

New species of the genus *Entedononecremnus* Girault, 1915
(Hymenoptera: Eulophidae) — parasitoids of whiteflies
(Homoptera: Aleyrodidae) from Mexico

НОВЫЕ ВИДЫ РОДА *Entedononecremnus* Girault, 1915
(Hymenoptera: Eulophidae) — паразитоиды белокрылок
(Homoptera: Aleyrodidae) из Мексики

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КЛЮЧЕВЫЕ СЛОВА: Eulophidae, Entedoninae, Euderomphalini, *Entedononecremnus*, Aleyrodidae, таксономия, Мексика.

ABSTRACT: Three new species of the genus *Entedononecremnus*, *E. annellus* sp.n., *E. funiculatus* sp.n. and *E. guamuchil* sp.n., are described from Mexico. All species were reared from hosts belonging to the subfamily Aleurodicinae of the family Aleyrodidae. A key to species of the genus *Entedononecremnus* from North and South Americas is given.

РЕЗЮМЕ: В статье описаны три новых вида рода *Entedononecremnus* из Мексики: *E. annellus* sp.n., *E. funiculatus* sp.n. и *E. guamuchil* sp.n. Все виды выведены из хозяев, относящихся к сем. Aleyrodidae, подсем. Aleurodicinae. Дается определительная таблица видов рода *Entedononecremnus* из Северной и Южной Америки.

Introduction

Whiteflies, or aleyrodids, are widespread in the New World. The family Aleyrodidae is predominantly tropical and most of its species are distributed in the tropics and subtropics. Many species of the tropical, subtropical and world fauna are of economic importance. They also cause indirect damage of plants through production of honeydew inducing sooty mould as well as through transmission of viral diseases of plants. These pests are predominantly controlled by their natural enemies. Various cases of the successful biological control of whiteflies are known in the world. These results increase an interest for studying the natural enemies of whiteflies as the potential biocontrol agents.

65 species of whiteflies from 28 genera are known from Mexico [Mejia *et al.*, 1994], some of them being common pests of agricultural crops [Garcia Martell,

1977; Mac Gregor & Gutierrez, 1983; Pacheco Mendivil, 1994]. It is very important to know the fauna of parasitoids and predators for the effective control of whiteflies. 35 species of parasitoids of the family Aphelinidae are recorded from Mexico. From these, 10 species were introduced into the country many years ago with different results (Myartseva & Ruiz Cancino, 2000). However, this is only a small part of the local fauna of the natural enemies of whiteflies.

