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A new species of *Acanthococcus* Signoret and new records for *Uhleria araucariae* (Maskell) (Hemiptera: Eriococcidae)

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Abstract

Acanthococcus mokanae González, Ramos & Caballero **sp. nov.** is described from specimens associated with *Hibiscus* sp. (Malvaceae) and *Capsicum* sp. (Solanaceae), in the departments of Atlántico and Córdoba (Colombia, South America). *Uhleria araucariae* (Maskell) is recorded for the first time in Colombia in association with *Araucaria heterophylla* (Salisb.) (Araucariaceae) and *Cryptomeria japonica* (Thunb. Ex L.f.) (Cupressaceae). A taxonomic key for eriococcids recorded from Colombia based on the external morphology of the adult female is provided.

Key words: Araucariaceae, Cupressaceae, Felt scales, Malvaceae, Neotropics, Solanaceae

Introduction

The felt scales (Hemiptera: Eriococcidae) are the fourth most species-rich family of the suborder Coccoomorpha, with 661 species in 108 genera currently described (García Morales *et al.* 2016). Evidence based in morphology of adult males and females and molecular analyses indicate that Eriococcidae *sensu lato* is non monophyletic, comprising three distinct lineages influenced by a biogeographical component (Cox & Williams 1987; Hodgson 2002; Cook & Gullan 2004). Therefore, phylogenetic studies are needed to associate the Neotropical felt scales with the appropriate lineage.

The diversity of Eriococcidae is rich in the Southern Hemisphere but poorly represented in tropical zones; until now 91 species have been recorded in the Neotropical region (Hodgson *et al.* 2004; González 2014; García Morales *et al.* 2016). The *Acanthococcus* species have cosmopolitan distribution with 30 species recorded in the Neotropical region (García Morales *et al.* 2016). Furthermore, *Uhleria* has only two species: *U. araucariae* (Maskell, 1879) which is a cosmopolitan species and has been recorded in 54 countries (García Morales *et al.* 2016), including Panama, Venezuela and Brazil (Hoy 1963), which border Colombia and *U. mariannae* (Pellizzari, 2010) with Palearctic distribution, absent from Neotropics.

Fifteen plant species have been reported in association with *U. araucariae*; *Cupressus* sp. and *Juniperus* sp. are the only records of this felt scale in association with Cupressaceae (Kozár *et al.* 2013). The association of *U. araucariae* with *Araucaria heterophylla* was published by Williams and Watson (1990). Other species of Araucariaceae recorded as host plants for *U. araucariae* are *Araucaria angustifolia*, *A. araucana*, *A. bidwillii*, *A. columnaris*, *A. cunninghamii*, *A. excelsa* and *A. hunsteinii* (García Morales *et al.* 2016).

Four species of Eriococcidae have been recorded from Colombia: *Acanthococcus popayanensis* (Balachowsky, 1959), *A. tucurinae* (Laing, 1929), *Capulinia linarosae* Kondo & Gullan, 2016 and *Eriobalchowskyia valenzuelae* (Balachowsky, 1959) (Balachowsky 1959; Hoy 1963; Kondo *et al.* 2016). This study aims to describe and illustrate a new species of *Acanthococcus*, reports to *Uhleria araucariae* for the first time in Colombia and provides a taxonomic key to species of Eriococcidae known from Colombia.

Materials and methods

The type material and specimens used in the present study are deposited in Universidad Nacional Agronomía Bogotá – UNAB (Colombia), and Instituto Fundación Miguel Lillo – IFML (Argentina). The specimens were slide-mounted according to the protocol of Sirisena *et al.* (2013). Terminology of morphological features follows Miller & Miller (1992), González (2008), Kozár & Konczné Benedicty (2008) and Kozár *et al.* (2013). The antennal segments are abbreviated as $S_{ant} \#$, and abdominal segments as $S_{abd} \#$. Illustrations and microphotographs were obtained using a Lumenera 1–5C camera (Lumenera Corporation, Nepean, ON, Canada) on a Nikon Eclipse E600 phase-contrast compound microscope (Nikon USA, Melville, NY).

The description of the new species is based on external cuticular features of adult females. Measurements of 13 specimens, including the holotype, were taken using Image Pro-Insight software. In their respective order, measurements are presented as mean, standard deviation, measurements of the holotype in square brackets and range of variation in parentheses. Type material of *Acanthococcus jorgenseni* and *A. perplexus* was studied for comparison with the new species. The taxonomic key to the adult females of Eriococcidae recorded from Colombia includes the recorded hosts for the country.

