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Source: Florida Entomologist, 106(2) : 69-73

Published By: Florida Entomological Society

URL: <https://doi.org/10.1653/024.106.0201>

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Description of a new species of *Aleurotulus* Quaintance & Baker (Hemiptera: Aleyrodidae) from Mexico, with a key to species

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Abstract

Aleurotulus carapii Sánchez-Flores & García-Martínez **sp. nov.** is described. This new species was found in Saltillo, Coahuila, and in Monterrey, Nuevo León, Mexico, on the underside of rosemary leaves, *Syngonium neglectum* Schott (Araceae). Microphotographs of morphological structures of puparium are provided, and separation from other *Aleurotulus* species is discussed. A key for the species of the genus is proposed.

Key Words: whiteflies; *Syngonium neglectum*; Coahuila; Nuevo León

Resumen

Se describe *Aleurotulus carapii* Sánchez-Flores & García-Martínez **sp. nov.** Esta nueva especie fue encontrada en Saltillo, Coahuila, y en Monterrey, Nuevo León, México, en el envés de las hojas del romero aromático, *Syngonium neglectum* Schott (Araceae). Se proporcionan microfotografías de las estructuras morfológicas del puparium y se discute la separación con otras especies de *Aleurotulus*. Se propone una clave para las especies del género.

Palabras Clave: moscas blancas; *Syngonium neglectum*; Coahuila, Nuevo León

In recent yr, taxonomic efforts about whiteflies in Mexico have focused on the genera *Aleuropleurocelus* (Sánchez-Flores & Carapia-Ruiz 2018a, b; Sánchez-Flores et al. 2018c, d, 2020; Carapia-Ruiz & Sánchez-Flores 2019a, b; Carapia-Ruiz et al. 2018a; b) and on *Aleurovitreus* (Sánchez-Flores et al. 2018e).

The whitefly genus *Aleurotulus* (Hemiptera: Aleyrodidae) comprises only 6 species in the world (Ouvrard & Martin 2023): *Aleurotulus anthuricola* Nakahara, *Aleurotulus arundinacea* Singh, *Aleurotulus laneus* Martin, *Aleurotulus mundururu* Bondar, *Aleurotulus nephrolepidis* (Quaintance), and *Aleurotulus pteridophytæ* Martin (all Hemiptera: Aleyrodidae). Five of the 6 species are present in the Neotropical region, and only *A. nephrolepis* (Quaintance) occurs in the Nearctic region. *Aleurotulus anthuricola* Nakahara was obtained from *Anthurium*, 1 plant from the family Araceae (Nakahara 1989), the same family for *Syngonium*. The host plant, *Syngonium neglectum* Schott (Araceae), commonly known as rosemary, is an evergreen plant native to Mexico. Whitefly pupae cover the leaves, giving them a cottony appearance.

Materials and Methods

Specimens were collected from the underside of rosemary leaves, *S. neglectum*, in Saltillo, Coahuila, and in Monterrey, Nuevo Leon, Mexico. They were transferred to the taxonomic laboratory for insects and mites in the Departamento de Parasitología Agrícola at Universidad Autónoma Agraria Antonio Narro, Saltillo, Coahuila, Mexico, and then were mounted on slides for examination under a compound microscope Motic BA 310® (Motic Microscopes, Beijing, China). The protocols by Martin (2004), with some modifications, were followed for the preparation of slides. All measurements are given in microns (µm).

OBSERVATIONS AND MEASUREMENTS OF STRUCTURES

The mounted specimens were examined under a compound microscope (Motic BA 310®; Motic Microscopes, Beijing, China)

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equipped with a micrometer and camera to take images at 40×, 100×, 400×, and 1,000×. Microphotographs of morphological structures of the puparium are provided. Separation from other *Aleurotulus* species is discussed and a key for the species of the genus is proposed.

Specimen Depositories

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

OASF-Personal collection of Oscar Ángel Sánchez-Flores, Victoria, Tamaulipas, Mexico.

