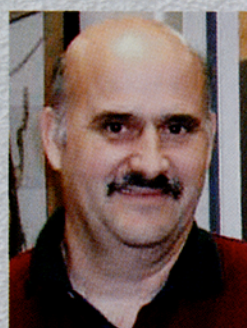




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(Hymenoptera: Chalcidoidea: Aphelinidae)
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Cd. Victoria, Tamaulipas, México
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SYNOPSIS

Encarsia Förster is one of the largest and economically important genera in the family Aphelinidae (Hymenoptera). Many species have been associated with classical biological control programs throughout the world against pests belonging to the families Aleyrodidae and Diaspididae. Some species were introduced into Mexico to combat whiteflies and armored scale insects on citrus. The species of the genus *Encarsia* known to occur in Mexico are presented and revised for the first time. A total of 88 species are treated, including forty-seven new species. Twelve species were described by senior author earlier (*catemaco*, *citricola*, *colima*, *dmitrii*, *flaviceps*, *guajavae*, *mexicana*, *pinella*, *tapachula*, *terebrella*, *trilineata* and *tuxtla*), four species were described with other coauthors (*clavata*, *polaszeki*, *tamaulipeca* and *verticina*), and thirty-one new species are described by authors in this book (*altacima*, *alvaradoi*, *antennata*, *azteca*, *elcielica*, *floreana*, *funiculata*, *fursovi*, *gaonae*, *guamuchil*, *juanae*, *kasparyani*, *lacuma*, *leucaenae*, *llera*, *llerica*, *macula*, *mahoniae*, *moctezumana*, *neoporteri*, *pineti*, *pitilla*, *ruizi*, *subelongata*, *superbum*, *tarsalis*, *tetraleurodis*, *trialeurodis*, *tuxpan*, *unisetae* and *woolleyi*). Males were described for *E. guadeloupae* Viggiani and *E. variegata* Howard, and female for *E. titillata* Girault. Female and male of *E. perplexa* Huang & Polaszek and female of *E. guadeloupae* Viggiani were redescribed. Two new species-groups are proposed: *Encarsia albiscutellum* species-group, containing *E. alvaradoi*, *E. funiculata*, *E. mexicana* and *E. pinella*, and *Encarsia porteri* species-group, containing *E. neoporteri* and *E. porteri* (Mercet). The following ten new distribution records are given for Mexico based on our investigations: *E. bimaculata* Heraty & Polaszek, *E. citrella* (Howard), *E. coquilletti* Howard, *E. costaricensis* Evans & Angulo, *E. cubensis* Gahan, *E. dominicana* Evans, *E. guadeloupae* Viggiani, *E. inaron* (Walker), *E. pseudocitrella* Evans & Polaszek, and *E. titillata* Girault. In addition, new collection records for species already reported from Mexico were included. Descriptions and illustrations of all new species, diagnosis and illustrations of known species are given. Information on *Encarsia* species and their scientific names are given, according to the present state of the taxonomic knowledge. *E. tabacivora* Viggiani is removed from synonymy with *E. pergandiella* Howard. *E. polaszeki* (Myartseva & Coronado-Blanco), comb. n. is transferred from *Encarsiella* (genus synonymized with *Encarsia*); status of *E. narroi* Gómez & García is restored. A key to

available information on hosts and distribution for all species is given. List of reviewed literature contains 183 references. Figs 420. Photos 48.

RESUMEN

Svetlana N. Myartseva y Gregory A. Evans. 2007. "Avispas parasíticas de plagas y otros insectos. El género *Encarsia* Förster (Hymenoptera: Chalcidoidea: Aphelinidae) de México. Revisión, clave y descripción de especies nuevas". UAT. Cd. Victoria, Tam., México. 320 pp. 420 figuras + 48 imágenes.

El género *Encarsia* Förster es uno de los más diversos y de gran importancia económica en la familia Aphelinidae (Hymenoptera). Un gran número de especies han sido utilizadas en programas de control biológico clásico en todo el mundo contra plagas de las familias Aleyrodidae y Diaspididae. Algunas especies fueron introducidas a México para combatir mosquitas blancas y escamas en cítricos. En este trabajo se estudiaron y revisaron por primera vez las especies del género *Encarsia* Förster presentes en México. Un total de 88 especies son tratadas, incluyendo 47 especies nuevas. Doce especies fueron descritas previamente (*catemaco*, *citricola*, *colima*, *dmitrii*, *flaviceps*, *guajavae*, *mexicana*, *pinella*, *tapachula*, *terebrella*, *trilineata* y *tuxtla*), cuatro especies fueron descritas con otros autores (*clavata*, *polaszeki*, *tamaulipeca* y *verticina*), y 31 especies nuevas son descritas aquí por los autores de esta obra (*altacima*, *alvaradoi*, *antennata*, *azteca*, *elcielica*, *florena*, *funiculata*, *fursovi*, *gaonae*, *guamuchil*, *juanae*, *kasparyani*, *lacuma*, *leucaenae*, *llera*, *llerica*, *macula*, *mahoniae*, *moctezumana*, *neoporteri*, *pineti*, *pitilla*, *ruizi*, *subelongata*, *superbum*, *tarsalis*, *tetraleurodis*, *trialeurodis*, *tuxpan*, *unisetae* y *woolleyi*). Se describen los machos de *E. guadeloupae* Viggiani y de *E. variegata* Howard, y la hembra de *E. titillata* Girault. Se redescubren la hembra y el macho de *E. perplexa* Huang & Polaszek y la hembra de *E. guadeloupae*. Se proponen dos nuevos grupos de especies: el grupo de *Encarsia albiscutellum*, el cual contiene a *E. alvaradoi*, *E. funiculata*, *E. mexicana* y *E. pinella*, y el grupo de *Encarsia porteri*, el cual incluye a *E. neoporteri* y *E. porteri* (Mercet). Los siguientes 10 nuevos registros de distribución para México fueron obtenidos en nuestras investigaciones: *E. bimaculata* Heraty & Polaszek, *E. citrella* (Howard), *E. coquilletti* Howard, *E. costaricensis* Evans & Angulo, *E. cubensis* Gahan, *E. dominicana* Evans, *E. guadeloupae* Viggiani, *E.*

(Howard), *E. coquilletti* Howard, *E. costaricensis* Evans & Angulo, *E. cubensis* Gahan, *E. dominicana* Evans, *E. guadeloupae* Viggiani, *E. inaron* (Walker), *E. pseudocitrella* Evans & Polaszek y *E. titillata* Girault. Además, se incluyen los nuevos datos de distribución de afelinidos reportados previamente. Se elaboraron descripciones e ilustraciones de todas las nuevas especies así como las diagnosis de las especies ya conocidas. Se presenta información sobre las especies de *Encarsia* y sus nombres científicos, de acuerdo al estado actual del conocimiento taxonómico. *E. tabacivora* Viggiani es removida de la sinonimia con *E. pergandiella* Howard. *E. polaszeki* (Myartseva & Coronado-Blanco), comb. n. es transferida de *Encarsiella* a *Encarsia* (por ser su sinónimo actualmente); el estatus de *E. narroi* Gómez & García es restablecido. Se elaboró una clave para las hembras de *Encarsia* que ocurren en México y se anotó toda la información disponible sobre los hospederos y la distribución de todas las especies. La literatura revisada contiene 183 referencias. Figs 420. Fotografías 48.

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INTRODUCTION

The genus *Encarsia* Foerster contains more than 280 described species, making it the largest genus in the family Aphelinidae. These small and inconspicuous insects are most commonly known as primary parasitoids of whiteflies (Aleyrodidae) and armored scale insects (Diaspididae), but also parasitize hormaphidine aphids (Evans *et al.*, 1995). Males of certain species of *Encarsia* have also been reared from lepidopterous eggs (Polaszek, 1991) and soft scales (Coccidae). *Encarsia* species play an important role in biological control of scale insects and whiteflies throughout the world. *Encarsia* species have been used successfully in mitigating the damage of several different species of armored scale and whitefly hosts. *Encarsia aurantii* (Howard), *E. formosa* Gahan, *E. clypealis* (Silvestri) and *E. perplexa* Huang & Polaszek (historically misidentified as *E. opulenta*) have been successfully employed for biological control of sternorrhynchous pests on cultivated plants in Mexico (Clausen, 1978; Altieri & Nicholls, 1999).

Much attention is now being devoted to the study of the genus *Encarsia* in various countries throughout the world. During the past 20 years, reviews and revisions of *Encarsia* have been published: in Italy (Viggiani, 1986), India (Hayat, 1989), China (Huang & Polaszek, 1998), Egypt (Polaszek *et al.*, 1999), Russia (Yasnosh, 1989; Trjapitzin *et al.*, 1996), U.S.A. (Schauff *et al.*, 1996), Finland (Huldén, 1986), Israel (Rivnay & Gerling, 1987) and Australia (Schmidt *et al.*, 2001). Reviews and keys for *Encarsia* parasitoids of the whitefly pests *Bemisia tabaci* (Gennadius) and *Trialeurodes vaporariorum* (Westwood) have been published (Polaszek *et al.*, 1992; Evans & Polaszek, 1997; Schmidt *et al.*, 2001; Hernández-Suárez *et al.*, 2003) and a database of the world fauna (Heraty & Woolley, 2002; Noyes, 2002, 2006; Evans, 2007a) is now accessible via the Internet. *Encarsia* species have been studied both cytotaxonomically and from protein profiles, which represent potential tools for species and species-groups identification (Baldanza *et al.*, 2000; Heraty & Polaszek, 2000; Babcock *et al.*, 2001; Pedata & Polaszek, 2003; Polaszek *et al.*, 2004; Schmidt & Polaszek, 2007).

Studies of local faunas of *Encarsia* are of considerable interest to entomologists and biological control specialists for their role as natural enemies of pests, and their assimilation into an integrated pest management strategy. Success in biological control programs depends

on the correct identification of both the biological control agent and the pest species. However, despite their great importance, the fauna, taxonomy and biology of *Encarsia* in Mexico are insufficiently known and their identification is difficult. This work is an attempt to provide a taxonomic base for active research in Mexico on this large and economically important genus of Aphelinidae, to compose a key for identification of Mexican species and to provide a list of their host species and distribution in the world.

MATERIAL AND METHODS

This study was based at the campus of the Universidad Autónoma de Tamaulipas in Ciudad Victoria and includes *Encarsia* species collected and registered in 25 states of Mexican Republic (Fig. 1). Although this is the most extensive study of this genus that has been conducted in Mexico from October 1998 to May 2007, it undoubtedly represents only a fraction of the total number of species occurring in this ecologically diverse country. Many insects and host plants in several landscapes of many areas have not been studied. Our contribution is an attempt to understand the composition, host-relationships and geographical range of the Mexican fauna of the genus *Encarsia*.



Fig. 1. Mexican states where *Encarsia* species have been registered.

Specimens were collected using different methods, following to Noyes (1982). Collection with an active sweeping and passive sampling, using yellow pan traps and Malaise traps were used, but these methods usually yielded few specimens. The main method used to collect *Encarsia* specimens was rearing them from their hosts. This yields the most information about the habitat and biology of parasitoid and its hosts, and more specimens. Twigs and leaves of plants infested with whiteflies and scale insects were cut from trees, shrubs and grasses. Samples were transported to the laboratory and maintained in small emergence containers-glasses or vials. Emerged specimens were transferred to vials with 75% ethanol and refrigerated. Most of the specimens used in this study have been mounted for preserving on microscope slides in Canada balsam, following the method outlined by Noyes (1982) with some slight modifications. Where only single specimens of some species were reared and available for study, important morphological features, relative measurements and color were noted before the specimen was slide-mounted. The method called critical point drying, which allows aphelinids to be handled more easily, was not used in our work, because we preferred to save small specimens on slides. Terminology used in the description of species follows that of Hayat (1989, 1998).

Illustrations of the main structures in all new species include antennae of female and male, scutellum, venation of fore wing, middle tarsus and spur of middle tibia and ovipositor are drawn to the same scale. Mesoscutum refers to the midlobe and side lobes combined. Gaster refers to the metasoma without the petiole (first metasomal tergite). Measurements of structures refer to their maximum length and width. The fore wing was measured from basal point of submarginal vein to the wing apex; the length of the marginal fringe of fore and hind wings refers to its longest setae. The length of ovipositor was measured as the combined length of second valvifer and third valvula.

For study and measurement of morphological structures and later for identification of species were prepared hundreds of microscope slides with specimens in Canada balsam. For identification of *Encarsia* species have been used various published keys (Polaszek *et al.*, 1992; Schauff *et al.*, 1996; Evans & Polaszek, 1997, 1998; Huang & Polaszek, 1998; Hayat, 1989, 1998; Heraty & Polaszek, 2000; Schmidt *et al.*, 2001; Hernández-Suárez *et al.*, 2003; Myartseva, 2001; Myartseva & Coronado-Blanco, 2002, 2004) and original descriptions and redescrptions of similar species to compare with preliminary identified species. The names for species of Diaspididae and

Aleyrodidae in the host list are given according to Borchsenius (1966), Computer Database of the Scale Insects of the World (ScaleNet, 2006) and Evans Computer publications (2002, 2007), respectively. In all materials and host records has been used the name *Bemisia tabaci* (Gennadius) instead of *Bemisia tabaci*-complex and *B. argentifolii* Bellows & Perring, which are *B. tabaci* populations (De Barro *et al.*, 2005). The key provided is designed to be used for *Encarsia* specimens mounted on microscope slides, examined with a good quality compound microscope at magnifications of up to at least 400x. Males are not known in several species and they are very difficult to identify without accompanying females. Therefore, our key was designated only for females, but with descriptions of male structures in samples where males and females are present together. Complete descriptions of species and figures are given using Mexican materials, diagnosis are given using original descriptions and redescriptions of species.

Specimens collected in this study are preserved in the Entomological Museum of the University of Tamaulipas (UAT), Cd. Victoria, Tam., Mexico; the Florida State Collection of Arthropods (FSCA), Gainesville, Florida, USA; the U.S. National Museum of Natural History, Washington DC, U.S.A. (USNM); and the History Museum, London, UK (NHM). Holotypes of new species are deposited in the Entomological Museum of University of California, Riverside, U.S.A. (UCR), (as permanent loan from UAT); paratypes deposited in other museums are given in the species descriptions. The authors have examined the available types of species described from, or known to occur in Mexico, deposited in the U.S. National Museum of Natural History, Washington DC, U.S.A.

TERMS AND ABBREVIATIONS

Body refers to the composite head, thorax (or mesosoma – including propodeum, first abdominal segment) and gaster (or metasoma – excluding the petiole).

HEAD – has lateral pairs of compound eyes, composed of a large number of facets (=ommatidia), three ocelli: one anterior (=median) ocellus and two posterior (=lateral) ocelli, which typically arranged in a triangle dorsomedially between the eyes. In anterior view, the head composed of the clypeus (a median region above the mouth) and the

face (region above clypeus between the inner margins of the eyes and the anterior ocellus). The frontovertex is the top of the head behind the anterior ocellus and between the eyes combined with upper face above antennal scrobes. The distance between lower margin of eye and the mouth margin is the malar space, divided by one groove - the malar sulcus. The posterior surface of the head, occiput, has an opening, occipital foramen, through which the head is connected to the mesosoma. Mouth parts are composed of the labrum, paired mandibles and labiomaxillary complex. The mandibles usually are well developed and toothed apically.

Antennae are attached to the head through an opening in the head capsule – the toruli. The antenna consists of three parts: the scape, pedicel and flagellum. The flagellum usually is divided into flagellar segments composed funicle (part of flagellum between pedicel and club) and club (=clava). Normally the flagellum is filiform. Some or all segments of flagellum have ridge-like, linear longitudinal sensilla. In descriptions of antenna are used abbreviations:

R = radicle, S = scape, P = pedicel, F1-F6 = flagellar segments from first to sixth (funicle and club).

For identification are used usually measurements of height/width of head, width of frontovertex, ocellar triangle, length of eyes/malar space, distance between toruli, distance between posterior ocellus and eye margin, length/width of antennal segments.

MESOSOMA is composed of three thoracic parts: prothorax, mesothorax and metathorax. The most conspicuous anterior part of prothorax is pronotum. The mesothorax forms the largest part of the mesosoma and is divided into an anterior mesoscutum (differentiated into a midlobe, side lobes and paramedical sulci, the notauli) and posterior scutellar-axillar complex (differentiated into antero-lateral pair of axillae and a median scutellum). In lateral view, the mesothorax is composed of the subtriangular in shape prepectus (reduced and difficult to distinguish) and mesopleuron (obliquely subdivided by a mesopleural suture into two parts). Metathorax includes the metanotum and other small parts not used for taxonomy. The propodeum is connected with the metasoma and has lateral spiracles.

Wings are presented on the mesothorax and metathorax, the fore and hind wings, respectively. Anterior tickened margin of fore wing divided into veins – submarginal, marginal and stigma. The membranous region anterior to the submarginal vein is costal cell. Stigmal vein usually has the apex enlarged into uncus. Taxonomically

important measurements of veins are the number of basal group setae situated under the apical part of submarginal vein, setation of disc, length of marginal fringe, number of setae along anterior margin of marginal vein and rarely submarginal vein.

Each from three pairs of legs composed of six segments: coxa, trochanter, femur, tibia, tarsus and pretarsus. Each tarsus subdivided into 3-5 tarsal segments. Apex of tibia has a single tibial spur. For legs is used tarsal formula: the number of tarsi of the fore, middle and hind legs, i.e., 5-5-5 or 5-4-5.

METASOMA – consists of the petiole and seven tergites that together comprise the gaster. The ovipositor there consists of the second valvifers, third valvulae and the median stylets. The genitalia of males consist of the lobular phallobase surrounding the aedeagus and posteriorly the phallobase is differentiated into lateral parameres. The typical lanceolate aedeagus usually has lateral apodemes projecting anteriorly for muscle attachment.

ACRONYMS USED FOR TYPE DEPOSITORIES

- FAU** Department of Plant Protection, Fujian Agricultural University, Fujian, China.
- GAE** Personal collection of Gregory A. Evans (University of Florida, Gainesville, U.S.A.).
- IEUN** Instituto de Entomología Agraria, Università degli di Napoli, Portici, Italia.
- NHM** The Natural History Museum, London, UK.
- QMBA** Queensland Museum, Brisbane, Australia.
- UAT** Entomological Museum, Universidad Autónoma de Tamaulipas, Ciudad Victoria, Tamaulipas, México.
- UCR** University of California, Riverside, U.S.A.
- FSCA** University of Florida, Gainesville, U.S.A.
- UNAM** Department of Zoology, Institute of Biology, Universidad Nacional Autónoma de México, México City, México.
- UNLP** Universidad Nacional de La Plata, Argentina.
- USNM** U.S. National Museum of Natural History, Washington DC, U.S.A.
- ZIN** Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia.

THE STUDY OF MEXICAN *ENCARSIA* SPECIES

The genus *Encarsia* Foerster, as with other genera of Aphelinidae, has been poorly investigated in Mexico. Myartseva & Ruíz-Cancino (2000) included 30 *Encarsia* species reported in the literature from Mexico. In comparison, 51 species, including 17 new species, were reported from India (Hayat, 1989), and 76 species, including 29 new species, were reported from China (Huang & Polaszek, 1998). Eight *Encarsia* species were introduced to Mexico more than 50 years ago, most of these as natural enemies of the citrus blackfly, *Aleurocanthus woglumi* Ashby.

Very few faunistic and taxonomic studies have been conducted on the genus *Encarsia* and other aphelinids in Mexico. *Encarsia citrina* (Craw), a parasitoid of many species of Diaspididae, described in 1891 from California, U.S.A., was the first species in this genus recorded from Mexico. The North American chalcidologist L.O. Howard in 1894-1908 studied different groups of parasitoids in the U.S.A. and described 10 new species of *Encarsia* from the southern states that were later recorded from Mexico. Similarly, several species described from southern U.S.A., *Encarsia elongata*, *E. formosa*, *E. meritoria*, *E. perniciosi* and *E. protravena*, described by Dozier (1937), Gahan (1924, 1927), Tower (1913) and Viggiani (1985), respectively, were later found in Mexico.

Only five *Encarsia* species had been described from Mexico: *Encarsia townsendi* (Howard, 1907), *E. americana* (De Bach & Rose, 1981), *E. paracitrella* and *E. unicitrella* (Evans & Polaszek, 1997) and *E. pinella* (Myartseva, 2001). Of these, *E. americana* is known to occur in several countries from Brazil to California, U.S.A., while the other four species are known only from Mexico. Taxonomic and biological studies of *Encarsia* have increased in the U.S.A. and other countries in recent years due to their economic importance as biological control agents of aleyrodid and armoured scale insect pests. Evans & Polaszek (1997) described *E. lanceolata*, and Evans & Polaszek (1998) described *E. hamoni*, reared from the *Bemisia tabaci*-complex in the southern U.S.A., and also reported both species from Mexico. Most of the remaining described species known from Mexico were described from Southeast Asia or Central and South America, and later recorded from Mexico. Gómez & García (2000) described *E. narroi* reared from *Aleurodicus* sp. in Coahuila, Mexico. The following ten species are newly reported for Mexico, based on our

investigations: *E. bimaculata* Heraty & Polaszek, *E. citrella* (Howard), *E. coquillettii* Howard, *E. costaricensis* Evans & Angulo, *E. cubensis* Gahan, *E. dominicana* Evans, *E. guadeloupae* Viggiani, *E. inaron* (Walker), *E. pseudocitrella* Evans & Polaszek and *E. titillata* Girault.

Schauff *et al.* (1996) provided a pictorial guide to the North American species of *Encarsia* parasitic on whiteflies. Their key includes 27 species, of which 15 are listed as occurring in Mexico, and 5 are known from the Caribbean and Central America. The present study provides a starting point for further taxonomic studies on this important genus of natural enemies, and includes a key to the 86 species of *Encarsia* now known to occur in Mexico, of which 47 are new.

DISTRIBUTION PATTERNS OF MEXICAN *ENCARSIA* SPECIES

The genus *Encarsia* has cosmopolitan distribution. Zoogeographical distribution of species reared from the main group of hosts, Aleyrodidae, has been characterized by Evans (2007): from 175 known species, most are distributed in the Neotropical region (59), Oriental region (54) and Western Palearctic region (53); in the Nearctics 29 species were registered. In Mexico now occur 69 species (78% of the genus) as parasitoids of whiteflies.

The Mexican fauna of *Encarsia* represents a conglomeration of 88 species native to several different geographical regions. Seven species are cosmopolitan, most of them widely distributed throughout the world by ecdysis, i.e. with their hosts, which have become serious pests in many countries. For example, the hosts of *Encarsia aurantii* (Howard) and *E. citrina* (Craw) include *Aonidiella aurantii* (Maskell); those of *E. lounsburyi* (Berlese & Paoli) include *Chrysomphalus aonidum* (L.), and those of *E. perniciosi* (Tower) include *Aonidiella aurantii* and *Quadraspidotus perniciosus* (Comstock). *E. bimaculata* Heraty & Polaszek, *E. formosa* Gahan and *E. sophia* Girault & Dodd are parasitoids of widely-distributed pest whitefly species, in particular, *Bemisia tabaci* and *Trialeurodes vaporariorum*.

Seven species of Oriental origin have been introduced into Mexico; of these, five were introduced to combat the citrus blackfly, *Aleurocanthus woglumi* - *E. clypealis* (Silvestri), *E. divergens* (Silvestri), *E. merceti* Silvestri, *E. perplexa* Huang & Polaszek (introduced as *E. opulenta*), and *E. smithi* (Silvestri), and three species,

E. protransvena Viggiani, *E. inaron* (Walker) and *E. elongata* (Dozier) were unintentionally introduced with their hosts.

Eight species described from Central and South America - *Encarsia costaricensis* Evans & Angulo, *E. hispida* De Santis, *E. tabacivora* Viggiani, *E. citrella* (Howard), *E. hamoni* Evans & Polaszek, *E. meritoria* Gahan, *E. pseudocitrella* Evans & Polaszek and *E. variegata* Howard also occur in Mexico; two species, *E. hispida* and *E. tabacivora*, are widely distributed throughout the Neotropics.

Eight species described from the Caribbean - *E. cubensis* Gahan, *E. dominicana* Evans, *E. haitiensis* Dozier, *E. lanceolata* Evans & Polaszek, *E. nigricephala* Dozier, *E. noyesi* (Hayat), *E. portoricensis* Howard and *E. titillata* Girault, are found in Mexico. *Encarsia nigricephala* is widely distributed throughout the New World; the distribution of *E. cubensis*, *E. noyesi* and *E. lanceolata* extends northward into the southern USA.

Four species described from the Nearctic region are found in Mexico: *E. coquilletti* Howard, *E. luteola* Howard, *E. pergandiella* Howard and *E. quaintancei* Howard; the latter three species are widely distributed throughout the Neotropics.

Currently, 51 species are known only from Mexico: *E. narroi* Gómez & García, *E. paracitrella* Evans & Polaszek, *E. townsendi* Howard and *E. unicitrella* Evans & Polaszek, plus 47 species described by the authors of this book.

As shows the analysis of the geographical distribution, from the 88 species that comprise the Mexican fauna of *Encarsia*, 16 species are cosmopolitan and/or introduced species and 8, 8 and 5 species were described from the Caribbean, Central/South America, and Nearctic, respectively, and most of them have distribution throughout the New World. Fifty-one species are known only from Mexico. Thus, fauna of *Encarsia* species in Mexico can be characterized geographically as typical New World fauna, and in the zoogeographical aspect, according to the predominance of species with southern distribution, as Neotropical fauna (81.8%). However, the actual geographical range of some of these species may be extended with further study of this genus in the New World.

ECONOMICAL IMPORTANCE OF *ENCARSIA*

Many parasitoids used successfully in biological control belong to the family Aphelinidae. They are valuable to agriculture as biological

control agents, including *Encarsia* as the genus with major importance (Van Driesche & Bellows, 1996). *Encarsia* species are economically important for the biological control of whitefly and armored scale insects pests. *Encarsia formosa* Gahan is the best known species in the history of biological control of whiteflies *Trialeurodes vaporariorum* (Westwood) and *Bemisia tabaci* (Gennadius), which have an enormous host range. This aphelinid species, possibly originated in the New World (Polaszek *et al.*, 1992), currently is worldwide distributed for commercial biological control of whiteflies in greenhouse crops, principally in European countries (Parrella *et al.*, 1999). There are innumerable publications on biology and use of *Encarsia formosa* in biological control of these whiteflies in many countries of the World, including Mexico. Several insect-rearing firms now supply *Encarsia formosa* to growers for augmentative releases in glasshouses. *E. formosa* was introduced into Mexico in 1992-1993 (Hennessey *et al.*, 1995; Arredondo-Bernal, 1999) and currently is known to occur in the states of Baja California, Guerrero, Jalisco, D.F. and Tamaulipas. In our opinion, *E. formosa* was already present in Mexico, or possibly entered the country through ecesis, i.e., with its hosts.

Many other introduced species of *Encarsia* have also successful activity in the biocontrol of insect pests in Mexico. Eight species of *Encarsia* were introduced into Mexico during the last 60 years against diaspidids and aleyrodids, generally on citrus (Myartseva & Ruíz-Cancino, 2000). The whitefly of Oriental origin *Aleurocanthus woglumi* Ashby, or citrus blackfly, spread worldwide via introductions. It was discovered in Mexico in 1935 in the State of Sinaloa as a citrus pest. Several hymenopteran parasitoid species were introduced to Mexico in 1949-1950 from tropical and subtropical Asia for biological control of this pest. Most of these species belong to the genus *Encarsia* Förster: *E. divergens* (Silvestri, 1926), *E. merceti* Silvestri, 1926, *E. smithi* (Silvestri, 1926), *E. opulenta* (Silvestri, 1927) and *E. chypealis* (Silvestri, 1927). Numerous publications contain information on introduction of *Encarsia* species to Mexico. But there are no recent publications concerning the rearing of many introduced species, and only *E. perplexa* (as *opulenta*) was recorded reliably as an effective parasitoid of *Aleurocanthus woglumi* (Myartseva & Ruíz-Cancino, 2000). It has been clarified recently (Huang & Polaszek, 1998; Noyes, 2002) that the species of *Encarsia* introduced to Mexico as *E. opulenta* Silvestri, is actually *Encarsia perplexa* Huang & Polaszek. Plausible evidence on introductions of *E. perplexa* is also known from the Dominican Republic (Evans & Serra, 2002), Hawaii, Guatemala (Heu

& Nagamine, 2001), and Trinidad and Tobago (Hoy, 2002). Known hosts of *E. perplexa* are *Aleurocanthus woglumi*, *Aleuroplatus pectiniferus* and *Aleurotuberculatus kuwanai*. *E. perplexa* is known as widely distributed natural enemy of *A. woglumi*.

Judging by the examination of several samples reared from the citrus blackfly and according to published data, currently *E. perplexa* is widely distributed in Mexico and in other countries of the New World too. The transferring of this parasitoid from one citrus orchard to another for biological control of the citrus blackfly is frequently applied in Mexico; however no published evidences of these transferences exist.

E. perplexa now is a common parasitoid of the citrus blackfly throughout Mexico: in the states of Colima, Morelos, Jalisco, San Luis Potosí, Sinaloa, Nuevo León, Veracruz, Tamaulipas. Our materials confirm also that the release of *E. perplexa* in Mexico was successful. Altieri and Nicholls (1999) referred results of this introduction to successes of classical biological control in Latin America.

Encarsia clypealis is distributed in India, Pakistan, Vietnam, Indochina, Malaysia, Philippines; it was introduced to Mexico, U.S.A. (Florida, Texas) and Guam (Hayat, 1998; Noyes, 2002). Known hosts of *E. clypealis* are *Aleurocanthus incertus*, *A. spiniferus*, *A. spinosus* and *A. woglumi*. *E. clypealis* is used for biological control of *A. spiniferus* and *A. woglumi*. In 1974, field-collected and laboratory-reared cultures of *E. clypealis* together with *E. perplexa* were introduced from Mexico to Texas (Hart, 1978). Evaluations undertaken from 1977-1982 indicated a widespread distribution of *E. perplexa* and no *E. clypealis* (Summy *et al.*, 1983). Later in southern Texas, *E. perplexa* was periodically released throughout the citrus growing region to increase biological control efficacy in commercial citrus groves (Meagher & French, 2004).

The senior author collected thousands parasitoids of the citrus blackfly in the states of Tamaulipas, Sinaloa and Nuevo León and in Texas, U.S.A., in 1998-2004 (Myartseva & Luna-Salas, 2005). Based on taxonomic examination of prepared slides, species were determined as *E. perplexa* and *E. sp. aff. clypealis*. The latter proved to be a new species, which was described as *Encarsia colima* (Myartseva, 2005). By our opinion, it is possible to suppose that the *Encarsia* species known from Mexico as *E. clypealis* (Silvestri) is, actually, *E. colima* Myartseva. The native area of *E. colima* is, perhaps, the Oriental region, from which the species was introduced to Mexico as *E. clypealis*, together with *E. perplexa* Huang & Polaszek, introduced as

E. opulenta Silvestri. Unfortunately, it was impossible to find and examine original primary samples of parasitoid species which were introduced to Mexico more than 50 years ago.

Encarsia smithi was introduced to Mexico to the states of Colima, Jalisco, Morelos, San Luis Potosí and Sinaloa, together with other species, also for biological control of the citrus blackfly. According to known data, this species was superseded by *E. clypealis* and *E. opulenta* (Clausen *et al.*, 1978). According to published information, till present, *E. smithi* has been not reared from citrus blackfly in Mexico. But in 2006 in the state of Colima, the senior author reared females and males of *E. smithi* from *Aleurocanthus woglumi* on *Citrus aurantifolia*. It was the first true confirmation of the successful establishment of this parasitoid in Mexico. The rearings of two other introduced species in Mexico, *Encarsia divergens* and *E. merceti*, also till present are not known. We suppose that they could establish in Mexico also. But because there were not undertaken special investigations of establishment and evaluations of introduced species, therefore presents possibility to find both species in Mexico, as in case with *E. smithi*.

Encarsia dominicana Evans (as *E. brasiliensis*) was introduced to Mexico for biological control of the woolly whitefly, *Aleurothrixus floccosus* (Maskell) in the 1950's. Till present was absent published information about rearing of this species from woolly whitefly in Mexico. In January 2007 in the state of Veracruz, the senior author reared series of females of *E. dominicana* from *Aleurothrixus floccosus*. It is the first true confirmation of the successful establishment of introduced species *E. dominicana* in Mexico, which becomes here a natural biological control agent of woolly whitefly.

Encarsia inaron (Walker) was not recorded in the New World prior to the invasion of pomegranate, or ash whitefly *Siphoninus phillyreae* (Haliday). This whitefly is an Old World species that now occurs in most geographical regions of the world. It was accidentally introduced into the Western Hemisphere about twenty-five years ago (Bellows *et al.*, 1990). In California, U.S.A., where it was first discovered in 1988, *S. phillyreae* caused severe damage to citrus and peas (Bellows *et al.*, 1990, 1992). In Venezuela, where it was first discovered in 1994, *S. phillyreae* caused damage to pomegranates (Arnal *et al.*, 1994). In Argentina it was found also (Viscarret & Botto, 1997). Throughout its geographical range, *S. phillyreae* is attacked by various natural enemies. The major and widely distributed parasitoid of ash whitefly is *Encarsia inaron* (Walker). This species is almost worldwide in

distribution and attacks many whitefly species. In the U.S.A., *E. inaron* is known as an introduced species for biological control programs of several whitefly pests, including *Bemisia tabaci* and *Siphoninus phillyreae* (Polaszek *et al.*, 1992; Gould *et al.*, 1992). *Encarsia inaron* was introduced into California from Italy and Israel, and released into urban communities (Bellows *et al.*, 1992). The parasitoid was very successful in reducing the whitefly population there to almost undetectable levels.

A previously unrecorded whitefly, *Siphoninus phillyreae* was collected in Mexico in 2005-2006 in the state of Tamaulipas on leaves of *Punica granatum* and *Fraxinus* spp. From pupae of whitefly were reared many females and males of *Encarsia inaron*. It is very likely that *Siphoninus phillyreae* entered northeastern Mexico from southern U.S.A., but an accidental self-introduction from the Old World is also possible. The aphelinid *Encarsia inaron* was apparently introduced together with its host. Both are newly recorded in Mexico. Observations of trees *Fraxinus* spp. and *Punica granatum* in Ciudad Victoria, Tamaulipas, in March-April 2007 showed that *Encarsia inaron* provided remarkable control, because were found many parasitized nymphs in all populations of whitefly.

Encarsia noyesi has been used in the classical biological control of *Aleurodicus cocois* (Curtis) in Central America (Cock, 1985). An undescribed species of *Encarsia* species-group was introduced into Nevis (Caribbean Islands) for biological control of whitefly *Aleurodicus pulvinatus* (Maskell), a serious pest of coconuts and many ornamental plants in the Caribbean, and appears to have become established (Kairo *et al.*, 2001). Currently, *Encarsia noyesi* has been studied as potential biological control agent of *Aleurodicus dugesii* (Cockerell) in ornamental plants in California (Dreistadt *et al.*, 2001). In Mexico, *A. dugesii* is known to exist in the states of Tamaulipas, San Luis Potosí, Guanajuato and Yucatán. *Aleurodicus pulvinatus* and *A. maritimus* Hempel also are found on several fruits and ornamentals in Mexico (García-Martell, 1977; Myartseva & Coronado-Blanco, 2004).

Two *Encarsia* species were introduced to Mexico for biological control of armored scale insects: *E. aurantii* (Howard) to combat the Florida red scale *Chrysomphalus aonidum* (L.), and *E. perniciosi* (Tower) against California red scale *Aonidiella aurantii* (Maskell) (García-Martell, 1973). *Chrysomphalus aonidum* has been recorded as a serious pest of citrus in southern states of U.S.A. and in Mexico, in recent years it was damaging bananas in Central America and coconut

palm in the Philippines. *Aonidiella aurantii* was the most important pest of citrus in most citrus-growing areas of the world (Rosen & De Bach, 1978). Introduction of *Encarsia* species for biological control of both diaspidid species to Mexico was successful. Nearly cosmopolitan *Encarsia aurantii* has very long record of hosts in the world. It was introduced to California and successfully controlled obscure scale *Melanaspis obscura* (Comstock) on oaks (Ehler, 2005) and other diaspidids. In Mexico, *E. aurantii* parasitize Florida red scale and California red scale. *Encarsia perniciosi* is also a worldwide distributed species. In Mexico, *E. perniciosi* was reared from San José scale *Diaspidiotus* (= *Quadraspidotus*) *perniciosus* (Comstock) (Perales *et al.*, 1990). This parasitoid was introduced also into many countries for biological control of *D. perniciosus* (Noyes, 2002).

Encarsia citrina is a parasitoid of many serious scale insect pests of citrus and fruit trees, such as *Aonidiella aurantii*, *Chrysomphalus aonidum*, *Aspidiotus destructor*, *Parlatoria oleae* and *Unaspis citri*. It was introduced into many countries against these pests. In 2004, *E. citrina* was reared in Sinaloa from vanda orchid scale *Genaparlatoria* (= *Parlatoria*) *pseudaspidotus* (Lindinger). This armored scale is widely distributed in the Oriental region, European greenhouses and introduced to U.S.A. In Mexico it is new pest of mango and also new host for *E. citrina* (Myartseva & González-Hernández, in press).

SYSTEMATIC POSITION OF GENUS *ENCARSIA* FÖRSTER IN THE FAMILY APHELINIDAE

The family Aphelinidae belongs to the superfamily Chalcidoidea in the Order Hymenoptera. This superfamily is one of the most abundant and biologically diversified groups of insects, which represents a significant part of the biological diversity, with most species playing a major role in biological and natural control of terrestrial insects. Aphelinidae contains about 1170 species in 33 genera (Noyes, 2006); about 140 described species are known from the Nearctic region (Woolley, 1997), 72 species have been recorded for Argentina (De Santis, 1998), 74 species are known to occur in Mexico (Myartseva & Ruíz-Cancino, 2000).

The family Aphelinidae is more closely related to the Encyrtidae and Signiphoridae than to any other group of Chalcidoidea (Rosen & De Bach, 1979). Morphologically, the Aphelinidae show affinity to the Encyrtidae and also Eulophidae. They resemble the former in the

structure of the mesonotum (parapsidal grooves complete, axillae advanced into the shape of the mesopleura) and in the small number of antennal segments, and the latter in the shape of the mesopleura, in the saltatorial midtibial spur and in the presence of a well developed strigil on the fore leg. Biologically, their hosts range resembles that of the Encyrtidae.

Aphelinidae is currently divided into five-seven subfamilies (Hanson, 1995; Hayat, 1998; Noyes, 2006). The majority of aphelinids species belong to the Aphelininae (about 300 species) and Coccophaginae (about 700 species) (Noyes, 2006). The genus *Encarsia* is one of the six genera of tribe Pteroptricini in the subfamily Coccophaginae. Short morphological characteristics of the family Aphelinidae, subfamily Coccophaginae and tribe Pteroptricini are given below, based on generalized data of Hayat (1998).

DIAGNOSIS AND BIOLOGY OF THE FAMILY APHELINIDAE

DIAGNOSIS. The aphelinids are recognized by the following combination of characters: female antenna 3-9-segmented, excluding the radicle and anellus; number of club segments varies from 0 to 4; mandible with three teeth or two teeth and truncation; notaular lines of mesoscutum straight, complete and widely separated; tarsal formula 5-5-5 or 5-4-5 or 4-4-4; fore tibia with curved, cleft spur; fore wing with marginal vein long, stigma vein short, postmarginal vein generally absent or short; petiole transverse or broad; gaster with seven tergites; cerci usually plate-like; third valvula separated and articulated with second valvifer; male similar to female, largely confined to the antennal structure and genitalia.

BIOLOGY. Most of the Aphelinidae are primary parasitoids or hyperparasitoids of Hemiptera Sternorrhyncha, particularly Aleyrodoidea, Coccoidea and Aphidoidea; some species in several genera are known to attack the eggs of insects in various orders (Polaszek, 1991). Reproduction of most species is biparental. Mated females normally lay diploid eggs in or on the host body, and these develop into females. The unmated females lay haploid eggs, which develop into males. Mated females can also lay haploid eggs, and these develop into males. The reproduction can also be uniparental. In this case, the unmated female normally produced diploid eggs, and very

rarely also haploid eggs. The eggs of aphelinids have different form, often stalked (Fig. 2).

Eggs of endoparasitoids usually elongate-oval, slightly curved, widely rounded anteriorly and narrowed posteriorly. Eggs of ectoparasitoids oval, stalked posteriorly; with this stalk egg is fixed on the body of larvae. Size of eggs very small: in *Encarsia inaron* – 0.13x0.04 mm, in *E. citrina* – 0.08x0.02 mm (Silvestri, 1915).

Emerged from eggs, the larvae in their development have three larval instars, which tend to be homogeneous in shape and structure. However, the first instar shows a major morphological plasticity. A common type of first instar larva, ectophagous, primary or secondary, and sometimes endophagous, is hymenopteriform and provided with four pairs of respiratory spiracles.

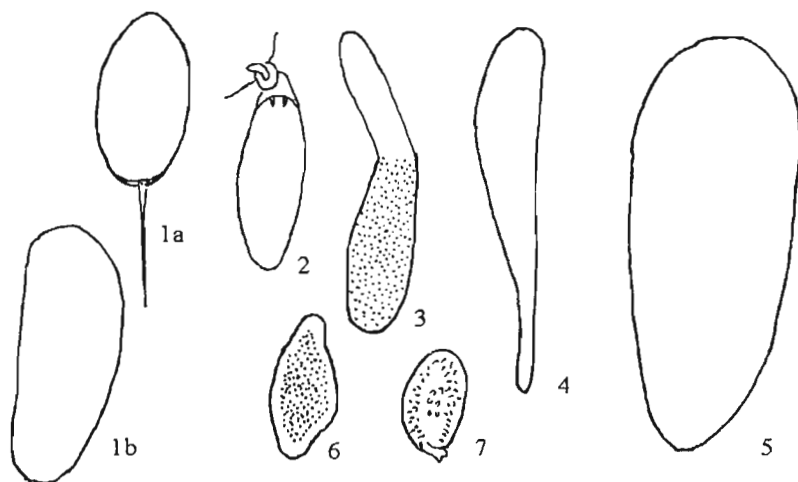


Fig. 2. Eggs of Aphelinidae: 1 – *Coccophagus bivittatus* Compere, unfertilized (a) and fertilized (b) (from Zinna, 1961); 2 – *Coccophagus lycimnia* (Walker) (from Nikolskaya & Yasnosh, 1966); 3 – *Marietta picta* (André); 4 – *Encarsia berlesei* (Howard) (from Silvestri, 1915); 5 – *Encarsia inaron* (Walker) (from Silvestri, 1915); 6 – *Casca parvipennis* Gahan (from Taylor, 1935); 7 – *Aphytis* sp. (from Taylor, 1935).

A second type of first instar larva normally belongs to the primary endophagous species. It is characterized by a more elongate body and is sometimes long-tailed, without respiratory spiracles (Viggiani, 1984). The second or intermediate instar is rather similar to the subsequent instar, but in endophagous species it shows reduction of the mandibles and of the respiratory system. The third and final instar is very uniform and similar to that of other allied families of Chalcidoidea (Fig. 3).

Normally, the respiratory system is provided with 8-9 pairs of spiracles or only 4-5 pairs in some genera. The first instar larvae of the males of some *Encarsia* are endophagous, whereas the subsequent instars become ectophagous on the same host (Viggiani, 1984). Pupation may take inside or outside the host. Parasitoids emerge by cutting a hole through the integument of the host mummy and such species lack functional mandibles (Viggiani, 1984). Aphelinids commonly overwinter in various preimaginal stages. Overwintering is normally as a mature larva or pupa. Emerged adults feed on honeydew exuded by their hosts and on secretions issuing from the wound caused during oviposition.

Females attack different instars of hosts. Several species oviposit directly on or into the host, in which their larvae develop, but when they oviposit in younger hosts, the parasitoids continue to develop in the next instar of host (Viggiani, 1984). *Encarsia formosa* prefers to parasitize the third and fourth instars of host, whereas *E. pergandiella* the second and third instar nymphs. Species that develop in relatively small hosts have small body and narrow fore wings with long marginal fringe (for example, *Encarsia citrina*, *E. pergandiella*). Number of generations per year and longevity of development of each generation depend on temperature and humidity. *Encarsia formosa* can develop 12 generations during one year in optimal laboratory conditions. *E. smithi* has one generation on each generation of *Aleurocanthus woglumi*, therefore in Japan this species has 4 generations and on tropical Molucca – 6 generations per year as its host (Nikolskaya & Yasnosh, 1966).

Parasitism by the aphelinids can be characterized by follows: homotrophic – female and male both are primary ecto-endoparasitoids in the same host; ditrophic – female is primary endoparasitoid, male is primary ectoparasitoid on the same host; heterotrophic – female and male both either primary or secondary parasitoids, but male develops in a host different from that of the female; adelphotrophic

(autotrophic) – as in heterotrophic mode except the male develops on the female of its own species.

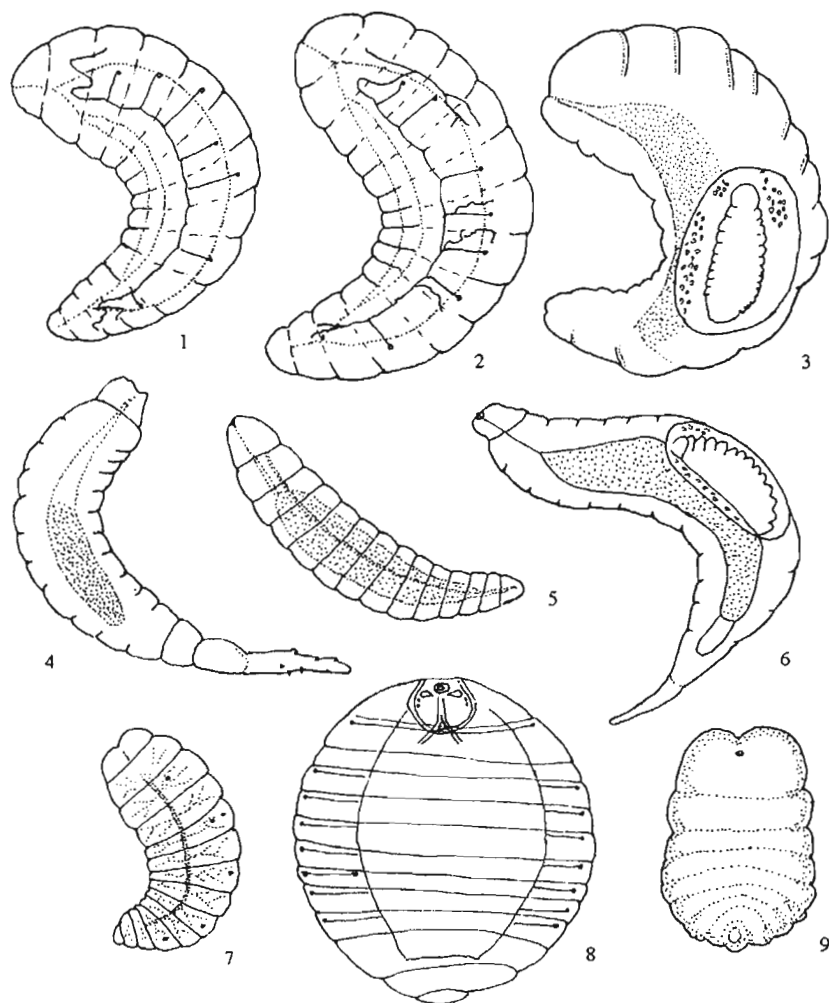


Fig. 3. Larvae of Aphelinidae: 1 – *Encarsia arabica* Hayat, male; 2 – *E. arabica*, female (from Pedata & Polaszek, 2003); 3 – *E. perniciosi* (Tower), prepupa of female with prepupa of male in capsule (from Chumakova & Goryunova, 1963); 4 – *E. citrina* (Craw) (from Bénassy, 1956); 5 – *Coccophagus bivittatus*, female (from Zinna, 1961); 6 – *Encarsia perniciosi*, larva of female with larva of male in capsule (from Chumakova & Goryunova, 1963); 7 – *Coccophagus bivittatus*, male (from Zinna, 1961); 8 – *Aphytis mytilaspidis* Le Baron (from Imms, 1916); 9 – *Eretmocerus serius* Silvestri (from Clausen & Berry, 1932).

Subfamily Coccophaginae Förster

This subfamily contains four tribes and thirteen genera, from them, six genera belong to the tribe Pteroptricini.

Diagnosis. Basic number of antennal segments 8, with reduction or addition in some genera; head with pale lines and sutures/grooves; prepectus a single continuous plate, ventrally longer and separated from mesosternum by a groove or suture; fore wing generally without linea calva; male genitalia without digiti or without denticulate digiti, parameras absent.

Tribe Pteroptricini Ashmead

Diagnosis. Pronotum medially membranous, thus made up of two plates; axillae elongate, sub-rectangular, strongly projecting forwards; inter-axillar distance usually greater than length of an axilla; each axilla usually with one seta, rarely two; scutellum biconvex-lens shaped, more than 1.5x as wide as long and usually with four setae, rarely six; parasitoids of Diaspididae and Aleyrodidae.

GENUS *ENCARSIA* FÖRSTER

Encarsia Förster, 1878: 65-66. Type species: *Encarsia tricolor* Förster, by original designation and monotypy.

Aspidiotiphagus Howard, 1894a: 229. Type species: *Coccophagus citrinus* Craw, by original designation. Synonymy by Viggiani & Mazzone, 1979: 44.

Prospalta Howard, 1894b: 6. Type species: *Coccophagus aurantii* Howard, by designation of the ICZN under its Plenary Powers, Opinion 845, 1968: 12-13. Preoccupied by *Prospalta* Walker, 1857 in Lepidoptera.

Prospaltella Ashmead, 1904: 126. Replacement name for *Prospalta* Howard. Synonymy by Viggiani & Mazzone, 1979: 44.

Mimatomus Cockerell, 1911: 464. Type species: *Mimatomus peltatus* Cockerell, by monotypy. Synonymy with *Prospaltella* by Girault, 1917: 114.

Doloresia Mercet, 1912: 294-296. Type species *Prospaltella filicornis* Mercet, by original designation. Synonymy by Mercet, 1930a: 191.

Prospaltoides Brèthes, 1914: 12. Type species *Prospaltoides howardi* Brèthes, by original designation. Synonymy with *Aspidiotiphagus* by Brèthes, 1916: 429.

Aspidiotiphagus (*Paraspidiotiphagus*) Alam, 1956: 359. Type species *Aspidiotiphagus flavus* Compere, by original designation. Synonymy by Viggiani & Mazzone, 1979: 44 (subgenus not mentioned, but synonymy implied by synonymy of *Aspidiotiphagus* with *Encarsia*).

Aleurodiphilus De Bach & Rose, 1981: 659. Type species: *Aleurodiphilus americanus* De Bach & Rose, by original designation. Synonymy by Hayat, 1983: 85.

Encarsiella Hayat, 1983: 85. Type species: *Encarsiella noyesi* Hayat, by original designation. Synonymy by Shafee & Rizvi, 1984: 379, Syn.rev. Synonymy by Schmidt & Polaszek, 2007: 81.

MORPHOLOGICAL DIAGNOSIS

COLORATION. Variable from completely pale to partly brown and (particularly males) completely brown to dark brown or black; pale colors in life often yellow, rarely pearlish-bluish-white, but range from very pale yellow to dark yellow and orange (Fig. 4). Color of gaster can vary in some species in different populations and by different conditions (Fig. 5). Fore wings hyaline or infusate behind marginal vein, very rarely with two cross bands. The males generally darker than the females.

STRUCTURE (Fig. 6).

HEAD. In frontal view usually wider than long. Frontovortex usually wider than long, with an oblique bars behind posterior ocelli. Ocellar triangle with apical angle 90° or more. Malar space with a sulcus. Eyes bare or setose. Mandibles with three teeth or two teeth and a truncation, either sharp or blunt. Maxillary palp one-, rarely two-segmented. Labial palp one-segmented. Mouth fossa less than 0.5x frontovortex width, rarely wider than that.

Antennae. Female antenna (excluding radicle and anellus) with eight segments, apical two, three or four segments forming a distinct club, sometimes club not defined. Club is usually apically rounded and not distinctly spindle-shaped. In some species (*E. noyesi* species group) suture between fifth and sixth segments at least slightly oblique, and

apical segment with sensory area, either conically shaped or obliquely truncate.

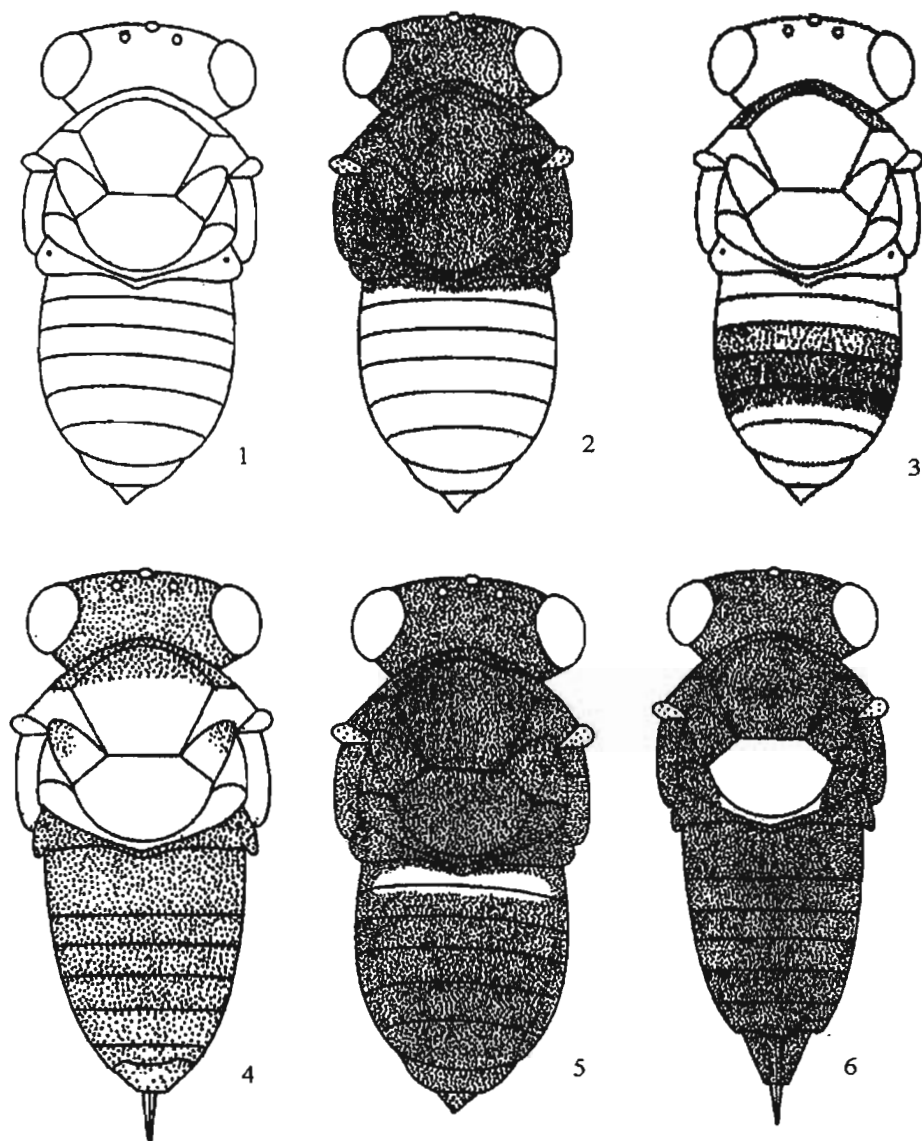


Fig. 4. Coloration of *Encarsia* species: 1 – *americana*, 2 – *inaron*, 3 – *citrella*, 4 – *portoricensis*, 5 – *coquilletti*, 6 – *clypealis*.

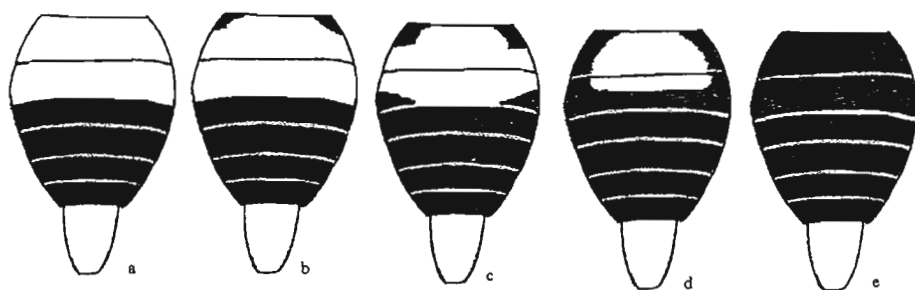


Fig. 5 (a-e). Variability of gaster coloration of *Encarsia perplexa*.

Anellus usually small and often indistinct. Scape cylindrical or slightly flattened, but never expanded beneath. Relative dimensions of pedicel and flagellar segments vary much, and these are useful as key characters. Flagellar segments bear longitudinal sensilla, more in males than in females. Male antenna eight- or often seven-segmented, two apical segments often fused, rarely first two-three flagellar segments enlarged, fused and with sensory area.

MESOSOMA. Pronotum medially with membranous incision. Midlobe of mesoscutum with 0-28, usually 2-12 setae, very rarely with more (up to about 100) setae, these often arranged in bilateral symmetry, in particular if midlobe with small or moderate number of setae. Each side lobe with 1-5, usually 2-3 setae. Axillae small to large, longer than wide. Scutellum wider than long and usually with more or less distinct median furrow or longitudinal sculpture, anterior and posterior margins convex, with two pairs of long setae and one pair of placoid sensilla, which very closely spaced or separated by a distance more than width of one sensillum. Metanotum as a narrow transverse strip; propodeum narrow in the middle, not much longer than metanotum and expanded on sides with a spiracle. Mesopleura not strongly bulged and with a distinct suture dividing it into a mesepisternum and a mesepimeron.

Wings. Fore wing with distinct marginal fringe of very variable length from about one-tenth up to distinctly longer than maximal width of the disc. Submarginal vein usually shorter than marginal vein, normally with two setae, rarely with only one or more (5-6) setae.

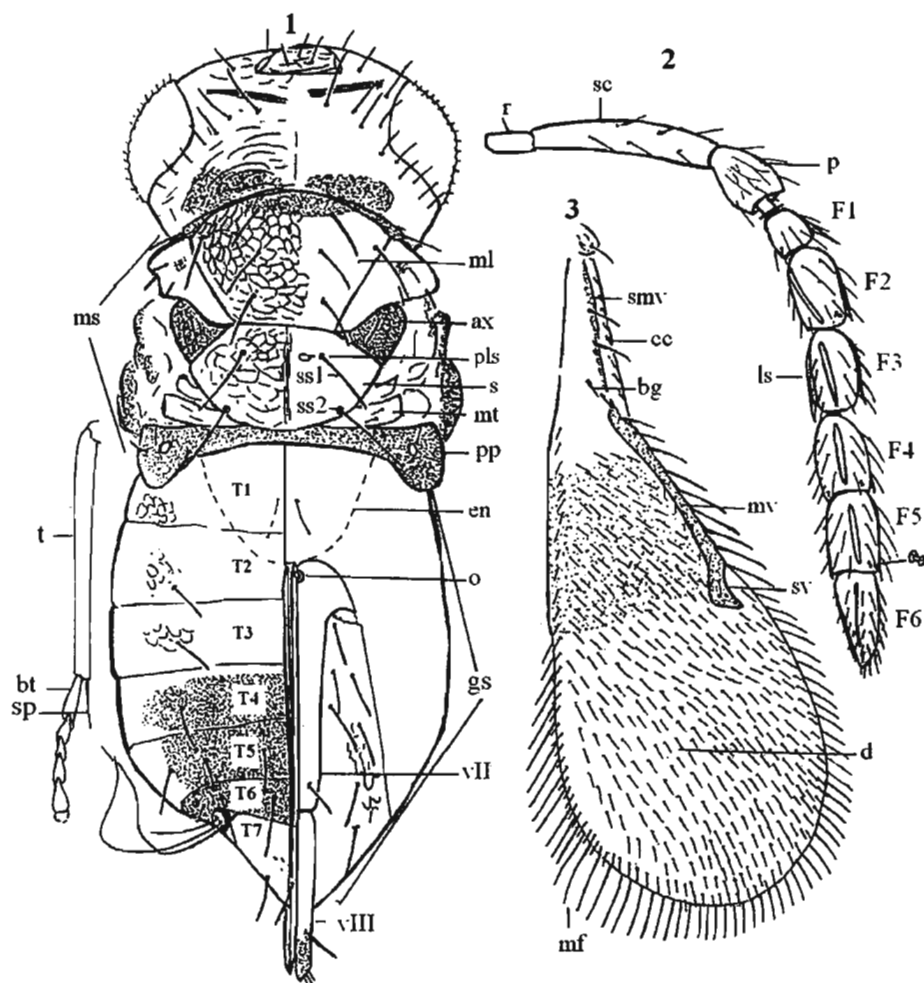


Fig. 6. Morphological structures of *Encarsia*, female. 1. **Habitus**, ms – mesosoma, divided medially with surface sculpture shown on left side: ml – midlobe of mesoscutum, ax – axilla, pls – placoid sensilla, s – scutellum, ss1 – anterior scutellar setae, ss2 – posterior scutellar setae, mt – metanotum, pp – propodeum, t – middle tibia, bt – basitarsus, sp – midtibial spur; gs – gaster, divided medially with dorsal side shown on left side and venter on right, T1-T7 – gastral tergites, en – endophragma, o – ovipositor, vII – second valvifer, vIII – third valvula. 2. **Antenna**, r – radicle, sc – scape, p – pedicel, F1-F6 – flagellar segments. 3. **Fore wing**, smv – submarginal vein, cc – costal cell, bg – basal group setae, mv – marginal vein, sv – stigmal vein, d – disc, mf – marginal fringe.

Anterior margin of marginal vein with a variable number of setae (often 6-8). Stigmal vein very short, always less than one-quarter of the length of the marginal vein, often with a distinct constriction, distinctly angled with marginal vein, sometimes without constriction and hardly angled with marginal vein, often inconspicuous anteriorly and apically, with four sensilla. Postmarginal vein absent. Fore wing disc sparsely to densely setose, in some species with bare or sparsely setose area near anterior margin proximal of stigmal vein. Linea calva absent. Group of basal cell setae variable, usually with less than ten setae, rarely without setae or with a larger number of setae (up to about twenty-eight). Hind wing narrow, with sparsely setose disc and a row of setae extending to apex of wing; marginal fringe usually at least as long as wing width.

Legs. Legs normal, tarsal formula 5-5-5 or 5-4-5. Basitarsus of middle and hind legs sometimes ventrally with stout, peg-like setae. Midtibial spur length varies from less than 0.5x of basitarsus length to as long as basitarsus, sometimes slightly longer.

Gaster (= metasoma without petiole) with seven tergites; length of seventh tergite very variable, ranging from distinctly wider than long to longer than wide; apex of seventh tergite always membranous and pale/translucent; first tergite usually without setae, second-fourth tergites usually with 1-5 setae on each side, fifth-sixth tergites usually each with two setae on each side (occasionally more) and seventh with four setae (occasionally six). Ovipositor exerted or not exerted at apex; relative lengths of third valvula and second valvifer variable. Male genitalia usually with the phallobase several times as long as wide, with a truncate or rounded apex and without digiti; aedeagus longer than phallobase.

The genus *Encarsia* is related to *Coccophagus* Westwood and *Dirphys* Howard. *Encarsia* can be separated from *Coccophagus* best by the latter having a minimum of six (and often more) setae on the scutellum (four in *Encarsia*). *Dirphys* can be separated from *Encarsia* by the apparent division of the mesoscutal side lobe (entire in *Encarsia*), but this character requires re-examination and re-evaluation (Polaszek & Hayat, 1992).

For identification of *Encarsia* species are using as most important morphological characters the tarsal formula, setation of wing disc and venae, dimensions of antennal segments, number of setae on midlobe of mesoscutum, distance between scutellar placoid sensilla and between scutellar long setae, ratios of length of ovipositor to length of

middle tibia, dimensions of lengths of third valvula and second valvifer, setation of gastral tergites, body coloration.

HOST-PARASITOID RELATIONSHIPS

Among the Chalcidoidea, Aphelinidae is rivaled only by Encyrtidae in the number of species that have been used effectively as biological control agents (Greathead, 1986; Altieri & Nicholls, 1999), but they comprise by far, the largest group of whitefly and armored scale parasitoids. *Encarsia* species are some of the most effective parasitoids of Aleyrodidae and Diaspididae and have often been used in biological control and integrated pest management programs. Their usefulness in biological control is largely due to a high degree of host specificity, at least at family level. To understand the importance of a species as a biological control agent, we need to identify the host-parasitoid complexes in natural and agricultural ecosystems, study their interspecific interactions and to establish host specificity. Many *Encarsia* species have a relatively wide host range, while that of other species is much more restricted. For example, *E. americana* has been reared only from *Aleurothrixus floccosus* (Maskell) throughout its wide geographic range (from Brazil to California). Although some records exist of the same *Encarsia* species parasitizing both whitefly and armored scale hosts, we suspect that many, if not all of these reports, are based upon the erroneous identification of the parasitoid species, or that the original sample contained both whitefly and armored scale insects. It is our experience that female *Encarsia* are reared from either whitefly or armored scales, but not both; however we have reared males of the same species of *Encarsia* from whiteflies, armored scales and/or soft scales (Coccidae). Males of most *Encarsia* species develop as hyperparasitoids on individuals of their own, or other parasitoid species (Williams & Polaszek, 1996) and males of *Encarsia porteri* (Mercet) have been reared from lepidopterous eggs (Polaszek, 1991). Four Oriental *Encarsia* species parasitize hormaphidine aphids (Evans *et al.*, 1995). Host and distribution data for *Encarsia* species are shown in Table 1.

Host species, particularly those with a wide geographic distribution, commonly will be attacked by several different parasitoid species. For example, *Bemisia tabaci* (Gennadius) and *Tetraleurodes acaciae* (Quaintance) are parasitized by 11 and 7 *Encarsia* species, respectively, in Mexico. Seven species were collected by sweeping and

their hosts are unknown in Mexico: *antennata* sp. n., *clavata* sp. n., *fursovi* sp. n., *lounsburyi* (Berlese & Paoli), *meritoria* Gahan, *tarsalis* sp. n. and *verticina* sp. n.

Table 1. Host specificity of *Encarsia* species.

Country	Total species	Aleyrodidae		Diaspididae		References
		species	%	species	%	
China	57	38	67	17	30	Huang & Polaszek, 1998
India	52	38	73	10	19	Hayat, 1989
Russia	30	21	70	9	30	Trjapitzin <i>et al.</i> , 1996
Italy	28	18	64	10	36	Viggiani, 1987
Egypt	14	10	71	4	29	Polaszek <i>et al.</i> , 1999
Mexico	88	69	78	14	16	Myartseva & Evans (herein)
World	185	132	71	49	26	Heraty & Woolley, 1999

Fig. 7 shows similarity of *Encarsia* species host specificity analyzed in Mexican and world fauna of this genus.

Table 2 shows the species of Diaspididae and Aleyrodidae hosts for *Encarsia* species reared in Mexico; the actual host range for some of these species include species reported from collections made in other countries.

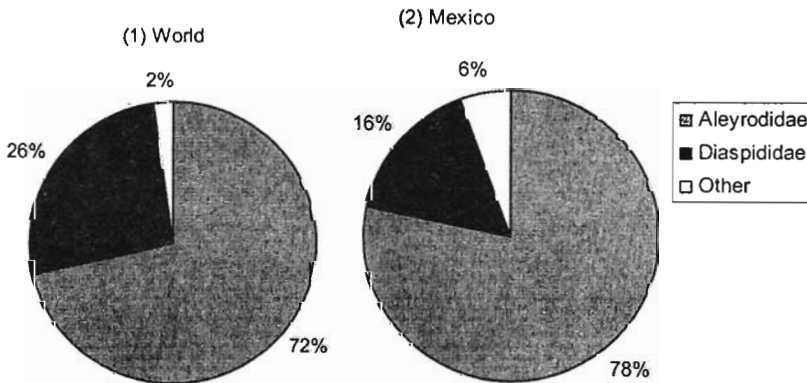


Fig. 7. Host range of *Encarsia* species in the world (185 spp.) and Mexico (88 spp.).

Table 2. Diaspididae and Aleyrodidae hosts of *Encarsia* species reared in Mexico.

Hosts	<i>Encarsia</i> species
Diaspididae	
<i>Abgrallaspis cyanophylli</i> (Signoret)	<i>citrina</i>
<i>Aonidiella aurantii</i> (Maskell)	<i>aurantii</i> , <i>citrina</i> , <i>juanae</i> , <i>subelongata</i>
<i>Chionaspis acericola</i> (Hollinger)	<i>unisetae</i>
<i>Chionaspis</i> spp.	<i>elcielica</i> , <i>pineti</i>
<i>Chrysomphalus aonidum</i> (L.)	<i>aurantii</i>
<i>Diaspis echinocacti</i> (Bouché)	<i>subelongata</i>
<i>Genaparlatoria pseudaspidotus</i> (Lind.)	<i>citrina</i>
<i>Hemiberlesia</i> spp.	<i>subelongata</i> , <i>juanae</i>
<i>Lepidosaphes beckii</i> (Newman)	<i>elongata</i>
<i>Melanaspis</i> sp.	<i>pinella</i>
<i>Phenacaspis pinifoliae</i> (Fitch)	<i>citrina</i>
<i>Pinnaspis strachani</i> (Cooley)	<i>citrina</i> , <i>gaonae</i>
<i>Quadraspidotus perniciosus</i> (Comstock)	<i>perniciosi</i>
<i>Siphoninus phillyreae</i> (Haliday)	<i>inaron</i>
<i>Unaspis citri</i> (Comstock)	<i>citrina</i> , <i>llerica</i>
Diaspididae gen. et spp.	<i>aurantii</i> , <i>citrina</i> , <i>titillata</i> , <i>subelongata</i> , <i>unisetae</i>
Aleyrodidae	
<i>Aleurocanthus woglumi</i> Ashby	<i>clypealis</i> , <i>colima</i> , <i>divergens</i> , <i>llera</i> , <i>merceti</i> , <i>perplexa</i> , <i>smithi</i>
<i>Aleurodicus dugesii</i> Cockerell	<i>noyesi</i>
<i>Aleurodicus</i> sp.	<i>narroi</i>
<i>Aleurothrixus floccosus</i> (Maskell)	<i>americana</i> , <i>citrella</i> , <i>dominicana</i> , <i>formosa</i> , <i>haitiensis</i>
<i>Aleurotrachelus trachoides</i> (Back)	<i>pergandiella</i> , <i>tabacivora</i>
<i>Aleyrodes</i> sp.	<i>kasparyani</i> , <i>portoricensis</i> , <i>townsend</i>
<i>Bemisia tabaci</i> (Gennadius)	<i>bimaculata</i> , <i>citrella</i> , <i>hispida</i> , <i>lanceolata</i> , <i>luteola</i> , <i>neoporteri</i> , <i>nigricephala</i> , <i>paracitrella</i> , <i>pergandiella</i> , <i>protransvena</i> , <i>quaintancei</i> , <i>tabacivora</i>
<i>Paraleyrodes</i> spp.	<i>variegata</i>
<i>Tetraleurodes acaciae</i> (Quaintance)	<i>hispida</i> , <i>luteola</i> , <i>moctezumana</i> , <i>nigricephala</i> , <i>paracitrella</i> , <i>protransvena</i>

Table 2. Continuation.

Hosts	<i>Encarsia</i> species
<i>Tetraleurodes mori</i> (Quaintance)	<i>guajavae</i> , <i>pergandiella</i>
<i>Tetraleurodes perseae</i> Nakahara	<i>mexicana</i>
<i>Tetraleurodes</i> spp.	<i>altacima</i> , <i>citrella</i> , <i>formosa</i> , <i>guajavae</i> , <i>guamuchil</i> , <i>hamoni</i> , <i>hispida</i> , <i>lacuma</i> , <i>leucaenae</i> , <i>luteola</i> , <i>macula</i> , <i>mahoniae</i> , <i>pergandiella</i> , <i>pitilla</i> , <i>tetraleurodis</i>
<i>Trialeurodes abutiloneus</i> (Haldeman)	<i>quaintancei</i> , <i>neoporteri</i>
<i>Trialeurodes floridensis</i> (Haliday)	<i>citricola</i> , <i>variegata</i>
<i>Trialeurodes vaporariorum</i> (Westwood)	<i>formosa</i> , <i>luteola</i> , <i>macula</i> , <i>neoporteri</i> , <i>nigricephala</i> , <i>pergandiella</i> , <i>quaintancei</i> , <i>tabacivora</i> , <i>trialeurodis</i> , <i>trilineata</i>
<i>Trialeurodes variabilis</i> (Quaintance)	<i>hispida</i> , <i>sophia</i> , <i>neoporteri</i>
<i>Trialeurodes</i> spp.	<i>coquilletti</i> , <i>formosa</i> , <i>hispida</i> , <i>luteola</i> , <i>nigricephala</i> , <i>pergandiella</i> , <i>quaintancei</i> , <i>sophia</i> , <i>tabacivora</i>
Aleyrodidae gen. et spp.	<i>alvaradoi</i> , <i>azteca</i> , <i>catemaco</i> , <i>citrella</i> , <i>costaricensis</i> , <i>cubensis</i> , <i>dmitrii</i> , <i>flaviceps</i> , <i>floreana</i> , <i>formosa</i> , <i>funiculata</i> , <i>guadeloupae</i> , <i>guamuchil</i> , <i>hamoni</i> , <i>kasparyani</i> , <i>lacuma</i> , <i>lanceolata</i> , <i>luteola</i> , <i>macula</i> , <i>mahoniae</i> , <i>mexicana</i> , <i>neoporteri</i> , <i>noyesi</i> , <i>pergandiella</i> , <i>polaszeki</i> , <i>pseudocitrella</i> , <i>ruizi</i> , <i>superbum</i> , <i>tamaulipeca</i> , <i>tapachula</i> , <i>trilineata</i> , <i>terebrella</i> , <i>tuxpan</i> , <i>tuxtla</i> , <i>unicitrella</i> , <i>variegata</i> , <i>woolleyi</i> .

ENCARSIA SPECIES GROUPS

Species of the genus *Encarsia* are placed into species groups usually based on the sharing of a combination of morphological characters. Many *Encarsia* species can be placed into one of these defined groups; however, the placement of some species remains tentative until more information on the world fauna and the degree of interspecific variation in some morphological structures and colouration is known. The composition of species groups of Mexican *Encarsia* herein is based on the proposals of previous workers (Viggiani & Mazzone, 1979; Hayat, 1989, 1998; Huang & Polaszek, 1998; Heraty & Woolley, 2002; Polaszek *et al.*, 2004), with some modifications (Evans & Polaszek, 1997; Heraty & Polaszek, 2000). Species groups have been included in the key to make its application for identification of species easier. The genus *Encarsia* is represented in Mexico by 88 species belonging to 20 of the approximately 29 currently recognized species groups (Fig. 8).

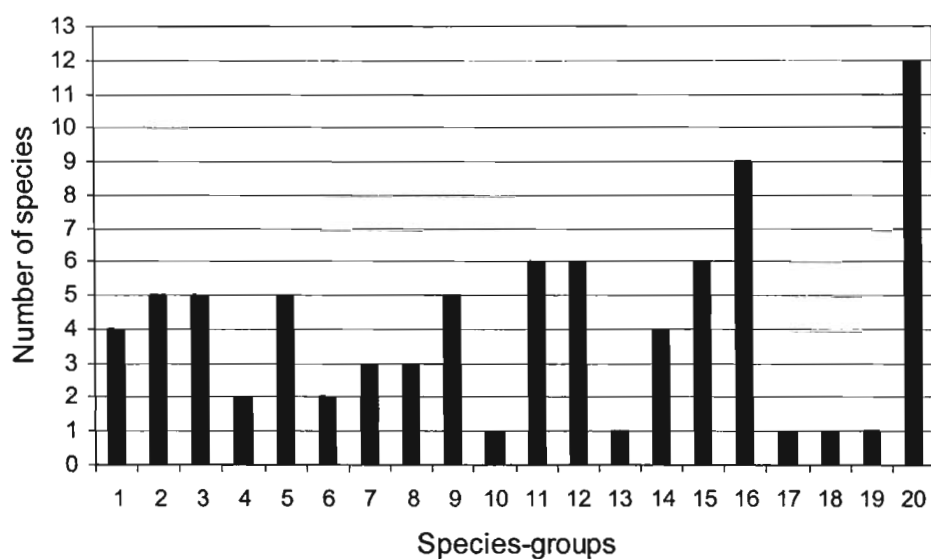


Fig. 8. Composition of *Encarsia* species groups represented in Mexico: 1 – *albiscutellum*, 2 – *aurantii*, 3 – *citrella*, 4 – *citrina*, 5 – *cubensis*, 6 – *divergens*, 7 – *japonica*, 8 – *inaron*, 9 – *inquirenda*, 10 – *lutea*, 11 – *luteola*, 12 – *meritoria* complex, 13 – *merceti*, 14 – *noyesi*, 15 – *opulenta*, 16 – *parvella*, 17 – *perflava*, 18 – *porteri*, 19 – *smithi*, 20 – *strenua*.

The *Encarsia porteri* species group is here proposed, containing *E. porteri* (Mercet) and *E. neoporteri* Myartseva & Evans, and the *Encarsia albiscutellum* species group containing 4 described species: *alvaradoi* sp. n., *funiculata* sp. n., *mexicana* sp. n. and *pinella* Myartseva (Table 3).

Table 3. Species groups of the genus *Encarsia* represented in Mexico.

Species group	Species
<i>albiscutellum</i>	<i>alvaradoi</i> , <i>funiculata</i> , <i>mexicana</i> , <i>pinella</i>
<i>aurantii</i>	<i>aurantii</i> , <i>elongata</i> , <i>juanae</i> , <i>perniciosi</i> , <i>subelongata</i>
<i>citrella</i>	<i>citrella</i> , <i>macula</i> , <i>moctezumana</i> , <i>paracitrella</i> , <i>unicitrella</i>
<i>citrina</i>	<i>citrina</i> , <i>lounsburyi</i>
<i>cubensis</i>	<i>cubensis</i> , <i>guamuchil</i> , <i>hamoni</i> , <i>nigricephala</i> , <i>quaintancei</i>
<i>divergens</i>	<i>divergens</i> , <i>portoricensis</i>
<i>japonica</i>	<i>azteca</i> , <i>citricola</i> , <i>mahoniae</i>
<i>inaron</i>	<i>clavata</i> , <i>coquilletti</i> , <i>inaron</i>
<i>inquirenda</i>	<i>fursovi</i> , <i>gaonae</i> , <i>llerica</i> , <i>tarsalis</i> , <i>unisetae</i>
<i>lutea</i>	<i>tapachula</i>
<i>luteola</i>	<i>kasparyani</i> , <i>llera</i> , <i>luteola</i> , <i>tuxtla</i> , <i>variegata</i> , <i>woolleyi</i>
<i>meritoria</i> complex	<i>floreana</i> , <i>formosa</i> , <i>guadeloupae</i> , <i>haitiensis</i> , <i>hispida</i> , <i>meritoria</i>
<i>merceti</i>	<i>merceti</i>
<i>noyesi</i>	<i>narroi</i> , <i>noyesi</i> , <i>polaszeki</i> , <i>tamaulipecta</i>
<i>opulenta</i>	<i>altacima</i> , <i>clypealis</i> , <i>colima</i> , <i>dominicana</i> , <i>perplexa</i> , <i>townsendi</i>
<i>parvella</i>	<i>americana</i> , <i>guajavae</i> , <i>lanceolata</i> , <i>leucaenae</i> , <i>pergandiella</i> , <i>tabacivora</i> , <i>tetraleurodis</i> , <i>trialeurodis</i> , <i>verticina</i>
<i>perflava</i>	<i>pitilla</i>
<i>porteri</i>	<i>neoporteri</i>
<i>smithi</i>	<i>smithi</i>

Table 3. Continuation.

Species group	Species
<i>strenua</i>	<i>bimaculata</i> , <i>costaricensis</i> , <i>elcielica</i> , <i>lacuma</i> , <i>protransvena</i> , <i>pseudocitrella</i> , <i>ruizi</i> , <i>sophia</i> , <i>terebrella</i> , <i>titillata</i> , <i>trilineata</i> , <i>tuxpan</i>
<i>berlesei</i> (tentatively placed)	<i>pineti</i>
Species group not identified	<i>antennata</i> , <i>superbum</i>

KEY TO THE SPECIES GROUPS AND SPECIES

1. Tarsus of middle leg 4-segmented (apical two segments at least partially fused) (Figs 43, 93, 123, 132, 166, 278).....2
 - Tarsus of middle leg 5-segmented (Figs 12, 26, 39, 65, 109).....21
2. Fore wing with an asetose area around stigmal vein; second flagellar segment of male antenna with round sensorial/glandular process.....*cubensis* group.....3
 - Fore wing without an asetose area around stigmal vein; second flagellar segment of male antenna without round sensorial/glandular process.....*luteola* group.....7
3. Midlobe of mesoscutum (midlobe) with 3 pairs of setae; scutellum bright yellow; gaster completely dark brown; male with first flagellar segment longer than second flagellar segment.....66. *quaintancei* Howard
 - Midlobe with 2 pairs of setae; gaster yellow or only partially dark brown.....4
4. Gaster completely yellow.....5
 - Gaster dark brown with central portion yellow.....6
5. Midlobe with anterior third to half dark brown; fore wing apex pointed; first flagellar segment 2x as long as wide; sixth flagellar segment elongate and with pointed apex.....53. *nigricephala* Dozier

- Midlobe entirely dark brown with yellow margins; fore wing apex rounded; first flagellar segment 0.7x as long as wide; sixth flagellar segment short and with rounded apex.....31. *guamuchil* sp. n.
- 6. Second flagellar segment longer than third segment; third valvula elongate, 0.6x as long as ovipositor.....17. *cubensis* Gahan
- Second flagellar segment shorter than third segment; third valvula shorter, 0.4x as long as ovipositor.....33. *hamoni* Evans and Polaszek
- 7. Body entirely yellow or orange; mesoscutum, axillae and base of gaster sometimes lightly infusate.....*meritoria* complex.....8
- Body with at least most of the midlobe dark brown.....11
- 8. Midlobe with 2 pairs of setae; flagellar segments increasing in length from second to sixth, first segment 0.8x as long as second (Fig. 125).....24. *floreana* sp. n.
- Midlobe with 3 or more pairs of setae; flagellar segments variable.....9
- 9. First flagellar segment quadrate or nearly so, about 0.5-0.6x as long as second; second to sixth segments subequal in length.....32. *haitiensis* Dozier
- First flagellar segment cylindrical; second to sixth segments increasing in length.....10
- 10. Second flagellar segment intermediate in length between first and third and usually without linear sensilla; sixth segment elongate, about 1.2-1.3x as long as fifth segment; in male, fifth and sixth segments separate.....34. *hispidia* De Santis
- Second flagellar segment as long as, or slightly shorter than third segment and usually with one linear sensillum; sixth segment about as long as fifth segment; in male, fifth and sixth segments fused.....48. *meritoria* Gahan
- 11. Gaster yellow, sometimes with dark brown base.....12
- Gaster entirely dark brown or with dark transverse or lateral bands.....14

12. Midlobe with 3 pairs of setae; club 3-segmented; midtibial spur as long as basitarsus83. *tuxtla* Myartseva
- Midlobe with 6-9 pairs of setae; club 2-segmented; midtibial spur shorter than basitarsus.....13
13. Head entirely dark brown; reticulations on mesosoma without internal striations; ovipositor usually shorter than middle tibia, rarely as long as middle tibia; first flagellar segment with linear sensillum25. *formosa* Gahan
- Head mostly orange with dark brown base; reticulations on mesosoma with internal striations; ovipositor usually longer than middle tibia, rarely as long as middle tibia; first flagellar segment without linear sensillum.....44. *luteola* Howard
14. Gaster entirely dark brown to black.....15
- Gaster with dark transverse or lateral bands.....17
15. Scutellum dark brown; fore wing 2.3x as long as wide; midlobe with 7-8 pairs of setae; midtibial spur 0.6x as long as basitarsus; first-second flagellar segments without linear sensilla.....8. *woolleyi* sp. n.
- Scutellum yellow.....16
16. Hind femora brown; ovipositor about as long as middle tibia; fore wing 2.6x as long as wide, its base with 3-5 setae; second to fourth tergites with 6 setae each.....29. *guadeloupae* Viggiani
- Hind femora whitish yellow; ovipositor 1.7x as long as middle tibia; fore wing 2.3x as long as wide, its base with 9 setae; second to fourth tergites with 2 setae each.....8. *catemaco* Myartseva
17. Only first tergite completely or basally black.....18
- Some other gastral tergites with dark transverse bands.....19
18. First tergite completely black; head brown, mesosoma yellow; fore wing 2.4x as long as wide, its base with 4-6 setae; ovipositor 1.2x as long as middle tibia; third valvula 0.8-0.9x as long as second valvifer; marginal fringe of hind wing 1.3x as long as wing width.....19. *dmitrii* Myartseva
- First tergite basally black; head light yellow, mesosoma yellowish brown; fore wing 2.5-2.8x as long as wide, its base with 3 setae; ovipositor 1.3x as long as middle tibia; third valvula 0.6-0.7x as

- long as second valvifer; marginal fringe of hind wing 2x as long as wing width.....23. *flaviceps* Myartseva
19. Fifth-sixth tergites and basal tergite with infusate transverse bands; midlobe with 6-8 pairs of setae; midtibial spur nearly as long as basitarsus; club longer than funicle and pedicel combined37. *kasparyani* sp. n.
- Gaster yellow with dark brown lateral margins.....20
20. First flagellar segment subequal to second segment; third segment elongate, about 1.5x as long as second; second segment without linear sensilla; marginal fringe of fore wing 0.4x as long as wing width; midlobe with 6 pairs of setae; exerted part of ovipositor about 0.5x as long as gaster.....41. *llera* sp. n.
- First flagellar segment about 0.5x as long as second segment; third segment shorter than second; second segment with linear sensilla; marginal fringe of fore wing 0.2x as long as wing width; midlobe with 5 pairs of setae; ovipositor only slightly exerted.....86. *variegata* Howard
21. Fore wing with an asetose area around stigmal vein22
- Fore wing without an asetose area around stigmal vein.....32
22. Marginal fringe of fore wing longer than width of wing; each side lobe with one seta; petiolus usually sculptured; parasitoids of Diaspididae..... *citrina* group.....23
- Marginal fringe of fore wing not longer than width of wing; each side lobe with 2 or more setae; petiolus usually smooth; parasitoids of Aleyrodidae *parvella* group.....24
23. Fore wing with one seta on submarginal vein and 3-4 setae on marginal vein; fore wing abruptly narrowed beyond venation and with apex pointed43. *lounsburyi* (Berlese and Paoli)
- Fore wing with 2 setae on submarginal vein and 4-6 setae on marginal vein; fore wing with more or less parallel sides beyond venation and with apex rounded11. *citrina* (Craw)
24. Mesoscutum largely brown anteriorly; gaster brown or with extensive dark areas.....25
- Mesoscutum and gaster entirely yellow.....28

25. Gaster brown, except seventh tergite whitish; midlobe with 2 pairs of setae; side lobe with 2 setae; base of fore wing with 2 setae, marginal vein with 6 setae; club 2-segmented; flagellar segments elongate; ovipositor 0.9x as long as middle tibia.....87. *verticina* sp. n.
- Gastral tergites yellow with some infuscations.....26
26. Gaster yellow with first, second and seventh tergites brown; apical setae of third valvula lanceolate; midlobe with 2 pairs of setae.....39. *lanceolata* Evans and Polaszek
- Metasomal tergites infuscated centrally, with yellow lateral margins; apical setae of ovipositor sheaths normal; midlobe with 3-5 (usually 4) pairs of setae.....27
27. Ovipositor as long as or longer than middle tibia; fifth flagellar segment as long as or slightly longer than fourth segment; basitarsus of middle leg usually as long as the 4 remaining tarsal segments combined; sixth tergite with 2 pairs of setae between cerci56. *pergandiella* Howard
- Ovipositor distinctly shorter than middle tibia; fifth flagellar segment distinctly (1.2x) longer than fourth segment; basitarsus of middle leg usually shorter than the 4 remaining tarsal segments combined; sixth tergite with one pair of setae between cerci.....72. *tabacivora* Viggiani
28. Midlobe with 4 pairs of setae; ovipositor as long as middle tibia; midtibial spur 0.5x as long as basitarsus29
- Midlobe with 2-3 pairs of setae; length of ovipositor and midtibial spur variable.....30
29. Clypeus whitish; fore wing hyaline; scape 3.6x as long as wide; second flagellar segment with sensillum; ovipositor subequal in length to middle tibia.....77. *tetraleurodis* sp. n.
- Clypeus brownish; fore wing infuscate; scape 4.0-4.5x as long as wide; second flagellar segment without sensillum; ovipositor 0.9x as long as middle tibia80. *trialeurodis* sp. n.
30. Midlobe with 2 pairs of setae; ovipositor subequal in length to middle tibia; distance between anterior scutellar setae longer than distance between posterior setae.....3. *americana* (De Bach and Rose)

- Midlobe with 3-4 pairs of setae; ovipositor longer than middle tibia; distance between anterior scutellar setae subequal or shorter than distance between posterior setae 31
- 31. Club slightly shorter than second-fourth flagellar segments combined; second segment without a linear sensillum; third valvula 1.2x as long as second valvifer; distance between anterior scutellar setae subequal to distance between posterior setae (Figs 150, 151, 154).....30. *guajavae* Myartseva
- Club longer than second-fourth flagellar segments combined; second segment with a linear sensillum; third valvula 0.6x as long as second valvifer; distance between anterior scutellar setae slightly longer than distance between posterior setae (Figs 204, 205, 208).....40. *leucaenae* sp. n.
- 32. Scutellar placoid sensilla very closely spaced, separated by a distance of about the width of one sensillum or less.....33
- Scutellar placoid sensilla widely spaced, separated by a distance of more than the width of one sensillum.....54
- 33. Apex of costal cell with exceptionally long setae; stigmal vein separated from marginal vein by a distinct constriction.....
.....*strenua* group sensu lato.....34
- Apex of costal cell without exceptionally long setae; stigmal vein smoothly joining marginal vein.....46
- 34. Marginal fringe of fore wing about 0.5x wing width; club 3-segmented; gaster brown with pale central area; parasitoids of Diaspididae.....78. *titillata* Girault
- Marginal fringe of fore wing less than 0.5x wing width; club 2- or 3-segmented; gaster coloration not as above; parasitoids of Aleyrodidae.....35
- 35. Club 2-segmented or undifferentiated; gaster of most species with extensive dark markings; parasitoids of Aleyrodidae.....
japonica group.....36
- Club 3-segmented; species entirely yellow or with minimal infuscate areas, except in *E. bimaculata* which has a large, inverted triangular, brown area on the midlobe and more extensive dark markings on the gaster.....*strenua* group sensu stricto.....
.....37

36. Midlobe with 6 setae; hind coxae and femora black; propodeum infusate; petiole infusate and sculptured; ovipositor 1.4x as long as middle tibia.....46. *mahoniae* sp. n.
- Midlobe with 8 setae; hind coxae and femora white; propodeum yellow; petiole whitish and not sculptured; ovipositor 1.6x as long as middle tibia6. *azteca* sp. n.
37. Mesosoma yellow with dark brown axillae and mesoscutum; gaster entirely or with some tergites brown; midlobe with 4-5 pairs of setae.....38
- Mesosoma and gaster entirely yellow; midlobe with 2-5 pairs of setae.....41
38. Gaster with some infuscations.....39
- Gaster primarily dark brown.....40
39. First-second tergites brownish; midlobe with 4 pairs of setae; second flagellar segment without sensilla.....
-7. *bimaculata* Heraty and Polaszek
- Gastral tergites with brownish lateral spots; midlobe with 5 pairs of setae; second flagellar segment with one sensillum.....
-81. *trilineata* Myartseva
40. Apical tergites of gaster yellow; midtibial spur 0.7x as long as basitarsus; ovipositor exerted, 0.9x as long as middle tibia (Figs 114, 115).....21. *elcielica* sp. n.
- Apical tergites of gaster infusate; midtibial spur subequal to basitarsus; ovipositor not exerted, 1.1x as long as middle tibia (Figs 197, 198).....38. *lacuma* sp. n.
41. Midlobe with 2 pairs of setae.....42
- Midlobe with more than 2 pairs of setae.....43
42. Second flagellar segment with linear sensillum and much longer than first segment; third valvula 0.76x as long as second valvifer (Figs 386, 390).....82. *tuxpan* sp. n.
- Second flagellar segment without linear sensillum and subequal to first segment; third valvula 0.45x as long as second valvifer (Figs 324, 328)67. *ruizi* sp. n.

