




## A new whitefly species, *Aleuropleurocelus petenensis* sp. nov. (Hemiptera: Aleyrodidae), from Guatemala

### Una nueva especie de mosca blanca, *Aleuropleurocelus petenensis* sp. nov. (Hemiptera: Aleyrodidae), de Guatemala

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**ABSTRACT.** A new species of whitefly, *Aleuropleurocelus petenensis* sp. nov. Carapia-Ruiz & García-Ochaeta, found on leaves of a plant belonging to the genus *Acalypha* (Euphorbiaceae) in Petén, Guatemala, is described based on characteristics of the pupa. This new species exhibits a black venter and has microtubercles on the subdorsal and submedian areas, whereas the most closely related species, *A. mixtecus* Carapia-Ruiz, presents a pale venter and has not microtubercles on the corresponding areas. In both species the transverse suture of the molt ends before the apparent margin and the dorsal surface presents folds; these features support the close relationship between these species. Microphotographs of morphological structures of the new species puparium are provided.

Key words: Aleyrodinae; Euphorbiaceae; whiteflies

**RESUMEN.** Una nueva especie de mosca blanca, *Aleuropleurocelus petenensis* sp. nov. Carapia-Ruiz & García-Ochaeta, encontrada sobre hojas de una planta perteneciente al género *Acalypha* (Euphorbiaceae) en Petén, Guatemala, es descrita basada en características de la pupa. La nueva especie presenta vientre negro y tiene microtubérculos en el área subdorsal y submediana, mientras que la especie más cercanamente relacionada, *Aleuropleurocelus mixtecus* Carapia-Ruiz, tiene el vientre pálido y no presenta microtubérculos en las áreas correspondientes. En ambas especies la sutura transversa de la muda termina antes de margen aparente y la superficie dorsal presenta pliegues; estas características apoyan la cercana relación entre estas especies. Microfotografías de estructuras morfológicas del pupario de la nueva especie son presentadas.

Palabras clave: Aleyrodinae; Euphorbiaceae; moscas blancas

## INTRODUCTION

*Aleuropleurocelus* Drews & Sampson, 1956 is a genus of whiteflies (Aleyrodidae) with 26 described species distributed in the Americas. Taxonomic knowledge of this genus has increased remarkably in recent years with the discovery and description of a large number of new species, primarily from Mexico, Guatemala, and the United States of America (Carapia-Ruiz, 2020a; 2020b; Carapia-Ruiz *et al.*, 2018a; 2018b; 2021; Carapia-Ruiz & Sánchez-Flores, 2019a; 2019b; Sánchez-Flores & Carapia-Ruiz, 2018a; 2018b; Sánchez-Flores *et al.*, 2018a; 2018b; 2020; 2021).

The genus *Aleuropleurocelus* includes whiteflies mainly with black puparia that have a deflexed submarginal area and toothed margin. A species from Guatemala with characters corresponding to those of this genus, but with specific features different from those on the known species is described and compared with closely related species.

## MATERIALS AND METHODS

*Aleuropleurocelus* whitefly pupae were collected from the underside of leaves of a plant belonging to the genus *Acalypha* plants (Euphorbiaceae) in Machaquilá, Municipality of Poptún, Department of Petén, Guatemala, on the geographic coordinates 16° 22' 52" N, 89° 29' 21" W, at an approximate elevation of 450 meters. The specimens were transferred for examination to the "Laboratorio de Diagnóstico Fitosanitario", Ministerio de Agricultura Ganadería y Alimentación, Petén, Guatemala. Initially, they were photographed under a stereoscopic microscope; later, the pupae were mounted on slides following the methodology by Martin (2004). The microscope was a Leica DM 2500 (Leica®) with differential interference contrast. Observations were made at 40, 100, 400, and 1,000 magnifications. Photographs were taken with a Nikon D5300 (Nikon®) camera with an 18–55 mm lens. The description of the new species was mainly based on slide mounted pupas. The terminology is that of Drews and Sampson (1956) and Martin (2005).

Specimens repositories:

UVGC: Colección de Artrópodos, Universidad del Valle de Guatemala. Ciudad de Guatemala, Guatemala.

CNIN: Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México. Mexico City, Mexico.

JFGO: Personal Collection of José Francisco García-Ochaeta.

OASF: Personal Collection of Oscar Ángel Sánchez-Flores.

