

Contribution to the knowledge of lohmanniid oribatid mites (Acari: Oribatida: Lohmanniidae) of Cuba

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Abstract: A list of identified oribatid mites of the family Lohmanniidae (Acari, Oribatida) collected from Cuba, including 4 species from 4 genera, is provided. The genus *Heptacarus* and species *Heptacarus supertrichus* Piffi, 1967 are recorded in Cuba for the first time. A new species of *Annectacarus* is described from leaf litter in forest of Valle de Viñales National Park. *Annectacarus vinalesensis* sp. n. is morphologically most similar to *A. krachan* Mahunka, 1995, but the new species differs from the latter by the rostrum with indentation and the presence of six pairs of neotrichal notogastral setae and six pairs of setae on epimere I. An identification key to the known species of *Annectacarus* in the Neotropical region is given.

Key words: oribatid mites; Lohmanniidae; morphology; taxonomy; new species; fauna; Cuba

Introduction

At present, lohmanniid mites are poorly known in Cuba and their number does not exceed 10 species (Călugăr & Vasiliu 1983; Palacios-Vargas & Socarrás 1993; Starý 1998; Socarrás & Palacios-Vargas 1999; Prieto Truebo & Schatz 2004). This work is a part of our continuing study (Ermilov & Tolstikov 2015) on the Cuban fauna of oribatid mites (Acari: Oribatida), and it includes the data on the family Lohmanniidae.

In the course of the taxonomic identification we found four species from four genera of Lohmanniidae, one is new for science. The main goal of the paper is to present data on the specific localities, notes on new records and the general known distribution of registered taxa, and to describe a new species under the name *Annectacarus vinalesensis* sp. n.

The genus *Annectacarus* was proposed by Grandjean (1950) with *Annectacarus mucronatus* Grandjean, 1950 as type species. It comprises 17 species, which are distributed in the Ethiopian, Neotropical and Oriental regions and Polynesia (Subías 2004, updated 2015). The main generic traits were listed by Grandjean (1950). The identification keys to selective species were presented by Coetzee (2001) and Balogh & Balogh (2002). Identification key to known species of *Annectacarus* in the Neotropical region is given below.

Material and methods

Our results are based on collections from three localities in Cuba (the material was deposited in the insufficiently labelled collection of the late Dr. Lidia Golosova at Tyumen State University, Museum of Zoology, Russia):

– Cuba 1: Parque Nacional Alejandro de Humboldt, 20°30' N, 74°40' W, leaf litter in forest.

– Cuba 2: Valle de Viñales National Park, 22°40'56.8" N, 83°42'57.5" W, Ancon, leaf litter in forest.

– Cuba 3: Cayo Santa Maria, 22°66'21" N, 78°96'88" W, leaf litter in forest.

Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration, all measurements are in micrometers. The body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width in dorsal aspect. Lengths of body setae were measured in lateral aspect. Formulas for leg setation are given in parentheses according to the sequence trochanter–femur– genu–tibia–tarsus (femulus included). Formulas for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus. General terminology used in this paper follows that of Grandjean (1950) and Norton & Behan-Pelletier (2009). Drawings were made with a drawing tube using a Carl Zeiss transmission light microscope “Axioskop-2 Plus”. Images were obtained with an AxioCam ICc3 camera using a Carl Zeiss transmission light microscope “Axio Lab.A1”.

Annectacarus vinalesensis sp. n. (Figs 1–9)

Diagnosis. Body size: 490–498 × 265. Body surface with dense microfoveolae; macropolygonal pattern absent. Rostrum with indentation and tooth. Transverse bands reduced, represented by oval parts between bothridia and on notogaster and epimeres. Notogaster with centro-dorsal setae c_1 , d_1 , e_1 , f_1 setiform, smooth; other setae longer, thickened, ciliated; six pairs of neotrichal setae present. Epimeral setal formula: 6–4–3–4. Three pairs of genital setae smooth, other seven pairs ciliated.

Description. *Measurements.* Body length: 498 (holotype: female), 490–498 (three paratypes: all females); notogaster width: 265 (holotype and three paratypes).