43. Fore wing with an evident group of long setae along the caudal half of the disc; sixth tergite with one pair of setae between cerci; midlobe with 4-5 pairs of setae.....*sophia* (Girault and Dodd)
 - Fore wing without an evident group of long setae along the caudal half of the disc; sixth tergite with two pairs of setae between cerci.....44
44. Pedicel and flagellum brownish; midlobe with 4 pairs of setae.....16. *costaricensis* Evans and Angulo
 - Pedicel and flagellum yellowish; midlobe with 4-5 pairs of setae.....45
45. Ovipositor 1.6x or more as long as middle tibia; midlobe with 4 pairs of setae; base of fore wing with 4 setae under submarginal vein.....76. *terebrella* Myartseva
 - Ovipositor less than 1.6x as long as middle tibia; midlobe with 5 pairs of setae; base of fore wing with 10 or more setae under submarginal vein.....4. *protransvena* Viggiani
46. Club 3-segmented; gaster yellow with dark transverse bands; first and second flagellar segments cylindrical; parasitoids of Aleyrodidae.....*citrella* group.....47
 - Club 2-segmented or undifferentiated; gaster extensively dark brown; first flagellar segment quadrate or nearly so.....
*divergens* group.....52
47. Midlobe and axillae entirely pale.....48
 - Midlobe with at least axillae darkened, often with more extensive dark markings.....51
48. Midlobe with 2-3 pairs of setae.....49
 - Midlobe with 4 pairs of setae.....50
49. First flagellar segment with a linear sensillum; midlobe with 2 pairs of setae; ovipositor 0.9x as long as middle tibia; third valvula 0.2x as long as ovipositor.....
65. *pseudocitrella* Evans and Polaszek
 - First flagellar segment without a linear sensillum; midlobe with 2-3 pairs of setae; ovipositor 1.2x as long as middle tibia; third valvula 0.4x as long as ovipositor (Figs 227, 231).....
45. *macula* sp. n.

50. Fore wing infusate under marginal vein; gaster yellow with central area of third-fifth tergites dark brown.....9. *citrella* (Howard)
- Fore wing hyaline; gaster yellow with lateral margins of first-seventh tergites dark brown.....50. *moctezumana* sp. n.
51. First and second flagellar segments without linear sensilla; midlobe with one pair of setae and large inverted, dark brown triangular area.....4. *unicitrella* Evans and Polaszek
- First and second flagellar segments with linear sensilla; midlobe yellow, with 4 pairs of setae.....55. *paracitrella* Evans and Polaszek
52. Midlobe yellow with dark brown anterior margin; first flagellar segment about 0.7-0.8x as long as second segment.....53
- Midlobe completely dark brown; first flagellar segment about 0.5x as long as second segment.....54
53. Base of sixth tergite exceptionally broad; first flagellar segment about 0.7x as long as second segment; fore wing hyaline.....63. *portoricensis* Howard
- Base of sixth tergite not exceptionally broad; first flagellar segment about 0.8x as long as second segment; fore wing infusate under marginal vein.....10. *citricola* sp. n.
54. Ovipositor longer than middle tibia and basitarsus combined and third valvula longer or only slightly shorter than 0.5x second valvifer; seventh tergite usually elongate and conical, as long as, or longer than wide.....55
- Ovipositor shorter than middle tibia and basitarsus combined; if as long as or longer, then either third valvula apparently shorter than 0.5x second valvifer or seventh tergite not conical and elongate, its basal width longer than its median length.....67
55. First flagellar segment transverse, quadrate to slightly longer than wide; second segment often longer than third segment; males with first and second flagellar segments usually expanded.....*opulenta* group.....56

- First flagellar segment distinctly longer than wide; second segment rarely longer than third segment; males of known species with first and second flagellar segments not expanded.....*albiscutellum* group.....63
- 56. Gaster dark brown, seventh tergite sometimes pale.....57
 - Gaster with transverse pale bands or areas.....61
- 57. First flagellar segment transverse; clypeus with protuberance; hind femora dark brown; head and mesosoma dark brown.....58
 - First flagellar segment longer than wide, sometimes quadrate; clypeus without protuberance; hind femora usually pale, sometimes infusate; head and mesosoma variable.....59
- 58. Fifth-sixth flagellar segments as long as fourth-third segments; male antenna with first and second flagellar segments united to a large oval structure, each slightly longer than wide.....13. *clypealis* (Silvestri)
 - Fifth-sixth flagellar segments distinctly shorter than fourth-third segments; male antenna with first and second flagellar segments elongate and not united to a large oval structure, each about 3x as long as wide.....14. *colima* Myartseva
- 59. Club 4-segmented; ovipositor slightly exerted.....12. *clavata* sp. n.
 - Club 3-segmented; ovipositor strongly exerted.....60
- 60. Head and mesosoma yellow; midlobe with 4 pairs of setae; scutellar placoid sensilla not closely placed (Fig. 10).....1. *altacima* sp. n.
 - Head and mesosoma dark brown, scutellum yellow; midlobe with 5 pairs of setae; scutellar placoid sensilla closely placed.....79. *townsendi* Howard
- 61. Midlobe with 3 pairs of setae; gaster yellow with first and fourth-sixth tergites brownish; ovipositor 2x as long as middle tibia.....74. *tapachula* Myartseva
 - Midlobe with 4-5 pairs of setae; gaster dark brown with basal tergites yellow.....62

62. First flagellar segment transverse; first-second tergites yellow; midlobe with 5 pairs of setae.....58. *perplexa* Huang and Polaszek
- First flagellar segment quadrate; second-third tergites yellow; midlobe with 4 pairs of setae.....20. *dominicana* Evans
63. Gaster dark brown with first-second tergites pale; fore wing infusate under marginal vein.....49. *mexicana* Myartseva
- Gaster completely dark brown; fore wing infusate or hyaline.....64
64. Head dark brown; midlobe with 14-16 setae; anterior scutellar setae very short, about 0.5x as long as posterior setae; first flagellar segment 2x as long as wide (Figs 300, 301).....59. *pinella* Myartseva
- Head completely yellow or yellow with dark brown base.....65
65. Midlobe with 4 setae; first flagellar segment 1.3x as long as wide.....42. *lherica* sp. n.
- Midlobe with 8 setae; first flagellar segment 1.5-2.0x as long as wide.....66
66. Midlobe brown with pale posterior margin; second flagellar segment slightly longer than wide; first segment with a linear sensillum.....26. *funiculata* sp. n.
- Midlobe completely dark brown; second flagellar segment elongate, 2x as long as wide; first segment without a linear sensillum.....2. *alvaradoi* sp. n.
67. Club 2-segmented; all flagellar segments longer than wide; body often with head and mesosoma dark brown; midtibial spur less than 0.5x as long as basitarsus; parasitoids of Aleyrodidae...*inaron* group.....68
- Club 3-segmented; midtibial spur usually longer than 0.5x basitarsus, if shorter, then head and mesosoma not dark brown.....69
68. Gaster mostly dark brown, except narrow pale transverse band on first tergite; middle femora dark brown.....15. *coquilletti* Howard
- Gaster mostly yellow, sometimes with infuscations laterally; middle femora yellow.....36. *inaron* (Walker)

69. Mouth fossa clearly broader than 0.5x frontovertex width or longer than malar space length; mandible large, with a distinct ventral tooth.....*merceti* group
First flagellar segment subequal to second segment, slightly longer than wide and without linear sensilla; first, second and sixth flagellar segments and fore wing infuscate; male with an asetose area under stigmal vein and 5-segmented antenna.....
.....47. *merceti* Silvestri
- Mouth fossa narrower than 0.5x frontovertex width or not longer than malar space length; mandible normal; first and second flagellar segments both not slightly longer than wide and not infuscate.....70
70. Midlobe with more than 50 setae arranged not symmetrically; club with an oblique suture between fifth and sixth flagellar segments.....*noyesi* group.....71
- Midlobe with not more than 50 setae, arranged in bilateral symmetry; club without an oblique suture between fifth and sixth flagellar segments.....74
71. Scutellum pale.....72
- Scutellum entirely brown to black; first flagellar segment without sensillum and shorter than pedicel; third valvula 0.48x as long as second valvifer.....
.....73. *tamaulipeca* (Myartseva and Coronado-Blanco)
72. Fore wing hyaline; hind femora brown; first flagellar segment subequal to pedicel or slightly shorter; midlobe distinctly sculpturated with more or less hexagonal cells.....73
- Fore wing infuscate below marginal vein; hind femora pale yellow; first flagellar segment longer than pedicel; midlobe smooth, sculpturated with rounded cells; third valvula 0.7x as long as second valvifer.....
.....62. *polaszeki* (Myartseva and Coronado-Blanco)
73. Fore wing with a long bare band along anterior margin; second flagellar segment longer than first segment; club, first segment and pedicel dorsally brown; body length 0.85-1.0 mm.....
.....54. *noyesi* (Hayat)

- Fore wing uniformly setose; second flagellar segment shorter than first segment; all antennal segments pale yellow; body length 1.37-1.40 mm.....51. *narroi* Gómez and García

- 74. Fore wing narrow, about 3x and more as long as wide; marginal fringe at least 0.6x as long as width of wing; midtibial spur approximately as long as basitarsus; midlobe usually with 2-3 pairs of setae; scutellar placoid sensilla widely spaced (close together in *E. titillata*); parasitoids of Diaspididae.....*inquirenda* group.....75
- Fore wing width moderate to broad, about 2.5x as long as wide; marginal fringe less than 0.6x wing width; midtibial spur usually shorter than basitarsus; midlobe usually with more than 3 pairs of setae; parasitoids of Aleyrodidae or Diaspididae.....78

- 75. Submarginal vein with one seta; first flagellar segment quadrate; body dark brown, with scutellum and posterior three-quarters of midlobe yellow; fore wing infusate under marginal vein (Fig. 142)85. *unisetae* sp. n.
- Submarginal vein with two setae; first flagellar segment cylindrical.....76

- 76. Fore wing infusate under marginal vein; scutellar placoid sensilla widely separated; midlobe with 2 pairs of setae (Fig. 146).....77
- Fore wing hyaline; scutellar placoid sensilla placed closely together; midlobe with 3 pairs of setae.....78. *titillata* Girault

- 77. Hind femora infusate; basitarsus of all legs whitish; setation of dorsum pale; distance between anterior scutellar setae longer than that between posterior setae.....8. *gaonae* sp. n.
- Hind femora whitish; basitarsus of all legs infusate; setation of dorsum dark; distance between anterior scutellar setae as long as that between posterior setae.....75. *tarsalis* sp. n.

- 78. Second flagellar segment longer than third segment; first segment short, transverse to quadrate; club 3-segmented; midtibial spur subequal to basitarsus; third valvula dark brown (in Mexican species); male with fifth and sixth flagellar segments partially

- fused; second segment expanded or with papillate sensillae in some species; parasitoids of Diaspididae.....*aurantii* group.....79
- Second flagellar segment not longer than third segment; first segment transverse to cylindrical; club variable; midtibial spur shorter than basitarsus; third valvula not dark brown; male with fifth and sixth flagellar segments separated or partially fused; second segment not expanded or with papillate sensillae in some species; parasitoids of Aleocharidae or Diaspididae84
79. Ovipositor originating at the level of sixth tergite.....80
- Ovipositor originating at the level anterior to sixth tergite.....81
80. Gaster dark brown; fore wing infusate, less than 3x as long as wide; marginal vein with 7-8 setae; second flagellar segment distinctly longer than third segment.....5. *aurantii* (Howard)
- Gaster largely light yellow; fore wing hyaline, 3.4x as long as wide; marginal vein with 5-6 setae; second flagellar segment as long as third segment27. *fursovi* sp. n.
81. Gaster completely or except apex of seventh tergite dark brown to black.....82
- Gaster not completely dark brown to black, at least first-second tergites pale; third valvula dark brown; ovipositor length variable.....83
82. Second flagellar segment more than 2x as long as wide; fore wing hyaline; scutellar placoid sensilla placed relatively close together; parasitoids of Aleocharidae.....18. *divergens* (Silvestri)
- Second flagellar segment not more than 2x as long as wide; fore wing infusate under marginal vein; face with a dark brown cross-band above toruli; ovipositor subequal to middle tibia57. *perniciosi* Tower
83. Ovipositor very short, with third valvula as long as second valvifer; midlobe with 4 pairs of setae; fore wing hyaline (Fig. 343)70. *subelongata* sp. n.
- Ovipositor longer, arising at second tergite, with third valvula less than 0.5x second valvifer; midlobe with 3 pairs of setae; fore wing infusate under marginal vein.....22. *elongata* (Dozier)

84. At least gaster dark brown.....85
 - Body entirely yellow to orange or with slightly infusate areas....
87
85. First flagellar segment quadrate to slightly longer than wide and distinctly shorter (about 0.5x) than second segment, the latter with a linear sensillum; male with fifth and sixth flagellar segments not fused, all segments with linear sensillae (no specialized sensillae); midtibial spur 0.7x as long as basitarsus; fore wing infusate under marginal vein in *E. smithi*; parasitoids of Aleyrodidae.....
*smithi* group.....68. *smithi* (Silvestri)
 - First and second flagellar segments cylindrical, subequal in length and without linear sensillae; midtibial spur subequal to basitarsus; fore wing hyaline; parasitoids of Diaspididae.....86
86. Length of ovipositor subequal to middle tibia; midlobe with 4 pairs of setae (Figs 178-182).....35. *juanae* sp. n.
 - Length of ovipositor 1.4x middle tibia; midlobe with 3 pairs of setae.(Fig. 310).....60. *pineti* sp. n.
87. First flagellar segment 1.5x as long as wide and 0.75x as long as second segment; basitarsus of middle leg elongate; base of fore wing with 6 setae; midtibial spur about 0.5x as long as basitarsus (Figs 269-273); male aedeagus short and broad, third flagellar segment without two or more papillate sensilla (*porteri* group), fifth and sixth segments partially fused.....
52. *neoporteri* sp. n.
 - First flagellar segment 2x as long as wide and subequal to second segment; basitarsus of middle leg not elongate; base of fore wing with 9-12 setae; midtibial spur subequal to basitarsus (Figs 311, 314); male aedeagus normal, i.e. elongate and narrow, third flagellar segment with two or more papillate sensilla (*perflava* group).....61. *pitilla* sp.n.

REVISION OF *ENCARSIA* SPECIES OF MEXICO

1. *Encarsia altacima* Myartseva and Evans, sp. n. (Figs 9-13)

Species-group placement. *opulenta* group.

Material examined. Holotype ♀, **Mexico:** Tamaulipas, Reserve "El Cielo", Alta Cima, 4.viii.2000, S. Myartseva, ex *Tetraleurodes* sp. on *Celtis* sp., UCR.

Description. Female. Length: 0.67 mm (excluding ovipositor).

Coloration. Head yellow, occiput slightly infusate. Mesosoma yellow, pronotum, anterior margin of midlobe of mesoscutum, side lobes (except inner margin along midlobe), axillae, metanotum on sides, propodeum and mesopleuron infusate. Setae on mesoscutum and scutellum pale. Fore wings hyaline, veins yellowish. Legs light yellow. Gaster dark brown, seventh tergite apex pale, ovipositor dark brown.

Structure. Head as wide as mesosoma, width 1.3x height; frontovortex 0.5x as long as head width. Ocelli in slightly obtuse triangle; distance between posterior ocelli slightly shorter than that between posterior ocellus and eye. Antennae (Fig. 9) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.0, S-3.7, P-1.5, F1-1.0, F2-1.9, F3-1.9, (F4-F6)-5.5. Second-sixth flagellar segments each with two linear sensilla. Club 3-segmented, not wider than funicle, slightly shorter than first-third segments and pedicel combined. Mesosoma as long as wide. Midlobe of mesoscutum 1.3x as long as scutellum, with 8 (4+2+2) setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla widely spaced, separated by a distance of about 3x diameter of a sensillum (Fig. 10). Posterior pair of scutellar setae 1.7x as long as anterior pair of setae; distance between anterior setae 0.7x as long as that between posterior setae. Fore wing uniformly setose, 2.5x as long as wide; marginal fringe 0.2x as long as maximum width of wing; one basal group seta; marginal vein slightly longer than submarginal vein, with 6 long setae along anterior margin (Fig. 11). Hind wing 8x as long as wide; its marginal fringe 1.4x as long as wing width. Tarsal formula 5-

5-5. Midtibial spur equal in length to basitarsus (Fig. 12). Seventh gastral tergite wider than its length. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor exerted, with base originating at level of second tergite, 1.4x as long as middle tibia and basitarsus combined; third valvula 0.54x as long as second valvifer (Fig. 13).

Male. Unknown.

Hosts. Aleyrodidae – *Tetraleurodes* sp.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia altacima* sp. n. is similar to *E. opulenta* (Silvestri) and *E. perplexa* Huang & Polaszek of the *opulenta* species group. According to Huang & Polaszek (1998), *E. opulenta* is distributed in China and Vietnam; *E. perplexa* is known from China and India and was introduced into the U.S.A. and Mexico (as *E. opulenta*). *E. altacima* can be distinguished from *E. opulenta* and *E. perplexa* as follows:

	<i>altacima</i>	<i>opulenta</i>	<i>perplexa</i>
Midlobe of mesoscutum color	yellow with anterior margin dark brown	dark brown	yellow with anterior margin dark brown
Midlobe of mesoscutum setae	4 pairs	5-6 pairs	4-5 pairs
Gaster	dark brown with seventh tergite apex pale	dark brown with seventh tergite entirely pale	dark brown with first-second and seventh tergites pale
Ovipositor valvulae	dark brown	apex dark brown	apex dark brown
Legs	pale yellow	middle and hind coxae and hind femora brown	pale yellow
First flagellar segment length/width	~1.0, quadrate	1.25, cylindrical	<1.0, transverse
Second flagellar segment length/width	1.9 and > F3	2.3 and = F3	1.5 and = F3

2. *Encarsia alvaradoi* Myartseva and Evans, sp. n.
(Figs 14-18)

Species-group placement. *albiscutellum* group.

Material examined. Holotype ♀, **Mexico: Sinaloa**, Guasave, 12.x.1990, B. Alvarado, ex whitefly, USNM.

Description. Female. Length: 1.10 mm.

Coloration. Body dark brown with yellow occiput and scutellum; third valvulae dark brown; fore wings slightly infuscate under marginal vein; legs yellow except for dark brown coxae and hind femora.

Structure. Habitus - Fig. 14. Antenna (Fig. 15) with 3-segmented club, flagellar segments with the following number of linear sensilla: F1:0, F2:0, F3:2, F4:3, F5:3, F6:3. Midlobe of mesoscutum with many hexagonal reticulations and 4 pairs of setae arranged as 4+2+2; each side lobe with 3 setae, each axilla with one seta located centrally. Anterior scutellar setae with bases reaching of posterior setae bases; distance between scutellar placoid sensilla about 4x the width of one sensillum. Endophragma reaching margin of first tergite: Fore wing (Fig. 16) broad, uniformly setose, about 2.5x as long as wide; marginal fringe 0.25x wing width; 3 basal group setae; marginal vein with 6 long and stout setae along anterior margin; 2 parastigmal setae at its base. Midtibial spur 0.9x as long as basitarsus (Fig. 17). Gastral dorsum with imbricate lateral margins on first-fourth tergites, becoming weak from fifth to seventh tergites. Ovipositor (Fig. 18) arising at base of second tergite and 1.5x as long as middle tibia; third valvula 0.35x as long as of ovipositor.

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Sinaloa.

Comments. The female of *Encarsia alvaradoi* sp. n. can be distinguished from other species in the *E. albiscutellum* group by its dark brown body with yellow scutellum and head (except base), and dark brown hind femora; first flagellar segment elongate, 2x as long as

wide and without a linear sensillum, and anterior pair of scutellar setae subequal to posterior pair of setae.

Etymology. This species is named in honor of Benito Alvarado, who collected this and several other species of *Encarsia* in Mexico.

Encarsia albiscutellum, new species group

The *albiscutellum* group is similar to the *opulenta* group in that the ovipositor is longer than the mid tibia and basitarsus combined, third valvula is longer or only slightly shorter than 0.5x of second valvifer and seventh tergite is elongate and conical, as long as, or longer than wide. This species group differs from the *opulenta* group in that first flagellar segment is cylindrical, distinctly longer than wide; second segment is rarely longer than third segment and males of known species do not have first and second flagellar segments expanded; as opposed to first segment transverse, quadrate to slightly longer than wide; second segment often longer than third segment; and males with first and second segments usually expanded in the *opulenta* group.

3. *Encarsia americana* (De Bach and Rose) (Figs 19-23)

Aleurodiphilus americanus De Bach and Rose, 1981: 660. Holotype ♀, Mexico: Colima, Santiago (Manzanillo), ex *Aleurothrixus floccosus* (Maskell) on *Citrus* sp., 21.i.1975, P. De Bach, M. Rose, in UCR. Allotype ♂ described (paratype ♀ and ♂ in USNM, examined). *Encarsia americana* (De Bach and Rose); Hayat, 1983: 70, change of combination.

Species-group placement. *parvella* group.

Diagnosis. Tarsal formula 5-5-5; fore wing hyaline, with large asetose area under stigmal vein; marginal vein (Fig. 20) with 5-6 setae along anterior margin; marginal fringe 0.5x wing width; 2 basal group setae; antennal club 2-segmented (Fig. 19); midlobe of mesoscutum with 2 pairs of setae; scutellar placoid sensilla widely spaced; midtibial spur subequal to basitarsus (Fig. 21); apical pretarsus of all legs with pair of very developed tarsal claws; ovipositor (Fig. 22) about 1.2x as long as middle tibia; third valvula about as long as second valvifer; female body entirely yellow. Male antenna - Fig. 23.

Hosts. Aleyrodidae - *Aleurothrixus floccosus* (Maskell).

World distribution. *Bolivia, Brazil, *Colombia, El Salvador, Honduras, Puerto Rico, U.S.A. (California).

Distribution in Mexico. Baja California Sur, Chiapas, Colima, Guerrero, Morelos, Oaxaca, San Luis Potosí, Sinaloa, Tamaulipas, Veracruz.

References. De Bach & Rose, 1981; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Schauff *et al.*, 1996; Noyes, 2002, 2006; Coronado-Blanco *et al.*, 2005a, 2005b; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: **Tamaulipas**, Jaumave, 1 ♀, 4.x.1998, ex *Aleurothrixus floccosus* on *Citrus* sp., S. Myartseva; 3 ♀, Ciudad Victoria, 17.ii.1999, same host on *Citrus sinensis*; 1 ♀, 30.iii.1999; 2 ♀, 1.v.1999; 3 ♀, 27.x.1999, same host on *Psidium guajava*; 2 ♀, 1 ♂, same host on *Citrus* sp., 1 ♀, 1.i.2000, S. Myartseva. **Chiapas**, Tapachula, 2 ♀, 27-28.ix.2006, ex *Aleurothrixus floccosus* on *Psidium guajava*, 1 ♀, 5.x.2006, same host and plant, S. Myartseva. **Bolivia**: Saavedra, 1 ♀, 14.iii.1988, ex whitefly on *Citrus* sp., F.D. Bennett. **Colombia**: Libertad, 1 ♀, 1999, ex whitefly, G. Leon.

Comments. *New record for Bolivia and Colombia.

4. *Encarsia antennata* Myartseva, sp. n.
(Figs 24-27)

Species-group placement. Not identified.

Material examined. Holotype ♂, Mexico: **Chiapas**, Reserva El Triunfo, Mirador Santa Rita, red de golpeo, N 15 39'34'', W 92 48'28'', CIB 97-061, 2.vii.1997, A. González Hdz., UCR.

Description. Male. Length: 0.70 mm.

Coloration. Head dark yellow, frontovertex, clypeus, upper part of cheeks brown, occiput infuscate, antennae yellow, last two flagellar segments slightly infuscate. Mesosoma brown, midlobe of mesoscutum (except central part), side lobes, scutellum yellowish brown, petiole

yellow. Fore wings hyaline, veins infusate. Legs whitish. Gaster brown.

Structure. Head as wide as mesosoma, its width about 1.5x as long as height; frontovertex 0.5x head width. Interocellar triangle transversely striate. Eyes setose, 1.2x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 24) inserted immediately under the level of lower margin of eyes. Between toruli two pairs of thin long setae. Antennal segments with following ratios of length to width: R-2.0, S-2.3, P-1.2, F1-0.7, F2-0.8, F3-1.6, F4- 3.0, F5-2.9, F6-3.7. First-third flagellar segments suffused in oval structure, third segment with area covered by group of small setae. In contrasting to first-third segments, fourth-sixth segments elongate and thin, fifth-sixth segments strongly fused. Club 2-segmented, slightly shorter than two preceding flagellar segments combined. First-second flagellar segments with 3 sensilla each, third segment with 4 sensilla, fourth-sixth segments with two sensilla each. Midlobe of mesoscutum 1.4x as wide as long and 1.4x as long as scutellum, with 6 (2+2+2) setae, one setae on each side lobe and one seta on each axilla placed close to upper margin. Sculpture of midlobe widely reticulate, along its posterior and lateral margins and on axillae longitudinal, on scutellum more small reticulation. Scutellum 1.6x as wide as long. Scutellar placoid sensilla ovoid, widely spaced, separated by a distance about 5x width of a sensillum. Anterior pair of scutellar setae about 0.5x as long as posterior pair of setae. Distance between anterior setae 1.4x as long as that between posterior setae. Fore wing uniformly setose, about 2.3x as long as wide; its marginal fringe 0.28 wing width; 4 basal group setae. Marginal vein (Fig. 25) subequal to submarginal vein, with 5 long setae along anterior margin. Hind wing 11x as long as wide, its marginal fringe about 1.5x wing width. Tarsal formula 5-4-5. Midtibial spur subequal to basitarsus (Fig. 26), the latter is subequal to proximal two tarsal segments combined. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Genitalia (Fig. 27) about as long as middle tibia.

Female. Unknown.

Hosts. Unknown.

Distribution in Mexico. Chiapas.

Comments. Male antennae in the genus *Encarsia* have tendency to varieties of first-third flagellar segments: they can be expanded, fused or with an extensive sensorial complex, often the two last flagellar segments fused also. In Mexican fauna, similar structure of male antenna have *E. nigricephala* Dozier, *E. perplexa* Huang & Polaszek, *E. herndoni* (Girault) and *E. dmitrii* sp. n. Antenna of male *E. antennata* sp. n. differs from these and other known species by having very contrasted width of first-third segments and fourth-sixth segments: the first three segments enlarged, first-second segments wider than length (1.4x and 1.2x, respectively), the next three segments elongate (3x, 3x and 3.7x, respectively) and fifth-sixth segments strongly fused.

5. *Encarsia aurantii* (Howard)
(Figs 28-31)

Coccophagus aurantii Howard, 1894a: 231. 2 ♀ syntypes, U.S.A.: California, San Gabriel, 9.v.1887, from *Aspidiotus aurantii* var. *citrinus* [= *Aonidiella citrina* (Coquillett)], D.W. Coquillett (in USNM, examined). Male unknown.

Prospalta aurantii (Howard); Howard, 1894b: 7, change of combination.

Prospaltella aurantii (Howard); 1908: 293, change of combination.

Encarsia aurantii (Howard); Viggiani & Mazzone, 1979: 44, 47, change of combination.

Species-group placement. *aurantii* group.

Diagnosis. Tarsal formula 5-5-5; fore wing infusate under marginal vein and uniformly setose; marginal vein (Fig. 29) with 7-8 setae, marginal fringe 0.33-0.40x wing width, 4-5 basal group setae; antennal club 3-segmented (Fig. 28); first flagellar segment transverse, second segment usually slightly longer than third segment; midlobe of mesoscutum with 4 pairs of setae; scutellar placoid sensilla widely spaced; midtibial spur (Fig. 30) slightly shorter than basitarsus; hind femora infusate; ovipositor (Fig. 31) originating at the level of sixth tergite, 0.6-0.7x as long as middle tibia; third valvulae margins concave with pale apices; body dark brown to black, scutellum, side lobes and posterior margin of midlobe of mesoscutum yellow.

Hosts. Diaspididae - this species was reared from *Chrysomphalus aonidum* (L.) and *Aonidiella aurantii* (Maskell) in Mexico. Many hosts have been recorded for this cosmopolitan species, parasitoid of Diaspididae - *Anamaspis lowi* (Colvée), *Aonidiella aurantii* (Maskell), *A. citrina* (Coquillett), *A. orientalis* (Newstead), *Aonidomytilus albus* (Cockerell), *A. concolor* (Cockerell), *Aspidiotus nerii* Bouché, *Chrysomphalus aonidum* (L.), *Ch. dictyospermi* (Morgan), *Cornuaspis beckii* (Newman), *Diaspidiotus ancylus* (Putnam), *Gonaspidiotus howardi* (Cockerell), *Hemiberlesia lataniae* (Signoret), *H. rapax* (Comstock), *Insulaspis gloveri* (Packard), *I. newsteadi* (Sulc), *Lepidosaphes espinosai* (Porter), *L. eucalypti* (Froggatt), *L. ulmi* (L.), *L. pini* (Maskell), *Lindingaspis fusca* McKenzie, *Lopholeucaspis japonica* (Cockerell), *Melanaspis obscura* (Comstock), *Nuculaspis abietis* (Schrank), *N. californica* (Coleman), *Parlatoria oleae* (Colvée), *Pinnaspis strachani* (Cooley), *Pseudaonidia duplex* (Cockerell), *Pseudaulacaspis pentagona* (Targioni-Tozzetti), *Quadraspidiotus forbesi* (Johnson), *Q. juglansregiae* (Comstock), *Q. ostreaeformis* (Curtis), *Q. perniciosus* (Comstock), *Temnaspidiotus destructor* Signoret.

World distribution. Nearly cosmopolitan.

Distribution in Mexico. Baja California Sur, Jalisco, Tamaulipas.

References. Borchsenius, 1966; De Santis, 1979; Gordh, 1979; Hayat, 1989; Heraty & Woolley, 1999; Howard, 1895; Myartseva & Ruíz-Cancino, 2000; Nikolskaya & Yasnosh, 1966; Peck, 1963; Polaszek *et al.*, 1999; Noyes, 2002, 2006; Myartseva *et al.*, 2004; Coronado-Blanco *et al.*, 2005a; Gaona-García *et al.*, 2005.

Material examined. Mexico: **Baja California Sur**, La Paz, 3 ♀, 16.xii.1998, ex Diaspididae, V. Trjapitzin, E. Chouvakhina; **Tamaulipas**, Ciudad Victoria, 3♀, 1-5.iii. 1999, in Malaise trap, L. S. Monrreal-Hernández; 1 ♀, 25.x.2001, ex *Aonidiella aurantii* on *Citrus sinensis*, S. Myartseva; Tropic of Cancer, 35 km S Cd. Victoria, 1♀, xi.2000, in Malaise trap, D. Kasparyan; **Jalisco**, La Huerta, Est. Biol. Chamela UNAM, Camino Ejido Central, 127 msnm, N 19 30'416'', W 105 02'238'', 1 ♀, 26.vii.2000, redeo, maleza, Y. Castillo O., A. Dávila L., A. González H., CIB 00-0032.

Comments. *E. aurantii* was successfully introduced into Mexico in 1949-1950 to combat the Florida red scale *Chrysomphalus aonidum* (Anonymous, 1979; Hennessey *et al.*, 1995). Reports of this species as a parasite of aleyrodid species, *Aleuroplatus coronatus* (Quaintance) and *Aleyrodes* (= *Neomaskellia*) *bergii* (Signoret), need to be confirmed, we suspect that these reports are based upon the erroneous identification of the parasite species or that the original sample contained both whitefly and armored scale insects.

6. *Encarsia azteca* Myartseva, sp. n.
(Figs 32-35)

Species-group placement. *japonica* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, 5 km S Gómez Farías, Ejido La Azteca, ex Aleyrodidae on *Adelia barbinervis* Cham. & Schlecht., 23.i.2002, S. Myartseva, UCR.

Description. Female. Length: 0.80 mm (without ovipositor).

Coloration. Head yellow, base whitish, occiput with brown transverse band medially. Antennae yellow, apice of club infusate. Mesosoma yellow except for pronotum, anterior margin of mesoscutum, side lobes apically, mesopleuron and propodeum laterally brown. Fore wings infusate under marginal vein; marginal and stigmal veins infusate, submarginal vein pale; setae on infusate area of disc dark, on hyaline distal half white. Legs pale yellow. Petiole whitish. Gaster dark brown. Ovipositor brown, apical half of third valvulae pale.

Structure. Head width 1.4x its height; frontovertex 0.5x head width. Ocelli in slightly obtuse triangle; distance between posterior ocelli 1.5x as long as distance between posterior ocellus and eye. Eyes setose, 1.7x as long as cheeks. Antennae (Fig. 32) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.0, S-4.5, P-1.3, F1-1.6, F2-1.5, F3-1.7, F4-2.0, F5-1.8, F6-2.3. Club 2-segmented, slightly longer than two preceding funicular segments combined. Second-fourth flagellar segments with one linear sensillum each, club segments with two sensilla each. Midlobe of mesoscutum with 8 setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla closely spaced, separated by a distance of about 2x width of a sensillum. Fore wing uniformly

setose, 2.7x as long as wide; marginal fringe 0.4x wing width; one basal seta. Marginal vein (Fig. 33) with 6 setae along anterior margin. Setae on infusate part of disc long and strong, setae on hyaline part of disc thin and short. Hind wing 9x as long as wide, with marginal fringe 1.1x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 34) 0.8x as long as basitarsus, the latter slightly longer than proximal two tarsal segments combined. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor (Fig. 35) exerted, its base originating at the level of second tergite, 1.6x as long as middle tibia; third valvula about 0.5x as long as second valvifer.

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia azteca* sp. n. is similar to *E. mahoniae* sp. n. in the *japonica* group. These species can easily be distinguished as follows: occiput with dark transverse band medially, petiole whitish, hind coxae and femora whitish; scape 4.5x as long as wide; midlobe of mesoscutum with 8 setae; ovipositor 1.6x as long as middle tibia; third valvula 0.5x as long as second valvifer. In *E. mahoniae*: occiput entirely dark; petiole infusate; hind coxae and femora dark; scape 3.5x as long as wide; midlobe of mesoscutum with 6 setae; ovipositor 1.4x as long as middle tibia; third valvula 0.4x as long as second valvifer.

7. *Encarsia bimaculata* Heraty and Polaszek
(Figs 36-40)

Encarsia bimaculata Heraty and Polaszek, 2000: 155- 157. Holotype ♀, India: Tabarbhani, 19.vii.1994, R. Nguyen, laboratory culture in Gainesville, Florida, U.S.A., USNM [non-type specimens from Gainesville laboratory culture examined].

Species-group placement: *strenua* group.

Diagnosis. Female habitus - Fig. 36. Tarsal formula 5-5-5; fore wing hyaline, slightly infusate near base of marginal vein, uniformly setose; marginal vein (Fig. 38) with 6 setae along anterior margin;

marginal fringe 0.25-0.40x wing width; 5-6 basal group setae; antennal club 3-segmented (Fig. 37) and second flagellar segment without a linear sensilla; midlobe of mesoscutum with 8 setae; scutellar placoid sensilla closely spaced, distance between sensillae less than diameter of one sensillum; midtibial spur (Fig. 39) 0.6-0.8x as long as basitarsus; apical pretarsus of all legs with pair of very developed tarsal claws; ovipositor 1.1-1.38x as long as middle tibia; third valvula 0.32-0.36x as long as second valvifer; female body mostly yellow, mesosoma with brownish markings, gaster with first-second tergites brownish. Male antenna - Fig. 40.

Hosts. Aleyrodidae - *Bemisia tabaci* (Gennadius). Additional host has been recorded: *Trialeurodes vaporariorum* (Westwood).

World distribution. Australia, China (J. Huang and A. Polaszek, personal communication), Honduras, India, Indonesia, Papua New Guinea, Philippines, Thailand, U.S.A. (Florida, Texas), possibly Sudan and Israel.

Distribution in Mexico. Guerrero.

References. Heraty & Polaszek, 2000; Schmidt *et al.*, 2001; Noyes, 2002, 2006; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: Guerrero, Taxco, 1 ♀, 1992, ex *Bemisia tabaci* (Gennadius) on *Chamaesyce hyssopifolia*, P. Stansly (Heraty & Polaszek, 2000).

8. *Encarsia catemaco* Myartseva (Figs 41-45)

Encarsia catemaco Myartseva, 2007b: 67-69. Holotype ♀, Mexico: Veracruz, Catemaco, ex Aleyrodidae on unknown tree, 8.i.2007, S. Myartseva, D. Kasparyan (in UCR, examined).

Species-group placement. *luteola* group.

Description. Female. Length: about 1.0 mm.

Coloration. Head black; antennae light yellow with radicle black, dorsal margin of scape and apical segment of club infuscate.

Mesosoma black, side lobes light yellow with dark apical spot. Scutellum light yellow, scutellar setae pale. Fore wings hyaline. Legs whitish yellow, hind coxae infuscate. Gaster black, third valvulae brownish, tips of stylets black.

Structure. Head 1.2x as wide as height. Frontovortex with transversely striate sculpture, its width about 0.5x head width. Distance between posterior ocelli about 1.7x as long as distance from ocellus to eye margin. Eyes finely setose, about 1.6x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 41) inserted immediately under the level of lower margin of eyes; distance between antennal toruli about as long as distance to eyes and 2 times longer than distance to mouth margin. Antennal segments with following ratios of length to width: R-2.5, S-4.5, P-1.5, F1-2.2, F2-2.4, F3-2.3. Club 2-segmented, about as long as two preceding funicle segments combined. All flagellar segments with one longitudinal sensillum each. Midlobe of mesoscutum with 18 setae, side lobes each with three setae, axillae each with one seta. Mesoscutum 1.2x as wide as long. Scutellum as wide as mesoscutum, about 0.7x as long as mesoscutum and about 1.8x as wide as long. Scutellar placoid sensilla widely spaced. Distance between anterior scutellar setae slightly shorter than distance between posterior setae (25:28). Both pairs of setae subequal in length, which is 0.6x scutellum length. Fore wing uniformly setose, 2.3x as long as wide, base with 9 setae under apical part of submarginal vein, marginal fringe about 0.2x maximum width of wing. Marginal vein (Fig. 42) with 10 setae along anterior margin, submarginal vein as long as marginal vein, stigmal vein close to wing margin. Hind wing about 8x as long as wide, its marginal fringe slightly longer than maximum width of wing (7:8). Tarsal formula 5-4-5. Midtibial spur (Fig. 43) about 0.9x as long as basitarsus; basitarsus longer than next two tarsal segments combined (25:20). Ovipositor (Fig. 44) exerted, about 1.8x as long as middle tibia; third valvula about 0.6x as long as second valvifer.

Male. Length: 0.64 mm.

Coloration. Head as in female. Mesosoma black, side lobes (except apical dark spot), lateral and posterior margins of midlobe of mesoscutum yellow. Scutellum yellow with two longitudinal dark markings. All coxae, femora and dorsal margin of hind tibiae on basal half infuscate.

Structure. Head 1.4x as wide as height. Frontoververtex as in female. Antennae (Fig. 45) inserted on the level of lower margin of eyes; distance between antennal toruli twice shorter than distance to eyes and twice longer than distance to mouth margin. Antennal segments with following ratios of length to width: R-2, S-3.5, P-1.2, F1-F4-2.5 each. All flagellar segments with two longitudinal sensilla. Club segments suffused, as long as two preceding funicle segments combined. Midlobe of mesoscutum with 14 setae, sculpture largely reticulate, width 1.5x longer than length. Scutellum also largely reticulate, 1.2x shorter than mesoscutum and 1.6x as wide as long. Distance between scutellar placoid sensilla 4x as long as width of one sensillum. Scutellar setae situated as in female, but anterior pair slightly shorter than posterior pair. Fore wing 2.5x as long as wide, its marginal fringe about 0.25x maximum width of wing, base with 5 setae, marginal vein with 7 setae along anterior margin. Hind wing 9.5x as long as wide, its marginal fringe about 1.7x as long as maximum width of wing. Midtibial spur 0.8x as long as basitarsus. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively.

Hosts. Aleyrodidae.

Distribution in Mexico. Veracruz.

References. Myartseva, 2007b.

Comments. *Encarsia catemaco* Myartseva is very close to *Encarsia guadeloupae* Viggiani described from Guadeloupe in Central America (Viggiani, 1987), especially in coloration, but can be readily distinguished by the following characters: in *E. catemaco* female, hind femora whitish yellow, fore wing 2.3x as long as wide, with 9 setae on base, ovipositor strongly exserted, 1.8x as long as middle tibia, gastral second-fourth tergites with 2 setae each, fifth with 4 setae; in *E. guadeloupae*, hind femora brown, fore wing 2.6x as long as wide, with 3-5 setae on base, ovipositor very slightly exserted, 0.95x as long as middle tibia, gastral second-fifth tergites with 6 setae each.

9. *Encarsia citrella* (Howard)
(Figs 46-50)

Prospaltella citrella Howard, 1908: 282. Lectotype ♀ (designated by Evans & Polaszek, 1997), U.S.A.: Florida, Orlando, ex *Aleyrodes* [= *Aleuroplatus*] *coronatus*, A.W. Morrill (in USNM, examined).

Encarsia citrella (Howard); Viggiani & Mazzone, 1979, change of combination.

Encarsia citrella (Howard); Evans & Polaszek, 1997: 566, redescription, male illustrated.

Species-group placement. *citrella* group.

Diagnosis. Tarsal formula 5-5-5; fore wing slightly infusate under marginal vein and uniformly setose; marginal vein (Fig. 47) with 6-7 setae along anterior margin; marginal fringe 0.4x wing width; 4 basal group setae; antennal club (Fig. 46) 3-segmented and second flagellar segment without a linear sensilla; midlobe of mesoscutum with 2 pairs of setae; scutellar placoid sensilla closely spaced, distance between sensillae less than 2x diameter of one sensillum; midtibial spur (Fig. 48) subequal to basitarsus; ovipositor (Fig. 49) exerted, 1.6x as long as middle tibia; third valvula 0.5x as long as second valvifer; female body yellow, except third-fifth gastral tergites dark brown centrally and third valvulae brownish apically. Male antenna - Fig. 50.

Hosts. Aleyrodidae - *Aleurothrixus floccosus* (Maskell), *Bemisia tabaci* (Gennadius), *Tetraleurodes* sp. The following hosts have been recorded: *Aleuroplatus coronatus* (Quaintance), *A. liquidambaris* (cited as *A. elemerae* Mound & Halsey, 1978), *Tetraleurodes ursorum* (Cockerell).

World distribution. Chile, Honduras, U.S.A. (Florida, Arizona, California).

Distribution in Mexico. *Tamaulipas.

References. Evans, 1993; Schauff *et al.*, 1996; Evans & Polaszek, 1997; Gordh, 1979; Heraty & Woolley, 1999; Noyes, 2002, 2006; Myartseva *et al.*, 2004, 2006; Myartseva & Ruíz-Cancino, 2005; Coronado-Blanco *et al.*, 2005a, 2005b.

Material examined. Mexico: Tamaulipas, Gómez Farías, Nacimiento, 5 ♀, 16 xi.1998, ex *Tetraleurodes* sp.; Gómez Farías, 1 ♀, 24.i.1999, same host; Ciudad Victoria, Cañon Novillo, 6 ♀, 2 ♂, 26.xi.1998, ex Aleyrodidae; Cd.Victoria, 4 ♀, 1 ♂, 3.ix.1998, ex *Bemisia tabaci*-complex on *Rosa* sp.; 3 ♀, 2 ♂, 2.x.1998, ex Aleyrodidae on *Psidium guayava*; 1 ♀, 9.xi.2006, ex *Tetraleurodes* sp. on unknown tree; Jaumave, 2 ♀, 4.x.1998, ex *Aleurothrixus floccosus* on *Citrus limon*; Balcon Moctezuma, 1 ♀, 23.ii.1999, ex Aleyrodidae; Tropic of Cancer, 35 km S. Cd.Victoria, 1 ♀, 11.i.2001, ex *Tetraleurodes* sp. on *Karwinskia humboldtiana*; Llera, Rio Guayalejo, 1 ♀, 27.xi.2005, ex *Tetraleurodes* sp. on *Karwinskia humboldtiana*, S. Myartseva.

Comments. New record for Mexico.

10. *Encarsia citricola* Myartseva, sp. n.
(Figs 51-57)

Species-group placement. *japonica* group.

Material examined. Holotype ♀, Mexico: Guanajuato, San Miguel de Allende, ex *Trialeurodes floridensis* (Haliday) on *Citrus sinensis*, 16.xi.2005, S. Myartseva, UCR. Paratypes - same label data as holotype, 2 ♀ and 2 ♂, UAT.

Description. Female. Length: 0.80 mm (without ovipositor).

Coloration. Head yellow; face, cheeks and occiput below foramen brownish; interocellar triangle and two triangular spots on frontovertex behind ocelli infuscate. Antennae yellowish-white; scape, pedicel and apical segment of club slightly infuscate. Pronotum, axillae, tegulae, mesopleuron and propodeum brown; midlobe of mesoscutum brownish-yellow, darker along the middle; scutellum, metanotum and side lobes of mesoscutum (except for apices) light yellow. Fore wings infuscate below marginal vein, with dark and strong setae on disc, apical half of disc with short, thin and light setation; marginal vein slightly infuscate. Legs whitish; middle coxae, hind coxae and hind femora brownish. Gaster brown, ovipositor valvulae yellowish-white.

Structure. Head about as wide as thorax and slightly wider than height. Frontovortex 0.5x as wide as head width and slightly wider than long (9:8). Ocelli forming slightly obtuse triangle; distance between posterior ocelli about 0.5x as long as distance from ocellus to eye margin and about as long as distance to occiput margin. Eyes finely and scatterly setose, about 1.4x as long as cheeks. Malar sulcus presents. Mandible with three teeth (Fig. 51). Antennae (Fig. 52) inserted immediately at the level of lower margin of eyes. Distance between toruli about 0.5x as long as distance to eye and twice as long as distance to mouth margin. Antennal segments with following ratios of length to width: S-4.0, P-1.5, F1-1.7, F2-F4-1.8 each. Club 2-segmented, slightly wider than funicle and about as long as two preceding funicular segments combined. First flagellar segment without sensillum, other segments with one sensillum each. Mesosoma with reticulate sculpture, distinctly visible on midlobe of mesoscutum and axillae. Midlobe of mesoscutum (Fig. 53) with 4 pairs of setae, side lobes each with three setae, each axilla with one seta. Midlobe about twice as wide as long. Scutellum shorter and slightly less than twice as wide as long. Scutellar placoid sensilla closely spaced, separated by distance about one width of a sensillum. Distance between posterior scutellar setae about 1.3 times as long as that between anterior setae. Fore wing (Fig. 54) uniformly setose, 2.6x as long as wide, its marginal fringe about 0.25x of wing width; disc with bare base, on apical middle with more short and thin setation than below marginal vein. Submarginal vein with two setae and one long seta on apex; marginal vein with 7 setae along anterior margin and subequal in length to submarginal vein. Hind wing about 7x as long as wide, its marginal fringe longer than maximum width of wing (4:3). Tarsal formula 5-5-5. Midtibial spur (Fig. 55) shorter than basitarsus (4:5); basitarsus subequal in length to two next tarsal segments combined. First-seventh gastral tergites with 1+1, 1+1, 1+1, 1+1, 1+1, 2+2 and 4 setae, respectively. Ovipositor (Fig. 56) exerted, its base arising at the level of third tergite. Ovipositor 1.5x as long as middle tibia. Third valvula 0.5x as long as second valvifer and 0.3x as long as ovipositor.

Male. Length: 0.70-0.80 mm.

Coloration. In coloration similar to female, but frontovortex without infusate triangular spots, antennae without infusate segments, fore wings hyaline.

Structure. Head about 1.2x wider than height and 1.8x wider than frontovertex. Eyes 1.6x as long as cheeks. Antennal segments with following ratios of length to width: S-3.3, (Fig. 57), F1-2.5, F2-F4-2.2 each. Club suffused, 3.7x as long as wide and about as long as two preceding funicular segments combined. All flagellar segments each with two sensilla. Fore wing 2.5x as long as wide, its marginal fringe about 0.3x wing width. Hind wing about 6.2x as long as wide. Genitalia about 0.6x as long as middle tibia.

Hosts. Aleyrodidae – *Trialeurodes floridensis* (Haliday).

Distribution in Mexico. Guanajuato.

Comments. Female of *Encarsia citricola* sp. n. is close to *E. quercicola* (Howard), described from *Aleyrodes gelatinosus* Cockerell on *Quercus* sp. in California, U.S.A. According to the original description by Howard (1908) and the redescription by Viggiani (1986), *E. citricola* can be distinguished by following characters: midlobe of mesoscutum with 8 (4+2+2) setae; middle coxae dark brown; club longer than third and fourth preceding segments combined; ovipositor with base at the level of third tergite; third valvula 0.3x as long as ovipositor; scape about 4x as long as wide; midlobe of mesoscutum brown-yellowish, along middle part fuscous. In *E. quercicola* - midlobe of mesoscutum with 6 (4+2) setae; middle coxae pale; club subequal in length to third and fourth preceding segments combined; ovipositor with base on the level of first tergite; third valvula about one-fourth of the total ovipositor length; scape about 5x as long as wide; hind portion of mesoscutum lemon yellow.

11. *Encarsia citrina* (Craw)
(Figs 58-61)

Coccophagus citrinus Craw, 1891: 25. Syntypes ♀♀, U.S.A.: California, San Gabriel Valley, 1889 (ex *Aspidiotus citrinus*) lost. Neotype ♀ (designated by De Bach & Rose, 1981), U.S.A.: California, San Gabriel Valley, 18.i.1889, D.W. Coquillett, from *Aspidiotus aurantii* var. *citrinus* [= *Aonidiella citrina*] (in USNM, examined).

Encarsia citrinus (Craw); Riley & Howard, 1891: 168, change of combination.

Aspidiotiphagus citrina (Craw); Howard, 1894a: 229, change of combination.

Prospaltoides howardi Brèthes, 1914: 13 (synonymized by Brèthes, 1916).

Aspidiotiphagus schoeversi Burgst, 1915: 292 (synonymized by Mercet, 1930b).

Aspidiotiphagus citrina (Craw); De Bach & Rose, 1981:671, neotype designation.

Encarsia citrina (Craw); Viggiani & Mazzone, 1979: 47; change of combination.

For full synonymy see Heraty & Woolley (1999).

Species-group placement. *citrina* group.

Diagnosis. Female habitus - Fig. 58. Tarsal formula 5-5-5; fore wing (Fig. 60) narrow, infusate below marginal vein, with large asetose area under stigmal vein; marginal vein with 4-5 setae along anterior margin; marginal fringe much longer than wing width; one basal seta; antennal club 3-segmented (Fig. 59), first-third flagellar segments subequal in length and without a linear sensilla; midlobe of mesoscutum with 2 pairs of setae; scutellar placoid sensilla widely spaced, distance between anterior scutellar setae longer than that between posterior setae; midtibial spur (Fig. 61) shorter than basitarsus; ovipositor slightly shorter than middle tibia and basitarsus combined; third valvula 0.5x as long as second valvifer; female head and mesosoma yellow with some brown markings; gaster dark brown except apex of seventh tergite yellow.

Hosts. Diaspididae, rarely Aleyrodidae (Huang & Polaszek, 1998). *E. citrina* was reared from *Abgrallaspis cyanophylli* (Signoret), *Aonidiella aurantii* (Maskell), *Chionaspis* (= *Phenacaspis*) *pinifoliae* (Fitch), *Genaparlatoria pseudaspidotus* (Lindinger), *Pinnaspis strachani* (Cooley), and *Unaspis citri* (Comstock) in Mexico. The following hosts have been recorded in the literature for this cosmopolitan species: Diaspididae - *Abgrallaspis cyanophylli* (Signoret), *Aonidia lauri* (Bouché), *Aonidiella aurantii* (Maskell), *A. citrina* (Coquillett), *A. orientalis* (Newstead), *A. taxus* Leonardi, *A. tinerfensis* (Lindinger), *Aspidiotus hedericola* Leonardi, *A. nerii* Bouché, *Aulacaspis rosae* (Bouché), *A. tuberculatus* (Newstead), *Borchseniaspis palmarum* (Cockerell), *Chionaspis lepineyi* Balachowsky, *Chrysomphalus aonidum* (L.), *Ch. dictyospermi* (Morgan), *Diaspidiotus alni* (Marchall), *D. ancylus* (Putnam), *D. prunorum* (Laing), *Diaspis boisduvali* Signoret, *D. bromeliae* (Kerner), *D.*

echinocacti (Bouché), *Dynaspidiotus britannicus* (Newstead), *Duplachionaspis berleseii* (Leonardi), *D. graminei* (Green), *Fiorinia fioriniae* (Targioni-Tozzetti), *Furchadiaspis zamiae* (Morgan), *Gonaspidiotus minimus* (Leonardi), *Hemiberlesia lataniae* (Signoret), *H. pitysophila* Takagi, *H. rapax* (Comstock), *Insulaspis tapleyi* (Williams), *Kuwanaspis bambusae* (Kuwana), *Lepidosaphes beckii* (Newman), *Lepidosaphes pallida* (Maskell), *L. ulmi* (L.), *Leucaspis pusilla* Loew, *L. signoreti* Targioni-Tozzetti, *Lindingaspis rossi* (Maskell), *Lineaspis striata* (Newstead), *Lopholeucaspis japonica* (Cockerell), *Melanaspis tenebricosa* (Comstock), *Nuculaspis californica* (Coleman), *Odonaspis secreta* (Cockerell), *Parlatoria oleae* (Colvée), *P. pergandii* Comstock, *P. ziziphi* (Lucas), *Phenacaspis pinifoliae* (Fitch), *Pinnaspis aspidistrae* (Signoret), *P. buxi* (Bouché), *P. strachani* (Cooley), *Pseudaonidia duplex* (Cockerell), *P. phaeoniae* (Cockerell), *Pseudaulacaspis pentagona* (Targioni-Tozzetti), *Quadraspidiotus gigas* (Thiem & Gerneck), *Q. ostreaeformis* (Curtis), *Q. perniciosus* (Comstock), *Q. pyri* (Lichtenstein), *Q. zonatus* (Frauenfeld), *Selenaspis articulatus* (Morgan), *Temnaspidiotus destructor* (Signoret), *Tsugaspidiotus tsugae* (Marlatt), *Unachionaspis bambusae* (Cockerell), *Unaspis euonymi* (Comstock), *U. yanonensis* (Kuwana). Aleyrodidae: *Aleurotrachelus micheliae* Takahashi.

World distribution. Cosmopolitan.

Distribution in Mexico. Chiapas, Guerrero, Jalisco, D.F., Nayarit, San Luis Potosí, Sinaloa, Tamaulipas, Veracruz.

References. Gordh, 1979; Heraty & Woolley, 1999; Howard, 1895; Huang & Polaszek, 1998; Hayat, 1998; Myartseva & Ruíz-Cancino, 2000; Polaszek *et al.* 1999; Ruíz-Cancino *et al.*, 1998; Viggiani, 1988; González-Hernández, 2000; Ruíz-Cancino & Coronado-Blanco, 2002; Noyes, 2002, 2006; Coronado-Blanco *et al.*, 2005 a, 2005b; Gaona-García *et al.*, 2005; Myartseva *et al.*, 2004; Myartseva & González-Hernández, 2007.

Material examined. Mexico: San Luis Potosí, 2 ♀, 12.xi.1999, ex Diaspididae on *Myrtilocactus geometrizers*, E. Ruíz; Guerrero, Acapulco, 6♀, 11.vi.2000, ex *Abgrallaspis cyanophylli* on ornamentals; 1♀, 12.vi.2000, on *Pithecellobium* sp., S. Myartseva. Tamaulipas, Ciudad Victoria, 2♀, 14.ii.2000, ex Diaspididae on

Amyris madrensis, H. S. Monrreal-Hernández; Llera, La Purísima, 4 ♀, 12.ii.2001, ex *Unaspis citri* on *Citrus sinensis*, S. Myartseva; 3 ♀, 22.x.1996, same host and plant; 1 ♀, 9.ix.1996, 1 ♀, 24.ix.1996, J.M. Coronado-Blanco. **D.F.**, Mexico City, 1 ♀, 14.iv.1990, ex *Chionaspis* (= *Phenacaspis*) *pinifoliae* on *Pinus* sp., F.D. Bennett; Botanical Garden, 9 ♀, 13.i.2007, ex Diaspididae on *Laurus nobilis* L., S. Myartseva. **Chiapas**, Tapachula, 1 ♀, 30.v.2005, ex *Unaspis citri* on *Citrus* spp., S. Myartseva. **Veracruz**, Los Tuxtlas, UNAM, 2 ♀, 10.i.2007, ex *Pinnaspis strachani* on *Citrus* spp.; Montepio, 7 ♀, 10.i.2007, ex *Pinnaspis strachani* on *Citrus* spp., S. Myartseva. **Sinaloa**, Los Mochis, 6 ♀, 12.ii.2004, ex *Genaparlatoria pseudaspidotus* (Lind.) on *Mangifera indica*, E. Garza-González; Mazatlán, 2 ♀, 18.v.2004, on *Hibiscus* sp., A. González-Hernández. **Jalisco**, Puerto Vallarta, 4 ♀, 24.vi.2004, on *Hibiscus* sp., A. González-Hernández. **Nayarit**, Alta Vista, 1 ♀, 22.v.2004, on *Mangifera indica*, A. González-Hernández.

Comments. Reports of this species as a parasitoid of aleyrodid species need to be confirmed, these reports could be based upon the erroneous identification of the parasitoid species or that the original sample contained both whitefly and armored scale insects.

12. *Encarsia clavata* Myartseva and González, sp. n.
(Figs 62-66)

Species-group placement. *inaron* group.

Material examined. Holotype ♀, **México: Chiapas**, Jiménez Ceballos, redeo, Hosp. 3,12, 12.viii.2000, A. González H., CIB 00-0090, UCR. Paratypes – same label data as holotype, 1 ♀. **Jalisco**, La Huerta, Est. Biol. Chamela UNAM, Vereda Tejon, redeo en maleza, 162 msnm, N 19 30.559', W 105 02.464', 27.vii.2000, 1 ♀, Y. Castillo O., A. Dávila L., A. González H., CIB 00-0039; Vereda Tejon-Ardilla, t. Malaise 2 en maleza, 17-21.i.2000, 1 ♀, M.A. Sarmiento, CIB 00-0065; Camino Chachalaca, redeo en maleza, 96.5 msnm, N 19 29.791', W 105 02.553', 26.vii.2000, 1 ♀, Y. Castillo O., A. Dávila L., A. González H., CIB 00-0036. FSCA, UCR, UNAM, UAT.

Description. Female. Length: 0.72-0.88 mm (holotype – 0.75 mm).

Coloration. Head yellow, frontovertex pale, cheeks on lower half brownish, triangular zones behind posterior ocelli slightly infuscate, occiput below foramen brownish, antennae whitish yellow, scape and apical segment of club slightly infuscate. Mesosoma brown, midlobe of mesoscutum posteriorly, side lobes, scutellum and metanotum yellow. Wings hyaline. Legs whitish, femora and tibiae near base slightly infuscate. Gaster brown, seventh tergite whitish yellow, ovipositor yellow, third valvulae and second valvifer laterally, apex of stylets brownish black.

Structure. Head as wide as mesosoma and 1.3-1.4x as wide as height. Frontovertex transversely striate, 0.6x head width. Ocelli forming small rectangled triangle; hind ocelli separated from eyes margin by distance about 3-4 diameters of an ocellus. Eyes about 1.4x as long as cheeks. Mandible 3-dentate. Malar sulcus present. Antennal scrobes deep and jointed above. Antennae (Fig. 62) inserted closely to mouth margin; distance between toruli 0.7-0.8x as long as distance from torulus to eye margin. Antennal segments with following ratios of length to width: S-4.0-4.2, P-1.7-2.2, F1-1.6-1.9, F2-1.6-1.9x, F3-1.4-1.5, F4-1.2-1.5, F5-1.4-1.5, F6-1.6-1.7. Club 4-segmented, slightly shorter than funicle, pedicel and scape combined; second-fifth flagellar segments each with one sensillum. Mesosoma with reticulate sculpture. Midlobe of mesoscutum (Fig. 63) with 4-5 pairs of setae (one female with 3 pairs of setae), side lobes each with two setae, axillae each with one seta. Midlobe about 1.8x as wide as long. Scutellum 0.6x as long as midlobe and about 2x as wide as long. Scutellar placoid sensilla widely spaced; distance between posterior pair of setae about 0.7 times as long as that between anterior pair of setae. Fore wing without an asetose area around stigmal vein, about 2.5x as long as wide, its marginal fringe 0.2-0.3x of maximum width of wing. Marginal vein with 5-6 long setae along anterior margin and slightly longer than submarginal vein; stigmal vein very short and closed to wing margin (Fig. 64). Base of wing with 3-4 setae on disc. Hind wing about 5.3x as long as wide, its marginal fringe slightly shorter than maximum width of wing. Tarsal formula 5-5-5. Midtibial spur (Fig. 65) about 0.8x as long as basitarsus; basitarsus subequal in length to next two tarsal segments combined. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 3+3, 3+3 and 4 setae, respectively. Ovipositor (Fig. 66) with base arising at the level of third tergite, slightly exserted, about 1.5x as long as middle tibia. Third valvula 0.5x as long as second valvifer.

Male. Unknown.

Hosts. Unknown.

Distribution in Mexico. Chiapas, Jalisco.

Comments. Antenna with 4-segmented club is very rare in *Encarsia* (for example, *E. nanjingensis* Hayat and Polaszek), also as club not clavate or not distinctly clavate (*E. smithi* Silvestri, *E. sueloderi* Polaszek, *E. phaea* Huang & Polaszek). In Mexican fauna of Aphelinidae *E. clavata* sp. n. is first native species with 4-segmented club. From *E. nanjingensis* it can be distinguished by follows: midlobe of mesoscutum with 4-5 pairs of setae, fore wing hyaline and 2.5x as long as wide, its marginal fringe 0.2-0.3x as long as width of wing, third valvula 0.5x as long as second valvifer, base of ovipositor arising at the level of third tergite, second funicular segment with sensillum. In *E. nanjingensis*: midlobe of mesoscutum with three pairs of setae, fore wing infusate below marginal vein and about 3x as long as wide, its marginal fringe 0.63x of wing width, third valvula 0.42x as long as second valvifer, base of ovipositor arising at the level of first tergite, second funicular segment without sensilla.

E. clavata is similar also to *E. smithi*, which was introduced into Mexico more 50 years ago for biological control of *Aleurocanthus woglumi* Ashby (Jiménez-Jiménez & Smith, 1958), but can be distinguished as follows: antenna distinctly 4-segmented, fore wing hyaline, ovipositor 1.5x as long as middle tibia, third valvula 0.5x as long as second valvifer, second funicular segment 1.1-1.3x as long as first segment. *E. smithi* has not distinctly clavate antenna, fore wing infusate below marginal vein, ovipositor shorter than middle tibia and basitarsus combined, third valvula 0.41x as long as second valvifer, second funicular segment 2x as long as first segment.

13. *Encarsia clypealis* (Silvestri)
(Figs 67-74)

Prospaltella clypealis Silvestri, 1928: 28-30. Syntype ♀, Vietnam: Coxan (Tonkin), ex *Aleurocanthus incertus* Silvestri on *Citrus* sp. (in IEUN, not examined).

Encarsia clypealis (Silvestri); Viggiani & Mazzone, 1979: 45, change of combination.

Species-group placement. *opulenta* group.

Diagnosis. Head, frontal view - Fig. 67, stigmal vein - Fig. 71, middle tibia, tarsus and midtibial spur - Fig. 72, second valvifer and third valvula - Fig. 73. Tarsal formula 5-5-5; fore wing (Fig. 70) hyaline and uniformly setose; first flagellar segment quadrate (Fig. 68); clypeus with a tooth; midlobe of mesoscutum (Fig. 69) with 5 pairs of setae; ovipositor distinctly exerted, seventh tergite elongated; body dark brown with pale scutellum, side lobes of mesoscutum and apex of seventh tergite; legs pale yellow with coxae, hind femora, basal half of fore and middle femora dark brown; in male antenna (Fig. 74) first and second flagellar segments united to form a large oval structure.

Hosts. Aleyrodidae - *Aleurocanthus incertatus* Silvestri, *A. spiniferus* (Quaintance), *A. spinosus* Kuwana, *A. woglumi* Ashby, *Aleyrodes* sp.

World distribution. Originally described from Vietnam and known from much of southeast Asia, introduced into U.S.A (Florida, Texas).

Distribution in Mexico. Colima, Jalisco, Morelos, San Luis Potosí, Tamaulipas, Veracruz (introduced).

References. De Santis, 1979; Evans, 1993; Hayat, 1989, 1998; Myartseva & Ruíz-Cancino, 2000; Ruíz-Cancino & Coronado-Blanco, 2002; Noyes, 2002, 2006; Myartseva *et al.*, 2004, 2006; Myartseva, 2005; Coronado-Blanco *et al.*, 2005a.

Comments. *E. clypealis* was introduced from southeast Asia to Mexico in 1949-1950 against the citrus blackfly, *Aleurocanthus woglumi*. According to Smith *et al.* (1964), this species provided satisfactory control of this pest when used in combination with *E. opulenta* (Silvestri) [probably a misidentification of *E. perplexa*] and *Amitus hesperidum* Silvestri. No recent records exist of this parasitoid reared from this or other hosts in Mexico.

14. *Encarsia colima* Myartseva
(Figs 75-82)

Encarsia colima Myartseva, 2005: 148-150. Holotype ♂, **Mexico, Colima**, Tecmán, 16.ii.2004, C.M. Díaz-Hernández, ex *Aleurocanthus woglumi* Ashby on *Citrus* sp. (in UCR, examined).

Species-group placement. *opulenta* group.

Description. Male. Length: 0.60 mm.

Coloration as in female, but scutellum slightly infusate, with setae dark.

Structure. Head slightly higher than wide. Frontoververtex transversely striate, about 0.6x head width. Ocelli forming small obtuse triangle. Eyes 1.6-1.7x as long as cheeks. Clypeus with small and short tooth-like projection. Antennae (Fig. 82) inserted immediately under the level of lower margin of eyes. Antennal scape about 4.5x as long as wide. Pedicel subquadrate. First and second funicular segments elongate and not united to form a large oval structure. Flagellar segments with following ratios of length to width: F1-2.8, F1-2.7, F3-3.0, F4-3.0, F5-3.0, F6-3.2. All segments with 4 longitudinal sensilla, except sixth with two sensilla. Midlobe of mesoscutum with 8-10 setae. Distance between anterior scutellar setae slightly greater than that between posterior setae (19:16). Fore wing uniformly setose, but with very small asetose area beneath stigmal vein and 2.4x as long as wide; its marginal fringe about 0.25x wing width. Marginal vein with 5 setae along anterior margin and slightly longer than submarginal vein. Hind wing about 9x as long as wide; its marginal fringe 1.4x wing width; disc weakly setose, its base with two setae under apical part of submarginal vein. Gaster not longer than mesosoma. Seventh tergite very slightly elongate.

Female. Length: 0.80-0.90 mm.

Coloration. Head yellowish brown; cheeks and clypeus brownish; frontoververtex with orange tinge; antennae yellow. Mesosoma brownish black; scutellum, side lobes of mesoscutum except apices, and metanotum yellow. Fore wings hyaline, veins slightly infusate. Fore and middle femora except apices, hind femora, hind tibiae basally brownish; fore and middle tibiae and all tarsi yellowish white. Petiole yellow. Gaster black; apical half of ovipositor black; apex of seventh tergite white.

Structure. Head (Fig. 75) about as wide as long. Frontoververtex transversely striate, about 0.5x head width. Ocelli forming small rectangular triangle. Eyes finely setose, 1.4-1.5x as long as cheeks.

Cheeks with malar sulcus. Mandible with three teeth. Antennae (Fig. 76) inserted immediately under the level of lower margin of eyes. Distance between toruli about 1.5x as long as distance between torulus and mouth margin, while shorter than distance between torulus and eye margin. Clypeus with small and short tooth-like projection medially and with 3 pairs of setae. Scape about 4.5x as long as wide. Pedicel slightly longer than wide (5:4). First flagellar segment short and subquadrate, about 0.7x as long as pedicel. All other segments of flagellum with following ratios of length to width: F2 -1.8, F3 -2.2, F4 -2.0, F5 -1.7, F6 -1.8. Second to sixth flagellar segments with two, fifth with three longitudinal sensilla. Mesosoma with reticulate sculpture, distinctly visible on midlobe of mesoscutum and axillae. Midlobe with 5 pairs of setae; side lobes each with 3 setae; axillae each with one seta. Scutellum about twice as wide as long. Scutellar placoid sensilla widely spaced. Distance between anterior scutellar setae less than distance between posterior setae (5:6). Fore wing (Fig. 77) 2.3x as long as wide; its marginal fringe about 1/6-1/5 of wing width; disc uniformly setose; base with 3 setae under apical part of submarginal vein. Marginal vein with 8 setae along anterior margin and longer than submarginal vein (7:5). Stigmal vein (Fig. 78) sessile, close to wing margin. Hind wing about 8 times as long as wide, its marginal fringe subequal in length to wing width; disc with scattered setae. Midtibial spur (Fig. 79) slightly shorter than basitarsus; basitarsus subequal in length to 3 next tarsal segments. Gaster longer than mesosoma; seventh tergite (Fig. 81) slightly longer than wide (11:10). Ovipositor (Fig. 80) with base at the level of first tergite and very protruded, twice as long as middle tibia and 1.5x as long as middle tibia and basitarsus combined. Third valvula about 0.7x as long as second valvifer.

Hosts. Aleyrodidae - *Aleurocanthus woglumi* (Ashby).

Distribution in Mexico. Colima, Veracruz.

References. Myartseva, 2005; Myartseva *et al.*, 2006.

Material examined. Mexico: Colima, Tecomán, 7 ♀, 1 ♂, 16.ii.2004, ex *Aleurocanthus woglumi* Ashby on *Citrus* sp., C.M. Díaz-Hernández; 1 ♀, 2.vi.2006, ex *Aleurocanthus woglumi* on *Citrus* sp., S. Myartseva. Veracruz, San Rafael, 1 ♀, 28.xii.2004, ex *Aleurocanthus woglumi* on *Citrus* sp., S. Varela-Fuentes.

Comments. *Encarsia colima* Myartseva is close to *E. clypealis* Silvestri, but can be easily distinguished by the structure of the male antenna. Male of *E. clypealis* was described in 1989 by Hayat. He has shown that the male antenna of *E. clypealis* is similar to that of *E. opulenta*: first and second funicle segments "united to form a large oval structure". This feature is absent in male of *E. colima*. Furthermore, the first and second funicular segments in *E. colima* are longer than in *E. clypealis*: ratio of length to width is 2.8 and 2.7, and 1.1 and 1.25, respectively; third and fourth flagellar segments in *E. colima* 3.0x as long as wide, whereas in *E. clypealis* they are 1.8x and 1.7x as long as wide, respectively. In female of *E. colima*, fifth and sixth flagellar segments combined are distinctly shorter than two preceding segments lumped together, whereas this relation is opposite in *E. clypealis*, according to figure by Hayat (1989, 1998). It was found that both sexes of *E. colima* and *E. clypealis* have a tooth on clypeus, however the apex of this prominence is roundish in *E. colima*, and triangular in *E. clypealis*.

Females of *E. colima* were compared with the original description and figures of *E. clypealis* in Silvestri (1927) and with the description and figures of *E. clypealis* in Hayat (1989), which differ from those by Silvestri. According to Silvestri's figure (1927), antennal toruli of *E. clypealis* situated distinctly lower than the level of the lower margin of eyes; in *E. clypealis* by Hayat (1989) and *E. colima*, toruli are situated distinctly higher, immediately under the level of the lower margin of eyes. In *E. clypealis* of Silvestri (1927) and *E. colima*, the torulus is subequal in length to the distance from torulus to the mouth margin; in *E. clypealis* of Hayat (1989) the torulus is longer than distance from torulus to the mouth margin. M. Hayat confirmed that *E. colima* is new species.

It is possible to suppose that *Encarsia* species known from Mexico as *E. clypealis* (Silvestri, 1927) is, actually, *E. colima*. The native area of *E. colima* is, perhaps, the Oriental Region, from which the species was introduced to Mexico as *E. clypealis* Silvestri together with *E. perplexa* Huang and Polaszek, introduced as *E. opulenta* Silvestri. Unfortunately, it was impossible to find and examine original primary samples of parasitoid species which were introduced to Mexico more than 50 years ago.

15. *Encarsia coquilletti* Howard

Encarsia coquilletti Howard, 1895: 29. Syntypes 5 ♀ and 2 ♂, U.S.A.: California, Los Angeles, 18-21.ix, , ex "*Aleyrodes*" on *Sonchus* sp., D.W. Coquillett (in USNM, examined).

Species-group placement. *inaron* group.

Diagnosis. Tarsal formula 5-5-5; fore wing hyaline and uniformly setose; scutellar placoid sensilla separated more than 2-3x diameter of one sensillum; body entirely brown to dark brown except small transverse yellow area on base of gaster.

Hosts. Aleyrodidae - "*Aleyrodes*" sp.; *Trialeurodes abutilonea* Haldeman, *Aleyrodes spiraeoides* Quaintance, *Trialeurodes* sp.

World distribution. U.S.A. (California).

Distribution in Mexico. *Jalisco, *Sinaloa.

References. Schauff *et al.*, 1996; Noyes, 2002, 2006.

Material examined. Mexico: Sinaloa, Quesin, 1 ♀, 26.vii.1990, ex *Trialeurodes* sp. on *Glycine max*, B. Alvarado. Jalisco, La Huerta Est. Biol. UNAM, Camino Verdin, 140 msnm, N 19 29'799'', W 105 02'621'', 3 ♀, 26.vii.2000, redeo en maleza, Y. Castillo O., A. Dávila L., A. González H., CIB 00-0038.

Comments. New record for Mexico.

16. *Encarsia costaricensis* Evans and Angulo
(Figs 83-87)

Encarsia costaricensis Evans and Angulo, 1996: 583-586. Holotype ♀, Costa Rica: Paraiso de Cartago, 4.ii.1994, ex *Trialeurodes vaporariorum* on *Sechium edule*, C.L. Angulo (in USNM, examined).

Species-group placement. *strenua* group.

Diagnosis. Female habitus - Fig. 83. Tarsal formula 5-5-5; fore wing hyaline, slightly infusate basally; marginal vein with 6-7 long and

slender setae along anterior margin; disc with 9 ~~group~~ basal setae; stigmal vein (Fig. 85) bulbous; club 3-segmented (Fig. 84), first flagellar segment the longest and without linear ~~sensilla~~; midlobe of mesoscutum with 8 setae; scutellar placoid sensilla closely spaced, separated by distance 1.5x diameter of one sensillum; ovipositor 1.1x as long as middle tibia; third valvula 0.26x length of ovipositor; body entirely yellow except posterior margin of pronotum, distal two-thirds of scape, pedicel and flagellum, brownish; legs yellow. Male habitus - Fig. 86, antenna - Fig. 87.

Hosts. Aleyrodidae - *Trialeurodes vaporariorum* (Westwood).

World distribution. Costa Rica.

Distribution in Mexico. *Tamaulipas.

References. Evans & Angulo, 1996; Heraty & Woolley, 1999; Noyes, 2002, 2006; Coronado-Blanco *et al.*, 2005a; Myartseva *et al.*, 2004.

Material examined. Mexico: Tamaulipas, Ciudad Victoria, Balcon Moctezuma, 2 ♂, 23.ii.1999, ex Aleyrodidae on *Karwinskia humboldtiana*, S. Myartseva.

Comment. New record for Mexico.

17. *Encarsia cubensis* Gahan (Figs 88-90)

Encarsia cubensis Gahan, 1931: 121. Syntype ♀, Cuba: Santiago de las Vegas, received from S.C. Bruner, reared from *Aleurothrixus howardi* (=flocosus), type N 43530, (in USNM, examined). Male unknown.

Trichoporus cubensis (Gahan); Dozier, 1933: 92.

Encarsia cubensis Gahan; Evans & Polaszek, 1998: 226; revision of species group.

Species-group placement. *cubensis* group.

Diagnosis. Female habitus - Fig. 88. Tarsal formula 5-4-5; fore wing (Fig. 90) hyaline and with an asetose area around stigmal vein; marginal vein with 5-6 setae around stigmal vein; 2 basal group setae; marginal

fringe 0.4x wing width; first flagellar segment (Fig. 89) 0.5x as long as second segment and the latter longer than third segment; midlobe of mesoscutum with 2 pairs of setae; scutellar placoid sensilla widely spaced, separated by distance about 5x width of a sensillum; midtibial spur 0.8x as long as basitarsus; ovipositor as long as middle tibia; third valvula 0.6x as long as second valvifer; head, pronotum, mesoscutum except lateral margins, axillae, propodeum laterally dark brown; gaster dark brown with central portion of first-second tergites yellow; seventh tergite and legs yellowish.

Hosts. Aleyrodidae – *Aleurothrixus floccosus* (Maskell), *Aleurotrachelus trachoides* (Back), *Bemisia tuberculata* Bondar.

World distribution. Brazil, Cuba, Dominican Republic, Guadeloupe, Haiti, Puerto Rico, U.S.A. (Florida).

Distribution in Mexico. Locality unknown.

References. De Santis, 1979; Evans, 1993; Schauff *et al.*, 1996; Evans & Polaszek, 1998; Heraty & Woolley, 1999; Evans & Serra, 2002; Noyes, 2002, 2006; Myartseva *et al.*, 2004.

Material examined. Mexico: San Antonio, P.O.E., 1♀, 12.v.1995, ex Aleyrodidae, D.R. Johnson.

Comment. New record for Mexico.

18. *Encarsia divergens* (Silvestri)
(Figs 91-94)

Prospaltella divergens Silvestri, 1926: 182-184. Syntypes ♀♀, Mexico/Cuba – Singapore, ex *Aleurocanthus woglumi* on *Citrus* sp. (in IEUN, not examined). Male unknown.

Encarsia divergens (Silvestri); Viggiani & Mazzone, 1979: 45.

Species-group placement. *divergens* group.

Diagnosis. Female habitus - Fig. 91. Tarsal formula 5-5-5; fore wing (Fig. 93) hyaline and uniformly setose, 2.5x as long as wide; marginal fringe about 0.25x wing width; marginal vein with 8 setae along anterior margin; first flagellar segment (Fig. 92) subquadrate, second

segment about 2.5x as long as first segment; midlobe of mesoscutum with 10 setae; scutellar placoid sensilla widely spaced, separated by distance more than 2-3x diameter of a sensillum; ovipositor (Fig. 94) 1.1x as long as middle tibia; third valvula 0.37x as long as second valvifer; head and body generally light brown except the posterior mesoscutum and scutellum, which are orangish or yellow; seventh tergite pale.

Hosts. Aleyrodidae – *Aleurocanthus citriperdus* Quaintance & Baker, *A. longispinus* Quaintance & Baker, *A. spiniferus* (Quaintance), *A. woglumi* Ashby.

World distribution. Cuba, India, Indonesia, Singapore.

Distribution in Mexico. Colima, Jalisco, Morelos, San Luis Potosí, Sinaloa (introduced).

References. De Santis, 1979; Hayat, 1989, 1998; Schauff *et al.*, 1996; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Myartseva *et al.*, 2004, 2006.

Comments. Clausen (1978) noted, that the importation of *E. divergens* into Mexico against *Aleurocanthus woglumi* was unsuccessful. This species has not been reared from citrus blackfly or other hosts during the 50-year period following its introduction, according to published data. But we include the species in this book, because there were not special investigations of distribution of introduced species; therefore presents possibility to find this species in Mexico, as in case with other introduced whitefly parasitoids, *Encarsia smithi* and *Encarsia dominicana*.

19. *Encarsia dmitrii* Myartseva
(Figs 102-106)

Encarsia dmitrii Myartseva, 2007b: 69-71. Holotype ♀, **Mexico: Veracruz**, Los Tuxtlas, 30 km N Catemaco, Estación de Biología Tropical de Instituto de Biología, UNAM [18°35' N, 95°5' W], ex Aleyrodidae on *Pleuranthodendron lindellii*, 11.i.2007, S. Myartseva, D. Kasparyan (in UCR, examined).

Species-group placement. *luteola* group.

Description. Female. Length: 0.70-0.72 mm.

Coloration. Head brown, face yellow, postocellar bars, clypeus and cheeks black, occiput around foramen and above, also behind postocellar bars darkened. Antennae whitish yellow. Mesosoma yellow, pronotum and anterior half midlobe of mesoscutum brownish black. Fore wings hyaline. Legs whitish yellow. Petiole brownish black with yellowish posterior margin. Gaster largely brownish black, seventh tergite completely yellow, first tergite completely black, central part of second-sixth tergites yellow, composed large triangled spot.

