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# Description of *Aleuropleurocelus sampsoni* sp. nov. (Hemiptera: Aleyrodidae) from Tamaulipas, Mexico

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## Abstract

A new species, *Aleuropleurocelus sampsoni* Sánchez-Flores & Carapia-Ruiz **sp. nov.** (Hemiptera: Aleyrodidae), from the state of Tamaulipas, Mexico, is described. It was collected on the underside of *Karwinskia humboldtiana* (Roemer & Schultes) Zucc. (Rhamnaceae) leaves, a common plant known as “tullidora” because it is toxic and can induce severe neurological damage in humans and animals that consume fruits, in Ciudad Victoria and Llera, Tamaulipas, Mexico. A key to species of the *ceanothi* group of the genus *Aleuropleurocelus* is proposed. Microphotographs of morphological structures of pupariae are provided; differences with *Aleuropleurocelus granulata* (Sampson & Drews) (Hemiptera: Aleyrodidae) and other related species is discussed.

Key Words: whiteflies; *Karwinskia humboldtiana*; key; *ceanothi* group

## Resumen

Se describe una nueva especie, *Aleuropleurocelus sampsoni* Sánchez-Flores & Carapia-Ruiz **sp. nov.** (Hemiptera: Aleyrodidae), del estado de Tamaulipas, México. Fue colectada del envés de hojas de *Karwinskia humboldtiana* (Roemer & Schultes) Zucc. (Rhamnaceae), una planta común conocida como tullidora por ser tóxica y por provocar daños neurológicos severos en humanos y animales que han consumido frutos, en Ciudad Victoria y Llera, Tamaulipas. Se propone la clave de especies del grupo *ceanothi* del género *Aleuropleurocelus*. Se incluyen microfotografías de las estructuras morfológicas de los puparios; se discuten las diferencias con *Aleuropleurocelus granulata* (Sampson & Drews) (Hemiptera: Aleyrodidae) y otras especies emparentadas.

Palabras Claves: moscas blancas; *Karwinskia humboldtiana*; clave; grupo *ceanothi*

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Genus *Aleuropleurocelus* was described by Drews and Sampson (1956), separating it from *Tetralicia* Harrison. *Aleuropleurocelus* is recognized by the following combination of characters: elongated species form the boat-shaped group and circular-elliptical species form the oval-elliptical group; venter is smaller than dorsum, resulting in a deflection of the dorsum, with a margin ventrally located and generally crenulate, black puparians (the only other species, *Aleuropleurocelus pallidus* Carapia-Ruiz and Sánchez-Flores (Hemiptera: Aleyrodidae), is known with pale pupa); slightly elevated vasiform orifice (sometimes appears to be surrounded by a sclerotized ring) and in several ways, but internally smooth; lingula hidden by the operculum; cephalic setae present or absent; first abdominal setae always absent (Martin 2005). Currently, 22 species are known worldwide. In Mexico, 11 species were described recently (Carapia-Ruiz & Sánchez-Flores 2019a, b; Carapia-Ruiz et al. 2018a, b; Sánchez-Flores & Carapia-Ruiz 2018a, b; Sánchez-Flores et al. 2018a, b). *Aleuropleurocelus* pupae with only a strip of wax on the dorsum found in Tamaulipas, Mexico, do not correspond to any of the described species; therefore, the objective of this article is to describe this new species.

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## Materials and Methods

Fourth instar nymphs of the genus *Aleuropleurocelus* Drews & Sampson (Hemiptera: Aleyrodidae) were collected from the underside of *Karwinskia humboldtiana* leaves (Roemer & Schultes) Zucc. (Rhamnaceae), in the Ciudad Victoria Campus at the Autonomous University of Tamaulipas, and on the same plant in the municipality of Llera, Tamaulipas, both in Mexico. Samples were transferred to the Biological Control Laboratory of the Faculty of Engineering and Sciences of the Autonomous University of Tamaulipas, Mexico, where puparia were mounted on slides, and studied under a compound microscope Leica Galen III® (Leica Microsystems, Wetzlar, Germany). Methodology followed for the preparation of specimens was the proposed by Martin (2004). Preparations were examined in a Leica Galen III microscope at 40×, 100×, 400×, and 1,000×; photographs were taken with a Nikon 5200® (Nikon Corporation, Tokyo, Japan) camera with 18–55 mm lens, directly to the lens eye of the microscope at 100× and 400×.