VECR: Personal Collection of Vicente Emilio Carapia-Ruiz.

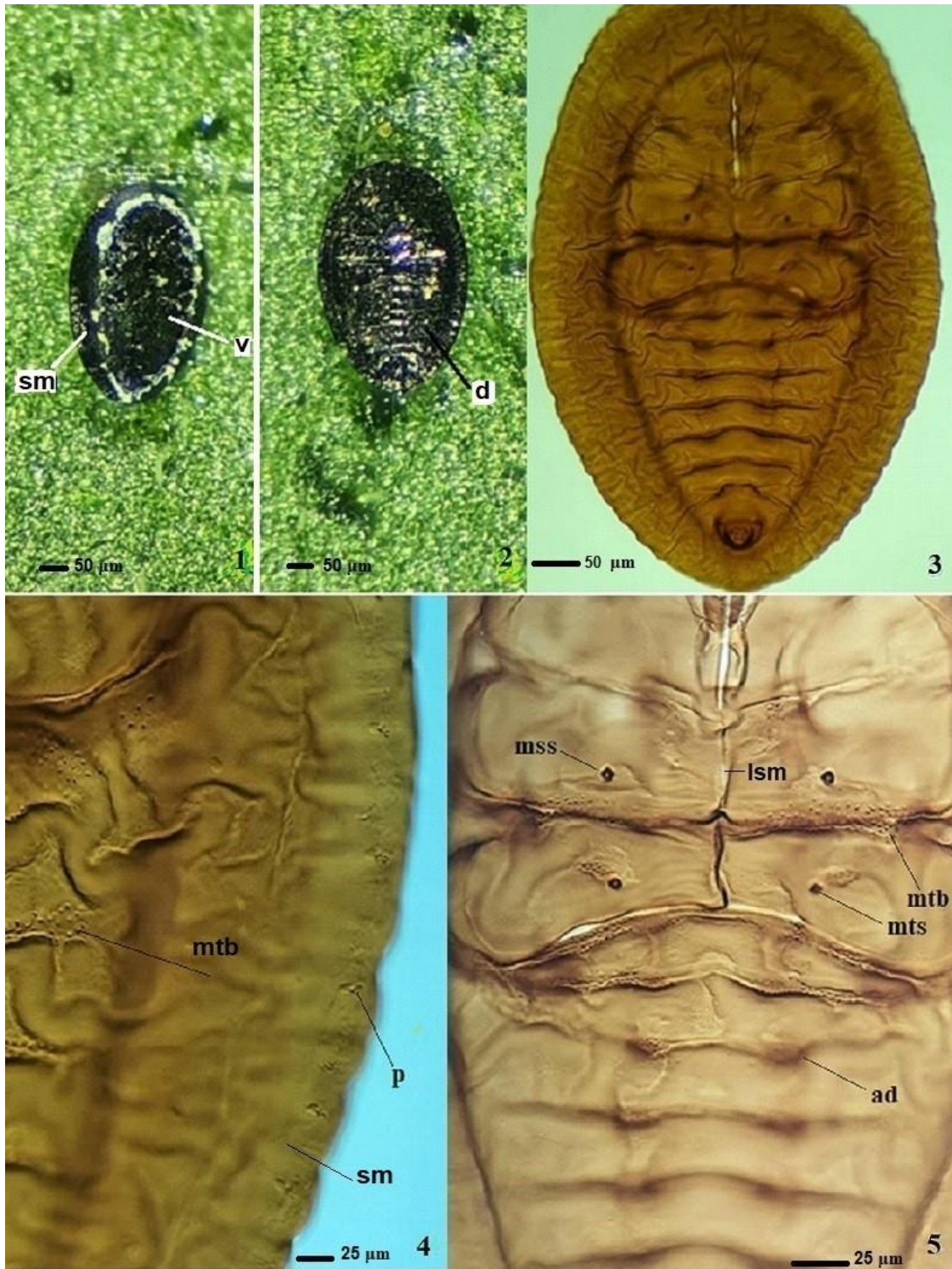
***Aleuropleurocelus petenensis* sp. nov.** Carapia-Ruiz & García-Ochaeta, 2023

<http://zoobank.org/urn:lsid:zoobank.org:act:D6BBB1EC-282B-4B84-A081-BC702E358FFA>

*General form. In situ* pupae. Black, usually located on the underside of leaves, with a band of white wax around the body that arises from the teeth of the pupal margin where adhesion to the surface of the leaf begins (Figs. 1, 2).

