

Encarsia aurantii species-group (Hymenoptera: Aphelinidae), parasitoids of armored scales (Hemiptera: Diaspididae) in Mexico, with key and description of a new species

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Encarsia escama sp. n. reared from Diaspididae in the state of Tamaulipas, Mexico, is described. A key for identification of *Encarsia* species from *aurantii* group parasitizing armored scales in Mexico is proposed. Also data on hosts and distribution for all six Mexican *Encarsia* species of *aurantii* group are given. Replacement name for *Encarsia polaszeki* (Myartseva & Coronado-Blanco) is proposed.

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Introduction

Genus *Encarsia* Förster is the biggest in the family Aphelinidae (Hymenoptera: Chalcidoidea) – 344 species in the world fauna are known (Heraty et al., 2007). This genus includes many species of economic importance for biological control of whiteflies and armored scales.

According to last data (Heraty et al., 2007), world fauna of *Encarsia* is divided into 26 taxonomical species-groups. *Aurantii* species-group is the richest, includes 42 species: most species are Oriental (22), in Nearctic are registered 7 species, in Neotropics – 5 species. Twenty two species in *aurantii* group are parasitoids of Diaspididae and thirty species are parasitoids of Aleyrodidae.

In Mexico are represented 6 species of the genus *Encarsia* from *aurantii* group: *E. aurantii* (Howard), *E. divergens* (Silvestri), *E. elongata* (Dozier), *E. perniciosi* (Tower), *E. portoricensis* Howard and *E. smithi* (Silvestri). From Mexico two new species were described belonging to this group, *Encarsia juanae* Myartseva & Evans and *E. subelongata* Myartseva & Evans (Myartseva & Evans, 2008). Thus, *aurantii* species-group in Mexico nowadays includes eight species. *Encarsia divergens*, *E. portoricensis* and *E. smithi* are parasitoids of whiteflies, other five species are parasitoids of scale insects. Two species of

aurantii-group were introduced to Mexico for biological control of armored scale insects: *Encarsia aurantii*, to combat the Florida red scale *Chrysomphalus aonidum* (L.) and *Encarsia perniciosi*, against California red scale *Aonidiella aurantii* (Maskell) (García-Martell, 1973). In Mexico parasitoids of *Encarsia aurantii* species-group were reared also from *Lepidosaphes beckii* (Newman), *Quadraspidiotus perniciosus* (Comstock), *Diaspis echinocacti* (Bouché), *Hemiberlesia* sp. and other undetermined Diaspididae.

In this article is described a new species *Encarsia escama* sp. n. from *aurantii* species-group, and a key to parasitoids of Diaspididae belonging to this group in Mexico is given. Data on known hosts and distribution for all six species of *aurantii*-group of the genus *Encarsia* are given also.

Myartseva & Coronado-Blanco (2004) described *Encarsiella polaszeki* from Mexico. Due to the synonymy of the genus *Encarsiella* with the genus *Encarsia* (Schmidt & Polasze, 2007), this species was transferred to the genus *Encarsia* by Myartseva & Evans (2008). However, the name *Encarsia polaszeki* was preoccupied by *Encarsia polaszeki* Evans, a species described from Brazil (Evans, 1996). Therefore the name *Encarsia polaszeki* (Myartseva & Coronado-Blanco, 2008) is replaced by *Encarsia andrewi* Myartseva & Coronado-Blanco, **nom. nov.**

Material and methods

In our study of parasitoids of Diaspididae of Mexico we used usual entomological methods of collecting insects and rearing of parasitoids following to Noyes (1982) for Chalcidoidea, with small modifications. In December 2007 specimens of undetermined Diaspididae were collected in Ciudad Victoria, State of Tamaulipas, on leaves of *Psidium guajava* L. In the laboratory from armored scales was reared parasitoid belonging to the genus *Encarsia*, *aurantii* species-group. All materials are preserved in the Entomological Museum of UAM Agronomía y Ciencias, Universidad Autónoma de Tamaulipas, Cd. Victoria, Tamaulipas, Mexico.

Results

Description of new species

Encarsia escama Myartseva sp. n. (Figs 1-5)

Holotype. ♀, **Mexico**, *Tamaulipas*: Ciudad Victoria, ex Diaspididae on *Psidium guajava* L., 30.XII.2007 (coll. J.M. Coronado-Blanco).

Holotype is preserved in Entomological Museum of the California University in Riverside, State of California, U.S.A.

Description. Female. Length of body: 0.6 mm.

Coloration. Head yellow, upper margin of mouth and cheeks, postocellar bars and occiput below foramen infusate. Antennae yellow. Pronotum brown. Mesosoma yellow, axillae, mesopleuron and sides of propodeum infusate, anterior margin of midlobe of mesoscutum brown. Fore wings hyaline. Legs whitish-yellow, hind femora and basal part of hind tibiae slightly infusate. Petiolus brown. Gaster brown, seventh tergite yellow. Outer margins of second valvifer and outer plates of ovipositor bordered with black, third valvulae pale, apices of stylets black.