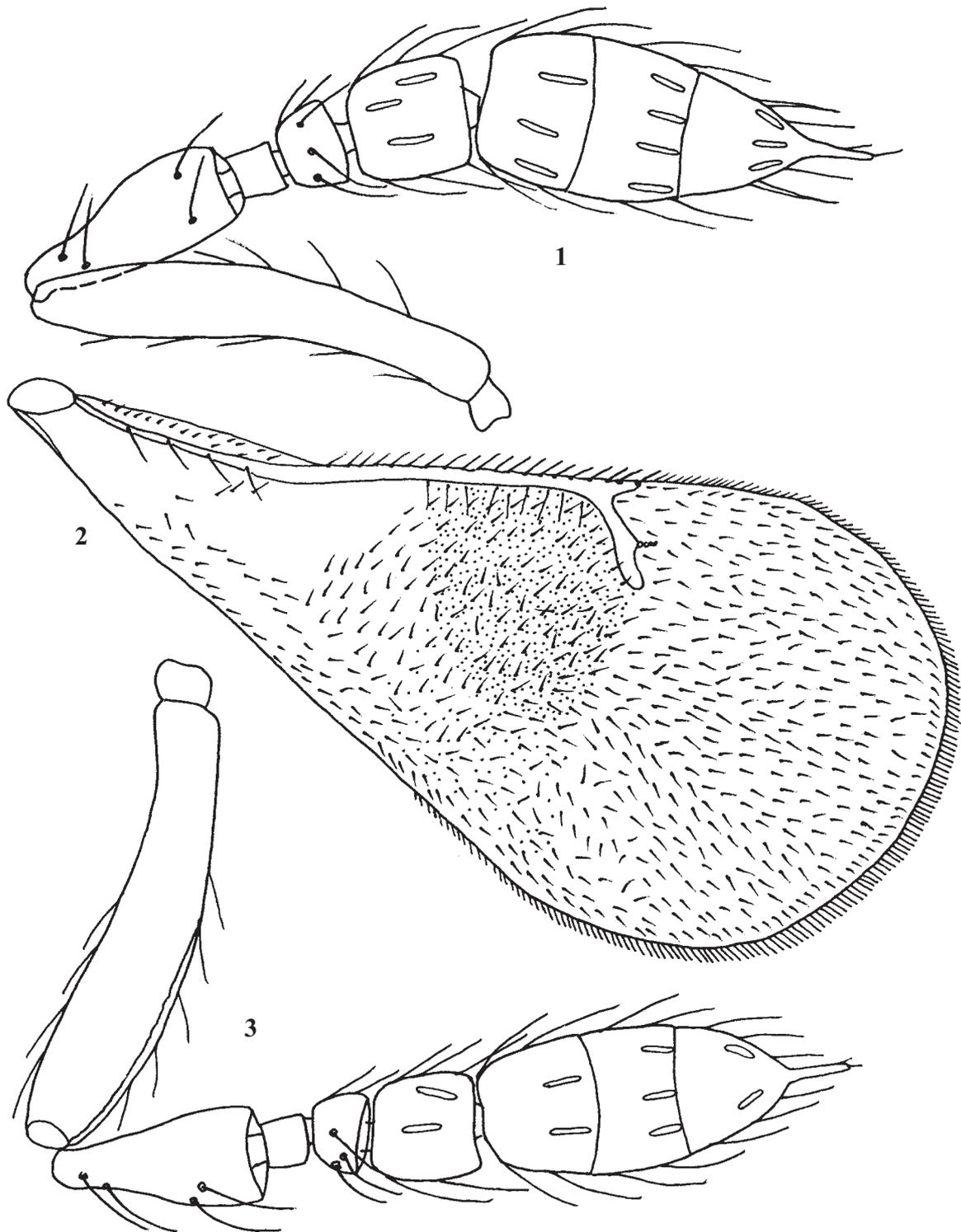
The tribe Euderomphalini belongs to the family Eulophidae and the subfamily Entedoninae. All species of this tribe with known biology are parasitoids of whiteflies. Only the genus *Entedononecremnus* was recorded for the Mexican fauna of the tribe Euderomphalini [La Salle & Schauff, 1994; Myartseva & Ruiz Cancino, 2001].

Genus *Entedononecremnus* Girault, 1915

Type species: *Entedononecremnus unicus* Girault, 1915: 278, original designation.

The genus *Entedononecremnus* was described by Girault from British Guiana and placed to the tribe Hemiptarsenini (Eulophidae, Eulophinae). Substantial changes of the taxonomic structure of the Eulophidae, especially at the genus level, were recently made. The tribe Euderomphalini of the subfamily Entedoninae was first proposed by Shafee *et al.* [1988] for the single genus *Euderomphale* Girault, 1916. Later La Salle & Schauff [1994] published an excellent systematic review of the Euderomphalini. They separated two groups of genera within this tribe, including the *Entedononecremnus* group with three genera and proposed a key for the identification of seven genera. Schauff *et al.* [1997] included four genera of the tribe Euderomphalini into the key to genera of Nearctic Chalcidoidea.

Entedononecremnus differs from the other genera of Euderomphalini by the following morphological features:



Figs. 1-3. *Entedononecremmus annellus*, sp.n.: 1 — female antenna, 2 — fore wing, 3 — male antenna.