Results

Acanthococcus mokanae González, Ramos & Caballero sp. nov. (Figs 1–2)

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Type material. Holotype: adult ♀. Colombia: Atlántico, Repelón-Villa Hermosa, 6 m, 10°29'29.34" North, -75°06'57.34" West, 3 Dec. 2007, ex *Hibiscus* sp. (Malvaceae), collector: N. Rodríguez [UNAB 4928]. Paratypes: 5 adults ♀♀. Colombia: Atlántico, Tubara, Playa Mendoza, 10°54'20.55" North, -75°01'58.96" West, 3 Dec 2007, ex: *Hibiscus* sp. (Malvaceae), collector: N. Rodríguez [UNAB N° cat. 4928; IFML].

Other material studied. 25 adults ♀♀. Colombia: Atlántico, Sabanagrande, Vda. La Ciénaga, 10 m a.s.l., 10°47'32.01" North, -74°44'45.48" West, 8 Dec. 2015, ex *Capsicum* sp. (Solanaceae), collector: O. Dix, E Palacio [UNAB 4928].

Diagnosis. Narrow macrotubular ducts numerous on venter of mesothorax and abdomen; two types of microtubular ducts; 7-ocular and trilocular pores present; 5-ocular pores abundant throughout ventral surface; translucent pores present on hind coxa and femur; frontal lobes and medial plate present.

Description (Figs. 1 and 2). Adult female body oval in shape, 2.1 ± 0.7 [2.5] (1.1–3.1) mm long, 1.3 ± 0.5 [1.4] (0.7–2.1) mm wide. Anal lobes strongly protruding, sclerotized, dorsal surface with three conical setae, inner posterior setae 38.2 ± 2.9 (31–44) μm long (Fig. 1 A, ips), inner anterior setae 28.3 ± 3.2 (23–36) μm long (Fig. 1 A, ias) and outer setae 42.8 ± 3.6 (31–51) μm long (Fig. 1 A, os); ventral surface with three setae, anterior setae 54.6 ± 5.7 (46–66) μm long (Fig. 1 B, ans), posterior setae 75 ± 16.6 [72] (29–96) μm long (Fig. 1 B, pos) and apical setae 293.9 ± 33.7 (223–338) μm long (Fig. 1 B, as).

Dorsal surface: conical setae with rounded apex (Fig. 1 C, Fig. 2 A), of two sizes, the smallest 31 ± 5 (18–39) μm long, scattered over surface; the largest setae 51 ± 7 (40–66) μm long, distributed in longitudinal bands in submarginal and lateral regions, absent in $S_{abd} \text{ VIII+IX}$. Macrotubular ducts with terminal gland, symmetrical, outer diameter 10.4 ± 0.7 (9–12) μm , tubule diameter 7.8 ± 0.9 (6–10) μm , 16.2 ± 3.3 (9–25) μm long (Fig. 1 D, Fig. 2 B), abundant on surface; macrotubular ducts of $S_{abd} \text{ VIII+IX}$ smaller than elsewhere, with outer diameter 7.9 ± 0.4 (7–8) μm , tubule diameter 5.4 ± 0.5 (5–6), few or absent. Microtubular ducts of two types, type I without division in ductule, with rounded inner border (Fig. 1 E, Fig. 2 C), type II with ductule longitudinally divided and inner border with two protuberances (Fig. 1 F, Fig. 2 D); both types with diameter 2.7 ± 0.6 (2–4) μm , “Type I” abundant and scattered over surface except in $S_{abd} \text{ VIII+IX}$; “Type II” scarce, usually on thorax or abdomen. Anal ring with eight flagellate setae 117.6 ± 16.3 (68–153) μm long and 43 ± 4 (34–47) pores (Fig. 2 E). Median plate slightly protruded (Fig. 1 G, Fig. 2 F), base 43.6 ± 9.4 [no measurement] (29–55) μm long.

Margin: marginal setae not differentiated.

