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A new species of *Lohmannia* (Acari: Oribatei: Lohmanniidae) from mangroves at Quintana Roo (Mexico)

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**ABSTRACT** — A new species of *Lohmannia*, *L. maya* n. sp., from mangrove soils in Mexico is described and illustrated. It is morphologically similar to *L. similis* Balogh, 1962, *L. jornoti* Mahunka, 1985 and *L. lanceolata* Grandjean, 1950 but differs from these species in having lateral and posterior setae wide in their proximal half and thin in their distal half, ending in a sharp tip, and a continuous notogastral band S8. It also has a smaller body size (727 µm) compared with the three aforementioned species (790, 810 and 840 µm respectively). The 11 species of the genus *Lohmannia* recorded from the Americas were compared, a key for them is included, and some ecological notes for the new species are also provided.

**KEYWORDS** — mites; taxonomy; mangrove fauna; key; Mexico

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**INTRODUCTION**

Data on taxonomy and ecology of oribatid mites from Mexico have been increasing in the last two decades (Palacios-Vargas & Iglesias, 2004) and ecological contributions have been published recently (García et al. 2014). Six genera of the family Lohmanniidae are known from Mexico, among which the genus *Lohmannia* is represented by three recorded species: *L. banksi* Norton et al., 1978 from Veracruz, Campeche and Hidalgo states; *L. juliae* Mahunka, 1984 from Veracruz and *L. lanceolata* Grandjean, 1950 from Quintana Roo (Vázquez, 2001).

Much later after the review of the Lohmanniidae by Granjean (1950), that of Sengbusch (1984) included the description of a new species from Micronesia and a comparison with most of the known taxa belonging to the genus *Lohmannia*. Recently, Norton and Ermilov (2014) did a historical review of immature oribatids where they include members of *Lohmannia*.

*Lohmannia* is a Cosmopolitan genus with 27 species, including two subgenera, *Lohmannia* (*Lohmannia*) and *Lohmannia* (Carolohmannia), as well as two subspecies, *Lohmannia* (L.) javana javana Balogh, 1961 and *Lohmannia* (L.) javana interrupta Choi, 1985 (Subías, 2004, online version 2016) but few have been recorded from the Americas until now.

From the United States of America, *L. texanus* Banks, 1910; *L. (Carolohmannia) carolensis* Norton et al., 1978; and *L. banksi* Norton et al., 1978 were described, the latter species occurs also in Mexico. From the Antilles (Marie-Galante, Guade-
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Loupe), L. jornoti Mahunka, 1985 was described, there are records of L. lanceolata Grandjean, 1950 from Panama and Peru. From South America, L. bifoliata Willmann, 1936 from Curacao and part of the Antilles; L. juliae Mahunka, 1984 from Paraguay and L. (lanceolata) turcmenica Bulanova Zachvatkina, 1960 from Argentina are known. Lohmannia vulcania Schatz, 1993 was described from the Galapagos Islands and L. similis Balogh, 1962 was recorded from Peru and the Galapagos Islands.

In this contribution we describe a new species of Lohmannia from Mexico and a key for those known from the Americas is provided and some new ecological data for the new taxon is given.

**Materials and Methods**

Mites were collected from mangrove soil and litter samples from Chetumal Island and fixed in 75% ethanol. Only 34 specimens of Lohmannia were found, and some were mounted under smooth slides in Hoyer’s solution and other were kept in 75% ethanol. Four specimens were dissected and mounted. Observations and measurements were undertaken under a phase-contrast Carl Zeiss microscope Axiostar plus and drawings were done with the aid of a “camera lucida”. In the description, all body measurements are in micrometers (µm) and indicated between parentheses after each morphological character. Setal nomenclature follows those of Grandjean (1950) and Norton (1977).

**Results**

**Description of species**

*Lohmannia maya* n. sp. (Figures 1-3)

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**Diagnosis** — Body length (n = 10) 727 (690–751), width 342 (320–358). Color light to medium brown. *Lohmannia maya* n. sp. differs from its congeners by the combination of smallest size; body surface homogeneously finely punctated; evenly covered with fine spots; posterior exopseudostigmatic setae (exp) dilated but elongated, about twice as long as its width; transverse bands S3 – S7 and S9 medially interrupted; all prodorsal and all 16 pairs of gastronomic setae phylliform, with serrated margins; setae p1 and p2 of different length and width, setae p1 directed dorsal; 2 pairs of subcapitular setae phylliform; epimeral setae strongly dilated; all medial genital setae setiform and smooth, lateral setae dilated and ciliate; all anal setae phylliform and slightly ciliate; legs with 2 kind of setae, setiform and ciliate, and broadly phylliform with serrated margins.

**Type-specimen** — Holotype (length: 740; width: 347) female mounted on slide and deposited in the acarological collection of Laboratorio de Ecología y Sistemática de Microartrópodos, Facultad de Ciencias, UNAM, Mexico. Original label 04/sep/2011, ex mangrove litter on littoral marine, A. García col.