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## Results

*Aleuropleurocelus sampsoni* Sánchez-Flores and Carapia-Ruiz **sp. nov.** (Figs. 1 & 2)

### PUPARIUM

Pupae on the underside of the leaves with a wide wax band between the submediate and subdorsal area (Fig. 1a) and another

next to the marginal teeth (Fig. 1c), in addition to a wax cover that is not very visible but can be detached by mechanical action in the rest of the dorsal area, including the surface of the submarginal band, without clear transverse lines on the submarginal area.

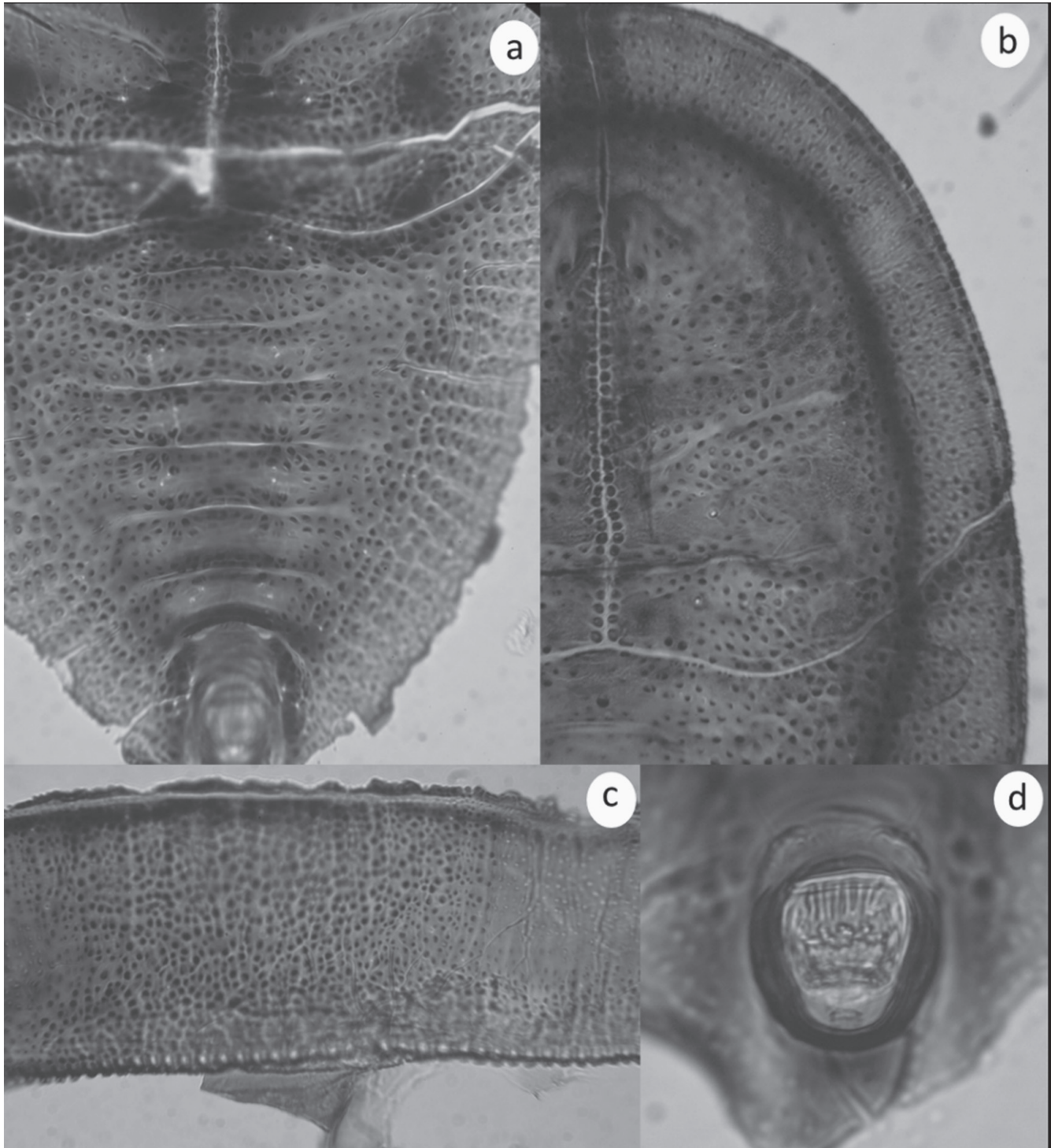
Slides: Boat-shaped body, 550 to 700  $\mu\text{m}$  long and 370 to 450  $\mu\text{m}$  wide (Fig. 1b). Submargin deflected 100 to 130  $\mu\text{m}$  in the widest part of the body.

