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Article

New Zealand Tenuipalpidae (Acari: Trombidiformes): A new species of *Acaricis* from Cyperaceae and its ontogenetic patterns in chaetotaxy

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Abstract

The genus *Acaricis* (Acari: Tenuipalpidae) was represented by two species from Australian sedges prior to this study. A new species, *Acaricis urigersoni* **sp. nov.**, is here described and illustrated from leaves of *Gahnia lacera* (Cyperaceae) in Auckland, New Zealand. In this paper, we presented the ontogenetic changes in idiosomal and leg chaetotaxy from larva to adult. A key to the world species of *Acaricis* is also proposed.

Key words: Flat mite, false spider mite, new species, Cyperaceae, *Gahnia lacera*, ontogenetic changes

Introduction

The Tenuipalpidae, commonly known as false spider mites or flat mites, has been considered as an under-explored family of plant-feeding mites of great economic importance (Gerson 2008). Recent increase in the interest in these mites was attributed to their biosecurity importance (as invasive species as well as vectors of virus diseases) and their use as model organisms to explore basic evolutionary questions such as sex determination and microorganism-mite interactions (Zhang 2010). Recent counts of the number of described species included 891 species (Mesa *et al.* 2009) and 895 species (Zhang *et al.* 2011), with several new species being described every year. In New Zealand, Spain and Luxton (1971) listed 11 described species, Zhang and Rhode (2003) estimated 23 species, and most recently, Sirvid *et al.* (2010) included 27 species of the Tenuipalpidae in the *New Zealand Inventory of Biodiversity*. There have been few papers on the Tenuiplapidae of New Zealand in the last decade (Zhang & Fan 2004; Berry & Fan 2012). This paper represents one of a series of papers to describe new species of this family and revise poorly described species from New Zealand.

The genus *Acaricis* was erected by Beard and Gerson (2009) with only two species: the type species *Acaricis plana* collected on *Scleria sphacelata* from Queensland, and *Acaricis danutae* collected on *Carex* sp. from New South Wales, Australia. Both host plant species are of plant family Cyperaceae. Currently, only 9 species belonging to 5 genera of the Tenuipalpidae have been described from Cyperaceae in the world. Wang (1983) described a new species *Tenuipalpus obvelatus* on Cyperaceae from China. Beard, Fan and Walter (2005) reported a new genus *Prolixus* with two new species collected on Cyperaceae in Australia. Beard and Ochoa (2011) added two new

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genera *Gahniacarus* and *Cyperacarus* (each genus with two species from Australia) to the list. Prior to this study, *Acaricis* was believed to be endemic to Australia. In this paper, a new species, *Acaricis urigersoni* **sp. nov.,** is described from *Gahnia lacera* (Cyperaceae) in New Zealand and its ontogenetic development in body and leg chaetotaxy is studied. A key to world species of *Acaricis* is also proposed.

Material and methods

Mites were mounted in Hoyer's medium, and examined at 1000 times with a DIC Nikon E800 microscope. All measurements were made from slide-mounted specimens using a stage-calibrated ocular ruler and are given in micrometers (μm) (Zhang & Fan 2004). Measurements of the holotype are presented, followed by a range of paratypes in brackets. Setae were measured from the centre of the setal base to the tip of the seta; distances between setae were measured as the distance from the centre of one setal base to the other. Legs were measured from the basal end of trochanter to the distal end of tarsus. Terminology follows that applied to the Tetranychidae by Lindquist (1985).

Family Tenuipalpidae Berlese, 1913

Genus *Acaricis* Beard & Gerson, 2009

Acaricis Beard & Gerson, 2009: 2; Beard & Ochoa, 2011: 32.
Type species: *Acaricis plana* Beard & Gerson, 2009

Diagnosis. Body elongate, more than twice as long as wide; palpus usually 4-segmented. Prodorsum with a rostral shield and 2 or 3 pairs of setae (sc_1 and sc_2 or v_2, sc_1 and sc_2); setae sc_2 lanceolate. Opisthosoma with 9 pairs of dorsal setae; dorsosublateral setae absent; dorsocentral setae c_1 absent, d_1 and e_1 present; humeral setae c_3 and dorsolateral setae 6 pairs (d_3, e_3, f_2, f_3, h_2 and h_1); setae h_2 long and attenuate. Genua IV nude.

The original concept of *Acaricis* was based on two Australian species (Beard & Gerson, 2009). The new species from New Zealand with new morphological features allows revision of the generic diagnosis as presented above.

Acaricis urigersoni sp. nov.

(Figs. 1–24)

Diagnosis. The adult female of *Acaricis urigersoni* **sp. nov.** is easily distinguishable from those of the two other species by the absence of the first pair of prodorsal setae v_2, setae sc_1 bifurcated, setae e_3 lanceolate, cylinder-shaped spermathecal vesicle, and chaetotaxy (legs I–IV): femora 4-4-2-1, genua 2-2-0-0, tibiae 5-5-3-2.

The adult male of *Acaricis urigersoni* **sp. nov.** is differentiated from those of the two other species by the absence of the first pair of prodorsal setae v_2, setae e_3 lanceolate, setae $4a_2$ elongate and flagelliform, and Chaetotaxy (legs I–IV): femora 4-4-2-1, genua 2-2-0-0, tibiae 5-5-3-2, tarsi 7+2ω-7+2ω-5+ω-5+ω.

Type specimens. Holotype ♀. New Zealand, Auckland, Kepa Reserve, 5 Aug, 2013, by Nicholas A. Martin, ex. *Gahnia lacera* (Cyperaceae). **Paratypes.** 6 females, 5 males, 7 deutonymphs, 4 protonymphs, 3 larvae, same data as holotype. 1 female, 1 male, 2 protonymphs, 3

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larvae, Wenderholm Regional Park, Auckland, New Zealand, 27 Sep, 2013, ex. *Gahnia lacera* (Cyperaceae), by Nicholas A. Martin. 8 females, 4 males, 4 deutonymphs, 2 protonymphs, Kepa Reserve, Auckland, New Zealand, 9 Oct, 2013, ex. *Gahnia lacera* (Cyperaceae), by Nicholas A. Martin. The holotype and 39 paratypes (12 females, 8 males, 9 deutonymphs, 6 protonymphs, 4 larvae) will be deposited in the New Zealand Arthropod Collection, Landcare Research, Auckland, New Zealand (NZAC); 10 paratypes (2 females, 2 males, 2 deutonymphs, 2 protonymphs, and 2 larvae) will be deposited in the Natural History Museum, London (BMNH).

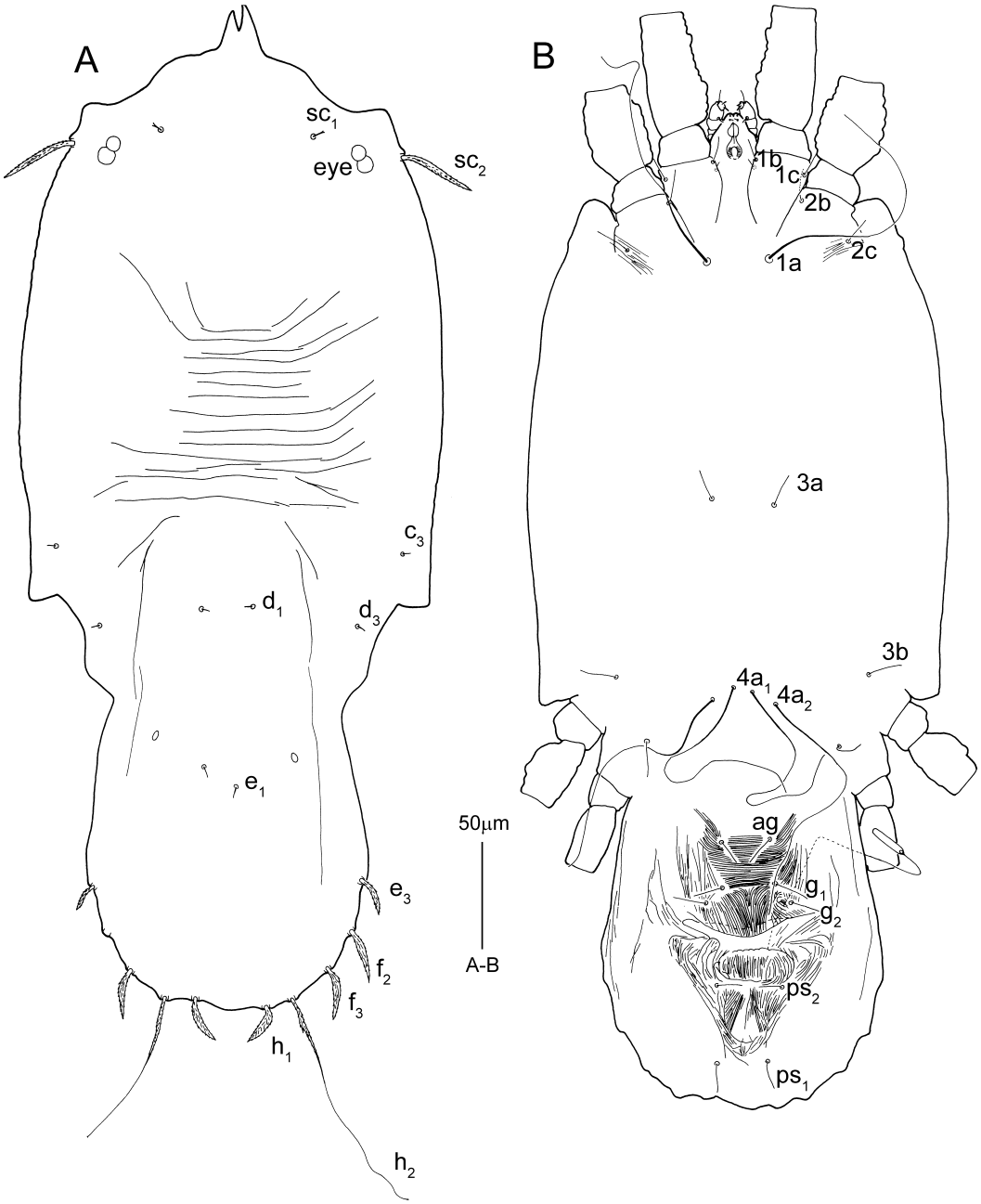


FIGURE 1. *Acaricis urigersoni* **sp. nov.** (adult female). A, dorsal view of idiosoma; B, ventral view of idiosoma.

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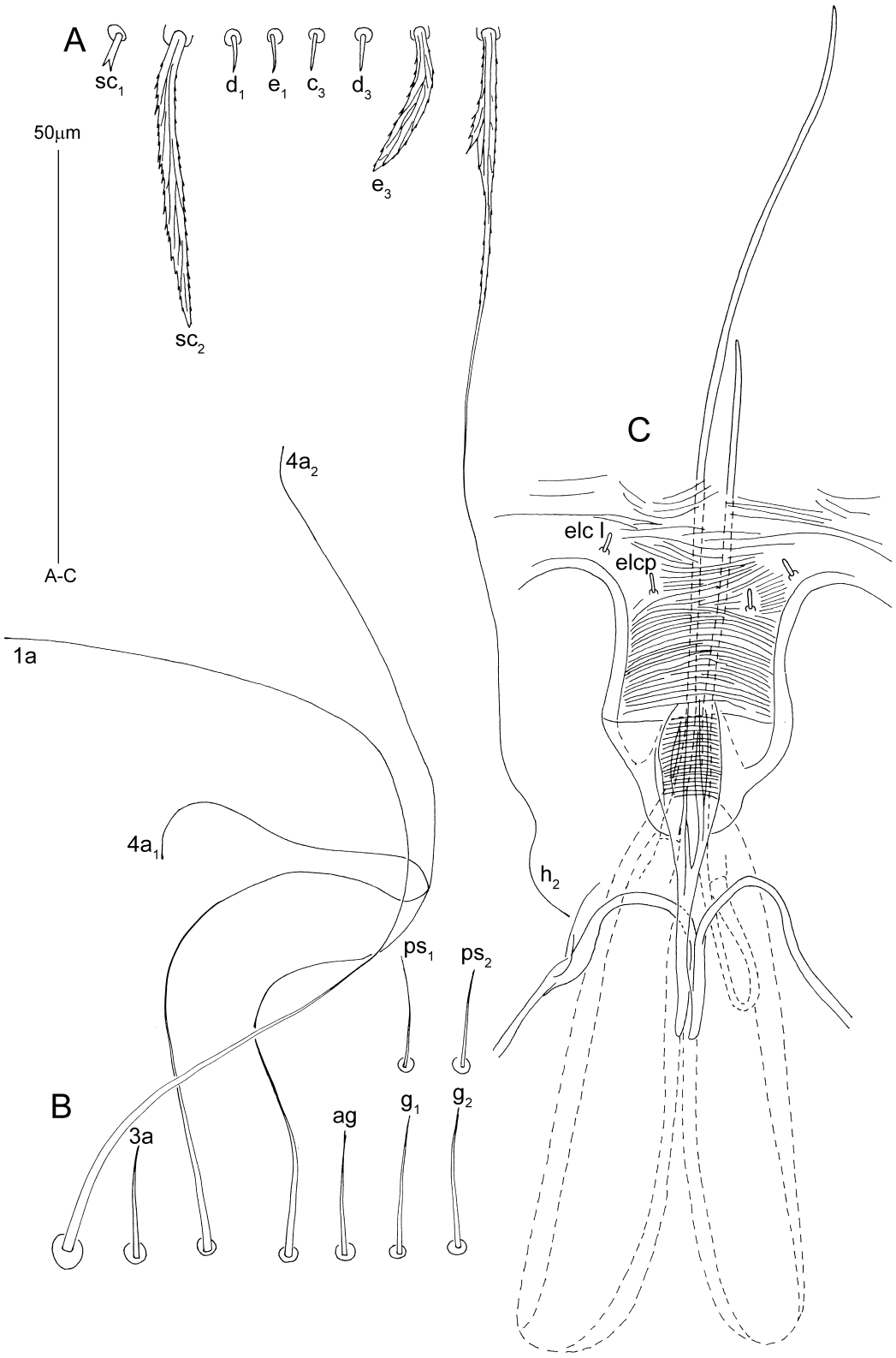


FIGURE 2. *Acaricis urigersoni* **sp. nov.** (adult female). A, dorsal setae; B, ventral setae; C, chelicerae and collar.