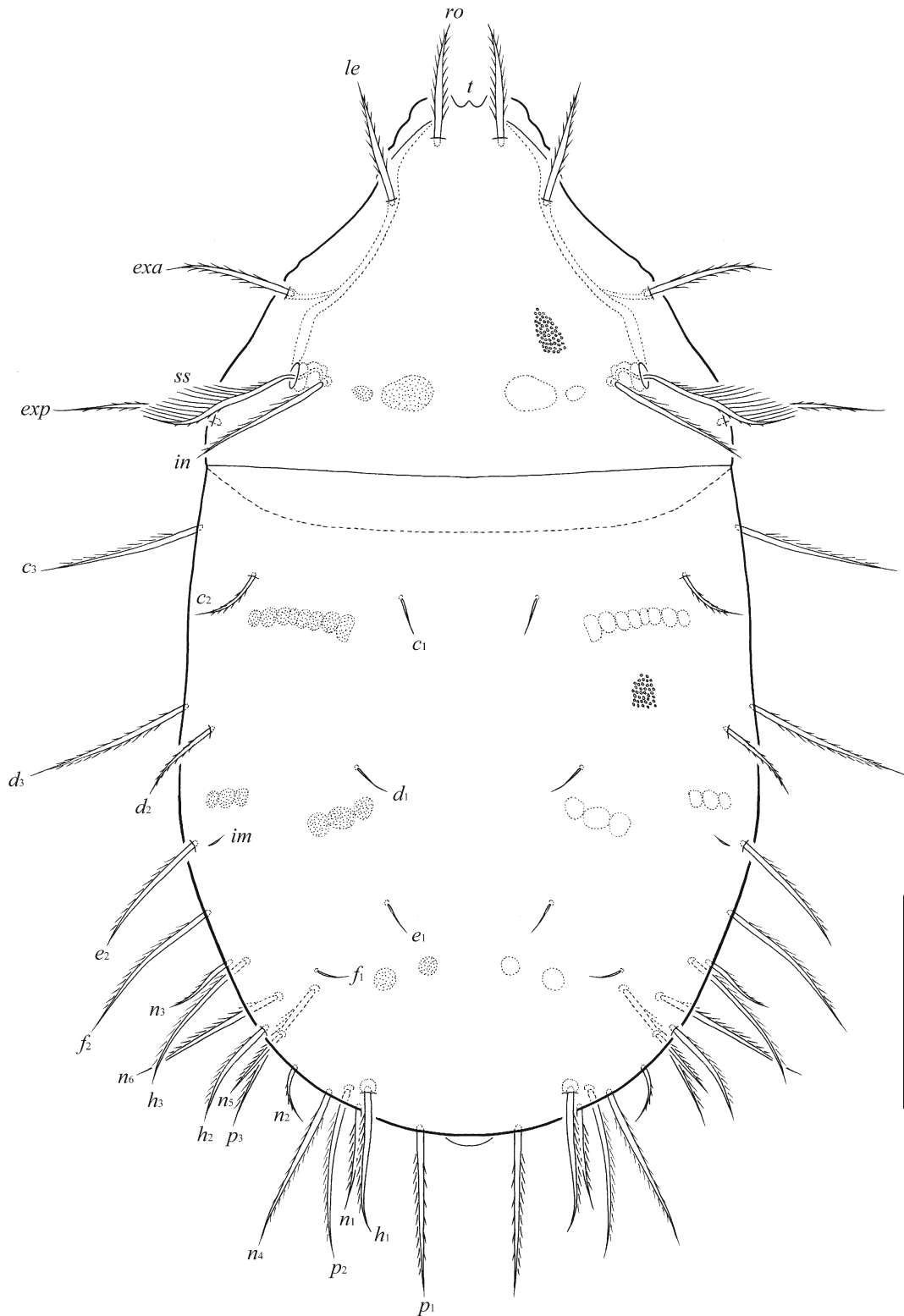


Fig. 1. *Annectacus vinalesensis* sp. n., adult: dorsal view. Scale 100 μ m.

Integument. Body color yellow. Surface and legs with dense microfoveolae (length up to 4) forming micropolygonal ornamentation; macropolygonal pattern absent.