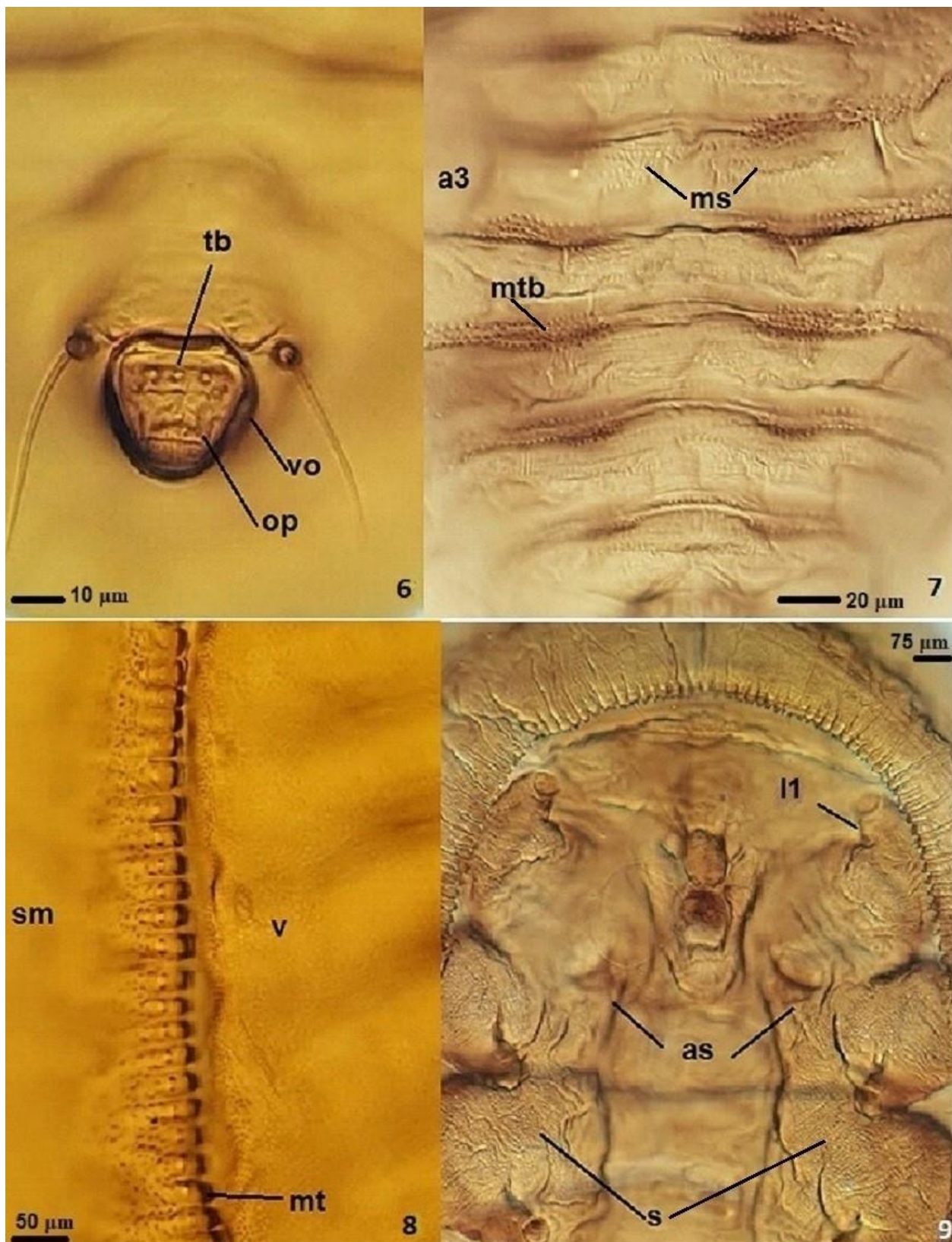
*Specimens on slides.* Boat-form body, 520 to 620  $\mu\text{m}$  in length, 320 to 410  $\mu\text{m}$  in width ( $n = 20$ ) (Fig. 3). Submarginal band deflexed (Figs. 3, 8). *Margin and submargin.* Toothed margin, each tooth about 20  $\mu\text{m}$  in width and 5  $\mu\text{m}$  apart from each other. Tuberculated submargin 70  $\mu\text{m}$  in width, the tubercles more abundant in proximity to marginal teeth (pupal margin) (Figs. 8, 9). *Cephaloprothorax.* Without ocular marks or cephalic setae. The cephalic area and prothorax 235  $\mu\text{m}$  in length, not clearly differentiated; pro-mesothoracic suture well-defined, with tubercles in the mesothoracic area near the longitudinal suture of the molt; mesothorax 50  $\mu\text{m}$  in length along the midline, with well-defined meso-metathoracic suture, with adjacent tubercles on metathorax and mesothorax; metathorax 35  $\mu\text{m}$  in length along midline (Figs. 3, 5). Thorax with two pairs of setae, mesothoracic setae 18  $\mu\text{m}$  long and metathoracic setae 20  $\mu\text{m}$  long, with a tuberculated area anterolateral to the metathoracic setae (Fig. 5 and 11). Longitudinal suture of the molt approximately 305  $\mu\text{m}$  long, without tubercles (Fig. 5); transverse suture of the molt 240  $\mu\text{m}$  long, without tubercles, curved posteriorly from middle of the suture to level of subdorsum, then curved anteriorly, not reaching meso-metathoracic suture, and ending before the submarginal line (Fig. 11). Subdorsal area near the submarginal line (apparent margin) with a regular row of pores and poretes, with irregular folds or reliefs on subdorsal surface of the pupa (Fig. 4). *Abdomen.* Dorsum of abdominal segments I–VIII clearly visible in the middle part, with approximate length for each segment as follow: I - 24  $\mu\text{m}$ , II - 26  $\mu\text{m}$ , III - 28  $\mu\text{m}$ , IV - 28  $\mu\text{m}$ , V - 28  $\mu\text{m}$ , VI - 30  $\mu\text{m}$ , VII - 24  $\mu\text{m}$  (well-developed), and VIII (from suture VII–VIII to vasiform orifice) - 38  $\mu\text{m}$ . Abdominal segments with a pair of depressions in the submedian area, with small tubercles; length of the