Margin and submargin. Characteristically wide submargin arranged in mosaic form (Fig. 2c); weakly serrated apparent margin, true margin with semi-quadrangular teeth.



**Fig. 1.** *Aleuropleurocelus sampsoni* Sánchez-Flores & Carapia-Ruiz **sp. nov.**: (a) puparium in situ; (b) puparium mounted on slides; (c) puparium in situ, ventral view; (d) legs.





**Fig. 2.** *Aleuopleurocelus sampsoni* Sánchez-Flores & Carapia-Ruiz **sp. nov.**: (a) abdominal segments; (b) longitudinal suture of the molt; (c) submarginal area; (d) vasiform orifice.

## DORSUM

**Cephalothorax.** Eyes absent, although sometimes with discolored maculae, cephalic setae absent, mesothoracic and metathoracic setae present, and depressions absent on thorax. Molt with longitudinal suture as zipper (Fig. 2b) that goes from the transverse suture to near the cephalic-prothoracic suture (approximately 100  $\mu$ m before the submarginal line), transverse suture of the molt ex-

tended from the midline to the sides at an angle of approximately 20 degrees, later to subdorsal area and then previously deflected at an approximate angle of 45 degrees in the direction of the apparent margin, ending on it, at a level almost of the meso-metathoracic suture (Figs. 1b, 2a).

**Abdomen.** Abdominal segments I–VIII clearly visible in the middle part with approximate length of: segment I - 37.5  $\mu$ m; segment II - 30  $\mu$ m; segment III - 32.5  $\mu$ m; segment IV - 32.5  $\mu$ m; segment V - 32.5  $\mu$ m;

segment VI - 30 µm; segment VII - 27.5 µm; from suture VIII to operculum - 50 µm; suture VIII to the vasiform orifice ring - 16 µm. Abdominal depressions absent, irregularly shaped semicircular tubercles that cover the submedian area of all abdominal segments, middle part of the abdominal segments with 4 rows of tubercles (some irregular), in each segment the rows vary in size and shape (Fig. 2a). Dorsal surface fully sculptured with irregularly tubercle shaped structures.

#### VASIFORM ORIFICE

Semicordiform (Fig. 2d), 56 µm long and 42 µm in the widest part; quadrangular operculum 23.5 µm long and 30 µm wide, completely covers the lingula and almost the entire length of the vasiform orifice, dorsal surface of the orifice with several groups of longitudinal grooves gives a characteristic sculpture; ring of the vasiform orifice is wide (Fig. 2d). Distance from the posterior margin of the vasiform orifice to the apparent margin (submarginal line) 21.5 µm, defined caudal protuberance and with caudal setae. Abdominal setae VIII anterolateral to the vasiform orifice.

#### PORES

As follows: 8 pairs on the cephalic area, 4 on each side of the midline; 4 pairs on the mesothorax, 2 on each side of the midline; 6 pairs on the metathorax, 3 on each side of the midline; medial area of segments I, III, IV, VII with 4 pairs each segment, segment VIII with 8 pairs; subdorsal area of abdominal segments III, IV, V, VI, and VII with 2 pairs of pores each segment; submarginal area with pores around the pupa closer to the apparent margin.

#### VENTER

Antenna extended to the base of the first pair of legs, prothoracic legs 60 µm long and 50 µm wide (base of the leg), mesothoracic legs 70 µm long and 30 µm wide in the basal segment, metathoracic legs 70 µm long and 32 µm wide, base of the legs smooth, without a band of spines, very thin velvety thoracic cuticle throughout the ventral part, a pair of adhesive sacs near the base of the first pair of legs, abdominal cuticle very smooth and velvety (Fig. 1d).

#### CHAETOTAXY

Anterior marginal setae present (emerging from the teeth), cephalic setae absent, mesothoracic and metathoracic setae present, setae on abdominal segment VIII approximately 10 µm long, located anterolateral of the vasiform orifice, caudal setae present approximately 20 µm long and marginal posterior setae inconspicuous.