Prodorsum. Roughly triangular in dorsal view, occupying about 1/3 of dorsal length. Rostrum with deep

indentation having small median tooth (*t*) and wavy antero-lateral sides. Rostral (*ro*, 61–69), lamellar (*le*, 77–90), interlamellar (*in*, 82–90) and both pairs of exobothridial (*exa*, 77–90; *exp*, 82–90) setae thickened, ciliated. Bothridial setae (*bs*, 86–94) pectinate, with 11 to 14 long and three to four short branches on one side,

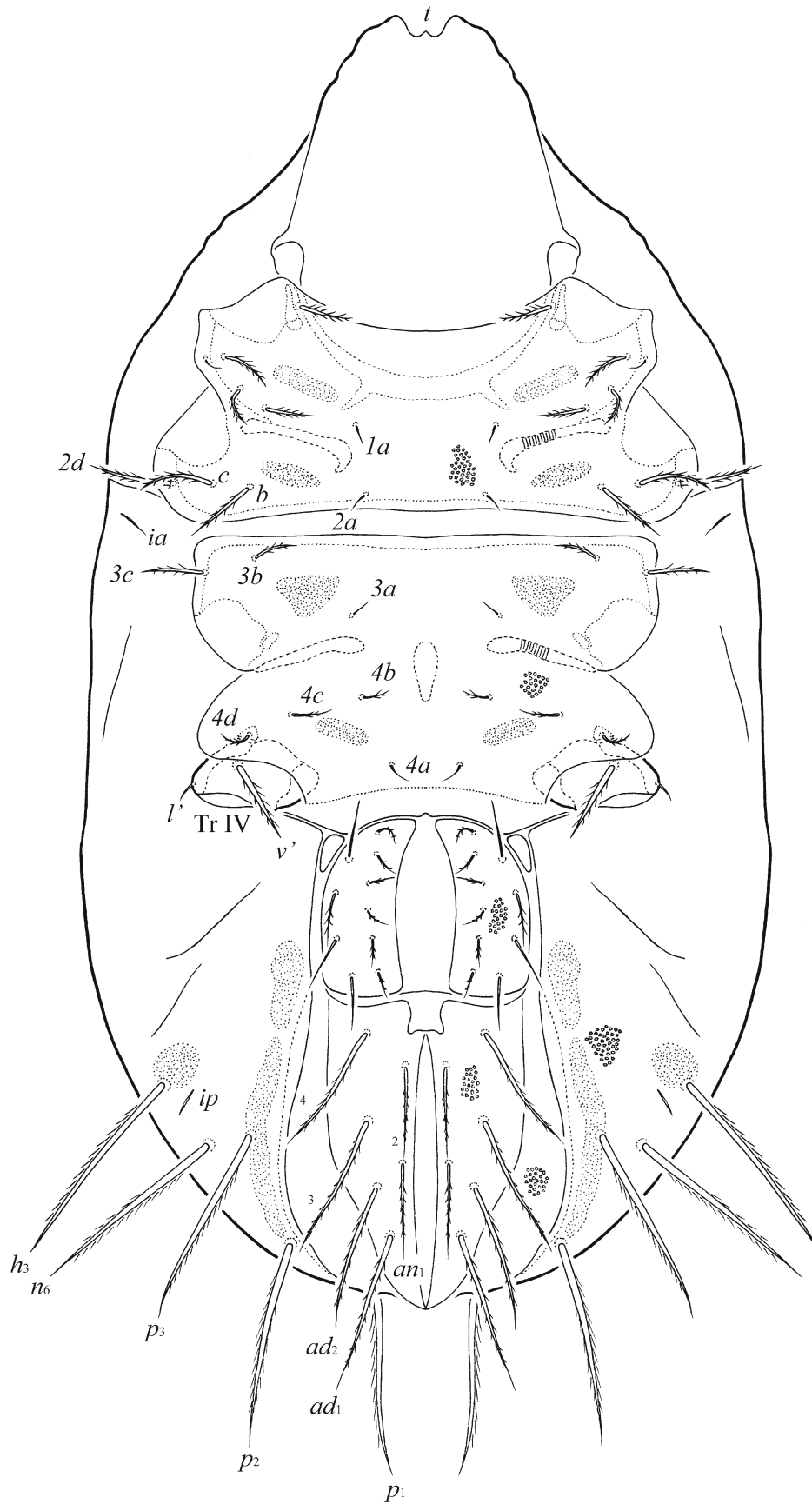
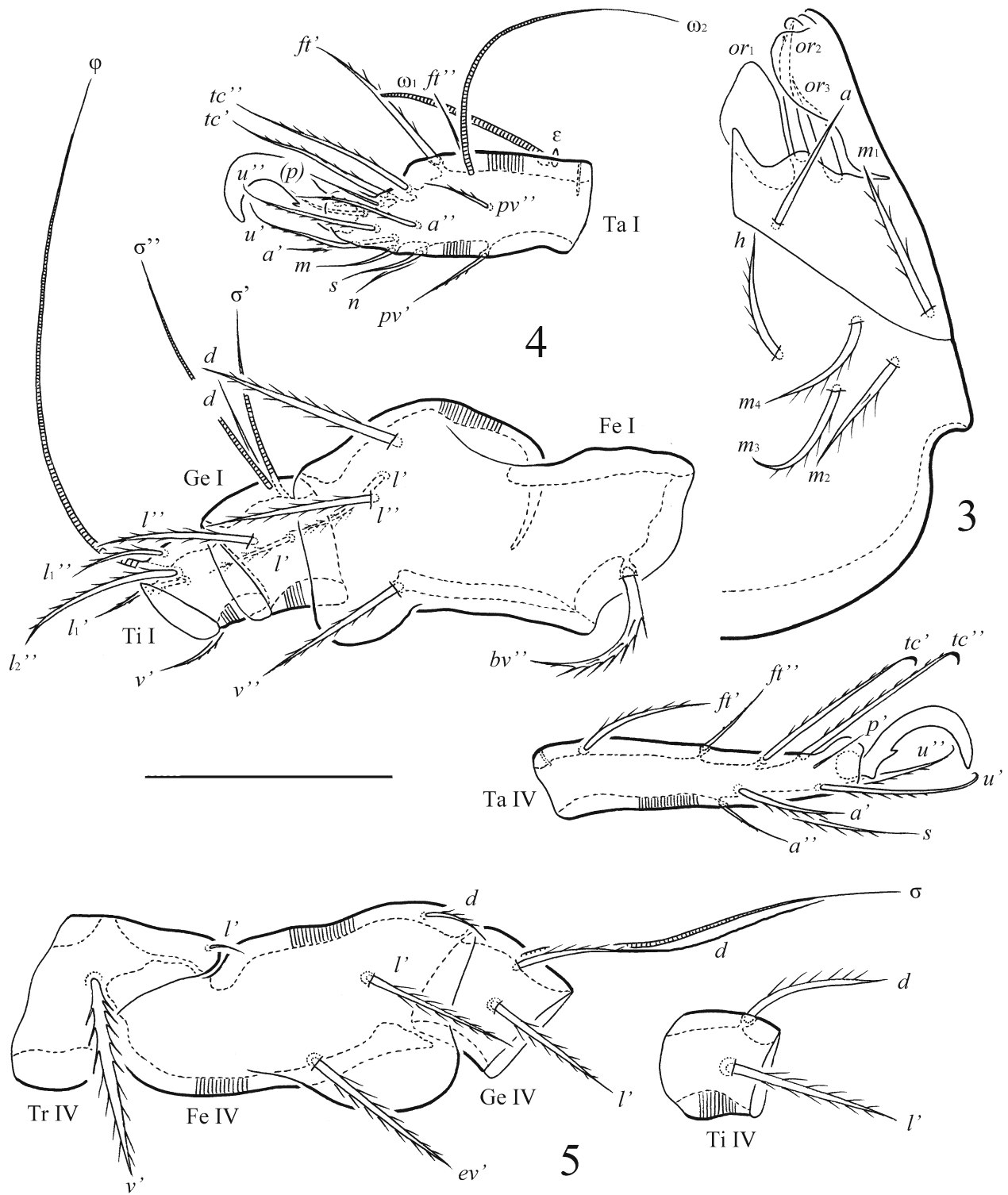