Structure. Head 1.4x as wide as height. Frontovortex width about 0.5x head width. Ocellar triangle transversely striate. Ocelli forming an obtuse apical triangle; distance between posterior ocelli slightly shorter than distance to eye margin. Eyes 1.5x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 102) inserted immediately under the level of lower margin of eyes; distance between toruli about as long as distance to eye and about 1.5x as long as distance to mouth margin. Antennal segments with following ratios of length to width: R-1.5, S-4.4, P-1.3; F1-1.2, F2-1.3, F3-1.5. Club 3-segmented, subequal in length to funicle and pedicel combined. First-second flagellar segments without sensilla, third-sixth segments with one sensillum each. Midlobe of mesoscutum with 5 pairs of setae, slightly wider than length (50:45). Scutellum about 0.8x as wide as long. Scutellar placoid sensilla ovoid and widely spaced, separated by distance about 4x diameter of one sensillum. Distance between anterior scutellar setae about 0.8x as long as distance between posterior setae. Fore wing uniformly setose, 2.4x as long as wide, base with 4-6 setae, marginal fringe about 0.2x maximum width of wing. Marginal vein (Fig. 103) about as long as submarginal vein, with 6-7 setae along anterior margin; stigmal vein very close to wing margin. Hind wing about 8x as long as wide, its marginal fringe longer than maximum width of wing (27:20). Tarsal formula 5-4-5. Midtibial spur (Fig. 104) as long as basitarsus; basitarsus as long as next two and half of fourth tarsal segments combined. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 3+3, 3+3 and 4 setae, respectively. Structure of sides of first-fourth tergites widely reticulate, on sides of fifth-sixth tergites structure longitudinally punctate. Ovipositor (Fig. 105) arising at the level of fourth tergite, about 1.2x as long as middle tibia; third valvula 0.8-0.9x as long as second valvifer.

Male. Length: 0.62-0.70 mm.

Coloration. Head as in female. Mesosoma brown, pronotum and middle part of midlobe of mesoscutum black, lateral and posterior margins yellow, scutellum and metanotum yellow, side lobes of mesoscutum yellow with dark apical spot. Petiole yellow posteriorly. Wings and legs as in female. Metasoma brownish black.

Structure. Head and frontovertex with ocelli about as in female. Eyes slightly longer than cheeks (40:35). Antennae (Fig. 106) inserted close to mouth margin. Antennal segments with following ratios of length to width: R-1.6, S-4.0, P-1.2, F1-1.0, F2-1.0, F3-1.2, F4-2.0; first-third segments forming an enlarged, specialized sensory-glandular complex. Club segments suffused, subequal in length to two preceding funicle segments combined. All flagellar segments with 4 linear sensilla each. Midlobe of mesoscutum about 1.5x as wide as long, with three pairs of setae, each side lobe with one seta, axillae each with one seta placed close to inner margin of axilla. Sculpture of midlobe of mesoscutum widely reticulate, along sides and posterior margin longitudinally striated. Scutellum longitudinally reticulate, 1.8x as wide as long. Scutellar placoid sensilla separated by distance about 7x diameter of a sensillum. Distance between anterior scutellar setae 1.5x as long as distance between posterior setae. Fore wing 2.5x as long as wide, base with 2 setae, marginal fringe about 0.4x maximum width of wing; disc scatterly setose, with small bare spot in front of stigmal vein and narrow bare area along posterior margin. Hind wing 9.6x as long as wide, its marginal fringe about 1.6x of maximum width of wing. Second-seventh gastral tergites with setation as in female. Structure of seventh tergite transversely wrinkled.

Hosts. Aleyrodidae.

Distribution in Mexico. Veracruz.

References. Myartseva, 2007b.

Material examined. Mexico: Veracruz, Los Tuxtlas, 30 km N Catemaco, Estación de Biología Tropical de Instituto de Biología, UNAM [18°35' N, 95°5' W], 1 ♀, 4 ♂, 11.i.2007, ex Aleyrodidae on *Pleuranthodendron lindellii*, S. Myartseva, D. Kasparyan; Catemaco, 3 ♀, 11.i.2007, ex Aleyrodidae, S. Myartseva, D. Kasparyan.

Comments. *Encarsia dmitrii* Myartseva female is close to two species in *luteola* species group, *Encarsia guadeloupae* Viggiani and *Encarsia variegata* Howard, described from Florida, U.S.A. (Howard, 1908). It can be easily distinguished from both species by the following characters: in *E. dmitrii*, mesoscutum largely yellow, all legs whitish yellow, club 3-segmented, first-second funicle segments without sensilla, midlobe of mesoscutum with 5 pairs of setae, midtibial spur as long as basitarsus, ovipositor 1.2x as long as middle tibia. In *E. guadeloupae*, mesoscutum dark brown to black, hind coxae and femur brown, club 2-segmented, first-second funicle segments with sensilla, midlobe of mesoscutum with 9-11 pairs of setae, midtibial spur shorter than basitarsus, ovipositor shorter than middle tibia.

In *E. dmitrii*, metasoma brownish black with large triangular yellow spot centrally, ovipositor 1.2x longer than middle tibia, first-fifth flagellar segments not more than 1.5x as long as wide, in male first-third funicle segments suffused in special complex; in *E. variegata*, metasomal tergites with small lateral brownish black spots, ovipositor 1.7x as long as middle tibia, first-fifth funicle segments more than 2.5x as long as wide, in male first-third funicle segments elongate, twice as long as wide. First-third funicular segments forming an enlarged, specialized sensory-glandular complex and fifth-sixth segments fused have also *Encarsia lutea* (Masi) and *E. davidi* Viggiani and Mazzone belonging to the *lutea* species-group. But these species female have tarsal formula 5-5-5 and metasoma largely yellow.

Etymology. The new species is named in honour of the Russian entomologist Dr. Dmitri Rafaelevich Kasparyan (Zoological Institute of Russian Academy of Sciences, Saint Petersburg, Russia), who many years worked in Mexico to study Ichneumonidae and published two books about tribe Cryptini of Mexico and several articles, for his friendly advices, help in collecting Hemiptera and actively supporting this work.

20. *Encarsia dominicana* Evans
(Figs 107-110)

Encarsia dominicana Evans, in Evans & Serra, 2002: 205-206. Holotype ♀, Dominican Republic: Las Terrenas, iv.1998, C. Serra, ex *Aleurothrixus floccosus* (in USNM, examined). Male unknown. *Prospaltella brasiliensis* (Hempel); misidentification by Dozier (1932: 121); Grissell (1979: 2).

Encarsia brasiliensis (Hempel); misidentification by De Santis, 1979; Myartseva & Ruiz-Cancino, 2000: 16.

Species-group placement. *opulenta* group.

Diagnosis. Tarsal formula 5-5-5; fore wing uniformly setose, with faint infuscation under marginal vein to posterior margin of wing; marginal vein (Fig. 108) with 7 long and stout setae along anterior margin; 2-3 basal group setae; marginal fringe 0.2x wing width; midlobe of mesoscutum with 8 setae; club (Fig. 107) 3-segmented; first flagellar segment subquadrate and without sensillum; scutellar placoid sensilla widely spaced, separated by a distance about 3x width of one sensillum; midtibial spur (Fig. 109) 0.9x as long as basitarsus; ovipositor (Fig. 110) 1.6-1.7x as long as middle tibia; third valvula 0.4x as long as ovipositor; head yellowish with dark brown transverse band at level of foramen; mesosoma yellow with anterior margin of midlobe and axillae dark brown; legs and antennae yellow; gaster yellow with fourth-sixth tergites and apical third of valvulae dark brown.

Hosts. Aleyrodidae – *Aleurothrixus floccosus* (Maskell).

World distribution. Dominican Republic, Haiti, U.S.A. (Florida).

Distribution in Mexico. Veracruz (introduced).

References. Grissell, 1979; Heraty & Woolley, 1999; Myartseva & Ruiz-Cancino, 2000 (as *brasiliensis* Hempel); Evans & Serra, 2002; Noyes, 2006; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: Veracruz, Los Tuxtlas, UNAM, 8 ♀, 11.i.2007, ex *Aleurothrixus floccosus* on *Citrus* spp., S. Myartseva.

Comments. *Encarsia dominicana* (as *E. brasiliensis*) was introduced into Mexico against the woolly whitefly *Aleurothrixus floccosus* in 1950th and successfully established, according to our first rearing of this parasitoid from this whitefly species.

21. *Encarsia elcielica* Myartseva and Evans, sp. n.
(Figs 111-116)

Species-group placement. *strenua* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, Reserve "El Cielo", San José, ex *Chionaspis* sp. on *Pinus* spp., 15.xi.1998, S. Myartseva, UCR. Paratypes – 2 ♀ and 2 ♂, same label data as holotype, deposited as follows: UCR-1 ♂, FSCA -1 ♀, 1 ♂, UAT-1 ♀.

Description. Female. Length: 0.58-0.60 mm (holotype female - 0.60 mm) [excluding ovipositor].

Coloration. Head dark yellow, antennae yellow, apical segment of club slightly infusate. Mesosoma yellow with pronotum, anterior margin of mesoscutum, base of axillae and mesopleuron infusate. For wings hyaline, setation light yellow. Legs light yellow, base of hind coxae slightly infusate. Gaster yellow, with first and sixth tergites entirely and sides of second-fifth tergites infusate, third valvulae light yellow.

Structure. Head not wider than mesosoma, slightly wider than height; frontovertex 0.5x head width. Ocelli in obtuse triangle; distance between posterior ocelli longer than that between posterior ocellus and eye. Antennae (Fig. 111) inserted on the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.6, S-4.4, P-1.7, F1-2.0, F2-2.2, F3-2.0, (F4-F6)-4.7. All flagellar segments except for first segment with two linear sensilla each. Club 3-segmented, subequal in length to funicle. Mesosoma as long as wide. Mesoscutum slightly less 1.5x as long as scutellum, midlobe with broad hexagonal sculpture and with 6 (4+2) setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla closely spaced (Fig. 112), separated by a distance equal to or less than one diameter of a sensillum. Anterior scutellar setae slightly shorter than posterior setae; distance between anterior setae 0.7x as long as distance between posterior setae. Fore wing uniformly setose, about 3x as long as wide; marginal fringe 0.5x wing width; 6 basal group setae; marginal vein (Fig. 113) 1.2x as long as submarginal vein, with 6-7 long setae along anterior margin. Hind wing about 10x as long as wide, its marginal fringe about 2x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 114) 0.7x as long as basitarsus. Ovipositor (Fig.

115) exerted, with base originating at level of fourth tergite, 0.9x as long as middle tibia; third valvula 0.28x as long as second valvifer (17:60).

Male. Length: 0.70mm.

Coloration similar to those of female, but axillae and tegulae infusate, base of first-third tergites sides of fourth tergite and fifth-seventh tergites more infusate.

Structure. Frontovortex including stemmaticum with transverse sculpture. Distance between posterior ocelli subequal to that between posterior ocellus and eye. Antennae (Fig. 116) inserted immediately above the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-3.0, S-4.0, P-1.5, F1-2.3, F2-2.5, F3-2.4, F4-2.2, (F5-F6)-3.2. Flagellar segments with 4 longitudinal sensilla each, sixth segment with two sensilla. Club slightly shorter than two preceding funicular segments combined. Genitalia 0.8x as long as middle tibia.

Hosts. Diaspididae – *Chionaspis* sp.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia elcielica* sp. n. is similar to *E. sophia* (Girault and Dodd), a cosmopolitan species in the *strenua* group, but can be distinguished by its darker coloration of head and body; midlobe of mesoscutum with 6 setae; fore wings without a conspicuous area of long setae; first flagellar segment shorter than second segment. *E. sophia* has the body pale yellow; midlobe of mesoscutum with 8-10 setae; fore wings with a conspicuous area of long setae along posterior margin of disc and first flagellar segment subequal to second segment.

22. *Encarsia elongata* (Dozier)
(Figs 117-120)

Prospaltella elongata Dozier, 1937: 128. Syntype ♀, U.S.A.: Louisiana, New Orleans, 6.i.1926, H.L. Dozier, ex *Lepidosaphes gloverii* [= *Cornuaspis gloverii*] on *Euonymus* sp., type N 51681 (in USNM, examined). Male described and illustrated by Viggiani (1986).

Prospaltella herndoni Girault, 1935: 3, name proposed by Girault for material from China misidentified by Silvestri, 1930; nomen nudum Hayat, 1989; nomen dubium Huang & Polaszek, 1998.

Encarsia elongata (Dozier); Viggiani & Mazzone, 1979, change of combination.

Species-group placement. *aurantii* group.

Diagnosis. Female habitus - Fig. 117. Tarsal formula 5-5-5; fore wing (Fig. 119) uniformly setose, infusate under marginal vein; marginal fringe 0.5x wing width; club 3-segmented (Fig. 118); first flagellar segment subquadrate; midlobe of mesoscutum with 8 setae; scutellar placoid sensilla widely spaced, separated by a distance 3-4 width of a sensillum; midtibial spur (Fig. 120) slightly shorter than basitarsus; ovipositor slightly longer than middle tibia; third valvula less than 0.5x of second valvifer; head yellow with an irregular brownish cross-band on face above toruli and another crossband on occiput at level of foramen; mesosoma yellow with pronotum, anterior margin of midlobe, axillae and propodeum laterally dark brown; legs pallid; gaster dark brown with first-second (except sides) and seventh tergites pale yellow; third valvula blackish.

Hosts. Diaspididae – *Aonidiella aurantii* (Maskell), *Chrysomphalus aonidum* (L.), *Fiorinia theae* Green, *Lepidosaphes beckii* (Newman), *Lepidosaphes gloverii* (Packard), *Lepidosaphes ulmi* (L.), *Parlatoria ziziphi* (Lucas).

World distribution. China, India, Italy, Puerto Rico, Spain, U.S.A. (California, *Florida).

Distribution in Mexico. Tamaulipas.

References. De Santis, 1979; Gordh, 1979; Hayat, 1989; Huang & Polaszek, 1998; Ruíz-Cancino *et al.*, 1998; Myartseva & Ruíz-Cancino, 2000; Ruíz-Cancino & Coronado-Blanco, 2002; Gaona-García *et al.*, 2005; Coronado-Blanco *et al.*, 2005a, 2005b; Myartseva *et al.*, 2004.

Material examined. Mexico: Tamaulipas, Gómez Farías, 1 ♀, 21.iii.1999, ex *Lepidosaphes beckii* on *Citrus sinensis*, S. Myartseva;

Padilla, Hta Paraiso, 1 ♀, 28.x.2004, on *Citrus* spp.; Hidalgo, Cruz y Cruz, 1 ♀, 28.xii.2004, on *Citrus* spp., S. Varela-Fuentes.

23. *Encarsia flaviceps* Myartseva
(Figs 121-124)

Species-group placement. *luteola* group.

Encarsia flaviceps Myartseva, 2007b: 71-73. Holotype ♀, **Mexico: Veracruz**, Los Tuxtlas, 30 km N Catemaco, Estación de Biología Tropical de Instituto de Biología, UNAM [18°35' N, 95°5' W], ex Aleyrodidae on *Pleuranthodendron lindellii*, 11.i.2007, S. Myartseva, D. Kasparyan (in UCR, examined).

Description. Female. Length: 0.60-0.80 mm.

Coloration. Head light yellow with very slightly infusate areas behind postocellar bars and on sides of foramen; clypeus, dorsal margin of mouth and malar sulcus dark; antennae whitish yellow with slightly infusate tip of club. Mesosoma yellowish brown, side lobes of mesoscutum yellow, scutellum, metanotum and sometimes lateral and posterior margins of midlobe of mesoscutum with more yellowish tinge. Fore wings hyaline. Legs whitish yellow. Petiole yellow with dark anterior margin. Gaster light yellow with anterior margin of first tergite dark.

Structure. Head 1.4-1.5x as wide as height. Frontovertex width about 0.5-0.6 head width. Ocellar triangle transversely striate. Distance between posterior ocelli about 0.5-0.7x as long as distance from ocellus to eye margin. Eyes finely setose, 1.4-1.5x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 121) inserted on the level of lower margin of eyes; distance between toruli about 0.5-0.7x as long as distance to eye margin and about 1.4-1.7x as long as distance to mouth margin. Antennal segments with following ratios of length to width: R-2.0-2.2, S-3.3-3.4, P-1.7-1.8; F1-1.7-2.0, F2-2.1-2.3, F3-2.8, F4-2.8. Club not clearly 2-segmented, subequal in length to two preceding funicle segments combines. Each flagellar segments except first and second, with one linear sensillum. Midlobe of mesoscutum with 5 pairs of setae, side lobes each with three setae, axillae each with one seta near inner margin of axilla. Sculpture of midlobe of mesoscutum largely reticulate in central part and with elongate cells along sides and

posterior margin. Mesoscutum 1.2-1.3x as wide as long; scutellum 1.7-2.0x as wide as long. Scutellar placoid sensilla ovoid, widely spaced, separated by distance about 5-6x diameter of a sensillum. Distance between anterior scutellar setae subequal to distance between posterior setae. Fore wing uniformly setose, 2.5-2.8x as long as wide, base with 3 setae, marginal fringe 0.3-0.4x maximum width of wing. Marginal vein (Fig. 122) with 5-6 long setae along anterior margin and subequal to submarginal vein. Hind wing 10-11x as long as wide, its marginal fringe about twice longer than maximum width of wing. Tarsal formula 5-4-5. Midtibial spur (Fig. 123) as long as basitarsus; basitarsus subequal to next two tarsal segments combined. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 2+2, 2+2, and 4 setae, respectively. Ovipositor (Fig. 124) arising at the level of second tergite, 1.4x as long as middle tibia; third valvula 0.6-0.7x as long as second valvifer.

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. San Luis Potosí, Veracruz.

References. Myartseva, 2007b.

Material examined. San Luis Potosí: Xilitla, 2 ♀, 13.iv.2002, ex Aleyrodidae, S. Myartseva.

Comments. *Encarsia flaviceps* Myartseva is close to two similar species - *E. formosa* Gahan and *E. luteola* Howard belonging to *luteola* species group, by having gaster yellow, tarsal formula 5-4-5, scutellar placoid sensilla widely spaced, fore wing uniformly setose. But in *E. flaviceps* head light yellow with small very slightly infuscate areas, marginal vein with 5-6 setae along anterior margin, midlobe of mesoscutum with 5 pairs of setae, midtibial spur as long as basitarsus, ovipositor 1.4x as long as middle tibia, eyes 1.4-1.5x as long as cheeks, scape 3.3-3.4x as long as wide.

24. *Encarsia florena* Myartseva and Evans, sp. n.
(Figs 125-129)

Species-group placement. *luteola* group, *meritoria* complex.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, Antiguo Morelos, Ejido Las Flores, ex Aleyrodidae, 9.xi.1999, S. Myartseva, UCR.

Description. Female. Length: 0.70 mm (including ovipositor).

Coloration. Head and body light yellow, with legs and V3 of ovipositor pale. Fore wings hyaline.

Structure. Head as wide as mesosoma, width 1.4x height; frontovertex width 0.5x head width. Ocelli in obtuse triangle; distance between posterior ocelli 0.7x as long as that between posterior ocellus and eye. Antennae (Fig. 125) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-3.5, S-3.6, P-1.7, F1-1.9, F2-2.4, F3-2.3, F4-2.1, (F5-F6)-4.5. Club 3-segmented, slightly differentiated from funicle, longer than two preceding flagellar segments combined. Flagellar segments third - with one sensillum, fourth-sixth - each with two linear sensilla. Mesoscutum 1.7x as long as scutellum, midlobe with 4 (2+2) setae, 2 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla widely spaced (Fig. 126), separated by a distance about 5x diameter of a sensillum. Anterior scutellar setae 0.7x as long as posterior setae; distance between anterior setae subequal to distance between posterior setae. Fore wing uniformly setose, 2.6x as long as wide; marginal fringe 0.3x wing width; 3 basal group setae; marginal vein (Fig. 127) longer than submarginal vein, with 7 long setae along anterior margin. Hind wing about 9x as long as wide, its marginal fringe 1.5x wing width. Tarsal formula 5-4-5. Midtibial spur (Fig. 128) about 0.6x as long as basitarsus, the latter longer than two proximal tarsal segments combined. Ovipositor (Fig. 129) exerted, with base originating at level of third tergite and 1.3x as long as middle tibia; third valvula 0.56x as long as second valvifer (33:59).

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Tamaulipas.

Comments. In the species group *luteola* only females of *E. meritoria* Gahan, *E. hispida* De Santis and *E. haitiensis* Dozier have a uniformly

pale yellow color. *E. florena* sp. n. is very similar to *E. meritoria*, but can be distinguished as follows: midlobe of mesoscutum with 4 setae; antennal scape 3.6x as long as wide and fourth flagellar segment 1.2x as long as second segment. In *E. meritoria*, midlobe of mesoscutum with 12 setae; antennal scape 4.5-5.0x as long as wide and fourth and second flagellar segments equal in length.

25. *Encarsia formosa* Gahan
(Figs 130-133)

Encarsia formosa Gahan, 1924: 14. Syntype ♀, U.S.A.: Idaho, Twin Falls, 9.v.1920, R.H. Smith, parasitic on aleyrodid (probably *Trialeurodes vaporariorum*) on *Geranium* sp., (in USNM, examined). Male known but rarely found in nature.

Species-group placement. *luteola* group, *meritoria* complex.

Diagnosis. Tarsal formula 5-4-5; fore wing hyaline and uniformly setose, 2.37-2.5x as long as wide; marginal fringe with 6-7 setae along anterior margin; marginal fringe 0.25-0.33x wing width; 3-4 basal group of setae; marginal and stigmal veins see on Fig. 131; club 2-segmented (Fig. 130); first flagellar segment distinctly shorter than second segment; linear sensilla on first flagellar segment usually absent; midlobe of mesoscutum with 18-20 setae; scutellar placoid sensilla widely spaced, separated by a distance 5-7x width of one sensillum; distance between anterior scutellar setae subequal to distance between posterior setae; midtibial spur (Fig. 132) shorter than 0.5x basitarsus; ovipositor (Fig. 133) 0.88-1.00x as long as middle tibia; third valvula 0.6x as long as second valvifer; head, mesosoma and petiole brown to dark brown, contrasting with yellow remainder of body; legs yellow except coxae basally brownish; third valvulae pale.

Hosts. Aleyrodidae – reared from *Trialeurodes vaporariorum* (Westwood), *Aleurothrixus floccosus* (Maskell), *Tetraleurodes* sp. in Mexico. The following hosts have been recorded: *Aleurothrixus floccosus* (Maskell), *Aleyrodes* sp., *Aleuroglandulus subtilis* Bondar, *Aleurotrachelus trachoides* (Back), *Aleyrodes lonicerae* Walker, *A. prolella* (L.), *A. singularis* Danzig, *A. spiraeoides* Quaintance, *B. tabaci* (Gennadius), *Dialeurodes citri* (Ashmead), *Massilieurodes chittendeni* (Laing), *Tetraleurodes mori* (Quaintance), *Tetraleurodes*

sp. *Trialeurodes abutiloneus* (Haldeman), *T. ricini* (Misra), *T. vaporariorum* (Westwood), *T. variabilis* (Quaintance).

World distribution. Cosmopolitan.

Distribution in Mexico. Baja California, D.F., Guerrero, Jalisco, Tamaulipas.

References. Gordh, 1979; Viggiani, 1988; Gerling, 1990; Polaszek *et al.*, 1992; Evans, 1993; Evans & Serra, 2002; Hennessey *et al.* 1995; Trjapitzin *et al.*, 1996; Schauf *et al.*, 1996; Huang & Polaszek, 1998; Myartseva *et al.*, 1998; Polaszek *et al.*, 1999; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Schmidt *et al.*, 2001; Noyes, 2002, 2006; Hernández-Suárez *et al.*, 2003; Myartseva *et al.*, 2004, 2006; García-Valente *et al.*, 2003; Coronado-Blanco *et al.*, 2005a.

Material examined. Mexico: Tamaulipas, Jaumave, 1♀, 19.vii.1998, ex *Trialeurodes vaporariorum* on *Ruta* sp.; 6 ♀, 23.ii.1999; 1 ♀, 21.iii.1999; 3 ♀, 31.ii.2001, S. Myartseva; Ciudad Victoria, 1 ♀, 12.ii.1999, in Malaise trap, S.L. Monrreal-Hernández; 3 ♀, 28.ii.1999, ex *Aleurothrixus floccosus* on *Citrus sinensis*; Miquihuana, 1 ♀, 1.iv.2001, ex *Tetraleurodes* sp. on *Sophora secundiflora*; 5 ♀, 30.i-10.ii.2006, ex *Trialeurodes vaporariorum* on unknown grass, S. Myartseva; UAT, 1 ♀, 6.iii.2002, yellow trap, V. Berezovsky, S. Triapitsyn. D.F., Mexico City, Chapultepec, 8 ♀, 21.vi.2000, ex *Aleyrodes* sp., D. Kasparyan; Mexico City, 1 ♀, 6.iv.1990, ex *Trialeurodes vaporariorum* on *Lantana* sp.; 1 ♀, 14.iv.1990, same locality, ex *Trialeurodes* sp. on *Lantana camara*. Guerrero, Taxco, 1 ♀, 10.iv.1990, ex *Trialeurodes* sp., F.D. Bennett. Jalisco, La Huerta, Est. Biol. UNAM, Camino Chachalaca, N 19 29'791'' W 105 2'553'', 96.5 msnm, 1 ♀, 26.vii.2000, redeo en maleza, Y. Castillo O., A. Dávila L., A. González H., CIB 00-0036.

Comments. In 1992, an Egyptian population of *E. formosa* was introduced into Mexico (Baja California) as a natural enemy of the *Bemisia tabaci*-complex (Hennessey *et al.*, 1995). In our opinion, *E. formosa* was already present in Mexico; possibly entering the country through ecesis, i.e. with its hosts.

26. *Encarsia funiculata* Myartseva and Evans, sp. n.
(Figs 134-138)

Species group placement. *albiscutellum* group.

Material examined. Holotype ♀, Mexico: Guerrero, Acapulco, ex Aleyrodidae on *Pithecellobium* sp., 12.vi.2000, S. Myartseva, UCR.

Description. Female. Length: 0.65 mm (without ovipositor).

Coloration. Head yellow, occiput and antennal scrobes infusate, antennae yellow. Mesosoma dark brown, mesoscutum dark yellow, with brown anterior margin and spot, scutellum lemon yellow, petiole pale yellow. Fore wings hyaline, marginal vein slightly infusate. Legs whitish-yellow, coxae and hind femora infusate. Gaster dark brown, third valvulae black exteriorly.

Structure. Head about as wide as mesosoma, width 1.2x height; frontovertex 0.6x head width. Frontovertex including stemmaticum with 8 pairs of setae placed symmetrically. Ocelli in obtuse triangle; distance between posterior ocelli slightly shorter than that between posterior ocellus and eye. Malar sulcus present. Antennae (Fig. 134) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.4, S-4.0, P-1.5, F1-1.7, F2-1.5, F3-1.2, (F4-F6)-4.0. Club 3-segmented, longer than funicle. All flagellar segments with one-two linear sensilla each. Mesosoma as long as wide; midlobe of mesoscutum 1.7x as long as scutellum, with 8 (4+2+2) setae, 3 setae on each side lobe, axilla seta located along inner margin, closer to base than to the apex. Scutellar placoid sensilla widely spaced (Fig. 135), separated by a distance of about 4-5x diameter of a sensillum. Anterior scutellar setae 0.5x as long as posterior setae; distance between anterior setae 0.9x as long as distance between posterior setae. Fore wing uniformly setose, about 2x as long as wide; marginal fringe 0.3x wing width; 4 basal group setae; marginal vein length equal to submarginal vein, with 6 setae along anterior margin; stigmal vein thin, with long uncus (Fig. 136). Hind wing about 8x as long as wide, its marginal fringe about 1.5x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 137) equal to basitarsus, the latter slightly shorter than adjacent 3 tarsal segments combined. Hindtibial spur 0.7x as long as basitarsus. Gaster apically broadly rounded. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2,

2+2 setae, respectively. Ovipositor (Fig. 138) exerted, with base originating at level of first tergite and 1.7x as long as middle tibia; third valvula 0.44x as long as second valvifer (36:82).

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Guerrero.

Comments. *Encarsia funiculata* sp. n. is similar to *E. alvaradoi* sp. n., but can be distinguished by having midlobe of mesoscutum brown with pale posterior margin; second flagellar segment slightly longer than wide; first segment with a linear sensilla; *E. alvaradoi* has the midlobe of mesoscutum completely dark brown; second flagellar segment elongate, 2x as long as wide; first segment without a linear sensilla.

27. *Encarsia fursovi* Myartseva, sp. n.
(Figs 139-144)

Species group placement. *inquirenda* group.

Material examined. Holotype ♀, Mexico: Tamaulipas, Ciudad Victoria, Rio San Marcos, sweeping on grass, 21.xii.2003, V. Fursov, UCR. Paratypes – same label data as holotype, 2 ♀, 1 ♂, UCR, FSCA.

Description. Female. Length: 0.55-0.60mm.

Coloration. Head yellow, clypeus, cheeks and occiput below foramen infusate, antennae whitish yellow. Mesosoma light yellow, pronotum and anterior margin of mesoscutum brown, axillae, propodeum and mesopleuron light brown to infusate. Fore wings hyaline. Legs whitish yellow. Petiole light yellow, anterior margin infusate. Gaster light yellow with brownish sides of second to sixth tergites, anterior margin of first tergite, fifth tergite along anterior and posterior margins infusate, tips of stylets black, third valvulae pale.

Structure. Head wide, 1.6x as wide as height; frontovertex transversely striate, its width about 0.5x head width. Ocelli forming slightly obtuse triangle; distance between posterior ocelli about as long

as distance from ocellus to eye margin. Postocellar bars oblique, extend from ocellus to eye margin. Eyes 1.4x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 139) inserted immediately under the level of lower margin of eyes. Distance between toruli slightly shorter than distance from torulus to eye and about 2x as long as distance to mouth margin. Antennal segments with following ratios of length to width: R-2.6, S-3.8, P- 1.9, F1-1.0, F2-1.8, F3-1.6, F4-1.3, F5-1.3, F6-2.0. Club 3-segmented, as long as funicle and pedicel combined and 1.3x wider than funicle. Each flagellar segments excluding the first, with one linear sensillum, sixth segment with two sensilla. Midlobe of mesoscutum with 4 pairs of setae, slightly wider than length, side lobes with 2 setae each, axillae with one seta near inner margin each. Scutellum (Fig. 140) about 0.6x as long as midlobe and 1.8x as wide as long. Scutellar placoid sensilla ovoid and widely spaced, separated by a distance about 4x width of one sensillum. Distance between anterior scutellar sensilla slightly longer than distance between posterior setae (21:19). Fore wing uniformly setose, 3.4x as long as wide; marginal fringe 0.5-0.6x wing width, 4-5 basal group setae. Marginal vein (Fig. 141) with 5-6 setae along anterior margin, about as long as submarginal vein. Hind wing 8x as long as wide, its marginal fringe about 1.8x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 142) about as long as basitarsus, the latter subequal to two proximal tarsal segments combined. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor (Fig. 143) arising at the level of sixth tergite, exerted, about 0.8x as long as middle tibia. Third valvula about 0.7x as long as second valvifer.

Male. Length: 0.50 mm.

Coloration. Similar to female but gaster brown and hind coxae infusate.

Structure. Head about 1.5x as wide as height, frontovertex width 0.6x head width. Antennae (Fig. 144) inserted slightly higher than level of lower margin of eyes. Distance between toruli slightly shorter than distance from torulus to eye and 2x as long as distance to mouth margin. Antennal segments with following ratios of length to width: R-2.7, S-2.9, P-1.9, F1-2.0, F2-1.3, F3-1.5. First and second segments suffused. Club 2-segmented, apical segment long, slightly less than 2x as long as preceding segment. Fore wing 3x as long as wide, 3 basal

group setae. Sculpture of midlobe and axillae with wide longitudinal cells. Scutellar placoid sensilla separated by a distance about 3x width of one sensillum.

Hosts. Unknown.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia fursovi* sp. n. is very similar to *E. aurantii* (Howard) and can be distinguished by follows: gaster largely light yellow, fore wing 3.4x as long as wide, marginal vein with 5-6 setae along anterior margin, marginal fringe 0.5-0.6x wing width, midtibial spur as long as basitarsus, hind and middle tibiae subequal in length, second and third flagellar segments subequal in length; in *E. aurantii*: gaster dark brown, fore wing not more than 3x as long as wide, marginal vein with 7-8 setae along anterior margin, marginal fringe 0.33-0.40 wing width, midtibial spur shorter than basitarsus, hind tibia shorter than middle tibia, second flagellar segment longer than third segment.

Etymology. The new species is named in honour of the Ukrainian entomologist Dr. Victor Nikolaevich Fursov (Zoological Institute of Ukrainian Academy of Sciences, Kiev, Ukraine), who collected this species.

28. *Encarsia gaonae* Myartseva and Evans, sp. n.
(Figs 145-149)

Species-group placement. *inquirenda* group.

Material examined. Holotype ♀, **Mexico:** Tamaulipas, Ciudad Victoria, Colonia Las Vegas, ex *Pinnaaspis strachani* (Cooley) on *Amyris madrensis*, 14.ii.2000, G. Gaona-García, UCR.

Description. Female. Length: 0.70 mm (without ovipositor).

Coloration. Head yellow, antennae, malar sulcus, frontovertex and occiput infusate. Mesosoma yellow with pronotum, anterior margin of midlobe of mesoscutum, axillae, middle part of propodeum and mesopleuron infusate. Setae on mesoscutum and scutellum pale. Fore wings hyaline, with area under marginal vein slightly infusate. Legs

light yellow, hind coxae and femora infusate. Gaster dark brown, apex of seventh tergite yellow, third valvulae brown.

Structure. Head as wide as mesosoma; frontovertex with striate sculpture, its width 0.6 x head width. Ocelli in small obtuse triangle; distance between posterior ocelli 0.7x as long as distance between posterior ocellus and eye. Antennae (Fig. 145) slender, inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.0, S-4.0, P-1.5, F1-1.5, F2-1.5, F3-1.7, (F4-F6)-6.6. Club 3-segmented, not wider than funicle, slightly longer than funicle and pedicel combined. Second-third flagellar segments with one, club segments with two linear sensilla each. Mesosoma as long as wide. Mesoscutum slightly more 1.5x as long as scutellum, midlobe of mesoscutum with 4 (2+2) setae, each side lobe with 2 setae and one seta on each axilla. Axillae with distinctly reticulate sculpture. Scutellar placoid sensilla widely spaced (Fig. 146), separated by a distance about 5x diameter of a sensillum. Anterior pair of scutellar setae 0.5x as long as posterior pair of setae; Distance between anterior setae 1.6x as long as distance between posterior setae. Fore wing uniformly setose, 3x as long as wide; marginal fringe 0.5x wing width; 1-2 basal group setae; marginal vein (Fig. 147) longer than submarginal vein, with 5 long setae along anterior margin. Hind wing 10x as long as wide; its marginal fringe 0.45x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 148) 0.75x as long as basitarsus. Petiole with distinctly reticulate sculpture. Ovipositor (Fig. 149) slightly exerted, with base originating at level of fourth tergite and 1.2x as long as middle tibia; third valvula 0.43x as long as second valvifer.

Male. Unknown.

Hosts. Diaspididae – *Pinnaspis strachani* (Cooley).

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia gaonae* sp. n. is similar to *E. diaspidicola* (Silvestri) and *E. niigatae* (Nakayama). The main differences between *E. gaonae* and *E. diaspidicola* appear to be as follows: *E. gaonae*: pedicel longer than second flagellar segment; each side lobe of mesoscutum with 2 setae; distance between anterior setae on scutellum 1.6x as long as that between posterior setae; base of ovipositor arising

at level of fourth tergite; third valvulae brown. *E. diaspidicola*: pedicel equal in length to second flagellar segment; each side lobe of mesoscutum with one seta; distance between anterior setae on scutellum equal or slightly greater than that between posterior setae; base of ovipositor arising at level of third tergite; third valvulae pale. The main differences between *E. gaonae* and *E. niigatae* appear to be as follows: in *E. gaonae* - antennae slender: first-third flagellar segments about 1.5x, 1.5x, 1.7x as long as wide, respectively; second segment with one sensillum; club 6.6x as long as wide; ocellar area with transverse sculpture; each side lobe of mesoscutum with 2 setae; distance between anterior setae on scutellum 1.6x as long as that between posterior setae; ovipositor shorter than middle tibia and basitarsus combined. In *E. niigatae* - antennae not slender: first-third flagellar segments about 1.1x, 1.2x, 1.3x as long as wide, respectively; second segment without sensillum; club 4.4x as long as wide; ocellar area with reticulate sculpture; each side lobe of mesoscutum with one seta; distance between anterior setae on scutellum equal or slightly greater than that between posterior setae; ovipositor slightly longer than middle tibia and basitarsus combined. *E. diaspidicola* and *E. niigatae* are very similar. Gahan (1924:14) synonymized the two species; however, Viggiani & Mazzone (1979) and Huang & Polaszek (1998) considered them distinct species. *E. gaonae* differs from both of these species by having 2 setae on each side lobe of mesoscutum; a wider distance between anterior scutellar setae; club more slender, 6.6x as long as wide (6.0x in *diaspidicola* and 4.4x in *niigatae*); first flagellar segment more elongate, 1.5x as long as wide (1.1x in *diaspidicola* and *niigatae*); longer stigmal vein, about 3.1x shorter than marginal vein (4.5x-4.8x in *diaspidicola* and 4.2x in *niigatae*).

Etymology. This species is named for entomologist Dr. Griselda Gaona-García (Mexico, Ciudad Victoria, University of Tamaulipas), who reared this and other species of *Encarsia*.

29. *Encarsia guadeloupae* Viggiani (Figs 150-154)

Encarsia guadeloupae Viggiani, 1987: 35-37. Holotype ♀, Guadeloupe: Wonche, 12.VI.1985, J. Étienne, ex *Aleyrodes* sp. on *Persea americana*, IEUN. Male unknown.

Encarsia guadeloupae Viggiani; Viggiani, 1993: 123-125 (redescription).

Species-group placement. *luteola* group, *meritoria* complex.

Description. Male. Length: 0.60-0.67 mm.

Coloration. Head dark brown, occiput above foramen yellow, antennae yellowish, scape with brownish dorsal margin. Mesosoma yellowish-brown, with more dark middle part of midlobe of mesoscutum and axillae; scutellum and side lobes except apices dark yellow in one specimen and yellowish-brownish in other specimen. Fore wings hyaline. Legs whitish yellow, hind coxae, apical 1/3 of hind femora dorsally and apices of middle and hind tibiae brownish. Petiole whitish-yellow anteriorly. Gaster dark brown.

Structure. Head as wide as mesosoma and 1.1-1.2x as wide as height; frontovertex width about 0.6x head width. Ocelli forming slightly obtuse triangle; distance between hind ocelli about 1.5x as long as distance from hind ocellus to eye margin. Eyes finely setose, about 1.7x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 154) inserted immediately on the level of lower margin of eyes. Distance between toruli about 0.7x as long as distance from torulus to eye margin. Antennal segments with following ratios of length to width: R-2, S-3.4, P-1.4, all flagellar segments slightly more than twice as long as wide, first segment shorter than other segments. Club 2-segmented, slightly shorter than two preceding funicle segments combined. Flagellar segments with 3 linear sensilla each. Midlobe of mesoscutum about 1.2x as wide as long, with 10-12 setae (4+2+2+2) or (4+4+2+2+) arranged more or less symmetrically. Side lobes with 3 setae each, axillae with one seta each near inner margin anteriorly. Scutellum about 0.7x shorter than mesoscutum and about 1.7x as wide as long. Scutellar placoid sensilla widely spaced, separated by distance 3-4x width of a sensillum. Distance between anterior long setae equal to distance between posterior setae. Fore wing without an asetose area around stigmal vein and 2.2x as long as wide, its marginal fringe about 0.2x maximum width of wing, base with 3-4 setae under apical part of submarginal vein. Marginal vein (Fig. 23) with 6 long setae along anterior margin and subequal in length to submarginal vein. Hind wing 9x as long as wide, its marginal fringe 1.3x longer than maximum width of wing. Tarsal formula 5-4-5. Midtibial spur (Fig. 24) about 0.8x as long as basitarsus; hindtibial spur about 0.7x as long as basitarsus. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 3+3,

3+2 and 4 setae, respectively. Genitalia about 0.8x as long as middle tibia.

Female. Length: 0.60-0.75 mm.

Coloration. Head and mesosoma as in male, antennal radicle, scape and two apical segments of flagellum infuscate, scutellum and side lobes yellow. Fore wings light infuscate under marginal vein. Hind coxae and femora black. Petiole yellowish. Seventh gastral tergite and third valvulae yellowish, tips of stylets black.

Structure. Head slightly wider than mesosoma and 1.3x as wide as height, frontovertex width about 0.5x of head width. Ocelli forming slightly acute triangle, distance between hind ocelli about 0.7x as long as distance from ocellus to eye margin. Eyes finely setose, about 2.3x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 150) inserted immediately on the level of lower margin of eyes. Distance between toruli about as long as distance from an ocellus to eye margin. Antennal segments with following ratios of length to width: R-2, S-4.7-4.8, P-1.5, F1-1.9, F2-2.1, F3-1.8. Club 3-segmented, very slightly wider than funicle and slightly shorter than funicle. Funicle segments with one linear sensillum each, segments of club with two sensilla each. Midlobe of mesoscutum about 1.4x as wide as long and with 16-20 setae, often rather irregularly arranged. Side lobes with 3 setae each, axillae with one seta each close to inner margin. Scutellum about 0.7x as long as midlobe of mesoscutum and twice as wide as long. Scutellar placoid sensilla widely spaced, separated by distance about 3 diameters of a sensillum. Distance between anterior long setae equal to distance between posterior setae. Fore wing without an asetose area around stigmal vein, 2.6x as long as wide, its marginal fringe about 0.2x of maximal width of wing, base with 4 setae under apical part of submarginal vein. Marginal vein (Fig. 151) with 6-7 long setae along anterior margin (in one female 8 long setae) and subequal in length to submarginal vein. Hind wing 8.4x as long as wide, its marginal fringe about 1.2x as long as maximum width of wing. Tarsal formula 5-4-5. Midtibial spur (Fig. 152) 0.8x as long as basitarsus, hindtibial spur about 0.5x as long as basitarsus. Gastral tergites second-seventh with varying number of setae: 2+3, 3+3, 3+3, 3+3, 3+3 and 4 or 2+2, 3+2, 2+2, 2+2, 3+3 and 4 setae, respectively. Ovipositor (Fig. 153) not exerted, its base on the level of third tergite, its length 1.2x as long as

middle tibia; third valvula about 0.7x as long as second valvifer and about 0.4x as long as ovipositor.

Hosts. Aleyrodidae - *Aleurodicus dugesii* Cockerell, *A. dispersus* Russell, *Bemisia tabaci* (Gennadius), *Lecanoideus floccissimus* Martin *et al.*, *Trialeurodes vaporariorum* (Westwood).

World distribution. Canary Islands, Guadeloupe, French Polynesia, Hawaii, India, Micronesia, Nauru, Papua New Guinea, Philippines, Thailand, Benin, U.S.A. (Florida).

Distribution in Mexico. Chiapas.

References. Schmidt *et al.*, 2001: 377, 379; Noyes, 2002, 2006; Hernández-Suárez *et al.*, 2003.

Material examined. Mexico: Chiapas, Tapachula, 3 ♀, 1 ♂, 5.X.2006; 2 ♀, 1 ♂, 9.X.2006, ex Aleyrodidae on *Psidium guajava*, S. Myartseva.

Comments. *Encarsia guadeloupeae* Viggiani female is one in the *luteola* species-group with dark brown to black body with yellow scutellum, numerous, often irregularly arranged mesoscutal setae and 4-6 setae on some gastral tergites. The female of this species was described and redescribed by Viggiani (1987, 1993). Colouration and structure of female are variable. Specimens from Pacific Islands and Papua New Guinea have head and body color mostly brown, including scutellum (Schmidt *et al.*, 2001). Specimens from Canary Islands have first-fifth flagellar segments with 2-3 pit-like sensilla, club 2-segmented, ovipositor 0.95x as long as middle tibia (Hernández-Suárez *et al.*, 2003). Mexican specimens are most similar to redescription of female given by Viggiani (1993). New record for Mexico. Earlier not known male is described.

30. *Encarsia guajavae* Myartseva
(Figs 155-159)

Encarsia guajavae Myartseva, 2007a: 8-9. Holotype ♀, **Mexico: Tamaulipas**, Ciudad Victoria, ex *Tetraleurodes* sp. on *Psidium guajava*, 7.ii.1999, S. Myartseva (in UCR, examined).

Species-group placement. *parvella* group.

Description. Female. Length: 0.57-0.59 mm (holotype - 0.57 mm).

Coloration. Head yellow, face whitish-yellow, frontovertex dark yellow, antennae yellow. Mesosoma yellow except pronotum, anterior margin of midlobe of mesoscutum infuscate. Fore wings very slightly infuscate, with small dark area under stigmal vein, posterior margin of stigmal vein brown. Legs whitish-yellow. Gaster yellow, petiole and anterior margin of first tergite slightly infuscate; third valvula pale, with apices laterally brown.

Structure. Head slightly wider than mesosoma, its width 1.5-1.6x height; frontovertex width 0.4-0.5x head width. Ocelli in small obtuse triangle; distance between posterior ocelli subequal to that between posterior ocellus and eye. Antennae (Fig. 155) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-3.0-3.2, S-3.9, P-1.7-1.9, F1-1.4-1.9, F2-1.7-2.0, F3-1.9-2.0, F4-2.1-2.2, (F5-F6)-4.8-4.9. Flagellar segments F3-F4 with one linear sensillum each, F5-F6 with 2 sensilla each. Club 2-segmented, very slightly shorter than second-fourth flagellar segments combined. Mesosoma slightly longer than its width. Mesoscutum 1.5-1.7x as long as scutellum, midlobe of mesoscutum with 6 (4+2) or 8 (4+2+2) thin setae, 2 setae on each side lobe, one seta located in middle of anterior half of axilla. Scutellar placoid sensilla widely spaced (Fig. 156), separated by a distance about 4-5x diameter of a sensillum. Anterior scutellar setae 0.75x as long as posterior setae; distance between anterior setae subequal to distance between posterior setae. Fore wing with an asetose area around stigmal vein and a bare narrow strip on posterior margin of wing distally, 3.0-3.3x as long as wide; marginal fringe 0.7x wing width; 2-3 basal group setae; marginal vein (46) (Fig. 157) slightly longer than submarginal vein (42), with 5 long setae along anterior margin. Hind wing about 8x as long as wide, its marginal fringe about 1.5x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 158) 0.7x as long as basitarsus, the latter slightly longer than the proximal 2 tarsal segments combined. Ovipositor (Fig. 159) slightly exserted, with base originating at the level of third tergite; its length subequal to that of middle tibia (in one female slightly longer); third valvula with apices obtuse rounded and 1.17x as long as second valvifer (35:30).

Hosts. Aleyrodidae – *Tetraleurodes mori* (Quaintance), *Tetraleurodes* sp.

Distribution in Mexico. Guerrero, Tamaulipas.

References. Myartseva, 2007a.

Material examined. Mexico: Tamaulipas, Ciudad Victoria, 1♀, 7.ii.1999, ex *Tetraleurodes* sp. on *Psidium guajava*; Tampico, ex *Tetraleurodes mori* (Quaintance), 1♀, 27.iii.2001, S. Myartseva. Guerrero, Acapulco, 1 ♀, 12.vi.2000, ex *Tetraleurodes* sp., S. Myartseva.

Comments. *Encarsia guajavae* Myartseva is similar to *E. gerlingi* Viggiani described from Kenya and belonging to *parvella* species group, but differs as follows: head and body yellow without any brownish areas except for small dark area under stigmal vein and apical part of third valvula; first flagellar segment 1.4-1.9x as long as wide; distance between anterior scutellar setae subequal to that between posterior setae; marginal fringe of fore wing 0.7x wing width; and third valvula 1.17x as long as second valvifer (35:30). In *E. gerlingi*: head and body with some brown areas; first flagellar segment 2.17x as long as wide; distance between anterior scutellar setae less than that between posterior setae; marginal fringe of fore wing 0.59x wing width; third valvula 0.48x as long as second valvifer (10:21). *E. guajavae* is also similar to *E. tetraleurodis* sp. n., but can be distinguished as follows: second-fourth flagellar segments increasing in length towards club; club not wider than funicle; first flagellar segment not oblique; distance between anterior scutellar setae subequal to that between posterior setae; basitarsus of middle leg 3.7x as long as wide; third valvula 1.2x as long as second valvifer (35:30). In *E. tetraleurodis*: second-fourth flagellar segments about subequal in length; club distinctly wider than funicle; first flagellar segment usually oblique; distance between anterior scutellar setae 1.3x as long as that between posterior setae; basitarsus of middle leg 5.7x as long as wide; third valvula about 0.5x as long as second valvifer (25:45).

31. *Encarsia guamuchil* Myartseva and Evans, sp. n.
(Figs 160-164)

Species-group placement. *cubensis* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, 5 km S Gomez Farias, Ejido La Azteca, ex *Aleyrodidae*, 23.i.2002, S. Myartseva, UCR. Paratypes – same label data as holotype, 3 ♀ (FSCA, UCR, UAT); **Guerrero**, Acapulco, ex *Tetraleurodes* sp. on *Pithecellobium* sp., 1 ♀, 12.vi.2000, S. Myartseva, UCR.

Description. Female. Length: 0.66-0.80 mm (holotype – 0.76 mm).

Coloration. Head brown to black, antennae yellow, apical segment slightly infuscate. Pronotum brown to black. Mesoscutum brown to black, laterally yellow; side lobes yellow, scutellum, axillae, metanotum, propodeum dark yellow. Fore wings hyaline. Legs yellow. Gaster dark yellow, third valvulae pale.

Structure. Head not wider than mesosoma, its width 1.2x height; frontovertex width 0.5x of head width, with sparse setae. Ocelli in slightly obtuse triangle; distance between posterior ocelli slightly longer than that between posterior ocellus and eye. Malar spaces with thin longitudinal striae. Antennae (Fig. 160) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-3.2, S-3.9, P-1.5, F1-0.7, F2-1.5, F3-1.7, (F4-F6)-4.3. Club 3-segmented, slightly shorter than funicle and pedicel combined. Second-third flagellar segments each with one linear sensillum, club segments with two sensilla each. Mesoscutum with distinct reticulate sculpture, 1.5x as long as scutellum, midlobe of mesoscutum with 4 (2+2) setae, 2 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla very widely spaced (Fig. 161), separated by a distance about 9x width of a sensillum; posterior scutellar setae 2.5x as long as anterior scutellar setae; distance between anterior setae 1.4x as long as that between posterior setae. Sculpture of scutellum with larger polygonal cells than on mesoscutum. Fore wing with an asetose area around stigmal vein, 2.4x as long as wide; marginal fringe 0.3x wing width; 3 basal group setae. Marginal vein (Fig. 162) slightly shorter than submarginal vein, with 4-6 long setae along anterior margin; setae about 2.5x as long as width of marginal vein; submarginal vein with 2 setae along anterior margin. Hind wing 7x as long as wide, its marginal fringe 0.7x wing width. Tarsal formula 5-4-5. Midtibial spur (Fig. 163) slightly shorter than basitarsus, the latter subequal in length to proximal two tarsal segments combined. Metasoma slightly longer than mesosoma. Ovipositor (Fig. 164) not

exserted, with base originating at level of third tergite and 1.1x as long as middle tibia; third valvula 0.7x as long as second valvifer (31:45).

Male. Unknown.

Hosts. *Tetraleurodes* sp.

Distribution in Mexico. Guerrero, Tamaulipas.

Comments. *Encarsia guamuchil* sp. n. is most similar to *E. nigricephala* Dozier and can be distinguished from this species as follows: fore wing broad, marginal fringe 0.3x wing width; 3 basal group setae; scutellar placoid sensilla separated by a distance about 9x width of a sensillum; distance between anterior scutellar setae 1.4x as long as that between posterior scutellar setae; first flagellar segment 0.7x as long as wide, sixth segment 1.6x as long as wide. In *E. nigricephala*: fore wing almond-shaped, its marginal fringe 0.5x wing width; one basal group seta; scutellar placoid sensilla separated by a distance about 6x width of a sensillum; distance between anterior scutellar setae 0.6x as long as that between posterior setae; first flagellar segment 2x as long as wide; sixth segment 2.3x as long as wide.

32. *Encarsia haitiensis* Dozier
(Figs 165-167)

Encarsia haitiensis Dozier, 1932: 118. Holotype ♀, Haiti: Damien, 15.xii.1930, reared from *Aleurothrixus floccosus* on *Spondias mombin*, H.L. Dozier (in USNM, examined).

Trichoporus haitiensis (Dozier); Dozier, 1933: 92. Polaszek *et al.*, 2004; lectotype ♀ designated. Male unknown.

Species-group placement. *luteola* group, *meritoria* complex.

Diagnosis. Tarsal formula 5-4-5; fore wing hyaline and uniformly setose; marginal fringe 0.25 wing width; marginal vein with 7-9 setae along anterior margin; 3-6 setae basal group; antennae (Fig. 165) long and slender, not clavate, flagellar segments subequal in length, except first segment which about 0.5x as long as second segment; midlobe of mesoscutum with 6 pairs of setae; anterior pair of scutellar setae shorter than posterior pair of setae; midtibial spur (Fig. 166) slightly

shorter than basitarsus; third valvula 0.75-0.8x as long as second valvifer (Fig. 167); head, mesosoma and gaster largely pale yellow, postocellar bars, pronotum, anterior axillae, scutellum, propodeum and petiole pale brown.

Hosts. Aleyrodidae - *Aleurothrixus floccosus* (Maskell). The following hosts have also been recorded: *Aleurodicus dispersus* Russell, *Aleuroglandulus subtilis* Bondar [= *A. malangae* Russell].

World distribution. Haiti, Cuba, Benin, Hawaii, Taiwan, Venezuela (Noyes, 2006).

Distribution in Mexico. Locality not known.

References. De Santis, 1979; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Evans & Serra, 2002; Myartseva *et al.*, 2004, 2006; Noyes, 2006.

Comments. This species is included to this book on the basis of previously published records for Mexico (De Santis, 1989; Alvarado-Mejía & González-Hernández, 1990).

33. *Encarsia hamoni* Evans and Polaszek (Figs 174-177)

Encarsia hamoni Evans & Polaszek, 1998: 227. Holotype ♀, U.S.A.: Florida, Davie, 24.ii.1994, ex *Tetraleurodes ursorum* on *Annona glabra*, A.B. Hamon (in USNM, examined). Male unknown.

Species-group placement. *cubensis* group.

Diagnosis. Tarsal formula 5-4-5; fore wing hyaline, with an asetose area around stigmal vein; marginal fringe 0.3x wing width; marginal vein (Fig. 175) with 5-6 long and stout setae along anterior margin; one basal seta; first flagellar segment (Fig. 174) quadrate and without linear sensillum; second segment shorter than third segment; midlobe of mesoscutum with 2 pairs of slender setae; scutellar placoid sensilla widely spaced, separated by a distance 5x width of one sensillum; midtibial spur (Fig. 176) 0.7x as long as basitarsus; ovipositor as long as middle tibia; third valvula 0.4x length of ovipositor (Fig. 177); head, pronotum, mesoscutum except lateral margins, axillae, metanotum

laterally dark brown; lateral margins of mesoscutum, side lobes, scutellum yellow; legs yellow; gaster dark brown with yellow central area of first, second and seventh tergites.

Hosts. Aleyrodidae - *Bemisia tabaci* (Gennadius), *Tetraleurodes ursorum* (Cockerell), *Tetraleurodes* sp.

World distribution. U.S.A. (Florida, Georgia).

Distribution in Mexico. Sinaloa, Tamaulipas.

References. Evans & Polaszek, 1998; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002, 2006; Coronado-Blanco *et al.*, 2005a; Myartseva *et al.*, 2004.

Material examined. Mexico: Tamaulipas, Ciudad Victoria, 5 ♀, 17.i.2000, ex *Tetraleurodes* sp. on *Leucaena pulverulenta*; same locality and host, 2 ♀, 6.v.2000, S. Myartseva; same locality, 3 ♀, 9-15.xi.2006, ex *Tetraleurodes* sp. on unknown tree, S. Myartseva; same locality, 1 ♀, 14.ii.2000, ex Aleyrodidae on *Delonix regia*; same locality, 1 ♀, 16.iii.2000, ex Aleyrodidae on *Acacia farnesiana*, G. Gaona-García; same locality, 1 ♀, 17.i.2000, ex Aleyrodidae on *Karwinskia humboldtiana*; 1 ♀, 14.i.2000, on *Cenchrus ciliaris*, sweeping, L.S. Monrreal-Hernández. Sinaloa, Guasave, 1 ♀, 12.x.1990, B. Alvarado.

34. *Encarsia hispida* De Santis (Figs 168-170)

Encarsia hispida De Santis, 1948b: 45. Holotype ♀, Argentina: Rosario, Santa Fe, ex Aleirodoidea [=Aleyrodidae] on 'coral rojo' [=Salvia splendens] (in UNLP, examined paratype ♀).

Encarsia hispida De Santis; Viggiani, 1989: 207, as junior synonym of *Encarsia meritoria* Gahan.

Encarsia hispida De Santis; Polaszek *et al.*, 1992: 383, status reinstated, 2004: 412, status confirmed.

Encarsia meritoria Gahan *sensu* Giorgini & Viggiani, 1996 (misidentifications).

Prospalta brasiliensis Hempel, 1904: 20, syn. n.

Prospaltella brasiliensis (Hempel); Dozier, 1932: 121; Grissell, 1979: 3.

Encarsia brasiliensis (Hempel); n. comb. Viggiani & Mazzone, 1979: 44.

Species-group placement: *luteola* group, *meritoria* complex.

Diagnosis. Tarsal formula 5-4-5; fore wing hyaline, uniformly setose, 2.4-2.6x as long as wide; marginal fringe 0.2-0.3x wing width; marginal vein with 8-9 setae along anterior margin; 4-5 basal group setae; antennal club (Fig. 168) 2-segmented, scape less than 1.6x as long as sixth flagellar segment, pedicel elongate, 1.2-1.3x as long as first flagellar segment, sixth segment elongate, 1.2x as long as fifth segment; midlobe of mesoscutum with 5-8 pairs of setae; scutellar placoid sensilla widely spaced, separated by a distance 4-5 width of one sensillum; midtibial spur (Fig. 169) 0.75-0.80x as long as basitarsus; ovipositor (Fig. 170) 1.0-1.2x as long as middle tibia; third valvula 0.3-0.4x as long as ovipositor, with one pair of medial setae and 3-4 apical setae; head and body pale yellow, sometimes with anterior margin of midlobe, axillae and base of gaster fuscous; legs pale; ovipositor apex dark in contrast with the rest of the ovipositor which is pale; in male two segments of club separate.

Hosts. Aleyrodidae – *Aleyrodes proletella* (L.), *A. singularis* Danzig, *A. spiraeoides* Quaintance, *Aleurodicus dispersus* Russell, *A. dugesii* Cockerell, *Aleuroglandulus subtilis* Bondar [= *A. malangae* Russell], *Aleurotrachelus rhamnicola* (Goux), *A. trachoides* (Back), *Aleurothrix porteri* Quaintance & Baker, *Bemisia tabaci* (Gennadius), *B. tuberculata* (Bondar), *Crenidorsum aroidephagus* Martin & Aguilar, *Lecanoideus floccissimus* Martin *et al.*, *Siphoninus phillyreae* (Haliday), *Tetraleurodes acaciae* (Quaintance), *Tetraleurodes abutiloneus* (Haldeman), *Trialeurodes floridensis* (Quaintance), *T. ricini* (Misra), *T. variabilis* (Quaintance), *Trialeurodes* sp., *Trialeurodes vaporariorum* (Westwood).

World distribution. Argentina, Barbados, Brazil, Chile, Colombia, Dominican Republic, France, Guadeloupe, Guatemala, Honduras, Italy, Jamaica, Madeira, Netherlands, Pacific Islands, Puerto Rico, South Africa, Spain, Venezuela.

Distribution in Mexico. Guerrero, Sinaloa, Tabasco, Tamaulipas, Yucatan.

References. Viggiani, 1989; Polaszek *et al.*, 1992, 2004; Booth & Polaszek, 1996; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Schmidt *et al.*, 2001; Noyes, 2002, 2006; Bellows *et al.*, 2002; Hernández-Suárez *et al.*, 2003; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: **Tamaulipas**, Ciudad Victoria, 1 ♀, 20.vii.1998, ex *Bemisia tabaci*-complex on *Euphorbia* sp.; 2 ♀, 29.vii.1998; 1 ♀, 19.x.1998; 1 ♀, 11.xi.1998, same locality, sweeping; Gómez Farías, Nacimiento, 1 ♀, 3.ii.1999, ex *Tetraleurodes* sp. on *Bauhinia divaricata*, S. Myartseva. **Yucatan**, Uxmal, 3 ♀, 1 ♂, 5.iv.1990, ex *Bemisia tabaci* on *Chamaesyce hyssopifolia*, F.D. Bennett. **Guerrero**, Taxco, 1 ♀, 10.iv.1990, ex *Trialeurodes* sp. on *Chamaesyce hyssopifolia*, F.D. Bennett. **Tabasco**, Villa Hermosa, 1 ♀, 2.viii.1990, ex *Trialeurodes variabilis* on *Carica papaya*, P. Stansly. **Sinaloa**, Quesin, 1 ♀, 26.vii.1990, ex *Tetraleurodes acaciae* on *Glycine maxima*, B. Alvarado.

Comments. *E. hispida* has been treated as a junior synonym of *E. meritoria* Gahan, 1927 (Viggiani, 1989; Schauff *et al.*, 1996). According to Polaszek *et al.* (1992), they are distinct species, and subsequent molecular evidence has supported this view (Babcock *et al.*, 2001; Polaszek *et al.*, 2004).

35. *Encarsia juanae* Myartseva and Evans, sp. n.
(Figs 178-182)

Species-group placement. *aurantii* group.

Material examined. Holotype ♀, Mexico: **Tamaulipas**, Jaumave, ex *Aonidiella aurantii* (Maskell) on *Ruta* sp., 6.ix.1998, S. Myartseva, UCR. Paratypes – 7 ♀, same label data as holotype, FSCA, UCR, UAT; 1 ♀, Ciudad Victoria, ex Diaspididae on *Leucaena* sp., 6.v.2000. J.M. Coronado-Blanco, UCR; 1 ♀, ex *Hemiberlesia* sp. on *Nerium oleander*, 29.vii.1999, G. Gaona-García, UAT; 1 ♀, 29.viii.1999, G. Gaona-García, UAT; 2 ♀, 13.iii.1999, ex *Hemiberlesia* sp. on *Bauhinia variegata*, G. Gaona-García, UCR, FSCA.

Description. Female. Length: 0.50-0.65 mm (holotype – 0.52 mm).

Coloration. Head predominantly dark yellow, face light yellow, postocellar bars brownish, occiput below foramen infusate, clypeus

and cheeks brownish, eyes and ocelli reddish, antennae yellow. Mesosoma yellow; pronotum, large central triangle-shaped area on midlobe of mesoscutum, axillae, propodeum laterally and mesopleuron brownish. Fore wings hyaline, venation slightly infusate. Legs whitish-yellow, hind femora except for apices infusate. Gaster brown, seventh tergite dark yellow.

Structure. Head about as wide as mesosoma, its width 1.5-1.6x height; frontovertex width 0.6-0.8x head width and finely transversely striate. Ocelli forming obtuse triangle; distance between posterior ocelli about 0.6x as long as that from ocellus to eye. Antennae (Fig. 178) inserted immediately under the level of lower margin of eyes; distance between toruli slightly shorter than that from torulus to eye and about 2x as long as distance to mouth margin. Antennal segments with following ratios of length to width: R-2.7-3.0, S-4.1-4.2, P-1.6-1.7, F1-1.0-1.1, F2-1.1, F3-1.2, (F4-F6)-3.3. Club 3-segmented, subequal or slightly shorter than funicle and pedicel combined. Flagellar segments third with one linear sensillum, fourth-sixth with two sensilla each. Mesosoma slightly wider than length. Midlobe of mesoscutum and axillae with wide longitudinally reticulate sculpture, about 1.4x as long as scutellum, with 8 (4+2+2) setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla widely spaced (Fig. 179), separated by a distance of about 4x width of a sensillum. Anterior pair of scutellar setae 0.6x as long as posterior pair of scutellar setae; distance between anterior setae basal 1.3-1.5x as long as distance between posterior setae basal. Fore wing uniformly setose, 2.4-2.6x as long as wide; mmarginal fringe 0.3-0.4x wing width; 3-6 basal group setae. Marginal vein (Fig. 180) slightly shorter than submarginal vein, with 4-5 short setae along anterior margin; stigmal vein thin and with long uncus. Hind wing 7-8x as long as wide, its marginal fringe about 1.2-1.5x as long as wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 181) subequal to basitarsus; the latter subequal in length to proximal 2 tarsal segments combined. Metasoma approximately as long as mesosoma or slightly shorter. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Second-fourth tergites laterally sculpturated. Ovipositor (Fig. 182) slightly exerted and 0.94x as long as middle tibia; third valvula 0.48x as long as second valvifer (17:35).

Male. Unknown.

Hosts. Diaspididae – *Aonidiella aurantii* (Maskell), *Hemiberlesia* sp.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia juanae* sp. n. is similar to *E. berlesei* (Howard) and *E. perniciosi* (Tower); both are very widely distributed in the world. New species can be recognized by following characters: antennal pedicel 2x as long as first funicle segment, first segment subquadrate and slightly shorter than second segment; second segment without sensillum; side lobe with 3 setae; marginal vein with 4-5 setae along anterior margin; ovipositor about as long as middle tibia; third valvula about 0.5x as long as second valvifer; fore wing hyaline and 2.4-2.6x as long as wide. In *E. berlesei*: antennal pedicel as long or little longer than first funicle segment, first segment 1.9x as long as wide and slightly longer than second segment; side lobe with 2 setae; marginal vein with 8-9 setae along anterior margin; ovipositor longer than middle tibia; fore wing infusate below marginal vein. In *E. perniciosi*: fore wing infusate below marginal vein and 2.79x as long as wide; marginal vein with 7 setae along anterior margin; third valvula 0.39x as long as second valvifer.

E. juanae sp. n. is also similar to *E. ectophaga* Silvestri, reared from *Chrysomphalus dictyospermi* (Morg.) in Argentina, but differs as follows: midlobe of mesoscutum with 8 setae; second flagellar segment without sensillum; gaster approximately as long as mesosoma. In *E. ectophaga*: midlobe of mesoscutum with 6 setae; second flagellar segment with sensillum; gaster as long as mesosoma and head combined.

Etymology. This species is named in honor of Dr. Juana María Coronado-Blanco (Universidad Autónoma de Tamaulipas, Ciudad Victoria, Tamaulipas, México) for her contributions to the study of Chalcidoidea of Mexico and for collecting this species.

36. *Encarsia inaron* (Walker)
(Figs 183-187)

Species-group placement. *inaron* group.

Aphelinus inaron Walker, 1839: 10. Lectotype ♀ [designated by Graham, 1976]:[UK] (Haliday) [no other data] (in NMI).

Aphelinus idaeus Walker, 1839: 12; synonymized by Graham, 1976.

Encarsia inaron (Walker); Graham, 1976: 142.

Encarsia partenopea Masi, 1909: 32; synonymized by Polaszek *et al.*, 1992.

Trychaporus aleyrodis Mercet, 1930a: 196; synonymized by Polaszek *et al.*, 1992.

Encarsia brassicae Shafee & Darvas, 1984: 29; synonymized by Hayat, 1998: 200.

Encarsia borealis Huldén, 1986: 18; synonymized by Huang & Polaszek, 1998.

Diagnosis. Tarsal formula 5-5-5; fore wing hyaline with some infuscation basally and uniformly setose, 2.4x as long as wide; marginal fringe short, 0.2x wing width; marginal vein (Fig. 184) with 6-7 setae along anterior margin; 4-5 basal group setae; club 2-segmented, all flagellar segments (Fig. 183) longer than wide and with linear sensilla; midlobe of mesoscutum with varied number of setae, from 3-4 pairs (Hernández-Suárez *et al.*, 2003) to 5-7 pairs (Huang & Polaszek, 1998), in Mexican specimens 5 pairs of setae; scutellar placoid sensilla widely spaced, separated by a distance about 5x width of one sensillum; midtibial spur (Fig. 185) about 0.57x as long as basitarsus; ovipositor 0.9x as long as middle tibia; third valvula 0.4x as long as second valvifer; head, mesosoma and petiole dark brown to black; gaster variable, from yellow, with a variable number of tergites laterally brown, to largely brown; ovipositor (Fig. 186) pale; legs yellow except coxae and in dark specimens – middle and hind femora; mexican female gaster yellow with brown base and sides of first tergite. Male antenna - Fig. 187.

Hosts. Aleyrodidae – *Acaudaleyrodes citri* (Priesner and Hosny), *A. rachipora* (Singh), *Aleyrodes lonicerae* Walker, *A. prolella* (L.), *A. singularis* Danzig, *Asterobemisia carpini* (Koch), *A. pavli* (Zahradnik), *Bemisia tabaci* Gennadius, *Bulgarialeurodes cotesii* (Maskell), *Pealius azaleae* (Baker and Moles), *P. quercus* (Signoret), *Siphoninus immaculatus* (Heeger), *S. phillyreae* (Haliday), *Trialeurodes vaporariorum* (Westwood).

World distribution. Widespread in southern Europe North Africa and Asia; introduced into U.S.A. (California, Florida).

Distribution in Mexico. *Tamaulipas.

References. Polaszek *et al.* 1992; Gould *et al.*, 1992; Bellows *et al.*, 1992; Schauff *et al.*, 1996; Noyes, 2002, 2006; Hernández-Suárez *et al.*, 2003; Myartseva, 2006.

Material examined. Mexico: Tamaulipas, Ciudad Victoria, all specimens reared from *Siphoninus phillyreae* (Haliday) on *Fraxinus* spp.: 2♀, 2♂, 15.i.2006; 1♀, 1♂, 16.ii.1006; 1♀, 1♂, 20.ii.1006; 1♀, 7.iii.2006; 1♀, 1♂, 14.iii.2006; 3♀, 2♂, 19.iv.2007, S. Myartseva. Colima, Tecomán, 1 ♀, 3.vi.2006, ex *Aleurocanthus woglumi* Ashby on *Citrus aurantifolia*, S. Myartseva.

Comments. *Encarsia inaron* was not introduced to Mexico specially. It is very likely that its host, ash whitefly *Siphoninus phillyreae* entered northeastern Mexico from southern U.S.A., and the parasitoid was apparently entered with this host. Both are newly recorded in Mexico.

37. *Encarsia kasparyani* Myartseva and Evans, sp. n.
(Figs 188-193)

Species-group placement. *luteola* group.

Material examined. Holotype ♀, Mexico: D.F., Mexico City, Chapultepec, ex *Aleyrodes* sp., 21.vi.2000, D. Kasparyan, UCR. Paratypes – same label data as holotype, 19 ♀, 3 ♂ (UCR-6 ♀, 2 ♂, FSCA-6 ♀, 1 ♂, UAT-7 ♀); San Luis Potosí, Xilitla, ex *Aleyrodidae*, 1 ♀, 11.xi.1999, S. Myartseva, FSCA. Paratypes 1 ♀, 1 ♂, NHM.

Description. Female. Length: 0.65-0.75 mm (holotype - 0.75 mm).

Coloration. Head with face light yellow, frontovertex dark yellow, occiput infusate, upper margin of mouth and cheeks brown, antennae yellow, apical segment slightly infusate. Mesosoma dark brown, side lobes of mesoscutum yellow, midlobe with dark yellow sides and base and large dark spot, often triangular-shaped, anteriorly. Setation of mesoscutum and scutellum black. Fore wings hyaline, submarginal vein infusate. Legs light yellow, middle and hind coxae on base slightly infusate. Gaster yellow, basally with infusate narrow margin and sometimes with slightly infusate fifth-sixth tergites; third valvula whitish, apices of stylets brown.

Structure. Head about as wide as mesosoma; frontovertex width about 0.5x head width. Ocelli in small rectangled triangle; distance between posterior ocelli subequal to that between posterior ocellus and eye. Antennae (Fig. 188) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-3.0, S-3.9-4.5, P-1.5-2.2, F1-1.9-2.0, F2-2.1-2.4, F3-2.4-2.9, F4-2.8, F5-2.9, F6-3.5-4.3. Club slightly differentiated from funicle. Third-sixth flagellar segments with two linear sensilla each. Female from Xilitla differs in ratios of length to width of scape, pedicel and sixth flagellar segment, than that in females from Mexico City: S- 3.9 vs 4.5, P- 1.5 vs 1.9-2.2 and F6- 4.3 vs 3.5, respectively. Mesosoma as long as wide. Mesoscutum 1.4-1.5x as long as scutellum, both with reticulate sculpture. Midlobe of mesoscutum with 12-16 setae, 3 setae on each side lobe, axilla seta located along the inner margin, closer to base; axilla with at most 5-6 reticulate cells longitudinally. Setation of mesoscutum and scutellum strong. Scutellar placoid sensilla widely spaced (Fig. 189), separated by a distance about 4-6x width of a sensillum. Distance between anterior scutellar setae 0.8x as long as that between posterior setae, the latter 1.5x as long as anterior pair of setae. Fore wing uniformly setose, 2.5x as long as wide; marginal fringe 0.2-0.3x wing width; 4-7 basal group setae. Marginal vein (Fig. 190) longer than submarginal vein, with 7-10 long setae along anterior margin; stigmal vein thin and with long uncus close to anterior margin of disc. Hind wing 8.0-9.7x as long as wide, its marginal fringe 1.6x wing width. Tarsal formula 5-4-5. Midtibial spur (Fig. 191) subequal to basitarsus, the latter longer than the proximal two tarsal segments combined. Metasoma longer than mesosoma. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor (Fig. 192) exerted, with base originating at the level of third tergite, 1.2x as long as middle tibia, but slightly shorter than middle tibia and basitarsus combined; third valvula 0.7-0.8x as long as second valvifer.

Male. Length: 0.65-0.70 mm.

Coloration. Head and mesosoma similar to female. Gaster dark brown.

Structure. Frontovertex 0.6-0.7x head width. Antennae (Fig. 193) inserted immediately below the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-1.6, S-4.0, P-1.5, F1-3.2, F2-3.0, F3-3.2, F4-3.2, (F5-F6)-6.7. All flagellar

segments each with two linear sensilla. Mesosoma and gaster structure similar to female, excluding genitalia. Posterior scutellar setae 1.3x as long as anterior setae. Fore wing 2.3x as long as wide, with marginal fringe 0.2x wing width. Hind wing marginal fringe 1.5x wing width. Midtibial spur slightly shorter than basitarsus.

Hosts. Aleyrodidae – *Aleyrodes* sp.

Distribution in Mexico. D.F., San Luis Potosí.

Comments. *Encarsia kasparyani* sp. n. is similar to *E. desantisi* Viggiani, described from Brazil and Venezuela, but can be distinguished in female as follows: sixth flagellar segment only slightly infusate and 3.8-4.3x as long as wide; third-fifth segments each more than 2.5x as long as wide; ovipositor distinctly exerted; hind wing 8.0-9.7x as long as wide; midlobe of mesoscutum with 6-8 pairs of setae. In *E. desantisi*: antenna more infusate towards club; sixth flagellar segment at most 2.9x as long as wide, third-fifth segments each less than 2.5x as long as wide; ovipositor not distinctly exerted; hind wing 7.3x as long as wide; midlobe of mesoscutum with 5 pairs of setae.

Etymology. This species is named in honor of Dr. Dmitri Rafaelevich Kasparyan (Zoological Institute of Russian Academy of Sciences, Saint Petersburg, Russia), who collected the colony of *Aleyrodes* sp., the host of this species.

38. *Encarsia lacuma* Myartseva and Evans, sp. n.
(Figs 194-198)

Species-group placement. *strenua* group.

Material examined. Holotype ♀, Mexico: Guerrero, Acapulco, ex *Tetraleurodes* sp. on *Pithecellobium* sp., 12.vi.2000, S. Myartseva, UCR. Paratypes – same label data as holotype, 1 ♀, FSCA; Tamaulipas, Ciudad Victoria, ex *Tetraleurodes* sp. on *Leucaena pulverulenta*, 1 ♀, 17.i.2000, S. Myartseva, UCR; same data, 1 ♀, S.L. Monrreal-Hernández, UAT; Querétaro, Jalpan, ex Aleyrodidae on shrub, 1 ♀, 14.iv.2002, S. Myartseva, NHM.

Description. Female. Length: 0.65-0.70 mm (holotype - 0.70 mm).

Coloration. Head light yellow, apical segment of antennae slightly infusate, face whitish-yellow. Mesosoma light yellow, except pronotum, anterior margin of midlobe of mesoscutum, exterior margins of side lobes, axillae, tegulae, propodeum and petiole infusate. Fore wings hyaline. Legs light yellow. Gaster light yellow, first-second tergites laterally and third-sixth tergites completely (fourth-sixth tergites infusate in one specimen); first-second tergites of female from Querétaro without lateral spots; third valvula pale yellow.

Structure. Head slightly wider than mesosoma, its width 1.4-1.5x height; frontovertex width 0.5-0.6x head width. Ocelli in slightly obtuse triangle; distance between posterior ocelli slightly less than between posterior ocellus and eye. Stemmaticum and area behind posterior ocelli with slightly striate sculpture. Antennae (Fig. 194) inserted under the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.7, S-5.0, P-1.3, F1-1.7, F2-1.7, F3-1.7, (F4-F6)-3.8. Club 3-segmented, slightly longer than funicle. First-second and fourth-sixth flagellar segments with one linear sensillum each, third segment with two sensilla. Mesosoma as long as wide. Midlobe of mesoscutum 1.7x as long as scutellum, with 6 (2+2+2) setae, 3 setae on each side lobe, axilla seta located near the center along the inner margin. Scutellar placoid sensilla closely spaced (Fig. 195), separated by a distance about the width of a sensillum. Anterior pair of scutellar setae 0.75x as long as posterior pair of setae; distance between anterior setae 0.7x as long as distance between posterior setae. Fore wing uniformly setose, 3.2x as long as wide; marginal fringe 0.5x wing width; 6-7 basal group setae. Submarginal vein with 2 short setae located close to its base; marginal vein (Fig. 196) longer than submarginal vein, with 7-9 setae along anterior margin; stigmal vein thin and with long uncus, close to anterior margin of disc. Hind wing 9x as long as wide, its marginal fringe about 1.6x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 197) as long as basitarsus, the latter slightly longer than the proximal two tarsal segments combined. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 long setae, respectively. Ovipositor (Fig. 198) not exerted, its base originating at level of third tergite and 1.1x as long as middle tibia; third valvula with acute apices and 0.3x as long as second valvifer (20:65).

Male. Unknown.

Hosts. Aleyrodidae – *Tetraleuodes* sp.

Distribution in Mexico. Guerrero, Querétaro, Tamaulipas.

Comments. *Encarsia lacuma* sp. n. is similar to *E. pitilla* sp. n. reared from *Tetraleuodes* sp. on *Leucaena pulverulenta*, but differs as follows: gaster with first-second tergites laterally and third-sixth tergites completely infusate; first flagellar segment with sensillum; scutellar placoid sensilla very closely placed; midlobe of mesoscutum with 6 setae; fore wing with 6-7 basal group setae. In *E. pitilla*: gaster with slightly infusate spots on exterior sides of first-fourth tergites; first flagellar segment without sensillum; scutellar placoid sensilla more widely placed; midlobe of mesoscutum with 4-6 setae; fore wing with 12 basal group setae.

E. lacuma sp. n. is also similar to *E. macula* sp.n., reared in Tamaulipas and Guerrero, Mexico from *Tetraleuodes* sp., but can be distinguished as follows: first flagellar segment with sensillum; midlobe of mesoscutum with 6 setae; 6 basal group setae; midtibial spur equal to basitarsus; third valvula with acute apices and 0.3x as long as second valvifer. In *E. macula*: first flagellar segment without sensillum; midlobe of mesoscutum with 4-6 setae; 3 basal group setae; midtibial spur shorter than basitarsus; third valvula with obtuse apices and 0.6x as long as second valvifer.

39. *Encarsia lanceolata* Evans and Polaszek
(Figs 199-203)

Encarsia lanceolata Evans and Polaszek, 1997: 564-565. Holotype ♀, Puerto Rico: Mayaguez, 16.xi.1988, ex *Bemisia tabaci*-complex on *Chamaesyce* sp., F.D. Bennett (in USNM, examined). Male unknown.

Species-group placement. *parvella* group.

Diagnosis. Female habitus - Fig. 200; frontal view of head see on Fig. 199. Tarsal formula 5-5-5; fore wing hyaline, slightly infusate at base, with bare area along the distal margin and surrounding stigmal vein; marginal fringe 0.7x wing width; marginal vein (Fig. 202) with 5-7 long and stout setae along anterior margin; 2 basal group setae; club 2-segmented (Fig. 201), first-second flagellar segments without linear sensilla; midlobe of mesoscutum with 2 pairs of slender setae; scutellar placoid sensilla widely spaced, separated by a distance about 5x width

of one sensillum; anterior pair of scutellar setae reaching bases posterior pair of setae; midtibial spur (Fig. 203) 0.6x as long as basitarsus; ovipositor 1.2x as long as middle tibia; third valvula 0.4x as long as ovipositor and with 4-5 pairs of lanceolate apical setae and one pair of medial setae; head yellow, clypeus and area above clypeus dark brown; body yellow with pronotum, central portion of midlobe of mesoscutum, axillae, propodeum and first, second and seventh tergites dark brown; legs and antennae yellow.

Hosts. Aleyrodidae - *Aleurodicus* sp., *Aleurotrachelus atratus* Hempel, *Bemisia tabaci* (Gennadius), *Tetraleurodes acaciae* (Quaintance). In Mexico, *E. lanceolata* was reared from *Bemisia tabaci* (Schuster *et al.*, 1998).

World distribution. Brazil, Dominican Republic, Ecuador, Haiti, Puerto Rico, U.S.A. (Florida).

Distribution in Mexico. D.F.

References. Myartseva & Ruíz-Cancino, 2000; Schuster *et al.*, 1998; Evans & Serra, 2002; Noyes, 2002, 2006; Myartseva *et al.*, 2004.

Material. Mexico: D.F., Mexico City, 1♀, 3.iv.1990, ex *Bemisia tabaci* (Gennadius)-on *Chamaesyce hyssopifolia*, F.D. Bennett (Evans & Polaszek, 1997).

40. *Encarsia leucaenae* Myartseva and Evans, sp. n.
(Figs 204-208)

Species-group placement. *parvella* group.

Material examined. Holotype ♀, Mexico: Tamaulipas, Ciudad Victoria, ex *Tetraleurodes* sp. on *Leucaena pulverulenta*, 17.i.2000, S. Myartseva, UCR. Paratypes 4 ♀ (UCR-2 ♀, FSCA-2 ♀) – same label data as holotype; 1 ♀, Balcon Moctezuma, ex *Tetraleurodes* sp. on *Karwinskia humboldtiana*, 23.i.1999, S. Myartseva, UAT; 1 ♀, Ciudad Victoria, ex Aleyrodidae, 17.ii.2000, L.S. Monrreal-Hernández, UAT; 3 ♀ (UCR-2 ♀, FSCA-1 ♀), Tropic of Cancer, 30 km S. Ciudad Victoria, ex *Tetraleurodes* sp. on *Karwinskia humboldtiana*, 11.i.2001, S. Myartseva.

Description. Female. Length: 0.65-0.75 mm (holotype - 0.75 mm).

Coloration. Head and body uniformly yellow, face yellowish-white, frontovertex dark yellow, apical segment of club slightly infusate. Fore wings hyaline. Legs light yellow, last tarsal segment slightly infusate. Setation of mesoscutum pale. Third valvula yellow with brown inner margins.

Structure. Head slightly wider than mesosoma, its width 1.5x height; frontovertex width about 0.5x width of head. Sculpture of head behind posterior ocelli transversely striate. Ocelli in obtuse triangle. Antennae (Fig. 204) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-3.0, S-4.0, P-1.7, F1-1.7, F2-2.1, F3-2.1, (F4-F6)-4.6. Club 3-segmented, slightly shorter than funicle. Second-fourth flagellar segments and last club segment with one linear sensillum each, fifth segment with two sensilla. Mesosoma slightly wider than long. Mesoscutum 1.7x as long as scutellum, midlobe of mesoscutum with 4 (2+2) or 6 (4+2) setae, 2 setae on each side lobe and one seta on each axilla. Mesoscutal setae very thin. Scutellar placoid sensilla widely spaced (Fig. 205), separated by a distance of about 6x width of a sensillum. Anterior pair of scutellar setae 0.75x as long as posterior pair of setae; distance between anterior setae slightly longer than distance between posterior setae. Fore wing with an asetose area around stigmal vein and 2.8x as long as wide; marginal fringe 0.4x wing width; 2 basal group setae. Marginal vein (Fig. 206) shorter than submarginal vein, with 7 setae along anterior margin; stigmal vein close to wing margin. Hind wing 8x as long as wide, its marginal fringe about 1.4x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 207) about 0.6x as long as basitarsus, the latter longer than the proximal two tarsal segments combined. Ovipositor (Fig. 208) exerted, with base originating at the level of third tergite and 1.1x as long as middle tibia; third valvula 0.6x as long as second valvifer (30:50).

Male. Unknown.

Hosts. Aleyrodidae - *Tetraleurodes* sp.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia leucaenae* sp. n. is similar to *E. americana* (De Bach and Rose), but differs as follows: marginal vein shorter than submarginal vein; ovipositor longer than middle tibia; third valvula 0.6x as long as second valvifer and wider. In *E. americana*: marginal vein longer than submarginal vein; ovipositor subequal in length to middle tibia; third valvula and second valvifer subequal in length and more slender.

41. *Encarsia llera* Myartseva and Evans, sp. n.
(Figs 209-213)

Species-group placement. *luteola* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas, Llera**, ex *Aleurocanthus woglumi* Ashby on *Citrus sinensis*, 11.vi.2000, S. Myartseva, UCR.

Description. Female. Length: 0.59 mm (without ovipositor).

Coloration. Head dark brown, lower part of face (except malar sutures) and antennae yellow. Pronotum and mesoscutum brown, scutellum yellow, other parts of mesosoma slightly infusate. Fore wings hyaline, venation light yellow. Legs light yellow. Gaster yellow, sides of first-fifth tergites with brown spots, third valvulae pale.