Ventral surface: Frontal lobes strongly protruding, unsclerotized, contiguous to first antennal segment (Fig. 1 H). Spiracles 63.9 ± 5 (53–74) μm long and 34.6 ± 2.3 (30–39) μm wide. Flagellate setae with pointed apex evenly scattered, flagellate setae with rounded apex distributed on medial region of head, thorax and abdomen; both types of

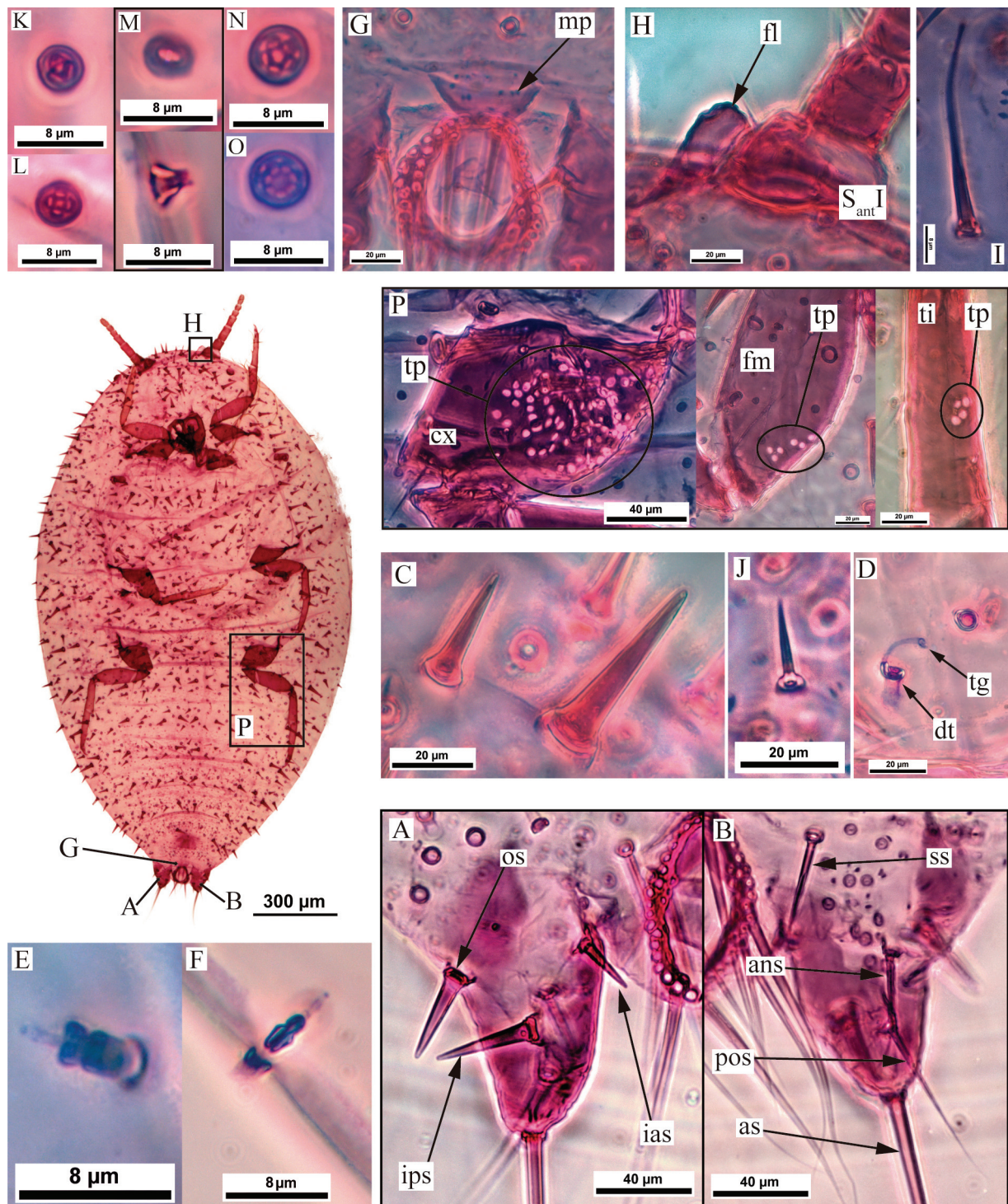


Figure 1. Microphotographs of *Acanthococcus mokanae* González, Ramos & Caballero **sp. nov.** with enlarged features. **A**, dorsal view of anal lobes with outer setae (os), inner posterior setae (ips) and inner anterior setae (ias); **B**, ventral view of anal lobes with suranal setae (ss), anterior setae (ans), posterior setae (pos) and apical setae (as); **C**, dorsal enlarged conical setae; **D**, macrotubular duct with ductule (dt) and terminal gland (tg); **E**, “type I” microtubular duct; **F**, “type II” microtubular duct; **G**, medial plate (mp); **H**, frontal lobe (fl) close to first antennal segment (S_{ant}); **I**, flagellated setae with apex rounded; **J**, ventral conical seta; **K**, trilocular pore; **L**, four-loculi pore; **M**, cruciform pore in upper and lateral view; **N**, five-loculi pore; **O**, seven-loculi pore; **P**, hind leg with translucent pores (tp) in coxa (cx), femur (fm), and tibia (ti).

setae longest on medial region and decreasing in size towards the marginal region (Fig. 1 I), 29 ± 14 [24–43] (7–75) μm long; 7–9 pairs of setae on interantennal region. Conical setae 17 ± 2.9 (12–26) μm long and small spiniform setae 3–5 μm long (Fig. 1 J, Fig. 2 G) along body. Suranal setae flagellate, 57.9 ± 7.1 (41–67) μm long (Fig. 1 B, ss). Trilocular pores (Fig. 1 K, Fig. 2 H) 4 ± 0.9 (3–6) μm diameter, scattered over surface between head to $S_{\text{abd}}^{\text{IV}}$, few