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FOUR NEW SPECIES OF *ANTRICOLA* TICKS (ARGASIDAE: ANTRICOLINAE) FROM BAT GUANO IN CUBA AND CURAÇAO

by Jorge De la CRUZ * and Agustin ESTRADA-PEña **

**SUMMARY:** Four new species of the tick genus *Antricola* Cooley & Kohls, 1942 (Acari: Argasidae, Antricolinae) are described from specimens collected on bat guano at "hot caves" in Cuba and Curacao. *A. centralis* n. sp. is a species closely related to *A. occidentalis* Cruz, but differs in the structure of the dorsomarginal tubercles and submarginal dorsal fold. *A. hummelincki* n. sp., previously reported as *A. silvai* Cerny from Curacao, is a very small species with minute spiracles and a partly developed postanal groove. *A. armasi* n. sp. is characterized by the presence of three strong tubercles behind the postanal groove. *A. siboneyi* n. sp. is a unique *Antricola* species in having the spiracle large in the female but very small in the male. Both sexes can be easily determined by the peculiar structure of the postanal groove.

**RÉSUMÉ:** Quatre espèces nouvelles du genre *Antricola* Cooley & Kohls, 1942 (Argasidae: Antricolinae) sont décrites d’après des spécimens récoltés dans le guano de chauve souris des « grottes chaudes » de Cuba et de Curacao. *A. centralis* n. sp. est étroitement apparentée à *A. occidentalis* Cruz, mais elle diffère par la structure des tubercules dorsomarginaux et du sillon dorsal submarginal. *A. hummelincki* n. sp., citée précédemment à Curacao sous le nom de *A. silvai* Cerny, est une toute petite espèce avec des spiracula minuscules et un sillon postanal incomplètement développé. *A. armasi* n. sp. est caractérisée par la présence de trois forts tubercules en arrière du sillon postanal. *A. siboneyi* n. sp. est unique au sein des *Antricola* parce que la femelle possède un grand spiraculum tandis que le mâle en possède un tout petit. Les deux sexes peuvent être aisément déterminés d’après la structure particulière du sillon postanal.

**INTRODUCTION**

At present, seven *Antricola* species are known from specimens collected in seven different caves in Cuba (reviewed by Cruz, 1978). Outside Cuba, the genus has been reported from USA (*Antricola coprophilus* McIntosh), Mexico, Guatemala, Panama, Colombia, and Trinidad (*A. mexicanus* Hoffman), Venezuela and Curacao (as *A. silvai* Cerny); however, Cruz (1976) considered this record of *A. silvai* as a misidentification.

Diagnostic characters in the genus are the shape and size of the dorsomarginal tubercles, relative depth of the dorsal folds, outline and relative size of the spiracle, and size and shape of the postanal groove together with its associated tubercles. Currently, the genus is defined as medium-sized to large ticks (3 to 7 mm) with the body outline variable, but always pyriform or diamond-shaped (one species with deep invaginations; some species with a very acute anterior margin). Dorsomarginal tubercles and dorsomarginal groove well defined (some species have a poorly developed dorsomarginal groove). A postanal transverse groove is always

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present, sometimes associated to several medium-sized to large tubercles; in some species, the postanal groove is only outlined by the tubercles. Anus large, rounded. Spiracles very variable in shape and relative size; some species have a very small spiracle, while others display a spiracle easily visible in dorsal view. Capitulum well developed; basis capituli as long as wide. Surface of the basis capituli irregularly micromammillated, with a variable number of setae. Hypostome small, scoop-like shaped, with numerous small denticles in two marginal rows; corona absent. Chelicera with several elongated, curved, harpoon-like structures. Palpi short and robust. Coxae variable. Legs long and slender, setose. Members of the genus have been recorded only from bat guano in the New World.

In this paper, we describe four new species of Antricola, collected in Cuba and Curacao on bat guano, one of which is based on material previously identified as A. silvai. A key for the world species is now in preparation.

**MATERIAL AND METHODS**

All the ticks were hand collected from bat guano, and fixed in 70 % ethyl alcohol. Some specimens were prepared for examination under the scanning electron microscope after the method of CRUZ and ESTRADA-PENA (1992). Materials have been deposited in the British Museum of Natural History (BMNH), U.S. National Tick Collection (USNTC), Zoological Collection of the Institute of Ecology and Systematics, Habana, Cuba (CZACC), and collection of the Department of Parasitology, Veterinary Faculty at Zaragoza, Spain (DPVF). All measurements are in millimeters, as average (minimum-maximum) and obtained from the entire type series; for each species, scanning electron micrographs of diagnostic characters are provided.

