

Two new species of the genus *Ghilarovizetes* (Acari: Oribatida: Ceratozetidae) from China

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Original research

ABSTRACT

Two new species of oribatid mites, *Ghilarovizetes labaheensis* sp. nov. and *Ghilarovizetes sichuanensis* sp. nov. are described from China based on adult morphology. *Ghilarovizetes labaheensis* sp. nov. is characterized by rounded rostrum, lamella short and wide, tutorium narrow and concave medially, notogastral setae short-size as long as bothridial setae and four pairs of notogastral porose areas. The adult instar of *Ghilarovizetes sichuanensis* sp. nov. has large body size, rostrum concave medially, lamella long and narrow, notogastral setae minute and five pairs of notogastral porose areas (porose areas A1 divided into two parts).

Keywords oribatid mites; *Ghilarovizetes*; new species; morphology; China

Zoobank <http://zoobank.org/798C7436-CA8A-45BE-A9B9-6166DAF794DB>

Introduction

The genus *Ghilarovizetes* is a small genus of oribatid of the family Ceratozetidae that was established by Shal'dybina (1969) with *Ghilarovizetes obtusus* Shal'dybina, 1969 as type species. Currently, it comprises six species: *Ghilarovizetes obtusus* Shal'dybina, 1969, *Ghilarovizetes rostralis* Shal'dybina, 1969, *Ghilarovizetes longisetosus* Hammer, 1952, *Ghilarovizetes maruyamai* Hirauchi, 1999, *Ghilarovizetes longiporusus* Ermilov et Martens, 2014 and *Ghilarovizetes africanus* Mahunka, 1984, which collectively distributed in the Holarctic region and Tanzania. Prior of this study, no described species of *Ghilarovizetes* were reported from China (Subías 2004, updated 2021). The main generic characters of *Ghilarovizetes* were presented by Ermilov and Martens 2014.

The main goal of this paper is to describe and illustrate two new species of *Ghilarovizetes*, *Ghilarovizetes labaheensis* sp. nov. and *Ghilarovizetes sichuanensis* sp. nov. both collected from soil in Sichuan province, Southwest China.

Methods

Specimens were mounted in lactic acid on temporary cavity slides for identification and for measurement and illustration. We measured the body length (from tip of rostrum to posterior edge of notogaster) and width (widest part of notogaster) of mites, and all the measurements are given in micrometers. Drafts drawing using a light microscope (OLYMPUS PM-10AD) equipped with plotting instrument.

Terminology used follows that of Grandjean (1939, 1949, 1953), Behan-Pelletier (1985, 1986) and Norton and Behan-Pelletier (2009). The following abbreviations are used: rostral

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(*ro*), lamellar (*le*), interlamellar (*in*) and exobothridial (*ex*) setae, lamella (*La*), translamella (*Tr*), bothridium (*bo*), bothridial setae (*bs*), pteromorph (*Ptm*), tutorium (*Tut*), genal tooth (*gt*), pedotectum (*Pd*), discidium (*Dis*), lyrifissures (*ia*, *im*, *ip*, *ih*, *ips*, *iad*), opisthonotal gland opening (*gla*), subcapitular setae (*a*, *m*, *h*), adanal and anal setae (*ad-*, *an*-series), aggenital seta (*ag*), epimeral setae (*1a-c*, *2a*, *3a-c*, *4a-c*), leg solenidia (σ , ϕ , ω), famulus (ε) and setae (*bv*, *d*, *l*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*, *pl*, *v*), and palp setae (*sup*, *inf*, *l*, *d*, *cm*, *acm*, *it*, *vt*, *ul*, *su*) and solenidion ω .

