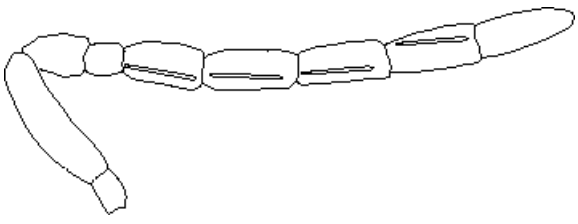

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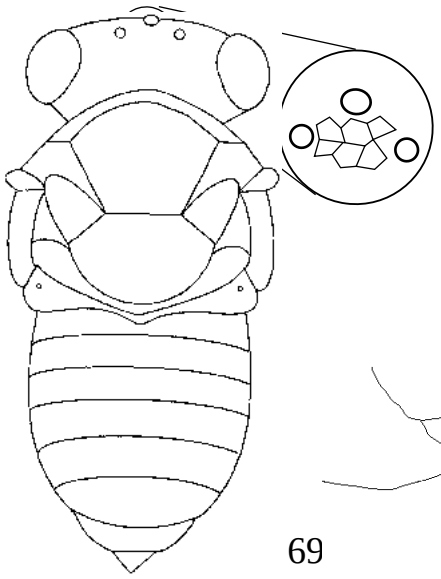

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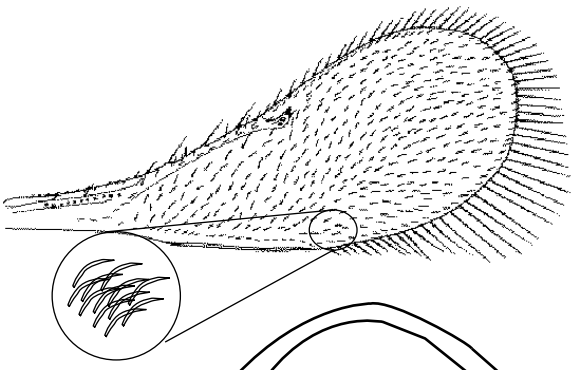

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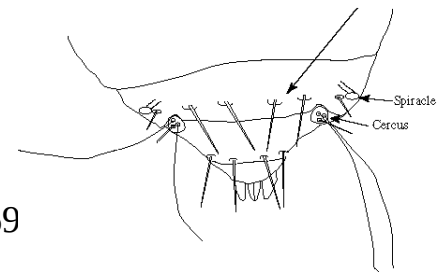

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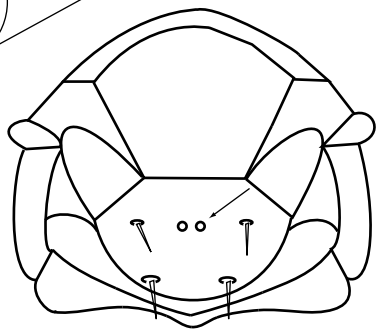

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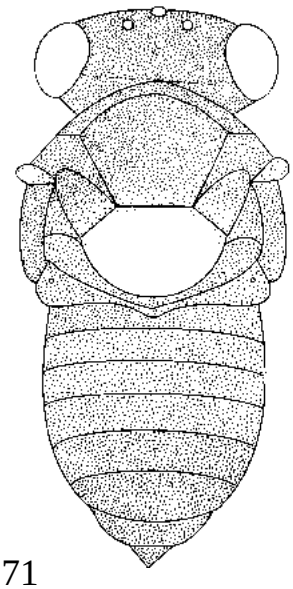

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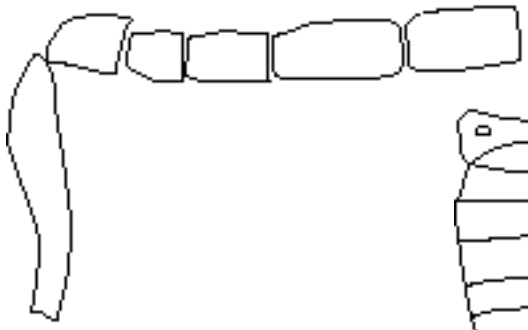

