

A new species of *Pediobius* (Hymenoptera: Eulophidae) from *Epilachna* (Coleoptera: Coccinellidae) in Costa Rica

Christer Hansson¹ and Kenji Nishida²

1 Department of Zoology, Lund University, Helgonavägen 3, S-223 62 Lund, Sweden. Fax: 46462224541; christer.hansson@zool.lu.se

2 Escuela de Biología, Universidad de Costa Rica, 2060 San José, Costa Rica; knishida@cariari.ucr.ac.cr

Received 03-X-2000. Corrected 16-IV-2001. Accepted 18-VI-2001.

Abstract: A new and morphologically very distinct species of *Pediobius* from Costa Rica is described. The new species (*P. nishidai*) is unique among New World species of *Pediobius* in having the propodeum elongated and extended backwards (*i.e.* with an elongated nucha). The entire type series (15 females, two males) was reared from a single prepupa of *Epilachna mexicana* and it has been concluded that the new *Pediobius* species is a gregarious endoparasitoid that pupates inside its host. The possible use of this new species as a biological control agent against “the Mexican bean beetle” (*E. varivestis*) should be tested.

Key words: Entedoninae, *Pediobius nishidai* sp. n., taxonomy, parasitoid, *Epilachna mexicana*.

The genus *Pediobius* Walker is a large and cosmopolitan group, with the majority of species occurring in the northern temperate regions. Relatively few species have been recorded from the Neotropical region, where *Pediobius* is thought to be largely replaced by *Horismenus* Walker (Boucek 1988). So far eight species of *Pediobius* have been recorded from this region, but some of the records need to be checked (*e.g.* *P. furvum* (Gahan), an African species (Kerrich 1973) recorded from the Bahamas and Bolivia by De Santis (1979)).

The host spectrum of *Pediobius* is large, with larvae developing as primary or secondary parasites in eggs, larvae or pupae of other insects (Coleoptera, Diptera, Hymenoptera, Lepidoptera, and occasionally other insect orders) (Boucek 1988). The new species described below has been reared from a prepupa (larva) of *Epilachna mexicana* Guérin (Coleoptera: Coccinellidae). Two previously described species of *Pediobius* also have *Epilachna* species as hosts: *P. amaurocoelus*

(Waterston) from *E. similis* (Kerrich 1973) and *P. foveolatus* (Crawford) from several host species, *e.g.* *E. varivestis* Mulsant (the Mexican bean beetle) (Peck 1985). The former species has an African origin and the latter originates from Asia and Australia (Kerrich 1973). Due to its potential as a biocontrol agent against the Mexican bean beetle, which causes damage in soybean plantations through its folivorous habits, *P. foveolatus* has been introduced into the United States (Peck 1985), and De Santis (1979) records it from Mexico.

Pediobius nishidai sp. n. shows morphological traits which make the species easy to identify and which also add to the concept of the genus. Also, since there is a possibility that this new species can be used as a biocontrol agent against the Mexican bean beetle, and, contrary to the species used previously in this respect –*P. foveolatus*, which is indigenous to the region– we feel that the description of this new species, including the biological information known to us, is a valuable contribution to

the poorly known eulophid fauna of the Neotropical region.

The terminology used in the text follows Gibson *et al.* (1997).

Diagnosis of *Pediobius*: *Pediobius* is a "hard-bodied" genus of the subfamily Entedoninae, *i.e.* the cuticle is so strongly sclerotized that hardly any part of the body collapses after death. Apart from this, most *Pediobius* species share the following characters: transverse carina along posterior pronotum present; mesoscutum without a median groove; scutellum without median and lateral grooves; propodeum with strong and complete plicae; propodeum either with 1- submedian carinae that diverge posteriorly, or 2- with a complete median groove, narrow to wide, lined with weak to strong carinae (some species lack these carinae), the groove is usually wider posteriorly, sometimes wider anteriorly or with same width throughout (several species from the Americas have this character state, including the new species described below (Fig. 1), or 3- with a single median carina; petiole distinct, reticulate with small mesh-