Descriptions of new species

Family Ceratozetidae Shadybina, 1969

Ghilarovizetes labaheensis sp. nov

Zoobank: D75872E1-BE9A-4869-9BDB-4939FE0113AE

(Figs 1, 2)

Material examined

Holotype (female) and three paratypes (females): Labahe National Nature Reserve (Yaan city, Sichuan province, China), above Huang Hai 1500–2000 m, 30°04'92"N, 102°26'13"E (collected by Wenqin Liang and Qiuxiao Tang).

Type deposition

The holotype and three paratypes are kept in 75% ethanol and deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Diagnosis

Body size 510–513 × 340–348. Rostrum rounded. Lamellar cusp short with minute lateral tooth, translamella indistinct. Genal tooth with long, thin, pointed top and reaching rostrum. Tutorium narrow and concave medially. Bothridial seta of short length, clavate. Notogaster with four pairs of porose areas: *A1* rounded, not divided into two parts, *A3* rounded. Notogastral setae smooth, as long as bothridial setae, the anterior notogastral setae (*c1*, *c2* and *c3*) are arranged in the same level. Epimeral setal formula: 3-1-3-3, slightly barbed. Aggenital setae and anoadanal setae smooth.

Description

Measurements — Body length: 512 (holotype), 510–513 (3 paratypes); notogastral width: 348 (holotype), 340–348 (3 paratypes).

Integument — Coloration brown or dark-brownish. Microtuberculate on margin of notogaster, all parts of genital and anal plate surface. Postscutum, epimeral region, femora and genua I–IV micropunctate.

Prodorsum (Figs 1A-D) — Rostrum rounded. Seta *ro*, 58, barbed unilaterally, insertion close tip of rostrum. Lamella short and wide, basal part slightly wider than basal part of cusps, without translamella, with indistinct transverse line. Cusps small, with lateral tooth. Seta *le* sparsely barbed, 101, extending beyond tip of rostrum. Seta *in* sparsely barbed, 90, extending beyond tip of lamellar cusp, its insertions not covered by anterior margin of notogaster. Exobothridial seta short and tiny, about 15. Bothridial seta 38, with heavily barbed clavate head, rounded distally.

Notogaster (Figs 1A-B) — Longer than wide, about 1.2:1, anterior margin weakly arched. Pteromorphs well developed and immovable. 15 pairs of notogastral setae, relatively long, 38, all smooth, the anterior notogastral setae (*c1*, *c2* and *c3*) are arranged in the same level. Four pairs of porose areas, all rounded and small, *A1* not divided into two parts. Lyrifissures *im* located directly above to *gla*.