Рис. 1-3. *Entedononecremmus annellus*, sp.n.: 1 — усик самки, 2 — переднее крыло, 3 — усик самца.

female gaster with very short hypopygium, outer plates of ovipositor enlarged and flattened; first gastral tergite smooth, with more metallic lustre than the remaining ones; axilla only partially advanced forwards of the scuto-scutellar suture; submarginal vein with three dorsal setae.

The genus *Entedononecremmus* is distributed in the tropics of the New World, from the Caribbean and South Mexico to Brazil and associated with whiteflies of the subfamily Aleurodicinae. It includes two species: *E. unicus* Girault, 1915 from British Guiana and *E. krauteri* Zolnerowich &

Rose, 1996 from Texas, USA. *E. krauteri* is known as a primary parasitoid of an invading whitefly *Aleurodicus dugesii* Cockerell. It has been transferred to several parts of Texas and California as a part of biological control efforts to regulate the whitefly [Zolnerowich & Rose, 1996].

Three species of the genus *Entedononecremnus* were reared from whiteflies of the subfamily Aleurodicinae in Mexico. A key to American species of the genus *Entedononecremnus* is also given.

KEY TO SPECIES OF *ENTEDONONECREMNUS* GIRAULT

1. Both mesoscutum and scutellum with 4-6 pairs of setae. Stigmal vein short 2
— Mesoscutum and scutellum with many scattered setae which are not arranged in pairs. Stigmal vein long 3
2. Fore wing with infuscate band extending to posterior wing margin. Midtibial spur shorter than basitarsus. Pedicel 0.4x length of scape; second funicular segment nearly 2x as long as the first one; clava more than 2x as long as wide *krauteri* Zolnerowich & Rose
— Fore wing with infuscate spot which does not extend to posterior wing margin. Midtibial spur longer than basitarsus. Pedicel 0.5x length of scape; second funicular segment 1.4–1.5x as long as the first one; clava 1.5–1.8x as long as wide *funiculatus* sp.n.
3. Annellus quadrate or subquadrate, not transverse. Fore wing with infuscate spot medially. All femora dark yellow *annellus* sp.n.
— Annellus strongly transverse. Fore wing hyaline, without infuscate spot 4
4. Midtibial spur setose, longer than basitarsus. Pedicel more 2x as long as wide at apex. All femora black
..... *guamuchil* sp.n.
— Midtibial spur simple, shorter than basitarsus. Pedicel somewhat longer than wide at apex. Fore and middle femora mostly reddish brown *unicus* Girault.

Description of new species

Entedononecremnus annellus Myartseva, sp.n.

Figs. 1–3.

Type material. Holotype ♀, mounted on a card, labelled: Mexico, Tamaulipas, Ciudad Victoria, ex *Ceraleurodicus altissimus* (Q.) on *Sapium subiferum*, 28-I-2000 (H. Olazarán Aguilar). Paratypes: same data as holotype, 11 ♀♀, 17 ♂♂.

The holotype and paratypes (4 ♀♀ and 5 ♂♂) are deposited in the Entomological Museum of the University of California, Riverside, USA; other paratypes (7 ♀♀ and 12 ♂♂) are deposited in the National Museum of Natural History, Washington, D.C., USA, the Natural History Museum, London, United Kingdom, the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia, and the Entomological Museum of the University of Tamaulipas, Ciudad Victoria, Mexico.

DESCRIPTION. Female. Body length 1.20–1.30 mm (holotype — 1.20 mm).

Coloration. Head black, with light metallic lustre; scape, pedicel and annellus yellow to dark yellow, funicle and clava yellowish-fulvous; labial and maxillary palpi black. Mesosoma black, with light metallic lustre; coxae black, femora black with apices brownish-yellow, tibiae dark yellow to brownish-yellow, tarsi whitish, with apical segment brown to black, fore tarsi slightly infuscate. Fore wings hyaline except weakly infuscate spot under distal half of marginal vein; venation brown. Metasoma black; first gastral tergite metallic blue-

green, remaining tergites black with metallic lustre on smooth parts.