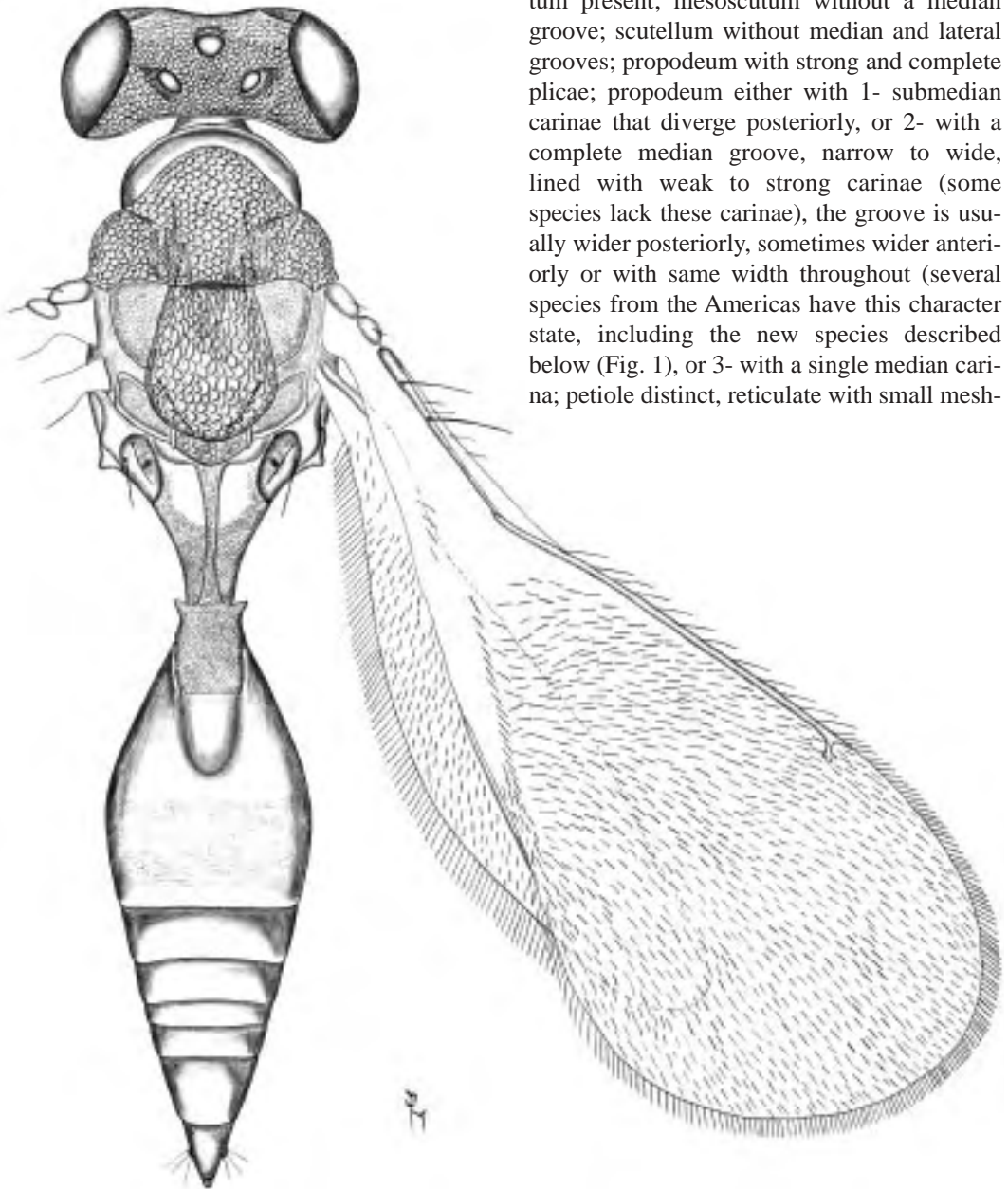


Fig. 1. Habitus of *Pediobius nishidai* sp. n. Holotype female. Length 2.5 mm.