*Antricola centralis* n. sp.

**Female** (Figs. 1 to 6). Body length 4.45 (4.3-4.95), width 2.9 (2.4-3.2), widest at the level of coxa III. Body diamond-shaped, with obtuse anterior angle and broadly rounded posterior margin. Dorsocentral tubercles (Fig. 2) closely arranged, regular in size, each with 2-4 setae. Dorsomarginal tubercles slightly separated from each other, larger than the central ones. Submarginal dorsal fold almost indiscernible, scarcely differentiated near the posterior body margin. Medial fold as two rhombi joined at the level of spiracle, more conspicuous at anterior and median portions of the body, weakly discernible at the posterior part. On the dorsal surface, laterally to the medial fold, and between coxae III and IV, there are some large tubercles.

Ventral surface with numerous tubercles, each with 1-3 setae (Fig. 3). Sternal region striated, covered by long setae; genital aperture located between coxae II. Ventral posteromarginal tubercles slightly longer than the remaining. Postanal groove (Fig. 4) very deep, as a transverse slit, curving medially, then ascending again before descending to reach the posterior body margin at an approximately 90° angle. Ventral tubercles near the postanal groove modified, as two coalesced central tubercles and two also coalesced lateral ones. Anus elliptical, surrounded by small tubercles carrying 2-4 small setae.

Spiracle large (Fig. 5) clearly visible from above. Capitulum as for the genus. Surface of the basis capituli irregularly micromammillated, with 1-6 long setae on lateral margins, 4-5 medium sized, and numerous minute setae on the central portion of the basis capituli. Hypostome (Fig. 6), chelicera, and palpi as in the genus.

Coxa I elongated, II to IV triangular in shape. Coxae I and II with a small fold between them, reaching the sternal field, the other coxae contiguous. Supracoxal fold very deep, lacking setae and micromammillation. Legs long and slender, setose.

**Male** (Fig. 7): The male of *A. centralis* n. sp. looks like the female, but with the sexual dimorphism typical for the genus. Body length 3.2 (2.8-3.35), maximum width 2.25 (1.9-2.4) at the level of coxae II-III. Dorsal and dorsomarginal tubercles as in the female, lacking a well-defined medial fold. Spiracle large, rounded, visible from above. Postanal groove (Fig. 7) and legs as in the female; all tarsi with a well developed apicoventral spur.
FIG. 1-6: Anricola centralis n. sp.

1. — Female, dorsal view (bar = 1.2 mm); 2. — Female, detail of dorsal integument (bar = 0.6 mm); 3. — Female, ventral view (bar = 1 mm); 4. — Female, anus and postanal groove (bar = 0.35 mm); 5. — Female, spiracle (bar = 0.3 mm); 6. — Female, hypostome, palpi and chelicera (bar = 0.18 mm).
**Etymology**: The new species is named after the geographical situation of the type locality, near the central portion of Cuba.

**Material examined**: Holotype female, allotype male, and 19 paratypes (6 females and 13 males) in USNTC, collected at Cueva del Majá, Buenaventura, Remedios, Las Villas province, Cuba, March 29, 1986; L.F. DE ARMAS, R. ARMÍÑANA and J. TRAVIESO col.; 33 paratypes (13 females and 20 males) in CZACC; 4 paratypes (two males and two females) in BMNH; 12 paratypes (5 males and 7 females) in DPVF. Collection data for all paratypes as for the holotype.

**Diagnosis**: A small Antricola species, with clearly differentiated dorsomarginal tubercles and weakly submarginal dorsal fold; dorsomarginal tubercles only slightly larger than the central ones. Spiracle large, clearly visible in dorsal view. Postanal fold long, sinuous, and very deep, with two lateral and two median, larger tubercles.

**Remarks**: *A. centralis* n. sp. is a species closely related to *A. occidentalis* Cruz in having a large spiracle, clearly visible from above; *A. occidentalis* has the largest spiracle of all the known species in the genus. However, the structure and relative size of the dorsomarginal tubercles and the form of the submarginal dorsal fold can be used to separate the two species. *A. occidentalis* possesses a clearly visible submarginal fold, with dorsomarginal tubercles very much larger than the medial ones; *A. centralis* has an indistinct submarginal fold, with dorsomarginal tubercles only slightly larger than the central ones.