on $S_{\text{abd}}^{\text{V}}$ and $S_{\text{abd}}^{\text{VI}}$, absent on $S_{\text{abd}}^{\text{VII}}$ and $S_{\text{abd}}^{\text{VIII+IX}}$; 4-locular pores (Fig. 1 L) 4–5 μm in diameter, few on thorax; cruciform pores (Fig. 1 M, Fig. 2 I) 4–5 μm in diameter, distributed on marginal and submarginal regions of head to $S_{\text{abd}}^{\text{V}}$, few on $S_{\text{abd}}^{\text{VI}}$ and absent on $S_{\text{abd}}^{\text{VII}}$ and $S_{\text{abd}}^{\text{VIII+IX}}$; 5-locular pores (Fig. 1 N, Fig. 2 J) 5–6 μm in diameter, scattered over surface; 7-locular pores (Fig. 1 O, Fig. 2 K) 6–7 μm in diameter, absent between head and $S_{\text{abd}}^{\text{III}}$, except for few around spiracles, few on $S_{\text{abd}}^{\text{IV}}$ and abundant on $S_{\text{abd}}^{\text{V}}$ and posterior segments. Macrotubular ducts symmetrical, of two sizes: larger ones with outer and tubule diameters similar in size to dorsal ducts, scattered over surface (Fig. 1 D, Fig. 2 L); smaller ones with outer diameter 7.1 ± 0.7 (6–8) μm and two sizes of tubule diameter: I) macrotubular ducts with smaller tubule diameter 3.6 ± 0.6 (3–5) μm present on $S_{\text{abd}}^{\text{II}}$ and posterior segments and II) ducts with tubule diameter 5.0 ± 0.6 (4–6) μm present on all surface, mainly on head to $S_{\text{abd}}^{\text{I}}$ and $S_{\text{abd}}^{\text{VIII+IX}}$. Microtubular ducts of two types, similar to dorsum, 2–4 μm in diameter; “Type I” absent on head, $S_{\text{abd}}^{\text{VII}}$ and $S_{\text{abd}}^{\text{VIII+IX}}$, few on prothorax, mesothorax and $S_{\text{abd}}^{\text{VI}}$ and abundant on metathorax to $S_{\text{abd}}^{\text{V}}$; “Type II” few on thorax and abdomen (Fig. 2 M). Spicules scattered over medial and lateral region on metathorax and abdominal segments, present medially on pro- and mesothorax.