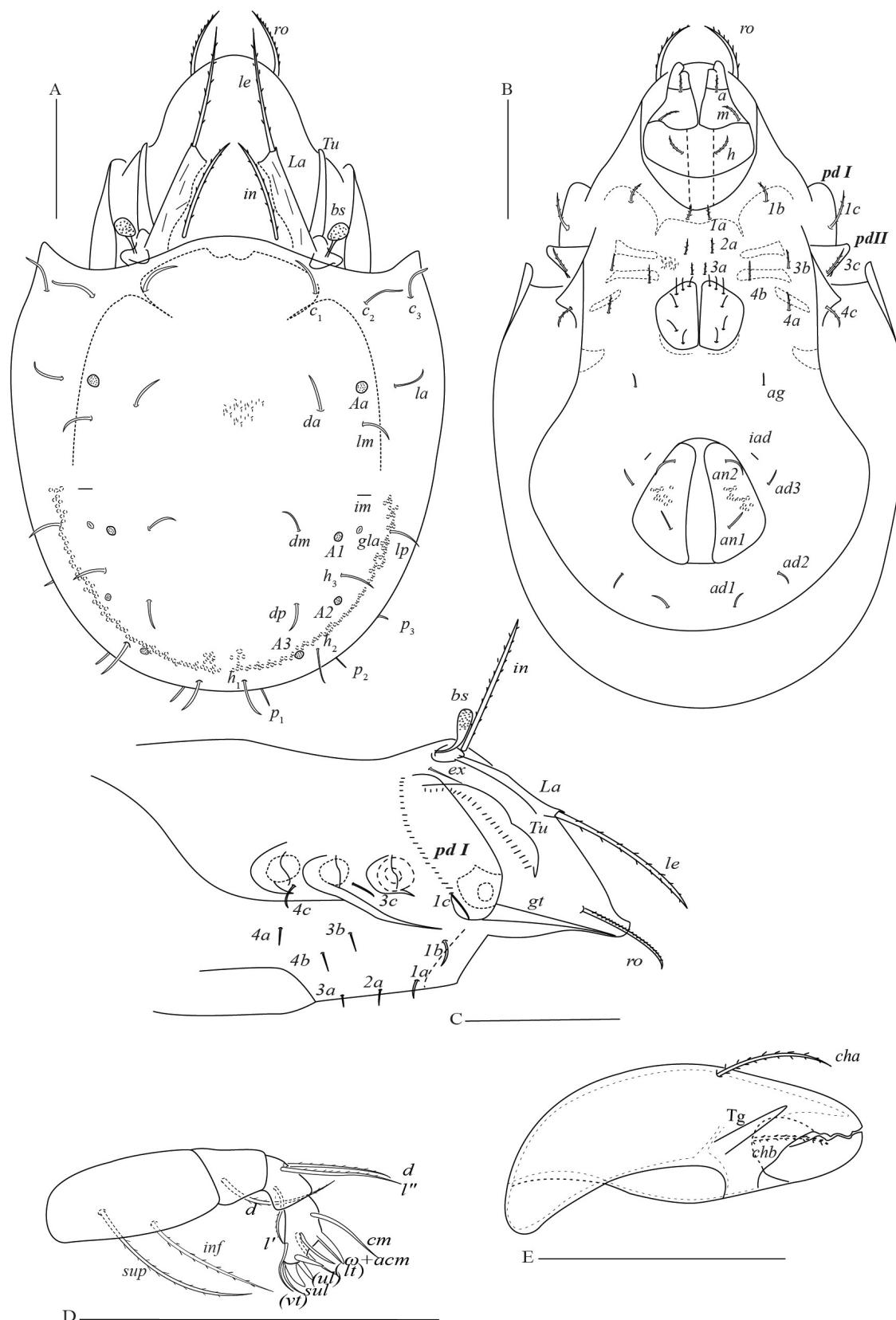


Figure 1 *Ghilarovizetes labaheensis* sp. nov., adult: A – dorsal view (legs not shown); B – ventral view (palp and legs not shown); C – lateral aspect of podosoma (legs, subcapitulum, palp and notogaster not shown); D – palp, left, paraxial view; E – chelicera, left, paraxial view. Scale bar all 100 µm (A-E)