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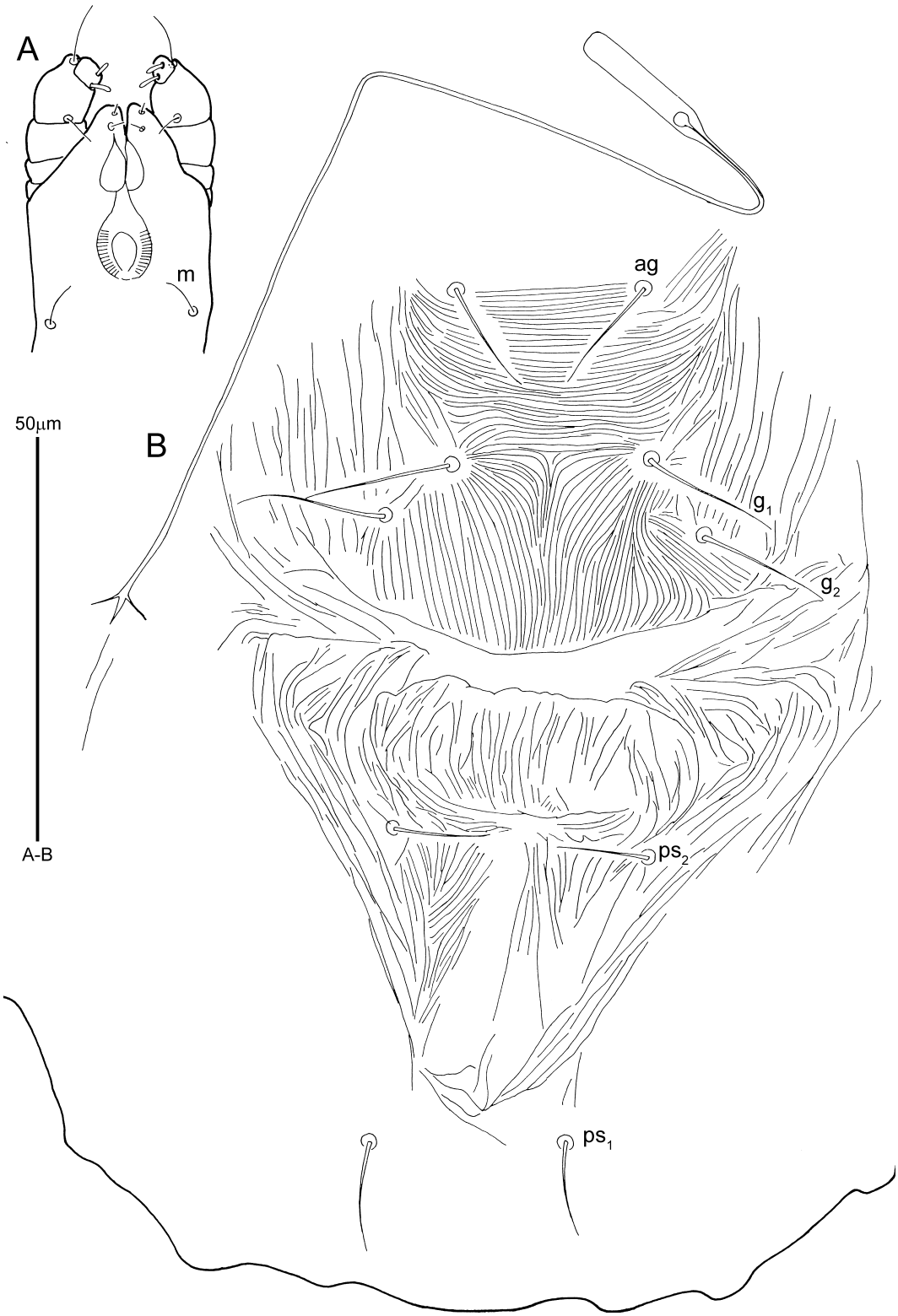


FIGURE 3. *Acaricis urigersoni* **sp. nov.** (adult female). A, subcapitulum; B, genital-anal plate.

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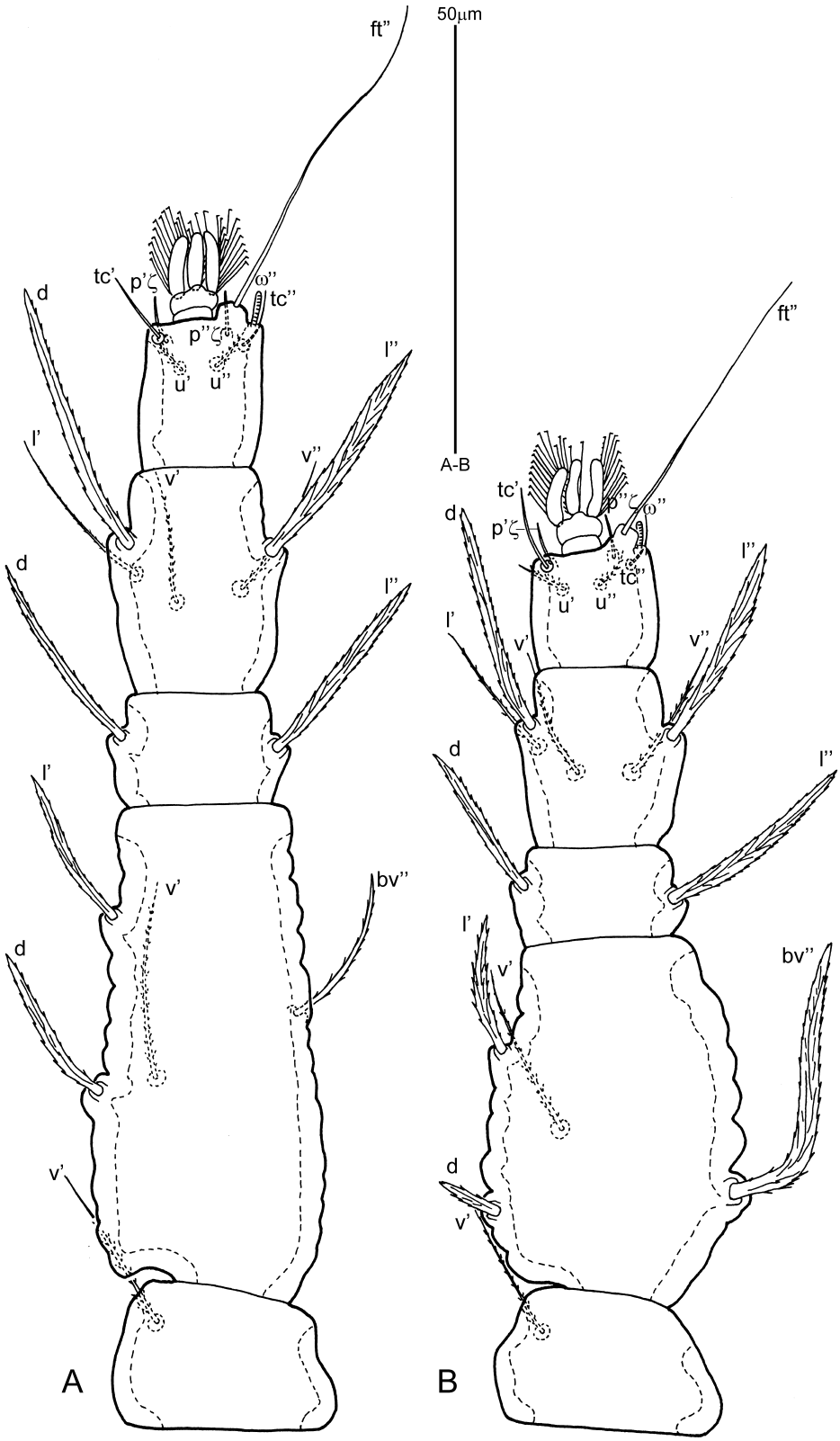


FIGURE 4. *Acaricis urigersoni* **sp. nov.** (adult female). A, leg I; B, leg II.

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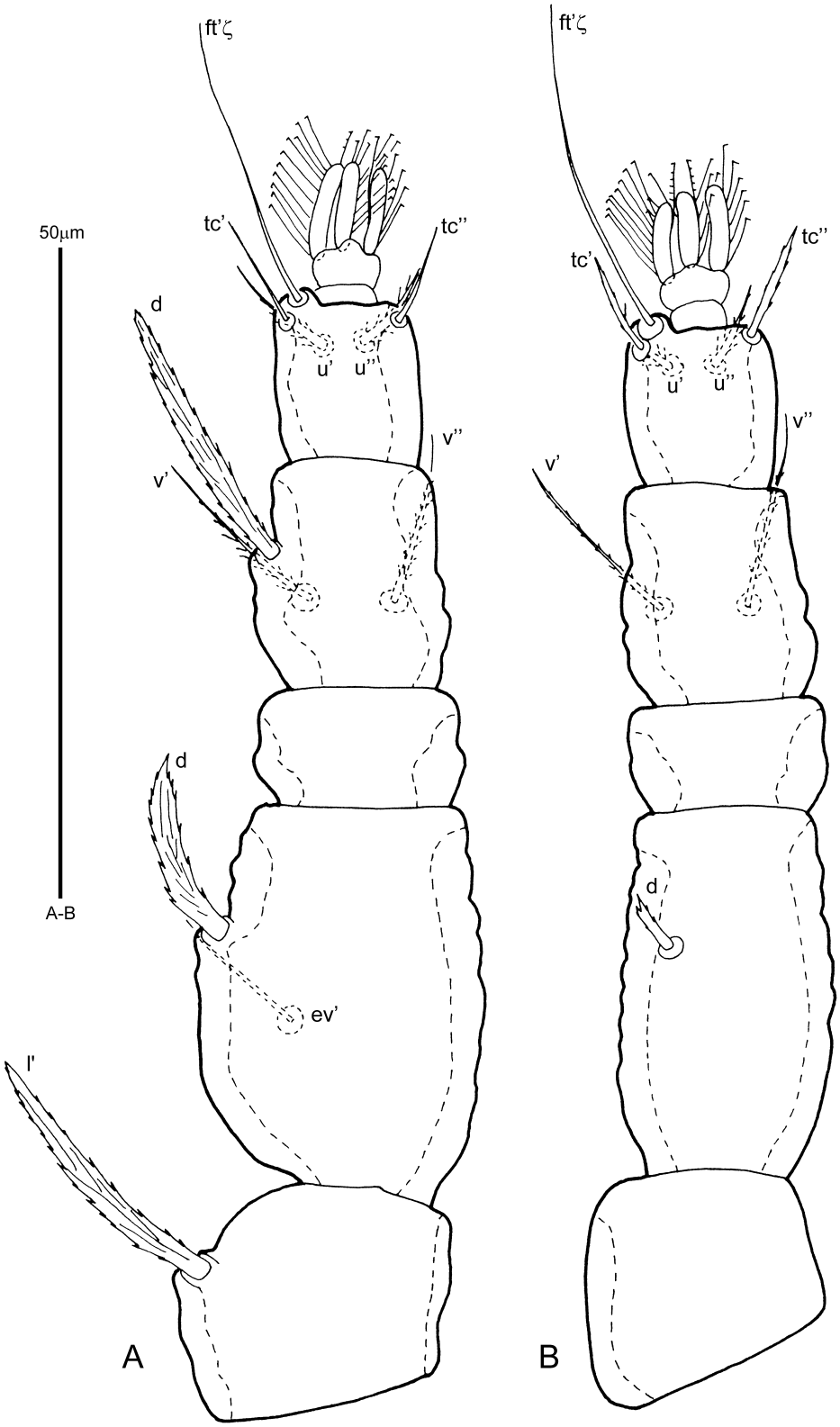


FIGURE 5. *Acaricis urigersoni* **sp. nov.** (adult female). A, leg III; B, leg IV.

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Adult Female (n=5)

Gnathosoma. (Fig. 3A) Rostrum reaching proximal end of femur I, subcapitular seta *m* setiform, *m*=16–18 (18), *m*–*m*=16–18 (18). Palp 4-segmented, setal formula: 0, 0, 2, 2; tarsus with 2 eupathidia 4, 4.

Idiosoma. (Figs. 1A, 2A, 20A, 21A) 445–470 (470) long, 195–205 (200) wide. Rostral shield pitted. Idiosoma widest at posterior margin of propodosoma, narrowing abruptly at base of opisthosoma, then expanding posteriorly. PRODORSUM covered with weak longitudinal sculpturing and faint broad band of transverse striations between setae sc_1 and d_1 (Figs. 1A, 20A); bearing 2 pairs of setae (sc_1 and sc_2), setae sc_1 bifurcated, sc_2 lanceolate, barbed; lengths: sc_1 5–6 (5), sc_2 31–36 (35); distances: sc_1–sc_1 70–74 (73), sc_1–sc_2 40–49 (43), sc_2–sc_2 155–165 (155). HYSTEROSOMA smooth, covered with oblique and longitudinal wrinkles as shown in Fig. 21A, a pair of distinct pores anterior to e_1; with 1 pair of humeral setae c_3, 2 pairs of dorsocentral setae d_1 and e_1, and 6 pairs of dorsolateral setae. Setae c_3, d_1, d_3 and e_1 setiform, dorsolateral setae e_3, f_2, f_3 and h_1 lanceolate, barbed, and h_2 elongate, ending in a minute club. Lengths: d_1 4–6 (4), e_1 4, c_3 4, d_3 3–4 (3), e_3 15–20 (20), f_2 23–25 (25), f_3 23–25 (25), h_2 117–142 (117), h_1 21–25 (21); distances: d_1–d_1 24–28 (24), e_1–e_1 10–20 (17), c_3–c_3 160–170 (165), d_3–d_3 120–130 (125), d_3–e_3 110–130 (125), e_3–e_3 120–135 (125), e_3–f_2 23–24 (24), f_2–f_2 115–125 (115), f_2–f_3 19–22 (21), f_3–f_3 95–105 (95), f_3–h_2 21–27 (22), h_2–h_2 (34), h_2–h_1 13–14 (13), h_1–h_1 33–42 (34).

Venter. (Figs.1B, 2B, 3B, 22A, 23A, B) Venter with few broken oblique striae laterally and fine transverse striations between coxae II and IV. All coxal setae setiform. Setae *1a* and posterior medioventral setae $4a_1$ and $4a_2$ flagelliform, anterior medioventral setae *3a* setiform; setae $4a_1$ and $4a_2$ subequal, more than 8 times as long as *3a* (Fig. 2B). Lengths: *1a* 130–145 (135), *1b* 10–11 (11), *1c* 10–12 (11), *2b* 17–19 (18), *2c* 18–20 (18), *3a* 13–15 (13), *3b* 16–20 (18), $4a_1$ 120–130 (125), $4a_2$ 115–125 (115), *4b* 15–20 (18). Distances: *1a*–*1a* 25–33 (30), *3a*–*3a* 30–32 (30), $4a_1$–$4a_1$ 9–13 (9), $4a_1$–$4a_2$ 11–15 (12), $4a_2$–$4a_2$ 29–39 (29). Genital and ventral plates with flaps of cuticle as shown in Fig. 1B, bearing 1 pair of aggenital setae *ag* and 2 pairs of gential setae (g_1 and g_2), setiform; setae g_1 and g_2 subequal. Anal plate with 2 pairs of pseudanal setae (ps_1 and ps_2). Seta lengths: *ag* 13–16 (14), g_1 15–18 (16), g_2 15–18 (16), ps_1 12–14 (12), ps_2 10–12 (10). Distances: *ag*–*ag* 22–28 (22), g_1–g_1 20–29 (24), g_1–g_2 10–12 (11), g_2–g_2 40–44 (40), ps_1–ps_2 36–37 (37).

Spermatheca. (Figs. 3B, 22A, 23B) A short, narrow, unsclerotised tube extending from genital opening (mesad setae ps_2) and ending in a cylinder-shaped vesicle.

Legs. (Figs. 4, 5) Lengths of legs I–IV: 125–135 (130), 100–110 (105), 82–87 (85), 80–84 (84). Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-1-0; femora 4-4-2-1; genua 2-2-0-0, tibiae 5-5-3-2, tarsi 7+ω-7+ω-5-5. Most dorsal and lateral setae on femora, genua and tibiae lanceolate, lateral setae *l′* on tibiae pectinate; ventral setae *bv″* on femur I pectinate and on femur II lanceolate; seta *ev′* on femur III setiform; ventral setae *v* pectinate. Setae *ft″* on tarsi I–II and *ft′ζ* on tarsi III–IV flagelliform; unguinal setae *u* pectinate and equal in length; proral setae p′ζ and *p″ζ* eupathidial; tectal setae *tc* setiform except on tarsus IV pectinate. Lengths of solenidia: I ω'' 4–5 (4), II ω'' 4–5 (4). Claws developed with tenent hairs on each side.

Male (n=5)

Gnathosoma. (Fig. 7C) Rostrum reaching proximal end of femur I, and rostral shield pitted, subcapitular setae *m* setiform, *m*= 14–18, *m*–*m*= 14–18. Palp 4-segmented, setal formula: 0, 0, 2, 2; tibia with 2 bare setae, tarsus with 2 eupathidia, lengthes 3–4, 3–4.