*Aleuropleurocelus sampsoni* Sánchez-Flores & Carapia-Ruiz **sp. nov.** is one species included in the *Aleuropleurocelus* boat-shaped group. It can be separated from *A. granulata* in situ by the excretion of wax on the dorsum (Fig. 1a) that is not present in *A. granulata* (Fig. 3a), and in mounted specimens by the combination of characters: transversal lines in the submarginal area absent in *A. sampsoni* (Fig. 2c) and

present in *A. granulata* (Fig. 4c); in *A. sampsoni* the zipper of the longitudinal suture goes from the transversal suture of the molt to the cephalic-prothoracic and does not reach the marginal area (Fig. 2b), in *A. granulata* the zipper reaches the middle of the submarginal area (Fig. 4b). In *A. sampsoni*, the transversal suture of the molt is extended from the midline to the sides, subsequently at an angle of approximately 20 degrees to the subdorsal, and then deviates anteriorly at an angle approximately 45 degrees anterior to the apparent margin, ending there, a little before the meso-metathoracic suture; in *A. granulata* the transversal suture of the molt is almost linear until the subdorsal line, there it anteriorly deviates approximately 40 degrees to the apparent margin of the meso-metathoracic suture; the vasiform orifice is elongated-oval in *A. sampsoni* (Fig. 2d) and oval-shaped in *A. granulata*; spinnerets absent at the base of the legs in *A. sampsoni* (Fig. 3d) but present in *A. granulata* (Fig. 4d). From *Aleuropleurocelus ornatus* Drews & Sampson (Hemiptera: Aleyrodidae), the new species can be separated because *A. ornatus* has a double wax strip on the dorsum and pores in the anterior part of the vasiform orifice, whereas *A. sampsoni* presents the 2 wax strips and no pores before the vasiform orifice.

#### ETYMOLOGY

The specific epithet of the species *Aleuropleurocelus sampsoni* Sánchez-Flores and Carapia-Ruiz **sp. nov.** is referred to W.W. Sampson, in recognition of his contribution to the knowledge of the family Aleyrodidae.

#### HOST PLANT

*Karwinskia humboldtiana* (Roemer & Schultes) Zucc. (Rhamnaceae)

#### DISTRIBUTION

Mexico, Tamaulipas (Victoria and Llera).

#### TYPE MATERIAL

**HOLOTYPE:** Puparium. MEXICO: Tamaulipas, Victoria, Ciudad Victoria, in *K. humboldtiana* 28-IX-2019, Cols. Sánchez-Flores, O.A. and Coronado-Blanco, J.M. Deposited at Colección Nacional de Insectos Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico.

**PARATYPES:** 62 puparia with same data as the holotype. Two paratypes deposited in the same collection; 10 deposited in the Museo de Insectos de la Facultad de Agronomía - Universidad Autónoma de Tamaulipas, Ciudad Victoria, Tamaulipas, Mexico; 30 in the personal collection of the first author (O. A. S. F.) and 20 in the personal collection of the second author (V. E. C. R.).

**Other materials:** 10 pupae. Mexico: Tamaulipas, Llera, Rancho Nuevo, in *K. humboldtiana* 27-X-2019. Col. Coronado-Blanco, J.M. A key to puparia of the 7 species of the genus *Aleuropleurocelus* group *ceanothi* was prepared.

Key to puparia of *Aleuropleurocelus* group *ceanothi* (puparia with transversal suture of the molt until the submarginal line).

1. One or 2 bands of dense wax on dorsum (1 thin band on subdorsum and 1 wide band on submedian area), big pores of double wall on dorsum ..... 2
- 1'. — Without such bands and pores ..... 3
2. (1) Two bands of dense wax on dorsum (1 thin band on subdorsum and 1 wide band on submedian area), big pores of double wall on dorsum ..... *Aleuropleurocelus ornatus* Drews and Sampson