Fig. 2. *Annectacarus vinalesensis* sp. n., adult: ventral view (gnathosoma and legs except trochanters IV not illustrated). Scale 100 μ m.



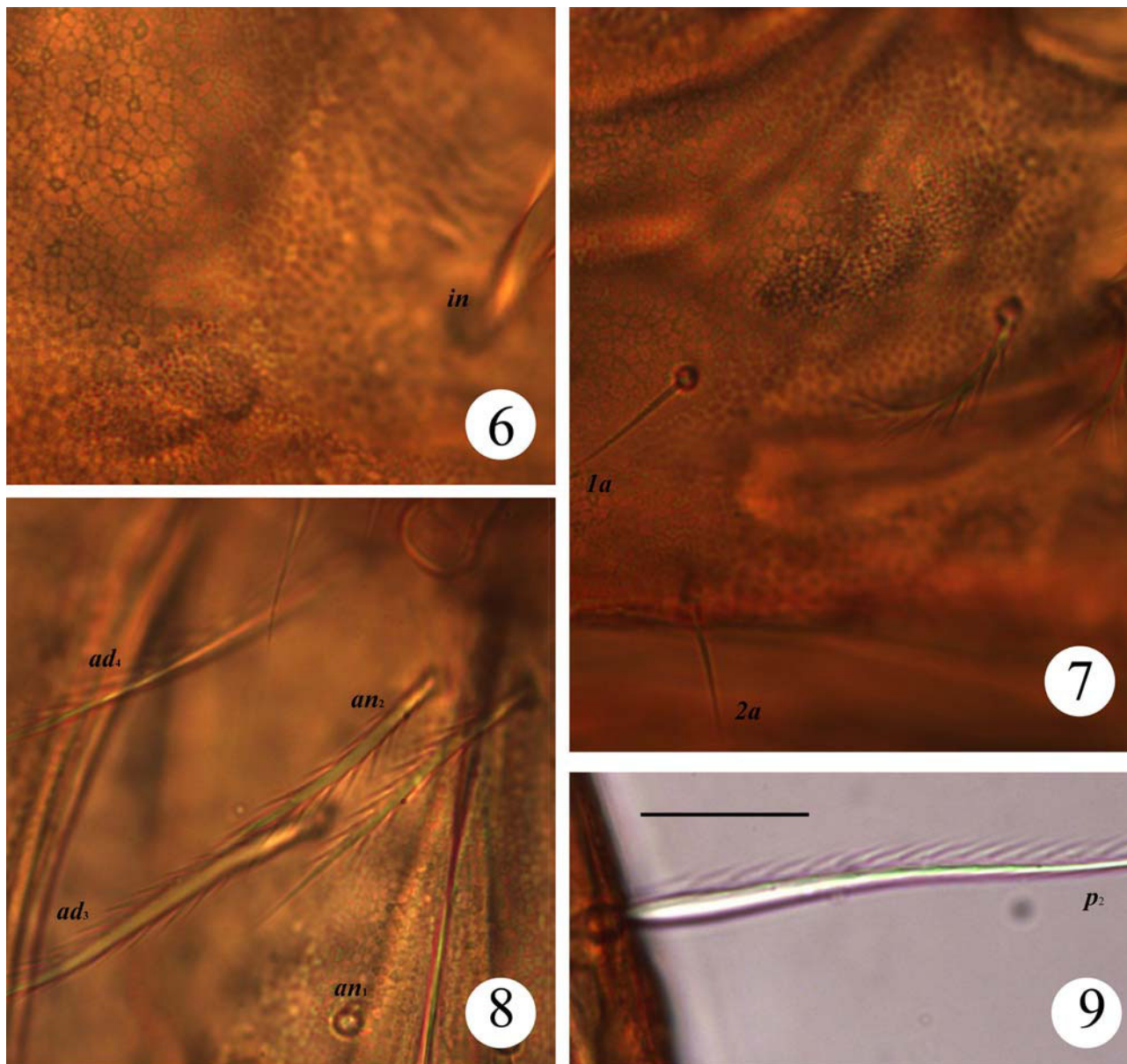
Figs 3-5. *Annectacarus vinalesensis* sp. n., adult: 3 - left half of subcapitulum, ventral view; 4 - leg I, without trochanter, left, antiaxial view; 5 - leg IV, left, antiaxial view. Scale 50 μ m.

and five to seven short cilia on the opposite side. Postbothridial transverse band reduced, represented by one or two pairs of oval parts between bothridia.