Structure. Head about 1.4× as wide as high; frontovertex about 0.6× head width. Eyes about 1.4× as long as cheeks. Antennae (Fig. 1) inserted at the level of lower margin of eyes.

Antennal radicle 2.5× as long as wide. Scape about 4.3× as long as wide. Pedicel 1.8× as long as wide. First two flagellar segments subequal in length and width, about 1.3× as long as wide. Third segment very slightly longer (10:9) and 1.1× as long as wide. Club 3-segmented, 1.4× wider than funicle and slightly shorter than funicle and pedicel combined. Segments of funicle without sensilla, segments of club with two longitudinal sensilla each. Midlobe of mesoscutum with 3 pairs of thin setae, situated symmetrically. Axillae with one seta; side lobes with two setae each. Mesoscutum about 1.2× as wide as long, scutellum 1.6× as wide as long and 0.6× as long as midlobe

of mesoscutum. Scutellar placoid sensilla ovoid, widely spaced, separated by a distance about 3-4× width of one sensillum (Fig. 2). Distance between anterior pair of scutellar setae slightly longer than that between posterior pair of setae (19:16). Fore wing about 2.5× as long as wide, uniformly setose, its marginal fringe about 0.5× wing width; 3-4 basal group setae. Marginal vein slightly longer than submarginal vein, with 5 setae along anterior margin (Fig. 3). Hind wing 8× as long as wide, its marginal fringe about 1.7× maximum width of wing. Tarsal formula 5-5-5.

Midtibial spur very slightly shorter than basitarsus (Fig. 4). Second-seventh gastral tergites with 2, 2, 2, 4, 4 and 4 setae, respectively. Ovipositor (Fig. 5) originating at the level of sixth tergite, very slightly exerted, 0.8× as long as middle tibia; third valvulae about 0.7× as long as second valvifer.

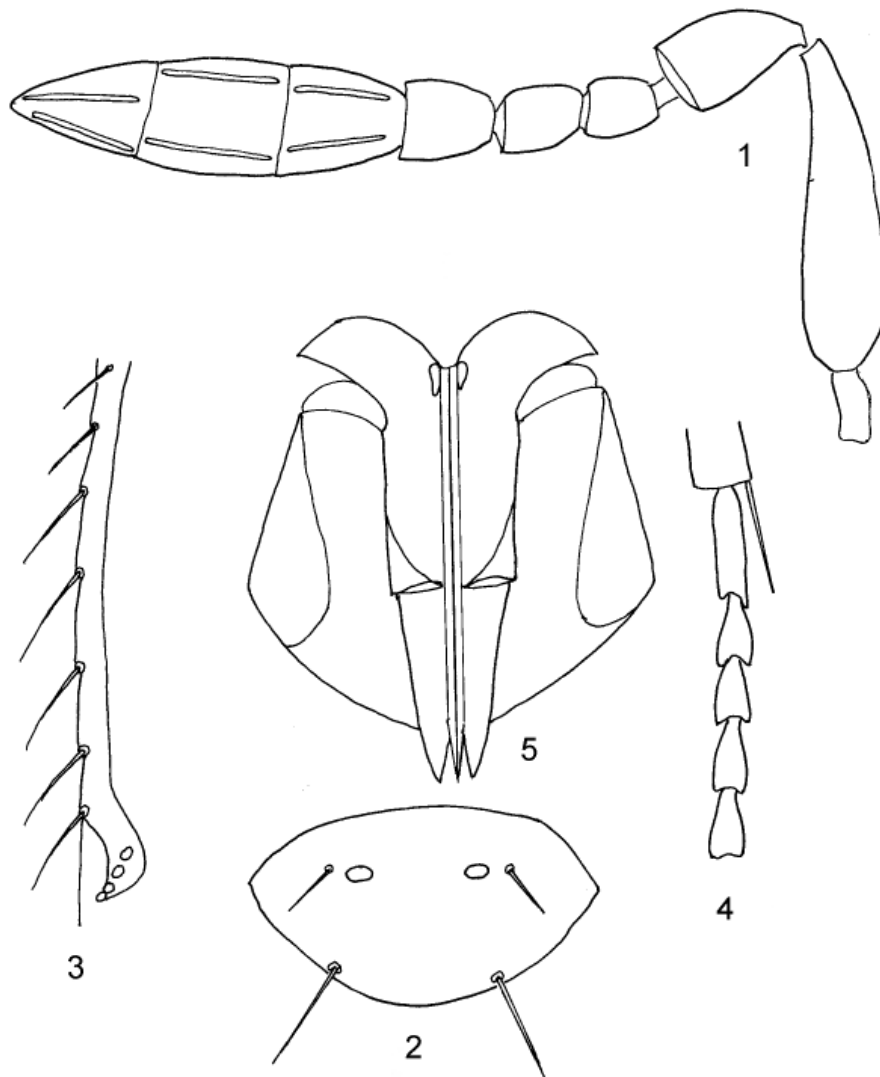
Male. Unknown.