Structure. Head not wider than mesosoma, with strong reticulate sculpture; head about 2x as wide as long and about 1.5x as wide as high. Frontovertex 1.3x as wide as long, its width about 0.5x head width. Occipital margin rounded and slightly concave. Ocelli in rectangular triangle; distance between posterior ocelli and occipital margin subequal to diameter of ocellus, and distance from ocellus to eye subequal to distance between posterior ocelli. Eyes with parallel inner margins and about 4x longer than cheeks. Mandibles with two teeth. Labial and maxillary palpi 1-segmented. Antennae (Fig. 1) inserted above level of lower eye margin. Scape cylindrical, more 5x as long as wide; pedicel about 2.5x as long as wide and 0.5x length of scape; annellus quadrate; first funicular segment about 1.5x as wide as long; second funicular segment subquadrate, its length nearly 2x (1.8x) that of first funicular segment; clava about 2x as long as wide and 2.7x as long as second funicular segment; apical spine long, about 0.25x length of clava. Mesosoma with strong reticulate sculpture, mesoscutum and scutellum with numerous scattered setae. Scutellum about 1.5x as wide as long. Fore wing (Fig. 2) about 1.5x as long as its maximum width. Marginal vein slightly longer than submarginal vein, postmarginal vein short, stigmal vein elongate, about 0.4x length of marginal vein. Submarginal vein with 3 long setae. Midtibial spur setose, slightly shorter than basitarsus. Metasoma subequal in length to mesosoma and rounded apically. First tergite polished, exceeds the other ones in length, remaining tergites short and with reticulate sculpture. Ovipositor almost not exerted, 1.5x length of middle tibia; outer plates with squamose sculpture.

Male. Body length 1.26–1.30 mm.

Similar to female, except for genitalia and scape (the latter has a groove in its apical half). Coloration of legs usually more dark. Annellus sometimes subquadrate, very slightly wider than long. Pedicel about 2x as long as wide (Fig. 3). Phallosome of genitalia about 0.5x length of middle tibia; digital sclerites with two apical teeth.

COMMENTS. Among the species of the genus *Entedononecremnus*, only *E. annellus* sp.n. has quadrate annellus, squamose sculpture of the outer plates of ovipositor, and dark yellow coloration of all legs. Other differences of *E. annellus* from the known species of *Entedononecremnus* are given in the key.

Entedononecremnus funiculatus Myartseva, sp.n.