Appendages: Antennae 269.9 ± 20.4 (236–306) μm long, with seven segments (Fig. 2 N): $S_{\text{ant}}^{\text{I}}$ 44.6 ± 9.0 (34–68) μm long and 75.2 ± 6.3 (60–84) μm wide, four flagellate setae; $S_{\text{ant}}^{\text{II}}$ 41.8 ± 4.8 (34–51) μm long and 44 ± 3.8 (38–52) μm wide, two flagellate setae; $S_{\text{ant}}^{\text{III}}$ 57 ± 7 (43–71) μm long and 34.8 ± 3.2 (29–41) μm wide, setae absent; $S_{\text{ant}}^{\text{IV}}$ 42.3 ± 3.7 (34–48) μm long and 29.3 ± 2.9 (24–34) μm wide, two flagellate setae; $S_{\text{ant}}^{\text{V}}$ 25.1 ± 2 (21–28) μm long and 26 ± 1.9 (22–30) μm wide, one fleshy seta; $S_{\text{ant}}^{\text{VI}}$ 25.3 ± 2.2 (20–29) μm long and 24.4 ± 1.5 (22–28) μm wide, four flagellate setae; $S_{\text{ant}}^{\text{VII}}$ 38.3 ± 2.8 (30–42) μm long and 21.9 ± 1.3 (20–25) μm wide, four fleshy setae and six flagellate setae. Labium with three segments; length apical+middle segments 113.6 ± 5.5 [109] (104–120) μm ; basal segment slightly sclerotized, with two pairs of setae, middle segment with one pair of setae and apical segment with six pairs of setae. Fore legs 463.1 ± 25.1 (319–515) μm long: trochanter + femur 205 ± 12.4 (179–224) μm ; tibia 110 ± 8.7 (88–122) μm ; tarsus 125.2 ± 5.9 (108–134) μm ; claw 37.4 ± 2.1 (29–43) μm . Middle leg 508.2 ± 20 (452–539) μm long: trochanter + femur 210 ± 11.1 (184–228) μm ; tibia 119.2 ± 8.8 (99–128) μm long; tarsus 135.3 ± 4.9 (125–143) μm ; claw 39.3 ± 3.7 (29–43) μm . Hind leg 537.6 ± 27.8 (481–584) μm (Fig. 2 M): trochanter + femur 222.7 ± 13.1 (198–145) μm ; tibia 126 ± 9.4 (103–140) μm ; tarsus 148 ± 5.7 (138–157) μm , tarsal digitule 55.6 ± 2.6 (47–59) μm ; claw 41.5 ± 2.4 (37–48) μm , 39.5 ± 3.1 (33–44) μm . Chaetotaxy: six setae on coxa, four on trochanter, five on femur and tibia and seven on tarsus, claw with denticle near claw apex. Translucent pores only on hind leg (Fig. 1 P): 58.7 ± 13.2 (29–81) on coxa, 5.6 ± 2.3 (2–11) on femur; some specimens with translucent pores on tibia, 1.6 ± 2.6 (0–7), but when present on tibia, they are present only in one of both tibiae. Four placoid sensilla on trochanter and one on tarsus.

Distribution. Colombia.

Host plants. *Hibiscus* sp. (Malvaceae) and *Capsicum* sp. (Solanaceae)

Comments. *Acanthococcus mokanae* **sp. nov.** morphologically resembles *Acanthococcus jorgenseni* (Morrison, 1919), *A. dubius* (Cockerell, 1896), *A. perplexus* (Hempel, 1900) and *A. popayanensis* (Balachowsky, 1959). *Acanthococcus jorgenseni* differs from *A. mokanae* **sp. nov.** by the following combination of features (character states of *A. mokanae* **sp. nov.** in parentheses): (i) largest dorsal setae arranged in transverse bands (largest dorsal setae arranged in longitudinal bands), (ii) narrow ventral macrotubular ducts with broad cup (without a broad cup), (iii) cruciform pores on both dorsal and ventral surfaces (cruciform pores only on ventral surface), (iv) frontal lobes absent (frontal lobes present), and (v) one pair of setae on basal segment of labium (two pairs of setae on basal segment of labium) [character states of *A. jorgenseni* are taken from Kozár & Konczné Benedicty (2008) and the studied cotype material]. *Acanthococcus dubius* differs from *A. mokanae* **sp. nov.** (character states of *A. mokanae* **sp. nov.** in parentheses) by (i) six setae in fore tibia (five setae in fore tibia), (ii) dorsal setae arranged in three longitudinal lines on each side of body (two longitudinal lines on each side of body), (iii) frontal lobes absent (frontal lobes present), and (iv) microtubular ducts of one type (two types) [character states of *A. dubius* are taken from Miller & Miller (1992)]. *Acanthococcus perplexus* differs from *A. mokanae* **sp. nov.** (character states of *A. mokanae* **sp. nov.** in parentheses) by (i) hind coxae with translucent pores grouped in clusters of 3–4 pores (translucent pores not forming clusters on hind coxae), (ii) three dorsal conical setae of anal lobes of similar length (the inner anterior setae shorter than the other two setae), and (iii) microtubular ducts of one type only which are restricted to dorsum (two types of microtubular ducts, both on dorsum and venter) [character states of *A. perplexus* are taken from Kozár & Konczné Benedicty (2008) and