Comments. *Encarsia escama* sp. n. is close to *E. aurantii* (Howard), but differs by follows: in *E. aurantii*: second flagellar segment longer than third segment, fore wings infusate under marginal vein, marginal vein with 7-8 setae along anterior margin, midlobe of mesoscutum with 4 pairs of setae; in *E. escama*: second flagellar segment shorter than third segment, fore wings hyaline, marginal vein with 5 setae along anterior margin, midlobe of mesoscutum with 3 pairs of setae.

The new species is similar also to *Encarsia fursovi* Myartseva, but differs by its fore wing 2.5× as long as wide, gaster brown, midlobe of mesoscutum with 3 pairs of setae, second flagellar segment shorter than third segment. In *E. fursovi*: fore wing 3.4× as long as wide, gaster light yellow, with brownish sides of second to sixth tergites, anterior margin of first tergite, fifth tergite along anterior and posterior margins infusate, midlobe of mesoscutum with 4 pairs of setae, second flagellar segment longer than third segment.

Key to *Encarsia* species of *aurantii*-group, parasitoids of Diaspididae in Mexico

1. Gaster completely dark brown. Second flagellar segment distinctly longer than third segment; fore wing infusate under marginal vein; marginal vein with 7-8 setae along anterior margin *aurantii* (Howard)
– Gaster not completely dark brown 2
2. Only seventh gastral tergite completely or on apex yellow 3
– Some other gastral tergites yellow 5
3. Face with a dark brown crossband above toruli; ovipositor subequal to middle tibia; Fore wing infusate *perniciosa* (Tower)
– Face without a dark brown crossband above toruli; ovipositor length variable; fore wing hyaline 4
4. Second-fourth tergites laterally sculptured; ovipositor 0.94× as long as middle tibia; third valvula 0.48× as long as second valvifer *juanae* Myartseva & Evans



Figs 1-5. *Encarsia escama* sp. n., female. 1, antenna; 2, scutellum; 3, marginal vein of fore wing; 4, midtibial spur and tarsus; 5, ovipositor.

- Second-fourth tergites laterally without distinct sculpture; ovipositor 0.8× as long as middle tibia; third valvula 0.7× as long as second valvifer *escama* sp. n.
- 5. Ovipositor arising at sixth tergite; third valvula as long as second valvifer; fore wing hyaline *subelongata* Myartseva and Evans
- Ovipositor arising at second tergite; third valvula less than 0.5× as long as second valvifer; fore wing infusate *elongata* (Dozier)

Review of *Encarsia* species of *aurantii*-group

Encarsia aurantii (Howard, 1894)

Hosts. This species was reared in Mexico from *Chrysomphalus aonidum* (L.) and *Aonidiella*

aurantii (Maskell). Many other hosts have been recorded: *Anamaspis lowi* (Colvée), *Aonidiella aurantii* (Maskell), *A. citrina* (Coquillett), *A. orientalis* (Newstead), *Aonidomytilus albus* (Cockerell), *A. concolor* (Cockerell), *Aspidiotus nerii* Bouché, *Chrysomphalus aonidum* (L.), *C. dictyospermi* (Morgan), *Cornuaspis beckii* (Newman), *Diaspidiotus ancylus* (Putnam), *Gonaspidotus 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* (Hartig), *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), *Temnaspidotus destructor* Signoret.

Distribution. Nearly cosmopolitan. Mexico – Baja California Sur, Jalisco, Tamaulipas.

Comments. *Encarsia aurantii* was successfully introduced into Mexico in 1949–1950 to combat the Florida red scale *Chrysomphalus aonidum* (Anonymous, 1979; Hennessey et al., 1995; Myartseva & Ruíz-Cancino, 2000; Coronado-Blanco et al., 2005; Myartseva & Evans, 2008).

***Encarsia elongata* (Dozier, 1937)**

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

Distribution. China, India, Italy, Puerto Rico, Spain, USA (California, Florida). Mexico – Tamaulipas.

***Encarsia juanae* Myartseva & Evans, 2008**

Hosts. In Mexico was reared from *Aonidiella aurantii* (Maskell) and *Hemiberlesia* sp.

Distribution. Mexico – Tamaulipas.

***Encarsia perniciosi* (Tower, 1913)**

Hosts. In Mexico *Encarsia perniciosi* was reared from *Diaspidiotus perniciosus* (Comstock). Other known hosts: *Aonidiella aurantii* (Maskell), *Diaspidiotus* [= *Quadraspidiotus*] *gigas* (Thiem & Gerneck), *Lepidosaphes ulmi* (L.), *Parlatoria acalcarata* McKenzie.