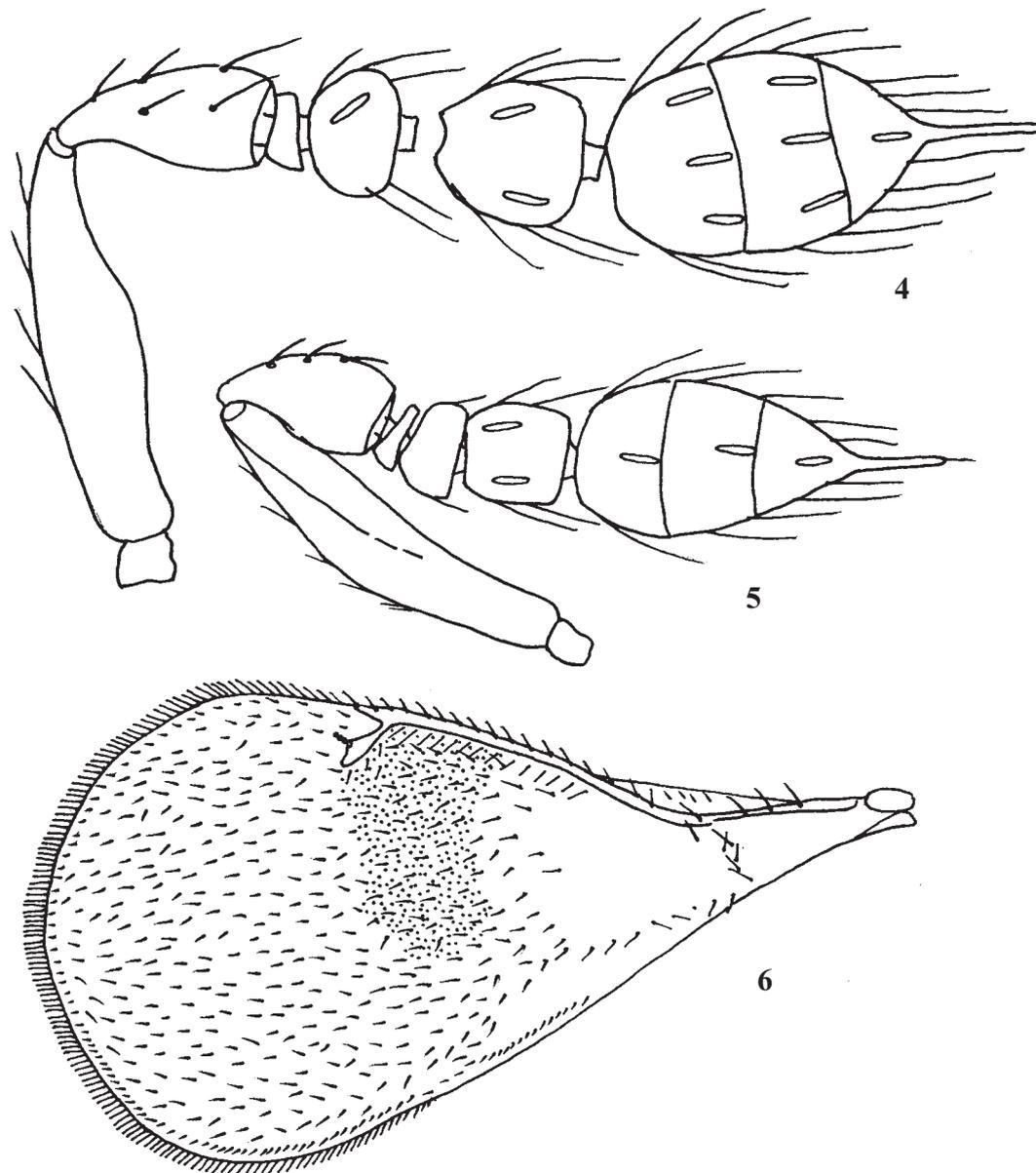
Figs. 4–6.

Type material. Holotype ♀, mounted on a card, labelled: Mexico, Tamaulipas, Ciudad Victoria, ex *Aleurodicus* sp. (undescribed species) on *Psidium guajava*, 25-VII-2000 (S. Myartseva). Paratypes: same data as holotype, 9 ♀♀, 10 ♂♂.

The holotype ♀ and paratypes (4 ♀♀ and 5 ♂♂) are deposited in the Entomological Museum of the University of California, Riverside, USA; paratypes (5 ♀♀ and 5 ♂♂) are deposited in the National Museum of Natural History, Washington, D.C., USA, the Natural History Museum, London, United Kingdom, the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia, and the Entomological Museum of the University of Tamaulipas, Ciudad Victoria, Mexico.

DESCRIPTION. Female. Body length 0.96–1.04 mm (holotype — 0.98 mm).

Coloration. Head black, sometimes with light metallic lustre; antennae yellow; labial and maxillary palpi light brown. Mesosoma black; all coxae, femora and tibiae black, tarsi