Notogaster. Anterior notogastral border straight. Sixteen pairs of primary notogastral setae and six pairs of additional neutrichal (*n*) setae present. Centro-dorsal setae *c*₁, *d*₁, *e*₁, *f*₁ similar in length (20-24), setiform, smooth; setae *n*₂, *n*₃ and *n*₅ (32-36), *c*₂ and *d*₂ (36-

41), *e*₂, *h*₂ and *n*₁ (53-61) and *c*₃, *d*₃, *f*₂, *h*₁, *h*₃, *p*₁-*p*₃, *n*₄ and *n*₆ (82-94) thickened, ciliated. Lyrifissures *ia*, *im* and *ip* distinct, other not visible. Transverse bands represented by several oval parts posterior to *c*₁-*c*₂, *d*₁ and *e*₁ and near to setae *h*₃; elongate transverse band present laterally to aggenito-adanal region.

Gnathosoma. Generally morphology of subcapitulum, palps and chelicerae typical for Lohmanniidae



Figs 6–9. *Annectacarus vinalesensis* sp. n., dissected adult, microscope images: 6 – transverse band, insertion of interlamellar seta and ornamentation in basal part of prodorsum; 7 – left half of epimeres I and II; 8 – right half of anterior part of ano-adanal region; 9 – medio-basal part of notogastral seta p_2 . Scale 20 μm .

(Grandjean 1950; Ermilov et al. 2012). Subcapitulum longer than wide (131–139 \times 110–118), with one pair of lateral tubercles. Subcapitular setae similar in length (32–36); h and m_1 – m_4 thickened, ciliated; a thickened, smooth. Three pairs of adoral setae present: or_1 (20–24) wide, lobe-formed, smooth; or_2 (32–36) thickened, with tooth in distal part; or_3 (20–24) thickened, smooth. Palps (57–61) with setation 0–1–0–1–10(+ ω). Distal three setae fused basally. Solenidia longer than palptarsi, thickened. Chelicerae (159–164) with two smooth setae; chb of medium size (41), setiform, cha short (6–8), thin.

Epimeral region. Anterior part of epimere IV separated medially by longitudinal sternal apodeme. Epimeral setal formula: 6–4–3–4. Medial setae $1a$, $2a$, $3a$ and $4a$ and one pair of lateral setae of epimere I short (16–20), setiform, smooth, $3b$, $3c$, $4b$, $4c$ and $4d$ (24–

28) setiform, ciliated, other setae (36–41) slightly thickened, ciliated. One pairs of elongate oval (sometimes triangular on epimere III) transverse bands present on all apodemes.

Anogenital region. First antero-lateral pair and two pairs of postero-lateral genital setae (28–32) setiform, smooth; second antero-lateral pair (28–32) and other six pairs of medial setae (12–16) setiform, ciliated. Two pairs of anal (an_1 , an_2 , 41–45) and four pairs of adanal (ad_1 – ad_4 , 73–82) thickened, ciliated. Ventrolateral bands not developed. Lyrifissures iad not visible.

Legs. Generally morphology of leg segments, setae and solenidia typical for Lohmanniidae (Grandjean 1950; Ermilov et al. 2012). Claw of each leg smooth dorsally and with small tooth on ventral side. Formulas of leg setation and solenidia: leg I (0–5–3–4–16) [2–1–2], leg II (0–6–3–4–13) [1–1–2], leg III (2–4–2–2–11) [1–1–

Table 1. Leg setation and solenidia of adult *Annectacarus vinalesensis* sp. n.

Leg	Tr	Fe	Ge	Ti	Ta
I	–	<i>d</i> , (<i>l</i>), <i>bv</i> "', <i>v</i> "'	(<i>l</i>), <i>dσ</i> "', <i>σ</i> '	(<i>l</i> ₁), <i>l</i> ₂ "', <i>v</i> ', <i>φ</i>	<i>ft</i> '', (<i>tc</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>), <i>m</i> , <i>n</i> , <i>ε</i> , <i>ω</i> ₁ , <i>ft</i> "' <i>ω</i> ₂
II	–	<i>d</i> , (<i>l</i> ₁), <i>l</i> ₂ "', <i>bv</i> "', <i>v</i> "'	(<i>l</i>), <i>dσ</i>	(<i>l</i> ₁), <i>l</i> ₂ "', <i>v</i> ', <i>φ</i>	(<i>ft</i>), (<i>tc</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>), <i>ω</i> ₁ , <i>ω</i> ₂
III	<i>l</i> ', <i>v</i> '	<i>d</i> , <i>l</i> _a '', <i>l</i> _p '', <i>ev</i> '	<i>l</i> ', <i>d,σ</i>	<i>d</i> , <i>l</i> ', <i>φ</i>	(<i>ft</i>), (<i>tc</i>), (<i>p</i>), (<i>u</i>), <i>s</i> , (<i>pv</i>)
IV	<i>l</i> ', <i>v</i> '	<i>d</i> , <i>l</i> ', <i>ev</i> '	<i>l</i> ', <i>d,σ</i>	<i>d</i> , <i>l</i> '	(<i>ft</i>), (<i>tc</i>), <i>p</i> ', (<i>u</i>), <i>s</i> , (<i>pv</i>)