Distribution. Nearly cosmopolitan. Mexico – Chihuahua, Coahuila, Nuevo León, Puebla, Tamaulipas, Veracruz.

Comments. According to several published data (Jiménez-Jiménez & Smith, 1958; Myartseva & Ruíz, 2000; Myartseva & Evans, 2008), *Encarsia perniciosi* was introduced to Mexico more than 40 years ago against the California red scale, *Aonidiella aurantii* and had substantial control of this scale (Altieri & Nicholls, 1999, with reference to Jiménez-Jiménez, 1961).

***Encarsia subelongata* Myartseva & Evans, 2008**

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

Distribution. Mexico – San Luis Potosí, Tamaulipas.

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References

- Altieri, M.A. & Nicholls, C.I. 1999. Classical biological control in Latin America. Past, Presents, and Future, p. 975–991. In: Bellows, T.S., Fisher, T.W. (Eds.). 1999. Handbook of Biological Control. Principles and applications of biological control. Academic Press, San Diego, California, USA: 1–1046.
- Anonymous. 1979. Lista de insectos entomófagos de intereses agrícola en México. Fitofilo, **32**(80): 50–96.
- Coronado-Blanco, J.M., Ruíz-Cancino, E. & Myartseva, S.N. 2005. Chalcidoidea (Hymenoptera) de Tamaulipas, México (excepto Encyrtidae), pp. 156–160. In: Barrientos, L.L., A. Correa S., J.V. Horta & J. García J. (Eds.). Biodiversidad Tamaulipeca, Vol. 1. Dirección General de Educación Superior Tecnológica – Instituto Tecnológico de Cd. Victoria, Tamaulipas, México, 273 pp.
- Dozier, H.L. 1937. Descriptions of miscellaneous chalcidoid parasites from Puerto Rico. Journal of Agriculture of the University of Puerto Rico, **21**: 121–135.
- Evans, G.A. 1996. A new species of *Encarsia* reared from the *Bemisia tabaci* complex. Florida Entomologist, **80** (1): 24–27.
- García-Martell, C. 1973. Primera lista de insectos entomófagos de interés agrícola en México. Fitófilo, **26**(68): 1–41.
- Hennessey, R.D., Arredondo-Bernal, M.C. & Rodríguez del Bosque, L.A. 1995. Distribución geográfica y huéspedes alternos de parasitoides afelinidos de *Bemisia tabaci* (Hymenoptera: Aleyrodidae). Vedaia, **2**: 61–75.
- Heraty, J., J. Woolley & A. Polaszek. 2007. Catalog of the *Encarsia* of the World http://www.faculty.ucr.edu/heraty/Encarsia_cat.pdf.
- Howard, L.O. 1894. The hymenopterous parasites of the California red scale. Insect Life, **6**: 227–236.
- Jiménez-Jiménez, E. 1961. Resumen de los trabajos de control biológico que se efectúan en México para el combate de plagas agrícolas. Fitófilo, **14**(32): 9–15.
- Jiménez-Jiménez, E. & Smith, H.D. 1958. El empleo de enemigos naturales para el control de insectos que constituyen plagas agrícolas en la República Mexicana. Fitófilo, **11**(21): 5–24.
- Myartseva, S. N. & E. Ruíz-Cancino. 2000. Annotated checklist of the Aphelinidae (Hymenoptera: Chalcidoidea) of Mexico. Folia Entomológica Mexicana, **109**: 7–33.
- Myartseva, S.N. & Coronado-Blanco, J.M. 2004. A new species of *Encarsiella* Hayat (Hymenoptera: Aphelinidae) with a key to Mexican species. Folia Entomológica Mexicana, **43**(2): 227–232.
- Myartseva, S.N. & Evans, G.A. 2008. Genus *Encarsia* Förster of Mexico (Hymenoptera: Chalcidoidea: Aphelinidae). A revision, key and description of new species. Serie Avispas parasíticas de plagas y otros

- insectos, No. 3. UAMAC, UAT, Cd. Victoria, Tamaulipas, Mexico. 320 pp.
- Noyes, J.S.** 1982. Collecting and preserving chalcid wasps (Hymenoptera: Chalcidoidea). *Journal of Natural History*, 16: 315-334.
- Schmidt, S. & A. Polaszek.** 2007. *Encarsia* or *Encarsiel-la*? – redefining generic limits based on morphological and molecular evidence (Hymenoptera, Aphelinidae). *Systematic Entomology*, 32: 81-94.
- Tower, D.G.** 1913. A new hymenopterous parasite on *Aspidiotus perniciosus* Comst. *Annals of the Entomological Society of America*, 6: 125-126.

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