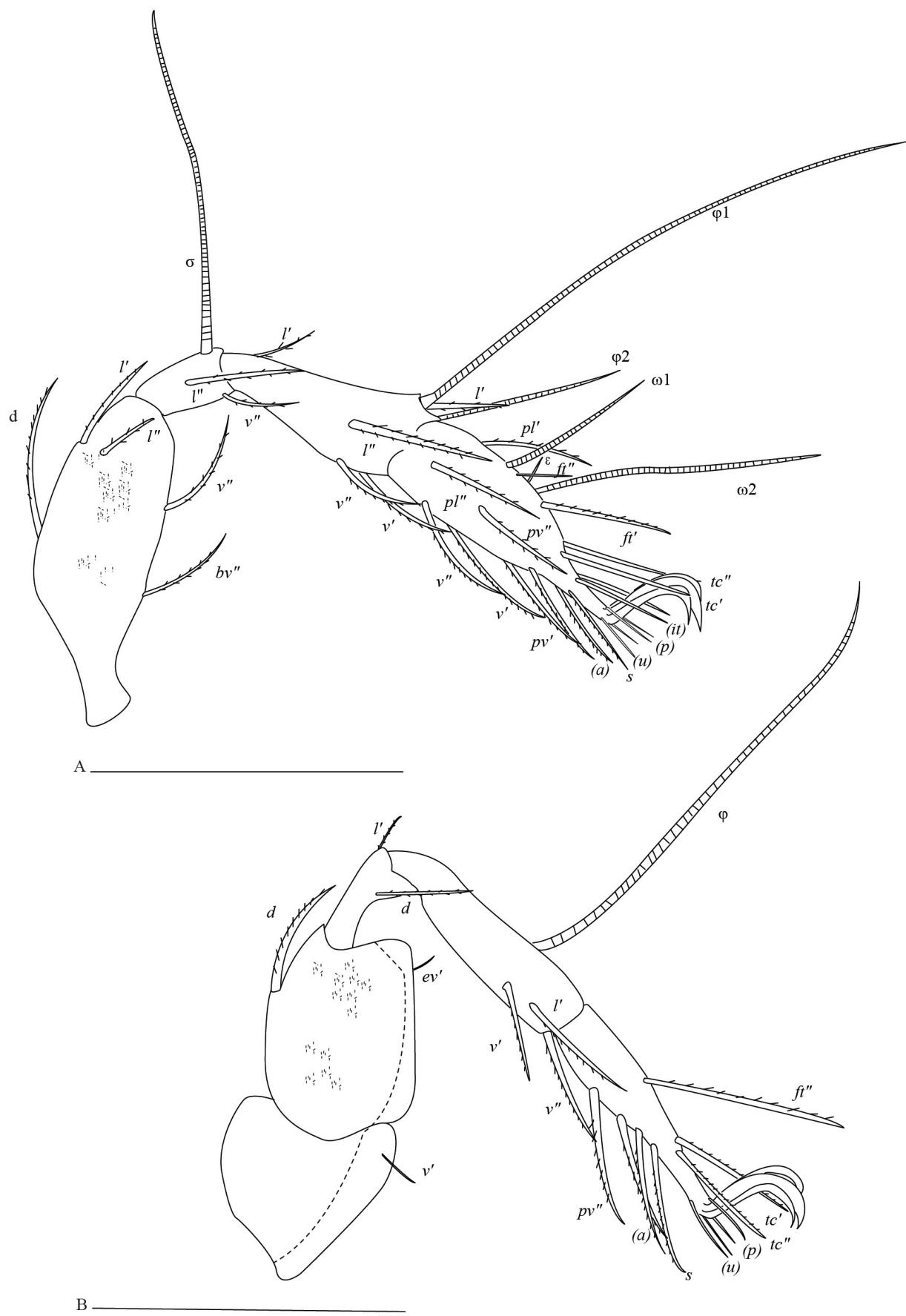


Figure 2 *Ghilarovizetes labaheensis* sp. nov., adult: A – leg I, left, paraxial view; B – leg IV, right, antiaxial view. Scale bar 50 μ m.

Gnathosoma (Figs 1B, 1D, 1E) — Subcapitulum longer than wide ($143\text{--}150 \times 104\text{--}110$). Subcapitular setae *h*, *m* and *a* short (18–23) and barbed. Palp (length 78–84) with most setae barbed, formula of palp setae [trochanter to tarsus (+ solenidion ω)]: 0-2-1-3-9(1). Cheliceral (length 143–150) seta *cha* longer (45–50) than *chb* (33–38), both barbed.

Lateral podosomal and epimeral regions (Figs 1B, 1C) — Pedotecta I large, concave, distal end swelling. Pedotecta II of medium size, scale-like, rounded anteriorly. Tutorium narrow, concave medially. Genal tooth elongate triangular, pointed distal end and reaching rostrum. Custodium with a long free distal spine extending anteriad of pedotectum II. Epimeral setal formula 3–1–3–3. Epimeral setae setiform, thin, slightly barbed; setae *1c*, *3c*, *4c* (39–45) longer than other (26–30).