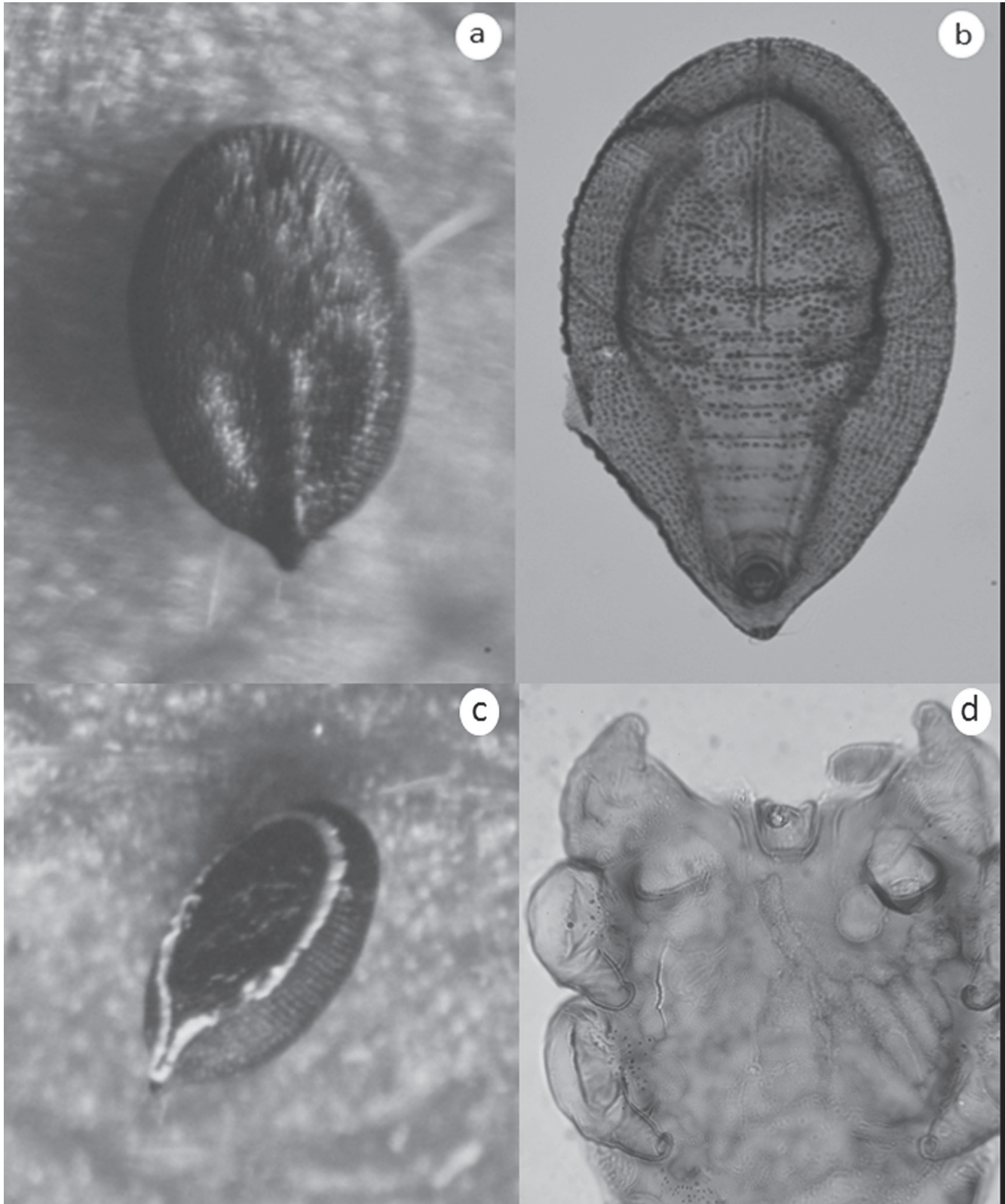


Fig. 3. *Aleuropleurocelus granulata* (Sampson & Drews, 1941): (a) puparium in situ; (b) puparium mounted on slides; (c) puparium in situ, ventral view; (d) legs.

- 2'. — One band of dense wax on dorsum (1 thin band on subdorsum and 1 wide band on submedian area), big pores of double wall on dorsum . . . . . *Aleuropleurocelus sampsoni* Sánchez Flores and Carapia-Ruiz **sp. nov.**
- 3. (1) No evident tubercles on dorsal surface and on submarginal area, only with diminutive tubercles near the abdominal depressions not well or not defined . . . . . 4