Structure. Head not wider than mesosoma, its width 1.6x height; frontovertex width 0.5x of head width. Frontovertex and stemmaticum transversely striate. Ocelli in rectangled triangle; distance between posterior ocelli subequal to that between posterior ocellus and eye. Antennae (Fig. 209) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.5, S-4.7, P-1.9, F1-1.7, F2-1.6, F3-2.1, (F4-F6)-6.2. Club 3-segmented, subequal in length to funicle and pedicel combined. Third flagellar segment with one sensillum, fourth-sixth segments with two linear sensilla each. Mesosoma slightly wider than length and shorter than metasoma. Mesoscutum with distinct reticulate sculpture, 1.3x as long as scutellum. Midlobe of mesoscutum with 12 (4+4+2+2) setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla widely spaced (Fig. 210), separated by a distance about 3x width of a sensillum. Anterior and posterior pairs of scutellar setae subequal in length; distance between anterior setae 0.8x as long as distance

between posterior setae. Fore wing uniformly setose, 2.5x as long as wide; marginal fringe 0.4x wing width; 5 basal group setae. Marginal vein (Fig. 211) slightly longer than submarginal vein, with 6 long setae along anterior margin. Hind wing 8.8x as long as wide, its marginal fringe 1.5x wing width. Tarsal formula 5-4-5. Midtibial spur (Fig. 212) slightly shorter than basitarsus. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Lateral margins of first-fifth tergites with longitudinal reticulate sculpture. Ovipositor (Fig. 213) considerably exerted, with base originating at the level of third tergite and 1.6x as long as middle tibia; third valvula 0.75x as long as second valvifer (45:60).

Male. Unknown.

Hosts. Aleyrodidae – *Aleurocanthus woglumi* Ashby.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia llera* sp. n. is similar to *E. luteola* Howard. It can be distinguished from *E. luteola* (specimens reared in Tamaulipas, Mexico) as follows: scutellum yellow with shallow sculpture; midlobe of mesoscutum with 12 setae, with large areolae without interior striations (maximum length 0.17mm); midtibial spur slightly shorter than basitarsus, the latter subequal in length to the proximal two tarsal segments combined; basitarsus of hind legs 0.26x as long as hind tibia; ovipositor more than 1.5x as long as middle tibia; antennal first-second segments less 2.0x as long as wide, club 6.2x as long as wide. In *E. luteola*: scutellum brown, with clear reticulate sculpture; midlobe of mesoscutum with 8 setae and smaller areolae (maximum length 0.15mm) with fine interior striations; midtibial spur about 0.5x as long as basitarsus, the latter subequal in length to proximal 3 tarsal segments combined; basitarsus of hind legs 0.37x as long as hind tibia; ovipositor less than 1.5x as long as middle tibia; antennal first-second segments more 2.0x as long as wide, club 7.8x as long as wide.

42. *Encarsia llerica* Myartseva, sp. n.
(Figs 214-217)

Species-group placement. *inquirenda* group.

Material examined. Holotype ♀, Mexico: Tamaulipas, Llera, ex *Unaspis citri* (Comstock) on *Citrus aurantifolia*, 26.iii.2001, S. Myartseva, UCR.

Description. Female. Length: 0.50-0.55 mm (without ovipositor).

Coloration. Head yellow, occiput and antennae slightly infusate, postocellar bars and pronotum brownish. Mesosoma yellow, axillae infusate. Fore wings infusate below marginal vein. Legs whitish yellow, hind femora slightly infusate. Petiole infusate. Gaster brown, seventh tergite pale.

Structure. Head width about 1.3x as long as height; frontovertex about 0.6x head width. Ocelli forming rectangled triangle; distance between posterior ocelli about as long as that from ocellus to eye margin. Eyes about 1.5x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 214) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.0, S-3.3, P-1.5, F1-1.3, F2-1.3, F3-1.5, (F4-F6)-5.0. Club 3-segmented, longer than funicle and pedicel combined. First-second flagellar segments without sensilla, third-fourth segments each with one sensillum, fifth-sixth segments with two sensilla each. Sculpture of midlobe and axillae widely reticulate. Midlobe with 4 (2+2) setae, 2 setae on each side lobe and one seta on each axilla placed near anterior margin. Midlobe about 1.4x as wide as long and about 1.5x as long as scutellum. Scutellum about 1.9x as wide as long. Scutellar placoid sensilla widely spaced, separated by a distance about 6x width of a sensillum. Anterior pair of scutellar setae about 0.5x as long as posterior pair of setae. Distance between anterior scutellar setae about 1.7x as long as distance between posterior setae. Fore wing uniformly setose, 3.5x as long as wide; its marginal fringe about 0.5-0.6x wing width; one basal seta. Marginal vein (Fig. 215) subequal in length to submarginal vein and with 5 setae along anterior margin. Hind wing 12.3x as long as wide, its marginal fringe 2.2x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 216) subequal to basitarsus, which is subequal to proximal two tarsal segments combined. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 1+1 and 4 setae, respectively. Seventh tergite 0.5x as wide as long. Ovipositor (Fig. 217) exerted, with base arising at the level of second tergite, about 1.2x as long as middle tibia; third valvula about 0.5-0.6x as long as second valvifer.

Male. Unknown.

Hosts. Diaspididae – *Unaspis citri* (Comstock).

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia llerica* sp. n. is similar to *E. gaonae* sp. n., but can be distinguished by follows: scape 3.3x as long as wide, second flagellar segment without sensillum, midtibial spur as long as basitarsus, ovipositor originating at level of second tergite and third valvula 0.5-0.6x as long as second valvifer. In *E. gaonae*: scape 4.0 as long as wide, second flagellar segment with sensillum, midtibial spur 0.75x as long as basitarsus, ovipositor originating at level of fourth tergite and third valvula 0.43x as long as second valvifer.

43. *Encarsia lounsburyi* (Berlese and Paoli)
(Figs 218-221)

Prospaltella lounsburyi Berlese and Paoli, 1916: 305. Syntype ♀, Madeira: ex *Chrysomphalus dictyospermi* (Morgan) (R. Stazione), (in ISZA?, not examined).

Aspidiotiphagus lounsburyi (Berlese and Paoli); Berlese, 1916: 12- 13, change of combination.

Encarsia lounsburyi (Berlese and Paoli); Viggiani & Mazzone, 1979: 47, change of combination. Male undescribed.

Species-group placement: *citrina* group.

Diagnosis. Female habitus - Fig. 218. Tarsal formula 5-5-5; fore wing (Fig. 220) infusate under marginal vein, with an asetose area around stigmal vein and 4.0x as long as wide; marginal fringe 1.25x as long as width of wing; marginal vein with 4 setae along anterior margin; submarginal vein with one setae; one seta in basal cell; club 3-segmented (Fig. 219), first three flagellar segments approximately subequal in length and without linear sensilla; midlobe of mesoscutum with 2 pairs of setae; each side lobe and each axilla with one seta; scutellar placoid sensilla widely spaced; distance between anterior scutellar setae longer than that between posterior setae; midtibial spur (Fig. 221) about 0.5x as long as basitarsus; ovipositor shorter than middle tibia and basitarsus combined; third valvula 0.56x as long as second valvifer; head yellow with clypeus, malar sulcus, occiput and

postocellar bars brown; mesosoma yellow except pronotum, anterior margin of midlobe of mesoscutum, axillae, mesopleuron and propodeum brown; gaster brown to dark brown except apex of seventh tergite yellow; legs pale yellow.

Hosts. Diaspididae - *Abgrallaspis cyanophylli* (Signoret), *Aonidia lauri* (Bouché), *Aonidiella aurantii* Maskell, *Aspidiotus nerii* Bouché, *Carulaspis juniperi* (Bouché), *C. visci* (Schrank), *Chrysomphalus aonidum* (L.), *C. dictyospermi* (Morgan), *Cornuaspis* (= *Lepidosaphes*) *beckii* (Newman), *Diaspis echinocacti* (Bouché), *Fiorinia fioriniae* (Targioni-Tozzetti), *Hemiberlesia lataniae* (Signoret), *Lepidosaphes beckii* (Newman) *Lepidosaphes pinnaeformis* (Bouche), *Lineaspis striata* (Newstead), *Parlatoria proteus* (Curtis), *P. ziziphi* (Lucas).

World distribution. Nearly cosmopolitan, and widely introduced.

Distribution in Mexico. Locality not known.

References. De Santis, 1979, 1989; Hayat, 1989; Huang & Polaszek, 1998; Heraty & Woolley, 1999; Polaszek *et al.*, 1999; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002, 2006; Gaona-García *et al.*, 2005; Myartseva *et al.*, 2004.

44. *Encarsia luteola* Howard (Figs 222-226)

Encarsia luteola Howard, 1895: 29. Holotype ♀, U.S.A.: Washington D.C., 24.viii.1881, reared from "*Aleyrodes*" sp. (in USNM, examined). Male described by Howard, 1895 [as *E. angelica*], by Rivnay & Gerling (1987) [as *E. deserti*] and redescribed by Polaszek *et al.* (1992).

Encarsia deserti Gerling & Rivnay, 1987: 439; synonymy by Polaszek *et al.*, 1992.

Encarsia angelica Howard, 1895: 30; Viggiani, 1986: 60; synonymy by Polaszek *et al.*, 1992.

Species-group placement. *luteola* group.

Diagnosis. Tarsal formula 5-4-5; fore wing hyaline and uniformly setose, about 2.8x as long as wide; marginal fringe about 0.4x wing width; marginal vein (Fig. 223) with 5-6 setae along anterior margin;

2-4 basal group setae; club 2-segmented (Fig. 222), all flagellar segments longer than wide, number of sensillae on first-second segments varied from 0 to 2; midlobe of mesoscutum with 4-6 pairs of setae; midtibial spur (Fig. 224) about 0.5x as long as basitarsus; ovipositor (Fig. 225) about 1.2x as long as middle tibia; head with occiput dark orange, rest of head brownish; mesosoma dark brown; gaster pale yellowish, petiole and first tergite basally infuscate; tips of stylets black. Male antenna - Fig. 226.

Hosts. Aleyrodidae - *Aleurocanthus* sp., *Aleurocybotus occiduus* Russell, *Aleyrodes* sp., *Bemisia tabaci* (Gennadius), *Dialeurodes* sp., *Dialeurodicus* sp., *Tetraleurodes acaciae* (Quaintance), *Tetraleurodes acaciae* (Quaintance), *T.* sp., *Trialeurodes abutiloneus* (Haldeman), *T. fernaldi* (Morrill), *T. packardi* (Morrill), *T. vaporariorum* (Westwood), *T. variabilis* (Quaintance), *Trialeurodes* sp., *Vasdavidius* [= *Aleurocybotus*] *indicus* (David & Subramaniam).

World distribution. Brazil, Guadeloupe, Puerto Rico, U.S.A.; introduced into Israel.

Distribution in Mexico. Colima, Guerrero, Sinaloa, Tamaulipas.

Material examined. Mexico: **Tamaulipas**, Ciudad Victoria, 1 ♀, 1 ♂, 20.vii.1998, ex *Bemisia tabaci* on *Euphorbia* sp.; 5 ♀, 2 ♂, 29.vii.1998; 2 ♂, 19.x.1998; 1 ♀, 1 ♂, 19.ix.1998, same host on *Euphorbia* sp.; Gómez Farías, Nacimiento, 1 ♂, 11.xi.1998, ex Aleyrodidae; Balcon Moctezuma, 24 km SSW Ciudad Victoria, 2 ♀, 23.ii.1999, ex *Tetraleurodes acaciae* on *Randia* sp.; Jaumave, 2 ♂, 23.ii.1999, ex *Trialeurodes vaporariorum* on *Ruta* sp.; 1 ♂, 30.iii.2001, the same host and plant; Jaumave, Paso Real, 4 ♀, 3 ♂, 31.iii.2001, ex *Tetraleurodes* sp. on *Quercus* sp., S. Myartseva. **Guerrero**, Taxco, 1 ♀, 10.iv.1990, ex *Trialeurodes* sp. on *Chamaesyce hyssopifolia*, F.D. Bennett. **Sinaloa**, Quesin, 1 ♀, 26.vii.1990, ex *Trialeurodes* sp. on *Glycine max*, B. Alvarado.

References. Mound & Halsey, 1978; De Santis, 1979; Gordh, 1979; Polaszek *et al.*, 1992; Evans, 1993; Schauff *et al.* 1996; Schuster *et al.*, 1998; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000, 2005; Noyes, 2002, 2006; Myartseva *et al.*, 2004, 2006.

Comments. Certain populations of *Encarsia luteola* are extremely difficult to distinguish from *E. formosa*. They have many of the same hosts, and both are widespread in the New World, and both are routinely reared from mass whitefly collections. Morphological differences between these species are often very slight. The morphological characters used to separate these species include number of multiporous plate sensilla on the antennae, color of the occipital region, number of cells along the diagonal axis of the axilla, and degree of surface sculpture on the mesosoma. Unfortunately, these characters can be difficult to discern or are variable within each species (Polaszek *et al.*, 1992). Reciprocal molecular markers were used successfully for distinguishing these closely related species, *Encarsia formosa* and *E. luteola* (Babcock & Heraty, 2000).

45. *Encarsia macula* Myartseva and Evans, sp. n.
(Figs 227-232)

Species-group placement. *citrella* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, Miquihuana, ex Aleyrodidae on *Sophora secundiflora*, 1.iv.2001, S. Myartseva, UCR. Paratypes: 5 ♀, 1 ♂ (UCR-3 ♀, 1 ♂, FSCA-2 ♀) - same label data as holotype; 1 ♀, Ciudad Victoria, canyon Novillo, ex *Tetraleurodes* sp., 26.xi.1998, UAT; 1 ♀, Gomez Farias, Nacimiento, ex *Tetraleurodes* sp., 16.xi.1998, UCR; 2 ♀, 1 ♂, Ciudad Victoria, ex *Tetraleurodes* sp. on *Karwinskia humboldtiana*, 22.x.2001, UAT; 1 ♀, Miquihuana, ex Aleyrodidae on *Sophora secundiflora*, 4.x.1998, UAT; 3 ♀, 156 km S Ciudad Victoria, El Madroño, ex *Tetraleurodes* sp., 15.ix.2000, FSCA; 1 ♀, 3 ♂, Jaumave, Paso Real, ex Aleyrodidae on *Quercus* sp., 31.iii.2001, UCR; 2 ♀, 1 ♂, ex Aleyrodidae on *Karwinskia humboldtiana*, 31.i. 2001, FSCA; 1 ♀, 2 ♂, Tropic of Cancer, 30 km S Ciudad Victoria, ex *Tetraleurodes* sp. on *Karwinskia humboldtiana*, 11.i.2001, FSCA; 1 ♀, Jaumave, ex *Trialeurodes vaporariorum* Westw. on *Ruta* sp., 31.iii. 2001, UAT; 2 ♀, 1 ♂, 5 km S Gomez Farías, Ejido La Azteca, ex Aleyrodidae, 23.i.2002, UCR. **Guerrero**, 2 ♀, Acapulco, ex Aleyrodidae, 12.vi.2000, UAT. 3 ♀, 2 ♂, **U.S.A., Texas**, Temple, ex *Tetraleurodes* sp. on *Quercus virginiana*, 23.v.2001, S. Myartseva, FSCA.

Description. Female. Length: 0.65-0.85 mm (holotype - 0.80 mm) [without ovipositor].

Coloration. Head light yellow, face whitish-yellow, mandibular teeth brown. Mesosoma light yellow, pronotum, tegulae and petiolus slightly infuscate. Fore wings hyaline. Legs whitish-yellow. Gaster light yellow; first tergite infuscate, fourth-sixth tergites black; third valvulae with exterior margin and apices pale and interior margin brown; apices of stylets black.

Structure. Head wider than mesosoma, its width 1.4x length; frontovertexwidth about 0.6x head width. Ocelli in slightly obtuse triangle; distance between posterior ocelli slightly less than that between posterior ocellus and eye. Antennae (Fig. 227) inserted immediately under the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.0, S-3.7, P-1.5, F1-1.6, F2-1.7, F3-1.7, (F4-F6)-5.2. Club 3-segmented, slightly shorter than funicle and pedicel combined. Second-sixth flagellar segments with two linear sensilla each. Mesosoma as long as wide. Midlobe of mesoscutum 1.7x as long as scutellum and with 4 (2+2) or 6 (4+2) setae, 3 setae on each side lobe, axilla seta located near middle along inner margin. Scutellar placoid sensilla closely spaced (Fig. 228), separated by a distance of about the width of a sensillum. Anterior pair of scutellar setae about 0.5x as long as posterior pair of scutellar setae; distance between anterior setae about 0.5x as long as that between posterior setae. Fore wing uniformly setose, about 2.5x as long as wide; marginal fringe 0.3x wing width; 3 basal group setae. Marginal vein (Fig. 229) subequal to submarginal vein, with 5-6 setae along anterior margin; stigmal vein thin and with long uncus. Hind wing 8x as long as wide, its marginal fringe 1.5x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 230) 0.7-0.8x as long as basitarsus. Third-seventh tergites with 1+1, 1+1, 2+2, 2 and 4 long setae, respectively. Ovipositor (Fig. 231) exerted, with base originating at the level of third tergite and 1.2x as long as middle tibia; third valvula with obtuse apices and 0.6x as long as second valvifer.

Male. Length: 0.65-0.85 mm.

Coloration. Head yellow, occiput infuscate, antennae yellow. Mesosoma yellow, except pronotum, anterior margin of mesoscutum, tegulae, axillae, sides of propodeum and petiole, mesopleuron infuscate. Gaster dark brown.

Structure. Antennal segments with following ratios of length to width: R-2.5, S-3.8, P-1.3, F1-2.1, F2-2.3, F3-2.3, F4-2.3, F5-2.3, F6-2.8. Club (Fig. 232) slightly shorter than two preceding funicle segments combined. All flagellar segments with 3 linear sensilla each. Fore wing marginal fringe 0.5x wing width. Midtibial spur 0.5x as long as basitarsus. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively.

Hosts. Aleyrodidae – *Tetraleurodes* sp., *Trialeurodes vaporariorum* (Westwood).

World distribution. U.S.A. (Texas).

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia macula* sp. n. appears very similar to *E. citrella* (Howard), the latter distributed in Florida, U.S.A., Honduras and also collected in Mexico. *E. macula* can be distinguished from *E. citrella* as follows: fourth-sixth tergites black, petiole infusate, fore wings hyaline; second flagellar segment with linear sensillum, first segment about 0.7x as long as second segment; axilla seta placed close to its anterior margin; third valvula pale, with more or less abrupted apices and 0.64-0.67x as long as second valvifer. In *E. citrella*: third-fifth tergites black, petiole yellow, fore wings infusate under marginal vein; second flagellar segment without sensillum, first segment slightly shorter than second segment; axilla seta placed centrally; third valvula infusate, with acute apices and 0.5x as long as second valvifer.

46. *Encarsia mahoniae* Myartseva and Evans, sp. n.
(Figs 233-238)

Species-group placement. *japonica* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, Miquihuana, ex *Tetraleurodes* sp. on *Mahonia trifoliata* Moric., 13.v.2000, S. Myartseva, UCR. Paratypes: 4 ♀, 11 ♂ (UCR-2 ♀, 6 ♂, FSCA-1 ♀, 3 ♂, UAT-1 ♀, 2 ♂) – same label data as holotype; 3 ♂, **Nuevo León**, Galeana, same host whitefly and plant, 7.vii.2000, S. Myartseva, UAT; 1 ♀, 1 ♂, **Coahuila**, Los Lirios, ex Aleyrodidae on *Mahonia trifoliata*, 11.iv.2002, S. Myartseva, USNM.

Description. Female. Length: 0.75-0.85 mm (holotype female - 0.85 mm).

Coloration. Head yellow, occiput and face above toruli infusate, antennae yellow, scape and apice of club slightly infusate. Mesosoma yellow except for pronotum, anterior margin of mesoscutum, axillae, tegulae, mesopleuron, propodeum brown. Fore wings infusate under marginal vein; marginal and stigmal veins infusate, submarginal vein pale; setae on infusate area dark. Legs pale yellow, hind coxae and femora except for apices infusate. Gaster dark brown. Ovipositor brown, apical part of third valvulae pale.

Structure. Head not wider than mesosoma, its width 1.4x height; frontovertex 0.7x head width. Ocelli in rectangled or slightly acute triangle; distance between posterior ocelli slightly less than that between posterior ocellus and eye. Stemmaticum with reticulate sculpture, face under anterior ocellus with transverse sculpture. Antennae (Fig. 233) inserted immediately under the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.4, S-3.5, P-1.5, F1-1.9, F2-1.8, F3-1.9, F4-2.0, (F5-F6)-4.0. Club 3-segmented, slightly longer than two preceding funicle segments combined and slightly fused. All flagellar segments with one linear sensillum each. Mesosoma subequal in width and length. Mesoscutum with thin reticulate sculpture; midlobe of mesoscutum 1.6x as long as scutellum and with 6 setae (2+4), 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla closely spaced (Fig. 234), separated by a distance of about 1.0-1.5x width of a sensillum. Distance between anterior scutellar setae about 0.6x as long as that between posterior setae, the latter about 2.5x as long as anterior setae. Fore wing uniformly setose, 2.8x as long as wide; marginal fringe 0.4x as long as wing width; 2-3 basal group setae. Marginal vein (Fig. 235) longer than submarginal vein, with 6-7 setae along anterior margin; stigmal vein 0.2x as long as marginal vein. Hind wing 7x as long as wide, with marginal fringe 1.3x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 236) subequal to basitarsus, the latter subequal to proximal two tarsal segments combined. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor (Fig. 237) slightly exserted, with base originating at the level of third tergite and 1.4x as long as middle tibia; third valvula 0.4x as long as second valvifer (37:90).

Male. Length: 0.67-0.75 mm.

Coloration. Similar to female but fore wings slightly infusate under marginal vein.

Structure. Antennae (Fig. 238) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.4, S-3.5, P-1.0, F1-3.0, F2-3.0, F3-2.0, F4-2.0, (F5-F6)-3.5. All flagellar segments with 2 linear sensilla each, club segments fused. Fore wing 2.5x as long as wide.

Hosts. Aleyrodidae – *Tetraleurodes* sp.

Distribution in Mexico. Coahuila, Nuevo León, Tamaulipas.

Comments. *Encarsia mahoniae* sp. n. is similar to *E. sophia* (Girault and Dodd) of the *strenua* group, described from Australia and widely distributed throughout the world. These species can easily be distinguished as follows: body with infusate areas on head and mesosoma, gaster brown; midlobe of mesoscutum with 6 setae; sculpture on stemmaticum reticulate; fore wings infusate and uniformly setose; midtibial spur equal to basitarsus; sixth tergite with 4 setae between cerci. In *E. sophia*: head and body pale yellow; midlobe of mesoscutum with 8-10 setae; sculpture on stemmaticum transverse striate; fore wings hyaline, with a conspicuous area of long setae near posterior margin; midtibial spur shorter than basitarsus; sixth tergite with one pair of setae between cerci.

E. mahoniae sp. n. is similar in colouration to *E. quercicola* Howard, but can be distinguished in morphology by follows: fore wing with basal group 2-3 setae and marginal fringe 0.4x wing width; ovipositor with base arising to third tergite and third valvula 0.3x as long as ovipositor; midtibial spur as long as basitarsus. In *E. quercicola*: fore wing basal group 4 setae and marginal fringe 0.25x wing width; ovipositor with base originating from first tergite and third valvula 0.25x as long as ovipositor; midtibial spur shorter than basitarsus.

47. *Encarsia merceti* Silvestri
(Figs 239-249)

Encarsia merceti Silvestri, 1926: 187-189. Syntypes ♀♀, Singapore: ex *Aleurocanthus woglumi* on *Citrus* sp. (in IEUN, not examined).

Species-group placement. *merceti* group.

Diagnosis. Frontal view of head - Fig. 239; mandibles and mouth margin see on Fig. 240. Tarsal formula 5-5-5; fore wing (Fig. 243) infusate under marginal vein, uniformly setose and about 2.5x as long as wide; marginal fringe about 2.5x wing width; marginal vein with 6-8 setae; stigmal vein see on Fig. 242; 2 basal group setae; marginal fringe of hind wing slightly longer than wing width; mouth fossa clearly broader than 0.5x frontovertex width; club 2-segmented (Fig. 241), first two flagellar segments slightly longer than wide and without linear sensilla; male antenna 5-segmented (Fig. 247), first flagellar segment (Fig. 248) with a distinct projection on ventro-lateral aspect and disc with a small asetose area around stigmal vein; part of fore wing of male see on Fig. 249; midlobe of mesoscutum with 10 setae; scutellar placoid sensilla widely spaced; distance between anterior scutellar setae equal to or slightly more than that between posterior setae; each placoid sensilla near anterior seta; midtibial spur (Fig. 244) more than 0.5x as long as basitarsus; ovipositor (Fig. 245) about 1.3x as long as middle tibia; third valvula about 0.4x as long as second valvifer; apical two tergites see on Fig. 246; frontovertex orange yellow with brown especially in ocellar triangle, face above toruli pale yellow, mouth dark brown; pronotum, petiole and gaster except orange yellow apex of seventh tergite, dark brown; scutellum yellow to white; third valvula pallid; antennal scape and third-fifth flagellar segments yellow, pedicel and first-second segments brownish to brown; legs pallid, hind coxae and femora dark brown, middle femora and basal third of hind tibiae pale brown.

Hosts. Aleyrodidae - *Aleurocanthus citriperdus* (Quaintance & Baker), *A. spiniferus* (Quaintance), *A. woglumi* Ashby.

World distribution. China, Cuba, India, Indonesia, Malaysia, Philippines, Singapore, Sri Lanka.

Distribution in Mexico. Colima, Jalisco, Morelos, San Luis Potosí.

References. Mound & Halsey, 1978; De Santis, 1979; Evans, 1993; Hayat, 1989; Schauff *et al.*, 1996; Heraty & Woolley, 1999; Noyes, 2002, 2006; Myartseva & Ruíz-Cancino, 2000; Myartseva *et al.*, 2004, 2006.

Comments. No reliable information regarding the results of the introduction of *E. merceti* into Mexico in 1949-1950 against citrus blackfly *Aleurocanthus woglumi* has been published. According to Clausen (1978), the importation of *E. merceti* was unsuccessful. The data on other species, *Encarsia smithi* (Silvestri), introduced also against citrus blackfly, was not known also after its introduction into Mexico, but in 2006 we reared this species from *Aleurocanthus woglumi* for the first time. Therefore we include *Encarsia merceti* into this book.

48. *Encarsia meritoria* Gahan
(Figs 171-173)

Encarsia meritoria Gahan, 1927: 19-20. Holotype ♀, U.S.A.: Florida, Miami Beach, ex *Trialeurodes floridensis* (Quaintance) on avocado *Persea americana*, 12.v.1924, G.F. Mozzett (in USNM, examined).

Encarsia hispida De Santis, 1948; synonymy by Viggiani, 1989: 207.

Encarsia hispida De Santis; stat. rev. Polaszek *et al.*, 1992: 383.

Encarsia meritoria Gahan, 1927; Polaszek *et al.*, 2004: 419; status confirmed for type material.

Species-group placement. *luteola* group, *meritoria* complex.

Diagnosis. Tarsal formula 5-4-5; fore wing hyaline and uniformly setose, 2.5x as long as wide; marginal fringe about 0.2x of wing width; marginal vein with 7 setae along anterior margin; 2-4 basal group setae; antennal club 2-segmented (Fig. 171), scape 1.8x as long as sixth flagellar segment, pedicel elongate, 1.2-1.3x as long as first flagellar segment, sixth segment about as long as fifth segment; midlobe of mesoscutum with 12 setae; scutellar placoid sensilla widely spaced, separated by a distance about 3x width of one sensillum; midtibial spur (Fig. 172) 0.7x as long as basitarsus; ovipositor (Fig. 173) 1.3x as long as middle tibia; third valvula about 0.5x as long as ovipositor; body uniformly coloured, from orange yellow to pale yellow, tip of ovipositor brown; in male two segments of club partially fused.

Hosts. Aleyrodidae - *Trialeurodes floridensis* (Quaintance).

World distribution. U.S.A. (Florida).

Distribution in Mexico. Jalisco.

References. Gordh, 1979; Polaszek *et al.*, 1992, 2004; Schauff *et al.*, 1996; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Schmidt *et al.*, 2001; Noyes, 2002, 2006; Myartseva *et al.*, 2004.

Material examined. Mexico: Jalisco, La Huerta, Est. Biol. Chamela UNAM, Camino Ardilla, 170 msnm, N19 30'323'' W105 02'384'', 1 ♀, redeo en maleza, Y. Castillo O., A. Dávila L., CIB 00-0034.

Comments. The synonymy of *E. meritoria* with *E. hispida* De Santis, 1948 (Viggiani, 1989) was rejected by Polaszek *et al.*, 1992; their status as distinct species was later supported with molecular analyses (Babcock *et al.*, 2001; Polaszek *et al.*, 2004).

49. *Encarsia mexicana* Myartseva
(Figs 250-255)

Encarsia mexicana Myartseva, 2007: 10-11. Holotype ♀, Mexico: Tamaulipas, Jaumave, ex Aleyrodidae on *Persea americana* Mill., 4.x.1998, S. Myartseva (in UCR, examined).

Species-group placement. *albiscutellum* group.

Description. Female. Length: 0.65-0.77 mm (holotype - 0.77 mm).

Coloration. Head pale yellow, frontovertex dark yellow, occiput above slightly infuscate, antennae yellow. Mesosoma except for side lobes of mesoscutum dark brown, with dark setation. Fore wings very slightly infuscate under marginal vein. Legs pale yellow, hind coxae infuscate. Gaster dark brown with first, second and seventh tergites yellow and third valvulae dark brown.

Structure. Head about the same width as mesosoma, its width 1.3x height; frontovertex width about 0.6x head width. Ocelli in slightly obtuse triangle; distance between posterior ocellus and eye about 2x diameter of an ocellus. Antennae (Fig. 250) inserted at the level of

lower margin of eyes. Antennal segments with following ratios of length to width: R-2.0, S-4.4, P-1.4, F1-1.2, F2-2.1, F3-1.9, (F4-F6)-4.8. Club 3-segmented, slightly shorter than funicle and pedicel combined. Second-third flagellar segments each with one linear sensillum, fourth-sixth segments with two sensilla each. Mesosoma slightly wider than length, with thin reticulate sculpture. Midlobe of mesoscutum 1.4x as long as scutellum, with 8 setae (4+2+2), 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla widely spaced (Fig. 251), separated by a distance of 4-5x width of a sensillum. Anterior pair of scutellar setae 0.63x as long as posterior pair of scutellar setae; distance between anterior setae 0.7-0.9x as long as that between posterior setae. Fore wing uniformly setose, about 2.4x as long as wide; marginal fringe 0.2x wing width; 3 basal group setae. Marginal vein (Fig. 252) shorter than submarginal vein, with 7 long setae along anterior margin; stigmal vein with broad uncus, close to margin of wing. Hind wing 6.3x as long as wide, its marginal fringe 1.2x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 253) subequal to basitarsus. Third-seventh tergites with 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor (Fig. 254) exerted, with base originating at base of metasoma, 1.5x as long as middle tibia; third valvula 0.5x as long as second valvifer (24:47).

Male. Length: 0.55 mm.

Coloration. Head and mesosoma similar to that of female, hind femora and tibiae basally slightly infusate. Gaster dark brown except middle part of first and seventh tergites brownish yellow.

Structure. Antennal segments with following ratios of length to width: R-2.0, S-3.2, P-1.3, F1-1.5, F2-2.0, F3-1.9, F4-2.0, (F5-F6)-3.4. Segments of club fused (Fig. 255). Funicular segments with four sensilla and club segments with one linear sensillum each.

Hosts. Aleyrodidae.

Distribution in Mexico. Tamaulipas.

References. Myartseva, 2007a.

Material examined. Mexico: Tamaulipas, Jaumave, 1 ♂, 4.x.1998, ex Aleyrodidae on *Persea americana* Mill., S. Myartseva; Ciudad

Victoria, 2 ♀, 7.x.1998, ex Aleyrodidae on *Psidium guayava* L., S. Myartseva; 25 km SSW Ciudad Victoria, El Madroño, 8 ♀, 4.xi. 2001, ex Aleyrodidae; Gómez Farías, Los Cedros, 2 ♀, 23.xii.2003, ex Aleyrodidae on unknown tree, S. Myartseva. **Michoacán**, Uruapan, 1 ♀, 2 ♂, 27.ix.2005, ex *Tetraleurodes perseae* Rose on *Persea americana*, E.C. López-Barbosa, C. López-Maldonado.

Comments. *Encarsia mexicana* Myartseva is similar to *E. townsendi* Howard described from Mexico, but differs as follows: face yellow, scutellum dark brown, metasoma yellow with sixth-seventh tergites dark brown; first flagellar segment longer than wide; distance between anterior scutellar setae 0.7-0.9x as long as that between posterior setae. In *E. townsendi*: face brown, scutellum lemon yellow, metasoma dark brown with sixth-seventh tergites pale brown; first flagellar segment wider than length; distance between anterior scutellar setae as wide as that between posterior setae.

50. *Encarsia moctezumana* Myartseva and Evans, sp. n.
(Figs 256-261)

Species group placement. *citrella* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, 24 km SSW Ciudad Victoria, Balcon Moctezuma, ex *Tetraleurodes acaciae* (Quaintance) on *Randia* sp., 23.ii.1999, S. Myartseva (in UCR, examined).

Description. Female. Length 0.70-0.75 mm (holotype - 0.75 mm) [without ovipositor].

Coloration. Head light yellow, frontovertex and antennae except for scape dark yellow. Mesosoma yellow except for pronotum, anterior margin of mesoscutum, exterior margins of midlobe, side lobes, axillae, tegulae, scutellum, propodeum slightly infusate, setation pale. Fore wings hyaline, venae slightly infusate. Legs whitish-yellow. Gaster yellow, first-fourth tergites with infusate lateral margins and fifth-seventh tergites entirely lightly infusate; exerted part of third valvulae pale yellow.

Structure. Head slightly wider than mesosoma, its width 1.6x height; frontovertex width 0.6x head width, with transverse striate sculpture

behind posterior ocelli; stemmaticum with reticulate sculpture. Ocelli in small obtuse triangle; distance between posterior ocelli slightly longer than that between posterior ocellus and eye. Antennae (Fig. 256) inserted under the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.5, S-4.4, P-2.0, F1-2.4, F2-2.4, F3-2.1, (F4-F6)-5.8. Club 3-segmented, equal to funicle in length. Fourth-sixth flagellar segments with two linear sensilla each. Mesosoma with thin reticulate sculpture and thin setation, slightly wider than its length. Midlobe of mesoscutum 1.3x as long as scutellum, with 8 (4+2+2) setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla closely spaced (Fig. 257), separated by a distance of 1.0-1.5x width of a sensillum; anterior pair of scutellar setae 0.5x as long as posterior pair of setae; distance between anterior setae 0.6x as long as that between posterior setae. Fore wing uniformly setose, 3x as long as wide; marginal fringe 0.4x wing width; 7-8 basal group setae. Submarginal vein with 2 widely separated long setae; marginal vein (Fig. 258) subequal to submarginal vein, with 5-6 long setae along anterior margin; stigmal vein short and with rounded uncus. Hind wing long, 10x as long as wing width; its marginal fringe 2x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 259) 0.6x as long as basitarsus, the latter subequal in length to proximal 3 tarsal segments combined. Seventh tergite wider than its length. Ovipositor (Fig. 260) exerted, its exerted part subequal to basitarsus of middle tibia, its base originating at the level of fourth tergite; ovipositor 1.3x as long as middle tibia; third valvula 0.36x as long as second valvifer (25:70).

Male. Length: 0.65 mm.

Coloration. Head and mesosoma similar to female but antennae darker yellow and gaster entirely brown.

Structure. Frontovortex slightly wider; distance between posterior ocelli longer than that between posterior ocellus and eye. Antennal segments with following ratios of length to width: R-2.5, S-4.5, P-1.6, F1-2.5, F2-2.6, F3-2.5, F4-2.4, (F5-F6)-4.2. Club 2-segmented (Fig. 261), shorter than two preceding flagellar segments combined. Funicular segments with 2 linear sensilla each, club segments with one linear sensillum each, and fused. Scutellar placoid sensilla very closely spaced.

Hosts. Aleyrodidae – *Tetraleurodes acaciae* (Quaintance).

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia moctezumana* sp. n. is similar to *E. protransvena* Viggiani, described from Florida, U.S.A., and widely distributed in Old and New World, but can be distinguished as follows: body with infusate areas; club subequal in length to funicle; midtibial spur longer than 0.5x basitarsus; sixth tergite with 4 setae. In *E. protransvena*: body pale yellow to yellow; club shorter than funicle; midtibial spur subequal to basitarsus; sixth tergite with 6 setae.

E. moctezumana sp.n. is also similar to *E. costaricensis* Evans and Angulo, reared from greenhouse whitefly *Trialeurodes vaporariorum* in Costa Rica, but differs by having: first flagellar segment not the longest antennal segment; second segment without sensillum; midtibial spur 0.6x as long as basitarsus; marginal fringe 0.4x wing width; ovipositor 1.3x as long as middle tibia; male with club longer than scape. In *E. costaricensis*: first flagellar segment the longest; second segment with sensillum; midtibial spur 0.5x as long as basitarsus; marginal fringe 0.25x wing width; ovipositor subequal in length to middle tibia; male with club shorter than scape.

51. *Encarsia narroi* Gómez and García
(Fig. 262)

Encarsia narroi Gómez & García, 2000: 49-51. Holotype ♀, Mexico: Coahuila, Parras, 1500 m a.s.l., ex *Aleurodicus* sp. on *Bauhinia variegata* and *Hibiscus* sp., 11.ii.1995, J. Gómez, O. García (in NRC BC in Colima, Mexico, not examined).

Encarsiella narroi (Gómez and García); Myartseva & Coronado-Blanco, 2002: 620, change of combination.

Encarsia narroi Gómez and García; Schmidt & Polaszek, 2007: 81, status restored with change of combination.

Species-group placement. *noyesi* group.

Diagnosis. Tarsal formula 5-5-5; fore wing hyaline, uniformly setose, except for small asetose area below stigmal vein, about 2.3x as long as wide; 10 basal group setae; marginal vein with many setae along anterior margin; club 3-segmented (Fig. 262), spindle shaped; midlobe of mesoscutum with 42 pairs of setae; scutellar placoid sensilla widely

spaced, separated by a distance about 2x width of one sensillum; midtibial spur 1.4x shorter than basitarsus; ovipositor shorter than gaster, originating between second and third tergite; body brown, scutellum pale yellow, antennal funicle and legs pale yellow, hind femora infusate.

Host. Aleyrodidae - *Aleurodicus* sp.

Distribution in Mexico. Coahuila.

References. Noyes, 2006; Myartseva & Coronado-Blanco, 2004; Myartseva *et al.*, 2004.

Comments. Schmidt & Polaszek (2007) the genus *Encarsiella* Hayat synonymized with *Encarsia* on the basis of molecular and morphological characters. All species described in *Encarsiella* were transferred to *Encarsia*. Status of *E. narroi* was restored.

***Encarsia porteri*, new species group**

The *Encarsia porteri* species group is characterized primarily by the unusually short and broad phallophase of the male aedeagus; in addition the male antennal segments second to fifth each have 2-3 basiconic sensilla. In most other species, these basiconic sensilla are only located at the apex of each segment. Males of *Encarsia porteri* and *E. neoporteri* have basiconic sensilla located near the central area of each segment as well as apically. The two species in this group – *E. porteri* and *E. neoporteri* also share the following characteristics: female body entirely yellow or nearly so; placoid sensilla spaced at least 2x width of one sensillum; all funicle segments longer than wide, club 3-segmented and often enlarged, wider than the funicle; fore wing uniformly setose. Females of known species only have been reared from whiteflies. Males of *Encarsia porteri* (Mercet) have been reared from lepidopteran eggs.

52. *Encarsia neoporteri* Myartseva and Evans, sp. n. (Figs 269-275)

Species group placement: *porteri* group.

Material examined. Holotype ♀, **Honduras:** Departamento de Choluteca, Santa Rosa, ex *Bemisia tabaci*-complex on *Cucumis melo*, 14.ii.1990, F.D. Bennett, USNM. Allotype ♂ and 4 ♀ paratypes same collection; 11 ♀ paratypes, Honduras: Santa Rosa de Copan, ex *Trialeurodes abutiloneus* on *Aeschynomene* sp., 19.ii.1990, F.D. Bennett.

Other material examined. **Mexico:** **Tabasco,** ex *Bemisia tabaci* on *Euphorbia heterophylla*, 24-30.xii.1989; Laguna de Rosario, ex *Trialeurodes variabilis* on *Carica papaya*, 2.viii.1990, P. Stansly. **Sinaloa:** Guasava, 26.vii.1990, B. Alvarado. **Guatemala:** Soloma, ex *Trialeurodes vaporariorum* on *Phaseolus vulgaris*, 19.iv.1998, H. Smith. **Honduras:** Cortes, San Pedro Sula, ex *Bemisia tabaci* on *Euphorbia glomerata*, 17.ii.1990, F.D. Bennett; Cortes, Omoa, ex *Bemisia tabaci* on *Ipomoea purpurea*, 21.i.1994, W. Morgan. **Panama:** J. Bernal; **U.S.A.:** **Arizona,** Cochise County, 31 miles east Douglas, ex aleyrodids on mesquite, 4.ix.1978; **Texas,** Hidalgo County, Mission, ex *Bemisia tabaci* (Gennadius) on *Citrullus lanatus*, 11.vi.1996.

Description. Female. Length: 1.0 mm (holotype).

Coloration. Body completely yellow except stemmaticum infusate; fore wings hyaline; antennae and legs yellow.

Structure. Female habitus - Fig. 269. Antenna (Fig. 270(a) - in mexican specimen, 271(b) - in specimen from type serie) with 3-segmented club, distinctly broader than funicle segments. Antennal segments with following ratios of length to width: R-2.0, S-3.9, P-1.4, F1-1.6, F2-1.7, F3-1.7, F4-1.7, F5-1.7, F6-1.9. F1-F6 with the following number of linear sensilla: F1-0, F2-1, F3-2, F4-2, F5-3, F6-3. Midlobe of mesoscutum with many elongate, hexagonal reticulations and 4-5 pairs of setae arranged as 4+2+2 or 4+2+2+2, each side lobe with 3 setae, each axilla with one seta located apically; scutellum with anterior pair of setae not reaching base of posterior pair of setae; distance between scutellar placoid sensilla about 4x width of one sensillum; endophragma reaching margin of first tergite. Fore wing (Fig. 272) uniformly setose, about 2.6x as long as wide; marginal fringe about 0.25x wing width; 3-5 basal group setae. Marginal vein with 5 setae along anterior margin, 2 parastigmal setae at its base. Midtibial spur (Fig. 273) 0.7x as long as basitarsus. Gastral dorsum

with weak, imbricate lateral margins on all tergites. Ovipositor arising at level of anterior margin of third tergite, 0.85x as long as middle tibia; third valvula 0.35x as long as ovipositor.

Male. Length: 0.93 mm (allotype).

Coloration. Head yellow except for dark brown, dorsal transverse bar; midlobe dark brown with yellowish lateral and posterior margins; scutellum yellowish; axillae and metanotum dark brown, seventh tergite lighter; legs and antennae yellowish.

Structure. Antennal segments (Fig. 274) with following ratios of length to width: R1-2.0, S-3.0, P-1.2, F1-1.2, F2-1.3, F3-1.2, F4-1.2, F5-1.2, F6-1.8; fourth flagellar segment see on Fig. 275; F5 and F6 separated. Flagellar segments third-fifth and base of sixth segment with basiconic sensilla along central area. Aedeagus of phallobase short and broad.

Hosts. Aleyrodidae – *Bemisia tabaci*-complex, *Trialeurodes abutiloneus* (Haldeman), *T. variabilis* (Quaintance), *T. vaporariorum* (Westwood).

World distribution. Honduras, Guatemala, Panama, U.S.A. (Arizona, Texas).

Distribution in Mexico. Tabasco, Sinaloa.

Comments. *Encarsia neoporteri* sp. n. is most similar to *E. porteri* (Mercet), but can be distinguished by having the antennal segments shorter: first-third segments each 1.5-1.7x as long as wide and midtibial spur 0.7x as long as basitarsus. In *E. porteri*: first-third segments each each about 2.0-2.1x as long as wide and midtibial spur 0.45x as long as basitarsus. Specimens from Mexico have relatively shorter flagellar segments than those of the type series, with length/width: R-1.0-2.2, S-4.7, P-1.8, F1-1.6, F2-1.6, F3-1.5, F4-0.9, F5-1.1, F6-1.5. Males of *E. neoporteri* are similar in color to males of *E. porteri*, but differ by having club segments separated, and sixth segment about as long as fifth segment; in *E. porteri* – club segments are partially fused and sixth segment distinctly longer than fifth segment.

53. *Encarsia nigricephala* Dozier
(Figs 276-280)

Encarsia nigricephala Dozier, 1937: 129. Lectotype ♀ [designated by Evans & Polaszek, 1998: 228], Puerto Rico: Mayaguez, ex *Bemisia euphorbiae* [= *B. tabaci*] on *Euphorbia hypericifolia*, 26.ii.1936, H.L. Dozier (in USNM, examined).

Species-group placement. *cubensis* group.

Diagnosis. Tarsal formula 5-4-5; fore wings hyaline, with an asetose area around stigmal vein, about 3x as long as wide and sometimes pointed; marginal fringe 0.5-0.6x wing width; 1-2 basal group setae; marginal vein (Fig. 277) with 5-6 setae along anterior margin; club 3-segmented (Fig. 276); midlobe of mesoscutum with 2 pairs of setae; scutellar placoid sensilla widely spaced, separated by a distance 6x width of one sensillum; midtibial spur (Fig. 278) 0.6-0.8x as long as basitarsus; ovipositor (Fig. 279) subequal to middle tibia; third valvula about 0.4-0.5x as long as second valvifer; head and anterior mesoscutum dark, remainder of body pale; antennae yellow, apical segments infusate; male antenna (Fig. 280) with second flagellar segment longer than third segment and bearing the sensorial complex.

Hosts. Aleyrodidae - *Aleurodicus dispersus* Russell, *Aleurotrachelus atratus* Hempel, *Aleurotrachelus trachoides*, *B. tabaci* (Gennadius), *Crenidorsum* sp., *Dialeurodes kirkaldyi* (Kotinsky), *Tetraleurodes acaciae* (Quaintance), *Trialeurodes abutiloneus* (Haldeman), *T. floridensis* (Quaintance), *T. vaporariorum* (Westwood). In Mexico, *E. nigricephala* was recorded from *Bemisia tabaci* and *Tetraleurodes acaciae* and reared from *Trialeurodes vaporariorum* (Westwood).

World distribution. Brazil, Barbados, Colombia, Dominican Republic, Ecuador, French Polynesia, Guadeloupe, Guatemala, Honduras, Jamaica, Nauru, Puerto Rico, Reunion, U.S.A., Venezuela.

Distribution in Mexico. D.F., Sinaloa, Tabasco, Tamaulipas.

References. Alarcón, 1993; De Santis, 1979; Polaszek *et al.*, 1992; Evans, 1993; Schauf *et al.*, 1996; Evans & Polaszek, 1998; Evans & Serra, 2002; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino,

2000; Schmidt *et al.*, 2001; Schuster *et al.*, 1998; Noyes, 2002, 2006; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: **Tabasco**, 2 ♀, 24-30 xii.1989, ex *Bemisia tabaci* on *Euphorbia heterophylla*, P. Stansly. **D.F.**, Mexico City, 1 ♀, 14.iv.1990, ex *Trialeurodes* sp. on *Lantana camara*, F. D. Bennett. **Sinaloa**, Quesin, 1 ♀, 12.x.1990, ex *Trialeurodes* sp.?, B. Alvarado. **Tamaulipas**, Ciudad Victoria, 2 ♀, 2 ♂, 25.i-4.ii.2006, ex *Trialeurodes vaporariorum* on unknown grass plant; 1 ♀, 10.xi.2006, ex Aleyrodidae on unknown tree, S. Myartseva.

54. *Encarsia noyesi* (Hayat)
(Figs 263-264)

Encarsiella noyesi Hayat, 1983: 85-87. Holotype ♀, Trinidad: St George, St Augustine, xi.1976 (Bennett) (in BMNH, not examined). *Encarsia noyesi* (Hayat); Schmidt & Polaszek, 2007: 81, change of combination.

Species-group placement. *noyesi* group.

Diagnosis. Tarsal formula 5-5-5; fore wing hyaline, uniformly setose, with a long bare band along wing margin, 2.2-2.3x as long as wide; marginal fringe short, 0.1x wing width; 8-10 basal group setae; marginal vein with 9 setae along anterior margin; club 3-segmented (fig. 263), spindle shaped; midlobe of mesoscutum with more 50 setae; axillae elongate and strongly projecting forward; scutellar placoid sensilla widely spaced, separated by a distance 6-7x width of one sensillum; distance between anterior scutellar setae 0.7x as long as that between posterior setae; midtibial spur about 0.9x as long as basitarsus; ovipositor (Fig. 264) about as long as middle tibia, originating between second and third tergite; third valvula 0.6x as long as second valvifer; frontovertex orange, face pale, occiput infuscate; antennal scape white, pedicel and first flagellar segment brownish, second and third segments yellow, club dark brown; body brown to black, scutellum pale yellow, in living female pearlish-bluish-white; legs pale yellow, middle and hind coxae and hind femora infuscate; third valvula pale, apices of stylets black.

Host. Aleyrodidae - *Aleurodicus cocois*, (Curtis), *A. dispersus* Russell, *A. dugesii* Cockerell, *Aleurothrixus floccosus* (Maskell).

World distribution. Anguilla, Antigua, Barbados, Bermuda, Costa Rica, Grenada, Peru, St Vincent&Grenadines, Trinidad&Tobago, U.S.A. (California, Florida).

Distribution in Mexico. Jalisco, San Luis Potosí, Tamaulipas, Yucatán.

References. Polaszek & Hayat, 1992; Myartseva & Coronado-Blanco, 2002, 2004; Myartseva *et al.*, 2004; Noyes, 2002, 2006.

Material examined. Mexico: **San Luis Potosí**, Xilitla, ex Aleyrodidae, 16 ♀, 17 ♂, 10.xi.1999, S. Myartseva. **Tamaulipas**, Jaumave, ex Aleyrodidae, 36♀, 2 ♂, 30.iv.2000, S. Hernández-Aguilar. **U.S.A., California**, Riverside, UCR Quarantine culture, A. Briones, emerged 3.iv.2000 from *Aleurodicus dugesii* Cockerell; 7♀, 1 ♂, orig. from Mexico, **Jalisco** and Guadalajara, 5.v.1997, D. Headrick.

Comments. Schmidt & Polaszek (2007) synonymized the genus *Encarsiella* Hayat with *Encarsia* on the basis of molecular and morphological characters. This species described in *Encarsiella* was transferred to *Encarsia*.

55. *Encarsia paracitrella* Evans and Polaszek
(Figs 281-284)

Encarsia paracitrella Evans and Polaszek, 1997: 567. Holotype ♀, Mexico: Tulum, Quintana Roo, viii.1990, ex *Tetraleurodes acaciae* on *Chamaesyce* sp., F.D. Bennett (in NHM) [examined paratype in FSCA Collection].

Species-group placement. *citrella* group.

Diagnosis. Female habitus - Fig. 281. Tarsal formula 5-5-5; fore wing (Fig. 283) hyaline and uniformly setose; marginal fringe 0.4x wing width; marginal vein with 8 setae along anterior margin; submarginal vein with 2 setae close to the proximal base; 6 basal group setae; club 2-segmented (Fig. 282), all flagellar segments longer than wide and with sensilla; midlobe of mesoscutum with 3-4 slender setae; distance between scutellar placoid sensilla 1.0-1.5x width of one sensillum; midtibial spur (Fig. 284) equal in length to basitarsus; first-fourth gastral tergites with imbricate lateral margins; ovipositor equal in

length to middle tibia; third valvula short, 0.2x as long as ovipositor; head and body yellow, with axillae, propodeum, first-second tergites laterally, third-sixth tergites centrally brown; third valvulae pale; antennae brown.

Hosts. Aleyrodidae - *Tetraleurodes acaciae* (Quaintance) and *Bemisia tabaci* (Gennadius).

Distribution in Mexico. Quintana Roo.

References. Schuster *et al.*, 1998; Myartseva & Ruíz-Cancino, 2000; Noyes, 2006; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: Quintana Roo, Tulum, 6 ♀, 4 ♂, viii.1990, ex *Tetraleurodes acaciae* on *Chamaesyce* sp.; 1 ♀, same date and locality, ex *Bemisia tabaci*-complex on *Chamaesyce* sp., F.D. Bennett.

56. *Encarsia pergandiella* Howard
(Figs 285-289)

Encarsia pergandiella Howard, 1907: 78. Syntype ♀, U.S.A.: Washington DC, 25.ix.1900, ex "*Aleyrodes* sp." [probably *Trialeurodes vaporariorum*] on *Xanthium strumarium*, T. Pergande (in USNM, examined). Male described by Viggiani (1988).

Encarsia versicolor Girault, 1908: 53; synonymy by Gahan, 1951.

Aleurodiphilus pergandiella (Howard); De Bach & Rose, 1981: 666, change of combination.

Encarsia tabacivora Viggiani, 1985: 82; synonymy by Polaszek *et al.*, 1992.

Species-group placement. *parvella* group.

Diagnosis. Tarsal formula 5-5-5; fore wing infusate under marginal vein and with an asetose area around stigmal vein, 3.5-4.0x as long as wide; marginal fringe 0.7-0.8x wing width; marginal vein (Fig. 286) with 4-5 long setae along anterior margin; 1-2 basal group setae; club 2-segmented (Fig. 285), all flagellar segments longer than wide; midlobe of mesoscutum with 10 setae; scutellar placoid sensilla widely spaced, separated by a distance about 4-5x width of one sensillum; distance between anterior scutellar setae subequal to distance between

posterior setae; midtibial spur (Fig. 287) short, about 0.4x as long as basitarsus; basitarsus elongate, slightly shorter than next tarsal segments combined; ovipositor (Fig. 288) about as long as middle tibia, third valvula 0.5-0.7 as long as second valvifer; head and mesosoma largely pale yellow except pronotum, inverted triangular spot in central mesonotum, axillae anteriorly brown; gaster largely brown; antennae pale yellow, legs whitish. Male antenna - Fig. 289.

Hosts. Aleyrodidae - reared in Mexico from *Bemisia tabaci* (Gennadius), *Tetraleuodes mori* (Quaintance), *Trialeuodes* sp. and *Trialeuodes vaporariorum* (Westwood). Also recorded from: *Aleyrodes* sp., *Aleurodicus dispersus* Russell, *Aleuroglandulus subtilis* Bondar [= *A. malangae* Russell], *Aleuroplatus coronata* (Quaintance), *A. elemerae* Mound & Halsey, *Aleurothrixus floccosus* (Maskell), *Aleurotrachelus socialis* Bondar, *A. trachoides* (Quaintance), *Bemisia tabaci* (Gennadius), *Dialeuodes citri* (Ashmead), *D. kirkaldyi* (Kotinsky), *Pealius azaleae* (Baker & Moles), *Trialeuodes abutiloneus* (Haldeman), *T. floridensis* (Quaintance), *T. packardi* (Morrill), *T. vaporariorum* and *T. variabilis* (Quaintance).

World distribution. Australia, Brazil, Colombia, Costa Rica, El Salvador, Grenada, Guadeloupe, Guatemala, Honduras, U.S.A., Venezuela. Introduced into Israel and Italy.

Distribution in Mexico. Colima, D.F., Guerrero, Quintana Roo, Sinaloa, Sonora, Tabasco, Tamaulipas.

References. Gordh, 1979; Mound & Halsey, 1978; Polaszek *et al.*, 1992; Evans, 1993; Schauff *et al.*, 1996; Heraty & Woolley, 1999; Myartseva & Ruiz-Cancino, 2000; Schmidt *et al.*, 2001; Noyes, 2002, 2006; Hernández-Suárez *et al.*, 2003; Myartseva *et al.*, 2004, 2006; Coronado-Blanco *et al.*, 2005a.

Material examined. Mexico: Tamaulipas, Ciudad Victoria, 2 ♀, 9.ix.1998, ex *Bemisia tabaci*-complex on *Euphorbia pulcherrima*; 1 ♀, 19.x.1998, 1 ♀, 7.xii.1998; 1 ♂, 30.i.1999; 4 ♀, 1 ♂, 6.ii.1999; 1 ♀, 1 ♂, 20.ii.1999, same host on *Euphorbia* sp., S. Myartseva; 4 ♀, 25.i.2006; 2 ♀, 30.i.2006; 4 ♀, 1-6.ii.2006, ex *Trialeuodes vaporariorum* on unknown grass plant, S. Myartseva; 1 ♀, 28.i.1999, ex Aleyrodidae on *Citrus sinensis*, E. Chouvakhina; Jaumave, 10 ♀, 4 ♂, 31.ii.2001, ex *Trialeuodes vaporariorum* on *Malva* sp.; 4 ♀, 14 ♂, 31.iii.2001, ex

Trialeurodes vaporariorum on *Ruta* sp.; Jaumave, Paso Real, 1 ♀, 31.iii.2001, ex *Tetraleurodes* sp. on *Quercus* sp.; Miquihuana, 1 ♂, 1.vi.2001, ex Aleyrodidae on *Sophora secundiflora*; Tampico, 1 ♂, 27.iii.2001, ex *Tetraleurodes mori*; 5 km S Gómez Farías, Ej. La Azteca, 1 ♀, 23.i.2002, ex Aleyrodidae, S. Myartseva. **Quintana Roo**, Cancun, 1 ♀, 6.viii.1990, ex *Bemisia tabaci* on *Chamaesyce hyssopifolia*, F.D. Bennett. **D.F.**, Mexico City, 1 ♀, 6.iv.1990, ex *Trialeurodes vaporariorum* on *Lantana* sp., F.D. Bennett; 1 ♀, 14.iv.1990, ex *Trialeurodes* sp. on *Lantana camara*, F.D. Bennet. **Guerrero**, Taxco, 1 ♀, 9.iv.1990, ex *Trialeurodes* sp. on *Chrysanthemum* sp., F.D. Bennett. **Tabasco**, Huimanguillo, 1 ♀, 3.viii.1990, ex *Trialeurodes* sp. on *Melanthera nivea*, P. Stansly. **Sinaloa**, Quesin, 1 ♀, 26.vii.1990, ex *Aleurotrachelus trachoides*, B. Alvarado; 1 ♀, 26.vii.1990, ex *Trialeurodes* sp., B. Alvarado.

Comments. This species is very similar to *Encarsia tabacivora* Viggiani and was considered a senior synonym of the latter species (Polaszek *et al.*, 1992). Recent unpublished evidence (J. B. Woolley, personal communication) supports the position that these are distinct species. We examined the type specimens of this species as well as a series of specimens reared from *Trialeurodes vaporariorum* in New York by M. Hunter. We consider the New York specimens conspecific with *E. pergandiella*, and distinguish these and the type specimens (females) from *E. tabacivora* by the presence of 2 pairs of setae between the cerci on sixth gastral tergite, the ovipositor as long as, or longer than middle tibia, and fifth flagellar segment of antenna as long as sixth segment and as long as or slightly longer than fourth segment. Females of *E. tabacivora* have one pair of setae between the cerci on sixth gastral tergite, the ovipositor shorter than middle tibia, and fifth flagellar segment of antenna distinctly (1.2x) longer than fourth segment. The type specimens for both species are apparently entirely yellow. We reared *E. tabacivora* from various host and geographic locations extending from South Carolina (U.S.A.) to Brazil. We believe that there exist a light form of both species that is entirely yellow, and a dark form that has an inverted dark brown triangle on the mesoscutum and the metasoma dark brown except for the pale lateral margins and seventh tergite. Information regarding the introduction of *E. pergandiella* into Mexico against *Aleurocanthus woglumi* (Alvarado-Mejía and González-Hernández, 1990, with reference to Domínguez & Carrillo, 1976) is erroneous.

57. *Encarsia perniciosi* (Tower)
(Figs 290-294)

Prospaltella perniciosi Tower, 1913: 125. Syntypes ♀♀ and ♂♂, U.S.A.: Massachusetts, Amherst, x.1912, ex *Diaspidiotus* [= *Quadraspidotus*] *perniciosus* (Comstock) (in USNM, examined). *Encarsia perniciosi* (Tower); Viggiani & Mazzone, 1979, change of combination.

Prospaltella aurantii argentina De Santis, 1948a: 238; synonymy by De Santis, 1979: 335.

Coccophagus clariscutellum Girault, 1915: 51, synonymy by Flanders, 1960: 758.

Prospaltella clariscutellum (Girault); Compere, 1931: 11, change of combination.

Encarsia clariscutellum (Girault); Viggiani, 1985: 240, change of combination.

Species-group placement. *aurantii* group.

Diagnosis. Female habitus - Fig. 290; frontal view of head see on Fig. 291. Tarsal formula 5-5-5; fore wing (Fig. 293) uniformly setose and infusate under marginal vein, about 2.5-2.8x as long as wide; marginal fringe about 0.3x wing width; marginal vein with 6-9 setae along anterior margin; 2-4 basal group setae; club 3-segmented (Fig. 292), first flagellar segment subquadrate or slightly longer than wide and without sensillum; midlobe of mesoscutum with 8-10 setae; scutellar placoid sensilla widely spaced, distance between anterior scutellar setae slightly longer than that between posterior setae; midtibial spur (Fig. 294) shorter than basitarsus; ovipositor nearly equal to or slightly shorter than middle tibia; third valvula about 0.4x as long as second valvifer; head yellow, clypeus, malar sulcus, a crossband above toruli, occiput brown; mesosoma yellow except pronotum, anterior margin of midlobe of mesoscutum, axillae, mesopleuron and propodeum brown; petiole brown; gaster brown except apex of seventh tergite yellow; third valvulae brown; legs pale yellow, fore tibiae, middle and hind coxae and hind femora infusate.

Hosts. Diaspididae - *Aonidiella aurantii* (Maskell), *Diaspidiotus* [= *Quadraspidotus*] *gigas* (Thiem & Gerneck), *D. perniciosus* (Comstock), *Lepidosaphes ulmi* (L.), *Parlatoria acalcarata* McKenzie. In Mexico, *E. perniciosi* was reared from *Diaspidiotus perniciosus*.

World distribution. Nearly cosmopolitan.

Distribution in Mexico. Chihuahua, Coahuila, Nuevo León, Puebla, Tamaulipas, Veracruz.

References. De Santis, 1979; Gordh, 1979; Hayat, 1989; Huang & Polaszek, 1998; Viggiani, 1998; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002, 2006; Ruíz-Cancino & Coronado-Blanco, 2002; Myartseva *et al.*, 2004; Gaona-García *et al.*, 2005; Coronado-Blanco *et al.*, 2005a.

Comments. According to published data (Jiménez-Jiménez & Smith, 1968), *E. perniciosi* was introduced to Mexico more than 40 years ago against the California red scale, *Aonidiella aurantii*; the results of this introduction need confirmation.

58. *Encarsia perplexa* Huang and Polaszek
(Figs 295-299)

Encarsia perplexa Huang & Polaszek, 1998: 1934. Holotype ♀, China: Fujian, Fuzhou, Jinshan, 23.viii.1995, ex *Aleuroclava* [= *Aleurotuberculatus*] *kuwanai* (Takahashi) on red bayberry, L. Ye (FAU, not examined).

Encarsia opulenta (Silvestri); Viggiani & Mazzone 1979: 45; Hayat, 1989: 31; Viggiani & Ren, 1993: 226; Schauff *et al.*, 1996: 23, misidentifications.

Prospaltella opulenta Silvestri; Grissell, 1979: 1; De Santis, 1979: 335, misidentifications.

Species-group placement: *opulenta* group.

Description (mexican materials). **Female.** Length: 0.70-0.90 mm, usually 0.80 mm.

Coloration. Head yellow; occiput above foramen, a crossband between eyes linked by three parts above toruli, postocellar bars dark brown to black, triangular spots above postocellar bars sometimes infuscate; antennae yellow, scape in proximal half infuscate. Mesosoma yellow with pronotum, midlobe of mesoscutum anteriorly, axillae and side lobes anteriorly and propodeum dark brown to black; petiole infuscate; fore wings slightly infuscate below marginal and

stigmal veins; legs whitish-yellow. Gaster coloration varied, but usually with two basal tergites yellow and seventh tergite whitish; third valvulae whitish with apices black.

Structure. Head as wide as mesosoma, slightly wider than height and about 2x as wide as long. Frontovortex width 0.5-0.6x head width and about 1.3x as wide as long. Ocelli forming small triangle with apical angle slightly less 90°; hind ocelli arranged in about two diameters of an ocellus to eye and occipital margin. Eyes finely setose, about 1.6x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 295) inserted under the level of lower margin of eyes, closer to mouth margin. Distance between toruli less than 1.5x as long as distance to mouth margin and about 0.5x as long as distance to eye margin. Antennal segments with following ratios of length to width: S-5.0, P-1.5, F1-1.0, F2-2.0, F3-1.8-2.0, (F4-F6)-5.5. Flagellar segments excluding the first segment with two linear sensilla each. Mesosoma with reticulate sculpture. Midlobe of mesoscutum with 10-14 setae, side lobes with 3 setae, axillae with one seta each. Scutellar placoid sensilla widely spaced, separated by a distance 4-5x width of one sensillum. Distance between anterior setae 0.7x as long as that between posterior setae. Fore wing uniformly setose, about 2.6x as long as wide; marginal fringe about one-sixth wing width; 2-3 basal group setae. Marginal vein slightly longer than submarginal vein, with 7-8 setae along anterior margin; stigmal vein see on Fig. 296. Hind wing about 6.5x as long as wide, marginal fringe slightly longer than wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 297) slightly shorter than basitarsus. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Seventh tergite elongate, about 0.8x as long as wide. Ovipositor (Fig. 298) strongly exserted, 1.8-1.9x as long as middle tibia; third valvula 0.7x as long as second valvifer.

Male. Length: 0.70-0.80 mm.

Coloration. Head yellow, occiput above foramen black, antennal scrobes above brownish, frontovortex between ocelli and behind posterior ocelli with triangular infuscate spot along occipital margin. Antennae yellow, scape pale, pedicel and first-second flagellar segments infuscate. Mesosoma brownish black, scutellum and notauli yellow. Fore wings hyaline, venation infuscate. Legs yellowish white; hind coxae, femora and basal one-third of hind tibiae slightly infuscate. Gaster brownish black, seventh tergite pale except sides.

Structure. Head slightly wider than height, frontovertex transversely striate, as wide as long and 0.5x head width. Ocelli situated as in female, but forming apical angle 90°. Eyes about 1.4x as long as cheeks. Antennae (Fig. 299) inserted immediately under the level of lower margin of eyes; distance between toruli as long as distance to mouth margin and 0.5x as long as distance to eye margin. Antennal segments with following ratios of length to width: S-4.0, P-1.1, F1-1.2, F2-1.4, F3-2.5, F4-2.5. Flagellar segments with 4 linear sensilla each, last segment with 3 sensilla. Midlobe of mesoscutum with 10 setae. Fore wing 2.2x as long as wide; marginal fringe 0.2x wing width. Genitalia 0.7-0.8x as long as middle tibia.

Variations. In female gaster colouration of first-second tergites varied from entirely yellow to entirely brownish black (see Fig. 5). Fuscous triangular spots above posterior ocelli can be very light or absent. Petiole varied from yellow to brownish black, propodeum from dark brown to black except middle part or dark only on sides. Infuscation of fore wing distinct or delicate or rarely absent. Specimens in populations reared from blackfly in Mexico and Southern Texas, have also differences in some structural measures: second and third flagellar segments 2.0 and 1.8-2.0x as long as wide, respectively, club slightly longer than funicle, midlobe of mesoscutum with 10-14 setae, third valvula 0.7x as long as second valvifer, in male club segments distinctly fused and genitalia 0.7-0.8x as long as middle tibia; in original description of *Encarsia perplexa* (Huang and Polaszek, 1998) - second and third flagellar segments 1.5x and 1.4x as long as wide, respectively, club subequal to funicle and pedicel combined, midlobe of mesoscutum with 8-9 setae, third valvula 0.57x as long as second valvifer, in male genitalia 0.55x as long as middle tibia.

Hosts. Aleyrodidae - *Aleurocanthus pectiniferus*, *A. woglumi* Ashby, *Aleuroclava kuwanai* (Takahashi), *Aleurothrixus floccosus* (Maskell), *Tetraleurodes acaciae* (Quaintance).

World distribution. Barbados, China, Dominican Republic, India, Taiwan, U.S.A. (Texas).

Distribution in Mexico. Colima, Jalisco, Morelos, Nuevo León, San Luis Potosí, Sinaloa, Tamaulipas, Yucatán.

References. Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Evans & Serra, 2002; Noyes, 2006; Ruíz-Cancino & Coronado-Blanco, 2002; Myartseva *et al.*, 2004, 2006; Myartseva et Luna-Salas, 2005; Myartseva & Ruíz-Cancino, 2005; Coronado-Blanco *et al.*, 2005a, 2005b; Varela-Fuentes *et al.*, 2006, 2007.

Material examined (all specimens reared from *Aleurocanthus woglumi* on *Citrus* spp). **Mexico: Tamaulipas**, Ciudad Victoria, Cañón Libertad, 8♀, 3♂, 26.viii.1998; 3♀, 27-28.ii.1999, S. Myartseva; 4♀, 16.i.2000; Ciudad Victoria, 1♀, 6.ii.2000, L.S. Monrreal-Hernandez; 2♀, 17.xi.1999, E. Chouvakhina; 1♀, 12.ii.2000, G. Gaona-García; Gómez Farías, 3♀, 1♂, 16.xii.1998; 2♀, 28.xi.1998, S. Myartseva; 1♀, 23-30.i.1999, in Malaise trap, S.G. Hernández-Aguilar; 1♀, 8.iii.2000, S. Triapitsyn, sweeping in citrus orchard Llera, La Purísima, 1♀, 1♂, 11.iv.2000; 11♀, 1♂, 12.ii.2001; 5♀, 12.ii.2001, S. Myartseva; Jaumave, 1♀, 18.ii.2004; Cd. Mante, 2♀, 7.v.2004, S. Myartseva. **Colima**, Tecomán, 1♀, 16.ii.2004, C.M. Díaz-Hernández; 1♀, 1♂, 30.vi.2006, S. Myartseva. **Nuevo León**, Monterrey, 8♀, 3♂, 26.iii.2004, S. Myartseva, J. Luna-Salas; Linares, 5♀, 3♂, 26.iii.2004, S. Myartseva, J. Luna-Salas. **Yucatán**, Merida, 1♀, 1.iv.1990, F.D. Bennett. **U.S.A.: Texas**, Hidalgo, 27♀, 7♂, 25.iii.2004, S. Myartseva, J. Luna-Salas, E. Hernández, D. Dávila-Garza.

Comments. According to Huang & Polaszek (1998), specimens of *Encarsia* species introduced in 1949-1950 into Mexico, South and Central America and the U.S.A. against the citrus blackfly *Aleurocanthus woglumi* as *E. opulenta* (Silvestri, 1927), are *E. perplexa* Huang & Polaszek; *E. opulenta* is distributed only in China and in Vietnam. Smith *et al.* (1964) stated that satisfactory control of citrus blackfly in Mexico was achieved by the combination of *E. clypealis* (Silvestri) and *Amitus hesperidum* Silvestri, two introduced species. The parasite release program continued for many years (Jimenez-Jimenez, 1961; Jimenez & Carrillo, 1968; Altieri & Nicholls, 1999). Our collections confirm that the release of *E. perplexa* in Mexico was successful; it is a very common parasite of the citrus blackfly in Mexico.

59. *Encarsia pinella* Myartseva
(Figs 300-305)

Encarsia pinella Myartseva, 2001: 15-17. Holotype ♀, **Mexico: Tamaulipas**, Gomez Farias, Reserve "El Cielo", La Perra (1900 m), ex *Melanaspis* sp. on *Pinus* spp., 23.x.1998 S. Myartseva (in USNM, examined).

Species-group placement: *albiscutellum* group.

Description. Female. Length: 0.67-0.92 mm.

Coloration. Head dark brown; frontovertex, occiput above foramen, band around eyes dark yellow, two triangular spots behind posterior ocelli and postocellar bars fuscous. Antennae pale brown except fuscous middle part of scape and pedicel pale. Mesoscutum brown, side lobes yellow; scutellum light yellow, anterior margin fuscous; axillae, propodeum and gaster dark brown. Legs dark brown, tibiae and tarsi light yellow. Fore wings hyaline, venation slightly infusate. Ovipositor brown, third valvulae brownish.

Structure. Head as wide as mesosoma, 2x as wide as long and slightly wider than height. Frontovertex about 1.5x as wide as long, its width about two-third of head width. Ocelli in small obtuse triangle; posterior ocelli separated from eyes and occipital margin by about equal distance. Antennae (Fig. 300) inserted immediately under the level of lower margin of eyes. Distance between toruli 0.5x as long as distance from torulus to eye margin. Antennal segments with the following ratios of the length to width: R-2.9, S-5.0, P-2.0, F1-2.4, F2-2.3, F3-2.0, (F4-F6)-4.2. All flagellar segments with 1-2 sensilla. Club 3-segmented, slightly shorter than funicle. Mesoscutum with 7-8 pairs of setae. Scutellar placoid sensilla widely spaced (Fig. 301), separated by a distance 5-6x width of one sensillum. Anterior scutellar setae 0.5x as long as posterior setae. Fore wing uniformly setose, 2.5x as long as wide; marginal fringe 0.2x wing width; 2-3 basal group setae; marginal vein (Fig. 302) with 7 setae along anterior margin and slightly shorter than submarginal vein. Hind wing about 5x as long as wide, its marginal fringe slightly shorter than wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 303) 0.7x as long as basitarsus. Ovipositor (Fig. 304) longer than middle tibia and basitarsus combined; third valvula about 3.3x shorter than second valvifer.

Male. Length: 0.50-0.87 mm.

Coloration. Similar to female.

Structure. Antennae (Fig. 305) inserted immediately above the level of lower margin of eyes. Antennal segments with the following ratios of length to width: R-3.0, S-3.8, P-1.7, F1-1.3, F2-1.7, F3-1.9, F4-2.0, F5-2.0, F6-2.3. All flagellar segments with 1-2 linear sensilla each. First-second segments with specific sensorial area on side with thin transversal strips. Club slightly shorter than third-fourth segments combined. Fore wing 2.3x as long as wide.

Hosts. Diaspididae - *Melanaspis* sp.

Distribution in Mexico. Tamaulipas.

References. Myartseva, 2001; Ruíz-Cancino & Coronado-Blanco, 2002; Coronado-Blanco *et al.*, 2005a; Gaona-García *et al.*, 2005; Myartseva & Ruíz-Cancino, 2005; Myartseva *et al.*, 2004, 2005.

60. *Encarsia pineti* Myartseva and Evans, sp. n.
(Figs 306-310)

Species-group placement. tentatively placed in the *berlesei* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, Reserve "El Cielo", San José, ex *Chionaspis* sp. on *Pinus* spp., 15.xi.1998, S. Myartseva, UCR. Paratypes - 2 ♀ (FSCA and UAT), same label data as holotype.

Description. Female. Length: 0.75-0.80 mm (holotype - 0.80 mm).

Coloration. Head yellow, occiput in middle and apical segment of antennal club infusate. Mesosoma yellow with pronotum, anterior margin of MLM, axillae infusate, propodeum and mesopleuron infusate. Fore wings hyaline. Legs light yellow. Gaster brown.

Structure. Head slightly wider than mesosoma, its width 1.2x height; frontovertex 0.7x head width. Ocelli in small obtuse triangle; distance between posterior ocelli slightly less than that between posterior ocellus and eye. Antennae (Fig. 306) inserted immediately under the

level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.3, S-4.4, P-1.9, F1-1.5, F2-1.1, F3-1.1, (F4-F6)-3.3. Club 3-segmented, subequal in length to funicle and pedicel combined. Club segments with two linear sensilla each. Mesosoma slightly longer than width, midlobe of mesoscutum 1.6x as long as scutellum, with 6 (4+2) setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla widely spaced (Fig. 307), separated by a distance of 4-5x width of a sensillum; anterior pair of scutellar setae 0.5x as long as posterior pair of setae; distance between anterior setae 1.4x as long as that between posterior setae. Fore wing uniformly setose, 2.6x as long as wide; marginal fringe 0.4x wing width; 3 basal group setae. Marginal vein (Fig. 308) longer than submarginal vein, with 6 long setae along anterior margin; stigmal vein 0.2x as long as marginal vein, close to wing margin. Hind wing 7x as long as wide, its marginal fringe 1.4x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 309) subequal to basitarsus, the latter slightly shorter than the proximal two tarsal segments combined. Ovipositor (Fig. 310) slightly exserted, with base originating at the level of third tergite and 1.4x as long as middle tibia; third valvula 0.40x as long as second valvifer (30:75).

Male. Unknown.

Hosts. Diaspididae – *Chionaspis* sp.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia pineti* sp. n. is similar to *E. brimblecombei* (Girault) described from Australia, but differs as follows: gaster brown, axillae slightly infusate; first flagellar segment longer than wide; third segment (13) longer than second segment (9); base of fore wing with 3 setae. In *E. brimblecombei*: gaster brown with yellow base, axillae brown; first flagellar segment transverse; third and second segments subequal in length; base of fore wing glabrous. *E. pineti* sp. n. is also similar to *E. juanae* sp. n. from Mexico, but differs as follows: apical segment of club infusate; first flagellar segment 1.5x as long as wide, third segment without sensillum; marginal vein longer than submarginal vein, with long setae along anterior margin, base of wing with 3 setae; ovipositor 1.4x as long as middle tibia, third valvula 0.4x as long as second valvifer. In *E. juanae*: apical segment of club not infusate; first flagellar segment nearly quadrate, third segment

with sensillum; marginal vein shorter than submarginal vein, with short setae along anterior margin, base of wing with 4-5 setae; ovipositor 0.94x as long as middle tibia, third valvula 0.5x as long as second valvifer.

61. *Encarsia pitilla* Myartseva and Evans, sp. n.
(Figs 311-315)

Species-group placement. *perflava* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, Ciudad Victoria, ex *Tetraleurodes* sp. on *Leucaena pulverulenta*, 17.i.2000, S. Myartseva, UCR. Paratypes – same label data as holotype, 2 ♀ (FSCA and UAT), S.L. Monrreal-Hernández, 3 ♀ (FSCA and USNM), ex *Tetraleurodes* sp. on *Pithecellobium dulce*, 25.iv.2005, S. Myartseva.

Description. Female. Length: 0.65-0.75 mm (holotype - 0.75 mm).

Coloration. Head light yellow, apical segment of club slightly infusate. Mesosoma light yellow, sides of pronotum, tegulae, exterior margins of axillae, side lobes and lateral margins of propodeum slightly infusate. Fore wings hyaline, venation slightly infusate. Legs pale, last segment of tarsi slightly infusate. Gaster light yellow, with infusate spots on exterior sides of first-fourth tergites.

Structure. Head not wider than mesosoma, its width 1.4-1.5x height; frontovertex 0.6x head width. Ocelli in obtuse triangle; distance between posterior ocelli slightly shorter than that between posterior ocellus and eye. Antennae inserted immediately under the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.5, S-4.5, P-1.3, F1-1.6, F2-1.6, F3-1.8, (F4-F6)-4.7. Club 3-segmented, slightly longer than funicle. Second-third flagellar segments with one linear sensillum each, club segments with two linear sensilla each. Mesosoma about as long as wide. Midlobe of mesoscutum 1.6x as long as scutellum, with 4 (2+2) or 6 (4+2) setae, 3 setae on each side lobe, axilla seta located along the inner margin. Scutellar placoid sensilla widely spaced, separated by a distance of 3-4x width of a sensillum. Distance between anterior scutellar setae 0.7x as long as that between posterior setae, the latter 2x as long as anterior setae. Fore wing uniformly setose, 2.9x as long as wide, marginal fringe 0.4x wing width; 9-12 basal group setae. Marginal vein longer

than submarginal vein, with 8-10 short setae along anterior margin. Hind wing 9.2x as long as wide, its marginal fringe 1.8x wing width. Tarsal formula 5-5-5. Midtibial spur subequal to basitarsus. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor slightly exserted, with base originating at the level of fourth tergite and 1.1x as long as middle tibia; third valvula 0.22-0.29x as long as second valvifer.

Male. Unknown.

Hosts. Aleyrodidae – *Tetraleurodes* sp.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia pitilla* sp. n. is similar to *E. confusa* Hayat, but can be easily distinguished as follows: first, second flagellar segments and pedicel subequal in length; midlobe of mesoscutum with 4-6 setae; distance between anterior scutellar setae setal bases shorter than that between posterior setae; midtibial spur subequal to basitarsus. In *E. confusa*: first flagellar segment shorter than second segment and pedicel; midlobe of mesoscutum with 8 setae; distance between anterior scutellar setae setal bases greater than that between posterior setae setal bases; midtibial spur shorter than basitarsus.

62. *Encarsia polaszeki* (Myartseva and Coronado-Blanco)
(Figs 265-266)

Encarsiella polaszeki Myartseva and Coronado-Blanco, 2004: 229-231. Holotype ♀, **Mexico: Tamaulipas**, Jaumave, ex Aleurodicinae, 30.iv.2000, S. Myartseva (in UCR, examined). *Encarsia polaszeki* (Myartseva & Coronado-Blanco, 2004) **comb. n.**

Species-group placement. *noyesi* group.

Description. Female. Length: 0.90-1.0 mm.

Coloration. Head yellow, frontovertex dark orange; antennae yellow, first and second club segments brown, pedicel and first flagellar segments infusate. Mesosoma yellow; pronotum, midlobe of mesoscutum and axillae dark orange or fuscous. Legs light yellow. Fore wings with light infumation of disc below marginal vein,

marginal vein slightly infusate. Gaster brown, third valvulae light yellow.

Structure. Head not wider than mesosoma, its width about 1.5x height; frontovertex width 0.5x head width. Ocelli in obtuse triangle; distance between posterior ocelli subequal to that between posterior ocellus and eye. Mandible with two teeth and truncation. Eyes more than 1.5x as long as cheeks. Antennae (Fig. 265) inserted immediately under the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-1.5, S-4.0-4.2, P-1.7, F1-2.0, F2-2.1, F3-1.9, (F4-F6)-3.25. Club 3-segmented, slightly shorter than funicle. First flagellar segment with one, second-fourth and sixth segments with two, and fifth segment with three linear sensilla. Mesoscutum about 1.5x as wide as long, with many (36-40) setae, its sculpture smooth, with rounded cells on midlobe and side lobes. Scutellum about 1.5x as wide as long; distance between anterior scutellar setae 0.8x as long as that between posterior setae; sculpture more smooth. Axillae distinctly sculptured with longitudinal hexagonal cells, one seta placed near the middle of inner margin of each axilla. Side lobes with 3 setae each. Fore wings uniformly setose, without bare band along margin, about 2x as long as wide; its marginal fringe 0.2x wing width. Submarginal vein with two setae along margin and slightly shorter than marginal vein. Midtibial spur 0.83-0.85x as long as basitarsus. First-seventh tergites with 1+1, 3+3, 3+3, 3+3, 5+5, 3+3, 2+2 setae, respectively. Ovipositor (Fig. 266) exerted, 1.2x as long as middle tibia; third valvula 0.7x as long as second valvifer.

Male. Unknown.

Host. Aleyrodidae.

Distribution in Mexico. Querétaro, Tamaulipas.

References. Polaszek & Hayat, 1992; Myartseva & Coronado Blanco, 2004; Noyes, 2006;

Material examined. Mexico: Tamaulipas, Jaumave, 2♀, 30.iv.2000, ex Aleurodicinae, S. Myartseva. Querétaro, Jalpan, 2♀, 15.iv.2002, ex Aleurodicinae, S. Myartseva.

Comments. *Encarsia polaszeki* Myartseva & Coronado-Blanco differs distinctly from other species of *inaron* group described in the New World by its more light colouration of the mesosoma, smooth reticulate sculpture of the midlobe of the mesoscutum, central middle position of setae on the axillae, longer first flagellar segment than pedicel, and longer third valvula.

Etymology. The new species is named in honour of the entomologist Dr. Andrew Polaszek (Natural History Museum, London, England), who many years study Chalcidoidea of the world and published several valuable articles, for his friendly advices and help in this book.

63. *Encarsia portoricensis* Howard

Encarsia portoricensis Howard, 1907: 77. Lectotype ♀ (designated by Viggiani, 1986), Puerto Rico: Bayamon, from "*Aleyrodes* sp." on climbing vine, i.1899, A. Busck, type No. 10301 (in USNM, examined). Male unknown.

Species-group placement. *divergens* group.

Diagnosis. Tarsal formula 5-5-5; fore wing uniformly setose; scutellar placoid sensilla separated by a distance slightly less than 2x diameter of one sensillum; ovipositor as long as gaster and exserted; body with head orange brown; pronotum, mesoscutum anteriorly, axillae anteriorly, propodeum and gaster brown, posterior mesoscutum, posterior axillae and scutellum yellow.

Hosts. Aleyrodidae - *Aleurothrixus floccosus* (Maskell) [= *A. howardi* (Quaintance)], *Aleuroplatus* sp., *Aleyrodes* sp., *Aleurodicus antillensis* Dozier, *Aleuroglandulus malangae* Russell, *A. subtilis* Bondar.

World distribution. Bermuda, Dominican Republic, Puerto Rico.

Distribution in Mexico. Locality unknown.

References. De Santis, 1979; Evans, 1993; Schauff *et al.*, 1996; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Evans & Serra, 2002; Noyes, 2006; Myartseva *et al.*, 2004.

Material. Mexico: iii.1907, E.K. Charnes, ex *Aleyrodes* sp. (Howard, 1907).

Comments. There has been some confusion in the literature regarding the identity of this species. Evans & Pedata (1997) considered records of this species reported as a parasitoid of *Comstockiella sabalis* (Russell, 1934) based on the erroneous identification of the male of *Coccobius donatellae* Pedata and Evans. We have not examined the specimens that De Santis recorded from Mexico, but have nevertheless decided to include it in this article. The original host of this parasite may be *Dialeurodes buscki* Quaintance & Baker, since both the type series of the whitefly and parasite have the same collection data.

64. *Encarsia protransvena* Viggiani
(Figs 316-319)

Encarsia protransvena Viggiani, 1985: 89. Holotype ♀, U.S.A.: Florida, Broward County, Fort Lauderdale, ix.1984, C.R.R. Thompson, ex *Dialeurodes kirkaldyi*, IESP (in USNM, paratype examined). Male described and illustrated by Heraty & Polaszek (2000).