**Paratypes** — All specimens are females, 15 on slide and 18 stored in 75% ethanol. Original labels. 04/sep/2011, ex mangrove litter of littoral marine sand, A. García col. All the material will be deposited in the acarological collection of Laboratorio de Ecología y Sistemática de Microartrópodos, Facultad de Ciencias, UNAM.

**Prodorsum** — (Figure 1A) slightly elongated, anterior part wide, almost membranous. Lateral margin weakly bisinuate anterior to setae exa. Transverse band Sb between interlamellar setae distinct, straight, clearly situated anterior to gastronomic tectum.

Setae ro slightly phylliform, with serrated margins, length 105 (86–111), with sharp tip, reaching anteriad of the rostrum. Setae le 94 (81–101), similar to ro but shorter; setae exa phylliform, with serrated margins, 48 (39–64); setae exp dilated and elongated, about twice long its width, 47 (42–53), with serrated margins and finely spinose surface (Figures 1A, D). Sensillus (ss) with 11 branches, distally increasing in length 91 (81–99), with four to six small spines opposite to branches (Figure 1A, D). Setae in 95 (83–104), phylliform with serrated margins.

**Notogaster** — (Figure 1A) Lateral margins parallel in anterior half, posteriorly rounded. Transverse bands weekly developed, bands S3 – S7 and S9 incomplete and interrupted medially; S6 incomplete
Figure 1: Lohmannia maya n. sp. ♀: A – dorsal chaetotaxy; B – ventral chaetotaxy; C – subcapitulum setae; D – prodorsal setae: ss = sensillus, exp = posterior exopseudostigmatic, exa = anterior exopseudostigmatic, ro = rostral, le = lamellar.
on each side. Band Ss complete. Lyriflies are hardly discernible: ia located laterally, at the level epimeral setae 3c; im located dorsally, next setae e2; ip laterally, in the middle part of notogaster; ips ventrally, next to preanal plate and ih between setae h3 and p3 (Figures 1A-B).

Sixteen pairs of gastronomic setae present, all phylliform, with serrated margins. Setae of inner rows e1, e2, d1, d2, c1, shorter and thinner than those of margins. Setae p1 strongly dilated, constantly erected dorsally; making it much shorter than p2 in dorsal aspect (Figure 1A-B). Measurements of setae (n=10): c1 60 (47-72), c2 74 (62-91), c3 105 (94-120), d1 62 (47-74), d2 66 (49-76), d3 103 (89-114), c1 67 (49-81), e2 73 (64-81), f1 89 (72-101), f2 95 (76-104), h1 103 (79-111), h2 90 (76-106), h3 105 (91-114), p1 70 (59-77), p2 107 (94-116), p3 105 (94-111).

Ventral region (Figure 1B-C)

Gnathosoma — Chelicerae and palps are very similar in appearance to those of L. lancicollata Grandjean, 1950. Subcapitulum with setae h (29) phylliform, strongly dilated with serrated margins, m3 (37) longer and thinner than h and both setae have spiculate surface, setae m1 (42) setiform and slightly ciliate, setae a (50) setiform and smooth. Three pairs of adoral setae, or1 (26) more or less triangular; or2 (40) long, setiform, thick and smooth; or3 (33) setiform, smooth and pointed, shorter than or2 (Figure 2A). Palptarsus with solenidion longer than segment (Figure 2B). Cheliceral setae cbb (43), long, setiform, slightly serrated; seta cha (5) very short and thin (Figure 2C).

Epimeral region — Apodeme I complete, with two sternal extensions medially; apodeme II incompletely medially; apodeme III complete with short central extension directed posteriorly; apodeme IV complete, uniform. Epimeral formula: 3-1-3-4, all setae strongly dilated with spiculate surface; setae of median row (1a to 4a) shorter and smaller than those of the lateral rows.

Anogenital region — Genital region with 6 pairs of medial setiform and smooth setae, 4 pairs of lateral setae phylliform and ciliate. The anterior lateral setae inserted close to median row. Measurements of setae: Medial g1 = 27, g2 = 27, g3 = 27, g4 = 32, g5 = 32, g6 = 30; lateral g1 = 32, g2 = 32, g3 = 35, g4 = 37. Preanal plate wide, width equal to that of genital plate. Adanal setae phylliform with serrated margins tapering distally. The 4th pair of adanal setae slightly thinner. Measurements of setae: ad1 = 79, ad2 = 81, ad3 = 81, ad4 = 79. Anal setae setiform and smooth; the second pair of anal setae reaching the insertion first pair. Measurements of anal setae: a1 = 49, a2 = 59. One additional adanal seta was observed in one specimen.

Legs — (Figure 3A-D). All legs monodactylic, short and stout. Femora I and II with ventral ridge. Claws without any ventral tooth. Legs of adults with two different kinds of setae: wide phylliform with serrate margins and spiculate surface, setiform and ciliate. Setal formulae of adult legs from trochanter to tarsus (solenidia between parenthesis) as follows: leg I 0-5(2)-5(1)-15(2+); leg II 0-6(3)-4(1)-13(1); leg III 2-3(1)-3(1)-12, leg IV 2-3(2)-1-2-12 (Figure 3A-D, Table 1).