Idiosoma. (Figs. 6A, 7A, 20B, 21B) 325–340 long, 140–155 wide. Rostral shield pitted. Idiosoma widest at posterior margin of propodosoma, narrowing abruptly at base of opisthosoma, then expanding posteriorly. PRODORSUM covered with faint broad band of transverse striations between setae sc_1 and d_1 (Figs. 6A, 20B); bearing 2 pairs of setae (sc_1 and sc_2), setae sc_1 setiform, sc_2 lanceolate, barbed; lengths: sc_1 4–5, sc_2 25–30; distances: sc_1–sc_1 56–65, sc_1–sc_2 34–38, sc_2–sc_2

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125–135. HYSTEROSOMA divided into metapodosoma and opisthosoma by narrow band of horizontal striations (Figs. 6A, 21B); with 1 pair of humeral setae c_3, 2 pairs of dorsocentral setae d_1 and e_1, and 6 pairs of dorsolateral setae. Setae c_3, d_1, d_3 and e_1 setiform, dorsolateral setae e_3, f_2, f_3 and h_1 lanceolate, barbed, and h2 elongate, ending in a minute club. Lengths: d_1 3–4, e_1 3–4, c_3 3–4, d_3 3–4, e_3 7–10, f_2 18–19, f_3 19–21, h_2 117–122, h_1 18–21; distances: d_1–d_1 15–22, e_1–e_1 10–13, c_3–c_3 120–130, d_3–d_3 80–91, d_3–e_3 90–100, e_3–e_3 70–81, e_3–f_2 15–20, f_2–f_2 70–82, f_2–f_3 12–18, f_3–f_3 66–78, f_3–h_2 12–18, h_2–h_2 45–53, h_2–h_1 10, h_1–h_1 24–36.

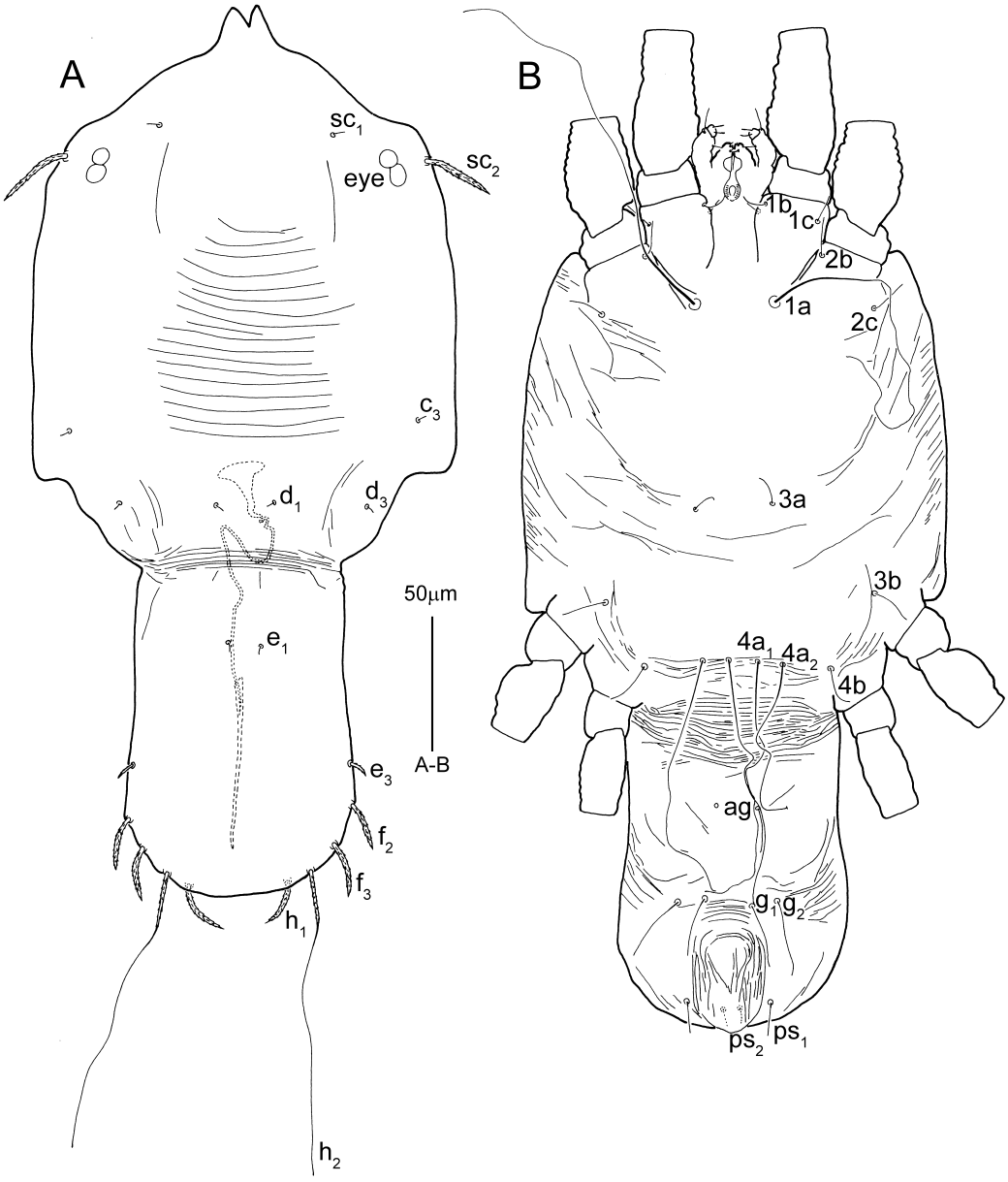


FIGURE 6. *Acaricis urigersoni* **sp. nov.** (adult male). A, dorsal view of idiosoma; B, ventral view of idiosoma.

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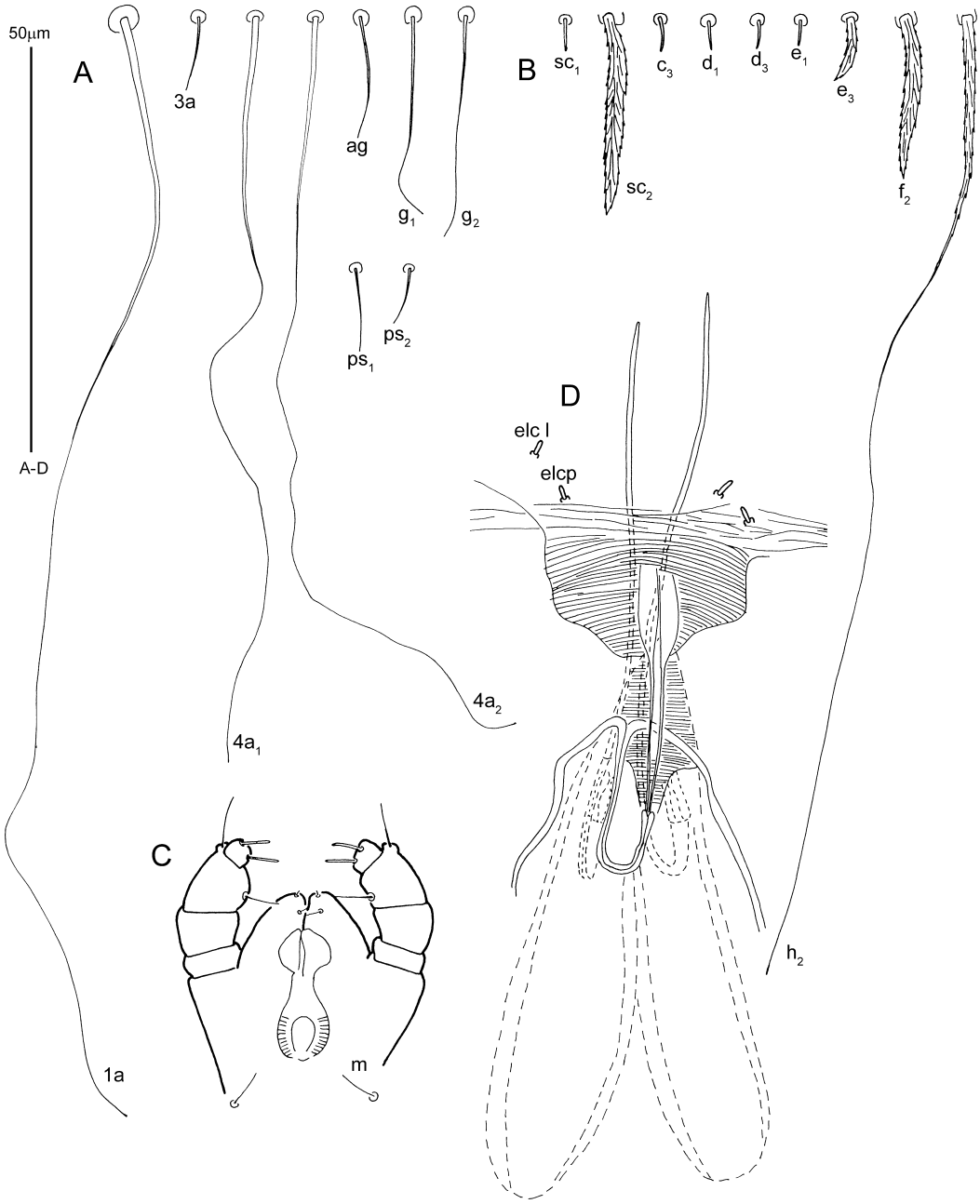


FIGURE 7. *Acaricis urigersoni* **sp. nov.** (adult male). A, dorsal setae; B, ventral setae; C, subcapitulum; D, chelicerae and collar.

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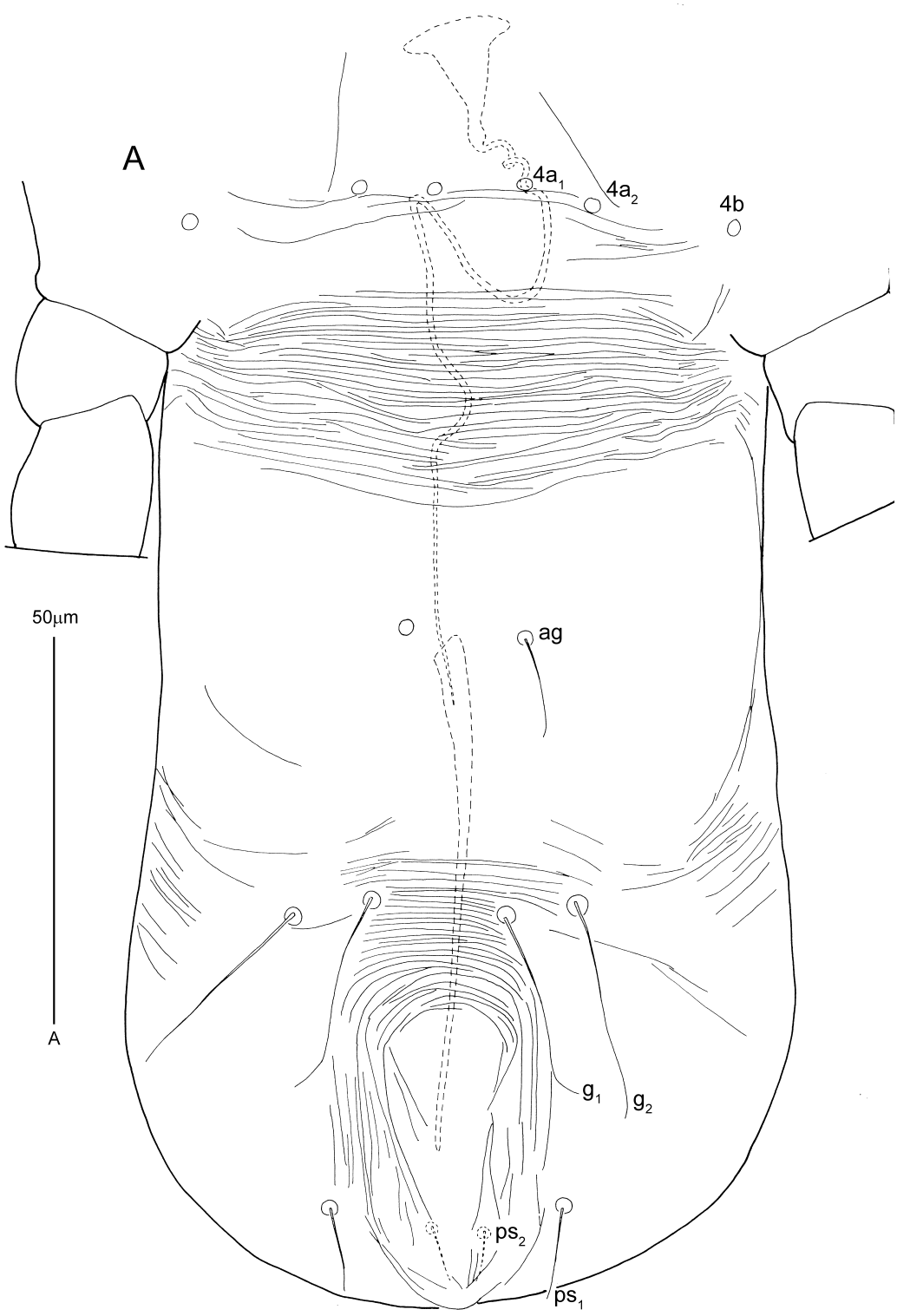


FIGURE 8. *Acaricis urigersoni* **sp. nov.** (adult male). A, genital-anal plate.

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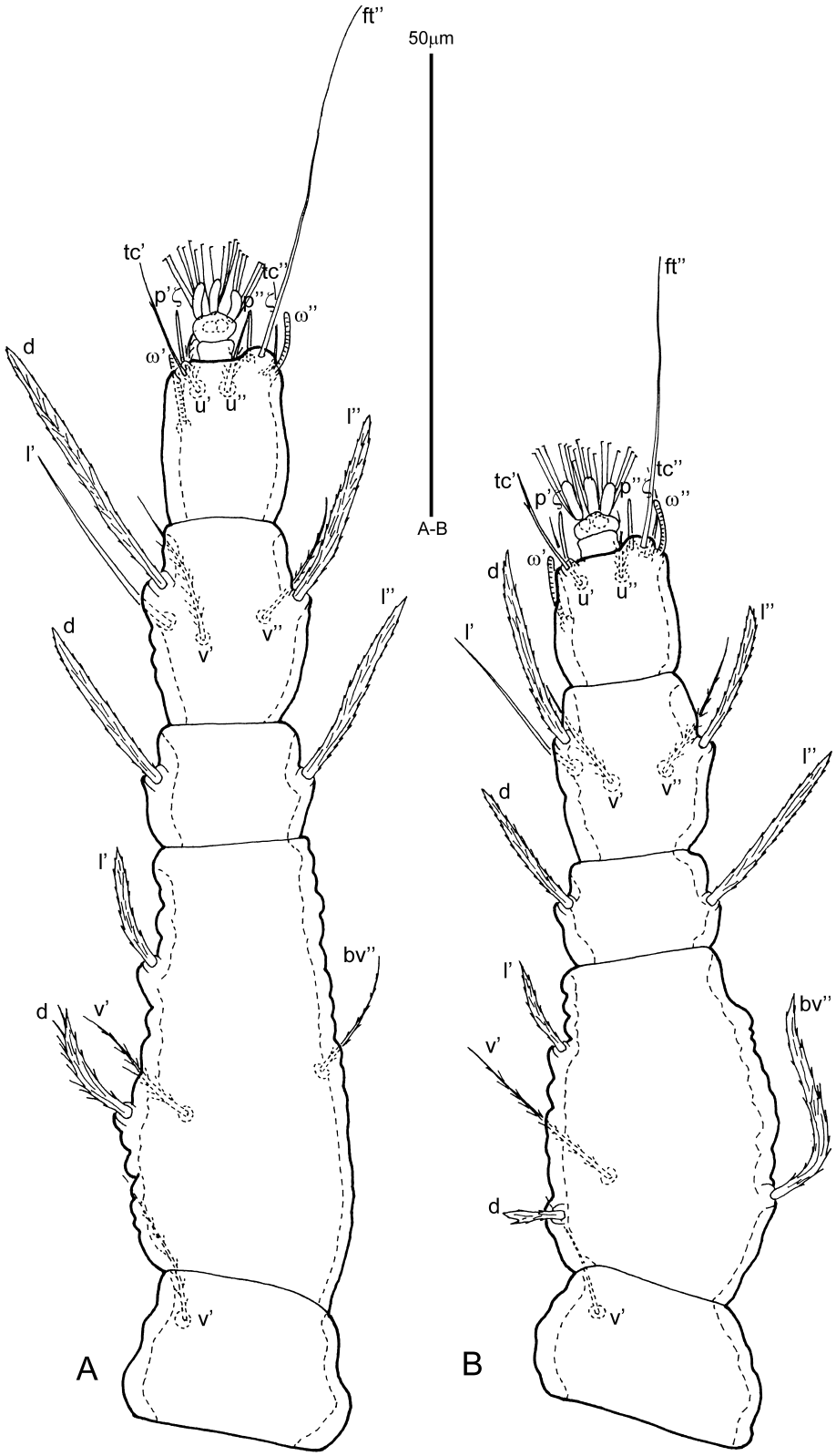


FIGURE 9. *Acaricis urigersoni* **sp. nov.** (adult male). A, leg I; B, leg II.