transverse band of tubercles on each segment as follow: I - 77  $\mu\text{m}$ , II - 57  $\mu\text{m}$ , III - 75  $\mu\text{m}$ , IV - 80  $\mu\text{m}$ , V - 65  $\mu\text{m}$ , VI - 55  $\mu\text{m}$ , and VII - 35  $\mu\text{m}$ ; submedian area of the abdominal segments between depressions without tubercles. The submedian area of the abdominal segments with transverse rows of elongated microstructures (Figs. 5, 7). *Vasiform orifice.* Semi-oval, 30  $\mu\text{m}$  in length and 31  $\mu\text{m}$  in width. Operculum length of 28  $\mu\text{m}$ , width of 27  $\mu\text{m}$ , with three tubercles in the anterior part, giving it a characteristic sculpted form, completely covering the spatulate lingula and most of the vasiform orifice; ring of vasiform orifice not well-defined, with elevation at its posterior part; abdominal setae VIII anterolateral to the anterior margin of the orifice, clearly differentiated in mounted specimens (Fig. 6). Distance from the posterior margin of the vasiform orifice to the submarginal line 44  $\mu\text{m}$ , well-defined caudal protuberance (Fig. 3). *Venter.* Antennae length 52  $\mu\text{m}$ , extending posteriorly. Prothoracic legs 88–91  $\mu\text{m}$  long, mesothoracic legs 78–82  $\mu\text{m}$  long, metathoracic legs 70–72  $\mu\text{m}$  long; adhesive sacs of the legs 12  $\mu\text{m}$  in diameter; surface of the legs with spinules (Fig. 10), similar to the contiguous ventral surface. A pair of adhesive sacs 18–24  $\mu\text{m}$  in diameter and 16  $\mu\text{m}$  in length, located between the base of the first pair of legs (Fig. 9); posterior abdominal setae 15  $\mu\text{m}$  long; the posterior spiracles between a sclerotized structure. *Pores.* Dorsum of the pupa with a row of approximately 17 to 18 pairs of associated pores and poretes near the submarginal fold (Fig. 4 and 11), 16 to 18 pairs in the subdorsal region, and 14 pairs in the submedian area of the puparium (Fig. 11). *Chaetotaxy.* Dorsum without cephalic setae; a pair of mesothoracic setae 18  $\mu\text{m}$  long, a metathoracic pair 20  $\mu\text{m}$  long, and a pair on abdominal segment VIII 62  $\mu\text{m}$  long, each derived from a tuberculated base; two caudal setae near the