Species-group placement. *strenua* group.

Diagnosis. Tarsal formula 5-5-5; fore wing hyaline, uniformly setose, about 2.6-3.1x as long as wide; marginal fringe about 0.3-0.4x wing width; marginal vein (Fig. 317) with 6 setae along anterior margin; 7-9 basal group setae; club 3-segmented (Fig. 316), all flagellar segments longer than wide; midlobe of mesoscutum with 4-5 pairs of setae; scutellar placoid sensilla ovoid, closely spaced, separated by distance not more than width of sensillum; distance between anterior scutellar setae shorter than that between posterior setae; midtibial spur 0.8-0.9x as long as basitarsus; ovipositor (Fig. 318) about 1.3-1.7x as long as middle tibia; third valvula short, about 0.3x as long as second valvifer; head and body yellow, antennae yellow. Male antenna - Fig. 319.

Hosts. Aleyrodidae - in Mexico *E. protransvena* was reared from *Bemisia tabaci* (Gennadius) and *Tetraleurodes acaciae* (Alarcon, 1993). It has also been reported from *Aleurocanthus* sp., *Aleurolobus* sp., *Aleurotrachelus rubi* Takahashi, *B. tabaci*-complex, *Dialeurodes citri* (Ashmead), *D. kirkaldyi* (Kotinsky), *Parabemisia myricae* (Kuwana), *Singhiella citrifolii* (Morgan), *Trialeurodes abutiloneus*

(Haldeman), *T. packardi* Morrill), *T. vaporariorum* (Westwood) and *T. variabilis* (Quaintance).

World distribution. Australia, Cayman Islands, China, Colombia, Egypt, Fiji, Hawaii, Honduras, Puerto Rico, Spain, Taiwan, U.S.A.

Distribution in Mexico. Sinaloa.

References. Polaszek *et al.*, 1992; Schauff *et al.*, 1996; Huang & Polaszek, 1998; Heraty & Woolley, 1999; Polaszek *et al.* 1999; Heraty & Polaszek, 2000; Myartseva & Ruíz-Cancino, 2000; Schmidt *et al.*, 2001; Noyes, 2002, 2006; Myartseva *et al.*, 2004, 2006.

65. *Encarsia pseudocitrella* Evans and Polaszek
(Figs 320-323)

Evans and Polaszek, 1997: 567-568. Type: Holotype ♀, U.S.A: Florida, Clewiston, US Sugar Corporation, ex *Parabemisia myricae* on *Citrus* sp., 4.v.1989, H.W. Browning (in USNM, examined).

Species-group placement. *strenua* group.

Diagnosis. Tarsal formula 5-5-5; fore wing uniformly setose and infusate under marginal vein, about 2.7x as long as wide; marginal fringe 0.4x wing width; 0 basal group seta; marginal vein (Fig. 321) with 5-6 long and stout setae along anterior margin; club 3-segmented (Fig. 320), all flagellar segments longer than wide and with linear sensilla; midlobe of mesoscutum with 2 pairs of slender setae; scutellar placoid sensilla closely spaced, separated by a distance not longer than diameter of one sensillum; anterior pair of scutellar setae short, 0.3x as long as posterior pair of setae; midtibial spur (Fig. 322) 0.8x as long as basitarsus; ovipositor (Fig. 323) 0.9x as long as middle tibia; third valvula very short, 0.2x as long as ovipositor; head and body yellow, with base of axillae and central area of second-fifth gastral tergites brown; legs and antennae yellow.

Hosts. Aleyrodidae – *Bemisia tabaci* (Gennadius), *Crenidorsum* sp., *Parabemisia myricae* (Kuwana).

World distribution. Brazil, Costa Rica, Guatemala, Honduras, U.S.A (Florida).

Distribution in Mexico. Querétaro.

References. Evans & Polaszek, 1997.

Material examined. Mexico: Querétaro, Jalpan, 1 ♀, 14.iv.2002, ex Aleyrodidae on unknown tree, S. Myartseva.

Comments. New record for Mexico.

66. *Encarsia quaintancei* Howard
(Figs 95-98)

Encarsia quaintancei Howard, 1907: 79. Lectotype ♀, (designated by Viggiani, 1986), U.S.A: Washington D.C., Bladensburg Road, 29.viii.1990, T. Pergande, from "*Aleyrodes* sp." on *Polygonum* sp., (in USNM, examined). Male described and illustrated by Evans & Polaszek (1998).

Prospaltella perspicuipennis Girault, 1910: 234; synonymy by Polaszek *et al.*, 1992: 387.

Encarsia perspicuipennis (Howard); Viggiani, 1986: 71, change of combination.

Species-group placement. *cubensis* group.

Diagnosis. Female habitus - Fig. 95. Tarsal formula 5-4-5; fore wing (Fig. 98) hyaline, rounded, with an asetose area around stigmal vein; club 2-segmented (Fig. 96), first-second flagellar segments subequal in length; midlobe of mesoscutum with 3-4 pairs of setae (Fig. 97); head, mesoscutum and gaster dark, scutellum and side lobes of mesoscutum pale; male antenna with first-second flagellar segments enlarged, second segment with rounded sensory structures.

Hosts. Aleyrodidae - this species was reared from *Bemisia tabaci*, *Trialeurodes abutiloneus*, *T. vaporariorum* and *Trialeurodes* sp. in Mexico; it has also been reported from *Aleurothrixus floccosus* (Maskell), *Aleyrodes* sp., and *Trialeurodes packardi* (Morrill).

World distribution. Brazil, El Salvador, Guadeloupe, Jamaica, Puerto Rico, U.S.A., Venezuela.

Distribution in Mexico. D.F., Quintana Roo, Sinaloa, Yucatán.

References. Mound & Halsey, 1978; Gordh, 1979; Polaszek *et al.*, 1992; Evans, 1993; Schauf *et al.*, 1996; Schuster *et al.*, 1998; Evans & Polaszek, 1998; Heraty & Woolley, 1999; Myartseva & Ruiz-Cancino, 2000; Noyes, 2002, 2006; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: D. F., Mexico City, 1♀, 6.iv.1990, ex *Trialeurodes vaporariorum* on *Lantana camara*; 1♀, 6.iv.1990, ex *Trialeurodes abutiloneus* on *Lantana* sp., F.D. Bennett. Quintana Roo, Cancun, 2 ♀, 6.viii.1990, ex *Bemisia tabaci* on *Chamaesyce hysopifolia*, F.D. Bennett. Sinaloa, Quesin, 1♀, 12.x.1990, ex *Trialeurodes?* sp., B. Alvarado.

Comments. *Encarsia quaintancei* is most similar to *Encarsia cubensis* Gahan, but can be separated by the color of the metasoma (large anterior yellow spot in *cubensis*) and the antenna (first flagellar segment only about 0.5x as long as second segment in *cubensis*).

67. *Encarsia ruizi* Myartseva and Evans, sp. n.
(Figs 324-328)

Species-group placement. *strenua* group.

Material examined. Holotype ♀, Mexico: Tamaulipas, Gómez Farías, Reserve "El Cielo", Alta Cima, ex Aleyrodidae on *Quercus* sp., 4.viii.2000, S. Myartseva, UCR.

Description. Female. Length: 0.66 mm.

Coloration. Head light yellow, antennae yellow, apical segment of club slightly infuscate. Mesosoma light yellow. Fore wings hyaline. Legs pale. Gaster light yellow.

Structure. Head as wide as mesosoma, its width 1.5x height; frontovertex 0.5x head width. Ocelli in rectangle triangle; distance between posterior ocelli 1.5x as long as that between posterior ocellus and eye. Stemmaticum with reticulate sculpture. Antennae (Fig. 324) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-1.5, S-3.9, P-1.5, F1-1.9, F2-1.9, F3-1.7, (F4-F6)-5.5. Club 3-segmented, slightly shorter than funicle and pedicel combined. Third-fifth flagellar segments each with one linear sensillum, apical club segment with two sensilla. Midlobe of

mesoscutum 1.7x as long as scutellum, with 4 (2+2) setae, 2 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla closely spaced (Fig. 325), separated by a distance about width of a sensillum. Anterior pair of scutellar setae 0.5x as long as posterior pair of scutellar setae; distance between anterior setae 0.6x as long as that between posterior setae. Fore wing uniformly setose, 2.9x as long as wide; marginal fringe 0.4x wing width; 3 basal group setae. Marginal vein (Fig. 326) longer than submarginal vein, with 6 long setae along anterior margin. Hind wing marginal fringe 1.4x wing width. Tarsal formula 5-5-5. Midtibial spur slightly shorter than basitarsus, the latter subequal in length to proximal 2 tarsal segments combined. Gaster longer than mesosoma. Sixth tergite with 4 setae. Ovipositor (Fig. 327) not exerted, with base originating at the level of second tergite and 1.5x as long as middle tibia; third valvula 0.45x as long as second valvifer (30:67).

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia ruizi* sp. n. is similar to *E. protransvena* Viggiani and *E. sophia* (Girault and Dodd). It can be distinguished from *E. protransvena* that the antennal club subequal in length or slightly shorter than first-third segments combined; base of ovipositor originating at level of fourth tergite; sixth tergite with 6 setae; first, second and third flagellar segments more than 2.0x as long as wide; fore wing with more 10 basal group setae. *E. ruizi* sp. n. can be distinguished from *E. sophia* that has the stemmaticum and frontovertex with transverse striate sculpture; fore wing with conspicuous area of long setae on posterior part of disc and with 7-11 basal group setae; second flagellar segment with a sensillum; first-third segments more than 2.0x as long as wide; base of ovipositor originating at level of fourth tergite.

Etymology. This species is named in honor of Dr. Enrique Ruíz-Cancino (Universidad Autónoma de Tamaulipas, Ciudad Victoria, Tamaulipas, México) for his contributions to study of Hymenoptera Parasitica of Mexico and for collecting Chalcidoidea species.

68. *Encarsia smithi* (Silvestri)
(Figs 329-333)

Prospaltella smithi Silvestri, 1928: 179-182. Syntypes ♀♀ and ♂♂, China: Guangdong Province, Canton, ex *Aleurocanthus spiniferus* and *A. woglumi* on *Citrus* sp. (in IEUN, not examined).

Encarsia smithi (Silvestri); Viggiani & Mazzone, 1979: 45, change of combination.

Species-group placement. *smithi* group.

Diagnosis. Tarsal formula 5-5-5; fore wing uniformly setose and infusate under marginal vein, about 2.4-2.6x as long as wide; 2 basal group setae; marginal fringe 0.2x wing width; marginal vein (Fig. 330) with 6-7 setae along anterior margin; antennae (Fig. 329) not distinctly clavate, first flagellar segment subquadrate, about 0.5x as long as second segment; midlobe of mesoscutum with 5 pairs of setae; scutellar placoid sensilla widely spaced, separated by a distance about 4-5x width of one sensillum; midtibial spur (Fig. 331) 0.7x as long as basitarsus; ovipositor (Fig. 332) exerted, about 1.3x as long as middle tibia; third valvula about 0.4x as long as second valvifer; head brown-yellow, clypeus, malar sulcus, occiput, postocellar bars brown to dark brown; mesosoma yellow except pronotum, midlobe of mesoscutum mostly, anterior part of side lobes, axillae, mesopleuron and propodeum brown to dark brown; gaster brown to dark brown, apex of seventh tergite yellow; third valvulae pale; antennae yellow, apical segments infusate; legs pale yellow, except middle and hind coxae, hind femora brown to dark brown. Male antenna - Fig. 333.

Hosts. Aleyrodidae - *Aleurocanthus citriperdus* (Quaintance & Baker), *A. husaini* (Corbett), *A. spiniferus* (Quaintance) and *A. woglumi* Ashby.

World distribution. China, Cuba, Guam, India, Japan, Maldives, Pakistan, Sri Lanka, U.S.A.

Distribution in Mexico. Colima, Jalisco, Morelos, San Luis Potosí, Sinaloa.

References. Mound & Halsey, 1978; De Santis, 1979; Hayat, 1989; Evans, 1993; Schauff *et al.*, 1996; Huang & Polaszek, 1998; Heraty &

Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002, 2006; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: Colima, Tecomán, 3 ♀, 2 ♂, 1-3-vi.2006, ex *Aleurocanthus woglumi* Ashby on *Citrus aurantifolia*, S. Myartseva.

Comments. Our rearing of *Encarsia smithi* from citrus blackfly in 2006 is the first true confirmation of the establishment of this species in Mexico since its introduction over 40 years against *Aleurocanthus woglumi* (Jiménez-Jiménez and Smith, 1968). Records of this species parasitizing *Bemisia tabaci* are probably erroneous.

69. *Encarsia sophia* (Girault and Dodd)
(Figs 334-338)

Coccophagus sophia Girault and Dodd, 1915: 49. Holotype ♀, Australia: Queensland, Cairns, 9.xi.1911, A.A. Girault, ex aleyrodid, type Hy. 2926 (in QMBA, not examined).

Encarsia sophia (Girault and Dodd); Viggiani & Mazzone, 1979.

Prospaltella transvena Timberlake, synonymy by Heraty & Polaszek, 2000: 163.

(see Heraty & Polaszek, 2000 for complete synonymy).

Species-group placement. *strenua* group.

Diagnosis. Female habitus - Fig. 334. Tarsal formula 5-5-5; fore wing (Fig. 336) hyaline and uniformly setose, 2.6-2.9x as long as wide, with a conspicuous area of long setae near the hind margin; marginal fringe 0.3-0.4x wing width; 7-11 basal group setae; marginal vein with 6-9 setae along anterior margin; club 3-segmented (Fig. 335), all flagellar segments more than 2.0x as long as wide, first segment about as long as pedicel and without sensilla; midlobe of mesoscutum with 8-10 setae; scutellar placoid sensilla closely spaced, separated by a distance less than diameter of one sensillum; midtibial spur (Fig. 337) slightly longer than 0.5x of basitarsus; ovipositor as long as, or slightly longer than middle tibia; third valvula 0.24-0.33x as long as second valvifer; ocellar triangle transversely striate; head and body yellow; antennal club slightly infusate; legs pale yellow. Male antenna - Fig. 338.

Hosts. Aleyrodidae - *Acaudaleyrodes rhachipora* (Singh), *Aleurodicus dispersus* Russell, *Aleyrodes proletella* (L.), *Bemisia afer* (Priesner & Hosny), *B. tabaci* (Gennadius), *B. tuberculata* (Bondar), *Dialeurodes citri* (Ashmead), *Parabemisia myricae* (Kuwana), *Pealius hibisci* (Kotinsky), *P. longispinus* Takahashi with *Bemisia afer* (Priesner & Hosny), *Trialeurodes ricini* (Misra), *T. vaporariorum* (Westwood) and *Vasdavidius* [= *Aleurocybotus*] *indicus* (David & Subramaniam). This species was reared from *Trialeurodes variabilis* (Quaintance) on *Carica papaya* in Mexico.

World distribution. Cosmopolitan in the Old World, introduced in the New World.

Distribution in Mexico. Sinaloa, Tabasco.

References. Viggiani, 1985; Schauff *et al.*, 1996; Schuster *et al.*, 1998; Huang & Polaszek, 1998; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000 (as *transvena*); Heraty & Polaszek, 2000; Schmidt *et al.*, 2001; Noyes, 2002, 2006; Evans & Serra, 2002; Hernández-Suárez *et al.*, 2003; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: Tabasco, Laguna Rosario, 1♀, 2.viii.1990, ex *Trialeurodes variabilis* on *Carica papaya*, P. Stansly; Villa Hermosa, same host, 1♀, 2.viii.1990, P. Stansly. Sinaloa, Quesin, 1 ♀, 26.vii.1990, ex *Trialeurodes?* sp., B. Alvarado.

70. *Encarsia subelongata* Myartseva and Evans, sp. n.
(Figs 339-343)

Species-group placement. *aurantii* group.

Material examined. Holotype ♀, Mexico: Tamaulipas, Hidalgo, Santa Engracia, ex *Diaspis echinocacti* (Bouché), 7.iii.2000, S. Myartseva, UCR. Paratypes: 2 ♀, same label data as holotype, UCR; 4 ♀, Ciudad Victoria, in Malaise trap, 12.ii.1999, S.L. Monrreal-Hernández, FSCA; 1 ♀, same locality, ex *Hemiberlesia* sp. on *Populus* sp., 31.viii.1999, G. Gaona-García, UCR; 1 ♀, 15 km N Ciudad Victoria, in Malaise trap, 5.vii.1998, S. Myartseva, UAT; 1 ♀, Gómez Farías, Los Cedros, in Malaise trap, 23-30.i.1999, S.L. Aguilar-Hernández, UAT; 3 ♀, Ciudad Victoria, ex *Aonidiella aurantii* (Maskell) on *Euonymus* sp., 23.viii.1998, G. Gaona-García, UCR; 1 ♀,

same locality, 25.viii.1998, FSCA; 1 ♀, ex Diaspididae on *Leucaena* sp., 16.v.2000, S. Myartseva, UAT; 5 ♀, same locality, ex *Diaspis echinocacti* on *Opuntia engelmanni*, 14.ii.1998, J.M. Coronado-Blanco (FSCA-1 ♀; UCR-2 ♀, UAT-2 ♀); 2 ♀, **San Luis Potosí**, ex Diaspididae on *Myrtillocactus geometrizans*, 12.xi.1999, E. Ruíz-Cancino, UCR.

Description. Female. Length: 0.60-0.70 mm; holotype - 0.65 mm (without ovipositor).

Coloration. Head yellow, occiput brown, antennae dark yellow. Mesosoma yellow with pronotum, anterior margin of midlobe of mesoscutum, anterior margins of side lobes narrowly, axillae, tegulae, mesopleuron, sides of propodeum, sides of first-fourth tergites, and fifth-seventh tergites entirely brown. Fore wings hyaline. Legs pallid except for base of hind coxae infusate. Third valvulae and lateral margins of second valvifers dark brown.

Structure. Head slightly wider than mesosoma, its width 1.4x height; frontovertex 0.6x head width. Sculpture of frontovertex and occiput above foramen transverse striate. Ocelli in slightly obtuse triangle; distance between posterior ocelli subequal to that between posterior ocellus and eye (about 2x diameters of an ocellus). Antennae (Fig. 339) inserted immediately at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-3.5, S-5.0, P-1.8, F1-1.3, F2-1.7, F3-1.3, (F4-F6)-4.5. Club 3-segmented, about as long as funicle segments and pedicel combined. All flagellar segments excluding first segment with one linear sensillum each. Mesosoma slightly wider than its length. Midlobe of mesoscutum about 1.5x as long as scutellum, with 8 (4+2+2) setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla widely spaced (Fig. 340), separated by a distance of more than 2x width of a sensillum; anterior pair of scutellar setae about 0.5x as long as posterior pair of scutellar setae; distance between anterior setae 1.1x as long as that between posterior setae. Fore wing uniformly setose, 3x as long as wide; marginal fringe 0.3x as long as wing width; 3-4 basal group setae (1 ♀ with 5 setae). Marginal vein (Fig. 341) shorter than submarginal vein, with 5 short setae along anterior margin; stigmal vein thin and with long uncus. Hind wing about 10x as long as wide, its marginal fringe about 1.5x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 342) 0.8x as long as basitarsus. Gaster longer than

mesosoma. Ovipositor (Fig. 343) exerted, with base originating at the level of fifth tergite and 0.7x as long as middle tibia; third valvula 0.89x as long as second valvifer (25:28).

Male. Unknown.

Hosts. Diaspididae – *Aonidiella aurantii* (Maskell), *Diaspis echinocacti* (Bouché), *Hemiberlesia* sp.

Distribution in Mexico. San Luis Potosí, Tamaulipas.

Comments. *Encarsia subelongata* sp. n. is similar to *E. elongata* (Dozier), but differs by having the fore wing hyaline, gaster brown with yellow bases (first-fourth tergites), first flagellar segment slightly longer than its width, ovipositor with base originating at the level of fifth tergite, third valvula pallid and 0.9x as long as second valvifer. In *E. elongata*: fore wing infusate under marginal vein, gaster brown with only first and second tergites yellow, first flagellar segment quadrate, ovipositor with base originating at level of second tergite, third valvula dark brown and 2x as long as second valvifer.

71. *Encarsia superbum* Myartseva, sp. n.
(Figs 344-348)

Species-group placement. unplaced.

Material examined. Holotype ♂, **Mexico: Tamaulipas**, Gómez Farias, Reserve “El Cielo”, Alta Cima, ex Aleyrodidae on *Psidium guajava*, 13.xi.1998, S. Myartseva, UCR.

Description. Male. Length: 0.60 mm.

Coloration. Head yellow, frontovertex orange, occiput slightly infusate, antennae yellow. Mesosoma yellow; pronotum dark brown, apices of side lobes, axillae and propodeum brown, midlobe of mesoscutum anteriorly and on middle infusate. Fore wings hyaline. Legs whitish. Gaster dark brown.

Structure. Head about 1.3x as wide as height, frontovertex about 0.6x head width. Ocellar triangle transversely striate. Ocelli in obtuse triangle; distance between posterior ocelli about 1.3x as long as

distance from ocellus to eye. Eyes 1.3x as long as cheeks. Antennae (Fig. 344) inserted immediately at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-1.4, S-3.5, P-1.2, F1-1.3, F2-1.6, F3-1.8, (F4-F6)-6.1. Club 3-segmented, not wider than funicle and slightly shorter than funicle and pedicel combined. Funicle segments join asymmetrically. All flagellar segments each with three linear sensilla. Midlobe of mesoscutum (Fig. 345) and axillae with longitudinally reticulate sculpture (only anteriorly sculpture widely reticulate), about 0.8x as wide as long and with 7 pairs of setae, 3 setae on each side lobe and one seta on each axilla. Scutellum about 0.6x as long as midlobe and about 1.9x as wide as long. Scutellar placoid sensilla widely spaced, separated by a distance about 5x width of a sensillum. Distance between anterior scutellar setae as long as that between posterior setae. Fore wing uniformly setose, 2.4x as long as wide; its marginal fringe about 0.3x as long as wing width; 14 basal group seta. Submarginal vein with 3 setae along anterior margin, marginal vein (Fig. 346) as long as submarginal vein, with 7 long setae along anterior margin. Hind wing about 6.6x as long as wide; its marginal fringe about as long as wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 347) slightly longer than basitarsus (18:16); basitarsus about as long as next two tarsal segments combined. Hindtibial spur 0.8x as long as hind basitarsus and hind basitarsus slightly shorter than next 3 tarsal segments combined. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Base of genitalia (Fig. 348) arising at the level of fifth tergite.

Female. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Tamaulipas.

Comments. Male of *Encarsia superbum* sp. n. has unusual complex of characters: antennal formula 1,1,3,3, midlobe of mesoscutum with 7 pairs of setae and longitudinal sculpture, submarginal vein with 3 setae, midtibial spur longer than basitarsus. Such male was found in the genus *Encarsia* for the first time. But *Encarsia herndoni* (Viggiani, 1987) male has 3-segmented club also. *E. bifasciata* Schmidt and Polaszek has 3-4 setae on submarginal vein, *E. pilosa* Schmidt and

Polaszek has 3-5 setae on submarginal vein (Schmidt & Polaszek, 2006).

72. *Encarsia tabacivora* Viggiani *stat. rev.*
(Figs 349-352)

Encarsia tabacivora Viggiani, 1985: 82. Holotype ♀, Brazil: Sao Paulo, Campinas, Lourencao, ix.1979, ex *Bemisia tabaci* (in UNLP, examined). Male described and illustrated.

Encarsia bemisiae De Santis, 1981: 37, name preoccupied by *Prospaltella bemisiae* Ishii 1938.

Encarsia tabacivora Viggiani, 1985: 82, replacement name for *Encarsia bemisiae* De Santis.

Encarsia tabacivora Viggiani, synonymized with *Encarsia pergandiella* Howard by Polaszek *et al.*, 1992: 387.

Species-group placement. *parvella* group.

Diagnosis. Tarsal formula 5-5-5; fore wing with an asetose area around stigmal vein, infuscate under marginal vein and about 3.3x as long as wide; marginal fringe 0.7x wing width; 1-2 basal group setae; marginal vein (Fig. 350) with 5 setae along anterior margin; club 2-segmented (Fig. 349), fifth flagellar segment 1.1-1.2x as long as fourth segment, first-second segments without sensilla; midlobe of mesoscutum with 4 pairs of setae; scutellar placoid sensilla widely spaced, separated by a distance 5x width of one sensillum; midtibial spur (Fig. 351) less than 0.5x as long as basitarsus; basitarsus about 0.7x as long as remainder tarsal segments combined; sixth tergite with one pair of setae between cerci; ovipositor (Fig. 352) subequal to middle tibia; third valvula 0.7x as long as second valvifer; head yellow, frontovertex orange; mesosoma yellow with brownish pronotum, anterior margin of mesoscutum, axillae and propodeum; gaster brownish with pale lateral margins and seventh tergite; antennae and legs whitish.

Hosts. Aleyrodidae – *Aleurodicus* sp., *Aleurotrachelus trachoides* (Back), *Bemisia tabaci* (Gennadius), *Trialeurodes abutiloneus* (Haldeman), *T. vaporariorum* (Westwood), *Trialeurodes* sp.

World distribution. Brazil, Dominican Republic, U.S.A.

Distribution in Mexico. D.F., Guerrero, Jalisco, Quintana Roo, Sinaloa, Tabasco.

References. De Santis, 1981 (as *E. bemisiae*); Polaszek *et al.*, 1992; Evans & Serra, 2002; Hernández-Suárez *et al.*, 2003.

Material examined. Mexico: **Quintana Roo**, Cancun, 1 ♀, 6.viii.1990, ex *Bemisia tabaci* on *Chamaesyce hyssopifolia*, F.D. Bennett. **D.F.**, Mexico City, 1 ♀, 6.iv.1990, ex *Trialeurodes vaporariorum* on *Lantana* sp.; 1 ♀, 14.iv.1990, ex *Trialeurodes* sp. on *Lantana camara*, F.D. Bennett. **Guerrero**, Taxco, 1 ♀, 9.iv.1990, ex *Trialeurodes* sp. on *Chrysanthemum* sp., F.D. Bennett. **Tabasco**, Huimanguillo, 1 ♀, 3.vii.1990, ex *Trialeurodes* sp. on *Melanthera nivea*, P. Stansly. **Sinaloa**, Quesin, 1 ♀, 26.vii.1990; 1 ♀, 26.vii.1990, ex *Aleurotrachelus trachoides*, B. Alvarado. **Jalisco**, La Huerta, Est. Biol. Chamela UNAM, Camino Ej. Central, 127 msnm, N 19 30'416'', W 105 02'238'', 1 ♀, 26.vii.2000, redeo en maleza, Y. Castillo, A. Dávila L., A. González H., CIB 00-0032.

Comment. See discussion under *Encarsia pergandiella*.

73. *Encarsia tamaulipecta* (Myartseva and Coronado-Blanco)
(Figs 267-268)

Encarsiella tamaulipecta Myartseva & Coronado Blanco, 2002: 621-623. Holotype ♀, **Mexico: Tamaulipas**, Ciudad Victoria, ex Aleyrodidae on *Psidium guajava*, 7-8.xii.1995, E. Chouvakhina (in USNM, examined).

Encarsia tamaulipecta (Myartseva & Coronado-Blanco); Schmidt & Polaszek, 2007: 81, change of combination.

Species-group placement. *noyesi* group.

Description. Female. Length: 0.75-0.82 mm (N= 8 specimens on points, 2 on slides); holotype - 0.75 mm.

Coloration. Head black, face ferrugineous from anterior ocellus to interantennal prominence and whitish below (except upper margin of mouth, hind part of cheeks and antennal scrobes). Pedicel and antennal club brown, scape (except distal half dorsally brown) and third flagellar segment whitish, first and second segments pale brown.

Mesosoma and gaster black. Legs yellowish-white, middle and hind coxae, hind femora black, middle femora and hind tibiae infusate. Fore wings hyaline. Third valvulae whitish.

Structure. Head wider than height and as wide as mesosoma. Frontoververtex 2x as wide as long, about 0.5x head width. Occipital margin slightly rounded and concave. Ocelli in slightly obtuse triangle; posterior ocelli close to occipital margin at a distance of less than diameter of an ocellus, and about 2 diameters of an ocellus from eye margins. Eyes about 2x as long as cheeks. Malar sulcus present. Antenna (Fig. 267) inserted immediately under the level of lower margin of eyes, closer to mouth margin than to eye margins. Antennal segments with the following ratios of length to width: R-15:9, S-60:15, P-22:13, Fl-18:12, F2-25:14, F3-20:15, (F4-F6)-67:20. Club 3-segmented, slightly longer than funicle. Second, third flagellar segments and club segments with two longitudinal sensilla each, sensilla absent on first segment. A very thin anellus is also present. Sculpture of dorsum of mesosoma with more or less hexagonal cells, sides of mesoscutum and scutellum with longitudinal cells. Mesoscutum slightly wider than long, with many setae varying in number from 54 to 64. Axilla with one seta, side lobes with three setae each. Scutellum about 2x wider than long. Fore wing uniformly setose, more than 2x as long as wide, marginal fringe about 0.14x wing width, base with 7-10 setae. Strong setae in two rows on anterior margin form narrow bare band, interrupted near vein by a few setae. Marginal vein equal to submarginal vein, stigmal vein very short. Marginal vein with 10-13 setae, marginal fringe 2.5x maximum wing width. Hind wing more than 4.5x as long as wide. Midtibial spur slightly shorter than basitarsus. Gaster rounded at apex, about 0.67x as long as mesosoma (in dry specimens). Ovipositor (Fig. 268) exerted, its exerted part 0.5x length of gaster (in dry specimens); ovipositor longer than middle tibia (14:11), third valvula about 0.5x as long as second valvifer.

Male.

Coloration. Similar to female, but face brown, legs black, except apices of fore and middle femora, apices of fore and hind tibiae, and the apical half of middle tibia and tarsi which are whitish.

Structure. Antenna inserted at the level of lower margin of eyes, at equal distance from margins of eye and mouth. Funicle 4-segmented, club 2-segmented. Antennal segments with the following ratios of length to width: R-1.4, S-4.0, P-1.3, F1-2.2, F2-2.4, F3-2.3, F4-2.1, F5-2.2, F6-2.6. Pedicel slightly less than 0.5x of first flagellar segment; club as long as the two preceding segments together. All flagellar segments with 3 longitudinal sensilla each. Fore wing with bare base. Mesoscutum wider than long; scutellum about 1.5x as wide as long.

Hosts. Aleyrodidae.

Distribution in Mexico. Tamaulipas.

Comments. According to the key and the revision of *Encarsiella* species of the world provided by Polaszek & Hayat (1992), *Encarsia* (*Encarsiella*) *tamaulipeca* is close to *E. aleurodici* (Girault) in coloration of body and antenna, and also the following morphological features: pedicel longer than first flagellar segment and club longer than first-third flagellar segments combined, absence of sensilla on first segment and setaceous wing base. It differs from *E. aleurodici* in the following: female with antennal anellus, anterior margin of fore wing with bare band; marginal vein equal to submarginal vein, marginal fringe longer (0.14x maximum wing width) (in *aleurodici* it is very short), ovipositor slightly longer than middle tibia (14:11); male club equal to length of two preceding flagellar segments combined.

Material examined. Mexico: Tamaulipas, Ciudad Victoria, ex Aleyrodidae on *Psidium guajava*, 1 ♀, 1 ♂, 7-8.XII.1995, E. Chouvakhina; 6 ♀, 27.X.1999, S. Myartseva.

74. *Encarsia tapachula* Myartseva
(Figs 353-357)

Encarsia tapachula Myartseva, 2007a: 11-12. Holotype ♀, Mexico: Chiapas, Tapachula, ex Aleyrodidae on *Psidium guajava*, 5.X.2006, S. Myartseva (in UCR, examined).

Species-group placement. *lutea* group.

Description. Female. Length: 0.70 mm.

Coloration. Head light yellow, ocelli reddish, occiput slightly infusate, antennae light yellow. Mesosoma yellow; pronotum anteriorly and anterior margin of midlobe of mesoscutum narrowly brownish-black, apical half of axillae, tegulae completely, propodeum laterally, mesopleuron and petiole slightly infusate. Fore wings hyaline, venation very slightly infusate. Legs whitish-yellow. Gaster yellow; basal tergite completely, fourth tergite posteriorly, fifth tergite completely, sixth tergite anteriorly slightly infusate, apex of seventh tergite pale; apical margin of second valvifer and third valvulae (except base) brownish black.

Structure. Head slightly wider than mesosoma and about 1.3x as wide as height. Frontovortex width about 0.5x head width. Ocelli forming small acute triangle. Eyes finely setose, about 1.8x as long as cheeks. Cheeks with malar sulcus not reaching mouth margin. Mandible 3-dentate. Antennae (Fig. 353) inserted immediately under the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.6, S-3.0, P-1.3, F1-0.6, F2-1.4, F3-1.2, F4-1.4, F5-1.4, F6-1.5. Club 3-segmented, about as wide as funicle and about as long as funicle and pedicel combined. First funicular segment without sensillum, other segments each with two sensilla. Midlobe of mesoscutum (Fig. 354) with 3 pairs of long setae; side lobes each with three setae, axillae each with one seta. Scutellum slightly shorter than midlobe and about 1.7x as wide as long. Scutellar placoid sensilla widely spaced, separated by distance about 8-9x width of an sensillum. Distance between anterior pair of scutellar setae about as long as distance between posterior pair of setae. Fore wing uniformly setose, about 3.3x as long as wide, its marginal fringe about 0.2-0.3x as long as maximum width of wing; base with two setae under apical part of submarginal vein. Marginal vein with 7 long setae along anterior margin and subequal to submarginal vein; stigmal vein close to wing margin (Fig. 355). Hind wing about 6.5x as long as wide, its marginal fringe slightly longer than maximum width of wing. Tarsal formula 5-5-5. Midtibial spur (Fig. 356) about 0.7x as long as basitarsus; basitarsus subequal in length to next three tarsal segments combined. Gaster longer than mesosoma; seventh tergite wider than long. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor (Fig.357) strongly protruded, its base inserted at the level of second tergite and its length twice as long as middle tibia. Extended part of ovipositor about 0.2x gaster length. Third valvula about 0.5x as long as second valvifer.

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Chiapas.

Comments. *Encarsia tapachula* Myartseva close to *E. udaipuriensis* (Shafee) described from India (Hayat, 1998), *E. davidi* Viggiani and Mazzone (1980) distributed in Egypt, Israel, South Africa and Macaronesia (Hernández-Suárez *et al.*, 2003) and *E. hamata* Huang and Polaszek described from China (1998). New species can be distinguished from these species by long exserted ovipositor and following other characters: in *E. tapachula* – antennal club subequal in length to funicle and pedicel combined, midlobe of mesoscutum with 3 pairs of long setae, fore wing 3.3x as long as wide, ovipositor twice as long as middle tibia, third valvula 0.5x as long as second valvifer and 0.3x as long as ovipositor. In *E. udaipuriensis* - antennal club distinctly shorter than funicle and pedicel combined, midlobe of mesoscutum with 4 pairs of setae, fore wing about 2.7x as long as wide, ovipositor not exserted and slightly shorter than middle tibia, third valvula longer than 0.5x second valvifer. In *E. davidi* - midlobe of mesoscutum with 4-5 pairs of setae, fore wing 2.3x as long as wide, ovipositor not exserted and 1.2x as long as middle tibia, third valvula 0.35-0.40x as long as ovipositor. In *E. hamata* - midlobe of mesoscutum with 4 pairs of setae, ovipositor not exserted, apices of third valvulae appearing hook-shaped and third valvula shorter than half the length of second valvifer.

According to Hayat's classification (1989), *Encarsia tapachula* can be belong to the *lutea* species group in the genus *Encarsia*. This group includes 8 species, among them 5 species have Oriental distribution (Noyes, 2006). In the New World is known to occur only the cosmopolitan species *Encarsia lutea* (Masi). Thus, *E. tapachula* is the second species registered in the New World as representative of *lutea* species group, and first species described from Neotropics belonging to *lutea* species group in the genus *Encarsia*. For Mexico, *Encarsia lutea* species-group is presented now also at the first time.

75. *Encarsia tarsalis* Myartseva, sp. n.
(Figs 358-361)

Species-group placement. *inquirenda* group.

Material examined. Holotype ♀, Mexico: Chiapas, Est. El Triunfo, Palo Gordo, red de golpeo, 6400 msnm, N 15 39'22'', W 92 48'31'', CIB 97-059, 21.vii.1997, A. González-Hdz., UCR.

Description. Female. Length: 0.83 mm.

Coloration. Head yellow, lower part of cheeks, clypeus and postocellar bars brown, antennae infusate. Pronotum brownish. Mesosoma yellow, axillae infusate. Setation of dorsum dark. Fore wings infusate below marginal vein. Legs whitish, basitarsus of all legs infusate. Gaster brown.

Structure. Head wider than mesosoma, its width about 1.5x as long as height; frontovertex width 0.6x head width. Ocelli forming rectangled triangle; distance between posterior ocelli 0.5x as long as that from ocellus to eye margin. Eyes 1.3x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 358) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.8, S-3.2, P-2.2, F1-1.7, F2-2.0, F3-1.7, F4-1.7, F5-1.8, F6-3.1, (F4-F6)-6.0. Club 3-segmented, about as long as funicle and pedicel combined. First and second flagellar segments without sensilla, third segment with one sensillum, club segments with two sensilla each. Midlobe of mesoscutum 1.2x as wide as long, with 4 (2+2) setae, 2 setae on each side lobe and one seta on each axilla placed above middle, the latter is narrow, 1.8x as long as wide. Sculpture of midlobe widely reticulate, along posterior and lateral margins longitudinal. Scutellum 0.5x as long as midlobe and 2.2x as wide as long. Scutellar placoid sensilla widely spaced, separated by a distance about 5x width of a sensillum. Anterior pair of scutellar setae about 0.5x as long as posterior pair of setae. Distance between anterior setae as long as that between posterior setae. Metanotum elongate, 0.3x as long as scutellum. Endophragma with strong and black margins basally. Fore wing uniformly setose, about 3x as long as wide; its marginal fringe about 0.5x wing width; 3 basal group setae. Marginal vein (Fig. 359) longer than submarginal vein (7:6) and with 5 long setae along anterior margin. Hind wing about 8.4x as long as wide, its marginal fringe 1.6x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 360) 0.9x as long as basitarsus, the latter is subequal to proximal two tarsal segments combined. Second-seventh tergites with 1+1, 1+1, 1+1, 2+2, 1+1 and 4 setae, respectively. Seventh tergite 0.5x as wide as long. Ovipositor (Fig. 361) with base arising at the level of third tergite,

about 1.2x as long as middle tibia; third valvula 0.4x as long as second valvifer.

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Chiapas.

Comments. *Encarsia tarsalis* sp. n. is similar to *E. gaonae* sp. n., but can be distinguished by follows: hind femora whitish, basitarsus of all legs infusate, setation of dorsum dark, distance between anterior scutellar setae as long as that between posterior setae. In *E. gaonae*: hind femora infusate, basitarsus of all legs whitish, setation of dorsum pale, distance between anterior scutellar setae longer than that between posterior setae.

76. *Encarsia terebrella* Myartseva
(Figs 362-366)

Encarsia terebrella Myartseva, 2007a: 12-13. Holotype ♀, **Mexico: Tamaulipas**, Gómez Farías, Reserve "El Cielo", ex Aleyrodidae on *Psidium guajava*, 22.viii.1998, S. Myartseva (in UCR, examined).

Species-group placement. *strenua* group.

Description. Female. Length: 0.53-0.54 mm (holotype female - 0.53 mm) [without ovipositor].

Coloration. Head yellow, face pale, antennae light yellow. Mesosoma yellow. Fore wings hyaline. Legs pale. Gaster yellow, third valvula pale.

Structure. Head not wider than mesosoma, its width 1.5x height; frontovertex width 0.5x of head width. Frontovertex and stemmaticum with reticulate sculpture. Ocelli in rectangled triangle; distance between posterior ocelli slightly shorter than that between posterior ocellus and eye. Antennae (Fig. 362) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-1.8, S-4.1, P-1.7, F1-1.9, F2-1.9, F3-2.3, (F4-F6)-5.6. Club 3-segmented, subequal in length to funicle and pedicel combined. Thirs

segment with one linear sensillum and club segments with two sensilla each. Midlobe of mesoscutum 1.3x as long as scutellum, with 8 (4+2+2) setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla closely spaced (Fig. 363), separated by a distance less than the width of a sensillum. Anterior pair of scutellar setae 0.5x as long as posterior pair of setae; distance between anterior setae 0.4x as long as distance between posterior setae. Fore wing uniformly setose, 2.6x as long as wide; marginal fringe 0.3x wing width; 4 basal group setae. Marginal vein (59) (Fig. 364) slightly longer than submarginal vein (50), with 6-7 long setae along anterior margin. Tarsal formula 5-5-5. Midtibial spur (Fig. 365) subequal in length to basitarsus, the latter subequal in length to proximal two tarsal segments combined. Gaster longer than mesosoma. Sixth tergite with 4 setae; seventh tergite wider than its length. Ovipositor (Fig. 366) strongly exerted, with base originating at base of gaster and 1.7x as long as middle tibia; third valvula 0.59x as long as second valvifer (46:77).

Male. Unknown.

Hosts. Aleurodidae

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia terebrella* Myartseva is similar to *E. neocala* Heraty and Polaszek and *E. strenua* (Silvestri). It can be distinguished from *E. neocala* that has axillae pale brown; first and second flagellar segments with sensilla; club only slightly longer than funicle; fore wing 2.3-2.4x as long as wide; sixth tergite with 6 setae; ovipositor with base originating at level of third tergite and slightly exerted. *E. terebrella* can be distinguished from *E. strenua* which has the 9-14 basal group setae; sixth tergite with 6 setae; club shorter than funicle; first flagellar segment 2.6x as long as wide; seventh tergite longer than broad and third valvula dorsally infusate.

77. *Encarsia tetraleurodis* Myartseva and Evans, sp. n.
(Figs 367-371)

Species-group placement. *parvella* group.

Material examined. Holotype ♀, **Mexico: Guerrero**, Acapulco, ex *Tetraleurodes* sp. on *Pithecellobium* sp., 12.vi.2000 S. Myartseva, UCR. Paratypes: 2 ♀, same label data as holotype, FSCA, UCR; 3 ♀, **Tamaulipas**, Ciudad Victoria, swept, 14.iii.1999, L.S. Monrreal-Hernández, UCR, FSCA, UAT.

Description. Female. Length: 0.53-0.64 mm (holotype - 64mm).

Coloration. Head yellow, face whitish, malar sulcus yellow, frontovertex dark yellow. Mesosoma yellow, pronotum infusate. Fore wings hyaline. Legs light yellow. Gaster yellow with cercal plates brownish and third valvula pale with brownish apices.

Structure. Head as wide as mesosoma, its width 1.5x height; frontovertex width 0.5x of head width. Ocelli in obtuse triangle; distance between posterior ocelli slightly less than that between posterior ocellus and eye. Antennae (Fig. 367) inserted immediately under the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-3.0, S-3.6, P-1.7, F1-2.0, F2-2.0, F3-1.7, F4-1.9, (F5-F6)-3.5. Club 2-segmented, longer than two preceding funicular segments combined. Second-third flagellar segments each with one linear sensillum, club segments with two sensilla each. Midlobe of mesoscutum 1.7x as long as scutellum, with 8 (4+2+2) setae, 2 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla widely spaced (Fig. 368), separated by a distance about 7x width of a sensillum. Anterior pair of scutellar setae 0.7x as long as posterior pair of scutellar setae; distance between anterior setae basal 1.3x as long as that between posterior setae basal. Fore wing with an asetose area around stigmal vein, 2.9x as long as wide; marginal fringe 0.5x wing width; 2 basal group setae. Marginal vein (Fig. 369) subequal in length to submarginal vein, with 5-6 long setae along anterior margin; stigmal vein 0.2x as long as marginal vein. Hind wing 8.5x as long as wide, its marginal fringe 1.6x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 370) about 0.5x basitarsus, the latter 5.7x as long as wide and slightly shorter than the proximal 3 tarsal segments combined. Ovipositor (Fig. 371) slightly exserted, with base originating at level of third tergite and subequal in length to middle tibia; third valvula 0.55x as long as second valvifer (25:45).

Male. Unknown.

Hosts. Aleyrodidae – *Tetraleurodes* sp.

Distribution in Mexico. Guerrero, Tamaulipas.

Comments. *Encarsia tetraleurodis* sp. n. is similar to *E. gerlingi* Viggiani, known from China and Kenya (Huang & Polaszek, 1998). It can be distinguished from *E. gerlingi* by having the clypeus whitish, malar sulcus yellow, gaster yellow with only cercal plates brown, third valvula brown, area surrounding the marginal and stigmal veins not infuscate, second flagellar segment with one sensillum, fourth segment 1.4x as long as first segment, and distance between bases of anterior scutellar setae 1.3x as long as that between bases of posterior setae. In *E. gerlingi*: the clypeus and malar sulcus are brown, the gaster has more extensive dark markings, base of marginal and stigmal veins each with a small, dark infuscate area, second flagellar segment without a sensillum, fourth segment about 1.7x as long as first segment and distance between bases of anterior scutellar setae shorter than that between bases of posterior setae.

78. *Encarsia titillata* Girault
(Figs 372-376)

Encarsia titillata Girault, 1926: 1. Syntypes ♂♂, Cuba: 30.vi.1914, H. Tryon, ex *Diaspis echinocacti* (in QMBA, not examined). Female not known.

Species-group placement. *strenua* group.

Description. Female. Length: 0.80 mm.

Coloration. Head yellow with frontovertex orange, antennae yellow and infuscate, clypeus, malar sulcus, occiput around foramen infuscate; mesosoma yellow with pronotum, midlobe of mesoscutum anteriorly, propodeum laterally, mesopleuron brownish; gaster yellow with first and fifth-sixth tergites entirely, second-fourth tergites laterally brownish, third valvulae whitish; legs whitish yellow.

Structure. Head 1.6x as wide as height, frontovertex width 0.6x of head width. Eyes 1.2x as long as cheeks. Antennae (Fig. 372) inserted at the level of lower margin of eyes; distance between toruli about as long as distance from torulus to mouth margin and 0.5x as long as that

to eye margin. Antennal segments with following ratios of length to width: R-2.0, S-5.0, P-1.6, F1-1.9, F2-2.5, F3-2.5, F4-2.5, F5-2.2, F6-2.3. Club 3-segmented, very slightly longer than funicle. Midlobe of mesoscutum with 8 setae. Scutellar placoid sensilla closely spaced, separated by a distance not longer than diameter of one sensillum. Distance between anterior scutellar setae 0.8x as long as distance between posterior setae. Fore wing hyaline and uniformly setose, 3.0x as long as wide; marginal fringe 0.5x wing width; 4-5 basal group setae; marginal vein (Fig. 373) with 6 setae along anterior margin and slightly longer than submarginal vein. Tarsal formula 5-5-5. Midtibial spur (Fig. 374) about 0.7x as long as basitarsus. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 2+2, 3+3 and 4 setae, respectively. Ovipositor (Fig. 375) exerted, 0.9x as long as middle tibia; third valvula 0.4x as long as second valvifer.

Male. Length: 0.70 mm.

Coloration. Head color as in female, but darker; axillae entirely brown; gaster brown with seventh tergite dark yellow.

Structure. Head 1.5x as wide as height; frontovertex about 0.6 head width. Eyes 1.3x as long as cheeks. Antennal segments with following ratios of length to width: R-2.0, S-4.0, P-1.4, F1-F5-2.7 each, F6-2.4. Club segments fused (Fig. 376). Fore wing 2.9x as long as wide, its marginal fringe 0.4x wing width. Genitalia about as long as middle tibia.

Host. Diaspididae - *Diaspis echinocacti* (Bouché).

World distribution. Cuba, U.S.A. (Florida).

Distribution in Mexico. Tamaulipas.

References. Heraty & Woolley, 1999; Viggiani, 1985; Noyes, 2002, 2006; Ruíz-Cancino & Coronado-Blanco, 2002; Coronado-Blanco *et al.*, 2005a; Myartseva & Ruíz-Cancino, 2005; Myartseva *et al.*, 2004.

Material examined. Mexico: Tamaulipas, Gómez Farías, Reserve "El Cielo", San José, 1♀, 1♂, 15.xi.1998, ex Diaspididae on *Pinus* sp., S. Myartseva.

Comments. The placoid sensilla of *Encarsia titillata* are spaced close together as in members of the *E. strenua* species group that are primarily parasites of aleyrodids; however, other characters such as the small number of mesoscutal setae, the short basitarsus of the middle leg with long tibial spur, and the narrow fore wing with long marginal fringe are more characteristic of species of the *E. inquirenda* group, that are parasites of armoured scale insects. According to Viggiani (1985), all of the specimens in the type series are apparently males. New record for Mexico. Female is described.

79. *Encarsia townsendi* Howard
(Figs 99-101)

Species-group placement. *opulenta* group.

Encarsia townsendi Howard, 1907: 78. Lectotype ♀, designated by Viggiani, 1986: 75, **Mexico: Tabasco**, Sangrillo del Chico, 19.vi.1897, from "*Aleyrodes* sp." on coarse grass, C.H.T. Townsend, type V10303 (in USNM, 4 ♀ paratypes, examined).

Diagnosis. Tarsal formula 5-5-5; fore wings uniformly setose; first flagellar segment wider than long; midlobe of mesoscutum with 8 setae; scutellar placoid sensilla widely spaced, separated by about 3.5x width of one sensillum; ovipositor as long as gaster and exerted, terminal valvulae about 0.5x as long as middle tibia; bhead and body brown, frontovertex orange, scutellum yellowish.

Hosts. Aleyrodidae - "*Aleyrodes*" sp.

Distribution in Mexico. Tabasco.

References. De Santis, 1979; Viggiani, 1986; Evans, 1993; Schauff *et al.*, 1996; Heraty & Woolley, 1999; Noyes, 2002, 2006; Myartseva & Ruíz-Cancino, 2000; Myartseva *et al.*, 2004.

Comments. *Encarsia townsendi* is placed in the *E. opulenta* group based on its very long ovipositor, short first flagellar segment, long midtibial spur and infusate fore wing. Unlike other species in this group, the scutellar placoid sensilla are spaced close together as in members of the *Encarsia strenua* group.

80. *Encarsia trialeurodis* Myartseva, sp. n.
(Figs 377-380)

Species-group placement. *parvella* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, Ciudad Victoria, ex *Trialeurodes vaporariorum* (Westwood) on unidentified grass, 25.i-16.ii.2006, S. Myartseva, UCR. Paratypes: same label data as holotype, 7 ♀ (FSCA, UCR, USNM, NHM); Jaumave, ex *T. vaporariorum* on *Malva* sp., 2 ♀, 31.ix.2001, S. Myartseva, UAT.

Description. Female. Length: 0.55-0.70 mm.

Coloration. Head and body yellow to light yellow, postocellar bars and antennae slightly infusate, clypeus above brownish, midlobe of mesoscutum anteriorly and scutellum anteriorly bordered brownish. Fore wings very slightly infusate below marginal vein, veins also slightly infusate. Legs whitish.

Structure. Head width about 1.3x height; frontovertex about 0.6x head width. Ocelli in small obtuse triangle; distance between posterior ocelli 0.6-0.7x as long as distance from ocellus to eye margin. Eyes 1.5x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 377) inserted immediately under the level of lower margin of eyes; distance between toruli 0.6x as long as distance from torulus to eye margin and 1.5x as long as that to mouth margin. Antennal segments with following ratios of length to width: R-3.0, S-4.0-4.5, P-1.9, F1-2.2, F2-2.5, F3-2.6, F4-2.4, (F5-F6)-5.0. Club 2-segmented, longer than two preceding flagellar segments combined. First and second flagellar segments without sensilla, fourth-sixth segments with two linear sensilla each. Midlobe of mesoscutum with 8 (4+2+2) thin setae, 2 setae on each side lobe, one seta on each axilla. Midlobe about 1.3x as wide as long and 1.6x as long as scutellum. Scutellum 1.9x as wide as long. Scutellar placoid sensilla ovoid, widely spaced, separated by a distance about 4-5x width of a sensillum. Anterior pair of scutellar setae 0.8x as long as posterior pair of setae; distance between anterior setae about 1.2x as long as that between posterior setae. Fore wing with an asetose area around stigmal vein, 3.7x as long as wide; marginal fringe about 0.8x wing width; one basal seta. Marginal vein (Fig. 378) about as long as submarginal vein, with 5-6 setae along anterior margin. Hind wing very narrow, 12x as long as wide, its marginal fringe 2.5x wing width.

Tarsal formula 5-5-5. Midtibial spur (Fig. 379) about 0.5x as long as basitarsus, the latter as long as the proximal 3 tarsal segments combined. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 2+2, 1+1 and 4 setae, respectively. Ovipositor (Fig. 380) with base originating at the level of fourth tergite and slightly shorter than middle tibia (58:62); third valvula 0.6-0.7x as long as second valvifer.

Male. Unknown.

Hosts. Aleyrodidae – *Trialeurodes vaporariorum* (Westwood).

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia trialeurodis* sp. n. is similar to *E. gerlingi* Viggiani described from Kenya and belonging to *parvella* species group and to *E. tetraleurodis* sp. n., but differs as follows: head and body yellow, clypeus brownish, fore wing slightly infuscate below marginal vein to posterior margin of disc, first and second flagellar segments without sensilla, fourth segment 1.5x as long as first segment, distance between anterior scutellar setae 1.2x as long as that between posterior setae. In *E. gerlingi*: head and body with some brown areas; base of marginal vein and submarginal vein each with a small dark infuscate area, fourth flagellar segment about 1.7x as long as first segment, distance between anterior scutellar setae less than that between posterior. In *E. tetraleurodis* sp. n.: clypeus whitish, fore wings hyaline, second flagellar segment with one sensillum, distance between anterior scutellar setae 1.3x as long as that between posterior setae.

81. *Encarsia trilineata* Myartseva
(Figs 381-385)

Encarsia trilineata Myartseva, 2007b: 73-75. Holotype ♀, **Mexico:** D.F., Mexico City, Botanical Garden, ex *Trialeurodes vaporariorum* (Westwood) on *Ruta graveolens*, 13.1.2007, S. Myartseva, D. Kasparyan (in UCR, examined).

Species-group placement. *strenua* group.

Description. Female. Length: 0.90-0.97 mm.

Coloration. Head light yellow, frontovertex dark yellow. Antennae brownish, radicle whitish, pedicel with yellowish tinge. Ocelli reddish, eyes dark brown. Pronotum dark brown. Mesosoma yellow with infusate longitudinal band along middle of midlobe of mesoscutum, median spot on apical part of side lobes, lateral margins of propodeum. Fore wings hyaline, venation infusate. Legs whitish yellow, apice of last tarsal segment of all legs infusate. Gaster yellow, first-fifth tergites with brownish-black lateral spots.

Structure. Head as wide as mesosoma, 1.1-1.2x as wide as height. Frontovertex width about half head width, transversely striate behind posterior ocelli. Ocelli forming slightly obtuse apical triangle; distance between posterior ocelli about as long as distance to eye margin. Eyes very finely setose, 1.1-1.2x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 381) inserted closely to mouth margin; distance between toruli about 0.5x as long as distance to eye margin. Antennal segments with following ratios of length to width: R-2.4, S-5.0-5.5, P-2.4, F1-2.2, F2-2.7, F3-2.7, F4-2.0, F5-2.0, F6-2.0. Club 3-segmented, slightly shorter than funicle. All flagellar segments with one linear sensilla each. Midlobe of mesoscutum with 5 pairs of setae and about 1.4x as wide as long; side lobes with 3 setae each, axillae with two setae situated close to inner margin in middle of axilla, second seta short and thin. Scutellum 1.4x shorter than mesoscutum and about 1.7x as wide as long. Scutellar placoid sensilla closely placed, separated by distance not more than one diameter of a sensillum. Distance between anterior scutellar setae about 0.6-0.7x as long as distance between posterior setae. Fore wing uniformly setose, about 2.8x as long as wide, base with 12-14 setae, marginal fringe about 0.3x of maximum width of wing. Apex of costal cell with 4-5 long setae; disc along posterior margin of wing with small area of more long setae. Marginal vein (Fig. 382) with 6-7 setae along anterior margin and 0.8x as long as submarginal vein. Stigmal vein bulbous, with one long seta. Hind wing about 10.7x as long as wide, its marginal fringe about 2.0x as long as maximum width of wing. Tarsal formula 5-5-5. Midtibial spur (Fig. 383) about 0.4x as long as basitarsus; basitarsus about as long as next three tarsal segments combined. Fifth and seventh gastral tergites with 4 setae each, between cerci two setae. Ovipositor (Fig. 384) with base arising at the level of third tergite, 1.1-1.3x as long as middle tibia; third valvula 0.3-0.4x as long as second valvifer.

Male. Length: 0.60-0.70 mm.

Coloration. Head and mesosoma as in female; apex of axillae infuscate; gastral tergites except for seventh tergite completely brownish.

Structure. Frontoververtex width about 0.6 head width. Antennal segments with following ratios of length to width: R-3, S-4.4, P-2.0, F1-2.5, F2-2.0, F3-2.6, F4-2.0, (F5-F6)-5.5. Club segments fused (Fig. 385). All flagellar segments with 2 linear sensilla each. Setation of mesosoma as in female. Midlobe of mesoscutum and scutellum subequal in width. Fore wing about 2.6x as long as wide, its marginal fringe and setation of disc as in female, base with 8-11 setae, apex of costal cell with 2-3 long setae. Midtibial spur about 0.5x basitarsus length.

Hosts. Aleyrodidae – *Trialeurodes vaporariorum* (Westwood).

Distribution in Mexico. Mexico D.F., Veracruz.

References. Myartseva, 2007b.

Material examined. Mexico: D.F., Chapultepec, ex Aleyrodidae on tree, 1 ♀, 2 ♂, 21.VI.2000, D. Kasparyan. Veracruz, Los Tuxtlas, 30 km N Catemaco, Estación de Biología Tropical de Instituto de Biología, UNAM [18°35' N, 95°5' W], ex Aleyrodidae on *Piper hispidum*, 1 ♀, 8.I.2007, S. Myartseva, D. Kasparyan.

Comments. *Encarsia trilineata* Myartseva is similar to *E. costaricensis* Evans and Angulo described from Costa Rica (1996), but can be easily recognized by following characters: in *E. trilineata*, body with some dark markings, first-fifth gastral tergites with lateral spot each, antennal scape 5.0-5.2x as long as wide, midlobe of mesoscutum with 5 pairs of setae, fore wings hyaline and with small area of more long setae along posterior margin of disc; in *E. costaricensis*, body yellow, antennal scape 3.8x as long as wide, midlobe of mesoscutum with 4 pairs of setae, fore wings slightly infuscate basally and without small area of more long setae along posterior margin of disc.

From other close species, *E. bimaculata* Heraty and Polaszek described from Florida, U.S.A. and known also from Mexico (Heraty & Polaszek, 2000), new species readily distinguished by following characters: in *E. trilineata*, mesoscutum anteriorly, axillae, propodeum

submedially yellow, first-second tergites yellow with dark spot laterally, midlobe of mesoscutum with 5 pairs of setae, first-second flagellar segments with one sensillum each, midtibial spur 0.4x as long as basitarsus, in fore wing costal cell with 4-5 long marginal setae apically, base with 12-14 setae posterior to submarginal vein, disc with small area of long setae along posterior margin; in *E. bimaculata*, mesoscutum anteriorly, axillae, propodeum submedially, first-second tergites brown, midlobe of mesoscutum with 4 pairs of setae, first-second flagellar segments without sensilla, midtibial spur 0.6-0.8x as long as basitarsus, in fore wing costal cell with one long marginal seta apically, base with 5-6 setae posterior to submarginal vein and disc without small area of long setae along posterior margin.

From other species of *strenua* group distributed in the New World - *E. protransvena* Viggiani, *E. sophia* (Girault and Dodd) and *E. strenua* (Silvestri), *E. trilineata* differs by spotted gastral tergites and longitudinal dark band along middle of midlobe of mesoscutum (see key for *strenua* species group of the New World in Heraty & Polaszek, 2000). Only *E. sophia* has transversely striate ocellar triangle and patch of longer setae in the posterior half of the wing disc, and now is found second species with this character.

82. *Encarsia tuxpan* Myartseva and Evans, sp. n.
(Figs 386-390)

Species-group placement. *strenua* group.

Material examined. Holotype ♀, **Mexico: Veracruz, Tuxpan, Citlaltepetl**, ex Aleyrodidae, 12iii.1999, S. Myartseva, UCR. Paratypes: 2 ♀, same label data as holotype, FSCA, UCR.

Description. Female. Length: 0.52-0.55 mm, (holotype - 0.55 mm) [without ovipositor].

Coloration. Head light yellow, frontovertex dark yellow, antennae yellow. Mesosoma yellow. Fore wings hyaline. Legs light yellow. Gaster yellow with sixth tergite sometimes slightly infusate and third valvula with apical half brown.

Structure. Head slightly wider than mesosoma, its width 1.4x height; frontovertex width 0.5x of head width. Ocelli in slightly acute triangle; distance between posterior ocelli about 2x as long as that between

posterior ocellus and eye. Antennae (Fig. 386) inserted at the level of lower margin of eyes. Antennal segments with following ratios of length to width: R-2.0, S-4.7, P-1.7, F1-1.4, F2-1.7, F3-1.7, (F4-F6)-4.9. Club 3-segmented, slightly wider than funicle and subequal in length to funicle and pedicel combined. Second-sixth flagellar segments each with one linear sensillum. Mesosoma as long as wide. Midlobe of mesoscutum 1.7x as long as scutellum, with 4 (2+2) thin setae, 3 setae on each side lobe and one seta on each axilla. Scutellar placoid sensilla slightly widely spaced (Fig. 387), separated by a distance about 2x width of a sensillum. Anterior pair of scutellar setae 0.5x as long as posterior pair of scutellar setae; distance between anterior setae 0.5x as long as distance between posterior setae. Fore wing uniformly setose, 2.8x as long as wide, with narrow glabrous band along margin of wing; marginal fringe 0.4x wing width; 2-4 basal group setae. Marginal vein (Fig. 388) subequal in length to submarginal vein, with 5-6 long setae along anterior margin; stigmal vein with thin uncus and 0.3x as long as marginal vein. Hind wing 9x as long as wide, its marginal fringe 1.7x as long as wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 389) slightly shorter than basitarsus. Ovipositor (Fig. 390) exerted, with base originating at the level of third tergite and 1.2x as long as middle tibia; third valvula 0.76x as long as second valvifer (38:50).

Male. Unknown.

Hosts. Aleyrodidae.

Distribution in Mexico. Veracruz.

Comments. *Encarsia tuxpan* sp. n. is similar to *E. aureola* (Girault) described from Australia, but can be distinguished as follows: lighter yellow colouration of body; first flagellar segment slightly longer than width, second and third segments 1.7x as long as wide each; midlobe of mesoscutum with 4 setae; marginal fringe of fore wing longer, 0.4x wing width; third valvula 0.44x as long as ovipositor. In *E. aureola*: body orange yellow, gaster suffused with dusky; first flagellar segment almost globular, second and third segments 2x as long as wide each; midlobe of mesoscutum with 8 setae; marginal fringe of fore wing 0.25x wing width; third valvula 0.33x as long as ovipositor.

83. *Encarsia tuxtla* Myartseva
(Figs 391-394)

Encarsia tuxtla Myartseva, 2007b: 75-77. Holotype ♀, **Mexico: Veracruz**, Los Tuxtlas, 30 km N Catemaco, Estación de Biología Tropical de Instituto de Biología, UNAM [18°35' N, 95°5' W], ex Aleyrodidae on *Pleuranthodendron lindenii*, 11.1.2007, S. Myartseva, D. Kasparyan (in UCR, examined).

Species-group placement. *luteola* group.

Description. Female. Length: 0.50-0.60 mm.

Coloration. Head brown black, antennae whitish yellow with apical club segment slightly infusate. Mesosoma brownish black with lateral and posterior margins of midlobe of mesoscutum and also scutellum yellowish brown; side lobes yellow with dark apical spot; propodeum except for apices and metanotum light yellow. Fore wings hyaline. Legs whitish yellow. Gaster light yellow, tips of stylets dark.

Structure. Head about 1.2x wide as high. Frontovortex width about 0.5x of head width, transversely striate in ocellar triangle. Ocelli forming slightly obtuse apical triangle; distance between posterior ocelli slightly shorter than distance from ocellus to eye margin. Eyes setose, about 1.7x as long as cheeks. Mandible 3-dentate. Antennae (Fig. 391) inserted immediately under the level of lower margin of eyes; distance between toruli slightly shorter than distance to eye margin and about twice as long as distance to mouth margin. Antennal segments with following ratios of length to width: R-2.0, S-3.8-3.9, P-1.5, F1-1.6, F2-2.0, F3-1.9, F4-1.7, F5-1.3, F6-2.0. Club 3-segmented, its last segment more long. Club in length subequal to funicle and pedicel combined. Third-sixth flagellar segments with one sensillum each. Midlobe of mesoscutum with 3 pairs of setae, with large reticulate sculpture in central part and longitudinal cells along sides and posterior margin. Side lobes with one seta each, axillae each with one short seta placed near anterior margin medially. Mesoscutum about 1.4x as wide as long. Scutellum about 0.7x as long as mesoscutum and about 1.8x as wide as long. Scutellar placoid sensilla ovoid and widely spaced, separated by distance about 6x width of one sensillum. Anterior pair of scutellar setae 0.6x as long as posterior pair of setae; distance between anterior setae about 1.3x as long as distance

between posterior setae. Fore wing 2.6x as long as wide, base with 2 setae, marginal fringe about 0.4x maximum width of wing; disc sparsely setose, with bare areas along posterior margin and anterior margin from stigmal vein to apex of wing. Marginal vein (Fig. 392) with 5-6 long setae along anterior margin; submarginal vein as long as marginal vein. Hind wing 8x as long as wide, its marginal fringe 1.4x as long as maximum width of wing. Tarsal formula 5-4-5. Midtibial spur (Fig. 393) about as long as basitarsus; basitarsus about as long as next two tarsal segments combined. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Ovipositor (Fig. 394) arising at the level of fourth tergite, about 0.9x as long as middle tibia; third valvula 0.5-0.6x as long as second valvifer.

Hosts. Aleyrodidae.

Distribution in Mexico. Chiapas, Veracruz.

Material examined. Mexico: Chiapas, Jaltenango, Reserva El Triunfo, Mirador Santa Rita, screen-sweeping (22), 1 ♀, 22.VII.1997, A. González-H.

Comments. *Encarsia tuxtla* Myartseva can be easily distinguished from two similar species of *luteola* species group, *E. formosa* Gahan and *E. luteola* Howard, which are very close in morphology and also have brown black head and mesosoma and yellow gaster, by following characters: in *E. tuxtla*, club 3-segmented, midlobe of mesoscutum with 3 pairs of setae, midtibial spur as long as basitarsus; in *E. formosa* and *E. luteola*, club 2-segmented, midlobe of mesoscutum with 6-9 pairs of setae, midtibial spur shorter than 0.5x basitarsus.

84. *Encarsia unicitrella* Evans and Polaszek
(Figs 395-399)

Encarsia unicitrella Evans and Polaszek, 1997: 568-570. Holotype ♀, Mexico: Guerrero, 6.6 miles SW Filo de Caballo, ex Aleyrodidae on ?*Solanum* sp., 12.vii.1985, J.B. Woolley (in USNM, 2 ♀ and 5 ♂ paratypes, examined).

Species-group placement. *citrella* group.

Diagnosis. Female habitus - Fig. 395. Tarsal formula 5-5-5; fore wing (Fig. 397) hyaline, with area under marginal vein very slightly infuscate, about 2.7x as long as wide, marginal fringe 0.4x wing width; 3-4 basal group setae; marginal vein with 5 long and stout setae along anterior margin; club 3-segmented (Fig. 396), all flagellar segments longer than wide, first and second segments without sensilla; midlobe of mesoscutum with one pair of setae; scutellar placoid sensilla closely spaced, separated by a distance less than diameter of one sensillum; midtibial spur (Fig. 398) 0.7x as long as basitarsus; ovipositor arising at base of fourth tergite, 0.9x as long as middle tibia; third valvula 0.3x as long as second valvifer; head yellow, occipital triangle dark brown; body yellow with pronotum, triangular area of midlobe of mesoscutum, axillae, first-second tergites and central area of third-fifth tergites brown; legs and antennae yellow. Male antenna - Fig. 399.

Hosts. Aleyrodidae.

Distribution in Mexico. Guerrero.

References. Evans & Polaszek, 1997; Myartseva & Ruiz-Cancino, 2000; Myartseva *et al.*, 2004.

Comments. *Encarsia unicitrella* sp. n. is similar to other species of *citrella* species group - *E. citrella* (Howard), *E. paracitrella* Evans and Polaszek and *E. pseudocitrella* Evans and Polaszek, in colouration and structure, but differs by having only one pair of setae on midlobe of mesoscutum, first and second flagellar segments without linear sensilla.

85. *Encarsia unisetae* Myartseva and Evans, sp. n.
(Figs 400-404)

Species-group placement. *inquirenda* group.

Material examined. Holotype ♀, **Mexico: Tamaulipas**, Ciudad Victoria, ex *Chionaspis acericola* (Hollinger) on *Fraxinus mexicanus*, 19.vii.1999, G. Gaona-García, UCR. Paratypes: 1 ♀, same label data as holotype, FSCA; 1 ♀, ex Diaspididae on *Spondias* sp., 6.viii.1999, G. Gaona-García, UCR.

Description. Female. Length: 0.58-0.62 mm (holotype - 0.62 mm).

Coloration. Head orange, occiput infusate, antennae yellow. Mesosoma yellow except pronotum, anterior margin of mesoscutum, axillae, propodeum laterally, metapleuron brown. Fore wings slightly infusate under marginal vein to posterior margin of wing. Legs pale, hind coxae basally infusate. Gaster dark brown and third valvulae pale.

Structure. Head as wide as mesosoma, its width 1.6x height; frontovertex 0.5x head width. Ocelli in slightly obtuse triangle; distance between posterior ocelli subequal to distance between posterior ocellus and eye. Antennal segments with following ratios of length to width: R-2.5, S-4.4, P-1.4, F1-1.0, F2-1.1, F3-1.2, (F4-F6)-4.7. Club 3-segmented (Fig. 400), longer than funicle and pedicel combined. Third flagellar segment with one sensillum, club segments with two linear sensilla each. Midlobe of mesoscutum 1.7x as long as scutellum, with 4 (2+2) setae, one seta on each side lobe and one seta on each axilla; sculpture thin reticulate. Scutellar placoid sensilla widely spaced (Fig. 401), separated by a distance about 5x width of a sensillum. Anterior pair of scutellar setae 0.5x as long as posterior pair of scutellar setae; distance between anterior setae basal 1.4x as long as that between posterior setae basal. Fore wing uniformly setose, 3.1x as long as wide; marginal fringe 0.5x wing width; 3 basal group setae. Marginal vein (Fig. 402) slightly shorter than submarginal vein (42:45), with 5 long setae along anterior margin; submarginal vein with one seta; stigmal vein 0.36x as long as marginal vein. Hind wing 10x as long as wide, its marginal fringe 2x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 403) subequal in length to basitarsus, the latter slightly shorter than proximal 2 tarsal segments combined. Ovipositor (Fig. 404) slightly exserted, with base originating at level of third tergite and 1.4x as long as middle tibia; third valvula 0.66x as long as second valvifer (31:47).

Male. Unknown.

Hosts. Diaspididae – *Chionaspis acericola* (Hollinger).

Distribution in Mexico. Tamaulipas.

Comments. *Encarsia unisetae* sp. n. is very similar to *E. diaspidicola* (Silvestri), but can be distinguished as follows: marginal fringe of fore wing 0.5x wing width; submarginal vein with one seta; 3 basal group

setae; ovipositor longer than middle tibia and basitarsus combined; third valvula 0.66x as long as second valvifer; distance between anterior scutellar setae 1.4x as long as that between posterior setae; second flagellar segment without sensillum and almost quadrate; apex of seventh tergite brown. In *E. diaspidicola*: marginal fringe of fore wing 0.8x wing width; submarginal vein with two setae; 2 basal group setae; ovipositor shorter than middle tibia and basitarsus combined; third valvula 0.45x as long as second valvifer; distance between anterior scutellar setae equal to, or slightly greater than that between posterior scutellar setae; second flagellar segment with a sensillum and distinctly longer than wide; apex of seventh tergite yellow.

86. *Encarsia variegata* Howard
(Figs 405-409)

Encarsia variegata Howard, 1908: 64. Holotype ♀, U.S.A.: Florida, Orlando, 25.vi.1907 A.W. Morrill, ex. *Paraleyrodes* (= *Aleurodicus*) *perseae* on *Citrus* sp., type 11707 (in USNM, examined). Male unknown.

Trichoporus variegata (Howard); Dozier, 1933, change of combination.

Encarsia variegata Howard; Viggiani & Mazzone, 1979: 45; Viggiani, 1986: 75.

Species-group placement. *luteola* group.

Description. Male. Length: 0.50-0.60 mm.

Coloration. Head brownish-black, orbits and borders of ocellar triangle narrowly yellow, clypeus and mouth margin black. Mandibles yellow, antennae whitish-yellow. Occiput above foramen yellow. Oculi and ocelli reddish. Mesosoma black, side lobes of mesoscutum except median spot anteriorly and metanotum yellow, scutellum brownish-yellow with wide longitudinal brownish strips on each side. Fore wings hyaline. Legs, including coxae yellowish-white, apices of middle and hind femora infusate. Gaster brownish-black.

Structure. Head wider than mesosoma, 1.2x as wide as height and about 2x as wide as long. Frontovortex slightly more than 0.5x head width and about 2x as wide as long, transversely striate. Ocelli forming small triangle with apical angle slightly more 90°; posterior ocelli

arranged in about one diameter of an ocellus to eye margin. Eyes finely setose, about 1.7x as long as cheeks. Mandible with two distinct teeth and one obtuse tooth similar to short truncation. Antennae (Fig. 409) inserted at the level of lower margin of eyes. Distance between toruli about 1.5x less than to eye margin and slightly longer than to mouth margin. Antennal segments with following ratios of length to width: S-3.5, P-1.2, F1-2.0, F2-F6 each slightly less than 2x as long as wide, all of the same width. Club 2-segmented, slightly wider than funicle and suffused. All flagellar segments with 3 thin linear sensilla each. Midlobe of mesoscutum, axillae and scutellum with reticulate sculpture, cells on axillae and middle part of scutellum elongate. Midlobe with 5 pairs of setae situated symmetrically along middle and 3 setae on each anterior corner. Side lobes with 3 setae, axillae with one seta each. Scutellum more than 1.5x as wide as long. Scutellar placoid sensilla widely spaced, separated by a distance of about 3.4 diameters of one sensillum. Distance between anterior scutellar setae slightly longer than that between posterior setae. Propodeum medially divided. Fore wing uniformly setose, about 2x as long as wide; marginal fringe about 0.2x wing width; 4 basal group setae. Marginal vein as long as submarginal vein, with 6-7 long setae along anterior margin. Hind wing about 6x as long as wide, its marginal fringe as long as wing width. Tarsal formula 5-4-5. Midtibial spur slightly shorter than basitarsus. Second-seventh gastral tergites with 1+1, 1+1, 1+1, 2+2, 2+2 and 4 setae, respectively. Genitalia slightly longer than middle tibia.

Female. Length: 0.70-0.80 mm.

Coloration. Head brownish-black with yellow orbits, border of ocellar triangle and face, except antennal scrobes. Mesosoma yellow with brownish-black pronotum, midlobe of mesoscutum, anterior part of axillae, spot on middle of side lobes and on sides of propodeum. Scutellum yellow with iridescent reflection. Fore wings hyaline. Gaster yellow, each tergite with brownish-black lateral spot, except last tergite. Apices of stylets brownish-black. Legs whitish-yellow.

Structure. Frontovortex about 0.5x head width, with transversely striate sculpture. Antennal segments with following ratios of length to width: R-2.0, S-4.4; P-1.7, F1-1.4, F2-1.7, F3-2.4, F4-2.4, F5-2.4, F6-2.4. Club 3-segmented (Fig. 405), slightly shorter than funicle and pedicel combined. Midlobe of mesoscutum with 12 setae. Scutellar

placoid sensilla separated by a distance about 3-4x width of one sensillum. Fore wing uniformly setose, 2.5x as long as wide; marginal fringe 0.2x wing width; 4 basal group setae; marginal vein (fig. 406) with 7 more or less short setae along anterior margin. Midtibial spur (Fig. 407) about 0.8x as long as basitarsus. Ovipositor (Fig. 408) strongly protruded, 1.7x as long as middle tibia; third valvula about 0.7x as long as second valvifer.

Hosts. Aleyrodidae - *Aleurocanthus woglumi* Ashby, *Aleurodicus* sp., *Aleuroplatus plumosus*, *Aleurothrixus floccosus* (Maskell), **Dialeurodes citri* (Ashmead), *Paraleyrodes minei*, *P. naranjiae* (Quaintance), *P. perseae* (Quaintance), *Singhiella citrifolii* (Morgan), **Trialeurodes packardi* (Morrill) and **T. floridensis* (Quaintance).

Males (as hyperparasites) have been reared from: Coccidae - **Protopulvinaria pyriformis*; Diaspididae - **Lepidosaphes beckii* (Newman), **Lepidosaphes gloverii* (Packard), and **Pseudaulacaspis cockerelli*.

World distribution. *Bahamas, Cuba, Haití, *Honduras, Puerto Rico, U.S.A., *Venezuela.

Distribution in Mexico. Chiapas, Guanajuato, Guerrero, Nuevo León, San Luis Potosí, Tamaulipas.

References. Evans, 1993; Schauff *et al.*, 1996; Viggiani, 1996; Heraty & Woolley, 1999; Myartseva & Ruíz-Cancino, 2000; Noyes, 2002, 2006; Evans & Serra, 2002; Myartseva *et al.*, 2004, 2006.

Material examined. Mexico: Guerrero, Iguala, Hotel "El Fortia", 1 ♀, 19.vii.1984, ex aleyrodid on *Carica papaya*, J.B. Woolley. Nuevo León, 20 km S Monterrey, 2 ♀, 7.vi.2005, S. Myartseva. San Luis Potosí, Tamuín, 1 ♀, 30.i.2005, S. Varela-Fuentes. Tamaulipas, Güémez, Ejido Plan de Ayala, 3 ♀, 3 ♂, 10.v.2005, ex *Paraleyrodes* sp. on *Citrus* spp., S. Myartseva and S. Varela-Fuentes; 3 ♀, 25.v.2005, the same host, S. Myartseva; Ciudad Victoria, Huerta San Pedro, 7 ♀, 3 ♂, 14.iii.2005, S. Varela-Fuentes. Guanajuato, San Miguel De Allende, 2 ♀, 1 ♂, 16.xi.2005, ex *Trialeurodes floridensis* (Quaintance) on *Citrus sinensis*, S. Myartseva. Chiapas, Tapachula, 1 ♀, 8.x.2006, ex Aleyrodidae on *Psidium guajava*; 1 ♀, 9.x.2006, ex Aleyrodidae on *Rosa* sp., S. Myartseva.

Specimens from other countries. Females. ***Bahamas**: ii.1994, ex whitefly on *Citrus* sp. H.W. Browning. ***Honduras**: Santa Rosa de Copan, 16.ii.1990, ex *Aleurodicus* sp. on *Citrus aurantifolia*; El Zamorano, 1 ♂, 28.vi.1988, ex *Protopulvinaria pyriformis* on *Dendropanax arboreus*, F.D. Bennett. **Puerto Rico**: Adjuntas, 1 ♂, 15.xi.1988, ex *Dialeurodes citrifolii*, F.D. Bennett; Vega Alta, 1 ♂, 15.xi.1988, ex *Protopulvinaria pyriformis* (Coccidae) on *Bauhinia* sp., F.D. Bennett. **U.S.A.**: **Florida**, Alachua Co., Gainesville, 6.iv.1992, on *Ligustrum* sp., G.A. Evans; Sarasota Co., Sarasota, 7.xi.1992, ex *Trialeurodes floridensis* on *Persea borborensis*, F.D. Bennett; Palm City, 1 ♂, 18.xii.1978, ex *Aleuroplatus plumosus*, E.W. Campbell; Orlando, 31.x.1991, ex *Trialeurodes packardii* on *Callicarpa* sp., F.D. Bennett; Ft. Lauderdale, 12.iii.1993., ex *Paraleyrodes minei* on *Citrus* sp., J.H. Tsai. **Venezuela**: Lara Estado, Araure, 1.V.1991, ex *Bemisia tabaci* on *Hibiscus* sp., F.D. Bennett. Males (probably as hyperparasites) reared from: **U.S.A.**, Miami, Dade Co., iv.1986, ex *Lepidosaphes beckii* on *Citrus* sp. (hyperparasite of *Aphytis*?), F.D. Bennett; **Florida**, Polk Co., Lake Alfred, 1994, ex *Protopulvinaria pyriformis*, isolate, H.W. Browning; Charlotte Co., Punta Gorda, 5.vi.1989, ex *Pseudaulacaspis cockerelli*, W.A. Klerks; Dade Co., Homestead, 9.ii.1989, ex **Lepidosaphes gloverii* (Diaspididae), H.W. Browning.

Comments. Female *Encarsia variegata* is easily distinguished from other species of *luteola* group by colouration (yellow face with brownish-black antennal scrobes, pronotum and midlobe of mesoscutum, silvery white scutellum with iridescent reflection, lateral brownish-black spots on gastral tergites, also by long ovipositor (1.7x as long as middle tibia), third-sixth flagellar segments with subequal length and more than 2.5x as long as wide each. Male described.

87. *Encarsia verticina* Myartseva and González, sp. n.
(Figs 410-415)

Species-group placement. *parvella* group.

Material examined. Holotype ♀, **Mexico**: **Chiapas**, Reserva El Triunfo, sendero Palo Gordo, T. agua, 97/049, 6400 msnm, 20-22.VII.1997, N 15 39'22'', W 92 48'31'', A. González-Hdz., J.B. Woolley, L. Montoya, CIB B97-0.57, UCR. Paratypes: 5 ♀, 2 ♂, same label data as holotype, **Chiapas**, Reserva El Triunfo, Mirador Santa

Rita, red de golpeo, 2.VII.1997, 1 ♂, N 15 39'34'', W 92 48'28'' (col. A. González-Hdz.), CIB 97-061; Jaltenango, Reserva El Triunfo, Mirador Santa Rita, screen-sweeping (22), 22.VII.1997, 2 ♀, A. Hernández G. Paratypes are preserved: 2 ♀ and 1 ♂ in the same Museum; 2 ♀ and 1 ♂ in the USNM, 2 ♀ and 1 ♂ in the BMNH, 1 ♀ in the UANL.

Description. Female. Body length: 0.53-0.63 mm.

Coloration. Head light yellow, occiput between foramen and eyes, and frontovertex slightly infusate, clypeus, cheeks and transverse thin band behind posterior ocelli on frontovertex brown, antennae whitish. Mesosoma light yellow, pronotum, anterior margin of mesoscutum brown, midlobe of mesoscutum on middle and propodeum infusate. Fore wings infusate on basal half, posterior margin of marginal vein brownish. Legs whitish, hind femora slightly infusate. Gaster brown, seventh tergite and ovipositor whitish.

Structure. Head as wide as mesosoma and about 1.3x as wide as height. Frontovertex about 0.5 of head width. Ocelli forming rectangled triangle; hind ocelli separated from eye margin by distance about 2.5x longer than diameter of an ocellus. Eyes about 1.6x as long as cheeks. Mandible with three small not clear teeth. Malar sulcus present. Antennal scrobes superficial. Antennae (Fig. 410) inserted closely to mouth margin. Distance between toruli about as long as distance from torulus to eye margin. Antennal segments with following ratios of length to width: S-4, P-2.5, F1-2, F2-2.6, F3-3.0, F4-2.6, F5-2.2, F6-2.5. Club 2-segmented, slightly fused, very slightly wider than funicle and slightly longer than two preceding funicular segments combined. First and second segments of flagellum without linear sensilla, third segment with one, fourth-sixth segments with two sensilla each. Midlobe of mesoscutum (Fig. 411) with widely reticulate sculpture and with two pairs of setae, side lobes with two setae each, axillae with one seta each. Midlobe about 1.4x as wide as long; scutellum 0.7x as long as midlobe and about 2.0x as wide as long. Scutellar placoid sensilla widely spaced, separated by distance about 4x diameters of one sensillum. Distance between anterior scutellar setae and between posterior setae subequal. Fore wing with an asetose area around stigmal vein, about 3.5x as long as wide, its marginal fringe about 0.8x width of wing; base with two setae. Marginal vein (Fig. 412) with 6 long setae along anterior margin and subequal in

length to submarginal vein. Stigmal vein short and almost sessile. Hind wing about 10x as long as wide, its marginal fringe about 2.5x as long as maximum width of wing. Tarsal formula 5-5-5. Midtibial spur (Fig. 413) about 0.8x as long as basitarsus; basitarsus as long as next two tarsal segments combined. Metasomal tergites second-seventh with 1+1, 1+1, 1+1, 2+2, 1+1 and 4 setae, respectively. Ovipositor (Fig. 414) with base at the level of fourth tergite, not exerted, about 0.9x as long as middle tibia. Third valvula about 0.6x as long as second valvifer and with small excavation inside apex of each (in all eight females).

Male. Length: 0.53 mm

Coloration. Similar to female, only axillae and seventh gastral tergite infusate.

Structure. Frontoververtex 0.6x of head width. Eyes about 1.4x as long as cheeks. Antennae (Fig. 415) inserted immediately above the level of lower margin of eyes. Antennal segments with following ratios of length to width: S-3.3, P-1.7, F1-3.1, F2-F4-3.5 each, F5-3.1, F6-4.0. Club segments slightly fused, club shorter than preceding two funicular segments combined. All flagellar segments with two linear sensilla each. Marginal fringe of fore wing as long as maximum width of wing. Hind wing 12.5x as long as wide, its marginal fringe 3x of wing width. Genitalia slightly longer than middle tibia.

Hosts. Unknown.

Distribution in Mexico. Chiapas.

Comments. *Encarsia verticina* sp. n. differs from all species of *parvella* species group by third valvula, which has rounded apex with small excavation on inner side. In this group similar coloration of gaster (entirely dark brown, excluding seventh tergite) has only *E. sueloderi* Polaszek, described from Costa Rica (Mound *et al.*, 1994). But *E. verticina* differs from *E. sueloderi* by following: head yellow, midlobe of mesoscutum with 2 pairs of setae, antennal club 2-segmented, ovipositor shorter than middle tibia (0.9x); in *E. sueloderi* – head uniformly brown, midlobe of mesoscutum with 4 pairs of setae, antenna with club not clavate, ovipositor as long as middle tibia.