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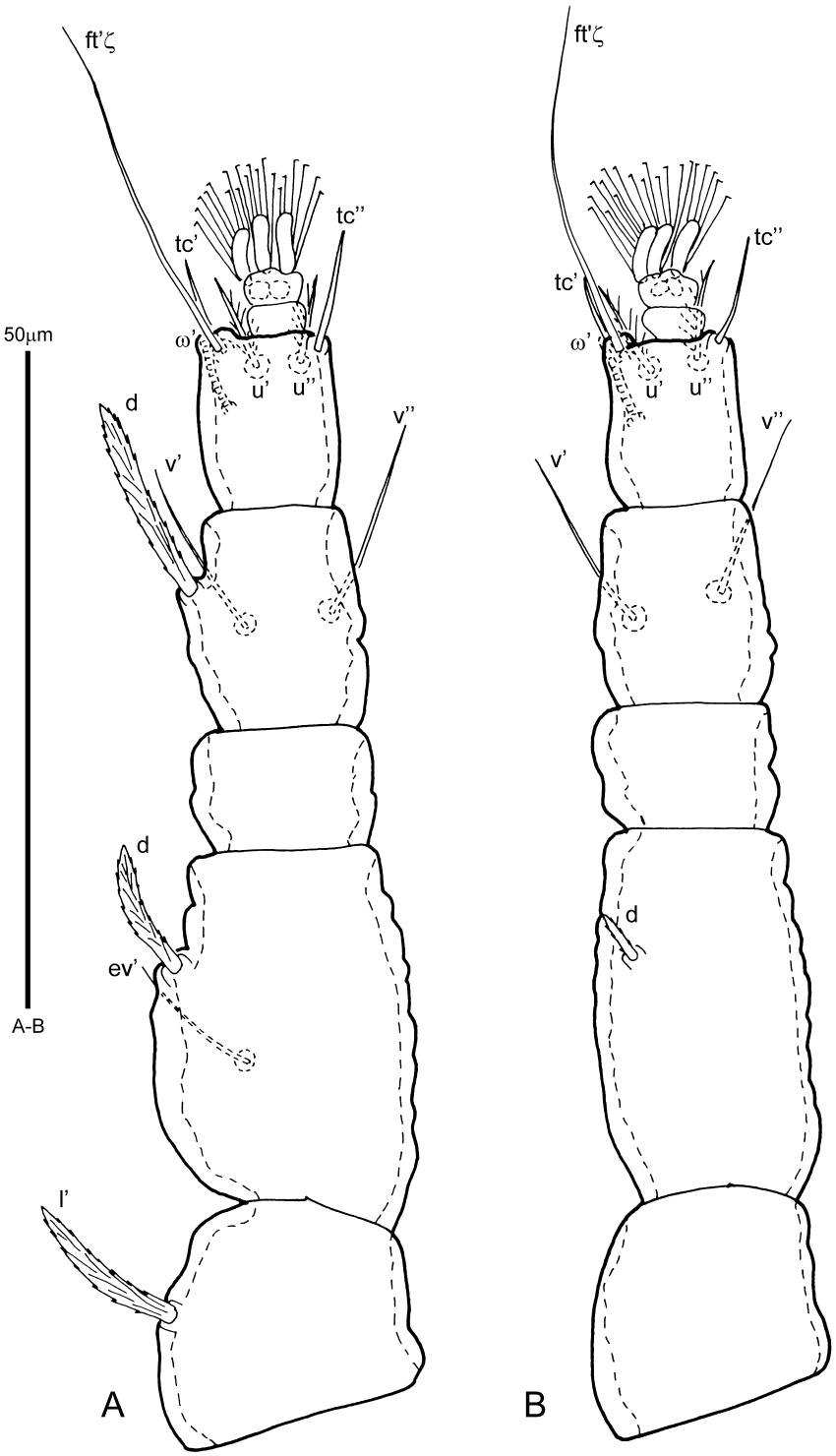


FIGURE 10. *Acaricis urigersoni* **sp. nov.** (adult male). A, leg III; B, leg IV.

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Venter. (Figs. 6B, 7B, 8A, 22B, 23D) Venter with fine transverse striation between coxae II and IV, longituidinal striations in the genital area. All coxal setae setiform. Setae *1a* and posterior medioventral setae $4a_1$ and $4a_2$ flagelliform, anterior medioventral setae *3a* setiform; setae $4a_1$ and $4a_2$ subequal, more than 9 times as long as *3a* (Fig. 7B). Lengths: *1a* 135–150, *1b* 10–11, *1c* 9–12, *2b* 15–20, *2c* 16–20, *3a* 10–12, *3b* 18–20, $4a_1$ 100–110, $4a_2$ 105-110, *4b* 14–17. Distances: *1a–1a* 25–30, *3a–3a* 23–28, $4a_1$–$4a_1$ 9–11, $4a_1$–$4a_2$ 8–10, $4a_2$–$4a_2$ 25–30. Genital and ventral plates with an aedeagus and seminal vesicle, bearing one pair of aggenital setae *ag* and 2 pairs of gential setae (g_1 and g_2), setiform; setae g_1 and g_2 subequal. Anal plate with 2 pairs of pseudanal setae ($ps_1$and ps_2). Seta lengths: *ag* 15–18, g_1 27–29, g_2 27–30, ps_1 11–12, ps_2 7–8. Distances: *ag–ag* 11–18, g_1–g_1 15–19, g_1–g_2 10–11, g_2–g_2 35–38, ps_1–ps_2 7–14.

Aedeagus. (Figs. 8, 22B, 23D) A narrow, elongate, sclerotised aedeagus tapering to a point posteriorly (at genital opening); membranous duct running from sclerotised aedeagus to flared, lightly sclerotised, cone-shaped cup distally, appearing to open into a soft membranous vesicle.

Legs. (Figs. 9, 10) Lengths of legs I–IV: 110–120, 90–96, 72–85, 72–83. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-1-0; femora 4-4-2-1; genua 2-2-0-0, tibiae 5-5-3-2, tarsi 7+2ω-7+2ω-5+ω-5+ω. Most dorsal and lateral setae on femora, genua and tibiae lanceolate, lateral setae *l′* on tibiae I and II setiform; ventral setae *bv″* on femur I pectinate and on femur II lanceolate; seta *ev′* on femur III setiform; ventral setae *v* pectinate except on trochanter II setiform. Setae *ft″* on tarsi I–II and *ft′ζ* on tarsi III–IV flagelliform; unguinal setae *u* pectinate and equal in length; proral setae p′ζ and *p″ζ* eupathidial; tectal setae *tc* setiform except *tc′* on tarsi I and II bifurcated. Lengths of solenidia: I ω' 8–9, ω'' 6–8, II ω' 7–8, ω'' 6, III ω' 7, IV ω' 7. Claws developed with tenent hairs on each side.

Deutonymph (n=5)

Gnathosoma. (Fig. 12A) Rostrum reaching proximal end of femur I, subcapitular seta *m* setiform, *m*=13–15, *m–m*=13–15. Palp 4-segmented, setal formula: 0, 0, 2, 2; tibia with 2 bare setae, tarsus with 2 eupathidia 3–4, 3–4.

Idiosoma. (Figs. 11A, 12C, 20C, 21C) 310–365 long, 140–160 wide. Rostral shield pitted. Idiosoma widest at posterior margin of propodosoma, narrowing abruptly at base of opisthosoma, then expanding posteriorly. PRODORSUM covered with faint broad band of transverse striations between setae sc_1 and d_1 (Figs. 11A, 20C), bearing 2 pairs of setae, setae sc_1 bifurcated, sc_2 lanceolate, barbed; lengths: sc_1 3, sc_2 21–28; distances: sc_1–sc_1 56–63, sc_1–sc_2 32–39, sc_2–sc_2 115–130. HYSTEROSOMA smooth, covered with oblique and longitudinal wrinkles as shown in Fig.11A. Setae c_3, d_1, d_3 and e_1 setiform, subequal, dorsolateral setae e_3, f_2, f_3 and h_1 lanceolate, barbed, and h_2 elongate, ending in minute club. Lengths: d_1 2–3, e_1 2–4, c_3 2–3, d_3 2–3, e_3 5–7, f_2 12–16, f_3 12–17, h_2 86–105, h_1 12–17; distances: d_1–d_1 15–21, e_1–e_1 6–10, c_3–c_3 110–125, d_3–d_3 81–100, d_3–e_3 57–86, e_3–e_3 73–95, e_3–f_2 11–16, f_2–f_2 72–95, f_2–f_3 11–16, f_3–f_3 60–85, f_3–h_2 12–20, h_2–h_2 40–51, h_2–h_1 10–13, h_1–h_1 19–26.

Venter. (Figs. 11B, 12C, 14C, 22C) Venter with fine transverse striations between coxae II and IV. All coxal setae setiform. Setae *1a* and posterior medioventral setae $4a_1$ flagelliform, anterior medioventral setae *3a* setiform; setae $4a_1$ about 6 times as long as *3a* (Fig. 12C). Lengths: *1a* 125–140, *1b* 8–10, *1c* 8–10, *2b* 9–13, *2c* 11–14, *3a* 10–14, *3b* 14–16, $4a_1$ 79–90, *4b* 12–13. Distances: *1a–1a* 21–23, *3a–3a* 21–24, $4a_1$–$4a_1$ 12–19. Genital and ventral plates with oblique cuticles anterior to *ag* and transverse cuticles between *ag* and g_1, and oblique striations laterad seta g_1 as shown in Fig. 22C, bearing one pair of aggenital setae *ag* and one pair of gential setae g_1, setiform. Anal plate with 2 pairs of pseudanal setae ($ps_1$and ps_2). Seta lengths: *ag* 10–14, g_1 11–14, ps_1 8–9, ps_2 5–7. Distances: *ag–ag* 14–23, g_1–g_1 13–23, ps_1–ps_2 18–30.

Legs. (Figs. 13, 14A, B) Lengths of legs I–IV: 84–96, 66–77, 53–61, 48–55. Chaetotaxy: coxae 2-2-1-1; trochanters 1-1-1-0; femora 4-4-2-1; genua 2-2-0-0, tibiae 5-5-3-2, tarsi 7+ω-7+ω-5-5. Most dorsal and lateral setae on femora, genua and tibiae lanceolate, lateral setae *l″* on genua I

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pectinate setiform, lateral setae *l′* on tibiae I and II setiform. Ventral seta *bv″* on femur I setiform and on femur II lanceolate; ventral seta *v* and *ev′* setiform. Setae *ft″* on tarsi I–II and *ft′ζ* on tarsi III–IV flagelliform; unguinal setae *u* setiform and equal in length; proral setae p′ζ and *p″ζ* eupathidial; tectal setae *tc* setiform. Lengths of solenidia: I *ω″* 4, II *ω″* 4. Claws developed with tenent hairs on each side.

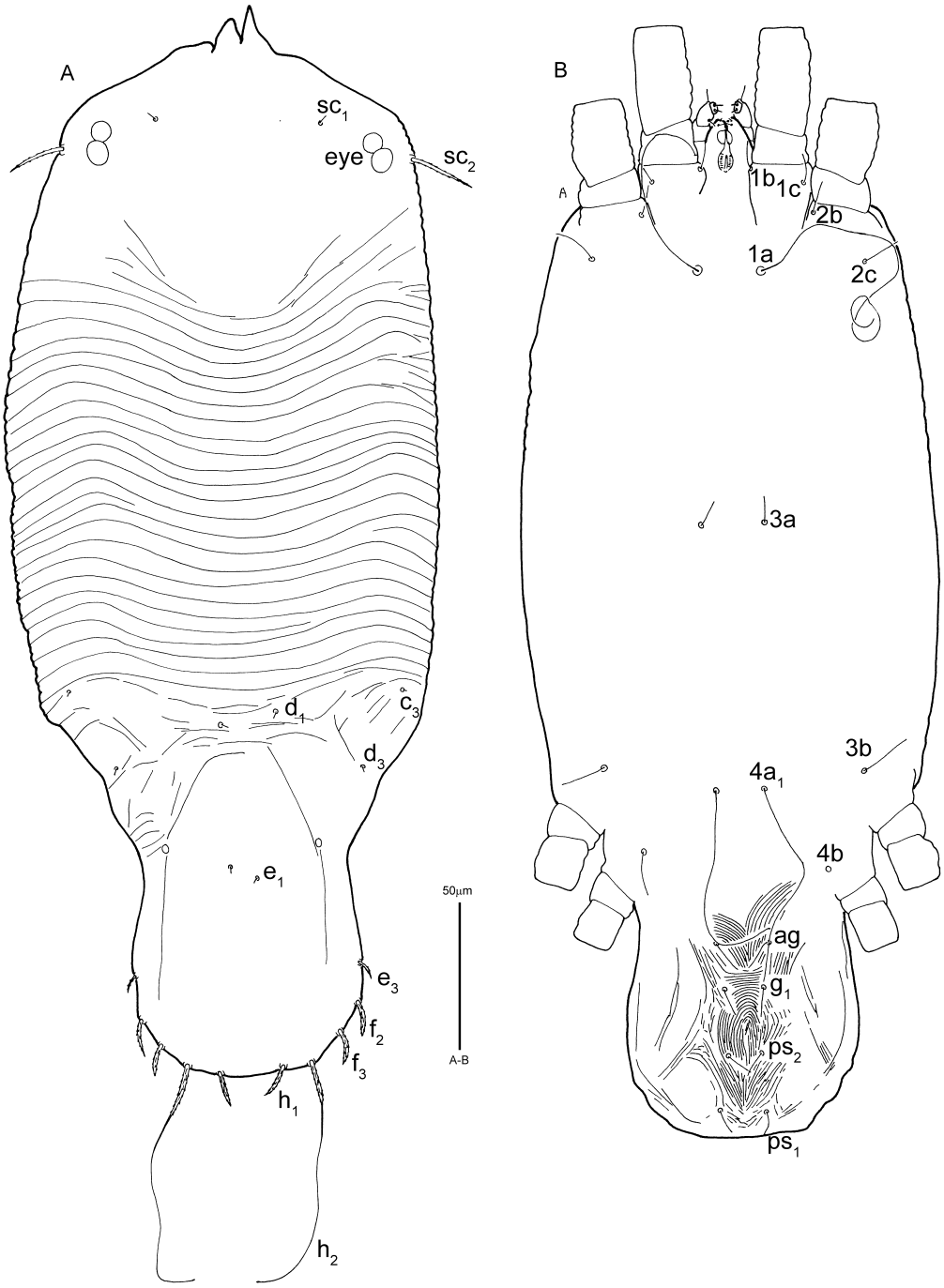


FIGURE 11. *Acaricis urigersoni* **sp. nov.** (deutonymph). A, dorsal view of idiosoma; B, ventral view of idiosoma.