es and with anterior end concave to embrace protruding part of median propodeum (the so-called nucha), petiole relatively longer in male. An additional character present in *Pediobius* but so far undetected, which is also an apomorphy, is the interrupted posterior margin of the prepectus (Fig. 2D). This character was introduced by Schauff (1991) in his phylogenetic analysis of the Holarctic genera of Entedoninae and was regarded as an apomorphy allegedly present only in the entedonine genera *Alachua* Boucek and Schauff, *Edovum* Grissell and *Horismenus*. *Pediobius* was included in the analysis but the presence of this character in *Pediobius* was not mentioned.

The genus *Pediobius* is distinguished from other hard-bodied genera of the sub-

family Entedoninae in the Neotropical region as follows: median propodeum bare (*Alachua* has this part more or less hairy); dorsal surface of petiole reticulate (*Edovum* with longitudinally striate dorsal surface); frontal suture V-shaped, placed comparatively closer to antennal toruli, and antennal scrobes usually join frontal suture separately (*Emersonella* with frontal suture straight or slightly down curved laterally, placed high up on frons, and antennal scrobes join below frontal suture); scutellum without median and lateral grooves (most species of *Horismenus* have these grooves); posterior ocelli distinctly separated from occipital margin (*Paracrias* Ashmead with posterior ocelli touching occipital margin).

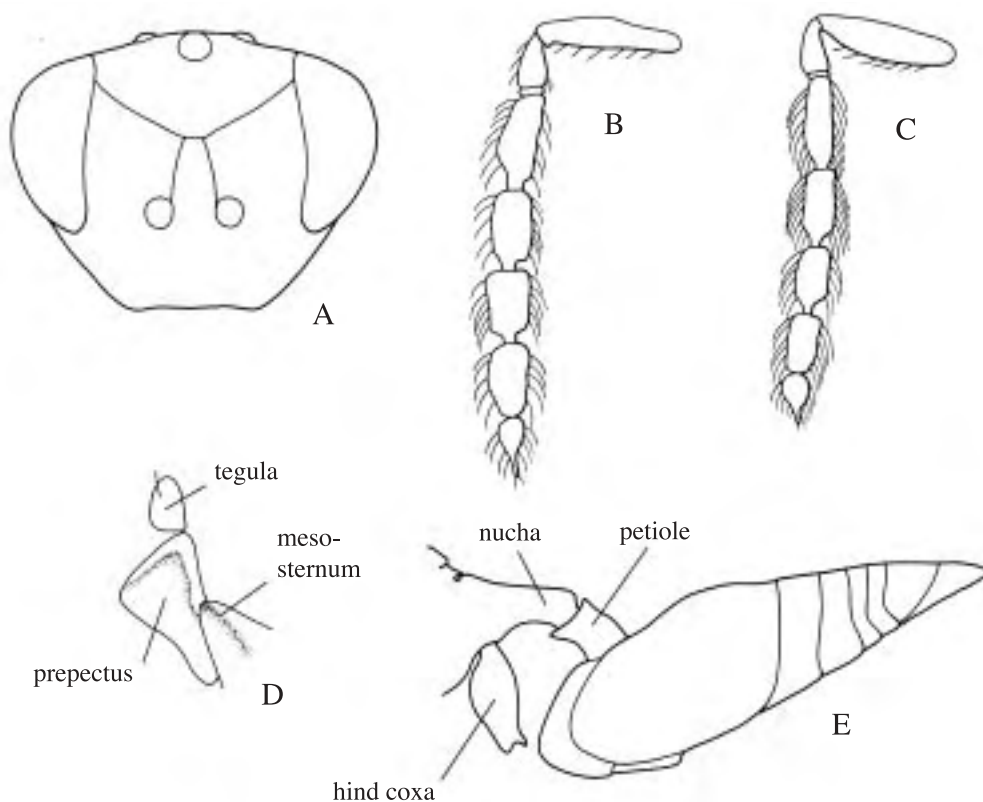


Fig. 2. *Pediobius nishidai* sp. n. A. Head, frontal view, female. B. Antenna, female. C. Antenna, male. D. Prepectus. E. Propodeum + petiole + gaster, lateral view, female.