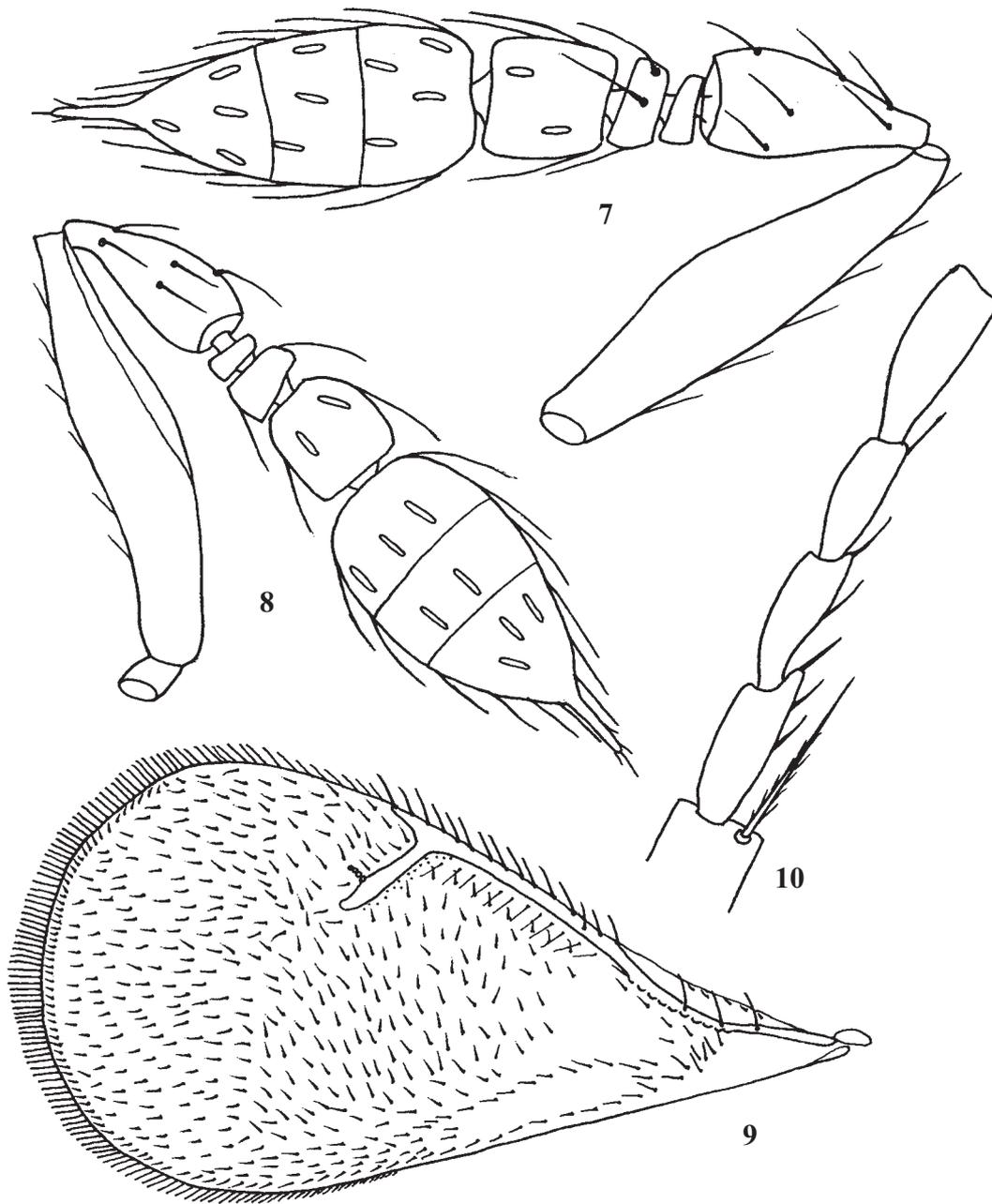
Figs. 4–6. *Entedononecremmus funiculatus*, sp.n.: 4 — female antenna, 5 — fore wing, 6 — male antenna.

Рис. 4–6. *Entedononecremmus funiculatus*, sp.n.: 4 — усик самки, 5 — переднее крыло, 6 — усик самца.

white, with apical segments brown to black, fore tarsi slightly infuscate. Fore wings with infuscate spot under distal half of marginal vein and stigmal vein, this spot does not reach posterior wing margin; venation yellowish-brown. Metasoma black; first tergite metallic blue-green, remaining tergites with light metallic bluish lustre.