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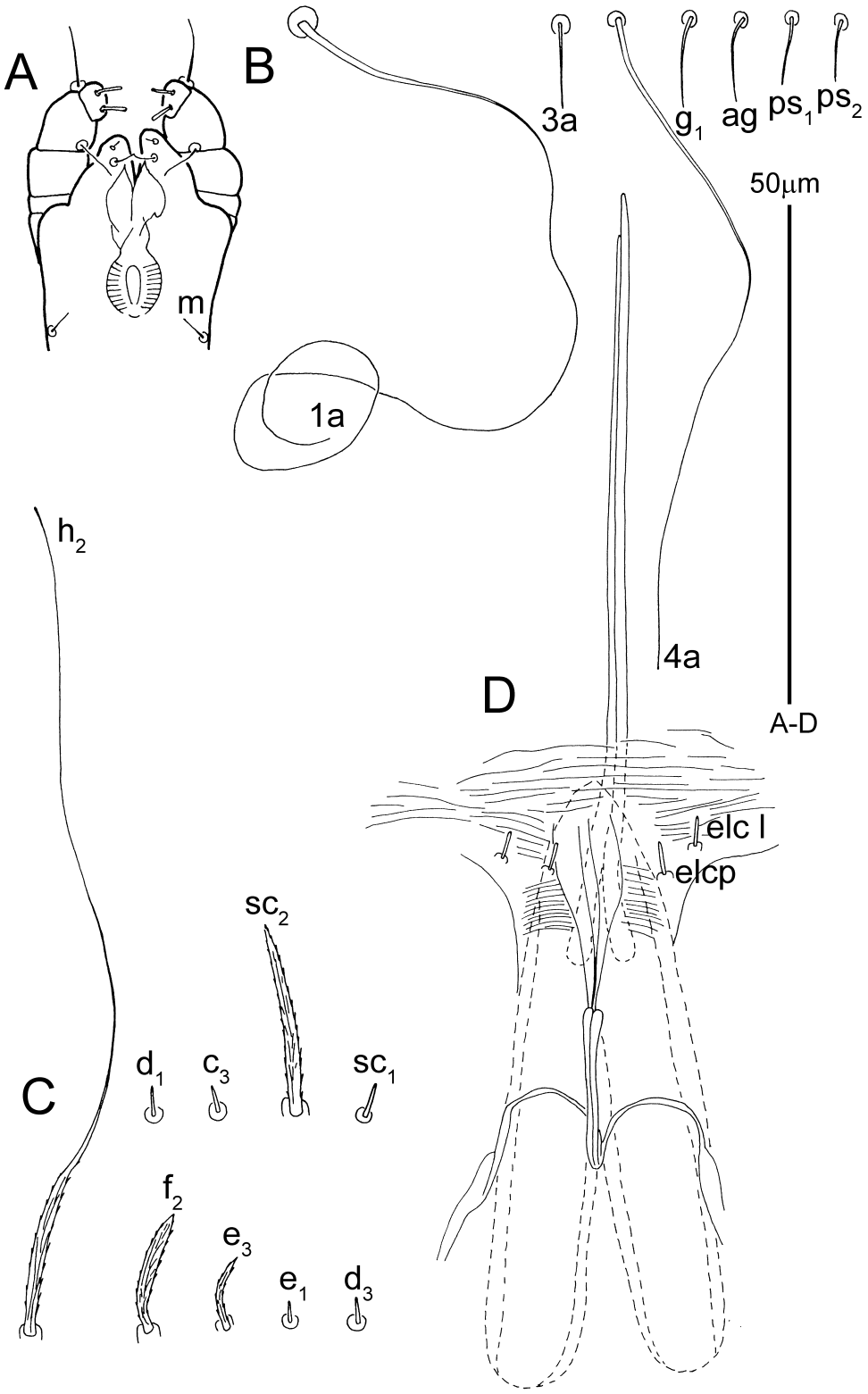


FIGURE 12. *Acaricis urigersoni* **sp. nov.** (deutonymph). A, subcapitulum; B, ventral view of idiosoma; C, dorsal view of idiosoma; D, chelicerae and collar.

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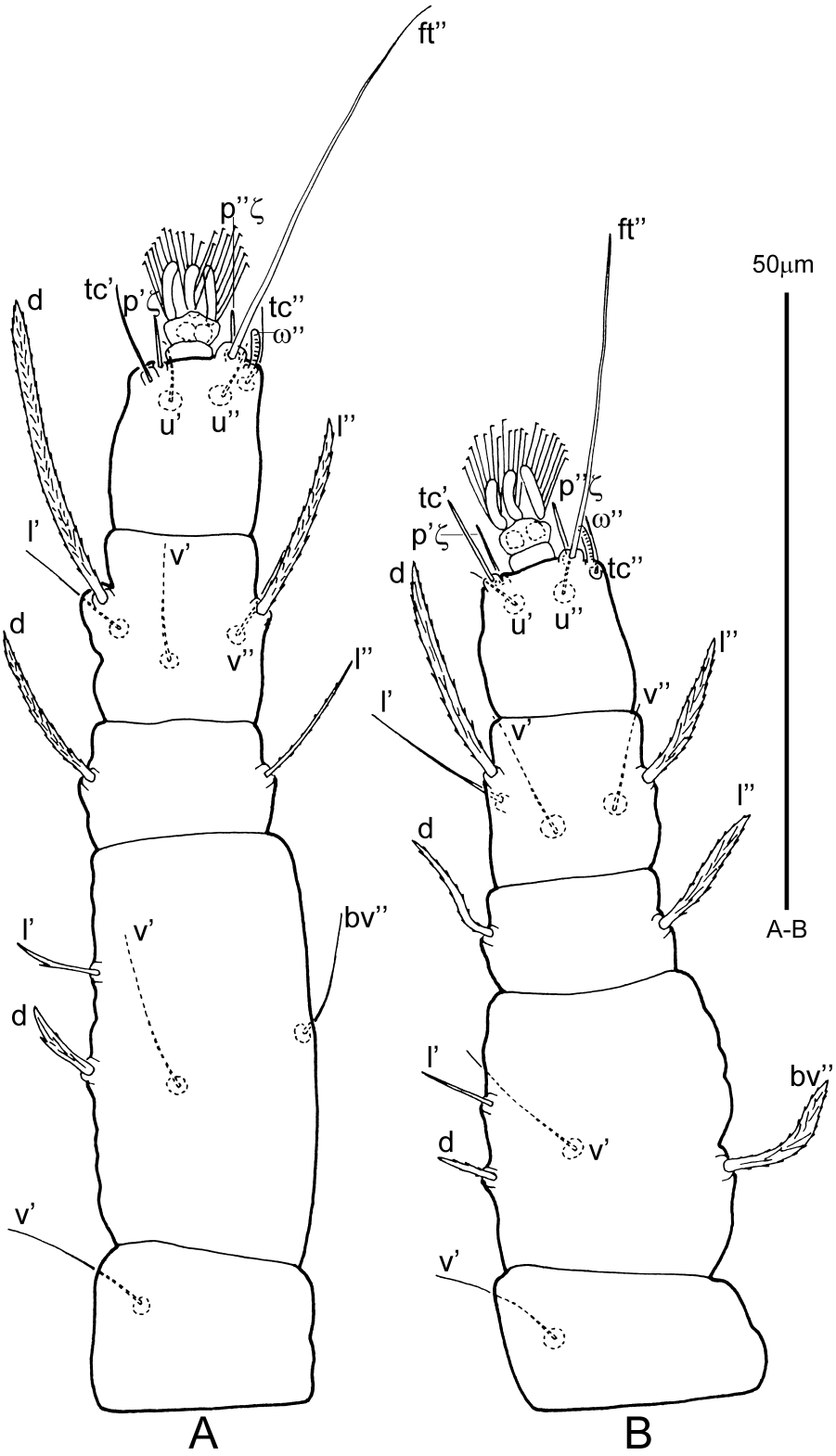


FIGURE 13. *Acaricis urigersoni* **sp. nov.** (deutonymph). A, leg I; B, leg II.

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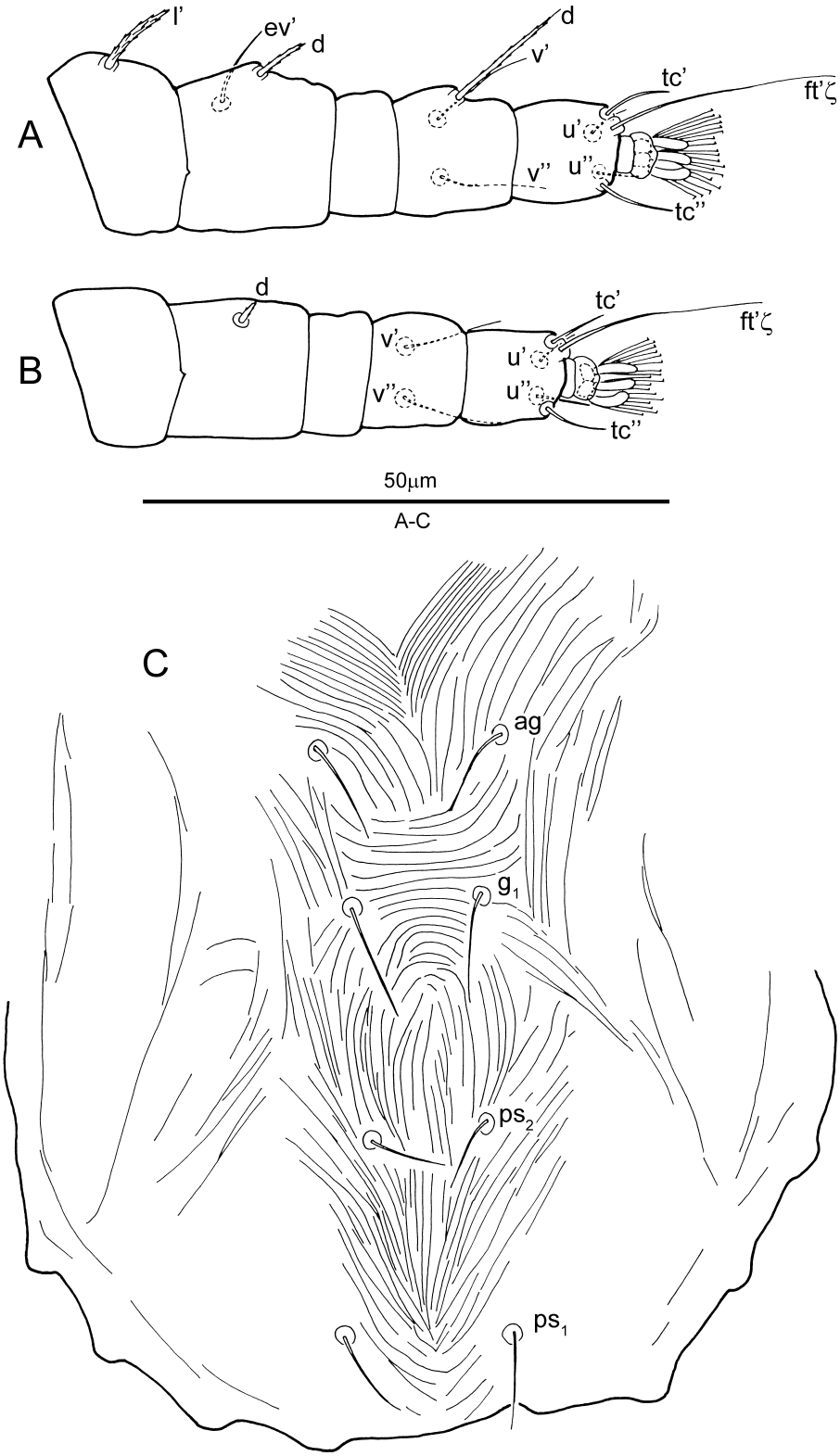


FIGURE 14. *Acaricis urigersoni* **sp. nov.** (deutonymph). A, leg III; B, leg IV; C, genital-anal plate.

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Protonymph (n=4)

Gnathosoma. (Fig. 16D) Rostrum reaching proximal end of femur I,and rostral shield pitted, subcapitular seta *m* setiform, *m*=14–16, *m*–*m*=14–16. Palp 4-segmented, setal formula: 0, 0, 2, 2; tibia with 2 bare setae, tarsus with 2 eupathidia 3–4, 3–4.

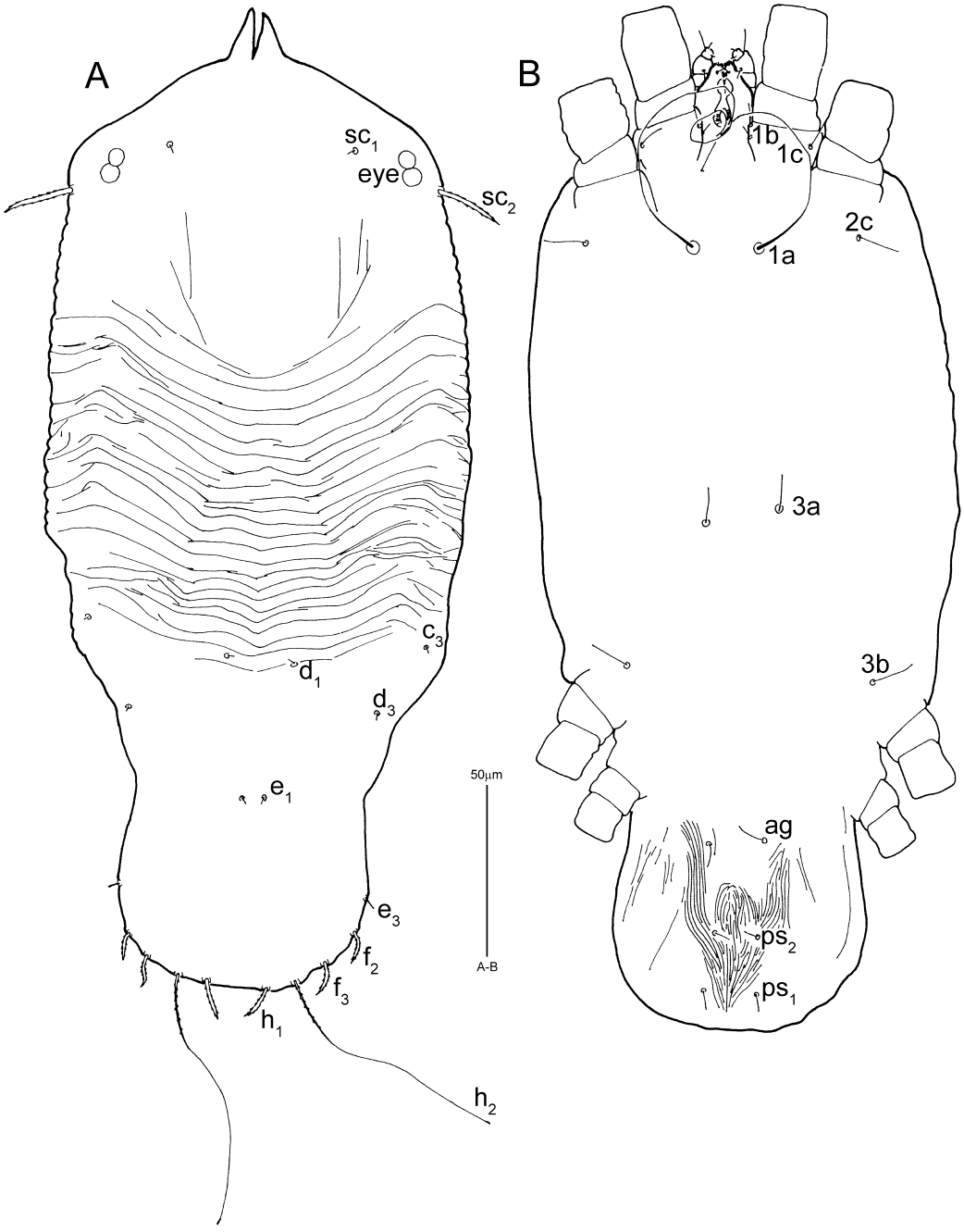


FIGURE 15. *Acaricis urigersoni* **sp. nov.** (protonymph). A, dorsal view of idiosoma; B, ventral view of idiosoma.