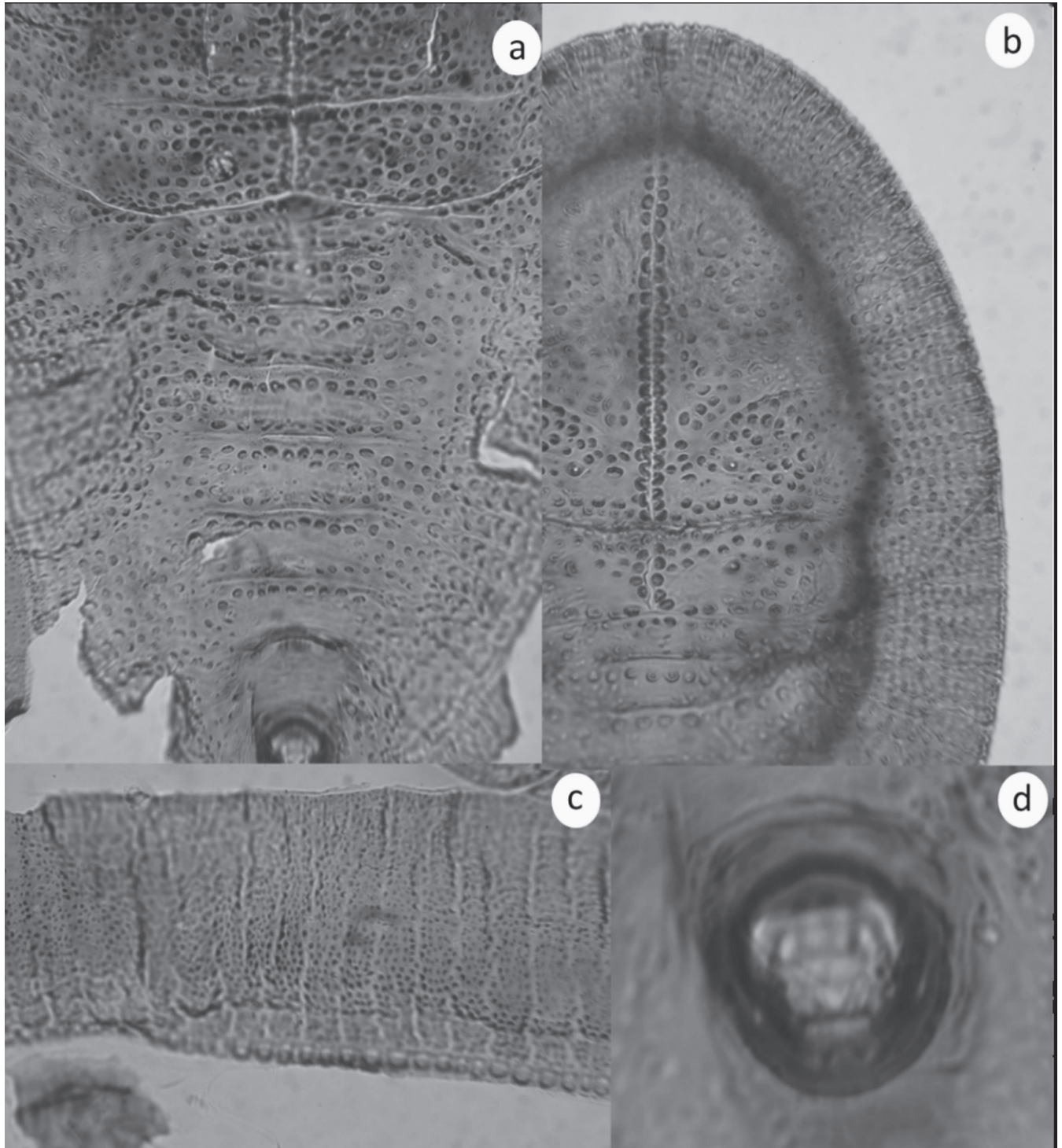


Fig. 4. *Aleuropleurocelus granulata* (Sampson & Drews, 1941): (a) abdominal segments; (b) longitudinal suture of the molt; (c) submarginal area; (d) vasiform orifice.

- 3'.— Evident tubercles on dorsal surface and on submarginal area, only with diminutive tubercles near the abdominal depressions not well defined ..... 5
- 4. (3) Diminutive tubercles near the abdominal depressions not defined ..... *Aleuropleurocelus laingi* Drews and Sampson
- 4'.— Diminutive tubercles near the abdominal depressions well defined ..... *Aleuropleurocelus coachellensis* Drews and Sampson
- 5. (3) Dense tubercles over all the submarginal band arranged or not in bands, subdorsum with transversal bands of tubercles in form of parentheses ..... 6

- 5'.— Submarginal area with small tubercles mainly on the half near to the marginal teeth, the half near the submarginal line with folds or semitransversal lines, subdorsum with transversal bands of tubercles in form of parentheses. . . . . *Aleuropleurocelus sierrae* Sampson
6. (5) Submedian area with tubercles basically on the anterior part of the abdominal segments; submarginal area with dense tubercles arranged in wide bands of approximately 5 tubercles. Transversal suture of the molt straight, with no posterior deviation on the submedian zone . . . . . *Aleuropleurocelus granulata* Sampson and Drews
- 6.— Submedian area with tubercles on the anterior and posterior part of the abdominal segments; submarginal area with dense tubercles without arranged in bands. Transversal suture of the molt straight, with posterior deviation from the longitudinal suture of the molt approximately 20 degrees in the submedian zone . . . . . *Aleuropleurocelus ceanothi* Sampson

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