**Antricola hummelincki** n. sp.


**Female** (Figs 8 to 12): Body length 2.75 (2.25-3.25), maximum width 1.9 (1.8-2.45) at the level of coxa III. Body acutely pointed at the anterior margin, rounded posteriorly, almost straight laterally. Dorsal tubercles (Fig. 8) of similar size, with only one or a few short setae on each tubercle. Dorsomarginal tubercles well differentiated all around the body, rectangular, clearly separate. Submarginal dorsal fold almost indistinct, but its position is indicated by the differences in shape and size between medial and marginal dorsal tubercles.

Ventral surface with small tubercles, each with 1-3 short setae. Sternal surface weakly striated, or with small micromammillae, lacking setae on the smooth surface. Genital aperture located between the coxae I. Ventral posteromarginal tubercles poorly developed, only slightly larger than the dorsal ones (Fig. 9). Postanal groove as an almost straight line, descending towards the posterior body margin laterally, with only two relatively broad anterior tubercles and one posterior, approximately as broad as the combined width of the anterior ones; lateral portions of the groove surrounded by relatively long and narrow tubercles; some postanal tubercles lacking setae. Anus as in the genus, enclosed by one coalesced tubercle. Spiracle very small, longer than wide, not visible from above (Fig. 10). Capitulum as in the genus (Fig. 11), with 32-40 long setae. Palpi as in the genus; segments I to III setose and slightly flattened. Hypostome small, scoop-like, with many very small denticles distributed along two marginal rows; corona absent. Chelicera (Fig. 12) as for the genus, with several elongated, curved, harpoon-like prolongations. Legs as in the genus.

**Male** (Fig. 13): Body length 1.65 (1.55-1.85), maximum width 1.4 (1.3-1.55) at the level of coxa III. Body pyriform, lacking the acute anterior margin of the female. Dorsal surface similar to that of the female, but with the marginal tubercles more drawn-out. Submarginal dorsal groove absent, but dorsal surface slightly flattened near the center and the body margins, with a depression between them. Genital pore at the level of coxa I. Postanal groove and associated tubercles as in the female (Fig. 13). Anus, spiracle, capitulum, and palpi as in the female; tubercles surrounding the anus not prominent. Coxae I to IV contiguous; supracoxal fold weakly developed. Legs stronger than in the female. All tarsi with a strong apicoventral spur.
FIG. 7-13: *Antricola centralis* n. sp. (7) and *A. hummelincki* n. sp. (8-13).

7. — Male, anus and postanal groove (bar = 0.3 mm); 8. — Female, detail of dorsal integument (bar = 0.3 mm); 9. — Female, anus and postanal groove (bar = 0.35 mm); 10. — Female, spiracle (bar = 0.15 mm); 11-12. — Female, basis capituli and hypostome, detail of palpi and chelicera (white square in lower portion shows magnification of the upper section) (bar = 0.21 mm); 13. — Male, anus and postanal groove (bar = 0.38 mm).
**Etymology**: The species is named after Wagenaar Hummelinck, collector of the type series.

**Material examined**: Holotype (female) allotype (male) and 19 paratypes (2 females, 10 males, and 7 nymphs), labelled *Antricola silvai*, 340a, W. Hummelinck coll., RML 45404, Cueva di Rato, Hato, Curacao, Venezuela, on *Mormoops megaphylla internedia*. Specimens currently deposited in USNTC.

**Diagnosis**: A small *Antricola*, with almost rectangular (female) or pyriform (male) body shape, very few and short setae on body surface. With well differentiated postanal groove in both sexes, with two anterior and one posterior broad tubercles, lacking setae. Very small and elongated spiracle, not noticeable from above. Submarginal dorsal fold very weakly developed, but with a clear differentiation between medial and marginal dorsal tubercles.

**Remarks**: *A. hummelincki* n. sp. was reported by Kohls (1969) as *Antricola silvai* Cerny from Curacao. Thanks to the kindness of James E. Keirans (Georgia Southern University, USA) we had the opportunity to examine the material collected by Kohls, and to confirm the true identity of these specimens. On the label, the name of the host is *Mormoops megalophylla internedia*; however, W. Hummelink (pers. comm. to J.C.) noted that the ticks were found on the guano of *M. m. internedia*. Hummelinck (1970) described the type locality as a biotope very similar to the "hot caves" reported as typical habitats for other species of *Antricola* in Cuba.