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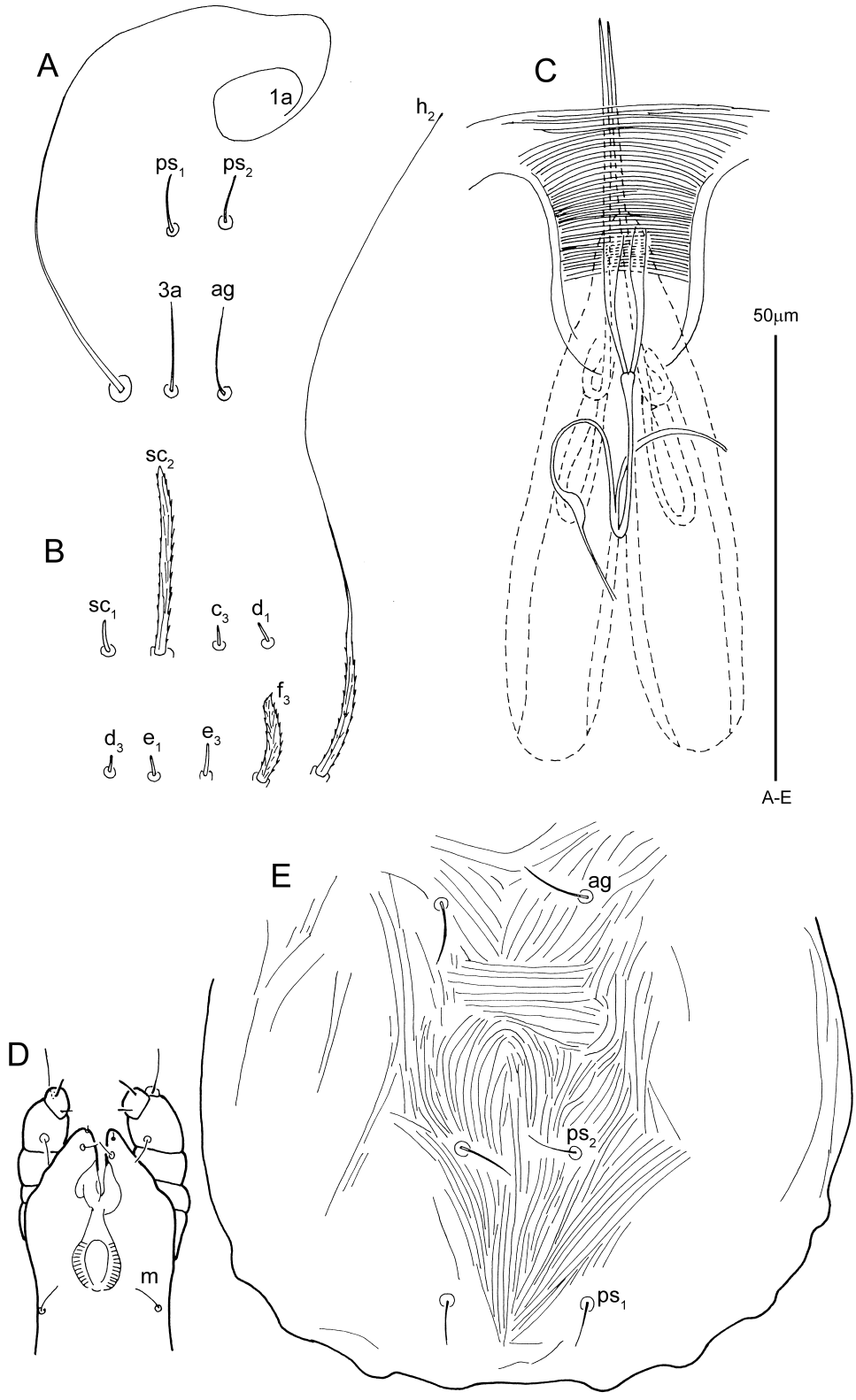


FIGURE 16. *Acaricis urigersoni* **sp. nov.** (protonymph). A, ventral setae; B, dorsal setae; C, chelicerae and collar; D, subcapitulum; E, genital-anal plate.

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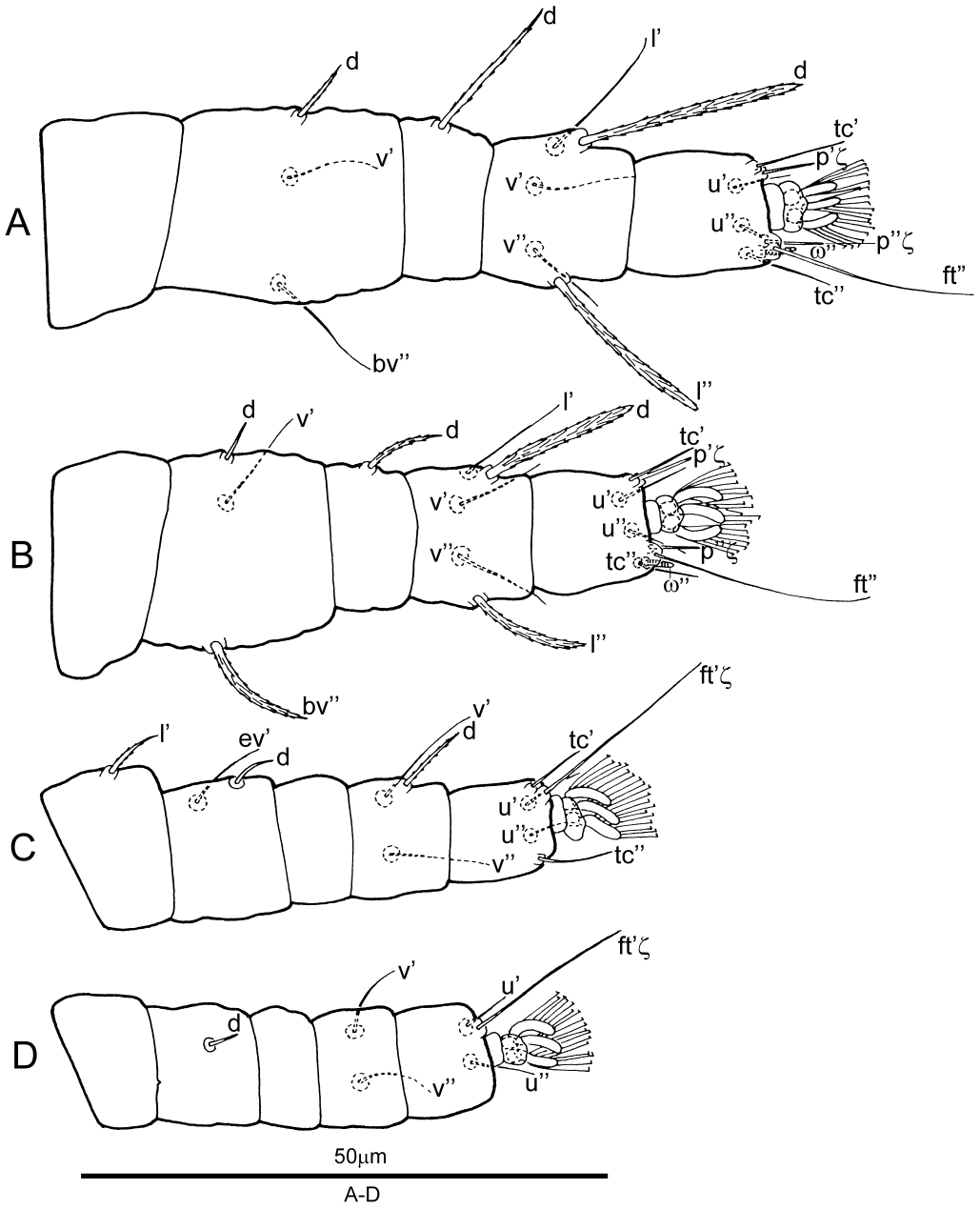


FIGURE 17. *Acaricis urigersoni* **sp. nov.** (protonymph). A, leg I; B, leg II; C, leg III; D, leg IV.

Idiosoma. (Figs. 15A, 16B, 20D, 21D) 279–305 long, 120–130 wide. Rostral shield pitted. Idiosoma widest at posterior margin of propodosoma, narrowing abruptly at base of opisthosoma, then expanding posteriorly. PRODORSUM covered with faint broad band of transverse striations between setae sc_1 and d_1 (Figs. 16B), bearing 2 pairs of setae, setae sc_1 setiform, sc_2 lanceolate, barbed; lengths: sc_1 3, sc_2 20–21; distances: sc_1–sc_1 45–57, sc_1–sc_2 28–33, sc_2–sc_2 105–115. HYSTEROSOMA smooth (Figs. 15A, 21D), with 1 pair of humeral seta c_3, 2 pairs of dorsocentral setae d_1 and e_1, and 6 pairs of dorsolateral setae. Setae c_3, d_1, d_3 and e_1 setiform, subequal,

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dorsolateral setae e_3, f_2, f_3 and h_1 lanceolate, barbed, and h_2 elongate, ending in minute club. Lengths: d_1 2, e_1 2–4, c_3 2, d_3 2, e_3 3–5, f_2 9–13, f_3 10–12, h_2 68–82, h_1 9–11; distances: d_1–d_1 15–24, e_1–e_1 6–9, c_3–c_3 93–99, d_3–d_3 68–75, d_3–e_3 55–58, e_3–e_3 63–73, e_3–f_2 8–15, f_2–f_2 59–66, f_2–f_3 9–13, f_3–f_3 46–54, f_3–h_2 8–14, h_2–h_2 29–37, h_2–h_1 9–10, h_1–h_1 11–20.

Venter. (Figs. 15B, 16A, E, 22D) Venter similar to deutonymph. All coxal setae setiform. Setae *1a* flagelliform and anterior medioventral setae *3a* setiform (Fig. 16A). Lengths: *1a* 98–105, *1b* 8–10, *1c* 8–9, *2c* 11–12, *3a* 9–10, *3b* 11–14. Distances: *1a–1a* 19–22, *3a–3a* 21–25. Similar to deutonymph, bearing one pair of aggenital setae *ag*, setiform. Anal plate with 2 pairs of pseudanal setae (ps_1 and ps_2). Setae lengths: *ag* 7–12, ps_1 6–7, ps_2 5–6. Distances: *ag–ag* 15–16, ps_1–ps_2 14–17.

Legs. (Fig. 17) Lengths of legs I–IV: 67–74, 55–62, 48–50, 41–44. Chaetotaxy: coxae 2-1-1-0; trochanters 0-0-1-0; femora 3-3-2-1; genua 1-1-0-0, tibiae 5-5-3-2, tarsi 7+ω-7+ω-5-3. Dorsal setae on femora, genua and tibiae lanceolate; ventral seta *bv″* on femur I setiform and on femur II lanceolate; lateral setae *l′* on tibiae I and II setiform and *l″* on tibiae I and II lanceolate; ventral seta *v* setiform. Setae *ft″* on tarsi I–II and *ft′ζ* on tarsi III–IV flagelliform; unguinal seta *u* and tectal seta *tc* setiform; proral setae p′ζ and *p″ζ* eupathidial. Lengths of solenidia: I ω'' 3, II ω'' 3. Claws developed with tenent hairs on each side.

Larva (n=5)

Gnathosoma. (Fig. 19D) Rostrum reaching middle of femur I, subcapitular seta *m* setiform, *m*=14–17, *m–m*=14–17. Palp 4-segmented, setal formula: 0, 0, 2, 2; tibia with 2 bare setae, tarsus with 2 eupathidia 3–4, 3–4.

Idiosoma. (Figs. 18A,19F, 20E, 21E) 240–275 long, 85–110 wide. PRODORSUM covered with faint broad band of transverse striations between setae sc_1 and d_1 (Figs. 18A, 20E), bearing 2 pairs of setae, setae sc_1 setiform, sc_2 lanceolate, barbed; lengths: sc_1 2–4, sc_2 12–16; distances: sc_1–sc_1 45–47, sc_1–sc_2 20–25, sc_2–sc_2 82–96. HYSTEROSOMA smooth (Figs. 18A, 21E), with 1 pair of humeral seta c_3, 2 pairs of dorsocentral setae d_1 and e_1, and 6 pairs of dorsolateral setae. Setae c_3, d_1, d_3, e_1 and e_3 setiform, subequal, dorsolateral setae f_2, f_3 and h_1 lanceolate, barbed, and h_2 elongate, ending in minute club. Lengths: d_1 3–4, e_1 2, c_3 2, d_3 2, e_3 4, f_2 8–9, f_3 8–9, h_2 89–98, h_1 8; distances: d_1–d_1 15–18, e_1–e_1 6–8, c_3–c_3 70–82, d_3–d_3 45–53, d_3–e_3 35–43, e_3–e_3 50–60, e_3–f_2 7–9, f_2–f_2 45–55, f_2–f_3 7–8, f_3–f_3 35–44, f_3–h_2 8–10, h_2–h_2 22–27, h_2–h_1 7–8, h_1–h_1 8–11.

Venter. (Figs. 18B, 19E, 22E) Venter similar to deutonymph. All coxal setae setiform. Setae *1a* flagelliform and anterior medioventral setae *3a* setiform (Fig. 19E). Lengths: *1a* 82–93, *1b* 7–8, *3a* 8–9. Distances: *1a–1a* 18–25, *3a–3a* 21–26. Anal plate with 2 pairs of pseudanal setae ($ps_1$and ps_2). Setae lengths: ps_1 5–6, ps_2 4–5. Distances: ps_1–ps_2 8–10.

Legs. (Figs. 19A, B, C) Lengths of legs I–III: 50–55, 44–48, 41–44. Chaetotaxy: coxae 1-0-0; trochanters 0-0-0; femora 3-3-2; genua 1-1-0, tibiae 5-5-3, tarsi 5+ω-5+ω-3. Most dorsal setae on femora, genua and tibiae lanceolate except on tibiae I and II nude. Ventral setae *bv″* on femora and lateral seta *l′* on tibiae setiform; lateral seta *l″* on tibiae I and II lanceolate; ventral seta *v* setiform. Setae *ft″* on tarsi I–II and *ft′ζ* on tarsus III flagelliform; unguinal seta *u* and tectal seta *tc* setiform; proral setae p′ζ and *p″ζ* eupathidial. Lengths of solenidia: I ω'' 2, II ω'' 2. Claws developed with tenent hairs on each side.

Etymology. The species is named after Prof Uri Gerson, who is an acarologist from Israel and has made significant contributions to the systematics and biology of the Tenuipalpidae.

Remarks. In live specimens, the body of this new species looks glossy with a translucent appearance, and is yellow-greenish with a series of minute black spots; legs I–II are obviously orange, and legs III–IV are pale orange; the eyes are red (Fig. 24). In one adult male, one dorsolateral setae h_2 was duplicated (h_2 and h_{2x} in Fig. 23C), and shortened by three times; the other seta h_2 was normal.