posterior margin 100  $\mu\text{m}$  long; anterior and posterior marginal setae present 9–10  $\mu\text{m}$  in length (Fig. 11).

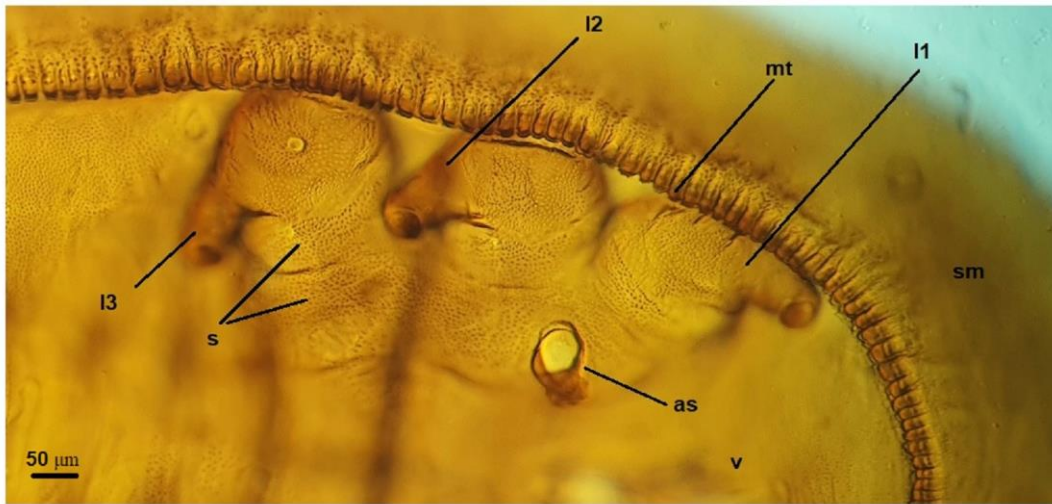


**Figures 1–5.** *Aleuropleurocelus petenensis* sp. nov. 1) Pupa on the leaf of *Acalypha* sp., ventral view, 2) pupa on the leaf of *Acalypha* sp., dorsal view, 3) slide-mounted pupa, dorsal view, 4) detail of subdorsal and submarginal area, 5) area of thorax and abdomen. ad= abdominal depression, d= dorsum, lsm= longitudinal suture of the molt, mss= mesothoracic seta, mts= metathoracic seta, mtb= microtubercles, p= pore, sm= submargin, v= venter.