from studied type material]. *Acanthococcus popayanensis* can be distinguished from *A. mokanae* **sp. nov.** (character states of *A. mokanae* **sp. nov.** in parentheses) by (i) enlarged conical setae arranged in transverse bands on dorsum (enlarged conical setae arranged in longitudinal bands on dorsum), (ii) microtubular ducts associated with dorsal setae (microtubular ducts evenly scattered, not associated with setae), and (iii) frontal lobes absent (frontal lobes present) [character states of *A. popayanensis* are taken from Balachowsky (1959)].

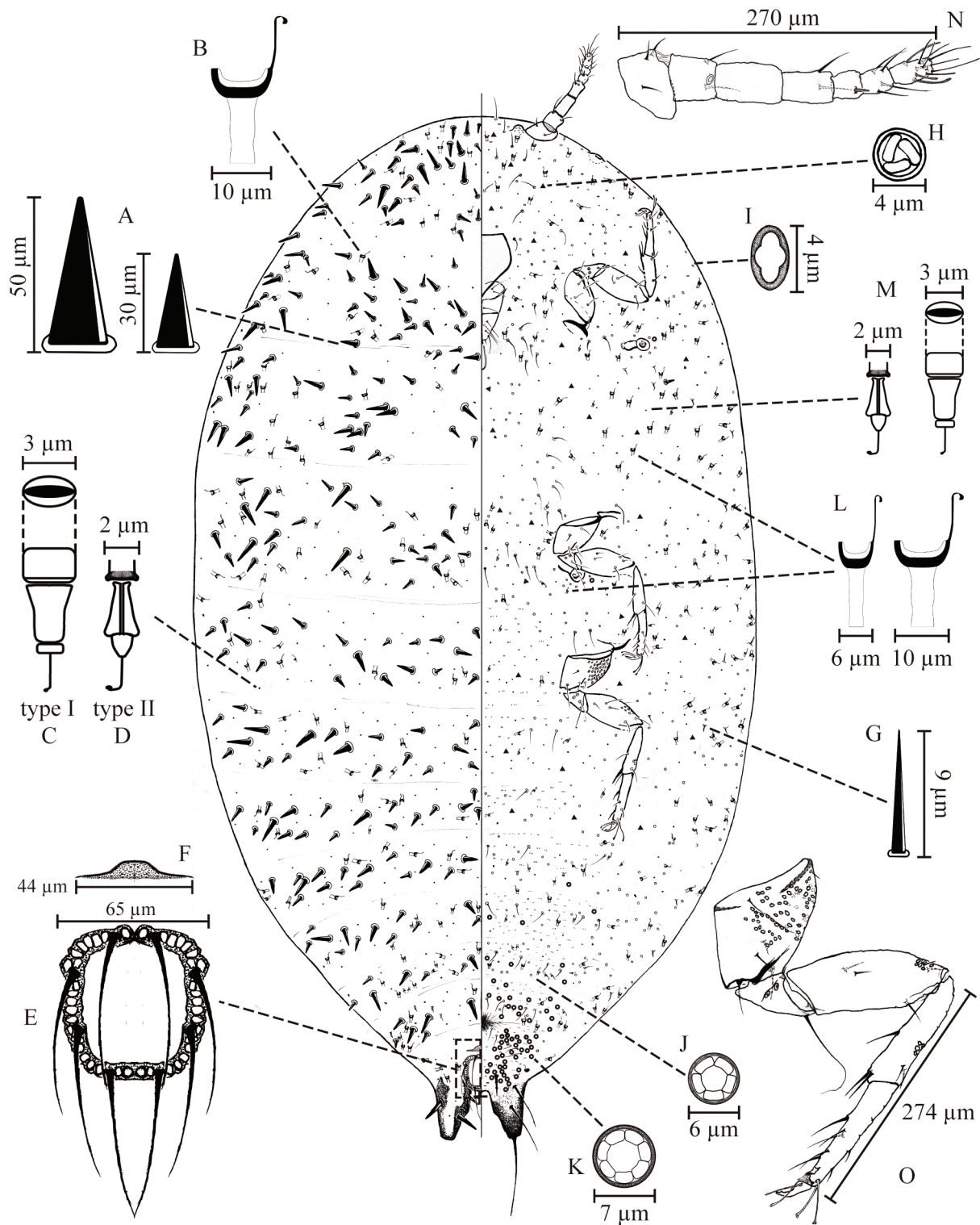


Figure 2. Taxonomic illustration of the adult female of *Acanthococcus mokanae* Gonzalez, Ramos & Caballero **sp. nov.** Details of dorsum (left side) and venter (right side): **A**, dorsal conical setae; **B**, macrotubular duct; **C**, “type I” microtubular duct; **D**, “type II” microtubular duct; **E**, anal ring; **F**, medial plate; **G**, ventral conical setae; **H**, trilocular pore; **I**, cruciform pore; **J**, five-loculi pore; **K**, seven-loculi pore; **L**, macrotubular ducts of two sizes; **M**, “type I” and “type II” microtubular ducts; **N**, antenna; **O**, hind leg.

On the other hand, *Acanthococcus* is morphologically similar to the genus *Rhizococcus* Signoret, 1875. According to Kozár *et al.* (2013), the diagnostic characters of *Rhizococcus* are the combination of short microtubular ducts (ca. 3–7 µm), hind tibiae with five setae and labium with 18 setae, in contrast with *Acanthococcus* which has four setae on hind tibiae, “long” (>7 µm) microtubular ducts and a labium with 16 setae. In order to provide information to future phylogenetic studies, we compare to *A. mokanae* **sp. nov.** with closely related species of *Rhizococcus*: *Rhizococcus brevenniae* (Goux, 1993) and *Rhizococcus echinatus* (Goux, 1938), *Rhizococcus istresianus* (Goux, 1989) and *Rhizococcus lactucae* (Borchsenius, 1949).