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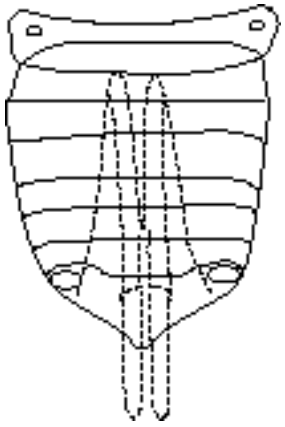

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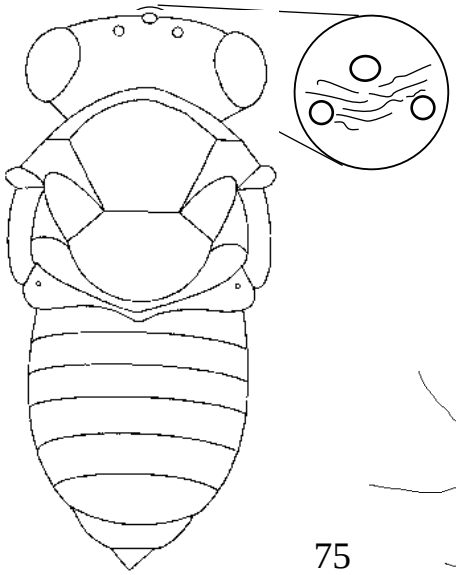

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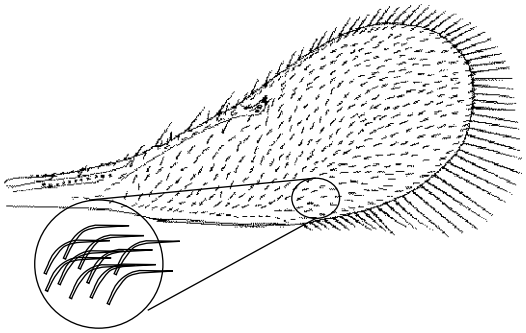

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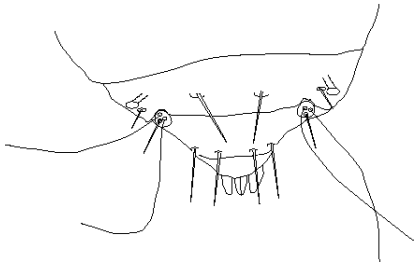

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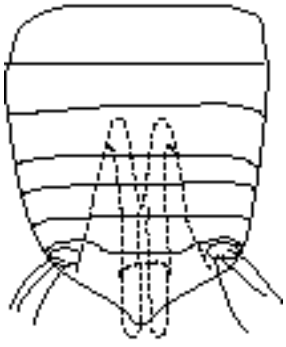

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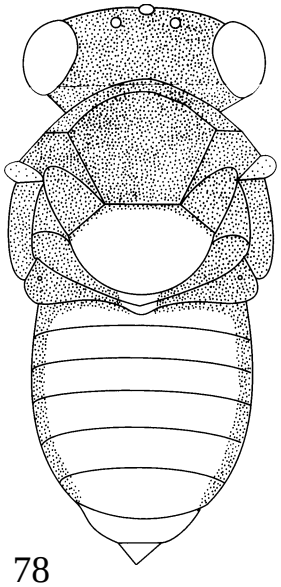

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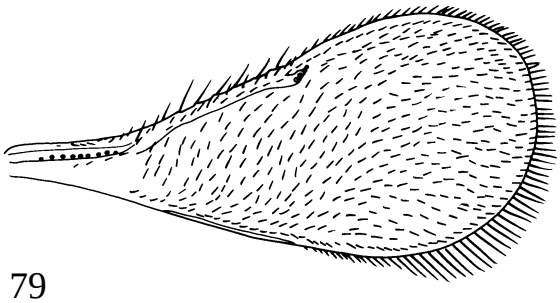

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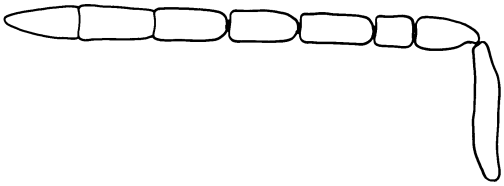

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