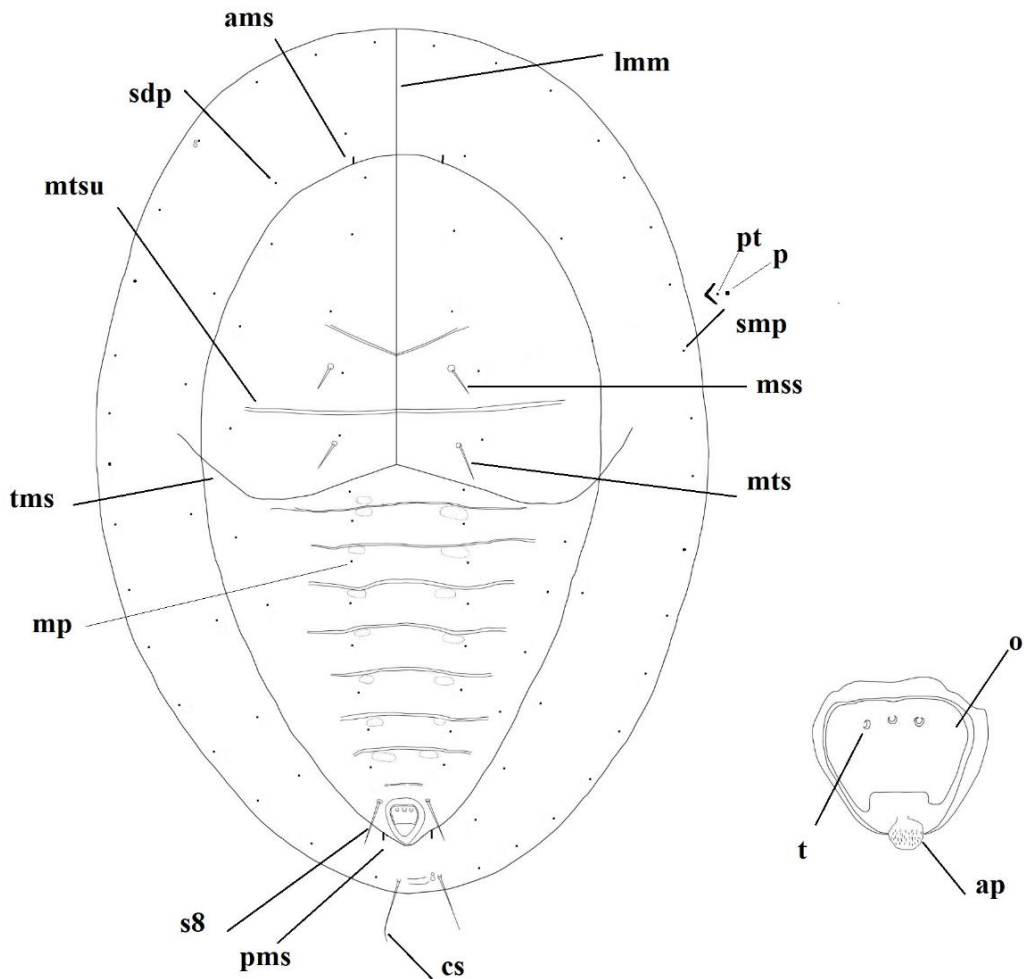




**Figures 6–9.** *Aleuropleurocelus petenensis* sp. nov. 6) Vasiform orifice, 7) dorsal surface abdomen, 8) submarginal band and marginal teeth, 9) spinules on the base of legs. A3= abdominal segment 3, as= abdominal sac, l1= foreleg, mt= marginal teeth, ms= microstructures, mtb= microtubercles, op= operculum, s= spinules, sm= submargin, tb= tubercles, vo= vasiform orifice, v= venter.



**Figure 10.** *Aleuropleurocelus petenensis* sp. nov. Submargin and venter. as= abdominal sac, l1= foreleg, l2= midleg, l3= hindleg, mt= marginal teeth, s= spinules, sm= submargin, v= venter.



**Figure 11.** Structures of *Aleuropleurocelus petenensis* sp. nov. ap= apical area of the operculum, cs= caudal seta, lmm= longitudinal suture of the molt, mp= submedian pore, mss= mesothoracic seta, mts= metathoracic seta, mtsu= metathoracic suture, o= operculum, p= pore, pt= porete, tms= transverse suture of the molt, s8= abdominal seta 8, sdp= subdorsal pore, smp= submarginal pore, t= tubercle, vo= vasiform orifice.

*Type material.* Holotype: Guatemala, Petén, Poptún, Machaquilá, 16° 22' 52" N, 89° 29' 21" W, elevation 450 m, collected from *Acalypha* sp. leaves, 2-viii-2021. Deposited in the UVGC collection. Paratypes: 24 with the same data as holotype. Two specimens in UVGC, 2 in CNIN, 5 in VECR, 5 in OASF, and 10 in JFGO.

*Etymology.* The specific epithet *petenensis* is in reference to the Petén region, in northern Guatemala, where these specimens were collected.

*Hosts.* *Acalypha* sp. (Euphorbiaceae).

*Distribution.* Petén, Guatemala.

## DISCUSSION

*Aleuropleurocelus petenensis* sp. nov. is a species in the group characterized by the boat-shaped form, which have the termination of the transverse suture of the molt anterior to the submarginal line. The new species differs from *A. palidonigrans* Carapia-Ruiz & Sánchez-Flores, *A. nigrans* (Bemis), *A. pallidus* Carapia-Ruiz & Sánchez-Flores, and *A. mixtecus* Carapia-Ruiz in the presence of black coloration on the venter, while in the other species the venter is pale. The above proves that the color of the venter is an important character for the differentiation of certain species as reported by Carapia-Ruiz (2020b). *Aleuropleurocelus pallidus* Carapia-Ruiz & Sánchez-Flores has capitate marginal teeth and the new species has truncated marginal teeth. *Aleuropleurocelus mixtecus* Carapia-Ruiz is one of the species most closely related to *A. petenensis* but the new species has a tuberculated areas on the dorsal surface.

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