88. *Encarsia woolleyi* Myartseva and Evans, sp. n.
(Figs 416-420)

Species-group placement. *luteola* group.

Material examined. Holotype ♀, **Mexico: Guerrero**, 6.6 miles SW Filo de Caballo, ex whitefly (Aleyrodidae) on ?*Solanum* sp., 12.vii.1985, J. B. Woolley and G. Zolnerowich, USNM. Paratypes: 2 ♀ and 8 ♂, same label data as holotype, USNM.

Description. Female. Length: 0.82 mm (holotype).

Coloration. Body dark brown with central area of midlobe of mesoscutum darker brown; third valvula dark brown; fore wings hyaline.

Structure. Female habitus - Fig. 416. Antenna (Fig. 417) with 2-segmented club. Flagellar segments with the following number of linear sensilla: F1-0, F2-0, F3-2, F4-3, F5-3, F6-3. Midlobe of mesoscutum 1.4x as wide as long, with many elongate hexagonal reticulations and 7 pairs of setae arranged as 6+2+2+2+2; each side lobe with 3 setae, each axilla with one seta located apically. Scutellum with anterior pair of setae reaching bases of posterior pair of setae. Distance between scutellar placoid sensilla about 4x width of one sensillum. Endophragma reaching margin of first tergite. Fore wing (Fig. 418) uniformly setose, broad, 2.3x as long as wide; 4 basal group setae. Marginal vein with 7 long and stout setae along anterior margin, 2 parastigmal setae at its base; marginal fringe 0.2x wing width. Tarsal formula 5-5-5. Midtibial spur (Fig. 419) 0.6x as long as basitarsus. Gastral dorsum with imbricate lateral margins on first-third tergites, becoming weaker from fourth to sixth tergites. Ovipositor arising at base of fourth tergite and 1.1x as long as middle tibia; third valvula 0.4x as long as ovipositor.

Male. Length: 0.90 mm.

Coloration. Body dark brown with large central triangle-shaped area of midlobe slightly darker; legs and antennae yellow, except dark brown hind femora; fore wings slightly infuscate from base to stigmal vein.

Structure. Antenna (Fig. 420) with club segments separate and sixth tergite with one pair of setae between cerci.

Hosts. Aleyrodidae.

Distribution in Mexico. Guerrero.

Comments. The female of *Encarsia woolleyi* sp. n. can be distinguished from other *E. luteola* group species by its dark brown body with lighter lateral margins of midlobe; third valvulae dark brown; fore wing hyaline; stigmal vein long, narrow and hooked upward.

Etymology. This species is named in honor of Dr. James W. Woolley (Texas A&M University, Texas, U.S.A.) for his contributions to Chalcidoidea systematics and for collecting this species.

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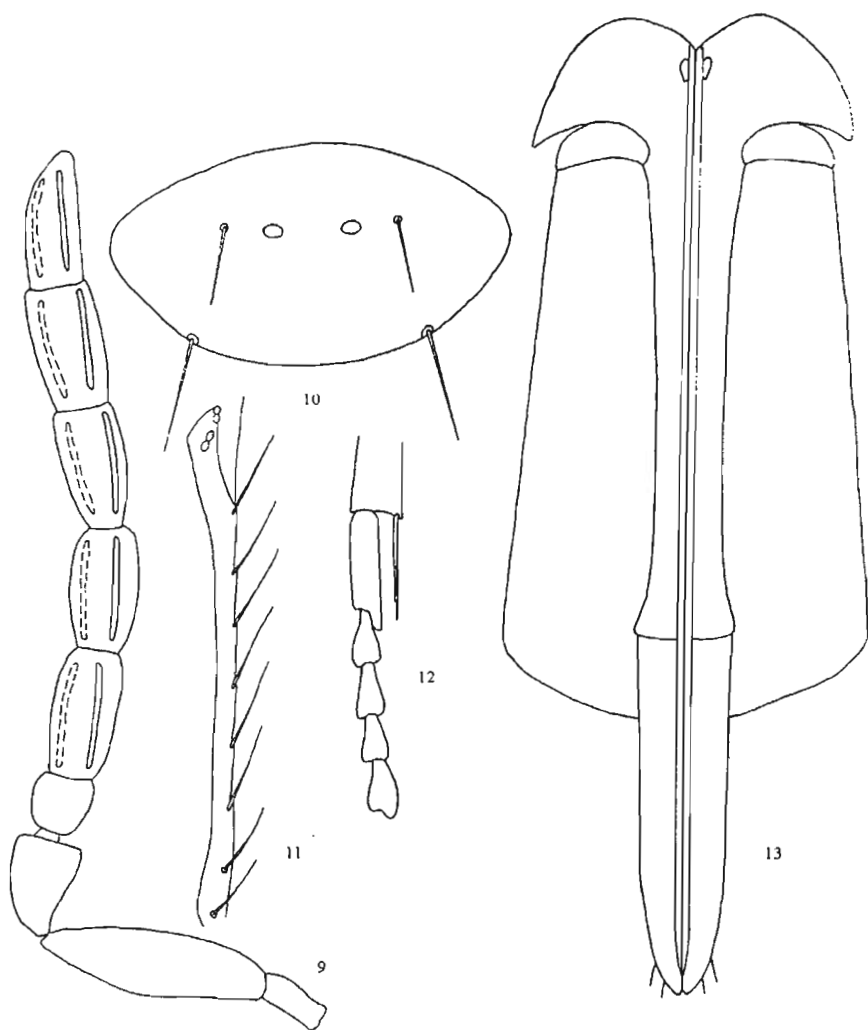
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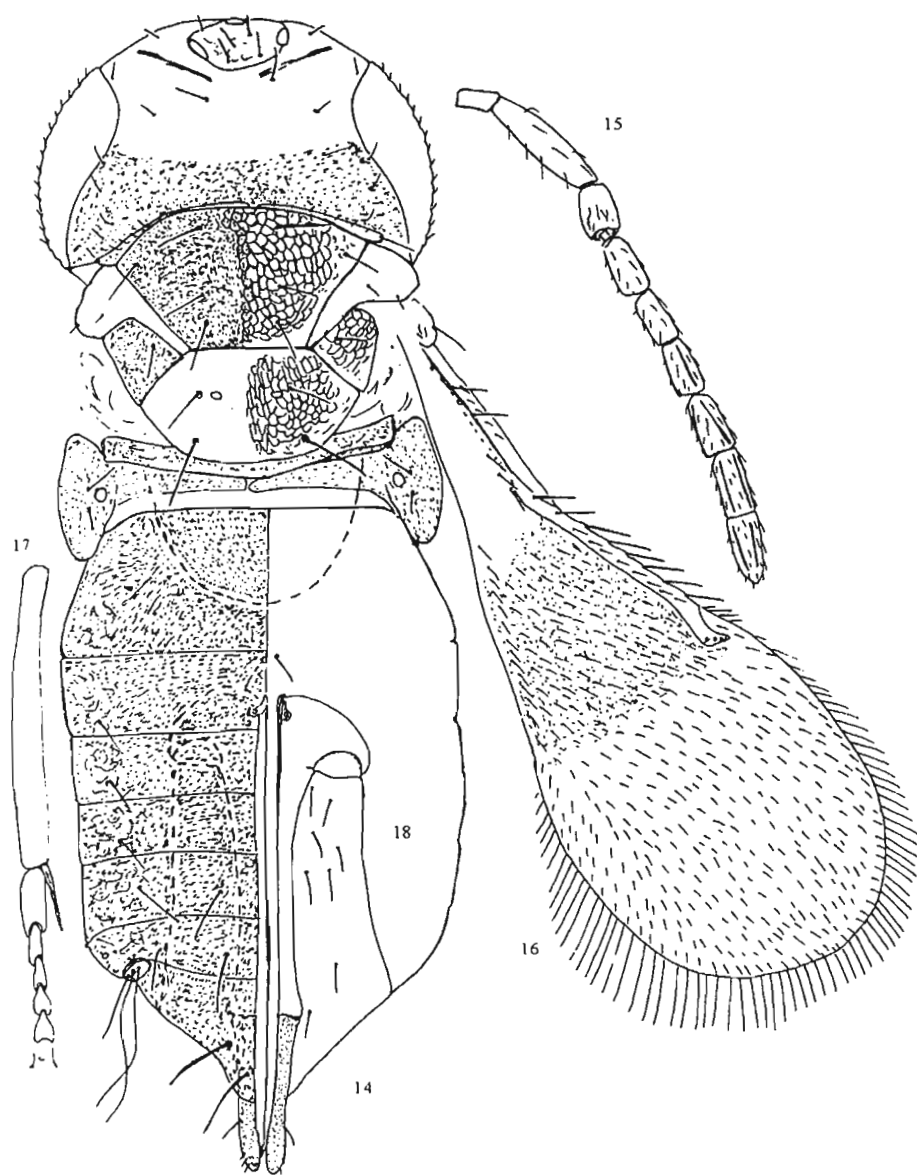
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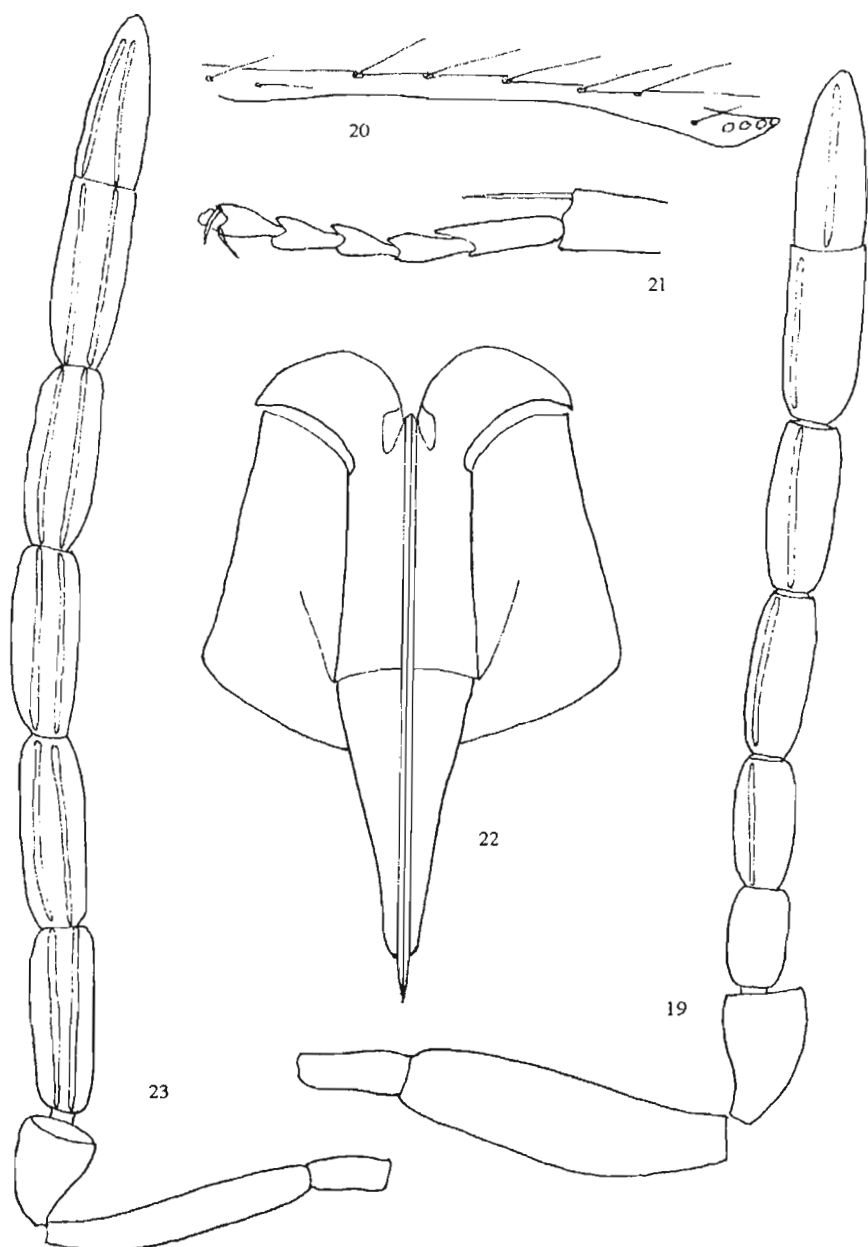
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ILLUSTRATIONS
(Figs 9- 420)

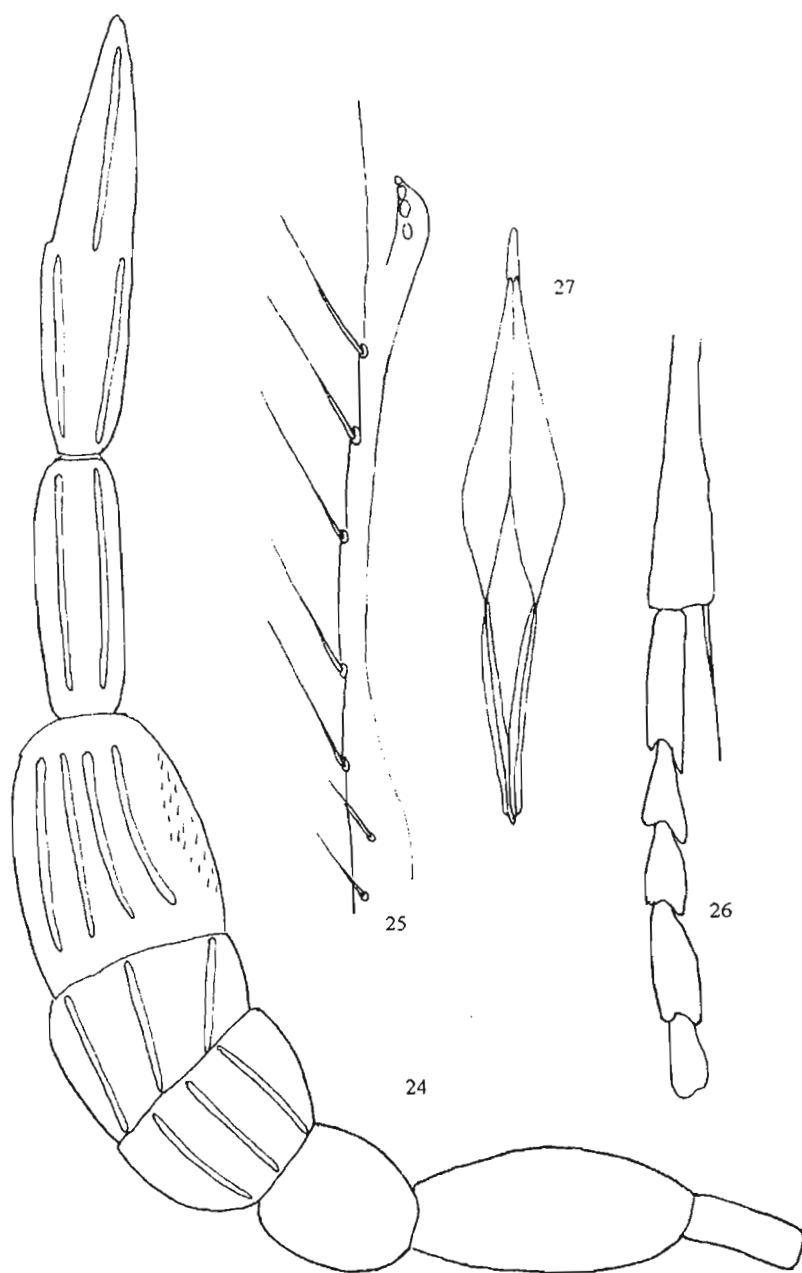
Figs 9-13. *Encarsia altacima*: 9 – antenna, female, 10 – scutellum, 11 – marginal and stigmal veins, 12 – middle tarsus and midtibial spur, 13 – ovipositor.



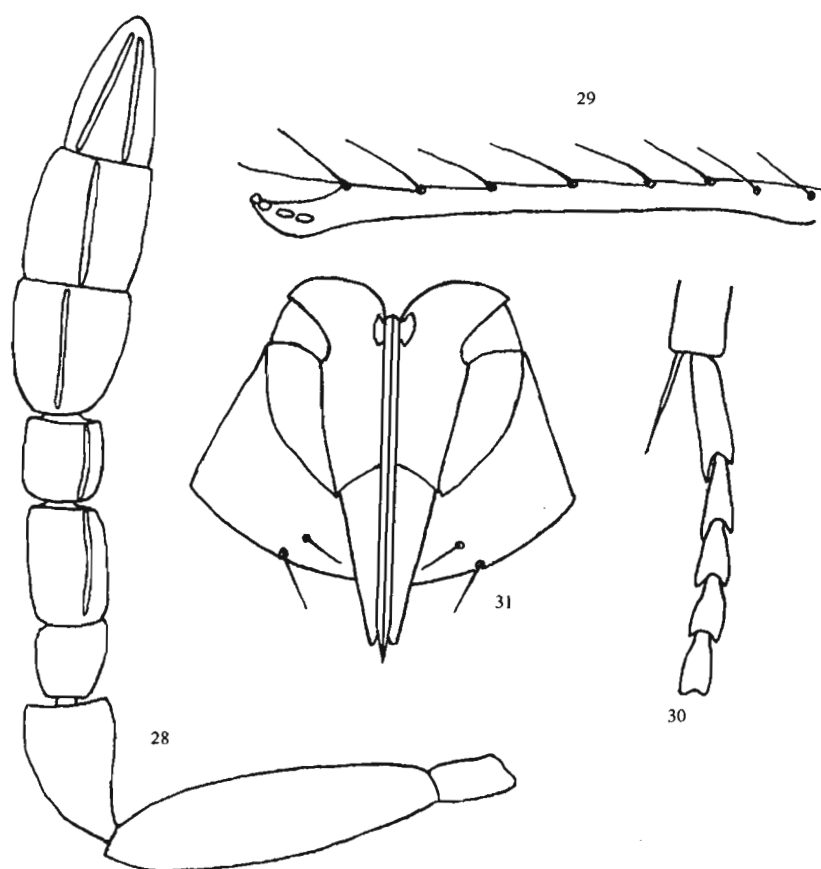
Figs 14-18. *Encarsia alvaradoi*: 14 – habitus, female, 15 – antenna, 16 – fore wing, 17 – middle tarsus and midtibial spur, 18 – ovipositor.



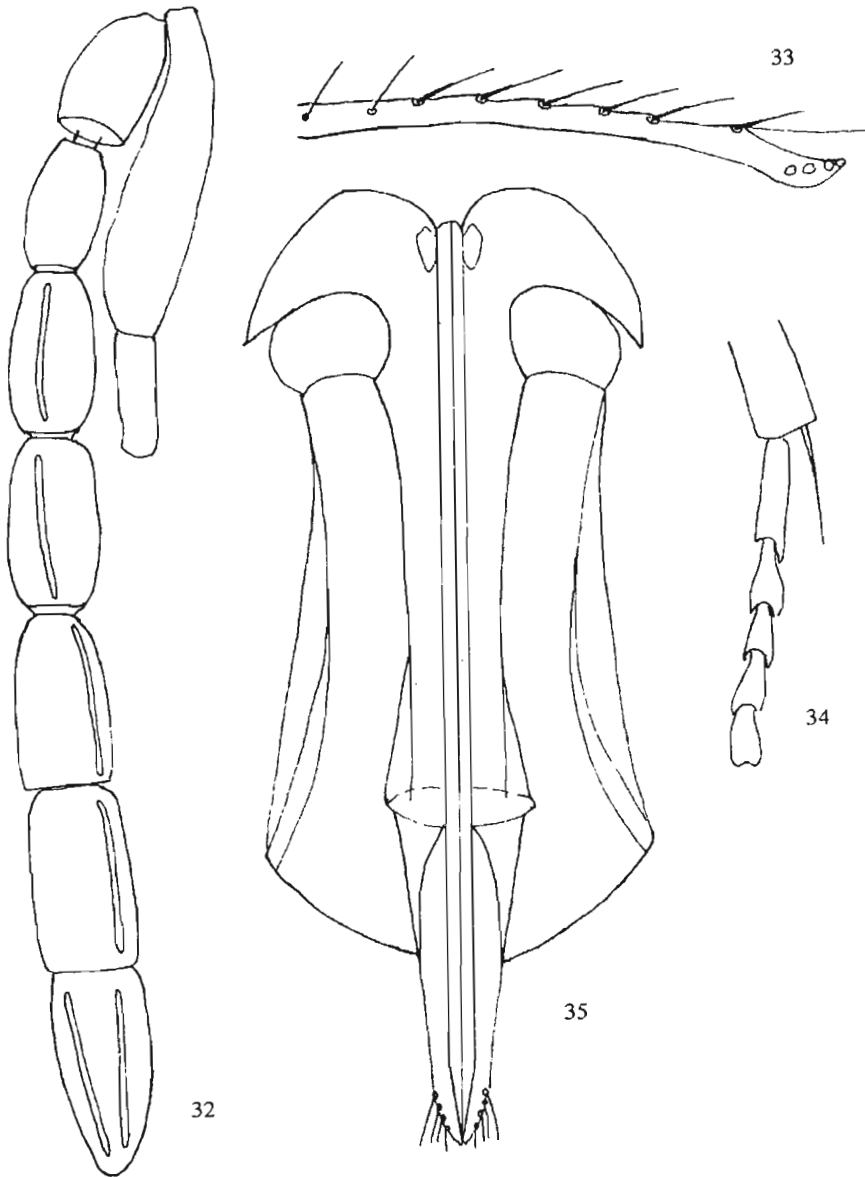
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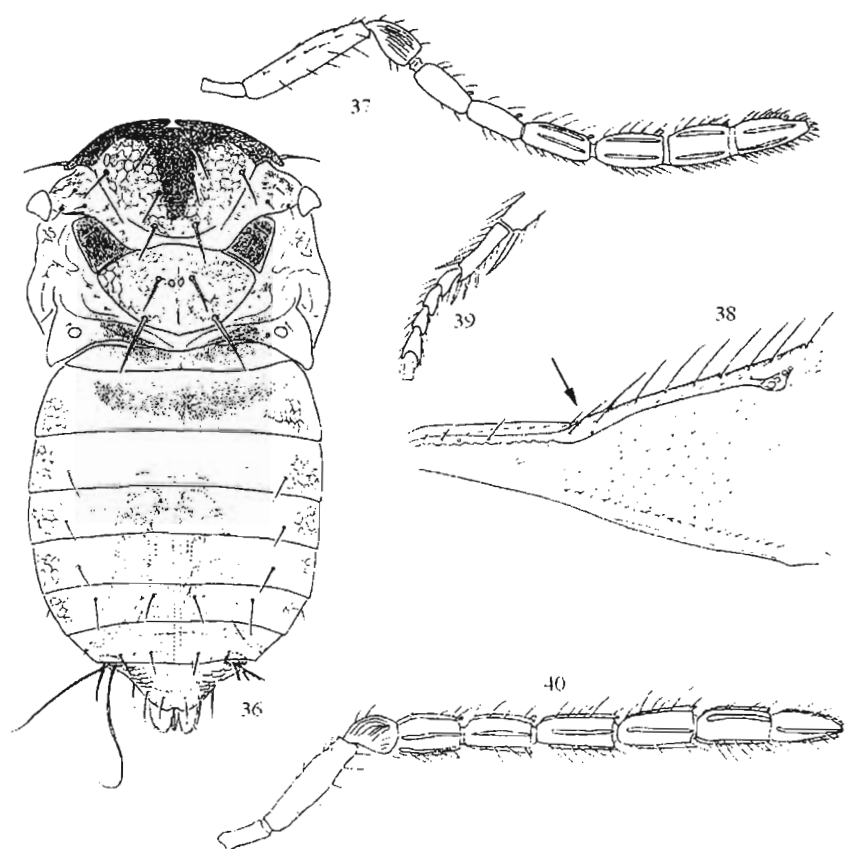
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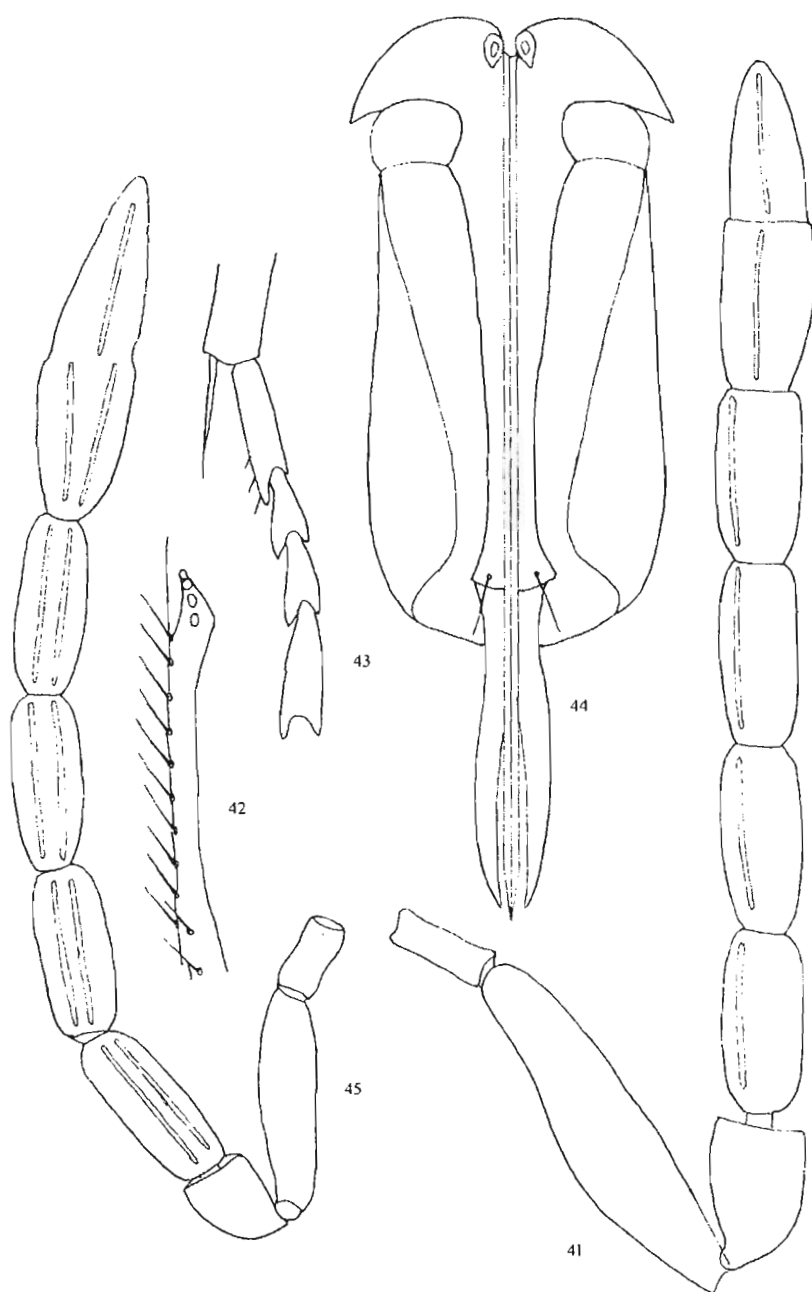
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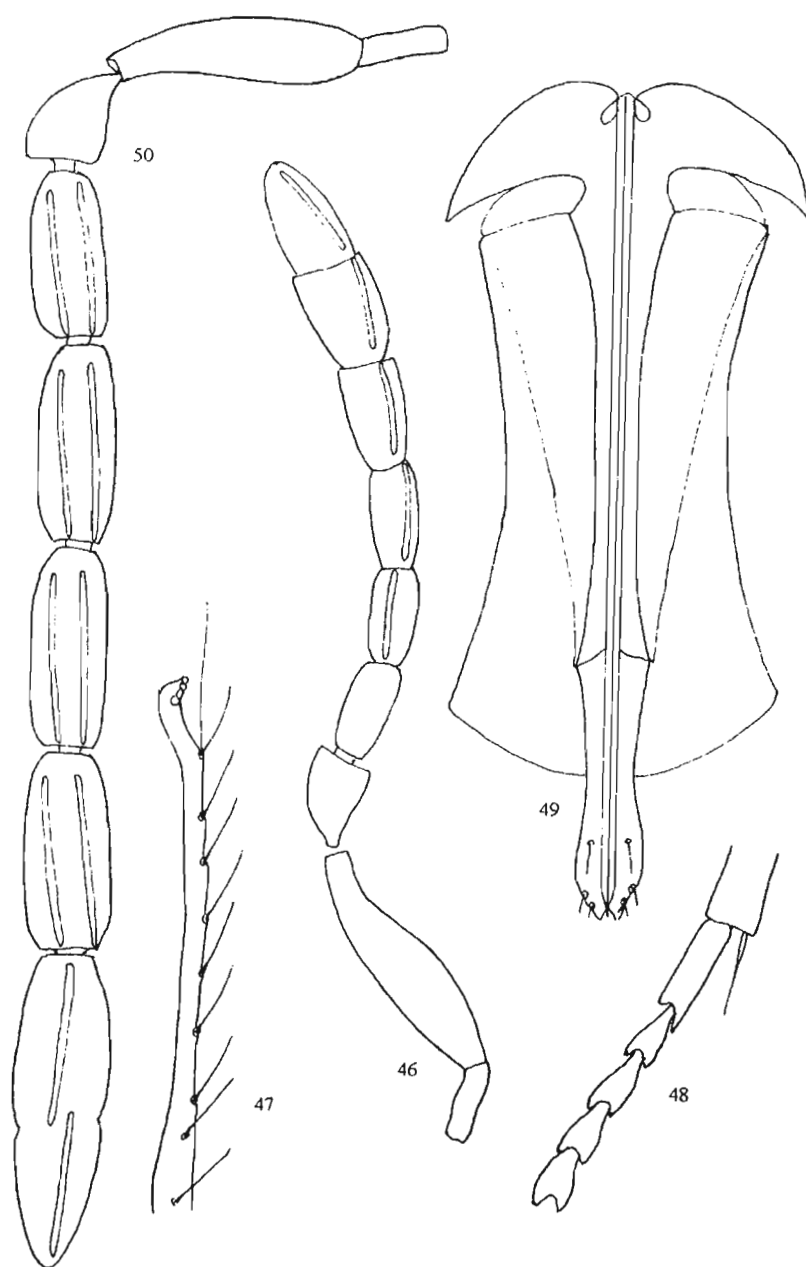
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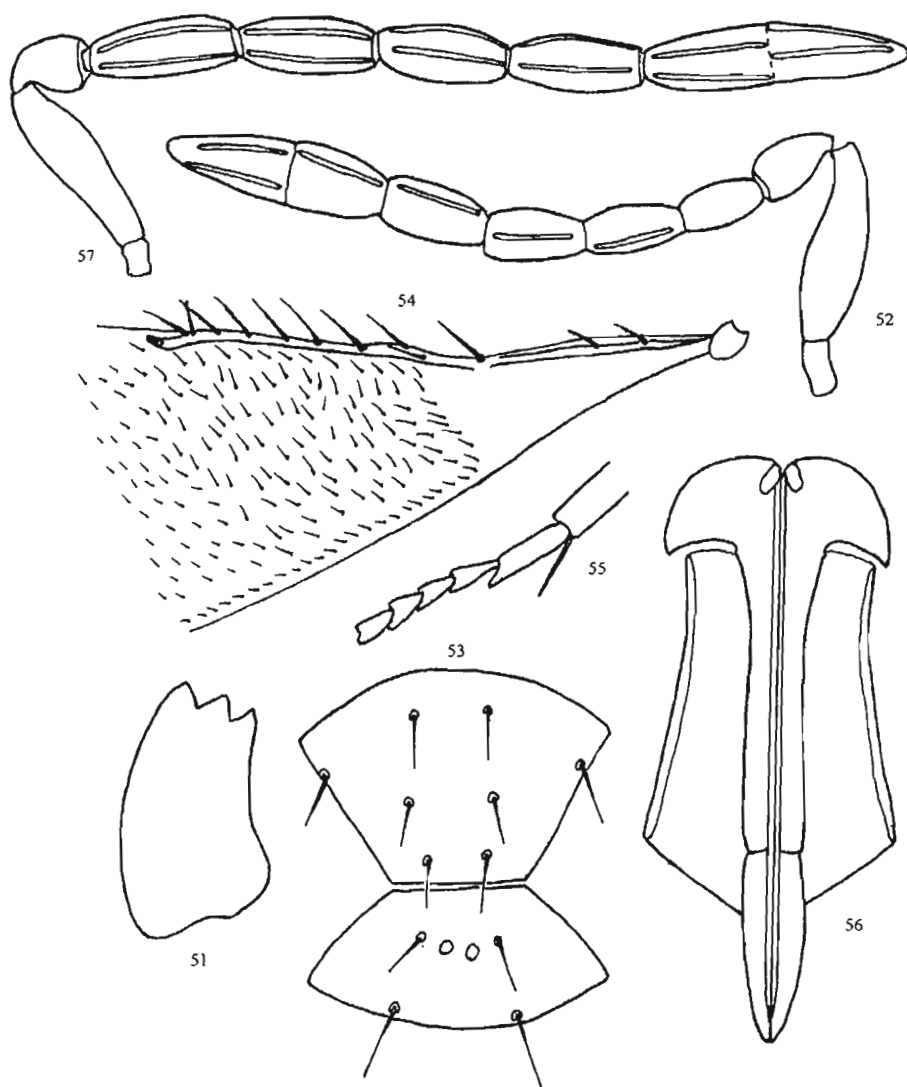
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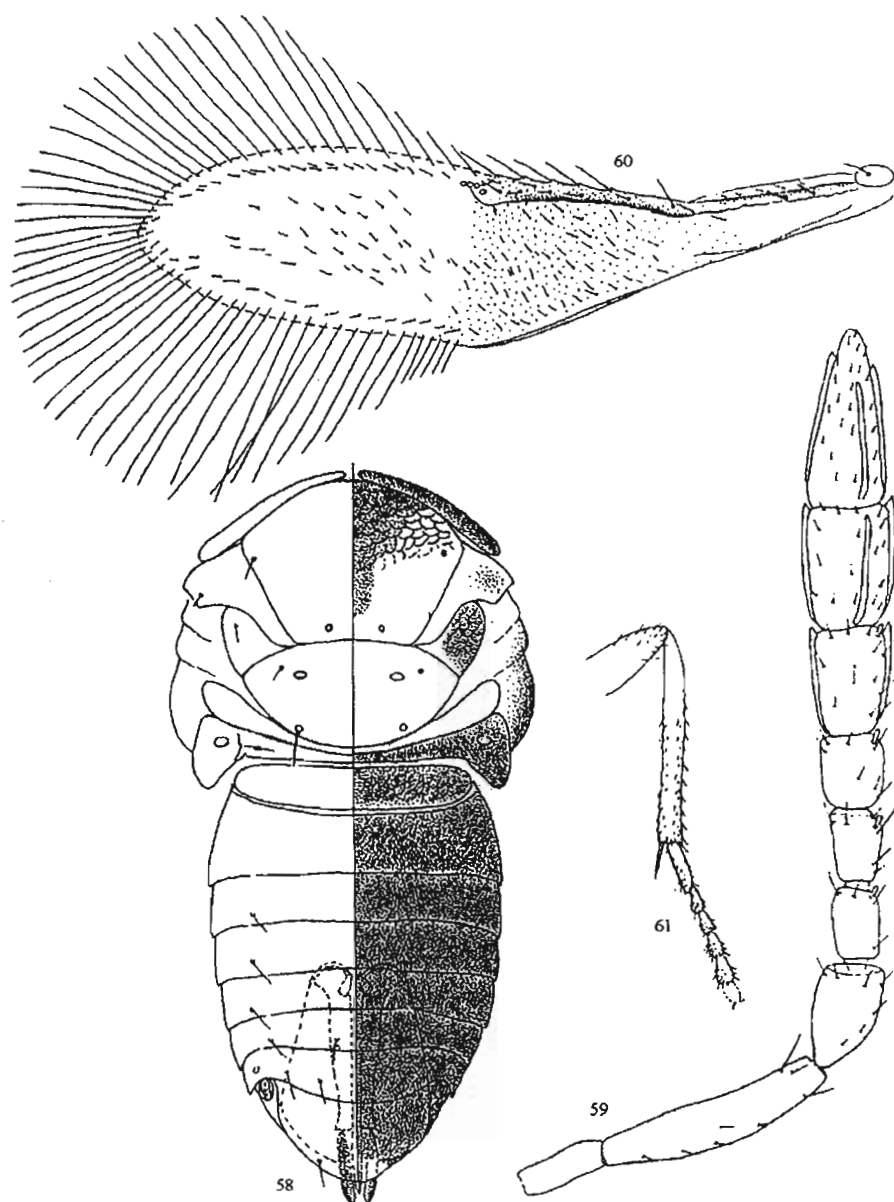
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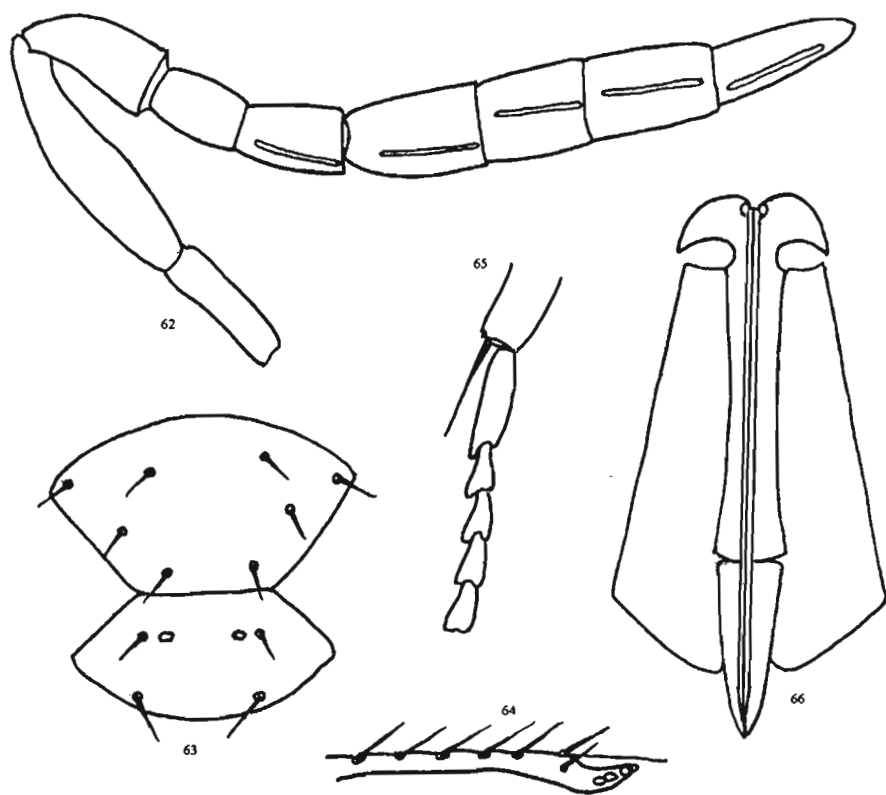
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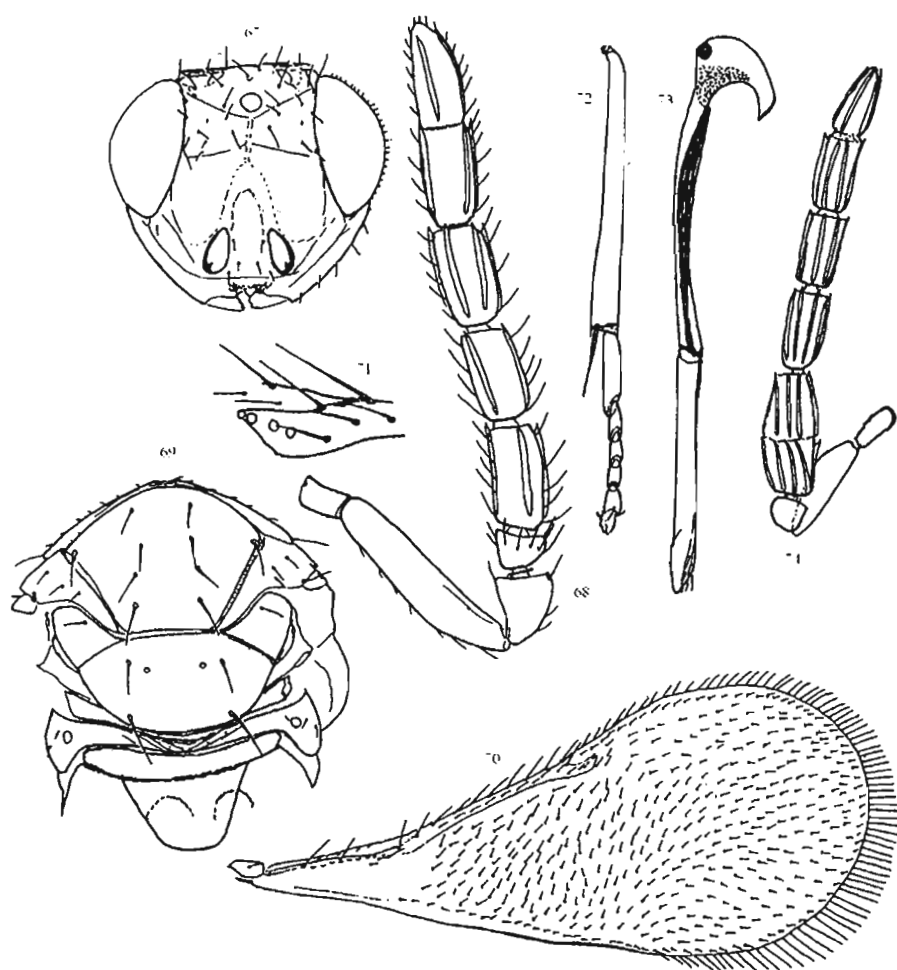
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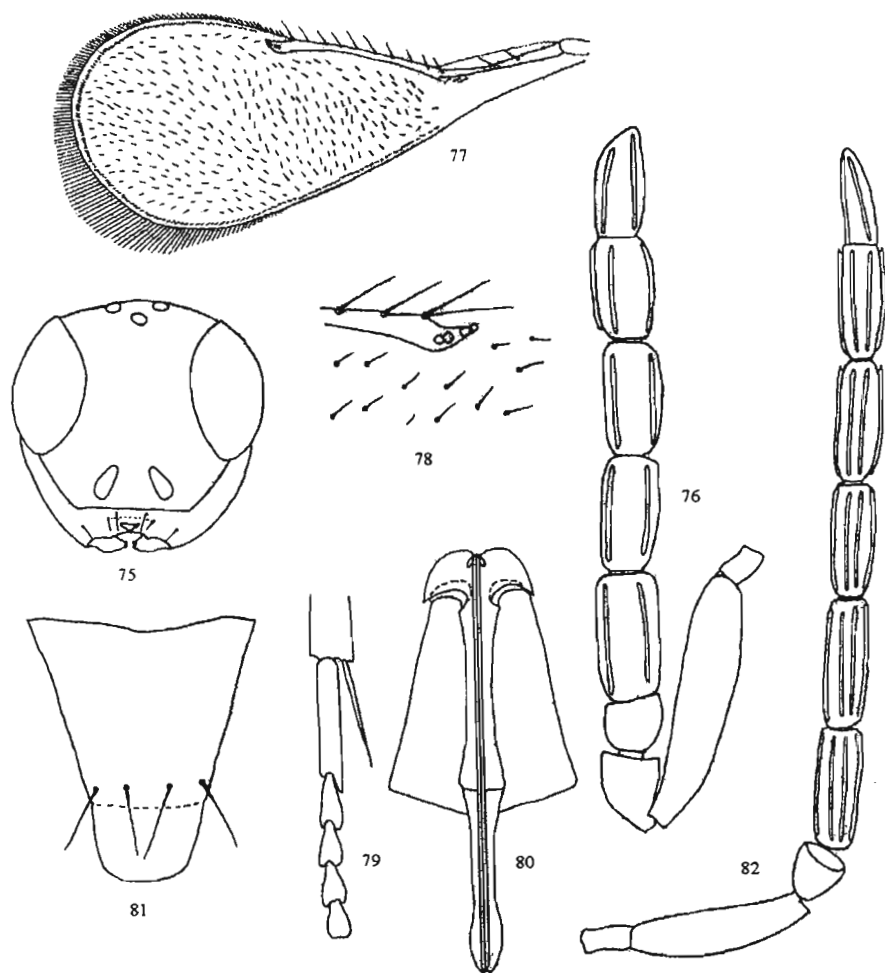
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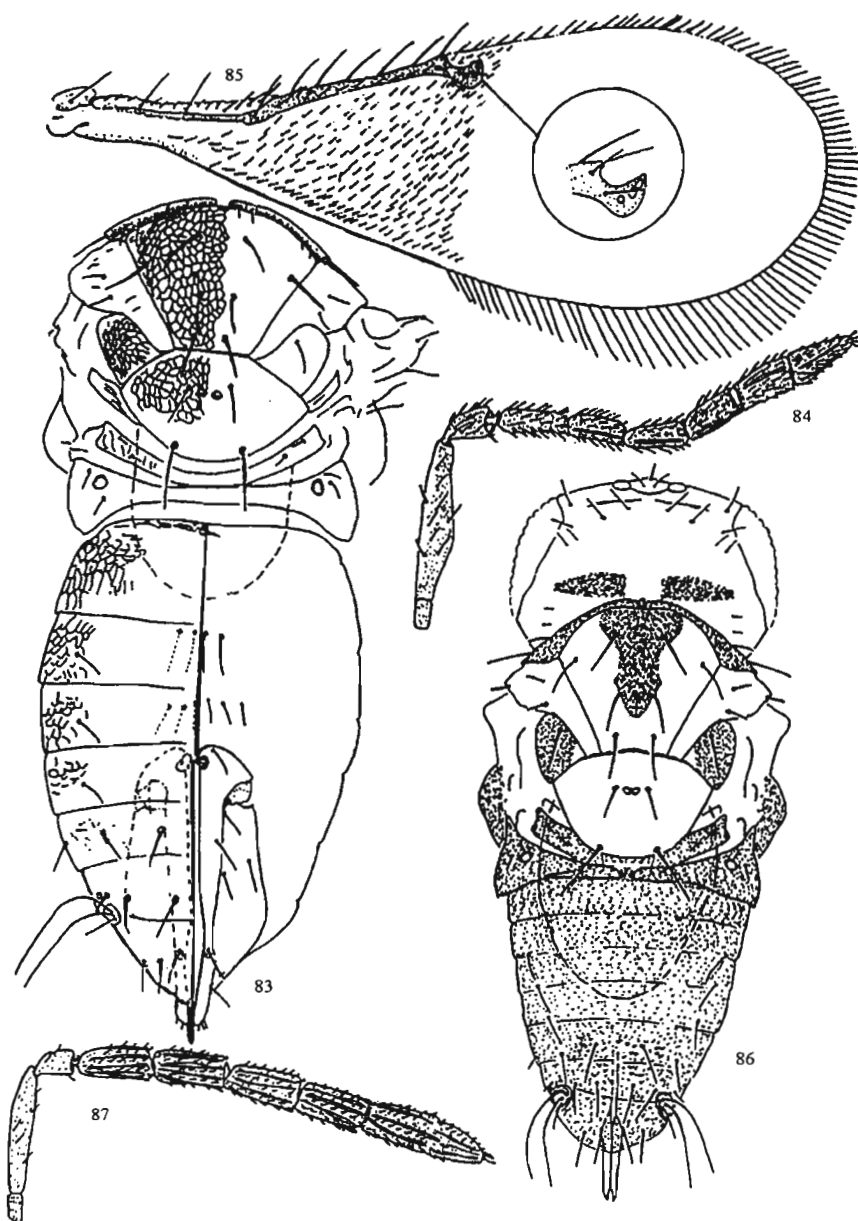
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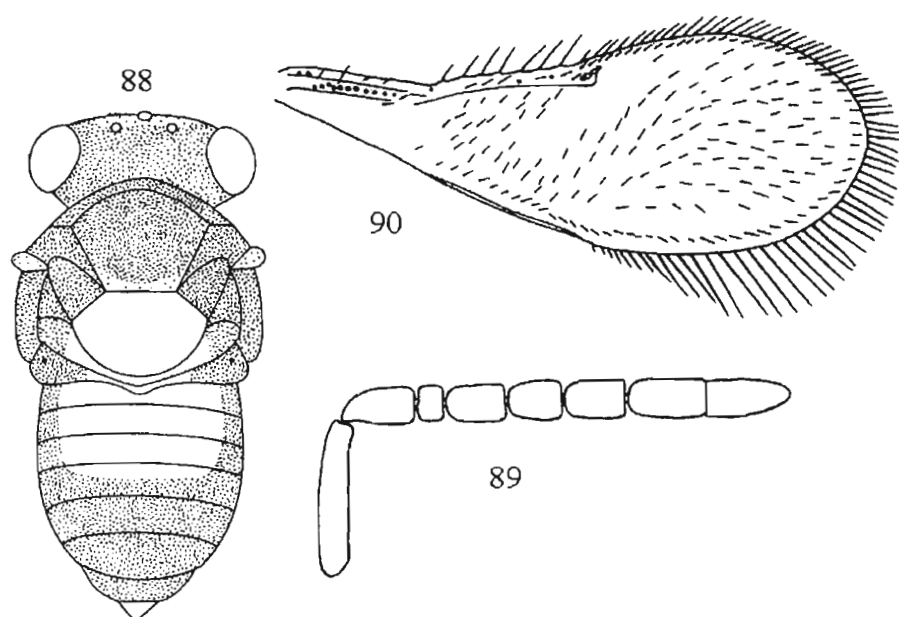
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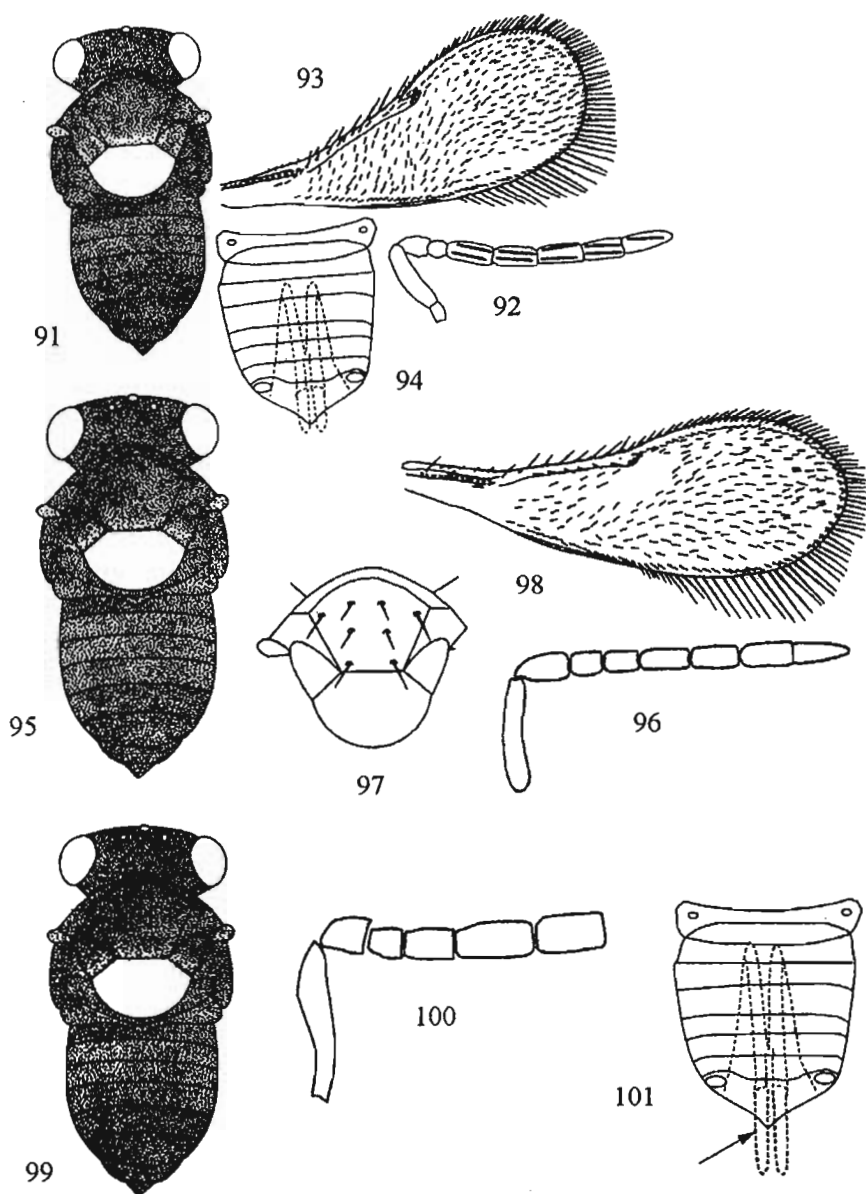
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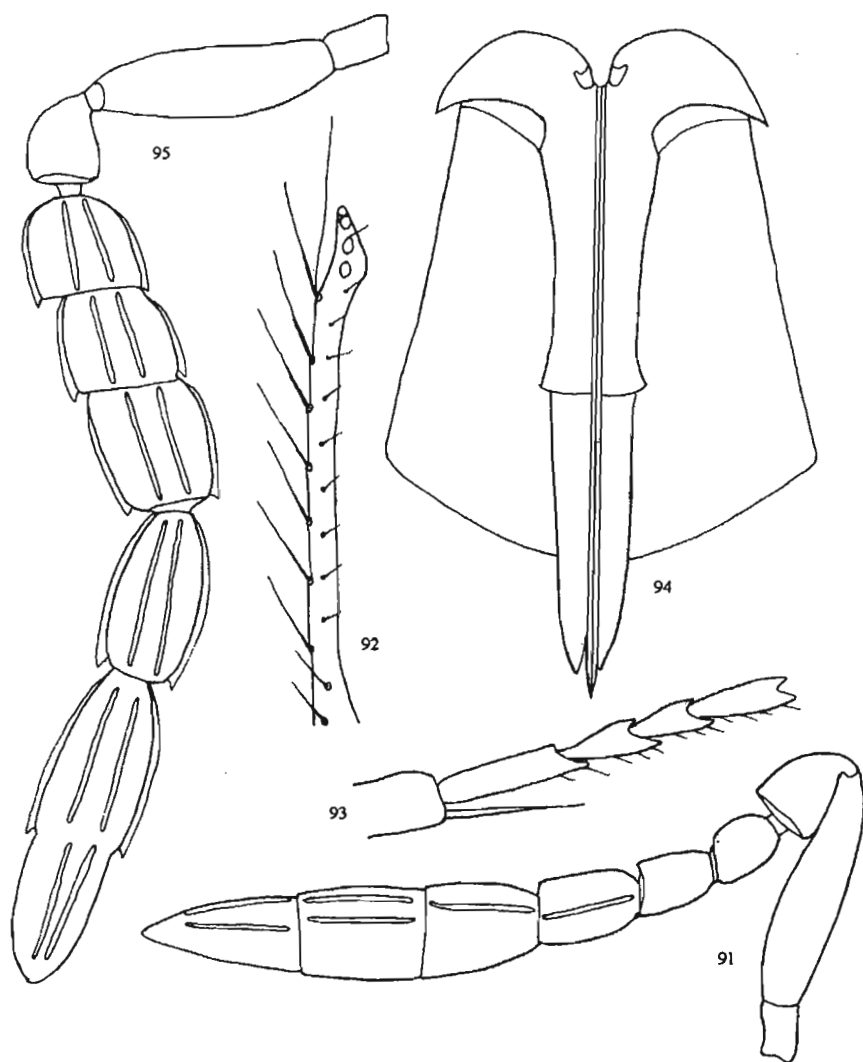
Figs. 83-87. *Encarsia costaricensis*: 83 – habitus, female, 84 – antenna, female, 85 – fore wing and stigmal vein, 86 – habitus, male, 87 – antenna.



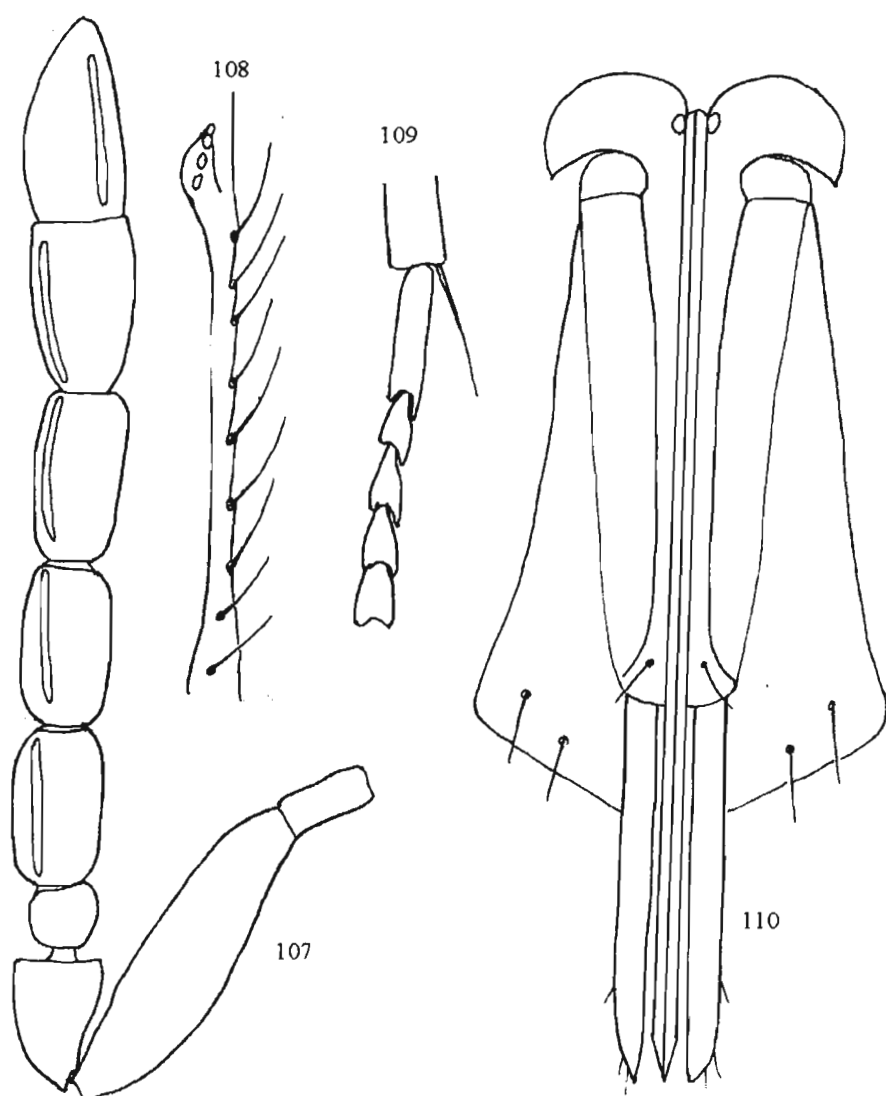
Figs. 88-90. *Encarsia cubensis*: 88 – habitus, female, 89 – antenna, 90 – fore wing.



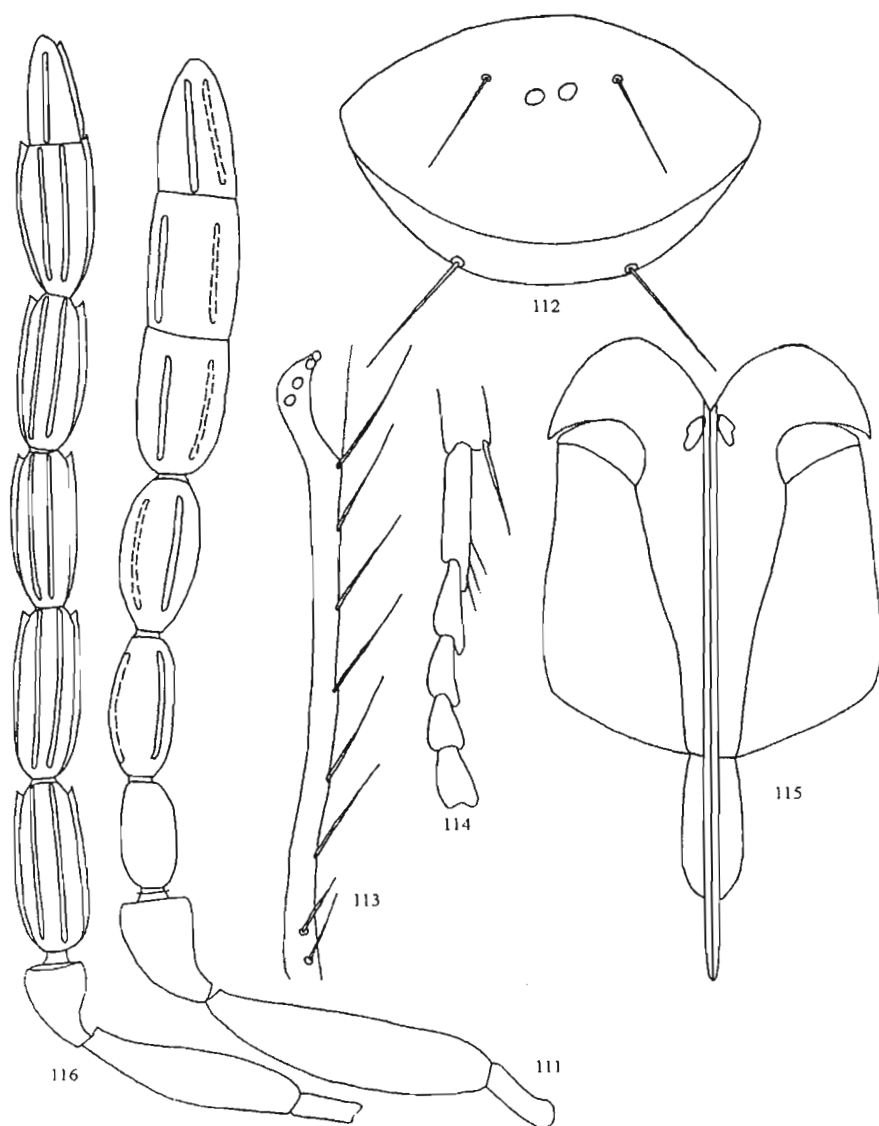
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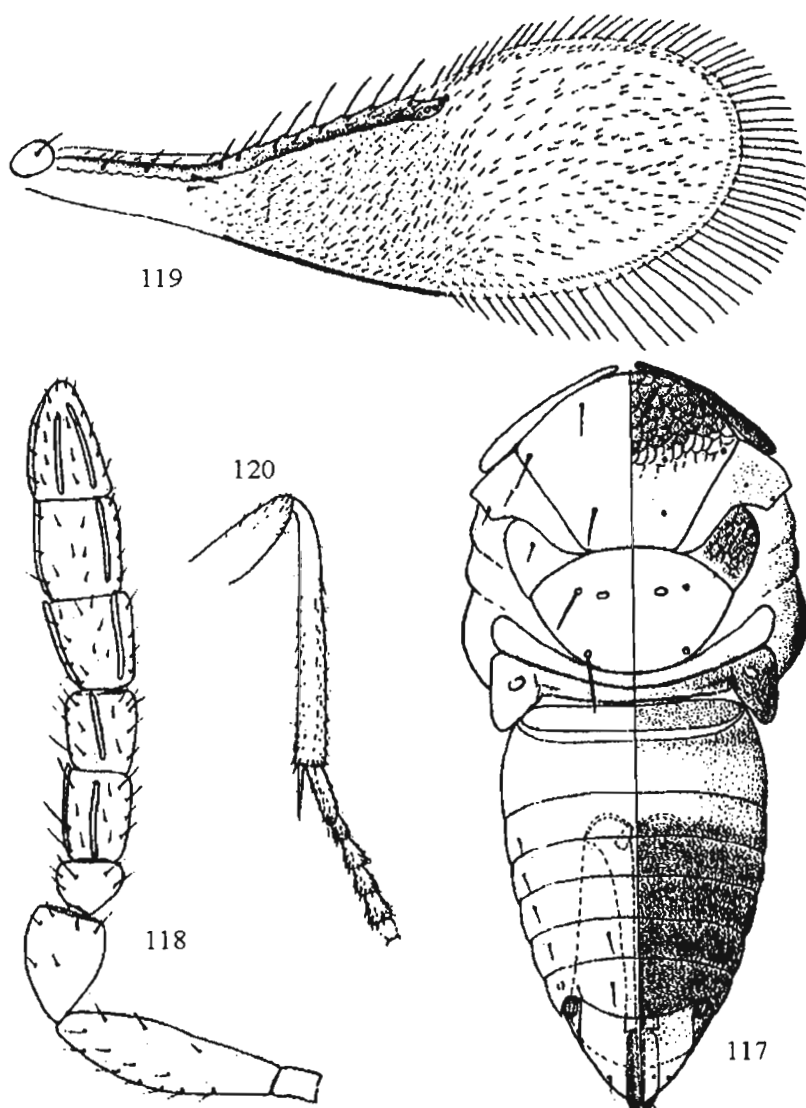
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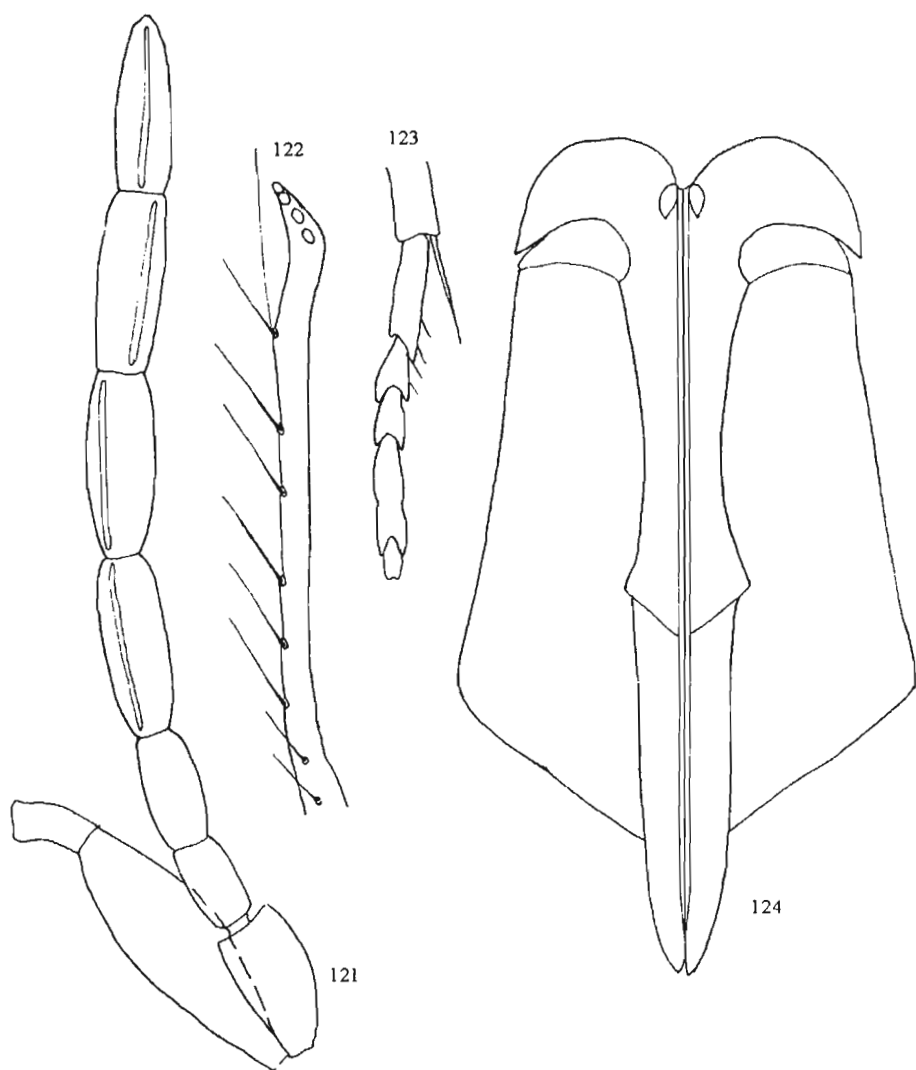
Figs. 107-110. *Encarsia dominicana*: 107 – antenna, female, 108 – marginal and stigmal veins, 109 – middle tarsus and midtibial spur, 110 – ovipositor.



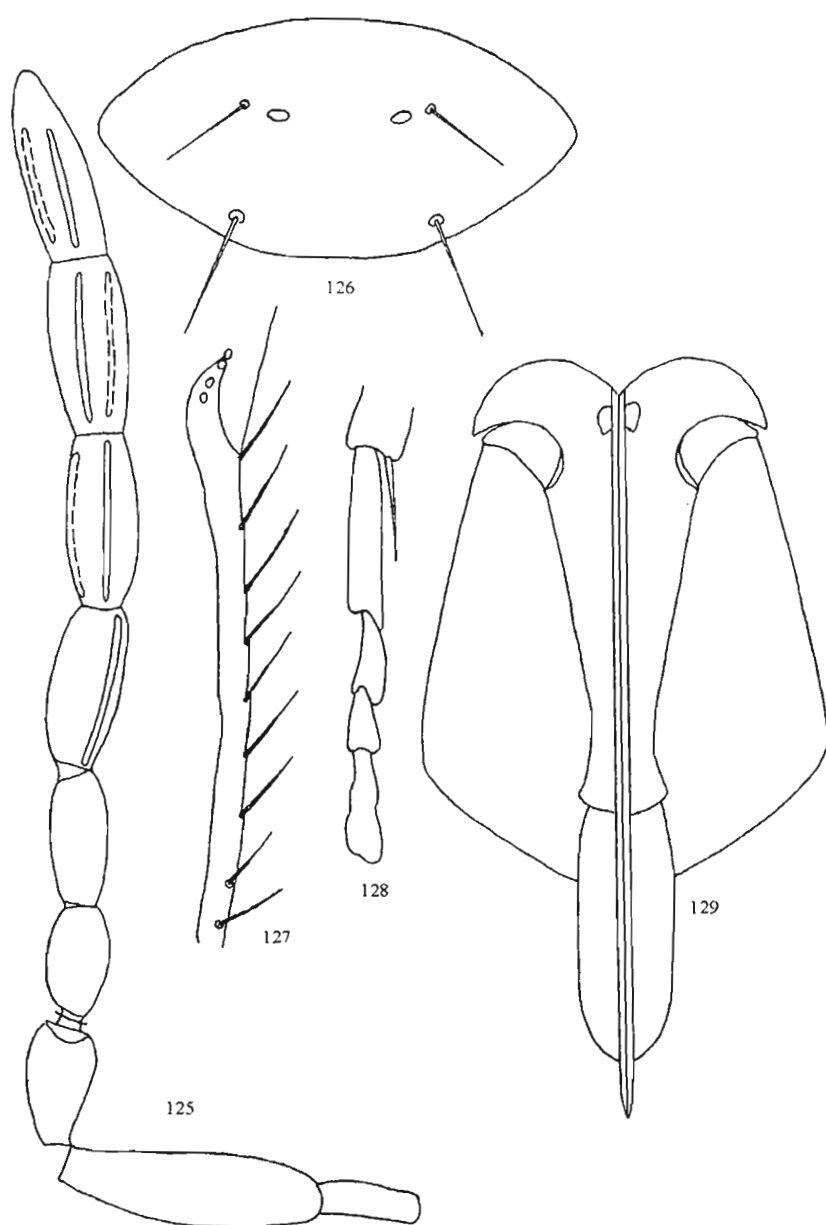
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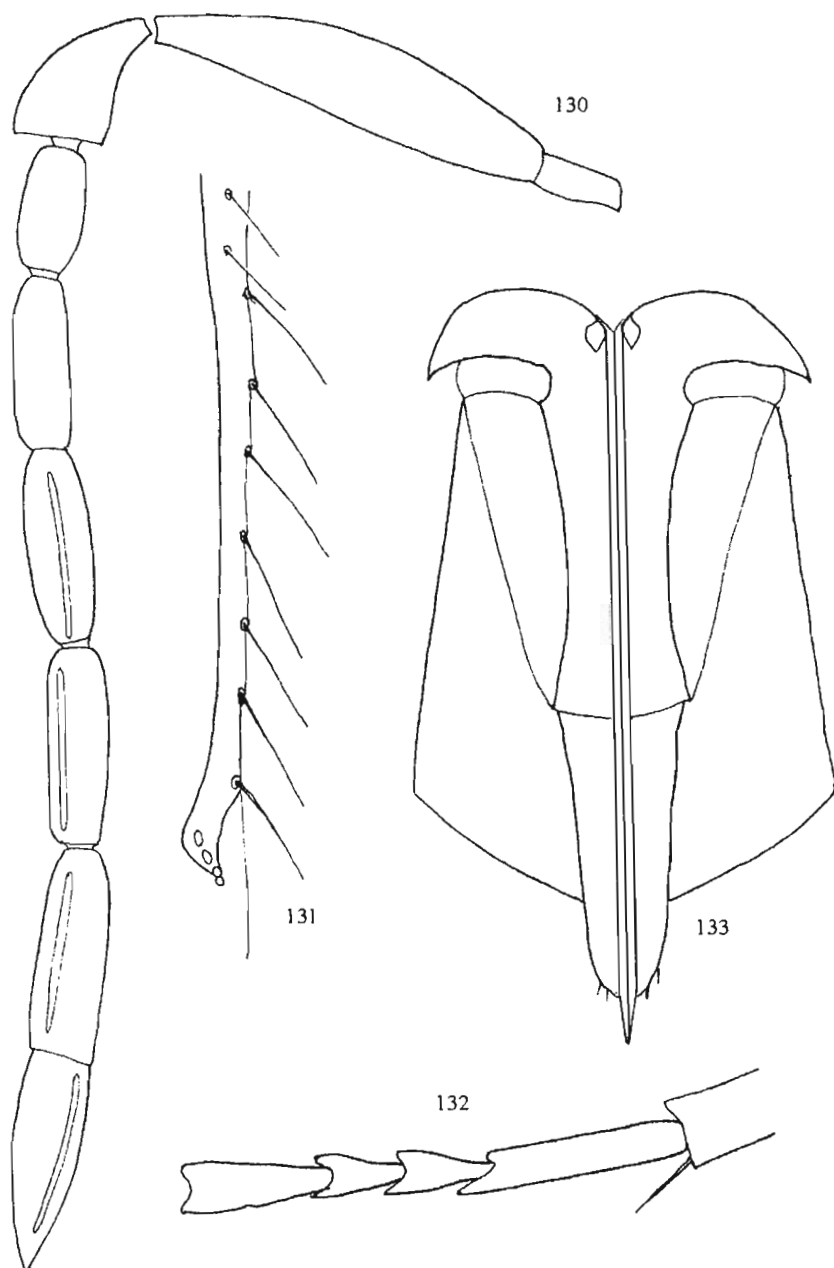
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117 – habitus, female, 118 – antenna, 119 – fore wing, 120 – middle
tibia, tarsus and midtibial spur.



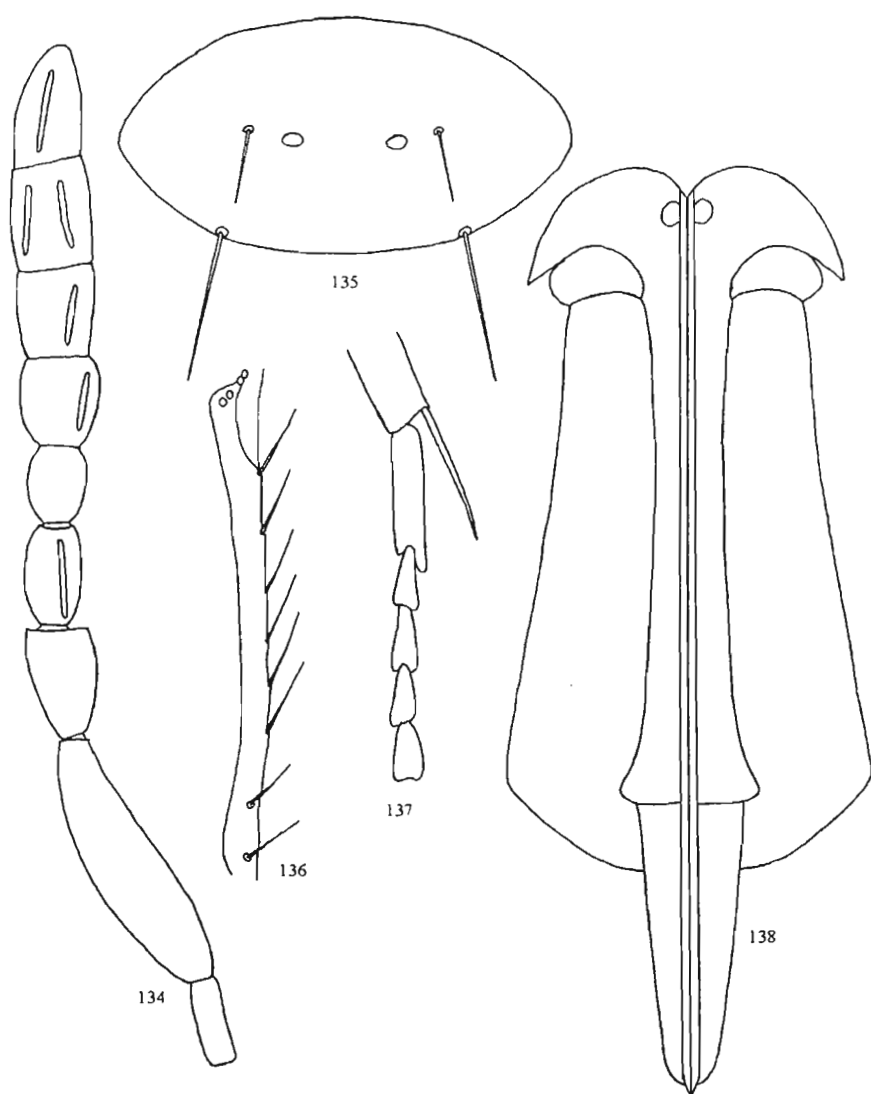
Figs. 121-124. *Encarsia flaviceps*: 121 – antenna, female, 122 – marginal and stigmal veins, 123 – middle tarsus and midtibial spur, 124 – ovipositor.



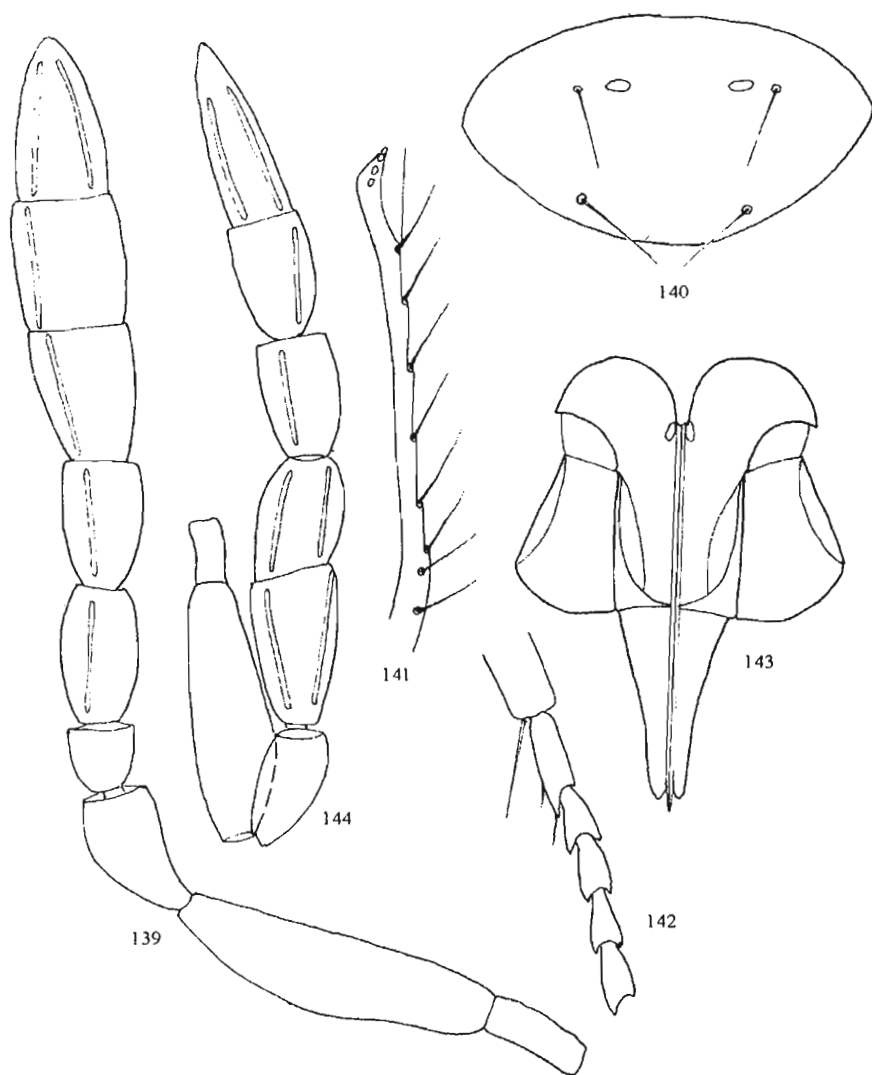
Figs. 125-129. *Encarsia florena*: 125 – antenna, female, 126 – scutellum, 127 – marginal and stigmal veins, 128 – middle tarsus and midtibial spur, 129 – ovipositor.



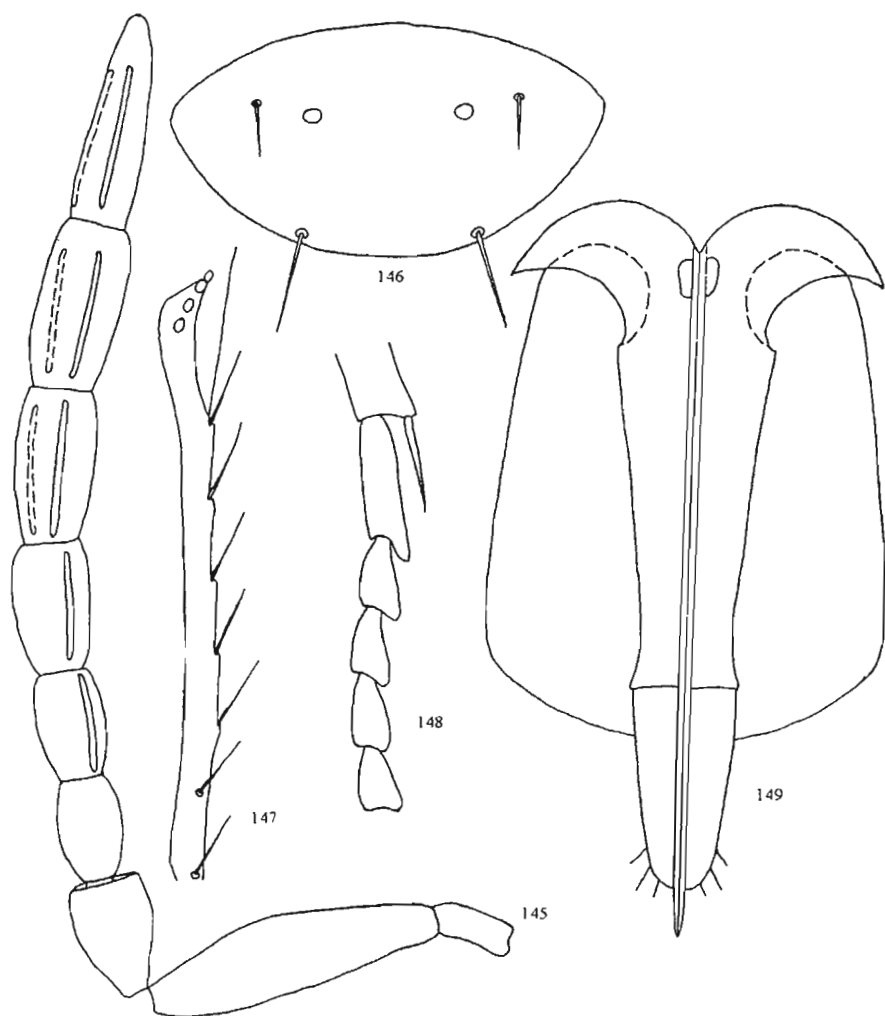
Figs. 130-133. *Encarsia formosa*: 130 – antenna, female, 131 – marginal and stigmal veins, 132 – middle tarsus and midtibial spur, 133 – ovipositor.



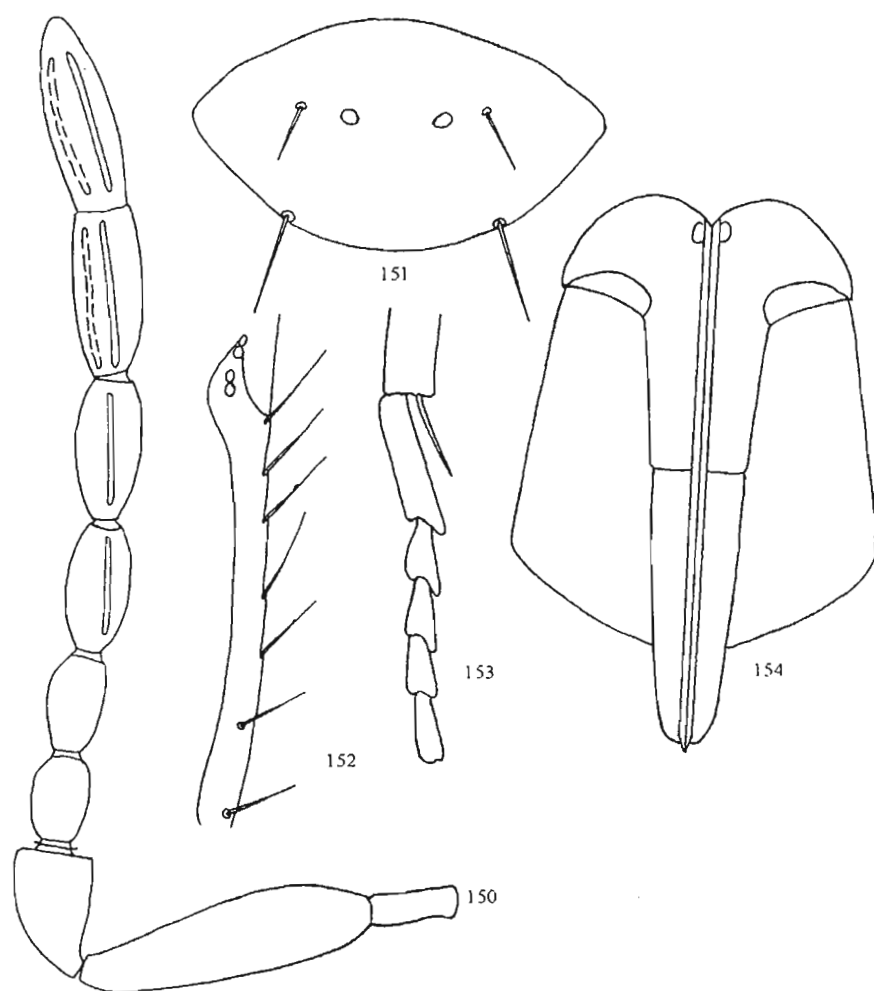
Figs. 134-138. *Encarsia funiculata*: 134 – antenna, female, 135 – scutellum, 136 – marginal and stigmal veins, 137 - middle tarsus and midtibial spur, 138 – ovipositor.