VECR-Personal collection of Vicente Emilio Carapia-Ruiz, Victoria, Tamaulipas, Mexico.

Results

Aleurotulus Quaintance & Baker

Puparia case small, elliptical to oval, usually light color (except for some, such as *Aleurotulus anthuricola* Nakahara).

DISTRIBUTION

Widespread (Australasian, Nearctic, Neotropical, and Palearctic regions).

TAXONOMY

Aleurotulus comprises species whose puparia display the following combination of characters (Martin 2005): margin regularly toothed, the teeth either simple or each with a gland at its base; if the margin is modified at tracheal openings then it has combs of modified teeth; single submedian pairs of metathoracic, eighth abdominal and caudal setae present, cephalic and mesothoracic pairs present or absent; submargin bearing 7 pairs of tiny setae in cephalothorax and anterior part of abdomen (character shared with species of *Aleurothrixus*, *Aleurotrachelus*, and some species of *Tetraleurodes*); abdomen with or without rhachis; vasiform orifice ovoid to cordate, mostly occupied by the operculum; lingula head large, usually extending beyond boundary of vasiform orifice, but sometime folded vertically into posterior part of the orifice; puparial cuticle pale or brown.

Aleurotulus carapii Sánchez-Flores and García-Martínez sp. nov. (Figs. 1–4)

PUPARIUM

Habitus. Puparia develop big aggregations under leaf blades. Each individual secretes a dense tangle of fine, translucent filaments from dorsal surface, whereas some individuals secrete distinct peripheral wax “stars” (Fig. 1). Puparium in slide (Fig. 2). Outline oval, 0.95 to 0.97 mm long, 0.55 to 0.75 mm wide, generally widest at the abdominal segment I/II. Margin regularly crenulate, teeth not modified at thoracic tracheal openings.

DORSUM

In outer submargin, each marginal tooth with a distinct basal gland, narrower than the tooth; basal glands of non-uniform teeth in pairs of 2 or 3 closer to the margin or other pairs of 2 or 3 farther



Fig. 1. *Aleurotulus carapii* Sánchez-Flores and García-Martínez sp. nov. puparium in situ.

from margin (Fig. 3); glands ovoid and slightly longer than wide; dorsal disc almost completely separated from wide submarginal area, sometimes by 1 disjunctive fold; longitudinal moulting suture reaching puparial margin, distinctly keeled; transverse moulting sutures terminating in subdorsum, opposite median part of abdominal segment I, but their confluence with the longitudinal suture is so far anterior as to be almost contiguous with suture-like meso-metathoracic fold. Dorsal disc with cuticle generally rather smooth; median part of abdomen raised to form a rhachis (Fig. 1) with very finely spinulose cuticle; lateral to rhachis, 4 major pairs of folds are directed posteriad at an acute angle to median line of puparium; abdominal segment VII not reduced in length medially, abdominal segments I to VIII clearly visible in the middle part with approximate length: segment I 80 μ m, segment II 40 μ m, segment III 50 μ m, segment IV 50 μ m, segment V 50 μ m, segment VI 50 μ m, and segment VII 55 μ m.

VASIFORM ORIFICE

Subcordate (Fig. 4), 60 μ m long, 65 μ m wide, about as long as wide; operculum rectangular, convex-sided, hind margin slightly curved anteriorly, occupying two-thirds vasiform orifice; lingula with the head wider than the shaft, circular, bristly surface and with 2 apical setae, usually just lingular head extending beyond bound-



Fig. 2. *Aleurotulus carapiai* Sánchez-Flores and García-Martínez sp. nov. puparium mounted on slides.

ary of vasiform orifice. Pockets (submedian abdominal segment VII/VIII boundary) evident.

PORES

Dorsal disc provided with pore/porette geminate pairs, fairly regularly paired on each side of body, 1 or 2 pairs on each segment of rhachis; outer subdorsum with uneven row of pore/porettes; 1 tiny porette present immediately mesal to some marginal tooth-base glands, and slightly further mesad with a row of slightly larger pores.