*A. hummelincki* n. sp. belongs to the *silvai* group of species, characterized by the presence of a small spiracle and a partly developed postanal groove, defined by the presence of some large tubercles. The new species is easily recognized by its small size, few and short dorsal setae, and clear postanal groove with the mentioned combination of tubercles. The spiracle in *A. hummelincki* is the more acute in the genus, except in *A. nomiae* Cruz; in the former species, the spiracle has its maximum width at its basal third, while in the latter has it as its base. *A. hummelincki* n. sp. is tentatively included in the *silvai* group after the features of its spiracle and the size and shape of the tubercles associated with the postanal groove.

**Antricola armasi** n. sp.

**Female** (Figs. 14 to 18): Body length 4.80 (3.95-4.85), maximum width 2.85 (2.10-2.95), at the level of coxa III. Body irregularly pyriform (Fig. 14), acute anteriorly, broadly rounded posteriorly, with two lateral concavities near the posterior body margin. Dorsal tubercles scarce, wide, not protruding; each tubercle with a small tuft of 4-6 setae. Marginal tubercles clearly delimited, elongated, distributed all around the body, as an encircling area. At some portions, it seems that tubercles are formed from the fusion of two or three dorsal ones. Anterior portion of the body with two rows of tubercles, instead of the single row at the rest of the body.

Ventral surface (Fig. 15) with small tubercles, each with 1-8 setae, longer than those of dorsal surface. Sternal region weakly striated and setose. Genital aperture located at the level of coxa I. Postanal groove (Fig. 16) an almost straight line, superficial, but clearly defined by the presence of three coalesced and conspicuous tubercles (located on at each side and one medially at the posterior edge of the postanal groove) and one short and broad tubercle at the anterior portion; posteroventral tubercles larger than the surrounding ones, with longer hairs. Anus as for the genus. Spiracle very small (Fig. 17), longer than wide, not visible from above. Capitulum strong. Basis capituli slightly longer than wide; surface of the basis capituli smooth, with 30-35 long setae at medial and lateral surfaces, and some short hairs unevenly distributed. Hypostome, palpi, and chelicera as in the genus. All the coxae elongated and contiguous. Supracoaxal fold with smooth surface. Legs long and robust, setose.

**Male** (Figs. 18-19): Body length 3.5 (2.75-3.75), maximum width 2.6 (1.75-2.7). Body outline pyriform (Fig. 18). Dorsal surface as in the female, but with marginal tubercles scarcely elongated. Submarginal dorsal groove not well defined. Postanal
Fig. 14-19: *Antricola armasi* n. sp.

14. — Female, detail of dorsal integument (arrow points to the spiracle) (bar = 0.7 mm); 15. — Female, ventral view (bar : 1.25 mm); 16. — Female, anus and postanal groove (bar = 0.35 mm); 17. — Female, spiracle (bar : 0.18 mm); 18-19. — Male, anus and postanal groove (bar : 0.38 mm).
groove present but not clearly differentiated (Fig. 19), without particularly large tubercles. Genital aperture between coxae I. Spiracle as in the female, not visible from above. Anus as in the female. Capitulum, hypostome, and palpi as in the female. Coxa I-IV contiguous. Supracoxal fold present. Legs more robust than in the female. All the tarsi with a prominent apicoventral spur.

**Etymology:** The species is dedicated to Luis F. de ARMAS, collector of the type series.

**Material examined:** Holotype (female), allotype (male), and 24 paratypes (3 females, 13 males, and 8 nymphs) collected on bat guano, Cueva de la Ventana, Guanahacacibes, Pinar del Rio province, Cuba, October 1988, deposited in USNTC; six paratypes (2 females, 4 nymphs) deposited in DPVF; two paratypes (one male and one female) each deposited in BMNH and CZACC. Collection data for all the paratypes as for the holotype.

**Diagnosis:** A medium-sized Antricola, with very well differentiated folds and grooves, and three large tubercles behind the postanal groove in the female; spiracle very small, not visible from above; one or two rows of elongated dorsal marginal tubercles.