Pediobius nishidai Hansson new species
(Figs. 1-2)

Type material: Holotype female labelled “Costa Rica: San José, San Pedro, UCR campus, I-1999, K. Nishida”, “ex pupa of *Epilachna* sp. on Myrtaceae” (in the Natural History Museum, London (BMNH)). Paratypes: 14 ♀ 2 ♂ with same label data as holotype (3 ♀ 1 ♂ in the BMNH, 3 ♀ in the Instituto Nacional de Biodiversidad (Santo Domingo, Costa Rica), 3 ♀ in the collection of Christer Hansson, 2 ♀ in the Museo de Insectos, Escuela de Biología, Universidad de Costa Rica, 3 ♀ 1 ♂ in the United States Museum of Natural History (Washington, D.C.).

Etymology: Named after Kenji Nishida, collector of the type series.

Diagnosis: Antenna in both sexes without distinct clava (Fig. 2B, C); reticulation on posterior scutellum more or less in straight but irregular rows, *i.e.* rows are not diverging posteriorly; posterior margin of dorsellum evenly rounded; forewing speculum open below and basal half of costal cell with a few setae on ventral surface (Fig. 1); propodeal nucha elongate (Fig. 1), 0.7x as long as length of propodeum; female gaster with anteroventral part protruding in front of attachment of petiole (Fig. 2E).

The elongate propodeal nucha distinguishes this species from all known Neotropical and Nearctic species of *Pediobius*. At a quick glance this new species looks like a *Paracrias*, this due to the fact that many species of *Paracrias* have an elongate propodeal nucha. However, it is easily separated from species of *Paracrias* through the placement of posterior ocelli which are situated away from occipital margin (situated at occipital margin in *Paracrias*).

Description: Length of body ♀ = 2.5-2.6 mm, ♂ = 1.9-2.0 mm.

Colour: Antenna dark and metallic. Female frons and vertex golden-purple with blue tinges; male frons metallic bluish-green, vertex golden-purple. Mesoscutum and scutel-

lum golden-purple. Propodeum metallic bluish-green, nucha golden-purple. Coxae, femora and tibiae dark and metallic; tarsi dark. Wings infusate. Petiole dark. First gastral tergite golden-green with posterior half metallic purple, remaining gaster metallic purple.

Head: Antennae as in Fig. 2B, C. Male head is very similar to female head (Fig. 2A). Ratio of height of eye/malar space/width of mouth ♀: 1.8/1.0/1.2, ♂: 1.8/1.0/1.1. Frons and vertex with strong small meshed reticulation, hence dull. Antennal scrobes join frontal suture separately. Occipital margin with a raised and sharp carina. Eyes bare. Ratio of distance between posterior ocelli/one posterior ocellus and eye/posterior ocelli and occipital margin: 2.8/1.5/1.0. Ratio of width of head/width of thorax just anterior to wingbase = 1.2.

Mesosoma: Mesoscutum and scutellum with strong small meshed reticulation, hence dull, meshes more or less isodiametric, in anterior 2/3 of scutellum slightly elongate; notauli distinct in anterior half, as indistinct depressions in posterior half; scutellum flattened in posterior half. Posterior margin of dorsellum evenly rounded. Transepimeral sulcus strongly curved. Forewing speculum open below; with 30 admarginal setae; ratio of length of wing/length of marginal vein/height of wing: 1.9/1.1/1.0; ratio of length of postmarginal vein/length of stigmal vein = 0.9. Propodeal callus with two setae. Petiolar foramen rounded.