VENTER

Tracheal folds absent. Antennal bases anteromesal to fore legs, antennae smooth sided, slightly acute apically and shorter than front legs. Ventral abdominal setae long, fine, similar to posterior marginal pair, underlying mid-point between vasiform orifice and pockets.

CHAETOTAXY

Submarginal area with 7 pairs of tiny setae (the anterior most 6 pairs depicted), these are difficult to see if margin is curled down. Posterior marginal setae present, hair-like; anterior marginal setae not always evident but shorter than posterior pair. Submedian setal pairs



Fig. 3. *Aleurotulus carapiai* Sánchez-Flores and García-Martínez sp. nov. submarginal area.

as follows: the cephalic absent; metathoracic thickened but long and rather ribbon-like, 150 mm; eighth abdominal broad, stout and acute, 80 mm in holotype; caudal, very long and fine, 100 mm in holotype.

COMMENTS

Aleurotulus carapiai is a member of the *A. mundururu* group, differing from *Aleurotulus laneus* Martin principally because of the absence of cephalic setae, and from *Aleurotulus mundururu* Bondar because the basal glands of the teeth are non-uniform, and the submarginal furrow is present.

ETYMOLOGY

Named for Vicente Emilio Carapia-Ruiz, in recognition of his contribution to the study of whiteflies for Mexico.

HOST PLANT

Syngonium neglectum Schott. Family: Araceae Juss.

DISTRIBUTION

Mexico: States of Coahuila (Saltillo) and Nuevo León (Monterrey).



Fig. 4. *Aleurotulus carapiai* Sánchez-Flores and García-Martínez sp. nov. vasiform orifice.

TYPE MATERIAL

HOLOTYPE: Mexico: Coahuila, Saltillo. 19–X–2016, collector Sánchez-Flores O. A. ex: on the underside of leaves of *Syngonium neglectum* Schott. Deposit: Holotype CNIN; 1 puparium.

PARATYPES: 205, same data as holotype. Deposit: CNIN 5; OSSF 100 puparia; VECR 100 puparia.
OTHER MATERIALS. Mexico, Nuevo León, Monterrey. 15–X–2015, collector García-Martínez O. ex: on the underside of leaves of *Syngonium neglectum* Schott. 270 puparia. Deposit: OSSF.

Key to species of *Aleurotulus* pupal cases (modified from Mound et al. 1994)

- Aleurotulus arundinacea* Singh is excluded from the key because it is considered an *incertae sedis* species (see Mound et al. 1994: 1409).
- 1. Pupal case dark brown to black; median area of abdomen not rhachisform. *Aleurotulus anthuricola* Nakahara
 - 1'.— Pupal case pale to dusky; median area of abdomen at least slightly rhachisform 2
 - 2. (1) Abdominal rhachis with pronounced oblique lateral rays, which extend almost to submargin 3
 - 2'.— If abdominal rhachis present lateral rays, these are short and perpendicular to longitudinal axis of puparium 5
 - 3. (2) Cephalic setal pair present; longitudinal moulting suture not keeled *Aleurotulus laneus*
 - 3'.— Cephalic setal pair absent; longitudinal moulting suture strongly keeled, often folding laterally in slide-mounted specimens 4
 - 4. (3) Basal glands of the teeth uniform; submarginal furrow absent *Aleurotulus mundururu*
 - 4'.— Basal glands of the teeth non-uniform; submarginal furrow present *Aleurotulus carapiai* sp. nov.

5. (2) Marginal teeth bases without associated glands; teeth at areas of thoracic tracheal openings modified, the 'comb' slightly protruding of the main outline of puparium. *Aleurotulus nephrolepidis* (Quaintance)
- 5'.— Marginal teeth base with associated glands; if teeth at areas of thoracic tracheal openings modified at all, then not standing proud of the main outline of puparium. *Aleurotulus pteridophytae* Martin

Acknowledgments

We thank the Program for Professional Teacher Development (PRODEP), and John Martin for his help with comments and scientific papers. We thank Luiza Collin (CELLAP, UAT), who helped with the English style.

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