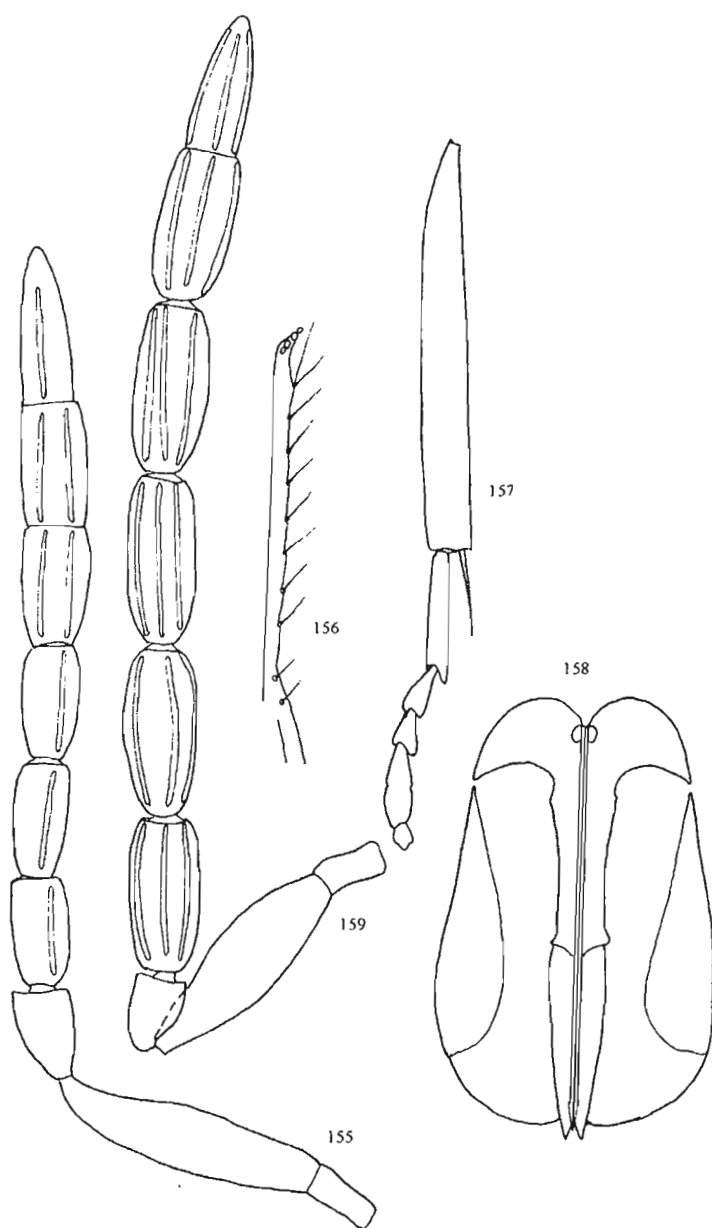
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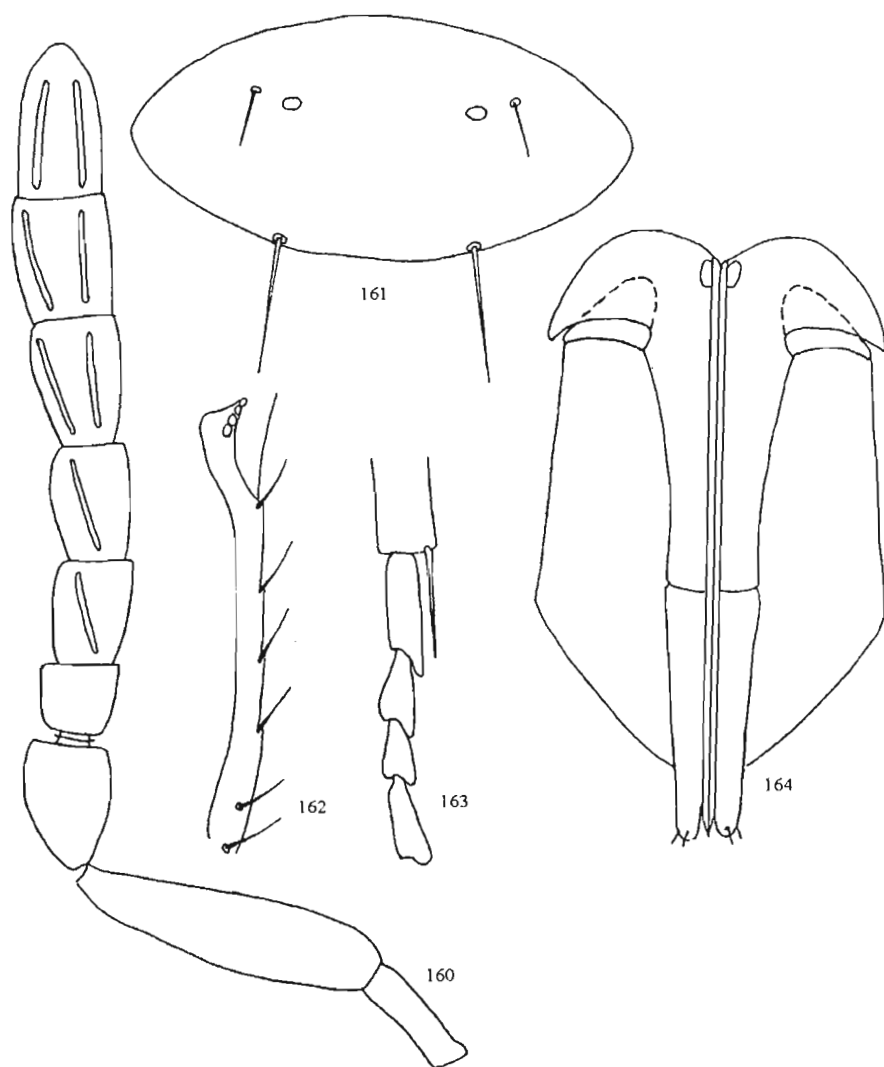
Figs. 145-149. *Encarsia gaonae*: 145 – antenna, female, 146 – scutellum, 147 – marginal and stigmal veins, 148 – middle tarsus and midtibial spur, 149 – ovipositor.



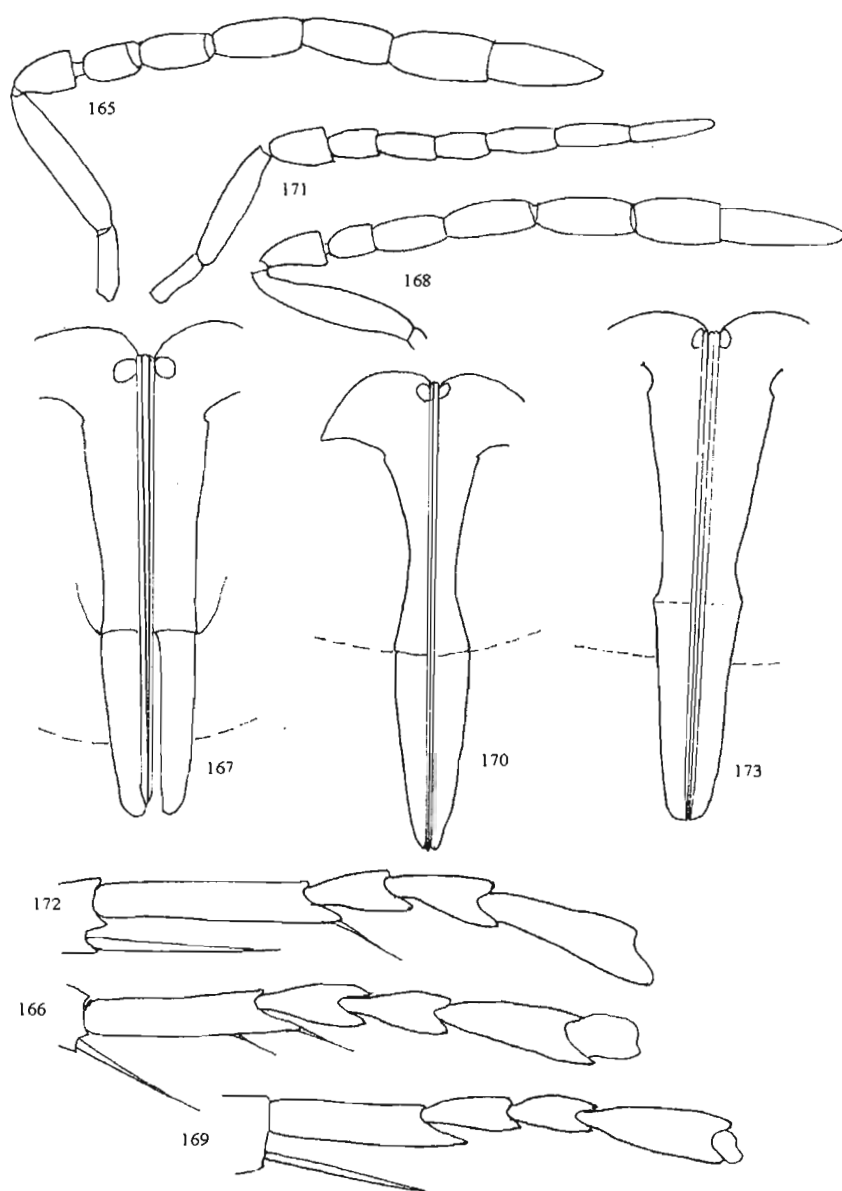
Figs 150-154. *Encarsia guajavae*: 150 – antenna, female, 151 – scutellum, 152 – marginal and stigmal veins, 153 – middle tarsus and midtibia spur, 154 – ovipositor.



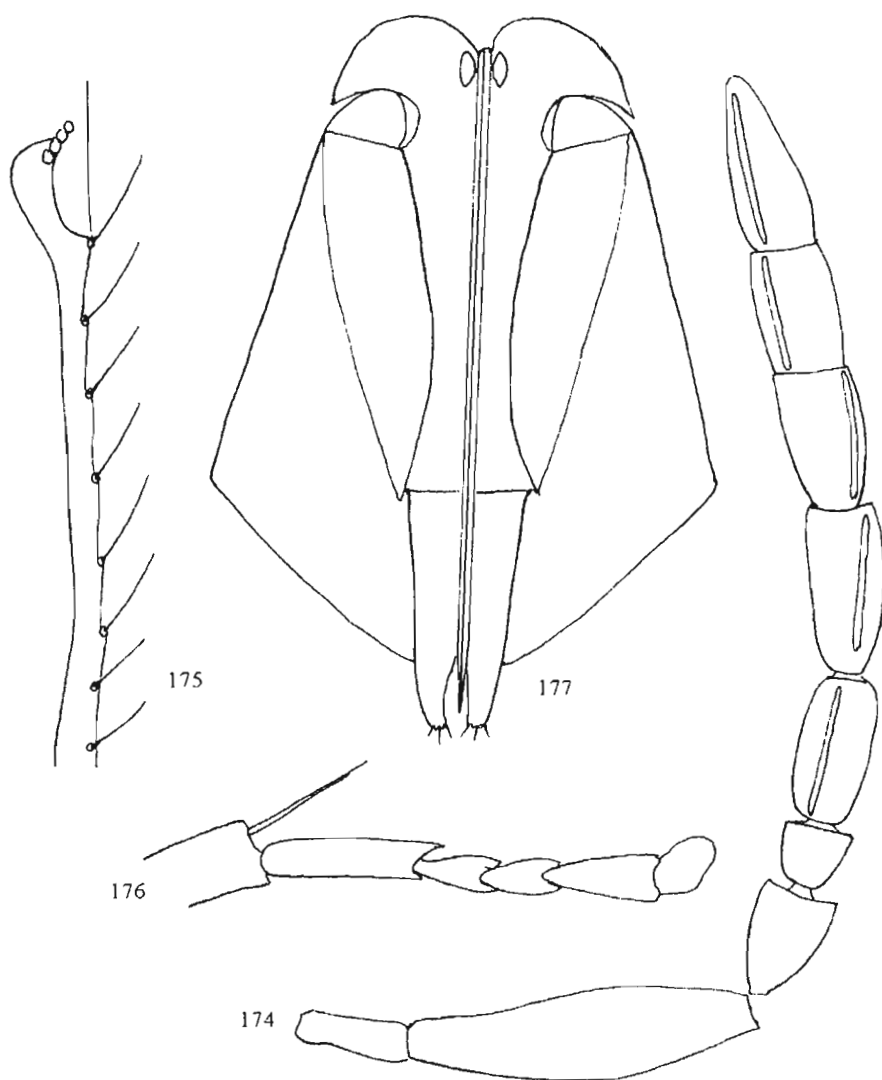
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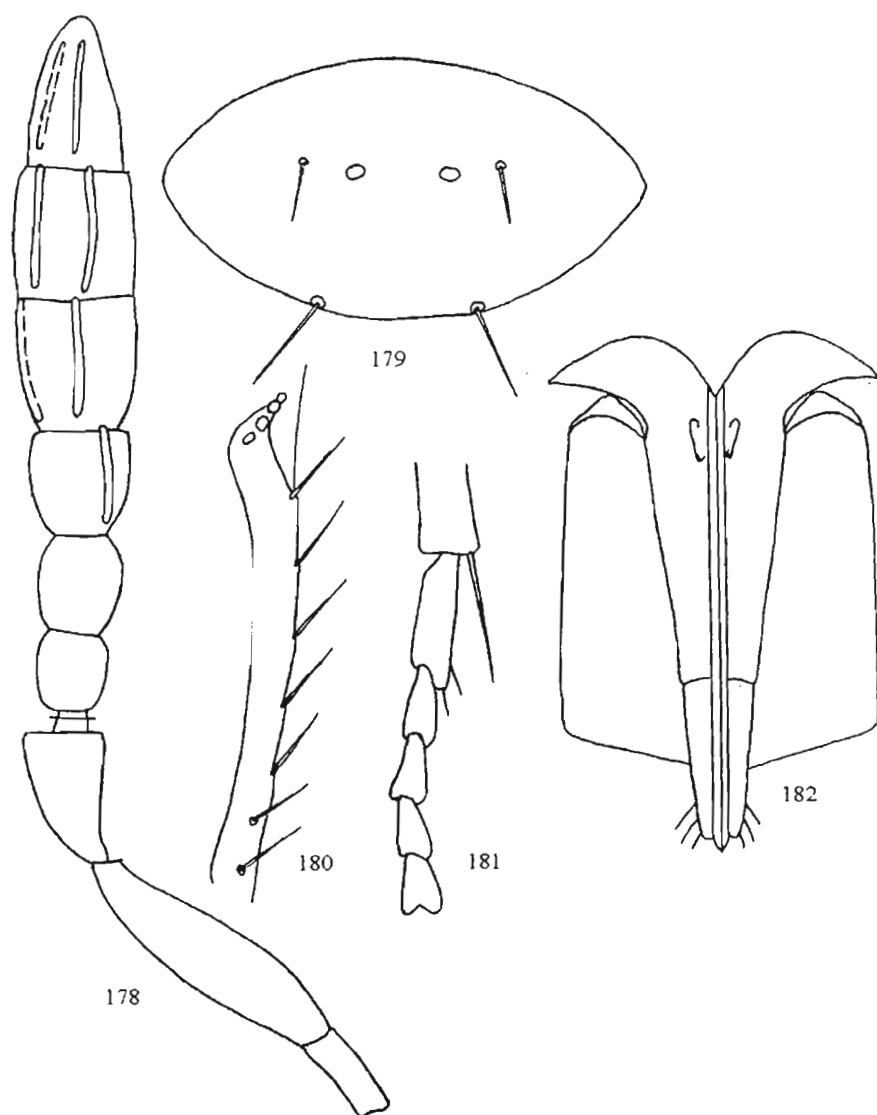
Figs 160-164. *Encarsia guamuchil*: 160 - antenna, female, 161 - scutellum, 162 - marginal and stigmal veins, 163 - middle tarsus and midtibial spur, 164 - ovipositor.



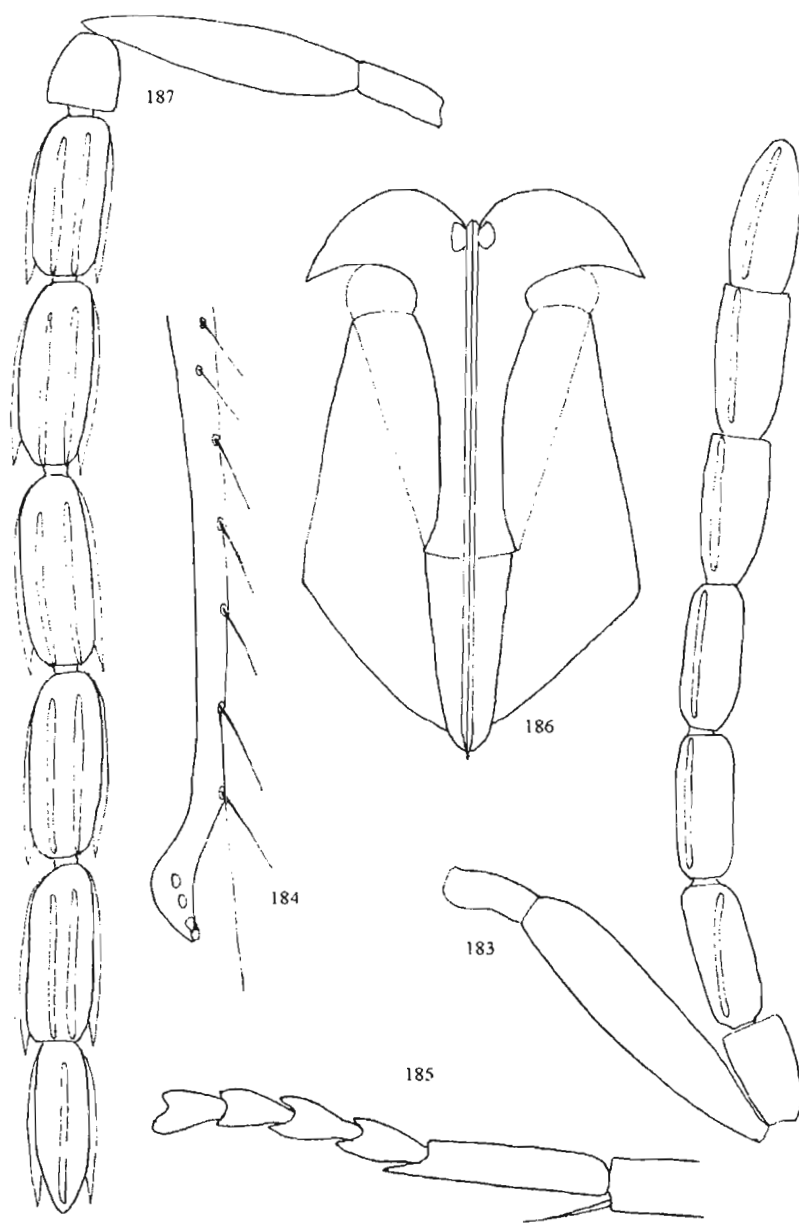
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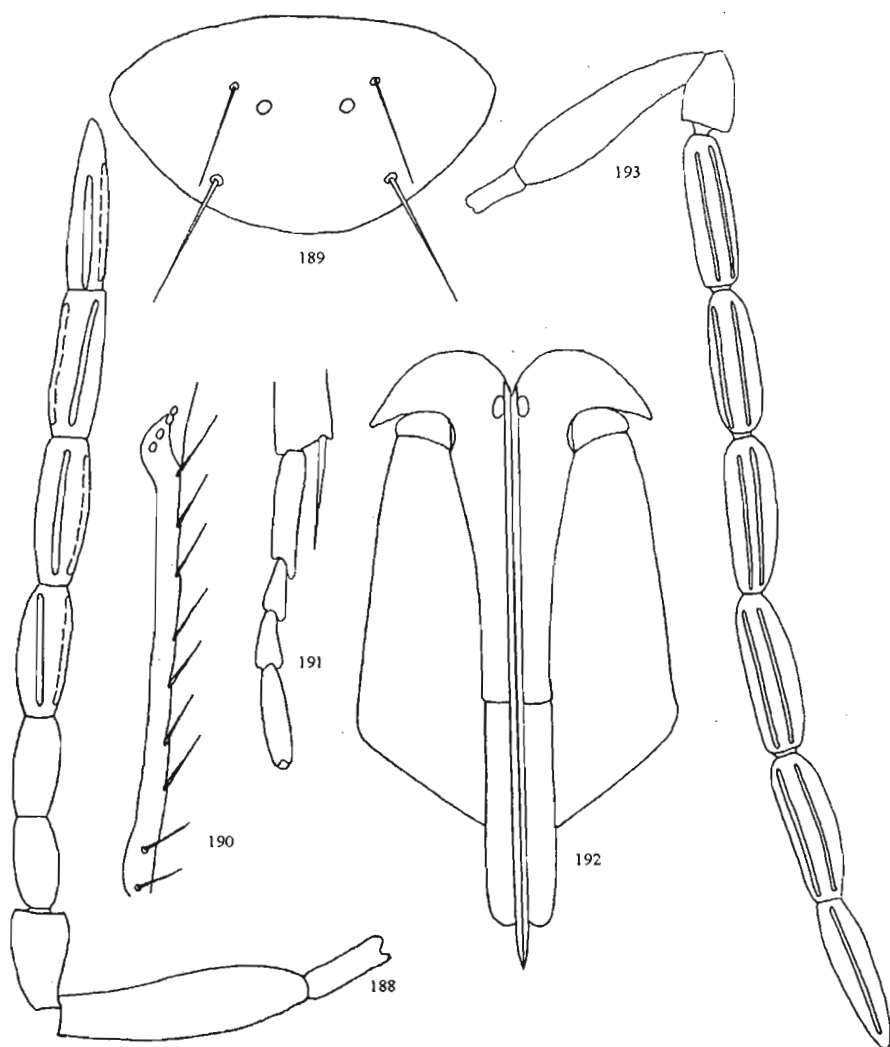
Figs 174-177. *Encarsia hamoni*: 174 – antenna, female, 175 – marginal and stigmal veins, 176 – middle tarsus and midtibial spur, 177 – ovipositor.



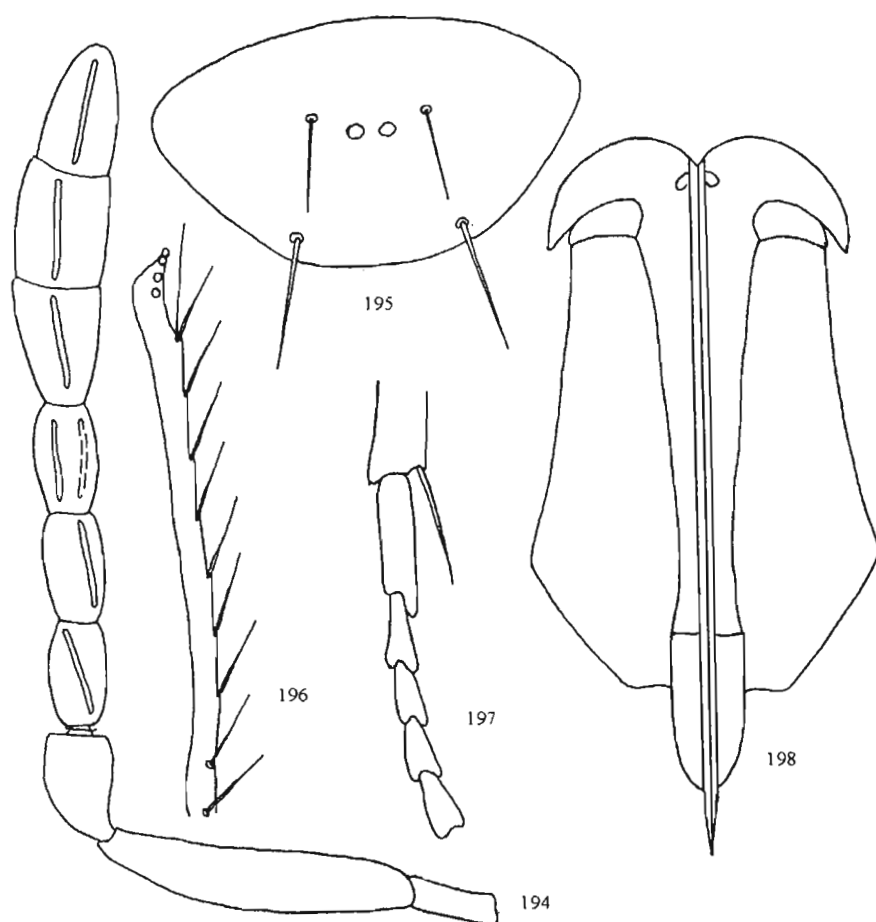
Figs 178-182. *Encarsia juanae*: 178- antenna, female, 179 - scutellum, 180 - marginal and stigmal veins, 181 - middle tarsus and midtibial spur, 182 - ovipositor.



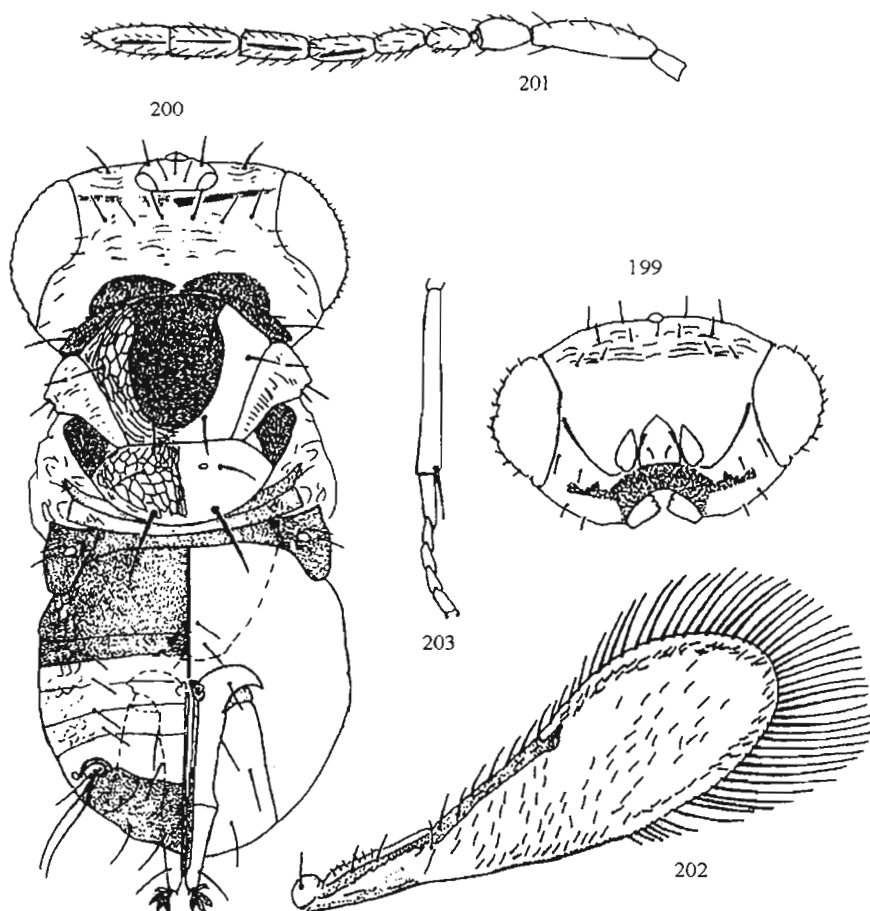
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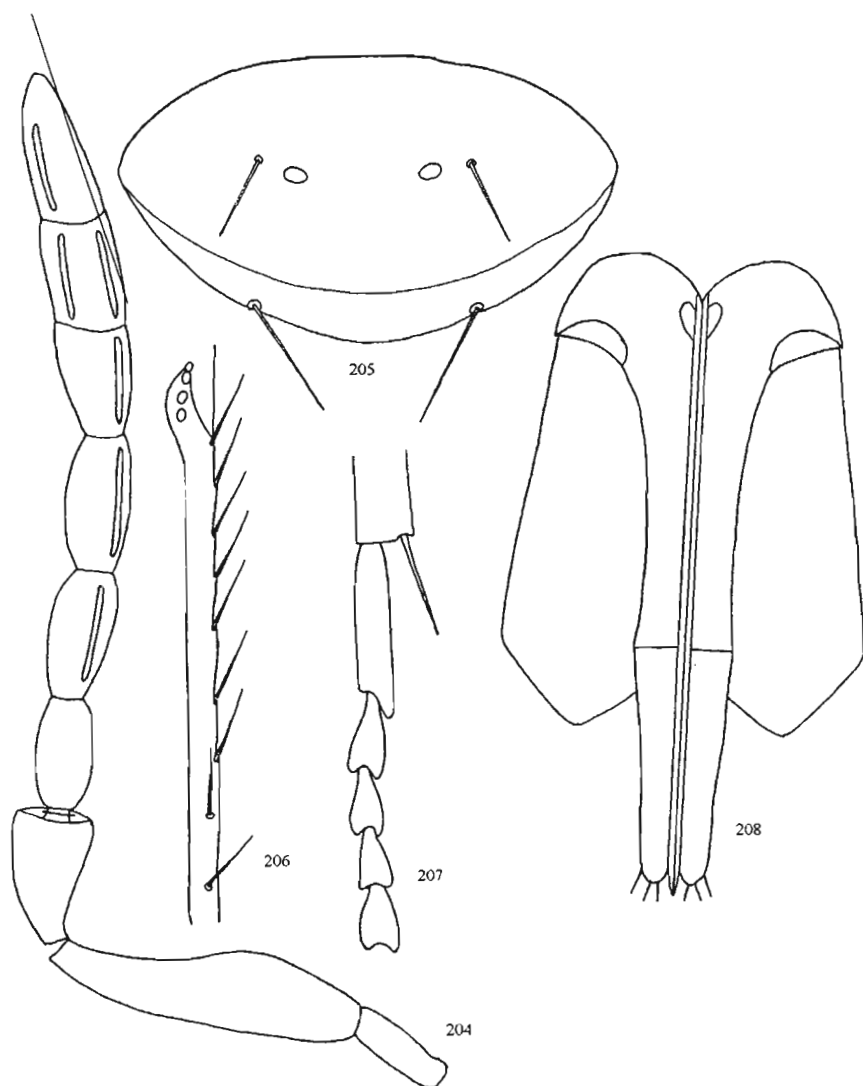
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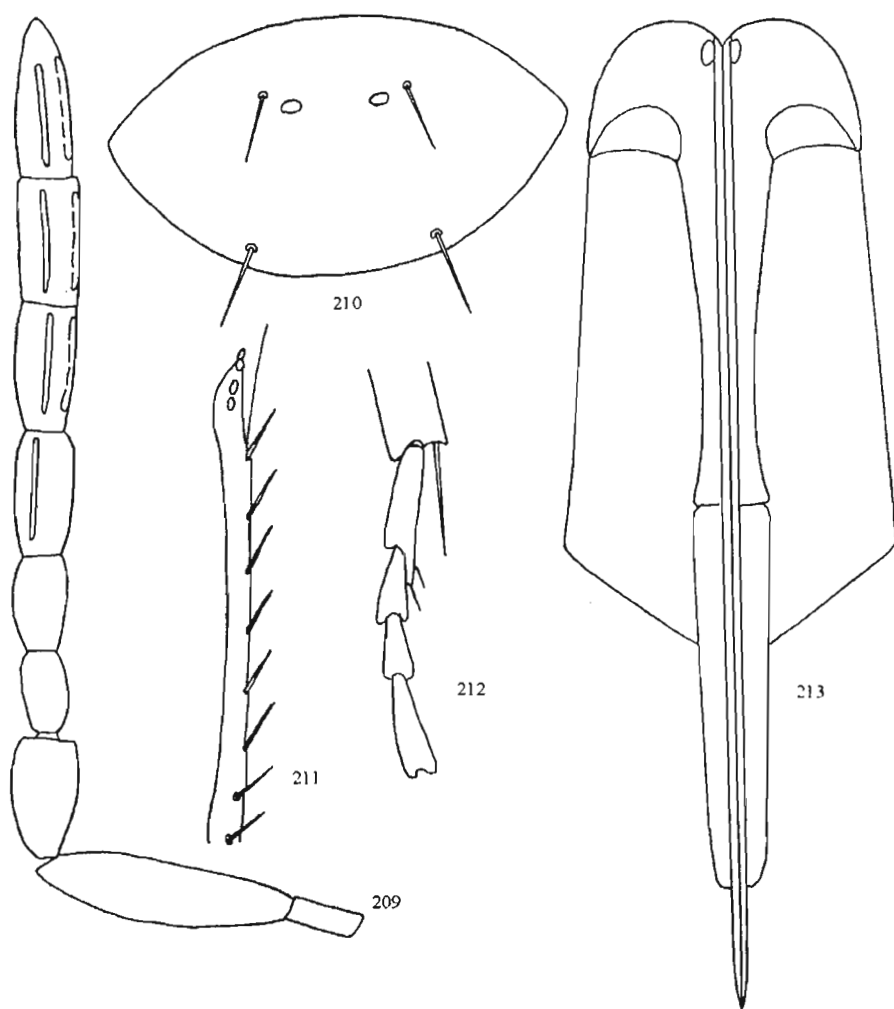
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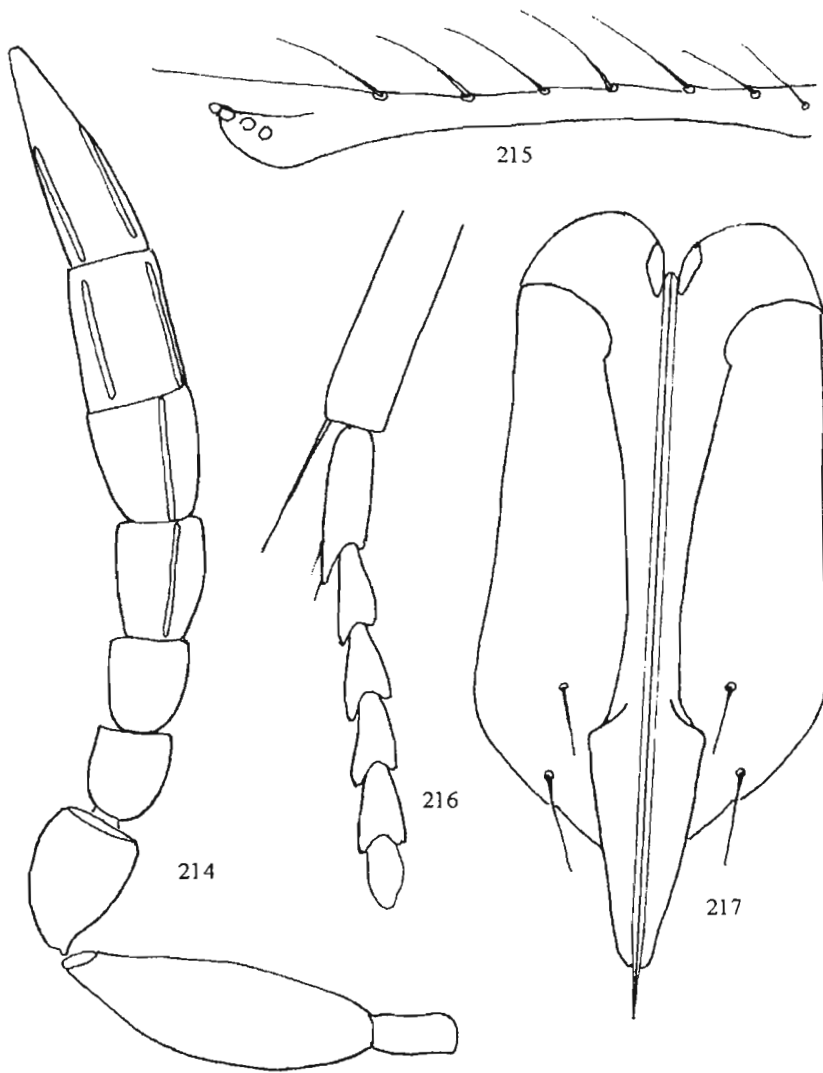
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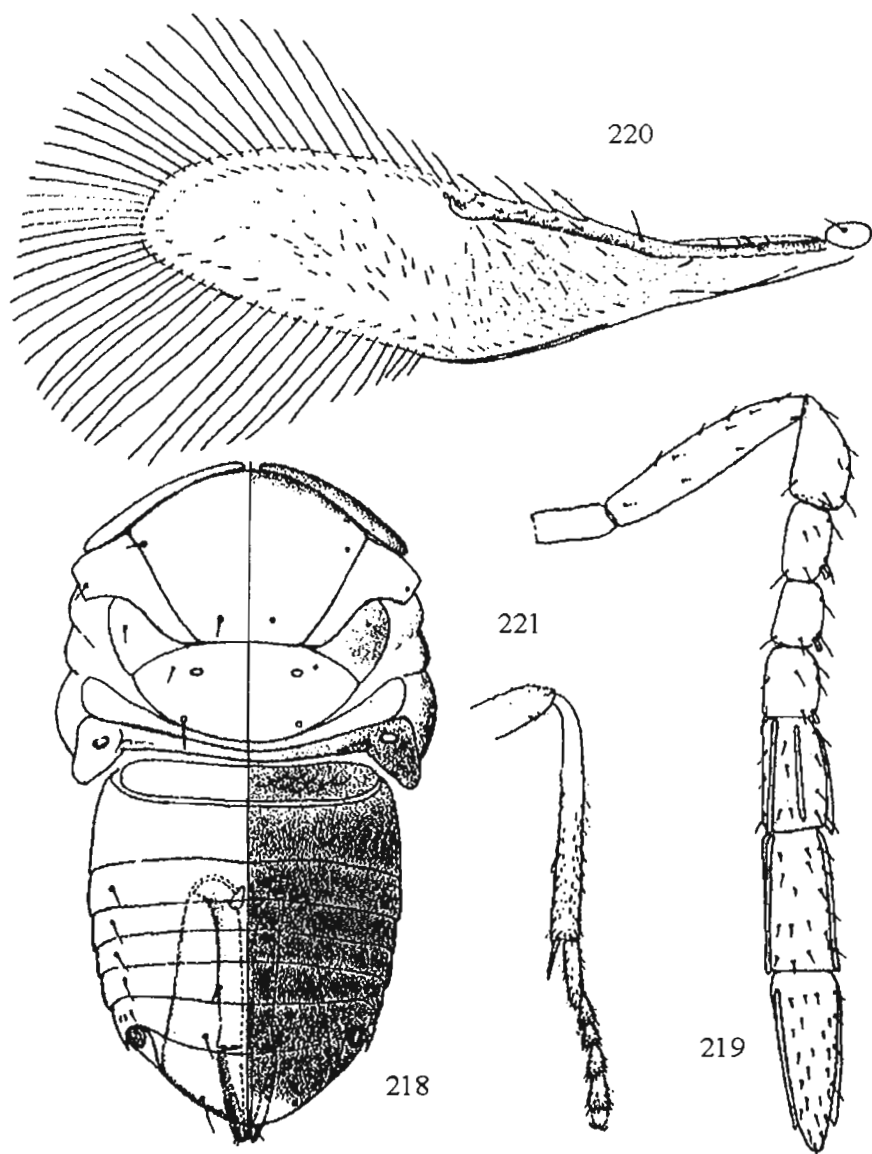
Figs 204-208. *Encarsia leucaenae*: 204 – antenna, female, 205 – scutellum, 206 – marginal and stigmal veins, 207 - middle tarsus and midtibial spur, 208 – ovipositor.



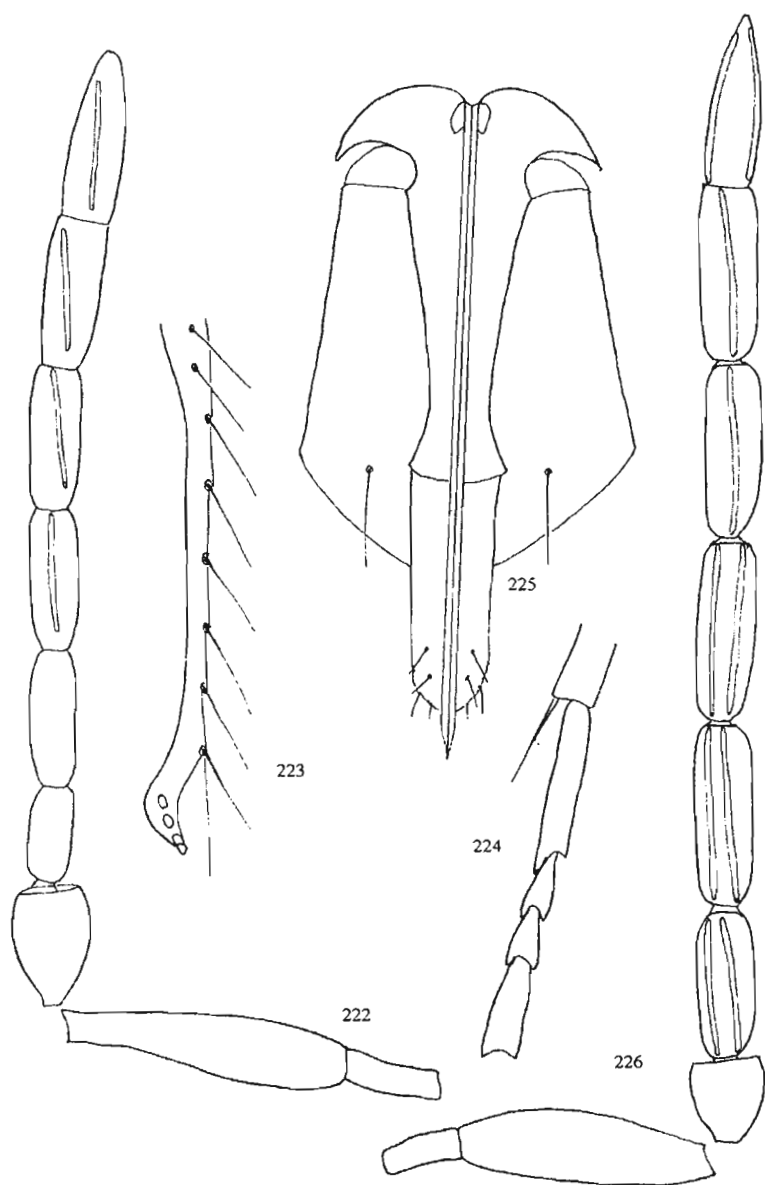
Figs 209-213. *Encarsia llera*: 209– antenna, female, 210 – scutellum, 211 - marginal and stigmal veins, 212 - middle tarsus and midtibial spur, 213 – ovipositor.



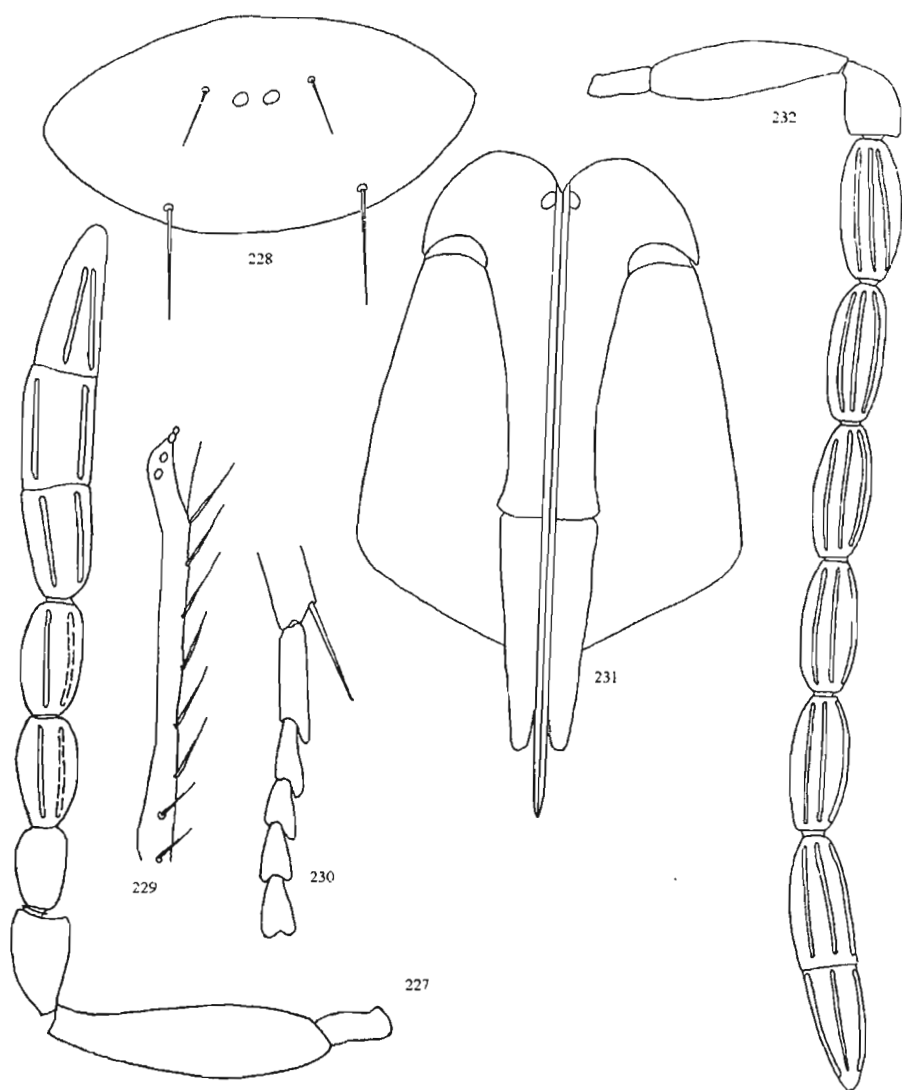
Figs 214-217. *Encarsia llerica*: 214 – antenna, female, 215 – marginal and stigmal veins, 216 – middle tarsus and midtibial spur, 217 – ovipositor.



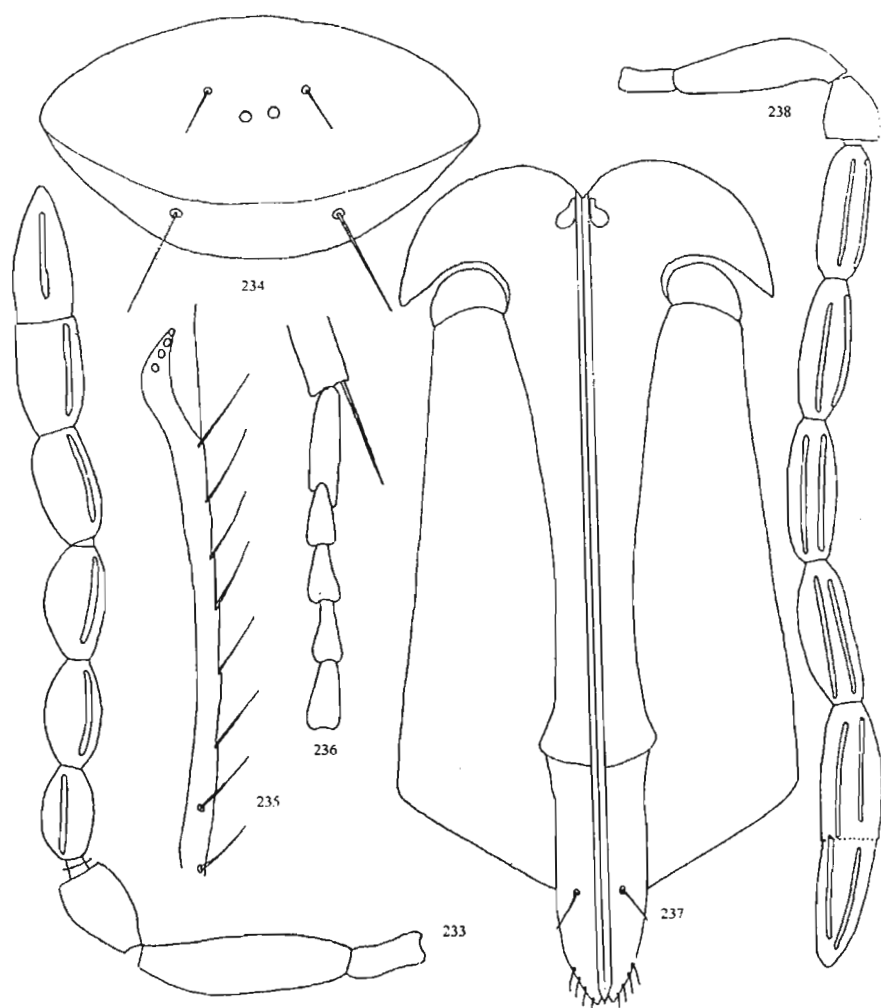
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218 – habitus, female, 219 – antenna, 220 – fore wing, 221 – middle
tibia, tarsus and midtibial spur.