Metasoma: Petiole 1.4x as long as wide in female, 1.7x as long as wide in male, with small meshed fine reticulation. Female gaster elongated with apex pointed; first gastral tergite covers 0.4x of gaster in female and is reticulate in posterior 1/2; ratio of length of mesosoma/length of gaster ♀ = 0.7-0.8, ♂ = 1.5-1.6.

Biology: The type series has been reared from a prepupa (larva) of *E. mexicana*. Through the host specimen we can establish that this new *Pediobius* species is a gregarious endoparasitoid that pupates within its host. The host species is found throughout Central America and Mexico, generally on various species of wildly grown Solanaceae where the larvae skeletonize the leaves (Saunders *et al.*

1998). The prepupa was collected in January (dry season) at the Leonel Oviedo Ecological Reserve (elevation 1150 m). It was attached to the underside of a leaf on a tree of Myrtaceae, which was located adjacent to a tree of the genus *Cestrum* (Solanaceae) and the *Epilachna* larva had probably been feeding on the *Cestrum* tree. The ecological reserve is a secondary growth forest (moist, premontane tropical forest according to Holdridge (1974)) and is located on the campus of the University of Costa Rica, San Pedro, Costa Rica.

Pediobius species frequently show a wide spectrum of hosts, e.g. *P. foveolatus* has, in addition to the Mexican bean beetle, also been reared from *Epilachna 28-punctata* Fabricius, *E. indica* Mulsant, *E. similis* Thunberg, *E. hirta* Thunberg, and several other hosts from other genera (Kerrich 1973). Thus even if *P. nishidai* sp. n. so far has been reared from a single species of *Epilachna*, there is a distinct possibility that other species may be targeted as well.

RESUMEN

Se describe una nueva especie de *Pediobius* de Costa Rica. La nueva especie, *P. nishidai*, es única entre las especies ya descritas en el Nuevo Mundo porque tiene el propodeo alargado y extendido hacia atrás. La serie tipo (15 hembras, dos machos) fue criada entera de una prepupa de *Epilachna mexicana*. La nueva *Pediobius* es un endoparásitoide gregario que pupa dentro de su hospedero. Se especula que es posible usar esta nueva especie para el control biológico del escarabajo mexicano del frijol (*E. varivestis*).

REFERENCES

- Boucek, Z. 1988. Australasian Chalcidoidea (Hymenoptera). C.A.B. International, Wallingford, U.K. 832 p.
- De Santis, L. 1979. Catálogo de los himenópteros calcidoideos de América al sur de los Estados Unidos. Comisión de Investigaciones Científicas de la Provincia de Buenos Aires, publicación especial, La Plata, Argentina. 488 p.
- Gibson, G.A.P. 1997. Morphology and terminology, p.16-44. In G.A.P. Gibson, J.T. Huber & J.B. Woolley (eds.). Annotated keys to the genera of Nearctic Chalcidoidea (Hymenoptera). National Research Council Research, Ottawa, Canada. 794 p.
- Holdridge, G.R. 1974. Life zone ecology. Tropical Science Center. San José, Costa Rica. 206 p.
- Kerrich, G.J. 1973. A revision of the tropical and subtropical species of the eulophid genus *Pediobius* Walker (Hymenoptera: Chalcidoidea). Bull. Brit. Mus. Natur. Hist. (Ent.) 29: 115-199.
- Peck, O. 1985. The taxonomy of the Nearctic species of *Pediobius* (Hymenoptera: Eulophidae), especially Canadian and Alaskan forms. Can. Entomol. 117: 647-704.
- Saunders, J.L., D.T. Coto & A.B.S. King. 1998. Plagas Invertebradas de cultivos anuales alimenticios en América Central. Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Turrialba, Costa Rica. xiv + 305 p.
- Schauff, M.E. 1991. The Holarctic genera of Entedoninae (Hymenoptera: Eulophidae). Contr. Amer. Entomol. Inst. 26: 1-109.