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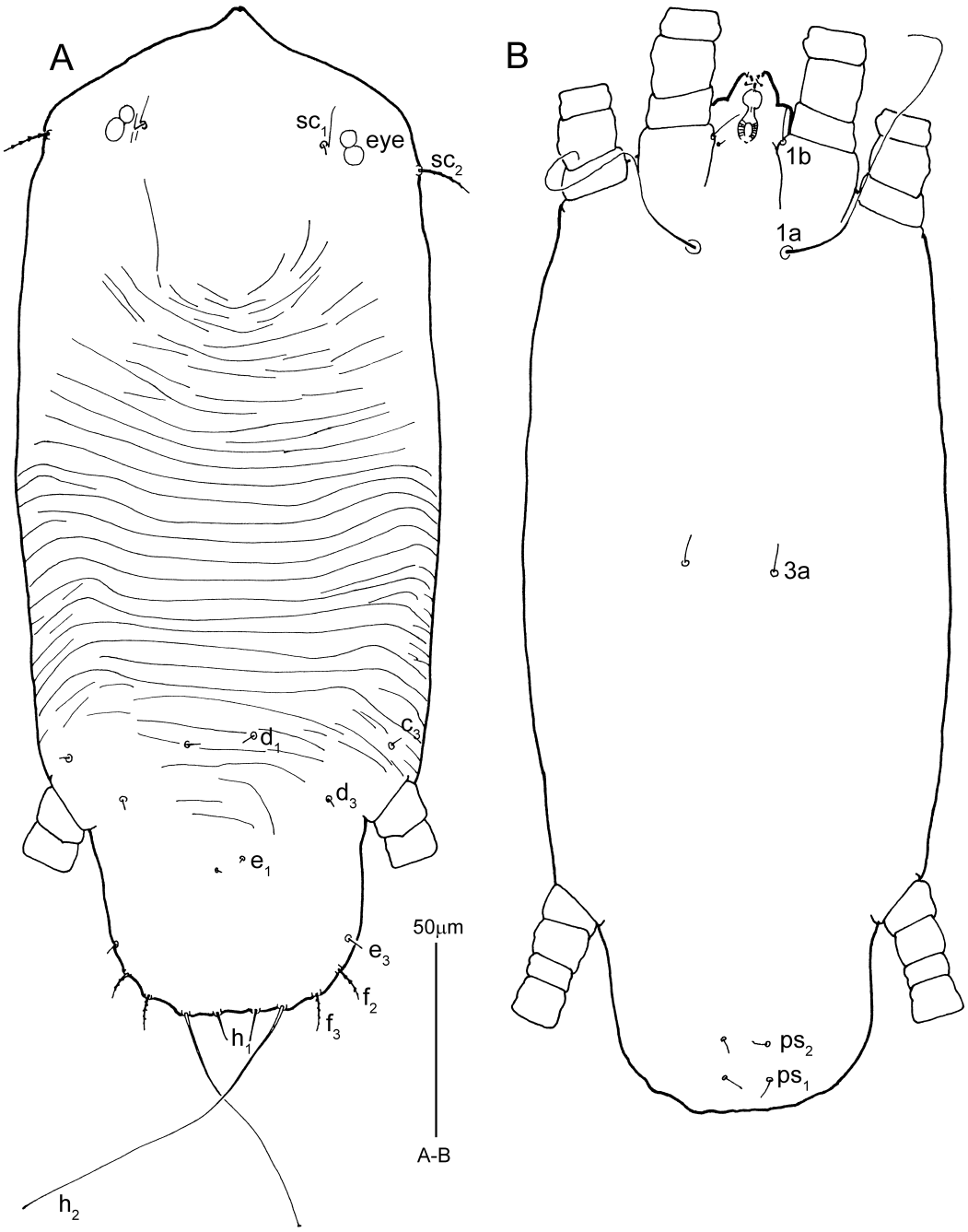


FIGURE 18. *Acaricis urigersoni* **sp. nov.** (larva). A, dorsal view of idiosoma; B, ventral view of idiosoma.

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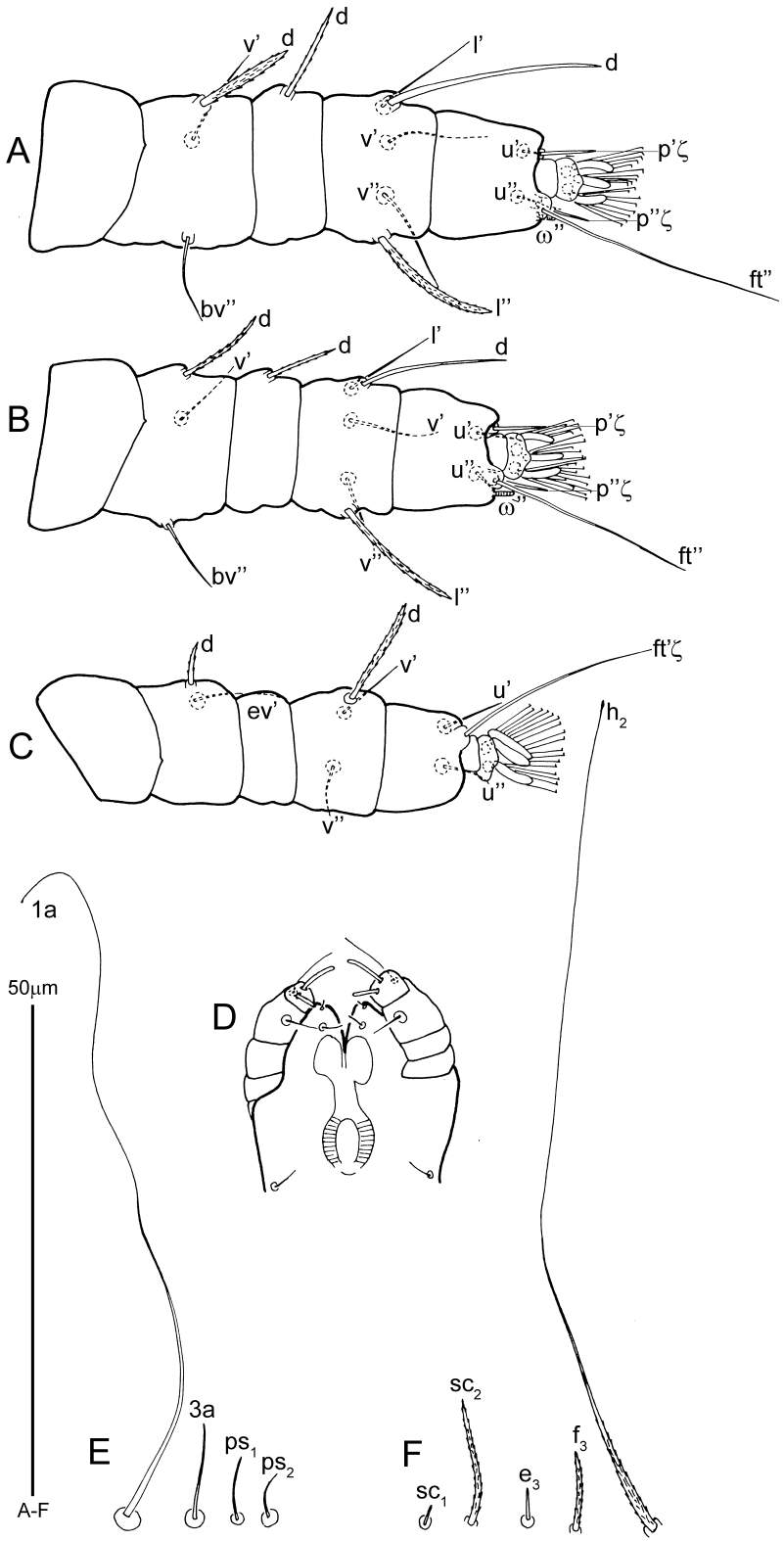


FIGURE 19. *Acaricis urigersoni* **sp. nov.** (larva). A, leg I; B, leg II; C, leg III; D, subcapitulum; E, ventral setae; F, dorsal setae.

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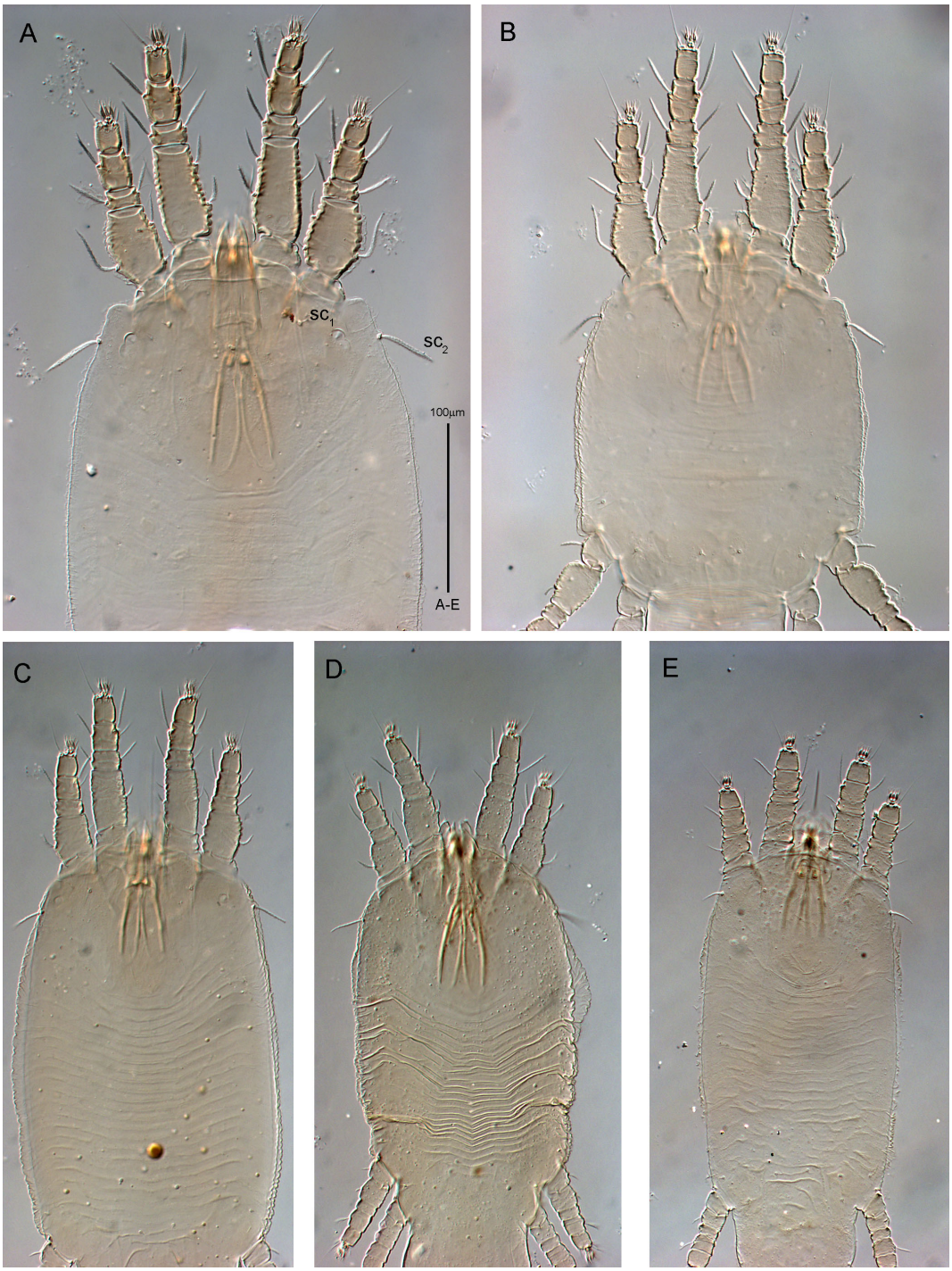


FIGURE 20. *Acaricis urigersoni* **sp. nov.** (prodorsum). A, female; B, male; C, deutonymph; D, protonymph; E, larva.

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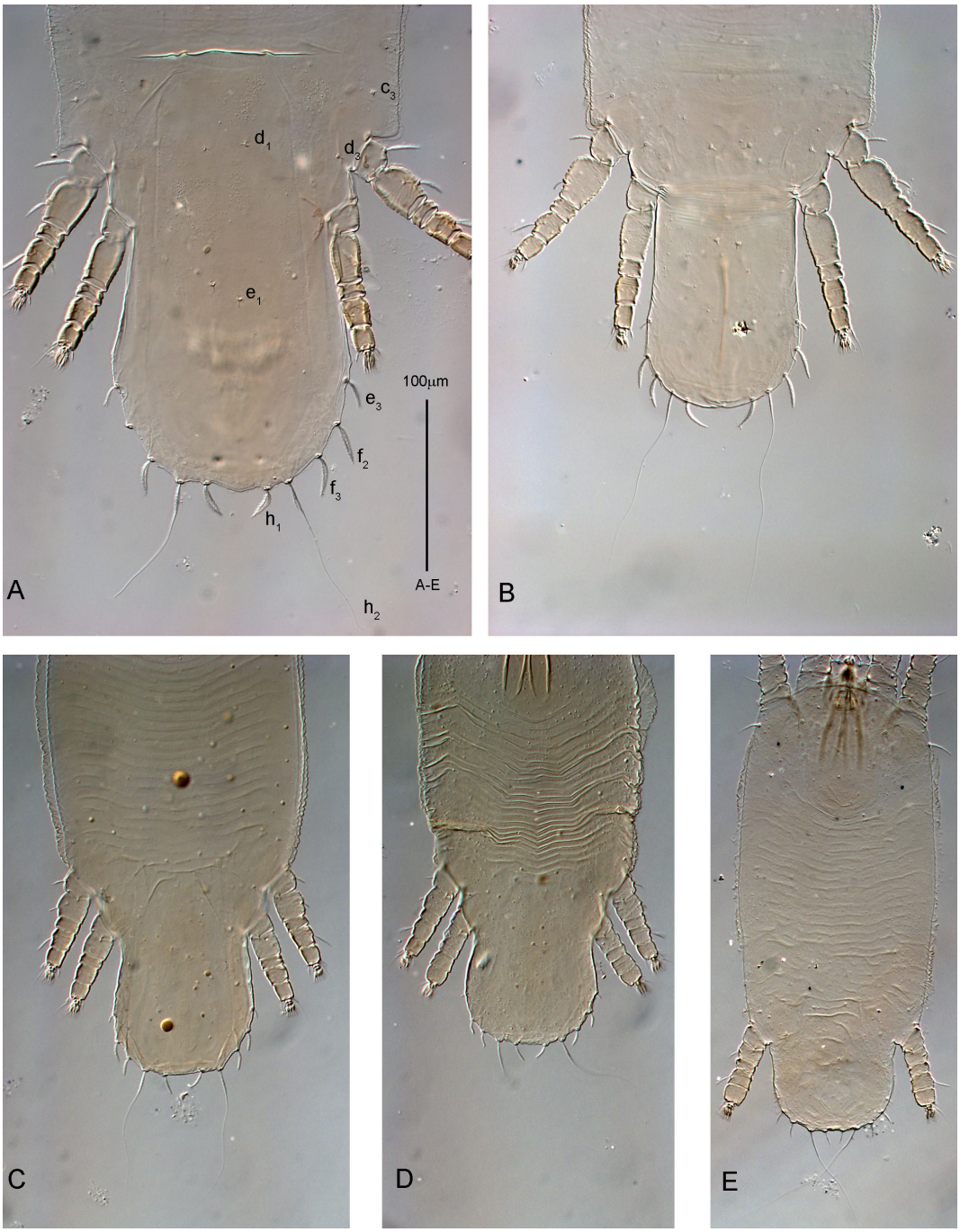


FIGURE 21. *Acaricis urigersoni* **sp. nov.** (hysterosoma). A, female; B, male; C, deutonymph; D, protonymph; E, larva.