Explanations: Roman letters refer to normal setae, Greek letters to solenidia (except *ε* = famulus), *dσ* and *ftω* – seta and solenidion coupled. Single prime (') marks setae on anterior and double prime (") setae on posterior side of the given leg segment. Parentheses refer to a pair of setae. Tr – trochanter, Fe – femur, Ge – genu, Ti – Tibia, Ta – tarsus.

0], leg IV (2–3–2–2–10) [1–0–0]; homology of setae and solenidia indicated in Table 1. Famuli (*ε*) tubercle-like, inserted posteriorly to *ω*₁.

Material examined. Holotype (female) and three paratypes (all females): locality Cuba 2.

Type deposition. The holotype is deposited in the collection of the Senckenberg Institution, Görlitz, Germany; three paratypes are in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology. The specific name *vinalesensis* refers to the place of origin, Valle de Viñales National Park.

Remarks. *Annectacarus vinalesensis* sp. n. is most similar to *A. krachan* Mahunka, 1995 from Thailand (Mahunka 1995) in the absence of macropolygonal pattern on notogaster and having short, smooth notogastral setae *c*₁, *d*₁, *e*₁ and *f*₁ similar in length. However, the new species differs from the latter by the rostrum with indentation (versus pointed in *A. krachan*) and the presence of six pairs of neutrichal notogastral setae (versus two pairs in *A. krachan*) and six pairs of setae on epimere I (versus five pairs in *A. krachan*).

Key to known species of *Annectacarus* in the Neotropical region

- 1 Notogastral setae *c*₁, *d*₁, *e*₁ and *f*₁ similar in length, all smooth 2
- Notogastral setae *f*₁ barbed, distinctly longer than *c*₁, *d*₁ and *e*₁ 3
- 2 Notogaster surface with macropolygonal pattern; notogastral setae *c*₂ and *d*₂ similar in length to *c*₁ and *d*₁; body length: 430–470 ***A. mucronatus*** Grandjean, 1950 (see Grandjean 1950).
Distribution: Neotropical region
- Notogaster surface without macropolygonal pattern; notogastral setae *c*₂ and *d*₂ distinctly longer than *c*₁ and *d*₁; body size: 490–498 × 265
..... ***A. vinalesensis* sp. n.** Distribution: Cuba
- 3 Prodorsum surface with macropolygonal pattern; epimere I with six pairs of epimeral setae; body length: 510 ***A. unilateralis*** Hammer, 1973 (see Hammer 1973). Distribution: Polynesia, Java and Galapagos Islands
- Prodorsum surface without macropolygonal pattern; epimere I with two pairs of epimeral setae; body size: 545 × 260 ***A. perezinigoii*** Călugăr & Vasiliu, 1983 (see Călugăr & Vasiliu 1983). Distribution: Cuba

Records

Heptacarus supertrichus Piffel, 1966 (see Piffel 1966). Distribution: Iraq and Mexico. First record of the genus and species in Cuba.

Material examined. Locality Cuba 3: three specimens (adults).

Meristacarus longisetosus Mahunka, 1978 (see Mahunka 1978; Schatz 1994). Distribution: Neotropical region.

Material examined. Locality Cuba 1: 74 specimens (29 adults and 45 juvenile instars).

Papillacarus incompletus (Mahunka, 1985) (see Mahunka 1985). Distribution: Neotropical region.

Material examined. Locality Cuba 2: two specimens (adults).

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