**Remarks:** *A. armasi* n. sp. is a species closely related to *A. silvai* Cerny and *A. granasi* Cruz, based on the small spiracle and on the partly developed postanal groove. However, these two species have very weak postanal tubercles, instead of the well developed ones observed in *A. armasi*; no other species in the genus possesses such a combination of strong postanal tubercles as in *A. armasi*.

**Antricola siboneyi** n. sp.

**Female** (Figs 20 to 26): Body length 4.5 (3.8-4.8), maximum width 2.65 (2.4-2.85). Body irregularly diamond-shaped (Fig. 20), with a very acute anterior margin, two small concavities at the postero-lateral region after the spiracle, and a clearly defined, deep posterior invagination. Dorsal tubercles widely separated, each with 4-6 setae. Dorsomarginal tubercles elongate, well defined (Fig. 21), forming a mosaic pattern. At the lateral portions of the acute anterior prominence, the dorsomarginal tubercles become indistinguishable. Submarginal dorsal fold deep, clearly visible, far from the periphery of the body, separating elongate from normal sized dorsal tubercles.

Ventral surface densely covered by small tubercles, with fewer setae than the dorsal ones. Sternal surface very weakly folded, with long setae. Genital aperture at the level of coxae I. VentrAL postero-marginal tubercles well determined. Postanal groove weakly defined (Fig. 22), as a cuticular straight fold between one anterior row of undifferentiated tubercles, which lack setae. Anus as in the genus.

Spiracle large (Fig. 23), visible from a dorsal view (see also Fig. 20). Capitulum, hypostome, palpi, and chelicera, as in the genus. Coxae I to III elongated, IV triangular in shape. Coxae I and II with a small fold between them; other coxae contiguous. Supracoxal fold lacking setae and micromammillation. Legs long and slender.

**Male** (Figs. 24-26): Body length 3.3 (3.25-3.35), maximum width 2.5 (2.45-2.65), rounded in shape. The male lacks the invagination at the posterior margin (Fig. 24) as mentioned for the female. Dorsomarginal tubercles as only a row of elongated structures, all around the body. At the level of coxae III-IV the dorsal tubercles conform two depressed areas of irregularly shaped tubercles in a concentric pattern. Submarginal dorsal fold absent. Spiracle small, not visible from above (compare Figs. 20 and 24). Other features, including postanal groove, as in the female. Capitulum (Fig. 25) and chelicera (Fig. 26) as in the female, with several curved structures on both cheliceral digits. Legs stronger than in the female; all the tarsi with an acute apicoventral spur.

**Etymology:** The word "siboneyi" is the name of the region where the new species was collected.

**Material examined:** Holotype (female) and allotype (male) collected on bat guano, Cueva de
FIG. 20-26: *Antricola siboneyi* n. sp.

20. — Female, dorsal view (bar = 1.05 mm); 21. — Female, detail of dorsal integument (bar = 0.5 mm); 22. — Female, anus and postanal groove (bar = 0.38 mm); 23. — Female, spiracle; 24. — Male, detail of dorsal integument (compare the presence of the female spiracle in Fig. 20 with the absence in male) (bar = 0.4 mm); 25-26. — Male, basis capituli and hypostome, detail of palpi and chelicera (white square in lower portion shows magnification of the upper section) (bar = 0.2 mm).
los Majaes, Siboney, Santiago de Cuba, Cuba, February 1975, J. Cruz coll., deposited in USNTC; 8 paratypes (5 females and 3 males) in CZACC; 5 paratypes (two females and 3 males) in DPVF; 1 paratype female deposited in BMNH. Collection data for paratypes as for the holotype.

Diagnosis: Female with irregular body outline, clearly invaginated at the posterior margin; dorsomarginal tubercles well defined, except at the level of the anterior acute body margin. Submarginal dorsal fold very deep. Spiracle large in the female and small in the male. Both sexes with an almost indistinguishable postanal groove, together with one relatively large medial and two smaller lateral specialized tubercles, which lack setae.

Remarks: *A. siboneyi* n. sp. is unique in having a large spiracle in the female (visible from above) and a small one in the male (not visible dorsally); the new species also possesses a weakly defined postanal groove with a medial and two lateral strong tubercles lacking setae. Both sexes can be associated on the basis of features of the postanal groove. The weakly developed postanal groove easily separates *A. siboneyi* from other species of the genus, which have very large tubercles in that body region.

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