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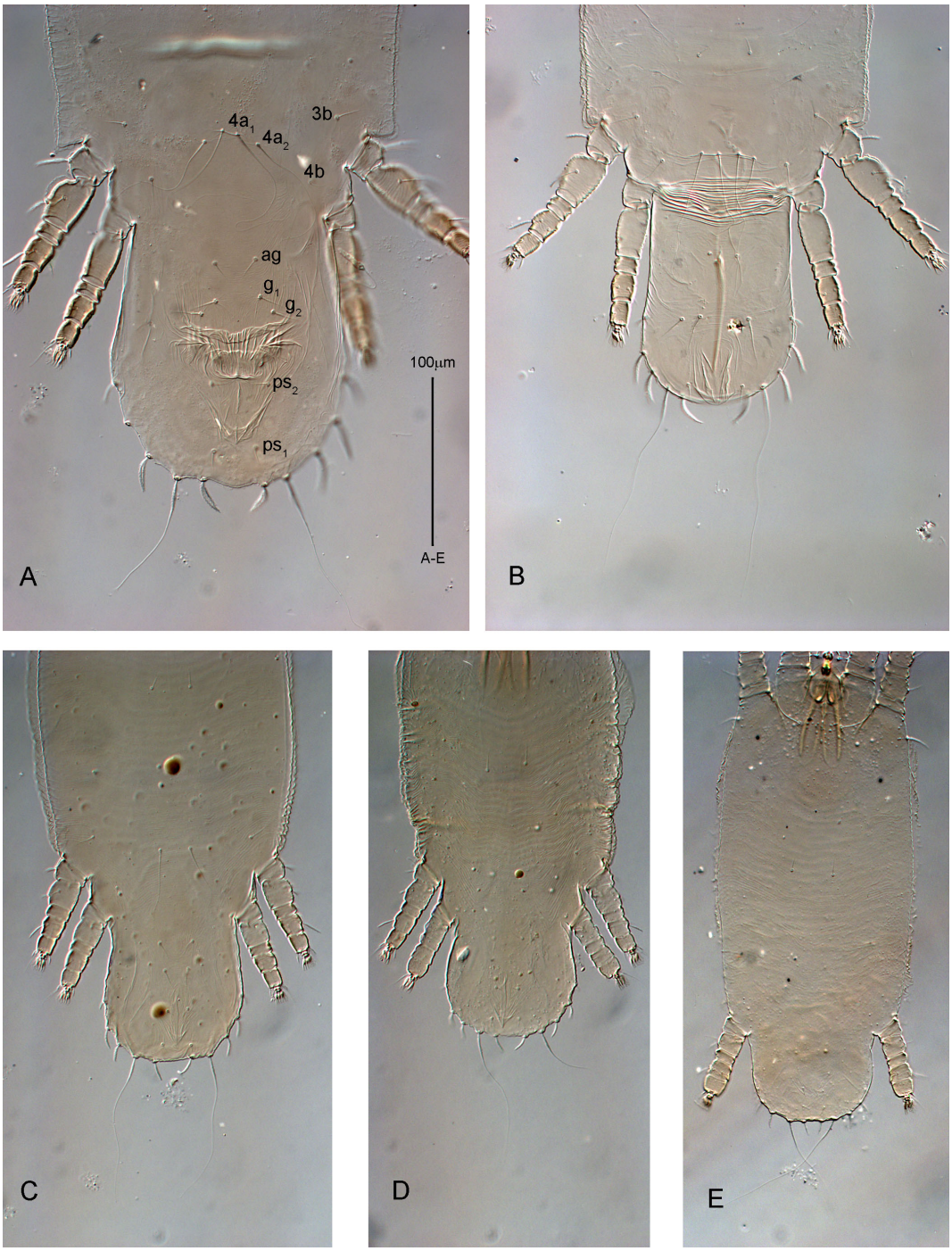


FIGURE 22. *Acaricis urigersoni* **sp. nov.** (genital-anal plate). A, female; B, male; C, deutonymph; D, protonymph; E, larva.

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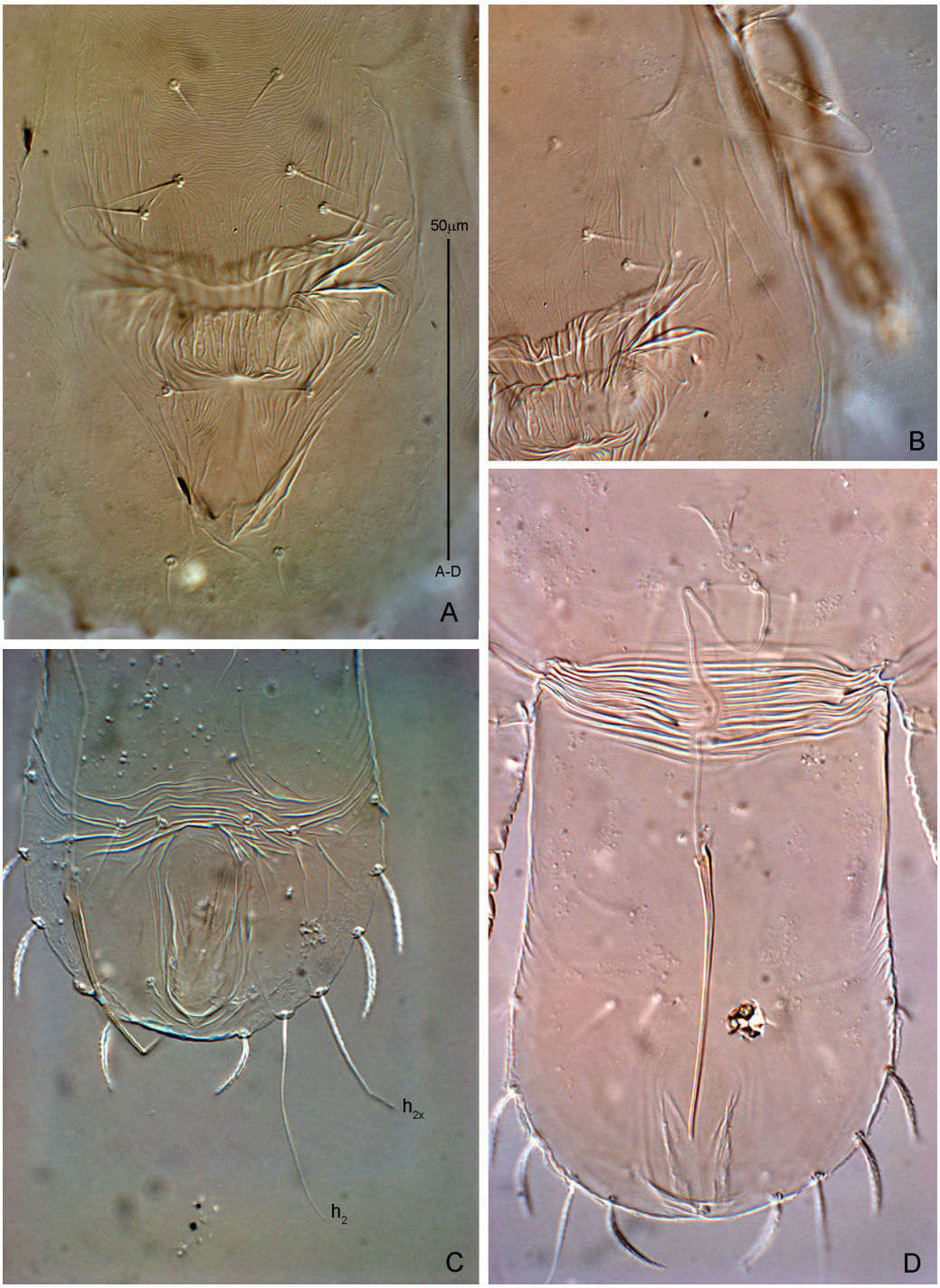


FIGURE 23. *Acaricis urigersoni* **sp. nov.** (adult). A, female genital plate; B, spermatheca; C, hysterosoma with 2 h_2; D, Aedeagus.

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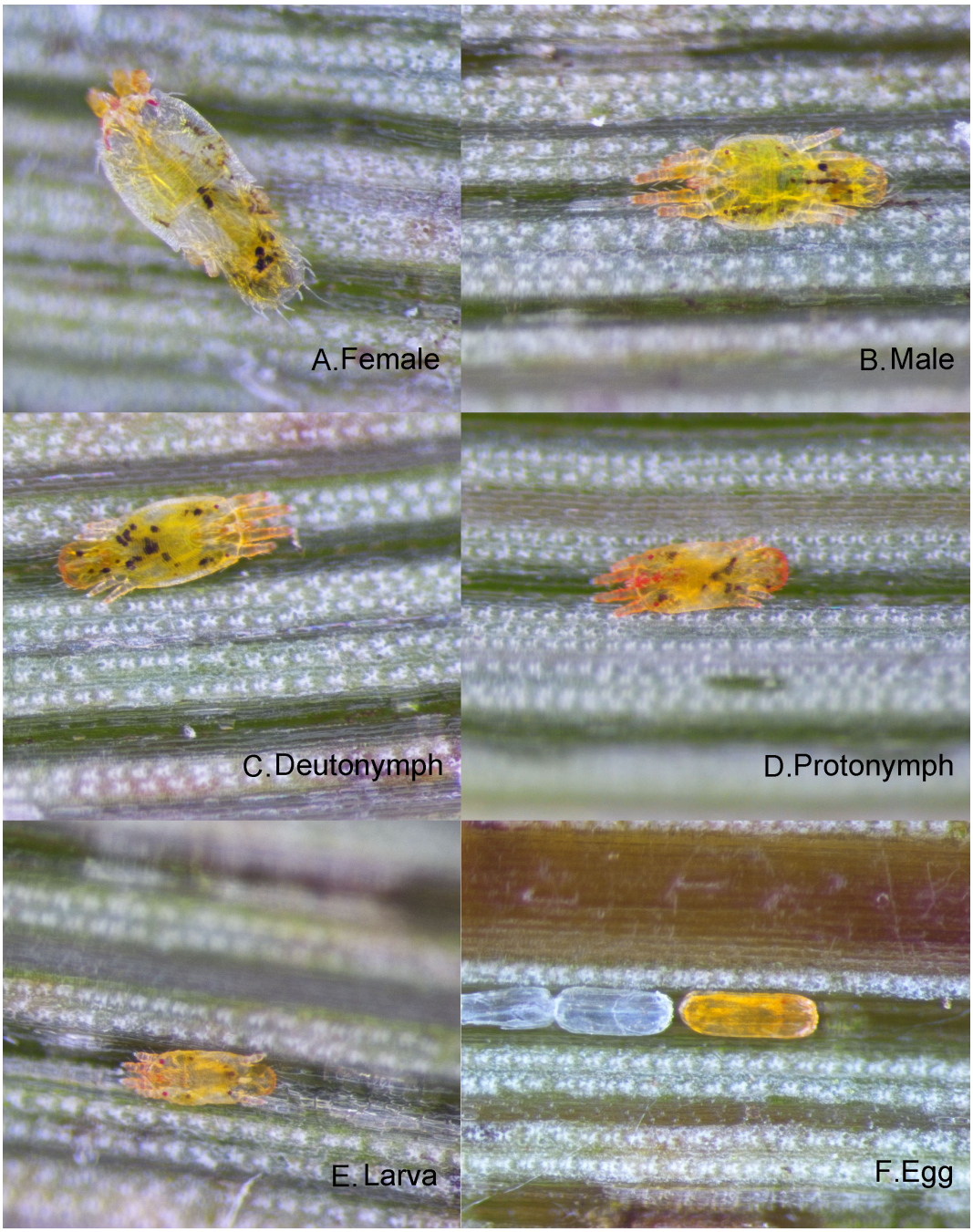


FIGURE 24. *Acaricis urigersoni* **sp. nov.** (dorsal view of idiosoma). A, female; B, male; C, deutonymph; D, protonymph; E, larva; F, egg.

The ontogeny of *Acaricis* was reported by Beard and Gerson (2009). Based on the observation of *Acaricis plana* and *Acaricis urigersoni* **sp. nov.**, the dorsal idiosomal setae (sc_1, sc_2, d_1, e_1, c_3, d_3, e_3, f_2, f_3, h_2 and h_1) and pseudanal setae (ps_1 and ps_2) are present throughout all stages.

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TABLE 1. Ontogeny of leg chaetotaxy in *Acaricis. plana* (Ap) and *A. urigersoni* (Au). Setae are indicated where they are first added. Setae in parentheses represent pairs. Hyphen indicates no additions.

	Coxae	Trochanters	Femora	Genua	Tibiae	Tarsi
Leg I						
Larva—Ap	*1b*	-	*d, v′, bv″*	*d*	*d*, (*l*), (*v*)	(*u*), *p′ζ, p″ζ, ft″*, ω″
Au	*1b*	-	*d, v′, bv″*	*d*	*d*, (*l*), (*v*)	(*u*), *p′ζ, p″ζ, ft″*, ω″
Protonymph—Ap	*1c*	-	-	-	-	(*tc*)
Au	*1c*	-	-	-	-	(*tc*)
Deutonymph—Ap	-	*v′*	*l′*	*l″*	-	-
Au	-	*v′*	*l′*	*l″*	-	-
Female—Ap	-	-	-	-	-	-
Au	-	-	-	-	-	-
Male—Ap	-	-	-	-	-	ω′
Au	-	-	-	-	-	ω′
Leg II						
Larva—Ap	-	-	*d, v′, bv″*	*d*	*d*, (*l*), (*v*)	(*u*), *p′ζ, p″ζ, ft″*, ω″
Au	-	-	*d, v′, bv″*	*d*	*d*, (*l*), (*v*)	(*u*), *p′ζ, p″ζ, ft″*, ω″
Protonymph—Ap	*2c*	-	-	-	-	(*tc*)
Au	*2c*	-	-	-	-	(*tc*)
Deutonymph—Ap	*2b*	*v′*	*l′*	*l″*	-	-
Au	*2b*	*v′*	*l′*	*l″*	-	-
Female—Ap	-	-	-	-	-	-
Au	-	-	-	-	-	-
Male—Ap	-	-	-	-	-	ω′
Au	-	-	-	-	-	ω′
Leg III						
Larva—Ap	-	-	*d, ev′*	-	*d*, (*v*)	(*u*), *ft′ ζ*
Au	-	-	*d, ev′*	-	*d*, (*v*)	(*u*), *ft′ ζ*
Protonymph—Ap	*3b*	*l′*	-	-	-	(*tc*)
Au	*3b*	*l′*	-	-	-	(*tc*)
Deutonymph—Ap	-	-	-	-	-	-
Au	-	-	-	-	-	-
Female—Ap	-	-	-	-	-	-
Au	-	-	-	-	-	-
Male—Ap	-	-	-	-	-	ω′
Au	-	-	-	-	-	ω′
Leg IV						
Protonymph—Ap	-	-	*d, ev′*	-	*d*, (*v*)	(*u*), *ft′ ζ*
Au	-	-	*d*	-	(*v*)	(*u*), *ft′ ζ*
Deutonymph—Ap	*4b*	-	-	-	-	(*tc*)
Au	*4b*	-	-	-	-	(*tc*)
Female—Ap	-	-	-	-	-	-
Au	-	-	-	-	-	-
Male—Ap	-	-	-	-	-	ω′
Au	-	-	-	-	-	ω′

* Leg IV absent in larva.

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Ventral setae *1c*, *2c* and *3b* are added in the protonymph, *2b*, $4a_1$ and *4b* added in the deutonymph, and $4a_2$ added in the adult. Aggenital seta *ag* emerges in the protonymph; the first pair of genital setae g_1 are formed in the deutonymph and the second pair appear in the adult. The palpal chaetotaxy (0, 0, 2, 2) remains unchanged from larva to adult. The changes in the chaetotaxy of leg segments are listed in Table 1. All dorsal setae *d* of legs lanceolate except on tibiae I and II in larva nude; ventral setae *v* in larva, protonymph and deutonymph setiform, in female pectinate, in male on leg I–II pectinate and on leg III–IV setiform; ventral seta *ev′* setiform; ventral seta *bv′* in adult pectinate and in all immature stages setiform; lateral setae *l″* in adult lanceolate, in larva, protonymph and deutonymph lanceolate except on genua I in deutonymph pectinate; unguinal seta *u* setiform in immature stages and pectinate in adult; tectal seta *tc* setiform and prorals setae p′ζ and *p″*ζ eupathidial.

Key to species of *Acaricis* (based on adult females)

1. Setae v_2 absent; sc_1 bifurcate; e_3 lanceolate; spermathecal vesicle cylinder-shaped; femora 4-4-2-1; genua 2-2-0-0; tibiae 5-5-3-2 . . . . . *A. urigersoni* **sp. nov.**
- Setae v_2 present; sc_1 setiform; e_3 setiform or barbed; spermathecal vesicle dome-shaped; femora 4-4-2-2; genua 2-2-1-0; tibiae 5-5-3-3 2
2. Setae e_3 setiform, sc_2 lanceolate; dorsal seta *d* on femur III lanceolate . . . . . *A. plana* Beard & Gerson
- Setae e_3 barbed, sc_2 short and barbed; dorsal seta *d* on femur III short and stout . . . . . *A. danutae* Beard & Gerson

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