Structure. Head slightly wider than mesosoma, with reticulate sculpture; head 2x as wide as long and wider than high. Frontovortex slightly longer than wide, its width about 0.4x head width. Occipital margin acute and slightly concave. Ocelli in rectangular triangle; distance between posterior ocelli and occipital margin subequal to diameter of ocellus, distance between posterior ocelli and eyes 2x longer. Inner margins of eyes slightly converging downwards. Eyes about 2.5x as long as cheeks. Antennae (Fig. 4) inserted just at level of lower eye margin. Scape cylindrical, about 4x as long as

wide; pedicel about 2x as long as wide and about 0.5x length of scape; annellus strongly transverse; first funicular segment 1.5–1.7x as wide as long; second funicular segment 1.1–1.4x as wide as long and about 1.5x longer than first funicular segment; clava 1.5–1.8x as long as wide and more than 2x as long as second funicular segment; apical spine long, about 0.4x length of clava. Mesosoma with strongly reticulate sculpture, both mesoscutum and scutellum with 4–6 pairs of setae. Scutellum more than 1.5x as wide as long. Fore wings (Fig. 5) about 1.7x as long as maximum width. Marginal vein subequal to or slightly shorter than submarginal vein, postmarginal and stigmal veins short. Midtibial spur setose, slightly longer than basitarsus. Metasoma slightly longer than mesosoma and rounded apically. First tergite polished, exceeds the other ones in length, remaining tergites short and with fine transverse-reticulate sculpture. Ovipositor almost



Figs. 7–10. *Entedononecremnus guamuchil*, sp.n.: 7 — female antenna, 8 — fore wing, 9 — middle tarsus and tibial spur, 10 — male antenna.

Рис. 7–10. *Entedononecremnus guamuchil*, sp.n.: 7 — усик самки, 8 — переднее крыло, 9 — средняя лапка и шпора голени, 10 — усик самца.

not exerted, about 1.8x length of middle tibia; outer plates with fine reticulate sculpture.

Male. Body length 0.86–1.04 mm.

Similar to female in coloration and structure, except for: genitalia, more strongly transverse annellus, quadrate second funicular segment (its length about 2x that of first funicular segment), scape with ventral groove in apical half (Fig. 6). Phallobase of genitalia about 0.5x length of middle tibia; digital sclerites with two apical teeth.

COMMENTS. *E. funiculatus* sp.n. is very similar to *E. krauteri* described from Texas. The Mexican species varies in

some morphological features, but can be distinguished from *E. krauteri* by the following features: second funicular segment 1.1–1.4x wider than long and 1.4–1.5x as long as first funicular segment; pedicel 0.5x length of scape; clava 1.5–1.7x as long as wide; midtibial spur longer than basitarsus; spot of fore wing does not reach posterior wing margin; femora and tibiae black; mandibular teeth subequal; second funicular segment of male quadrate and about 2x length of first funicular segment. In *E. krauteri*: second funicular segment subquadrate and about 2x length of first funicular segment; pedicel 0.4x length of scape; clava more 2x as long

as wide; midtibial spur shorter than basitarsus; spot of fore wing reaches posterior wing margin; femora and tibiae partly testaceous; dorsal mandibular tooth longer than the ventral one; second ocellar segment of male longer than wide and about 3x length of first interocellar segment.

Entedononecremnus guamuchil Myartseva, **sp.n.**

Figs. 7–10.

Type material. Holotype ♀, mounted on a card, labelled: Mexico, Guerrero, Acapulco, ex Aleurodicinae on *Pithecellobium* sp., 12-VI-2000 (S. Myartseva). Paratypes – same data as holotype, 4 ♀♀ and 6 ♂♂; Tamaulipas, Ciudad Victoria, ex Aleurodicinae on *Pithecellobium* sp., 2 ♀♀, 3 ♂♂, 18-V-2000 (J.M. Coronado Blanco); San Luis Potosi, Ciudad Valles, ex Aleurodicinae on *Pithecellobium* sp., 1 ♀ and 1 ♂, 27-III-2001 (S. Myartseva).