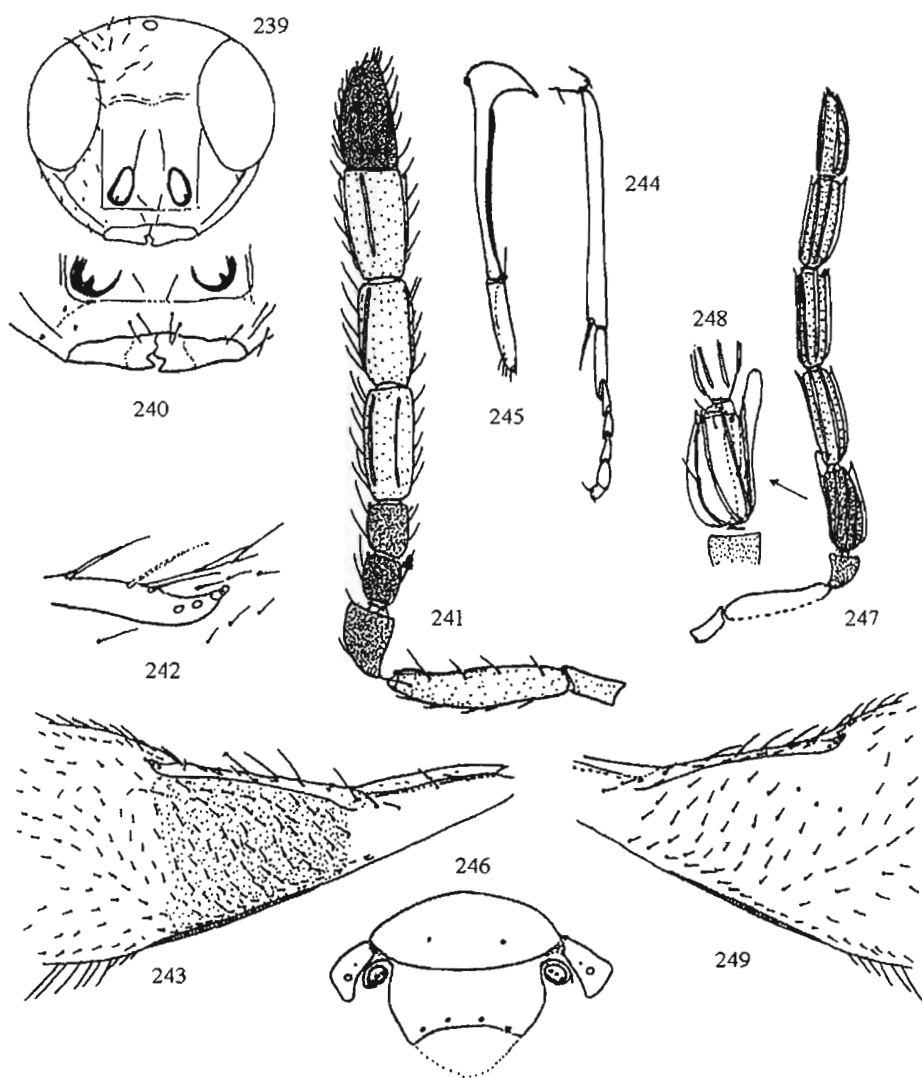
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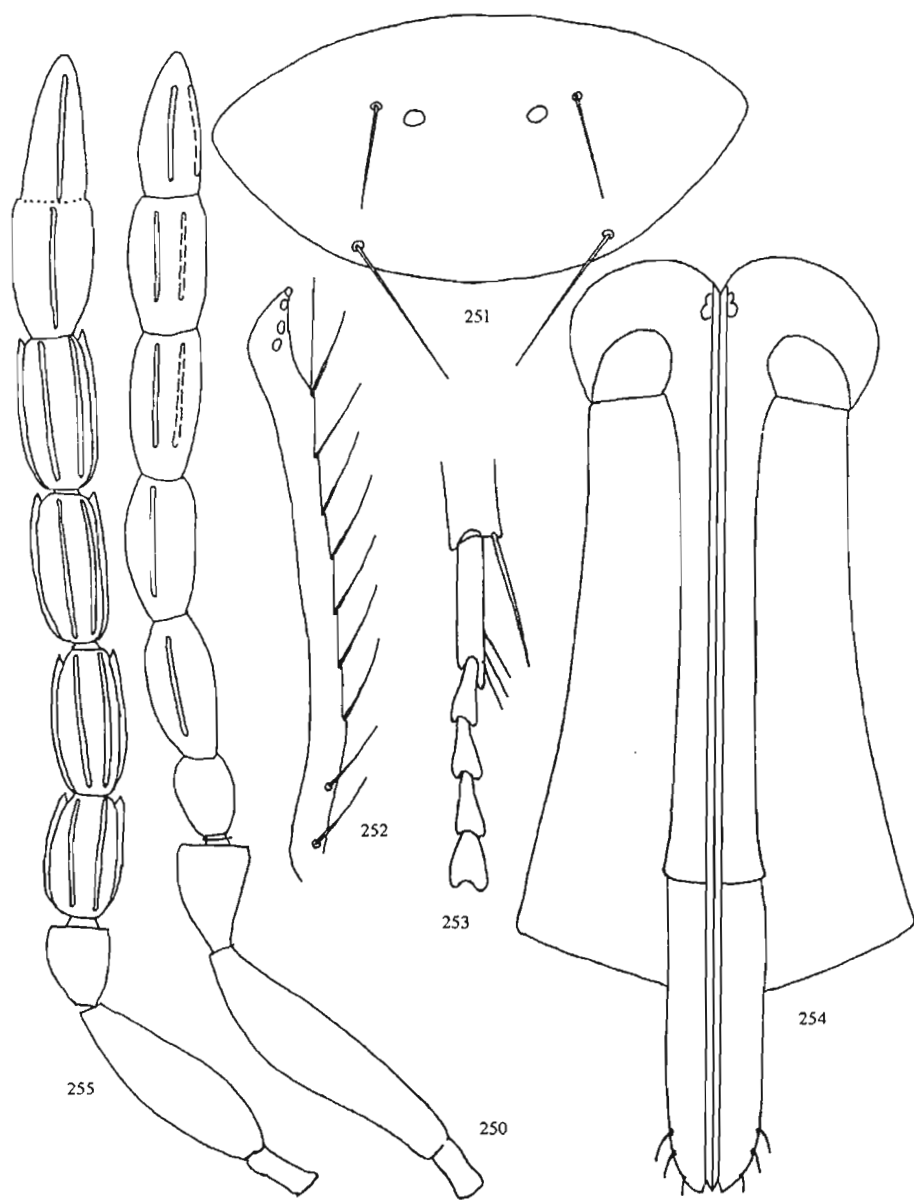
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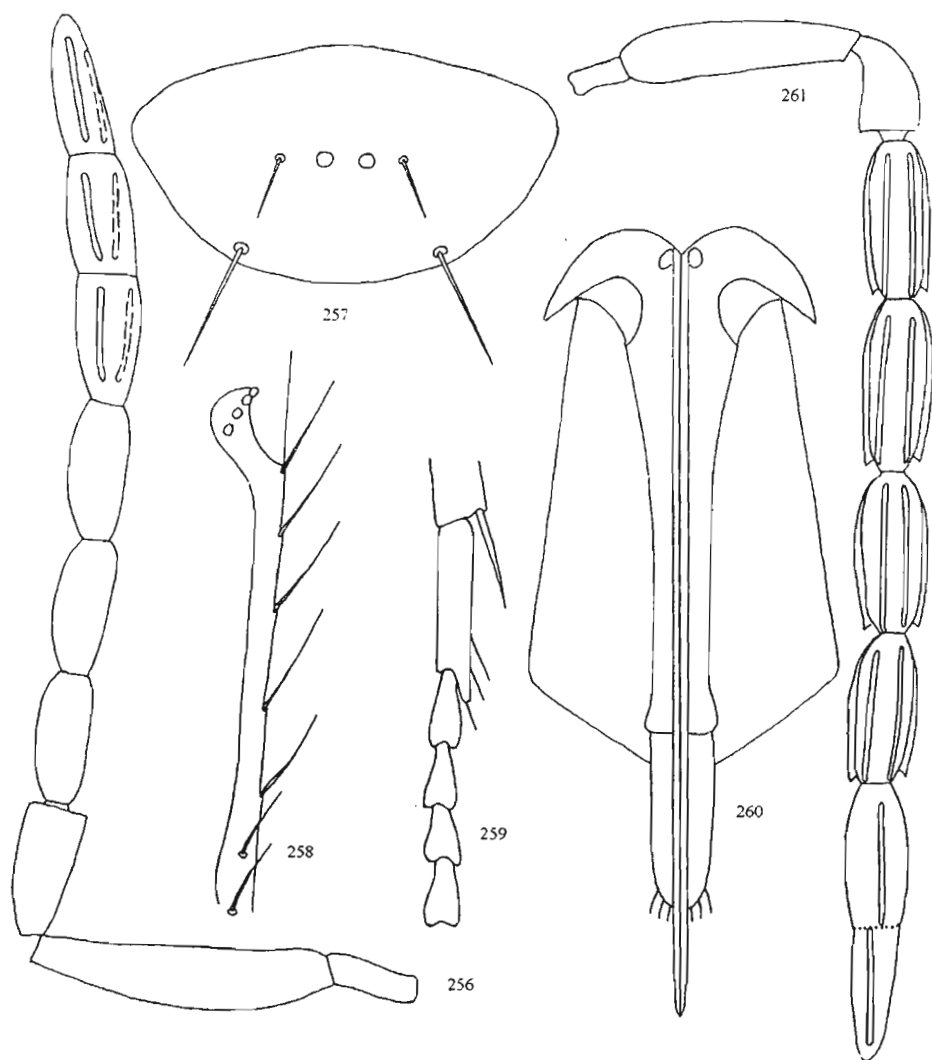
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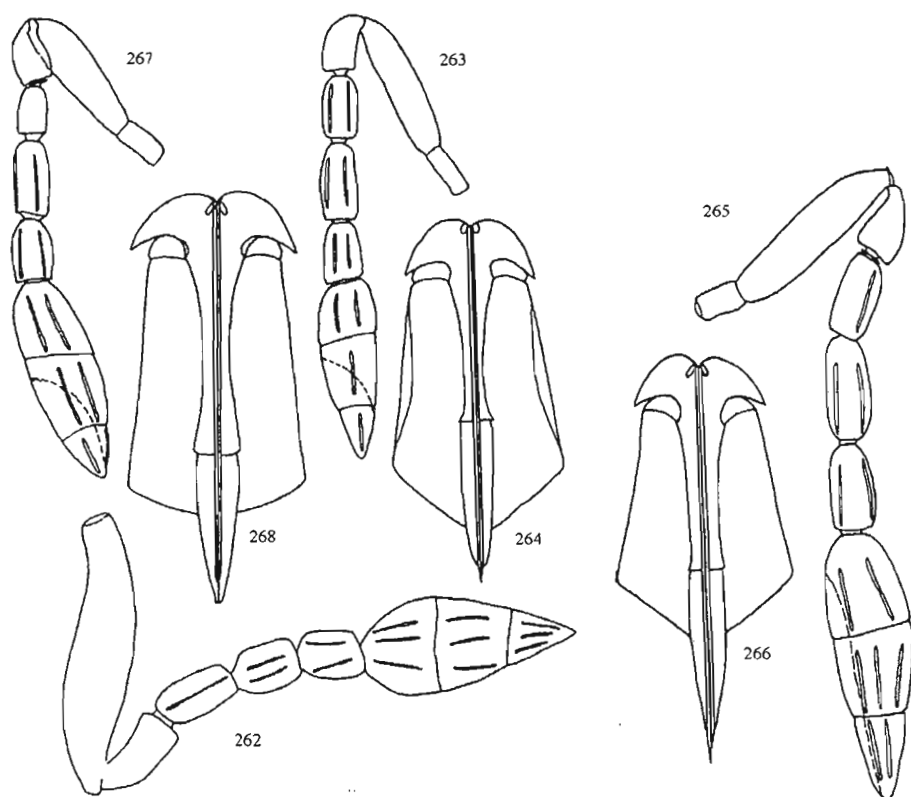
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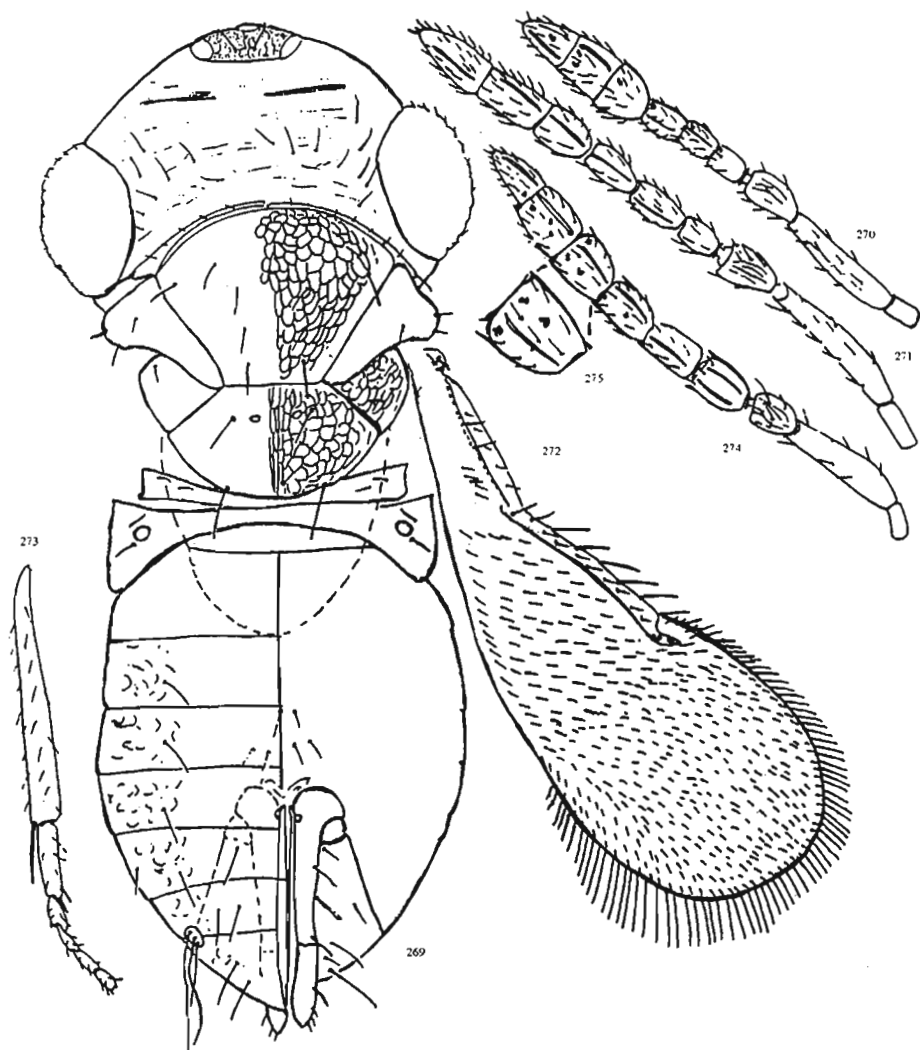
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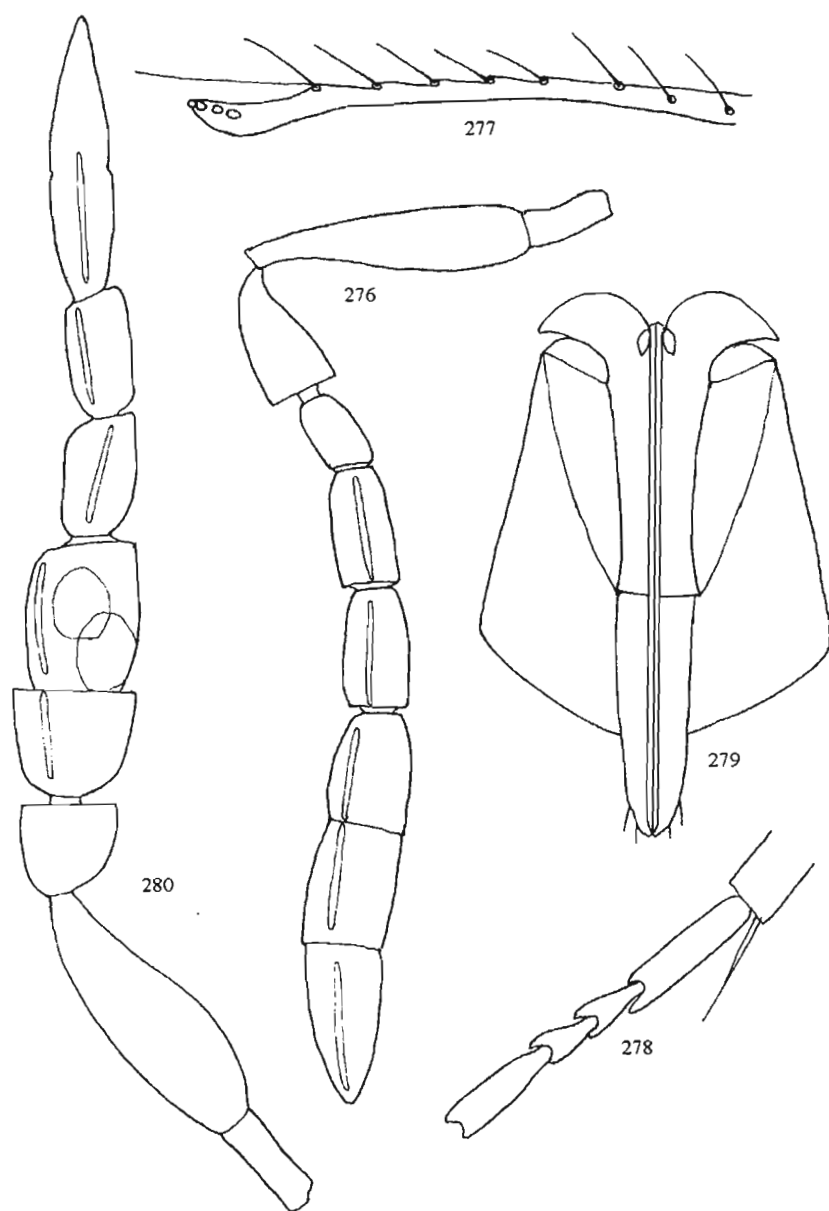
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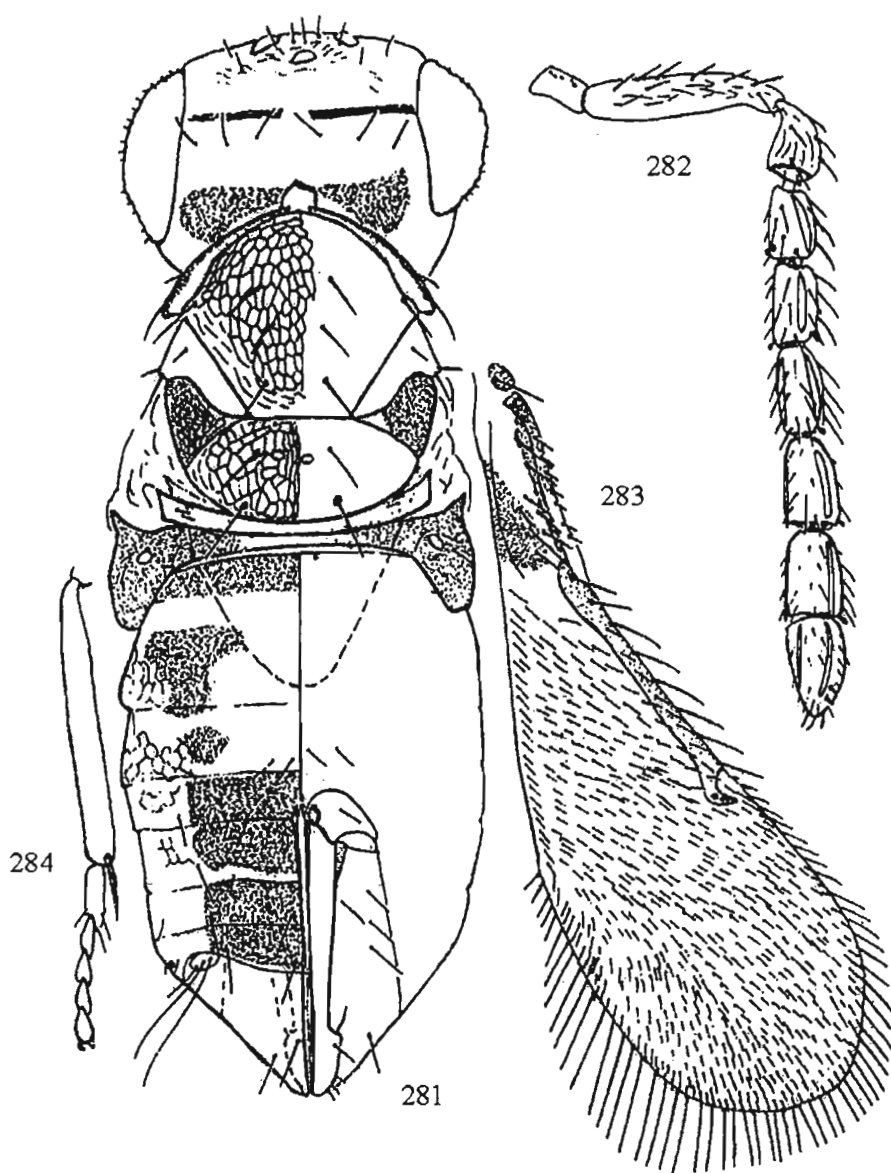
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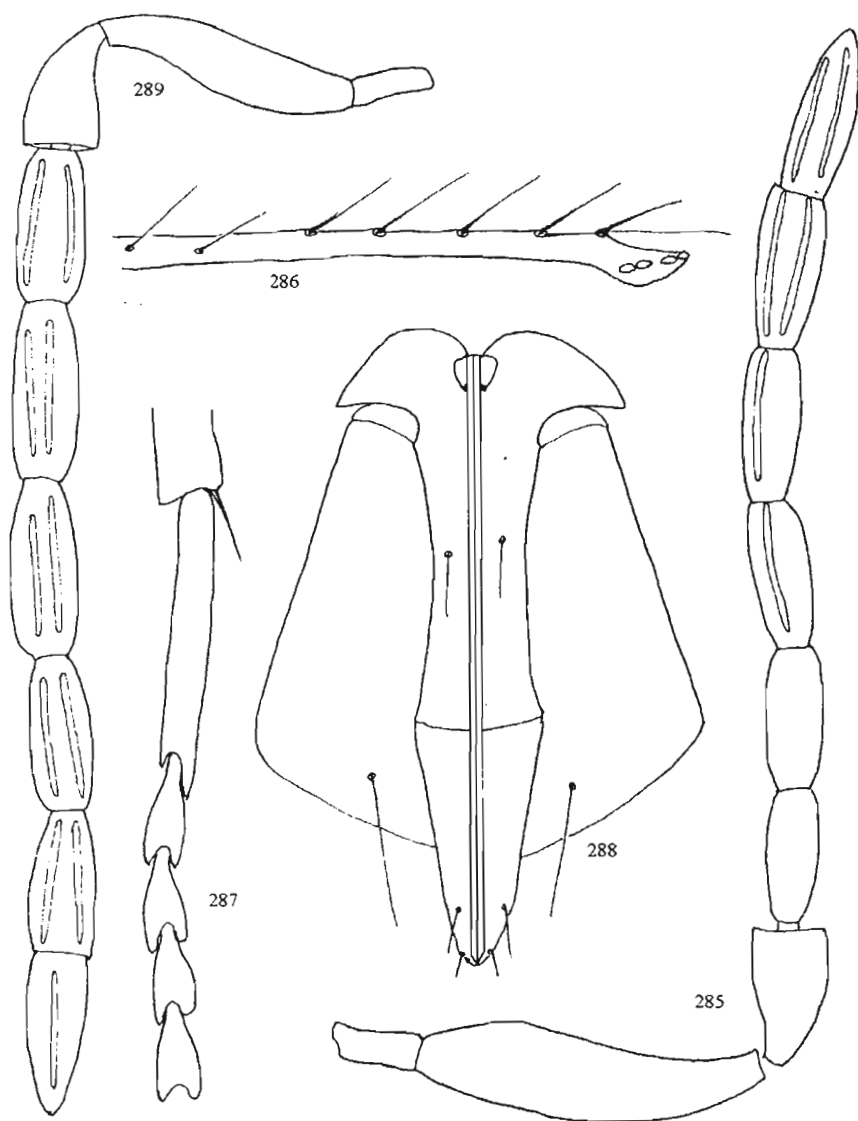
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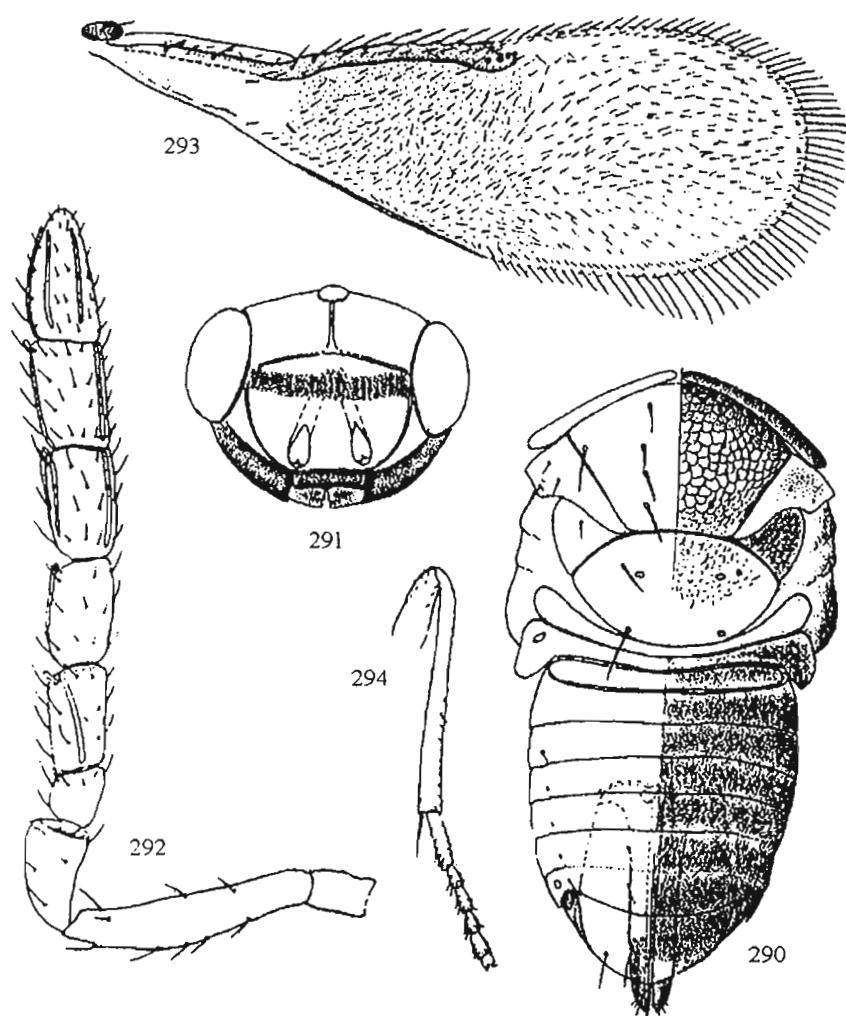
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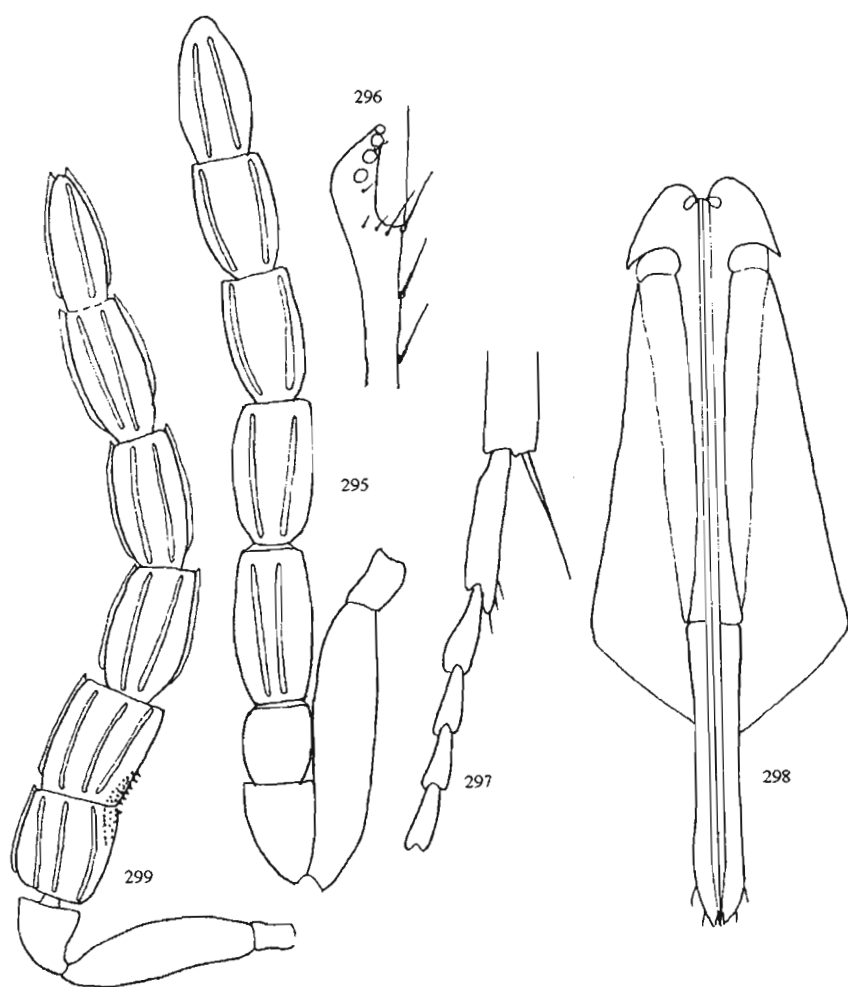
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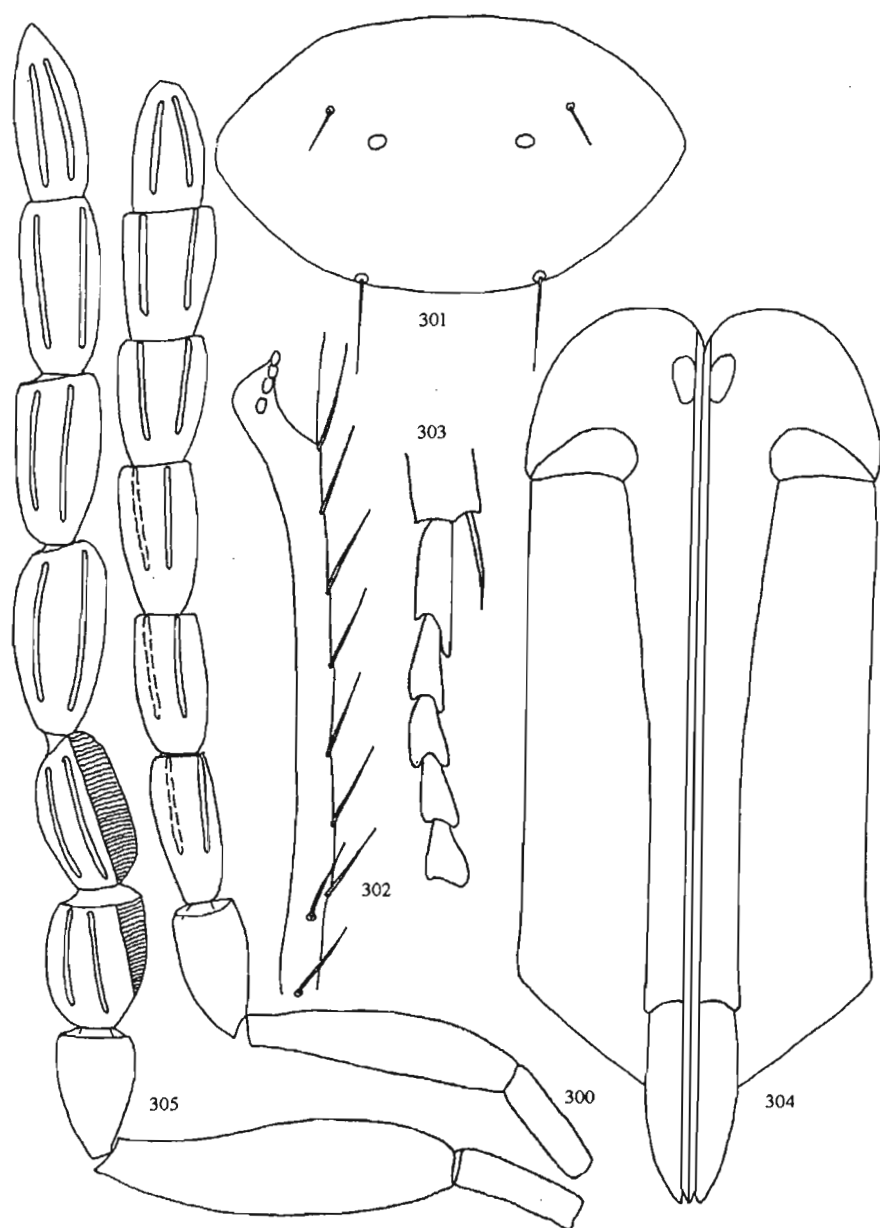
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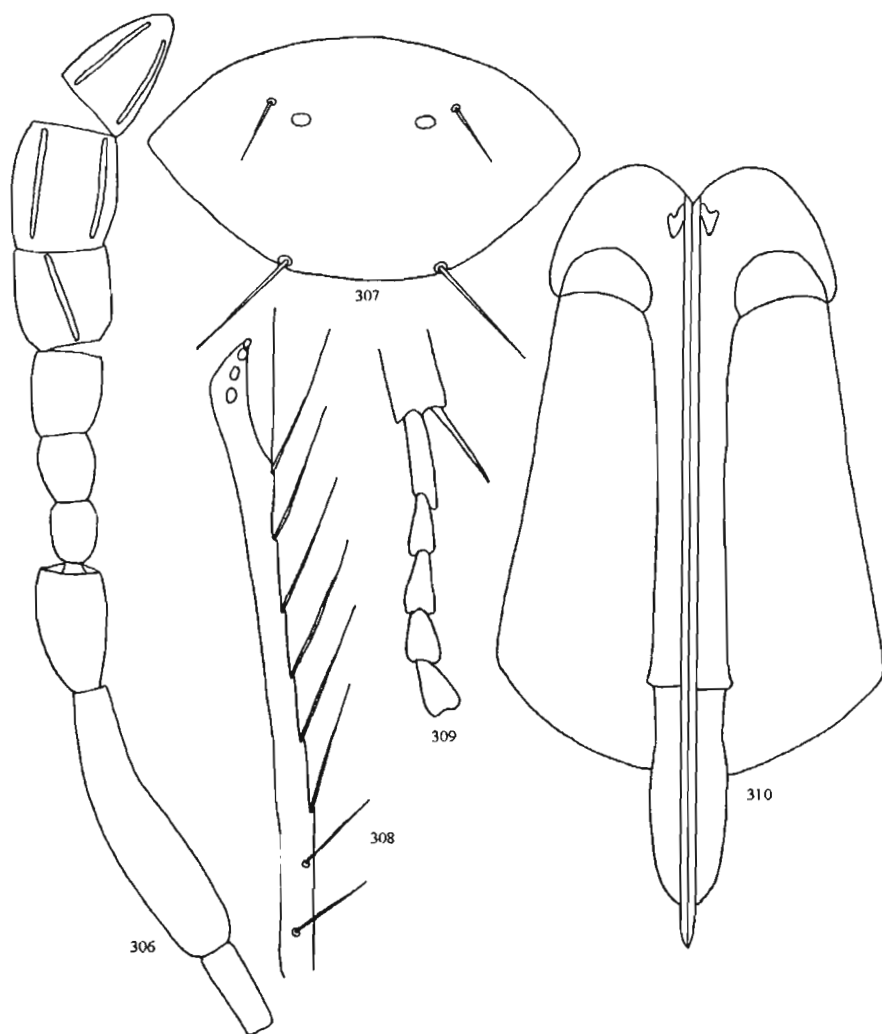
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290 - habitus, female, 291 - head, frontal view, 292 - antenna, 293 -
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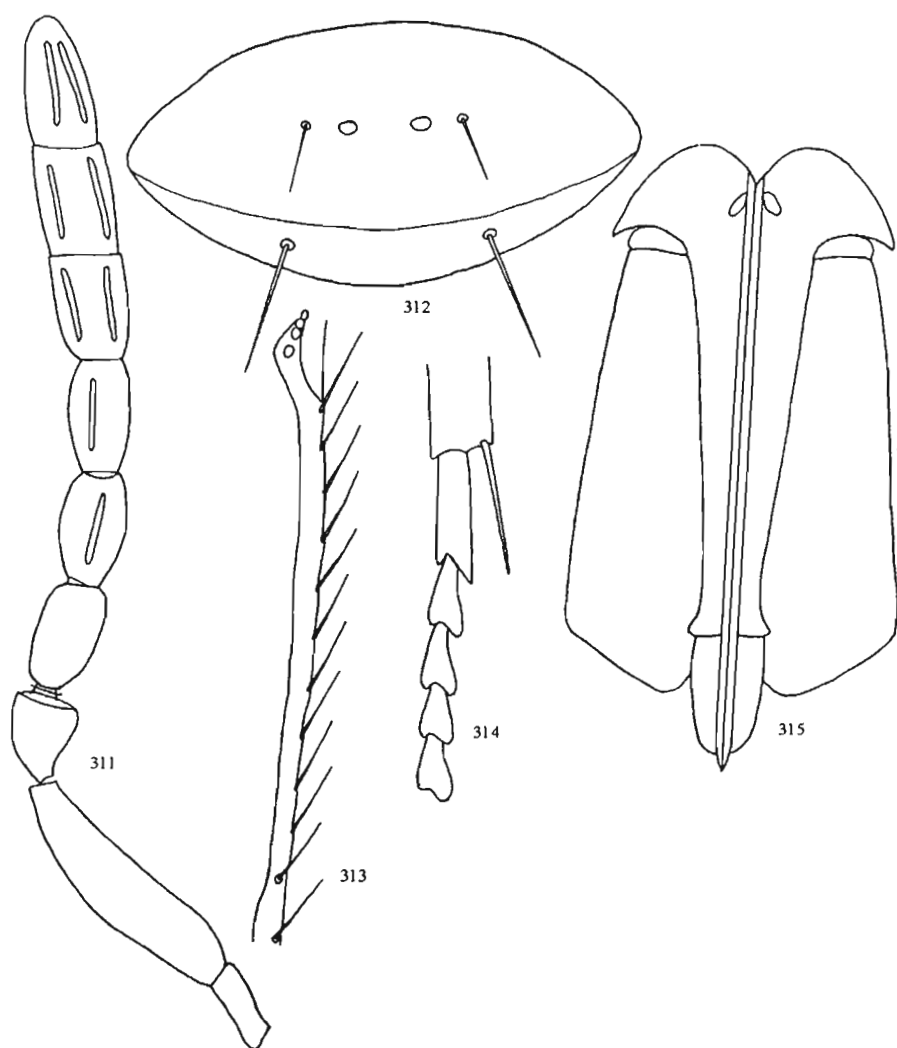
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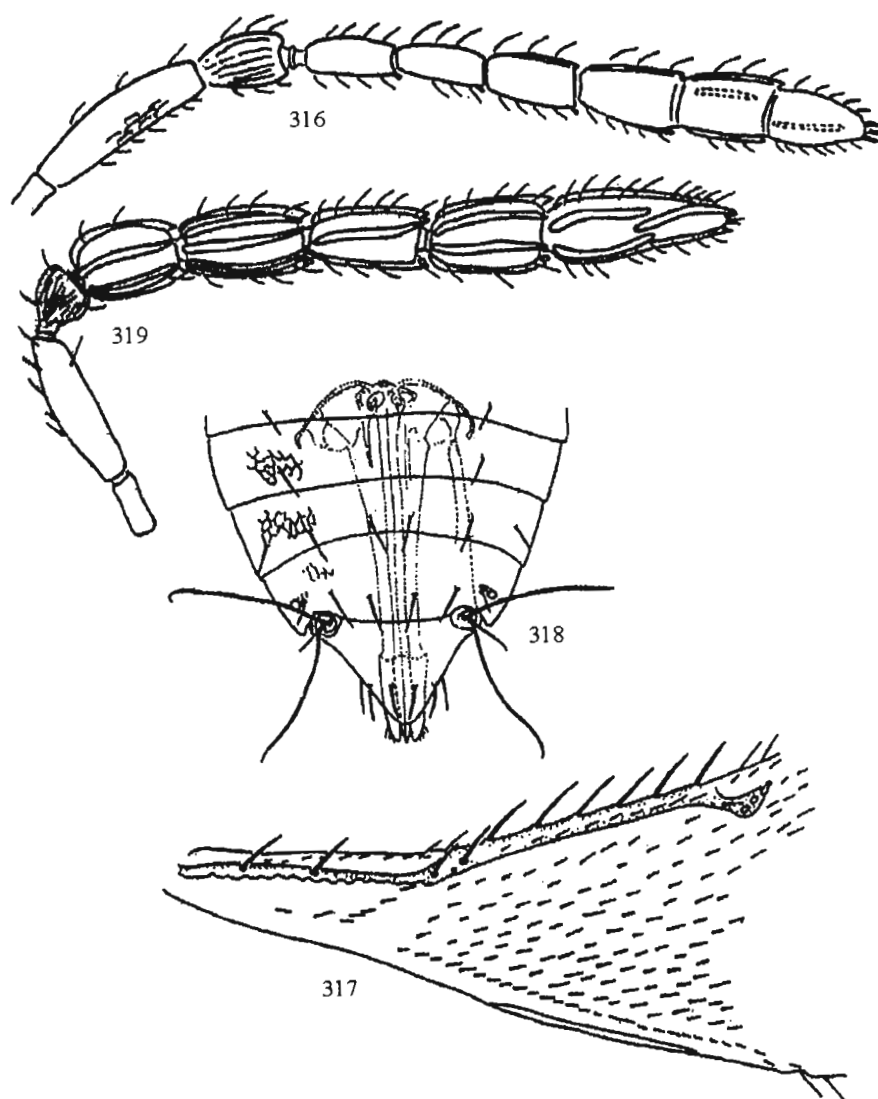
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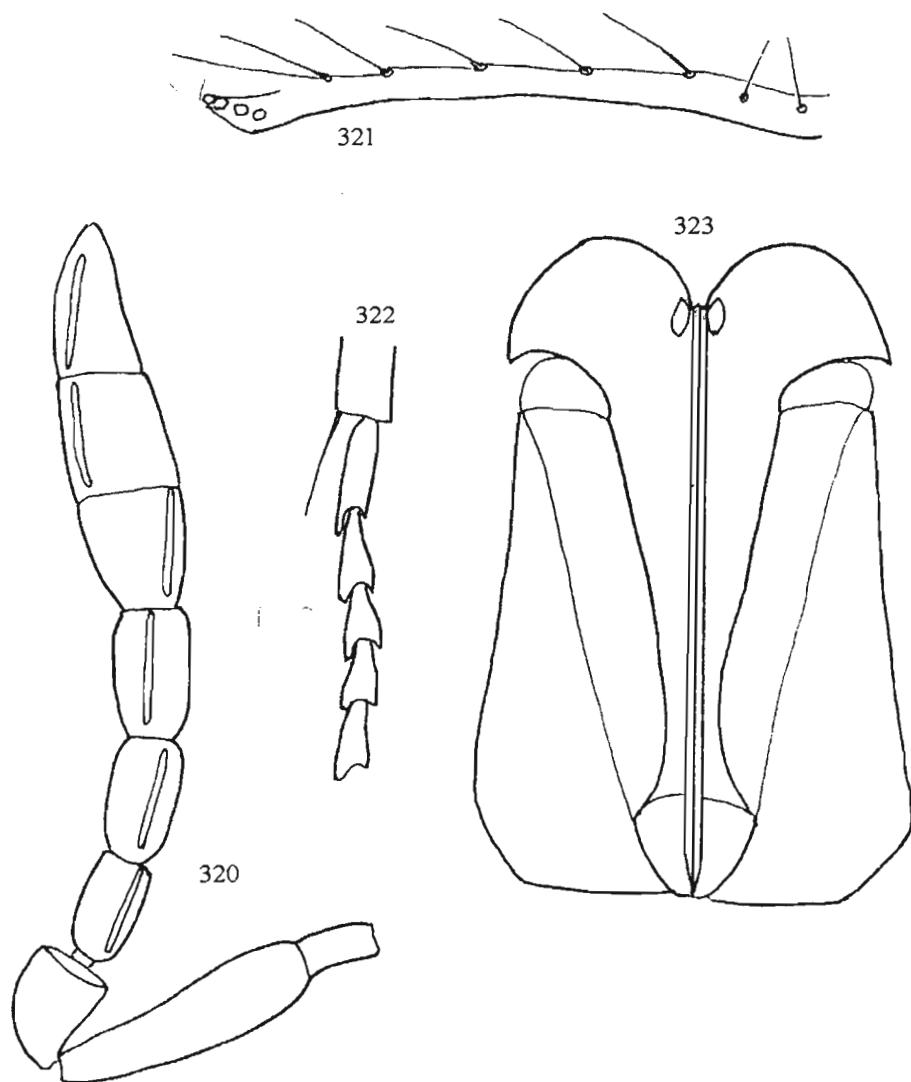
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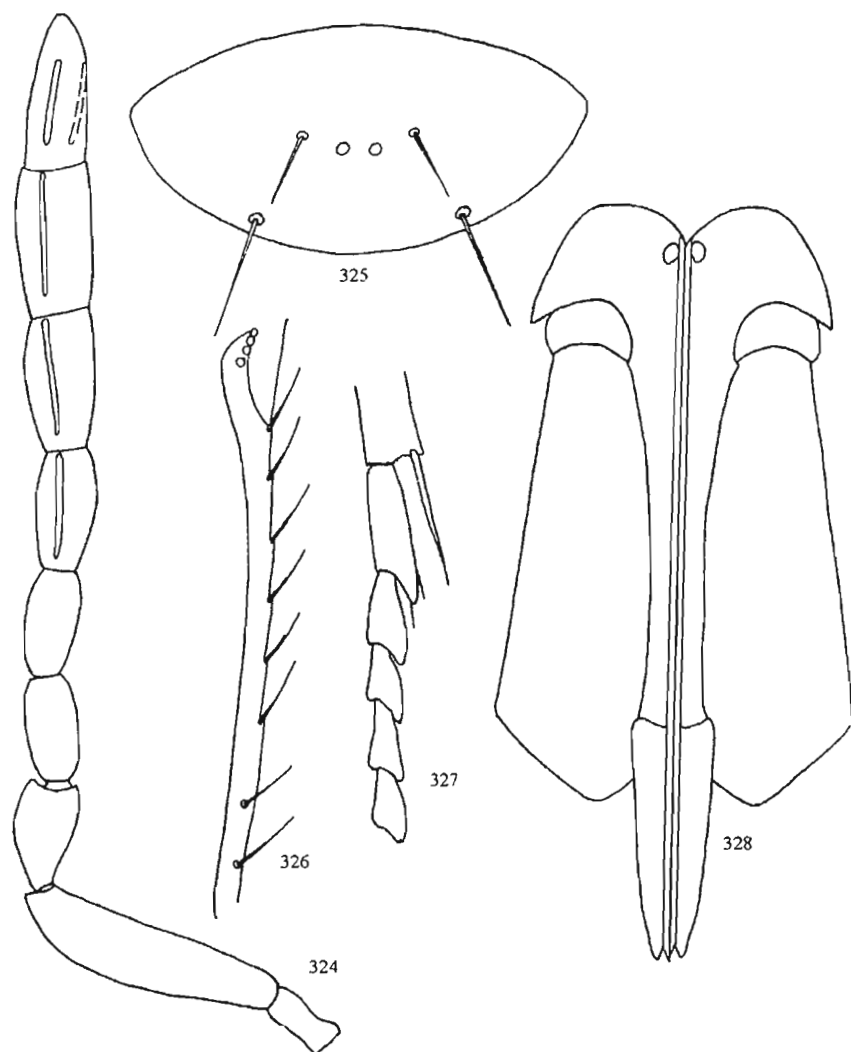
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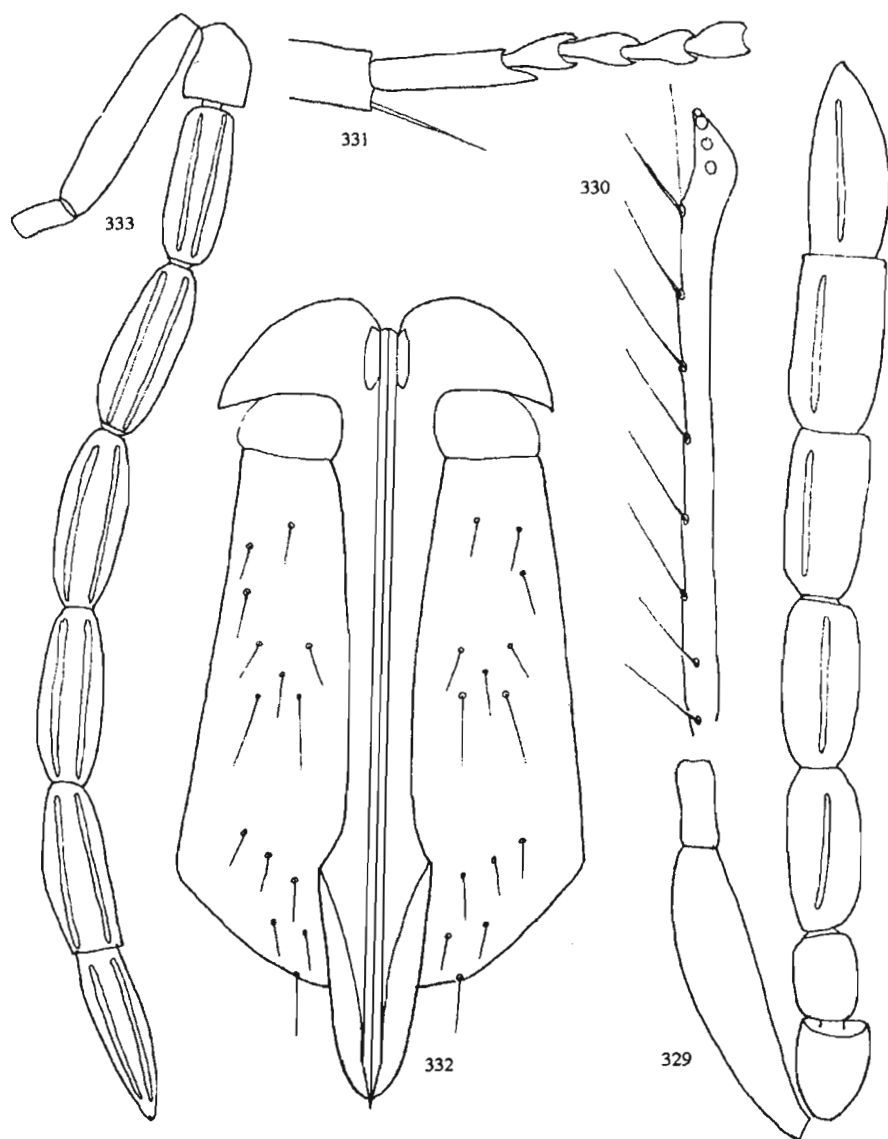
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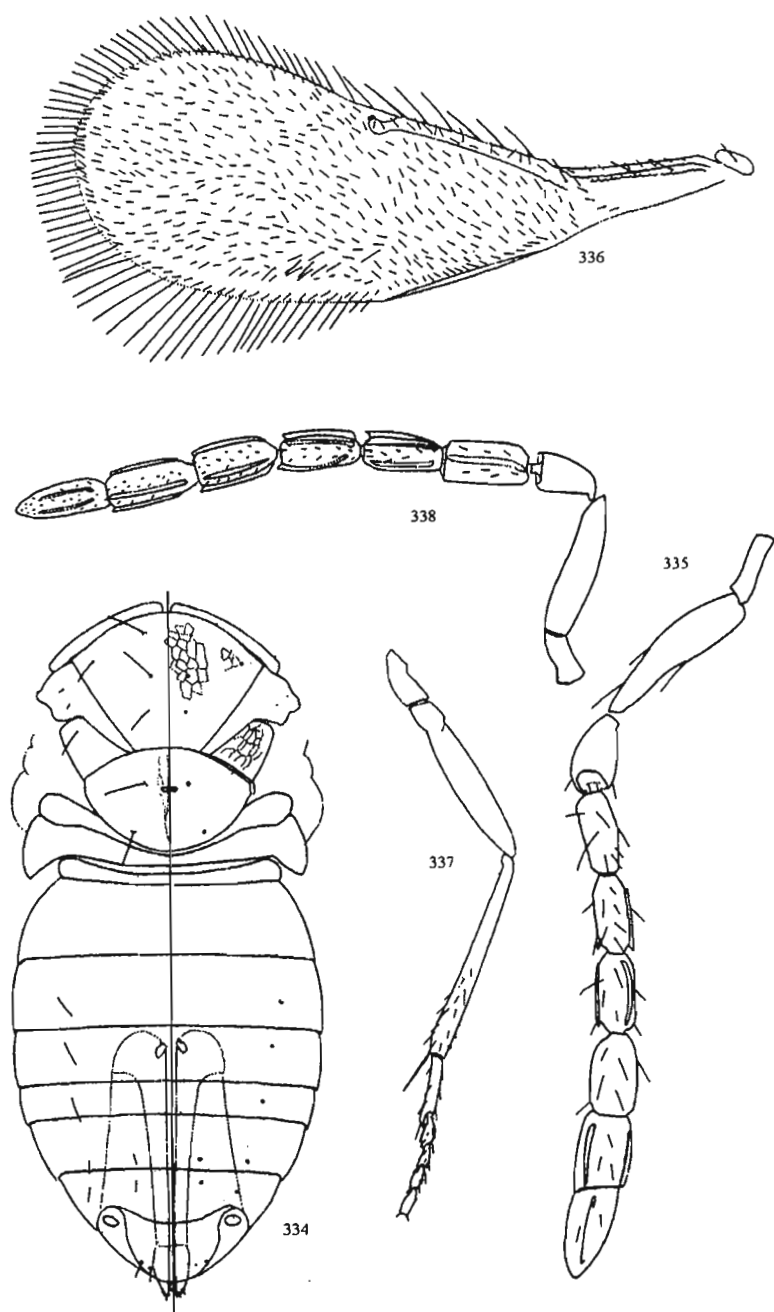
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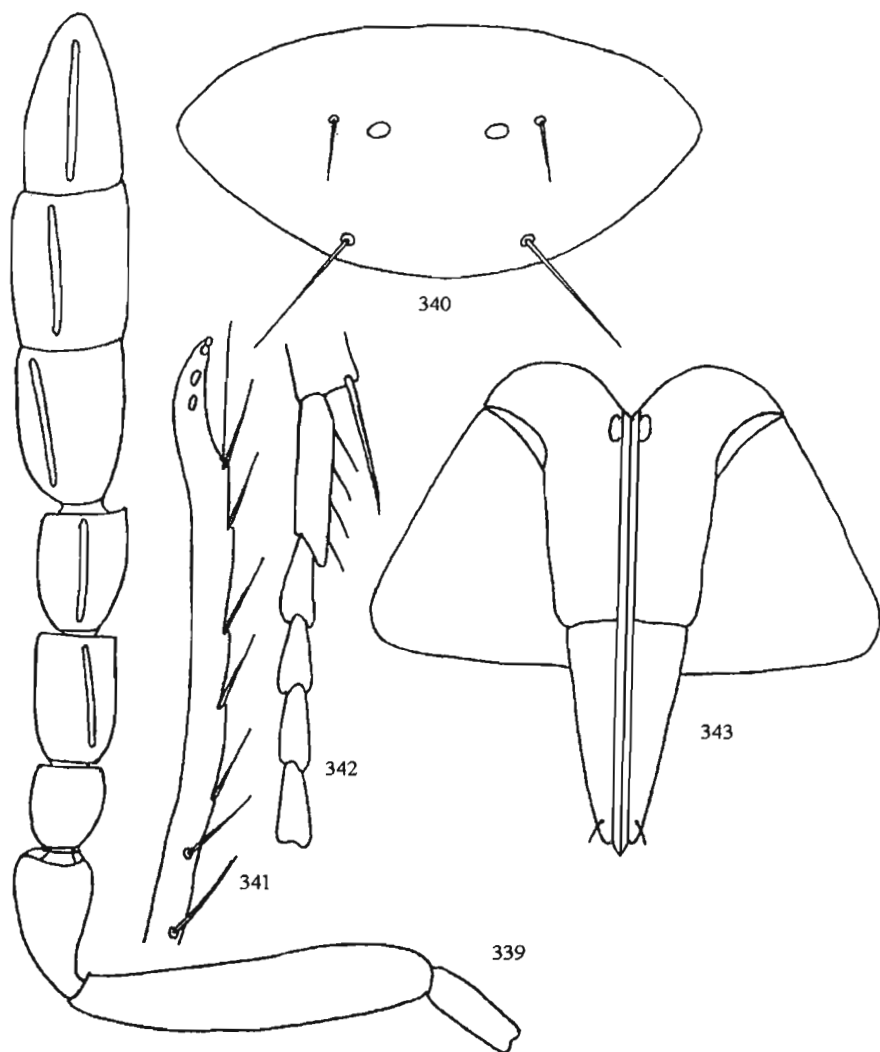
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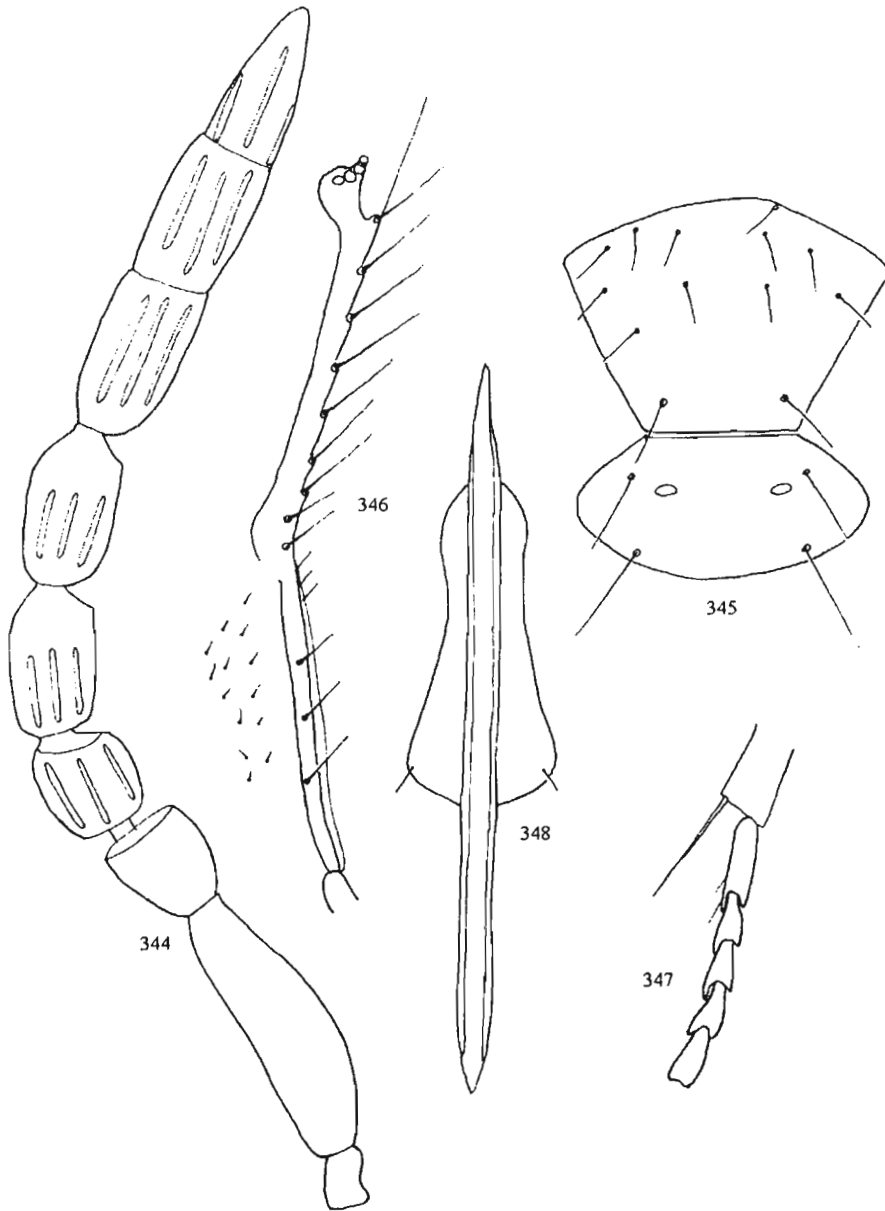
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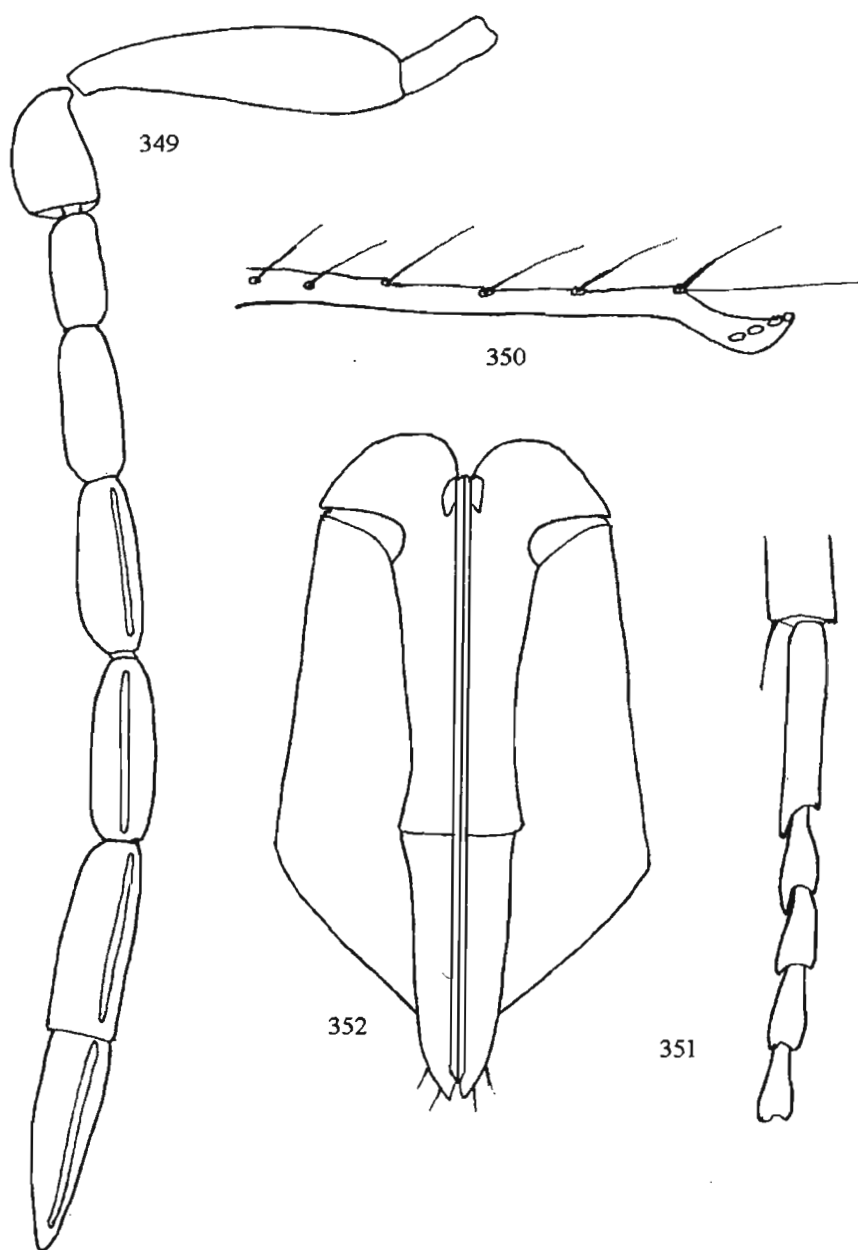
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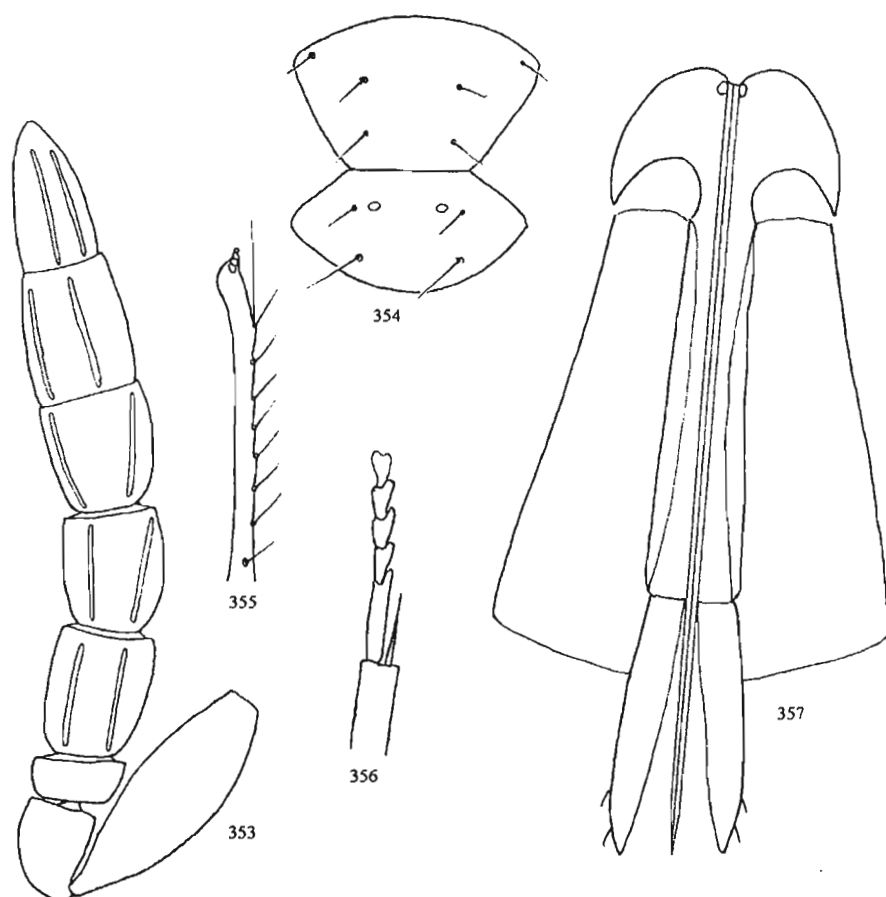
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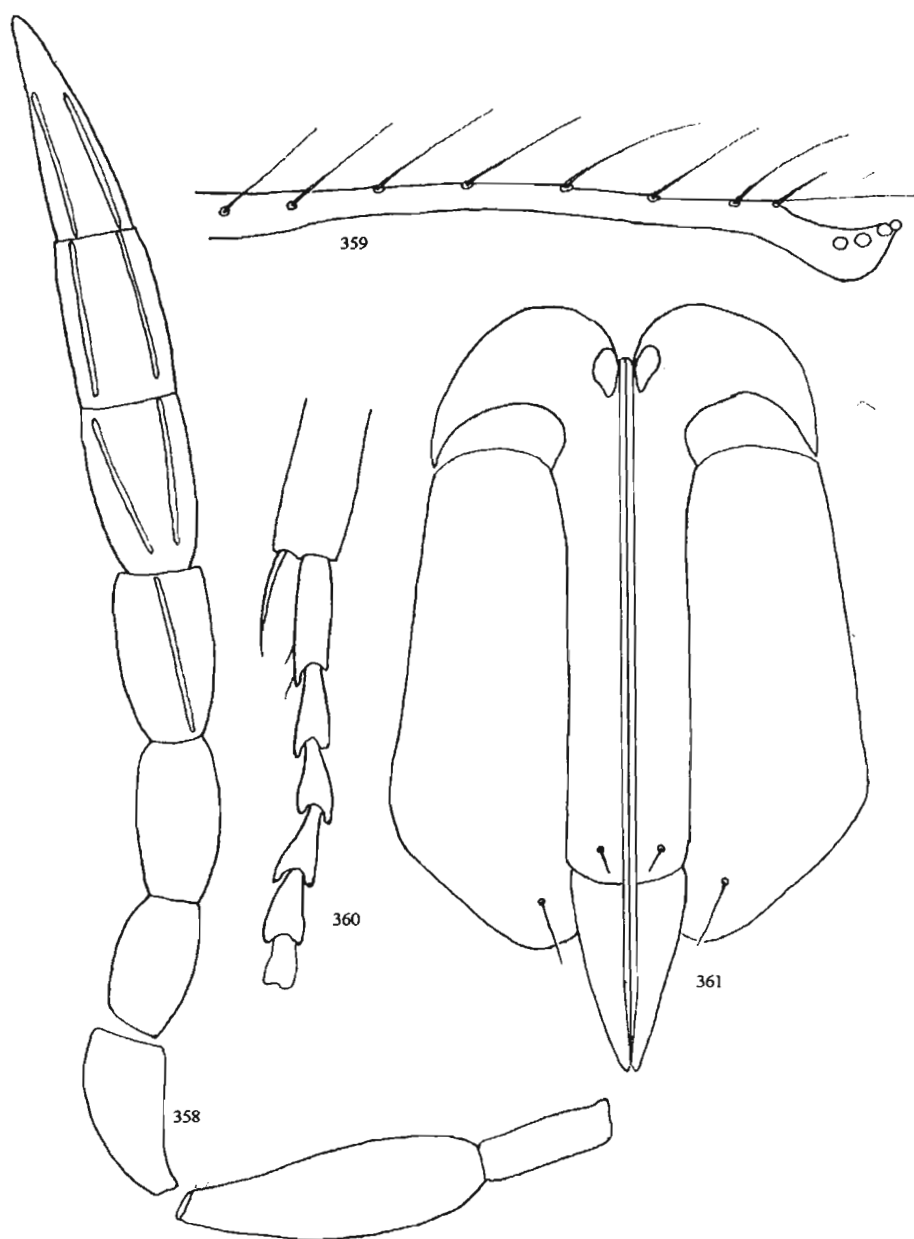
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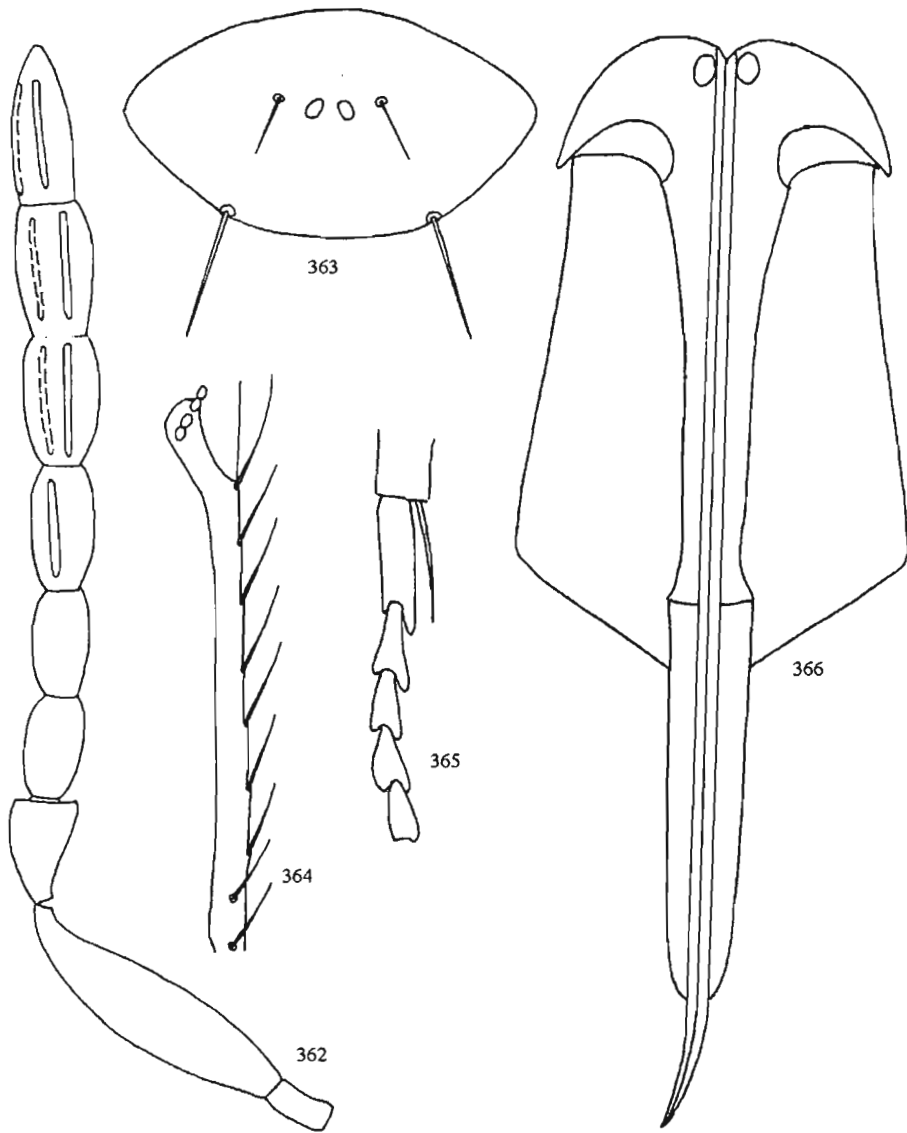
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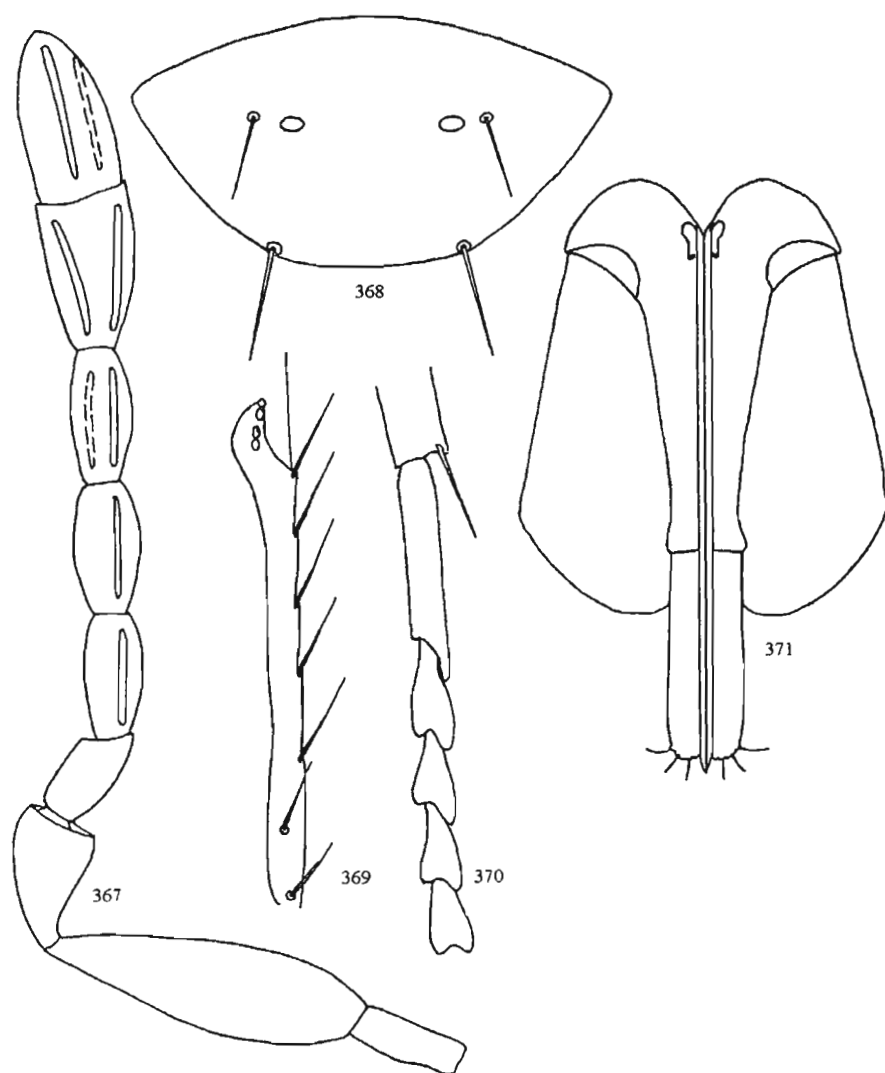
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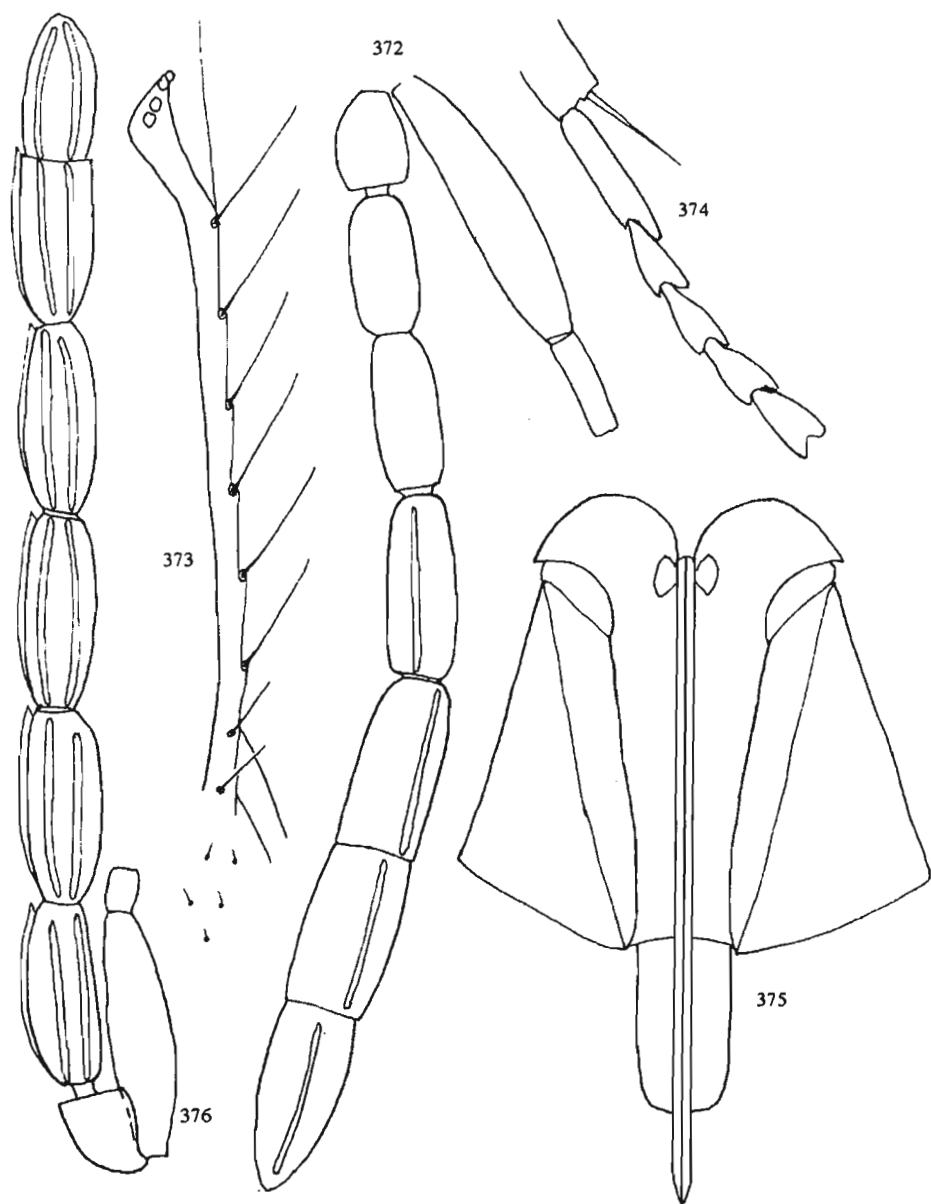
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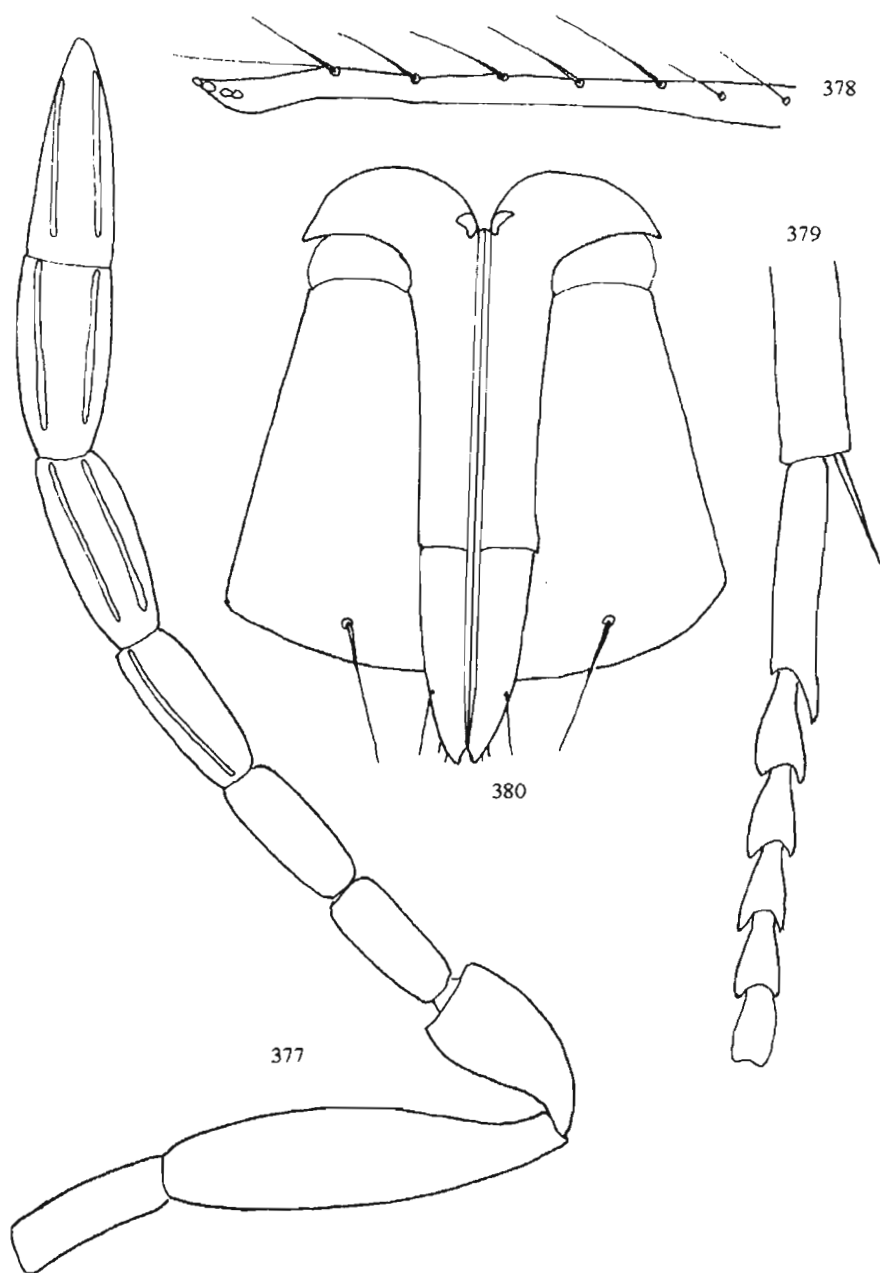
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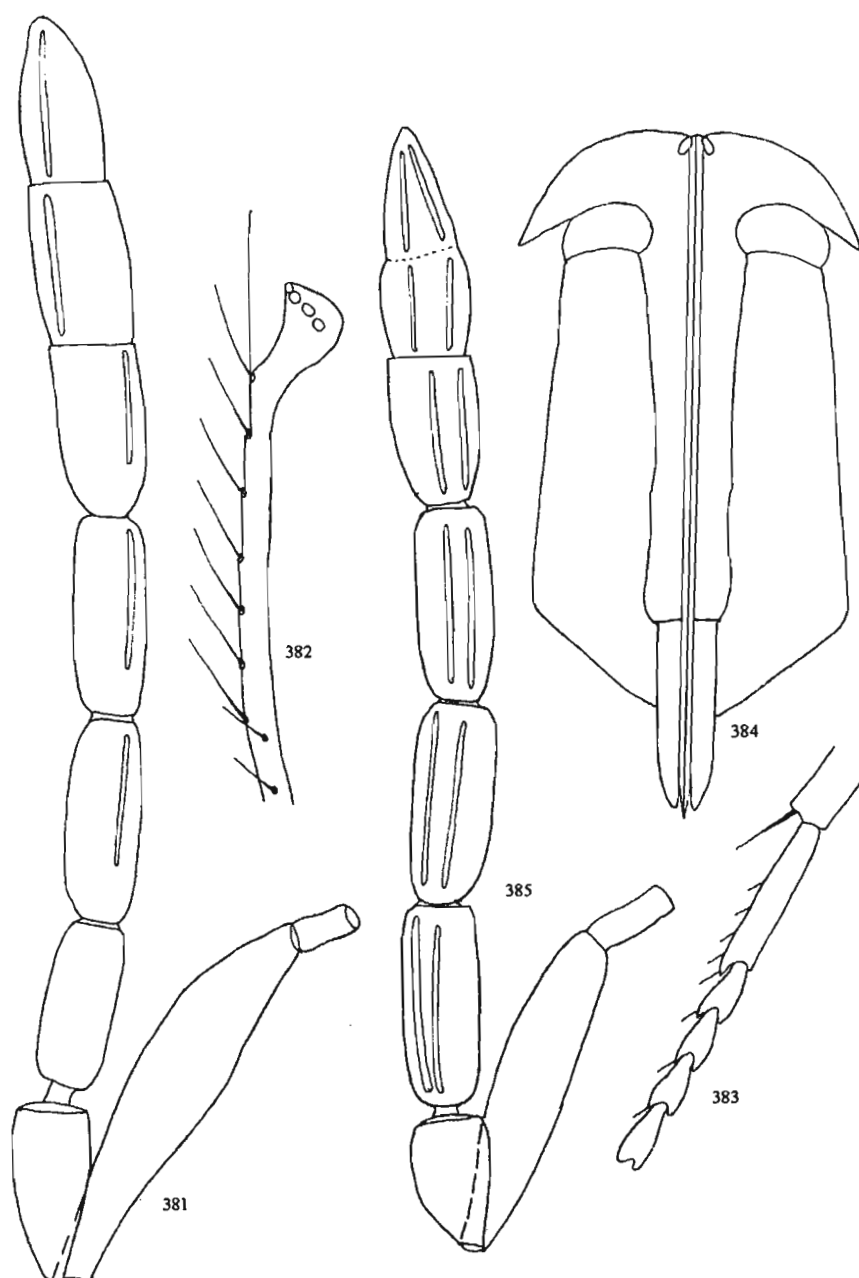
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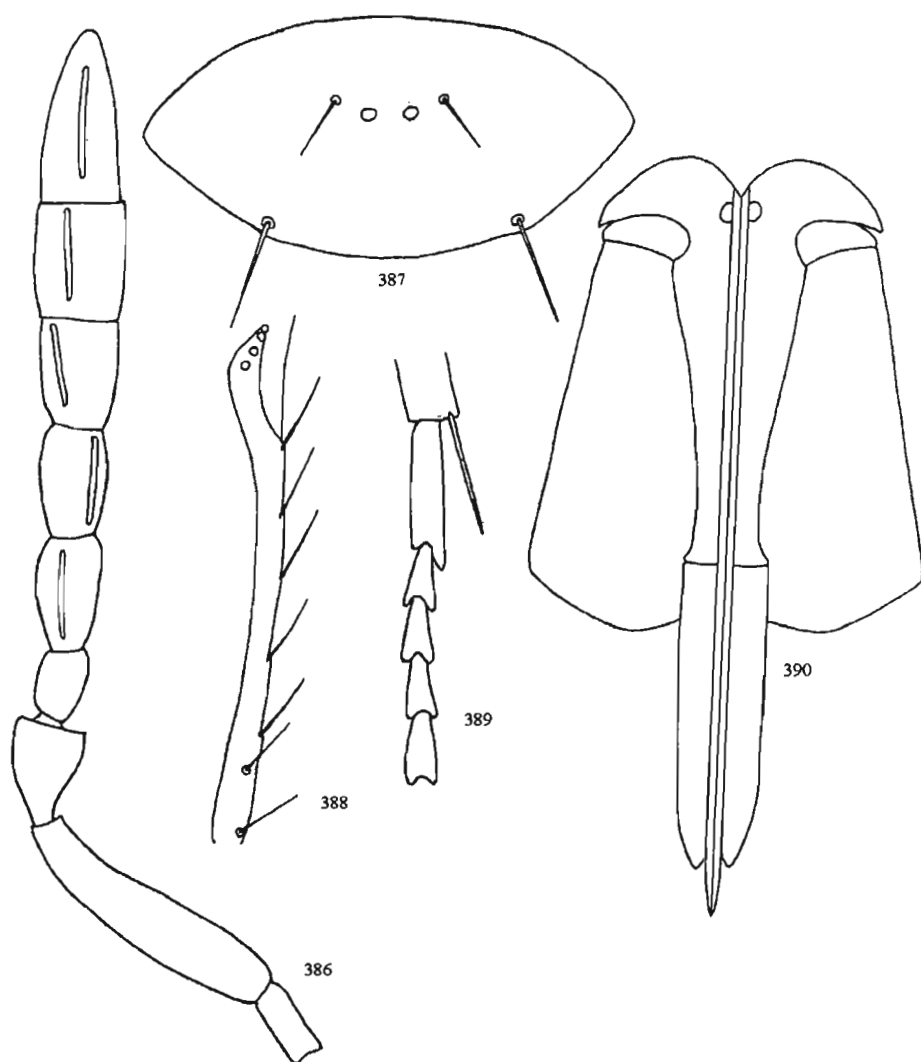
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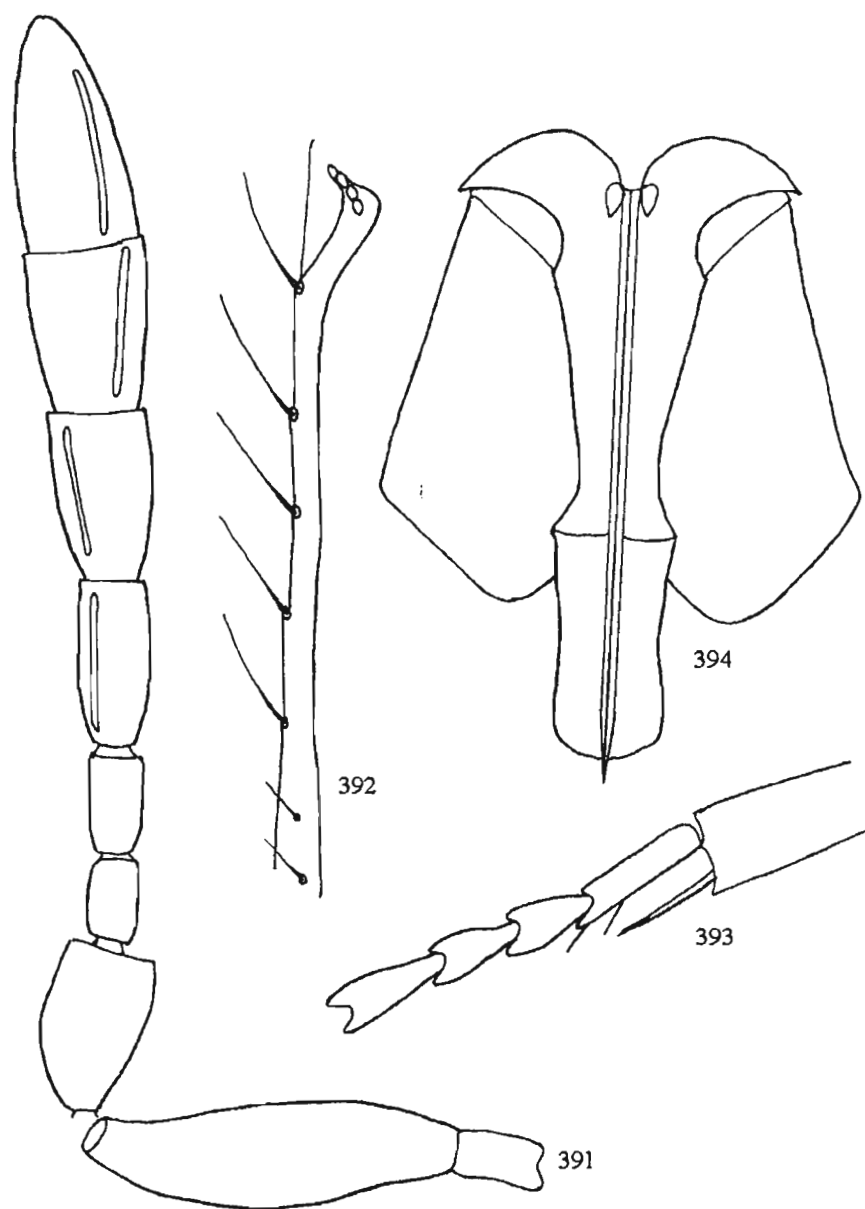
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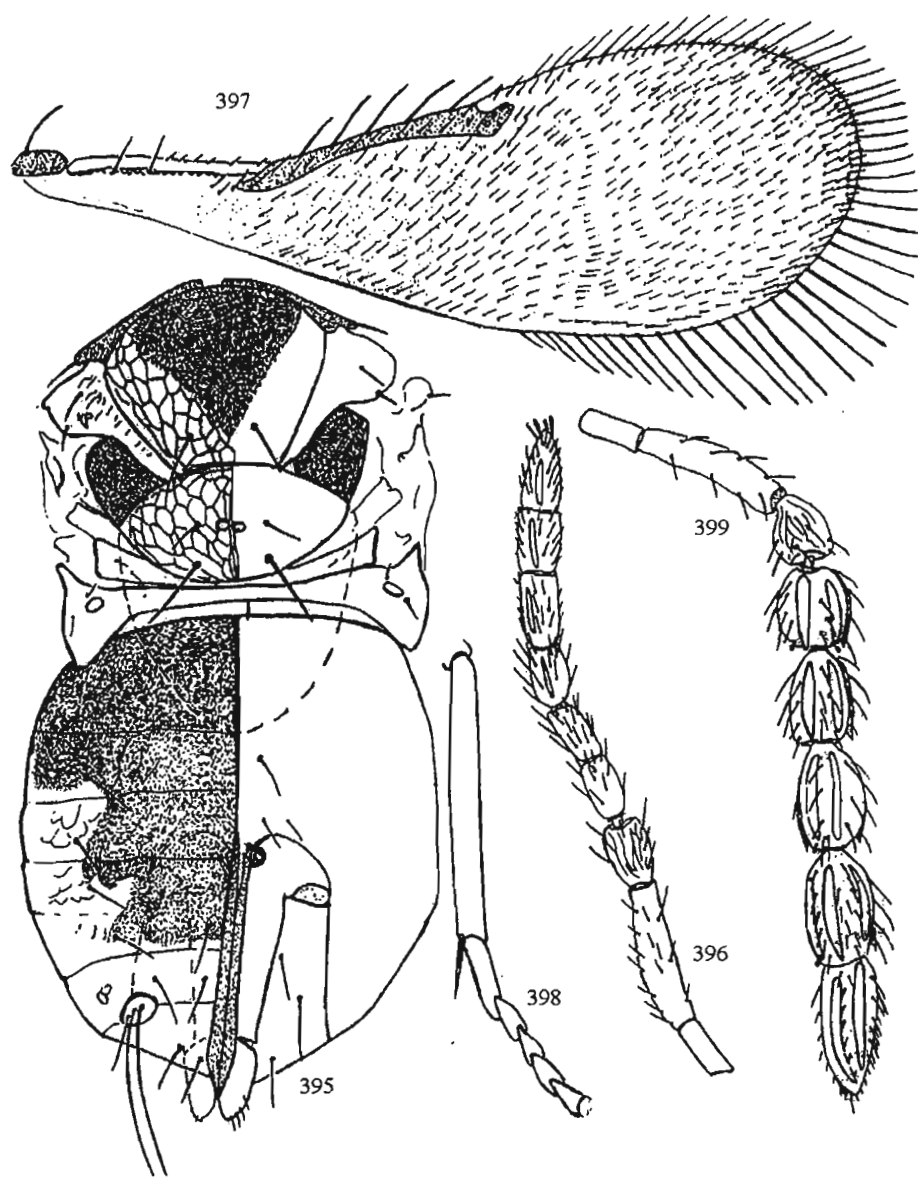
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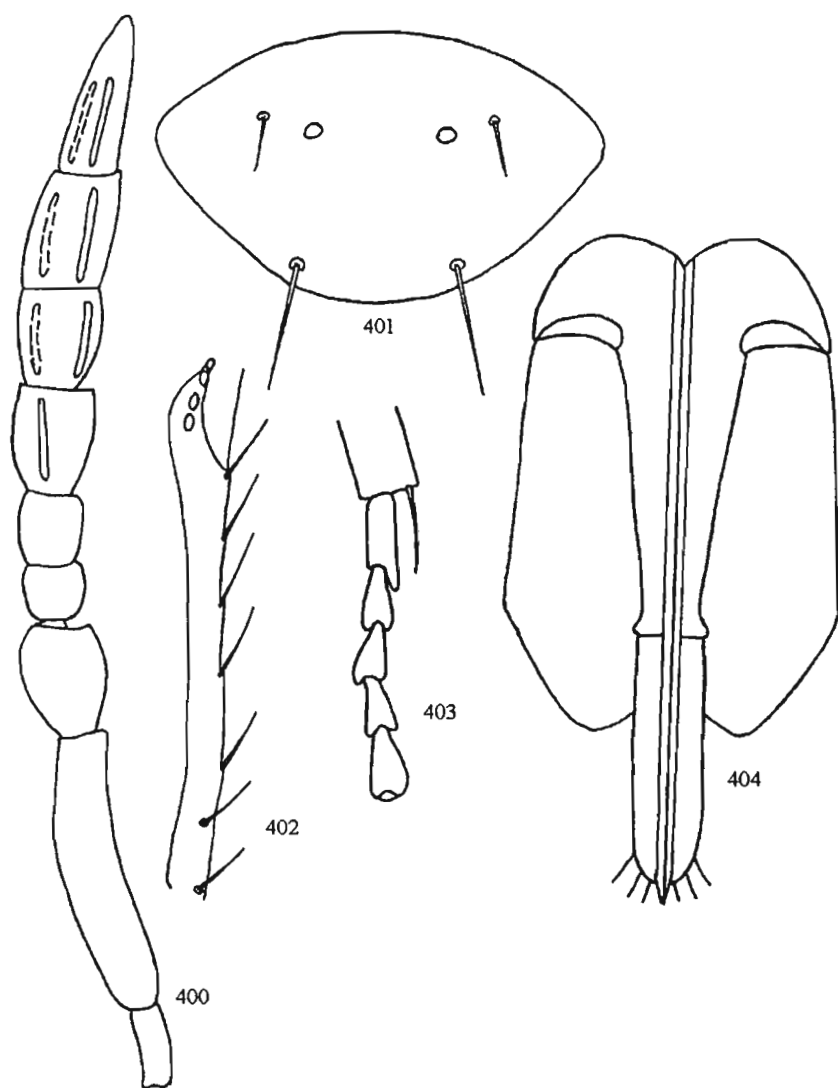
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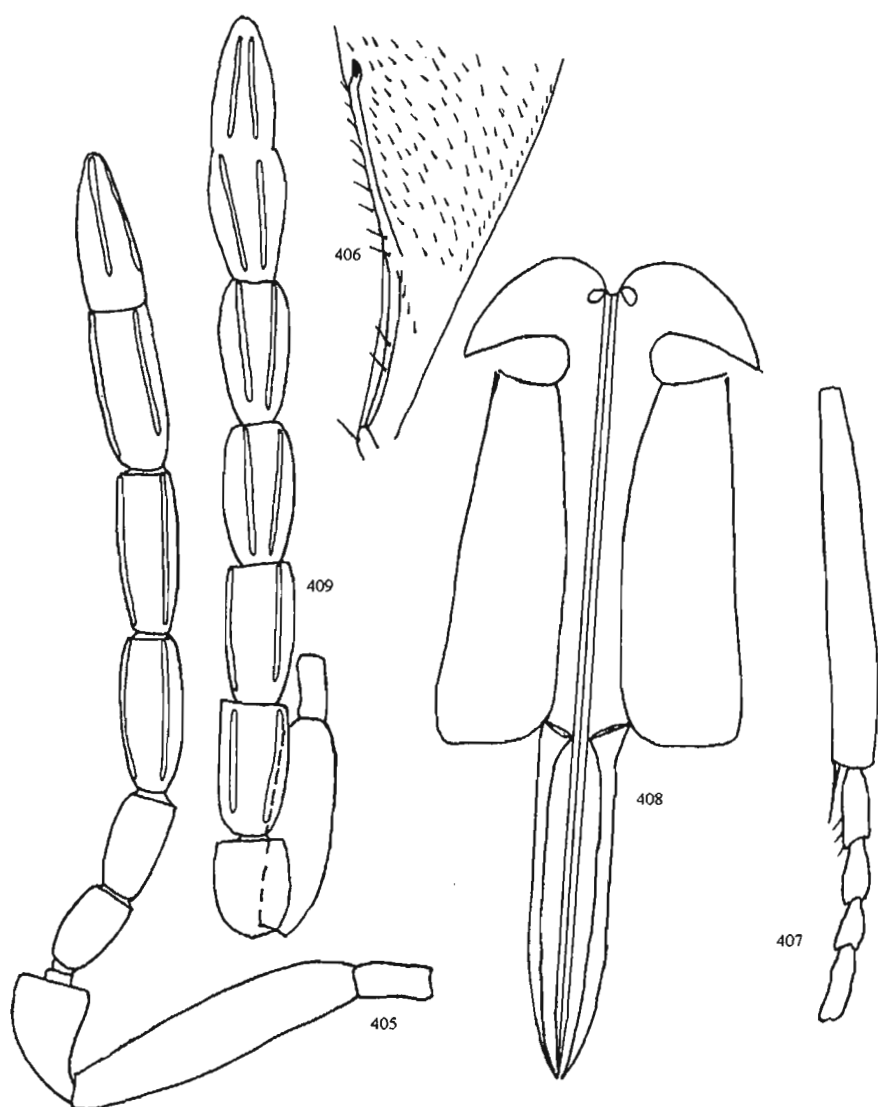
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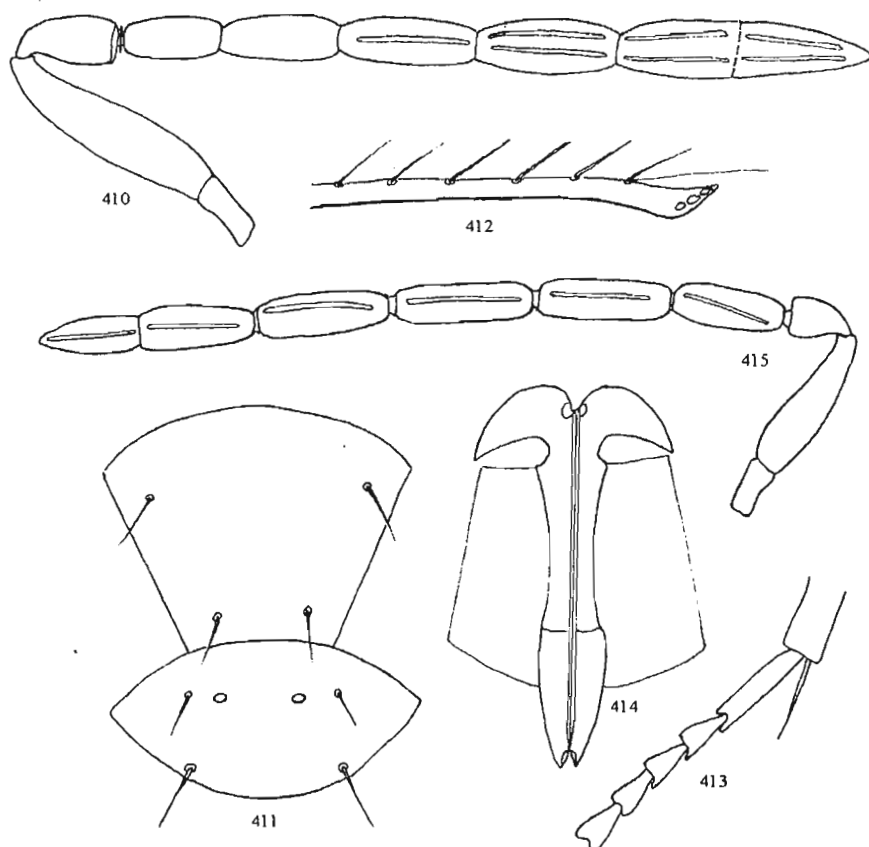
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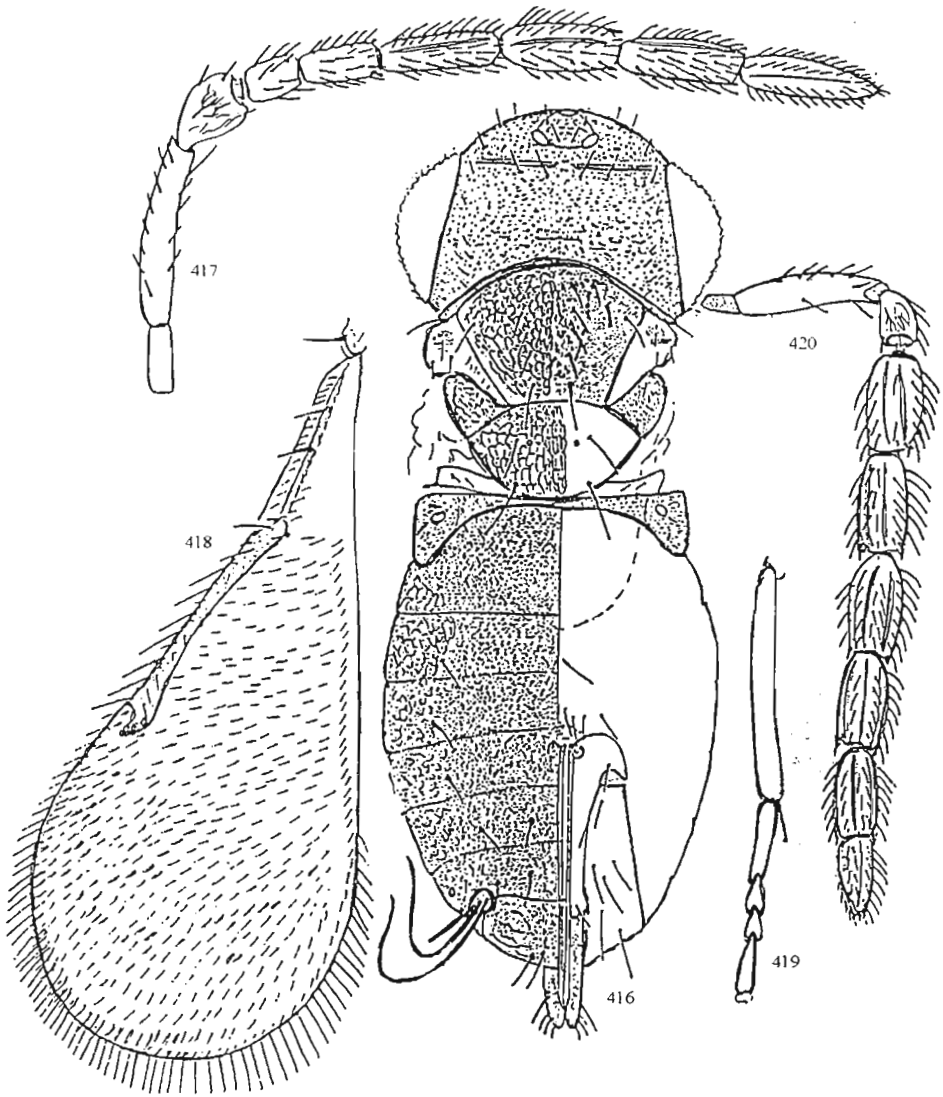
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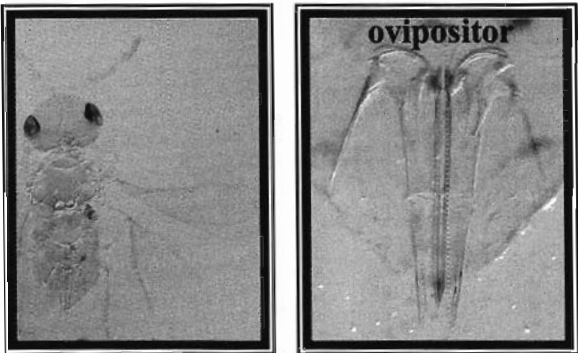


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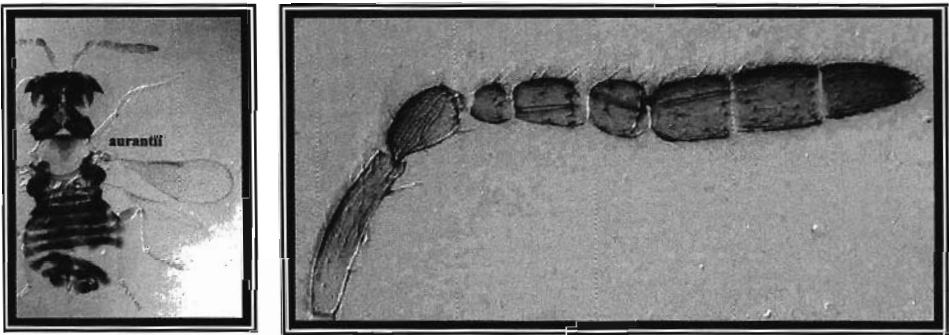


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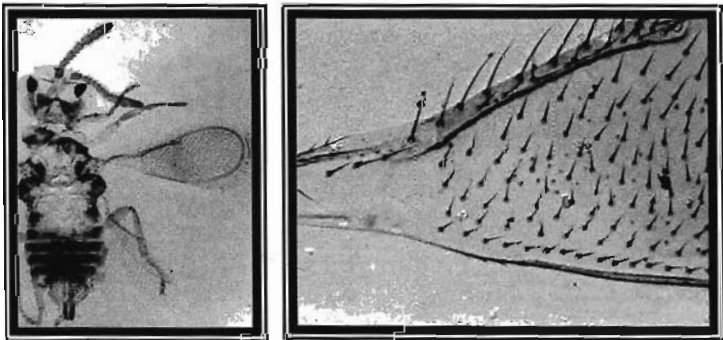
Images of *Encarsia* species from Mexico



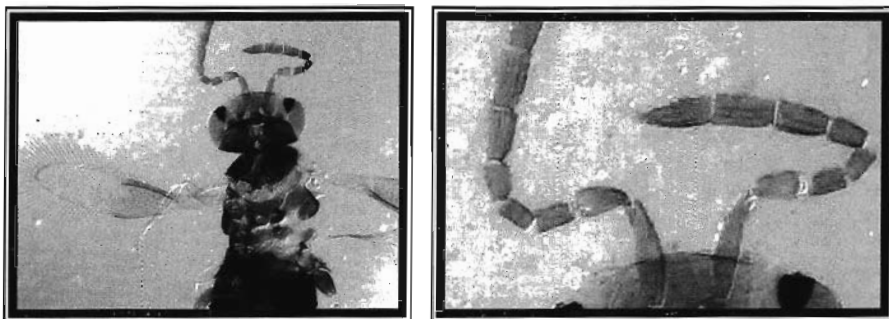
Encarsia americana (De Bach and Rose)



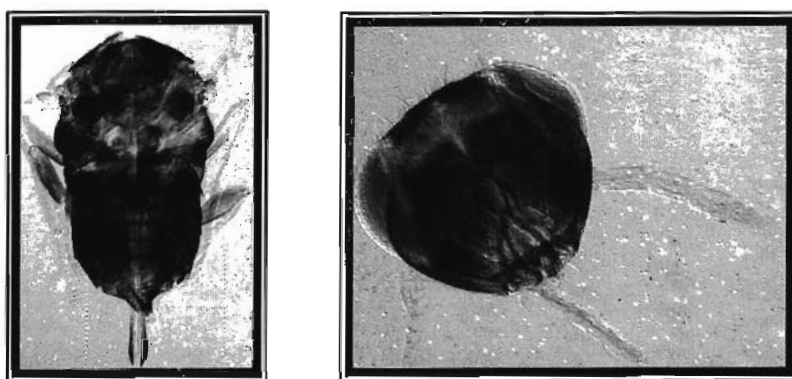
Encarsia aurantii (Howard)



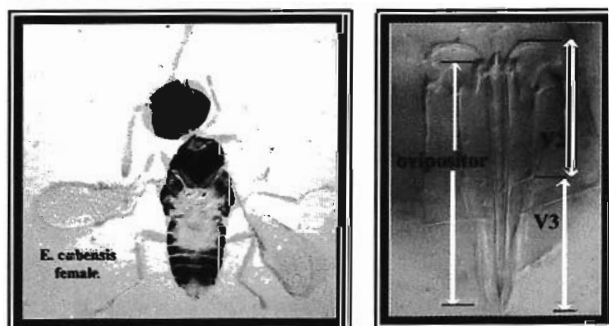
Encarsia citrella (Howard)



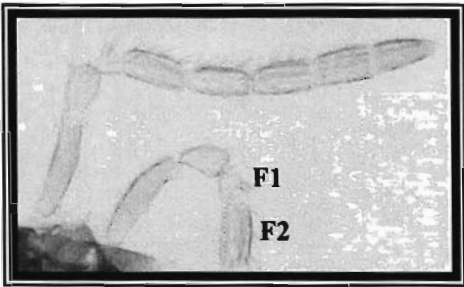
Encarsia citrina (Craw)



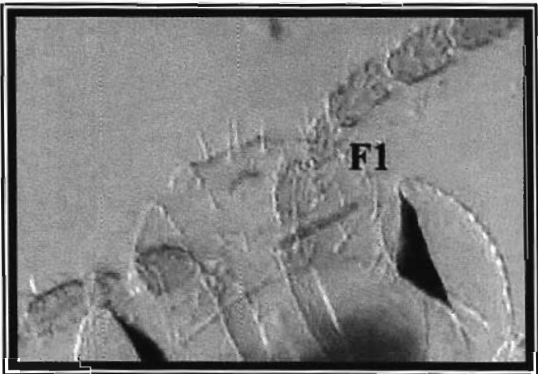
Encarsia clypealis (Silvestri)



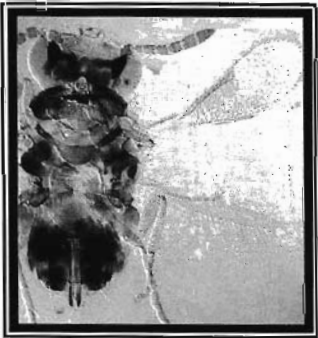
Encarsia cubensis Gahan



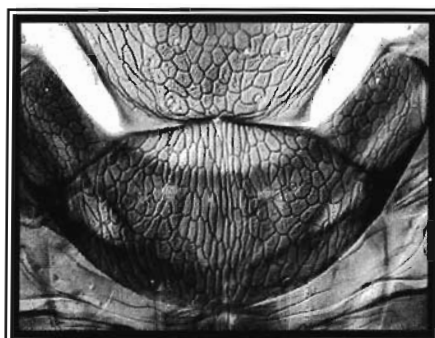
Encarsia divergens (Silvestri)



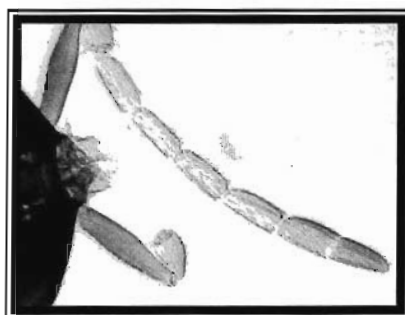
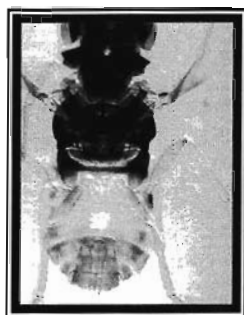
Encarsia dominicana Evans



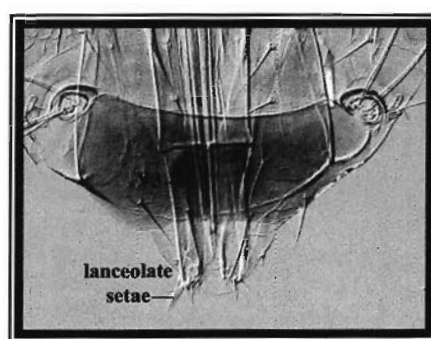
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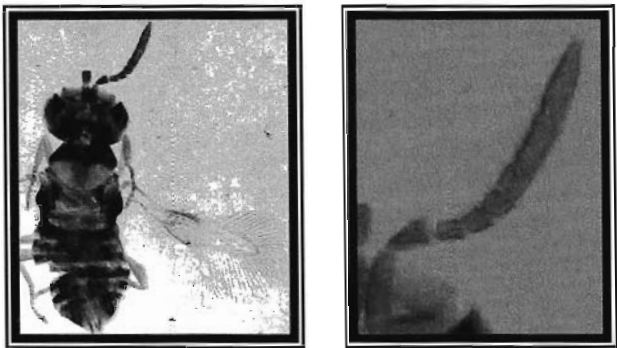
Encarsia formosa Gahan



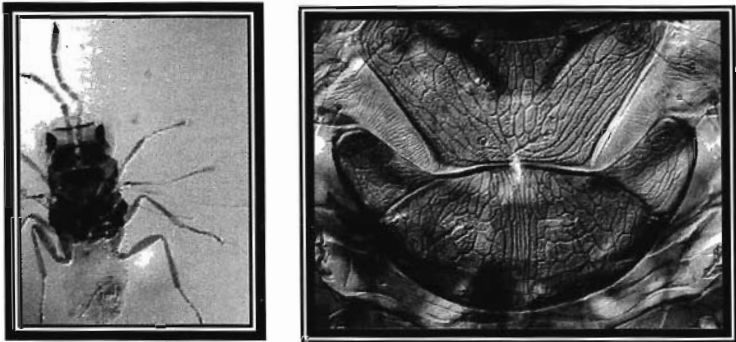
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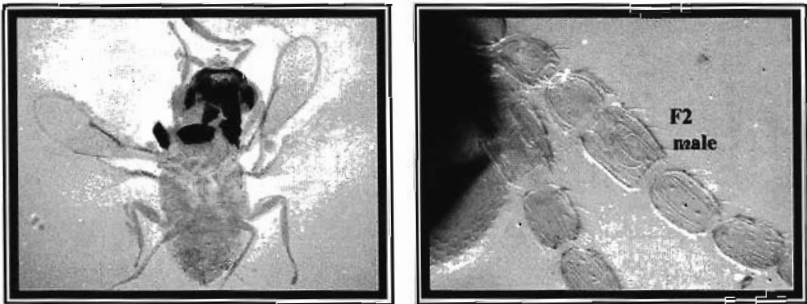
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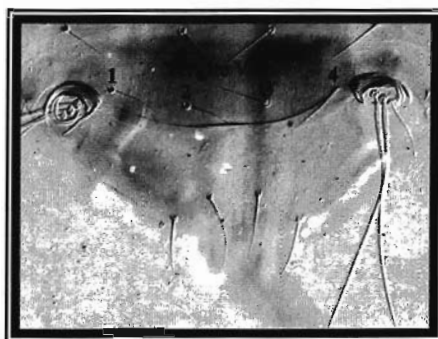
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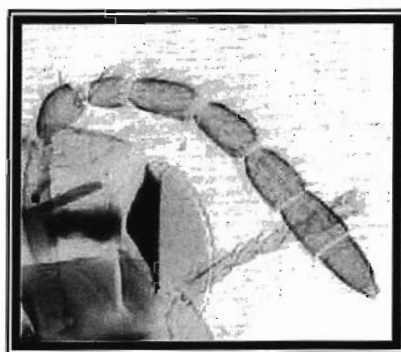
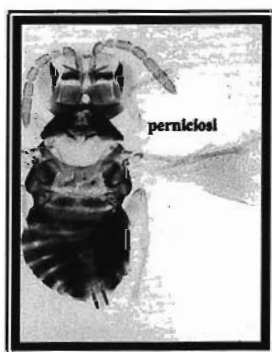
Encarsia luteola Howard



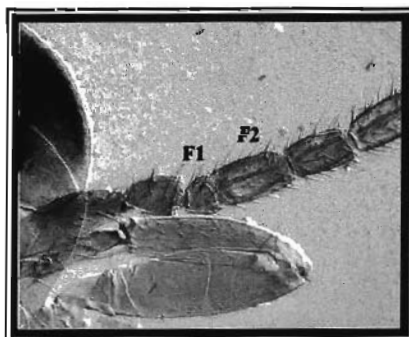
Encarsia nigricephala Dozier



Encarsia pergandiella Howard



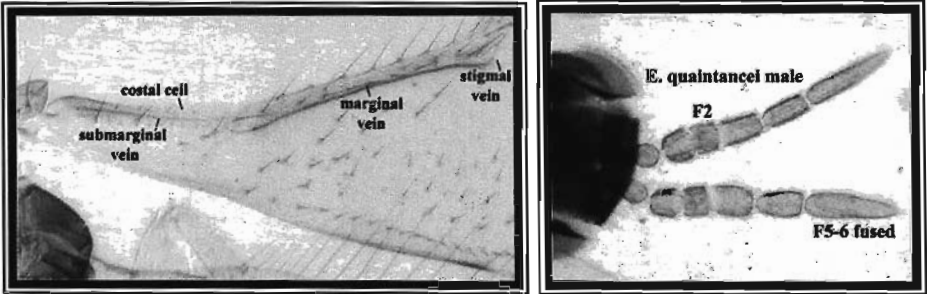
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Encarsia perplexa Huang and Polaszek



Encarsia portoricensis Howard

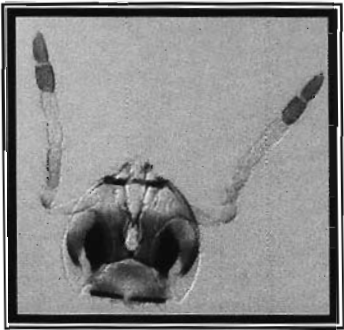


Encarsia quintancei Howard

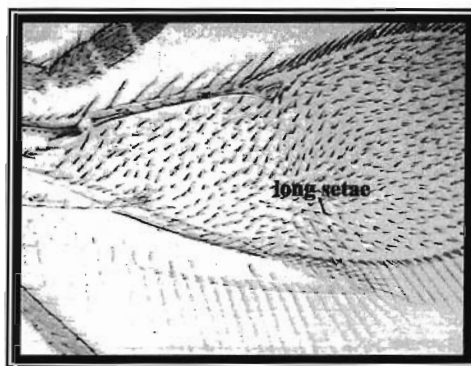
Encarsia



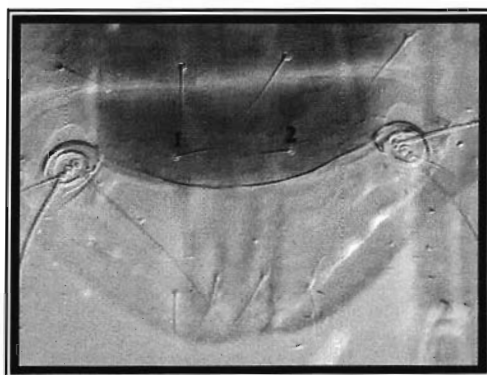
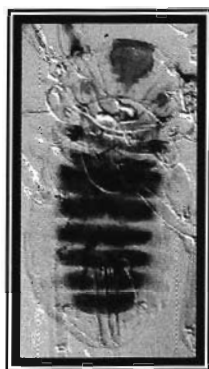
smithi



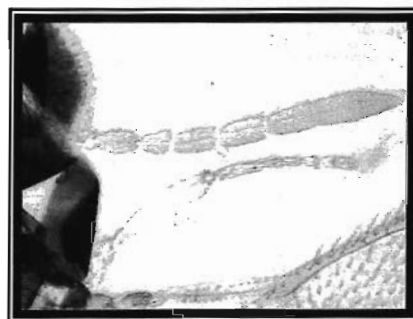
(Silvestri)



Encarsia sophia (Girault and Dodd)



Encarsia tabacivora Viggiani



Encarsia variegata Howard

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