Material Examined — Type-locality: Mexico: Quintana Roo: Isla Cozumel: 20°16′26.75″N, 86°59′11.69″W; ex mangrove litter Rhyzophora mangle and Avicennia germinans on littoral marine sand, in September, November of 2011 and March 2012, A. García col.

Etymology — The species is named after the Maya region, the area where it was found.

Distribution — Known only from the type locality, at Cozumel, Quintana Roo, México.

Ecology — It seems that species of this genus are quite well adapted to salinity, as several specimens of L. simillis Balogh, 1962 were collected from mangrove in Bermuda Islands (Schatz & Schuster, 2012) and Galápagos (Schatz, 1993), L. joroti Mahunka, 1985 described from Marie-Galante (Antilles), was 12 (Figure 3A-D, Table 1).

Galápagos (Schatz, 1993), L. joroti Mahunka, 1985 described from Marie-Galante (Antilles), was collected from the beach pebbles and L. maya n. sp. comes from Laguna Chuc Chacaab, Cozumel, Quintana Roo, in mangrove litter close to marine littoral where A. germinans tree was dominant. It may be a quite rare species as it was only found in three of the four months sampled: March, September and November but not in April. Relative humidity was 59 and 91 % during dry and rainy season, respectively. Temperature was 29.69 – 24.67 °C at noon; soil salinity was 36.8 – 32.3 %, while pH very alkaline (7.5-8.7). A total of 200 samples were col-
FIGURE 2: Lohmannia maya n. sp. ♀: A – subcapitulum; B – Palp; C – chelicera.
FIGURE 3: *Lohmannia maya* n. sp. ♀: A – chaetotaxy of first leg; B – chaetotaxy of second leg; C – chaetotaxy of third leg; D – chaetotaxy of fourth leg.
Remarks — Schweitzer (1993) made a comparison of several neotropical species from the "lanceolate" group and studied the type of species of Lohmannia from two localities: Peru and Galapagos Islands. Lohmannia maya sp. n. is very close to L. maya, as they share the following characters: they have a similar shape and length of setae, the lateral margins of the notogaster, and the same shape of the subcapitulum. Besides that, the new species is the smallest in length among all Lohmannia known from America. Table 2 shows a comparison of species of Lohmannia occurring in America.

Key to the American species of Lohmannia

1. Setae expanded, almost circular or elongated; 2. Setae clypeus dilated but elongated; 3. Setae clypeus dilated, almost circular or elongated; 4. Setae maxillae produced, almost circular; 5. Setae maxillae produced, almost circular.

Table 1: Leg formula of Lohmannia n. sp. (Phylliform setae are noted in bold).

Table 2: Comparison of species of Lohmannia occurring in America.
3. Setae ro much longer than le; setae in no reaching insertion of setae c1
— Setae ro only slightly longer than le; setae in reaching insertion setae c1
Maximum length: 751 µm; maximum width: 351 µm. — L. maya n. sp. Mexico

4. Setae p1 phylliform and straight; marginal setae of notogaster sparsely ciliate. Maximum length: 930 µm; maximum width: 390 µm. — L. similis Balogh, 1962 Peru, Galápagos Islands
— Setae p1 phylliform and curved; marginal setae of notogaster unilaterally densely ciliate. Maximum length: 840 µm; maximum width: 405 µm. — L. bifoliata Willmann, 1936. Curaçao

5. All gastronotic setae broadly dilate
— All gastronotic setae phylliform

6. With grooves running longitudinally on prodorsum; sensillus bristle-shape; setae le as long as ro. Maximum length: 400 µm. — L. texanus Banks, 1910 U.S.A.
— Without grooves on prodorsum; sensillus pectinate; setae le shorter than ro. Maximum length: 886 µm; maximum width: 443 µm. — L. banksi Norton et al., 1978 U.S.A., Mexico

7. Setae p1 phylliform and narrow
— Setae p1 phylliform but dilate

8. Setae le longer than ro; gastronotic median setae phylliform, long and narrow. Maximum length: 880 µm. — L. lanceolata Grandjean, 1950 Panama, Peru
— Setae le shorter than ro; gastronotic median setae phylliform, short and dilated. Maximum length: 898 µm; maximum width: 422 µm. — L. juliae Mahunka, 1984 Paraguay

9. Anal setae 2 no reaching insertion anal setae 1
— Anal setae 2 reaching insertion anal setae 1. Maximum length: 826 µm; maximum width: 410 µm. — L. jornati Mahunka, 1985 Antilles (Marie-Galante, Guadeloupe)

10. Solenidia of tibia I not so long, less long than the leg; setae le strongly phylliform, with serrated margins, curved, slightly funnel-shaped. Maximum length: 1125 µm; maximum width: 500 µm. — L. vulcania Schatz, 1993 Galápagos Islands
— Solenidia of tibia I very long, longer than leg; setae le narrowly phylliform. Maximum length: 800 µm; maximum width: 440 µm. — L. (lanceolata) turcmenica Bulanova-Zachvatkina, 1960 Argentina

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