Acanthococcus mokanae **sp. nov.** morphologically resembles to *R. brevenniae* and *R. echinatus* because they have seven antennal segments, frontal lobes, cruciform pores on margins and submargins of venter. *Rhizococcus brevenniae* and *R. echinatus* differ from *A. mokanae* **sp. nov.** by the following combination of features (characters states of *A. mokanae* **sp. nov.** in parentheses): (i) 7-locular and trilocular pores absent (present), (ii) translucent pores restricted to hind coxa (present on coxa, femur and sometimes on tibia), (iii) medial plate absent (present), (iv) macrotubular ducts of one size (two sizes), and (v) microtubular ducts of one type (two types). In addition, *R. echinatus* have enlarged sharply pointed setae (blunt setae) and antennal segment IV is twice as long as segment III (segment IV as long as segment III); *Rhizococcus brevenniae* differs from *A. mokanae* **sp. nov.** (characters states of *A. mokanae* **sp. nov.** in parentheses) by having short antennal segments, i.e. S_{ant} I 29–30 (34–68) µm long, S_{ant} II 18–22 (34–51) µm long, S_{ant} III 38–40 (43–71) µm long, S_{ant} IV 36–41 (34–48) µm long, S_{ant} V 14–15 (21–28) µm long, S_{ant} VI 15–16 (20–29) µm long, S_{ant} VII 29–32 (30–42) µm long. *Rhizococcus istresianus* and *R. lactucae* resemble *A. mokanae* **sp. nov.** by having antennae with seven segments, frontal lobes and medial plate present, enlarged setae with rounded tip and cruciform pores in submarginal region. *Rhizococcus istresianus* and *R. lactucae* differ from *A. mokanae* **sp. nov.** (characters of *A. mokanae* in parentheses) by the following combination of features: (i) hind coxa with less than 20 translucent pores (29–81 pores), (ii) 7-locular pores absent (present), (iii) macrotubular ducts of one size (two sizes) and (iv) microtubular duct of one type (two types). In addition, *R. lactucae* differs by having a frontal tubercle (absent in *A. mokanae*). Character states of the *Rhizococcus* species are taken from Kozár *et al.* (2013).

Etymology. The specific epithet *mokanae* is assigned in honor to the indigenous ethnic group Mokaaná, who occupies the department of Atlántico, Colombia, where the holotype was collected. It is a noun in apposition.