Holotype female and paratypes (2 ♀♀ and 3 ♂♂) are deposited in the Entomological Museum of the University of California, Riverside, USA; other paratypes (5 ♀♀ and 7 ♂♂) are deposited in the National Museum of Natural History, Washington, D.C., USA, the Natural History Museum, London, United Kingdom, the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia, and the Entomological Museum of the University of Tamaulipas, Ciudad Victoria, Mexico.

DESCRIPTION. Female. Body length 1.20–1.30 mm (holotype — 1.30 mm).

Coloration. Head black, with greenish lustre, the latter more strong in antennal scrobes; antennae yellow, clava and funicle usually also slightly infusate; labial and maxillary palpi brown to black. Mesosoma black, with light metallic lustre; legs black, 1st–3rd tarsal segments white. Fore wings hyaline, only with narrow light fuscous area along inner margin of stigmal vein; venation brown. Metasoma black; first tergite metallic green, remaining tergites with light metallic bluish-greenish lustre.

Structure. Head not wider than mesosoma, with strong reticulate sculpture; head about 2x as wide as long and about 1.3x wider than high. Frontovortex about 1.5x as wide as long, its width 0.5x head width. Occipital margin slightly rounded and concave. Ocelli in rectangular triangle; posterior ocelli separated from occipital margin by ocular diameter and from eyes – by interocular distance or slightly less. Eyes with parallel inner margins, more 3x longer than cheeks. Antennae (Fig. 7) inserted above level of lower eye margin. Scape cylindrical, about 4.5x as long as wide; pedicel slightly more 2x as long as wide and about 0.4x length of scape; annellus strongly transverse; first funicular segment about 2x as wide as long; second funicular segment quadrate and 2.5x as long as first funicular segment; clava slightly more 2x as long as wide and about 3x as long as second funicular segment; apical spine long, about 0.23x length of clava. Mesosoma with reticulate sculpture; mesoscutum and scutellum with numerous scattered setae. Scutellum about 1.3x as wide as long. Fore wing (Fig. 8) 1.7–1.8x as long as maximal width of wing. Marginal vein slightly shorter than submarginal vein; stigmal vein long, about 0.6x length of marginal vein; postmarginal vein short, about 0.3x length of stigmal vein. Midtibial spur (Fig. 9) setose, longer than basitarsus. Metasoma subequal in length to mesosoma, almost round. 1st tergite polished, exceeds the other ones in length, remaining tergites short; 2nd–3rd or 2nd–4th tergites with reticulate sculpture, other with fine transverse-reticulate sculpture. Ovipositor almost not exerted, about 1.7x length of middle tibia; outer plates with longitudinal squamose-reticulate sculpture.

Male. Body length 1.06–1.20 mm.

Similar to female in coloration and structure, except scape with ventral groove in apical half (Fig. 10) and genitalia.

Phallobase of genitalia about 0.6x length of middle tibia; digital sclerites with two apical teeth.

COMMENTS. *E. guamuchil* sp.n. is very similar to *E. unicus*, but can be distinguished by the following features: head and mesosoma with reticulate sculpture consisting of relatively wide cells; funicle and clava infusate; all femora and tibiae black; fore wing with light narrow fuscous area along inner margin of stigmal vein; midtibial spur setose, longer than basitarsus; pedicel more 2x as long as wide; postmarginal vein about 0.3x length of stigmal vein. In *E. unicus*: head and mesosoma with reticulate sculpture consisting of much finer cells; only clava infusate; femora and tibiae partly reddish brown; fore wing hyaline; midtibial spur not setose, shorter than basitarsus; pedicel somewhat longer than wide at apex; postmarginal vein subobsolete.

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