New record of *Uhleria araucariae* (Maskell, 1879) for Colombia

Material studied: Eight ♀♀ adults. Colombia: Cundinamarca, Bogotá, Universidad Nacional de Colombia campus, 2564 m a.s.l., 04°37'54.6" North, -74°04'56.7" West, ex leaves of *Araucaria heterophylla* (Araucariaceae), 31 Jan. 2014, collector: A. Caballero, [UNAB N° cat. 1876]; Cundinamarca, Bogotá, Botanical Garden “José Celestino Mutis”, 2555 m a.s.l., 04°40'1.78" North, -74°06'2.99" West, ex leaves and stems of *Cryptomeria japonica* (Cupressaceae), 13 Jun. 2017, collector: A. Caballero, [UNAB N° cat. 1876].

Distribution. Cosmopolitan.

Host plants. *Traulia orientalis* (Acrididae); *Araucaria angustifolia*, *A. araucana*, *A. bidwillii*, *A. columnaris*, *A. cunninghamii*, *A. excelsa*, *A. heterophylla*, *A. hunsteinii* (Araucariaceae); *Cupressus* sp., *Juniperus* sp. (Cupressaceae); *Cycas* sp. (Cycadaceae); *Kunzea capitata* (Myrtaceae); *Pinus pinea* (Pinaceae), *Eleusine indica* (Poaceae) (García Morales *et al.* 2016).

Taxonomic key to eriococcid species recorded from Colombia, based on the external morphology of the adult female

- 1- Fore and mid legs absent; antennae with four segments *Capulinia linarosae* Kondo & Gullan [*Psidium guajava*; in Kondo *et al.* (2016)]
- 1'- Fore and mid legs present; antennae with six or more segments 2
- 2- Conspicuous cluster of conical setae in submarginal and marginal region of venter; antennae with eight segments; microtubular ducts absent *Eriobalachowskya valenzuelae* (Balachowsky) [*Inga edulis*; in Balachowsky (1959)]
- 2'- Conical setae absent in submarginal and marginal region of venter, if present, then not arranged in clusters; antenna with seven segments; microtubular ducts present 3
- 3- Dorsal setae with truncate apex, shorter than marginal setae; dorsal microtubular ducts with bifurcate dermal orifice; ventral microtubular ducts absent *Uhleria araucariae* (Maskell) [*Araucaria heterophylla* and *Cryptomeria japonica*; present study]
- 3'- Dorsal setae with apex not truncated, not differentiated from marginal setae, microtubular ducts with dermal orifice not bifurcated 4

4-	Dorsal setae conical, concave at base and convex medially
 <i>Acanthococcus tucurinae</i> Laing [Undetermined species of plant; in Laing (1929)]	
4'-	Dorsal setae conical, straight, not convex medially	5
5-	Dorsal setae in transversal bands, microtubular ducts present at the base of dorsal setae; cruciform pores present along body margin
 <i>Acanthococcus popayanensis</i> (Balachowsky) [Inga edulis; in Balachowsky (1959)]	
5'-	Larger dorsal setae in longitudinal bands, microtubular ducts sparse, not associated with the base of setae; cruciform pores restricted to margin of cephalic and thoracic regions.....
 <i>Acanthococcus mokanae</i> sp. nov. [<i>Hibiscus</i> sp. and <i>Capsicum</i> sp.; present study]	

Discussion

The diversity of felt scales in Colombia is relatively low (four species grouped in three genera, before this study), compared with other countries of the Neotropical region such as Argentina (35 species in 11 genera), Brazil (33 species in 16 genera) and Chile (19 species in 11 genera). An outstanding question is whether low diversity in Colombia result from a lack of taxonomic studies or because the hotspot of diversification of felt scales is in temperate regions. In this sense, the present study provides new information on the biodiversity of scale insects in Colombia and the Neotropical region.

The genera *Acanthococcus* and *Rhizococcus* are morphologically closely-related, and it is difficult to classify the new species. Further studies are necessary to diagnosed both genera and compared them with other genera not mentioned here. Future studies should include Neotropical species since the range in characters considered to be diagnostic (e.g. number of setae on hind tibia) is quite variable. The taxonomic position of *Acanthococcus mokanae* sp. nov. and species of *Rhizococcus* of the Neotropical region need to be studied in order to understand their natural taxonomic relationship within the Eriococcidae.

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