Anogenital region (Fig. 1B) — Anogenital setae short, setiform, thin. Six pairs of genital setae (10–12) shorter and smooth. One pair of aggenital (11), two pairs of anal (19) and three pairs of adanal (19) setae smooth. Lyrifissures *iad* on the same level as setae *an2*.

Legs (Figs 2A, 2B) — Tridactylous, medial claw slightly thicker than lateral claws. Formulas of leg setation and solenidia: I (1-5-3-4-20) [1-2-2], II (1-5-2-4-14) [1-1-2], III (2-2-1-3-14) [1-1-0], IV (1-2-2-3-11) [0-1-0]; homology of setae and solenidia as indicated in Table 1.

Table 1 Leg setation and solenidia of *Ghilarovizetes labaheensis* sp. nov.

Leg	Tr	Fe	Ge	Ti	Ta
I	<i>v'</i>	<i>bv'', v'', (l), d</i>	<i>(l), v', σ</i>	<i>(l), φ₁, φ₂, (v)</i>	<i>(ft), (v), ε, (pv), s, (a), (u), (pl), (tc), (it), (p), ω₁, ω₂</i>
II	<i>v'</i>	<i>(l), d, v'', bv''</i>	<i>v', (l), σ</i>	<i>(v), (l), φ</i>	<i>s, (ft), (pv), (a), (u), (tc), (it), (p), ω₁, ω₂</i>
III	<i>l', v'</i>	<i>d, ev'</i>	<i>l', σ</i>	<i>(v), l', φ</i>	<i>(ft), s, (a), (u), (it), (tc), pv'', (p)</i>
IV	<i>v'</i>	<i>d, ev'</i>	<i>d, l'</i>	<i>(v), l', φ</i>	<i>ft'', pv'', (a), (u), (tc), (p), s</i>

Etymology

This species is named from the collection places of holotype, Labahee National Nature Reserve.

Remarks

Ghilarovizetes labaheensis sp. nov. the seventh species of the genus, is distinguishable from the type species, *Ghilarovizetes obtusus* Shaldybina, 1969 (see Shaldybina 1969), by (1) rounded rostrum, (2) notogastral porose areas *A1* not divided into two parts, and (3) anterior notogastral setae (*c1*, *c2* and *c3*) are arranged in the same horizontal level. The new species differs from *Ghilarovizetes longisetosus* Hammer, 1952 (see Hammer 1952; Behan-Pelletier 1985, 1986; Seniczak *et al.* 1990), by (1) cusps with lateral dens, (2) genal tooth longer, reaching to rostrum, (3) tutorium concave medially, (4) custodium with a free distal spine extending anteriad of pedotectum II, and (5) notogastral setae smooth. The new species is distinguishable from *Ghilarovizetes rostralis* Shaldybina, 1969 (see Shaldybina 1969), by (1) far smaller body, (2) notogastral porose areas *Aa* small, similar in size with other porose areas, (3) notogastral setae of medium size, as long as bothridial setae, and (4) tutorium concave medially. The new species is distinguishable from *Ghilarovizetes longiporus* Ermilov *et al.* 2014 (see Ermilov *et al.* 2014), by (1) rounded rostrum, (2) without translamella, (3) rounded *A3*, and (4) similar body size. The new species is distinguishable from *Ghilarovizetes maruyamai* Hirauchi, 1999 (see Hirauchi 1999), by (1) rounded rostrum, (2) notogastral porose areas *A1* not divided into two parts and (3) tutorium concave medially. The new species is distinguishable from *Ghilarovizetes africanus* Mahunka, 1984 (see Mahunka 1984b), by (1) similar body size, (2) notogastral setae of medium size and smooth and (3) shorter lamellar cusps.

Ghilarovizetes sichuanensis sp. nov.

Zoobank: 0362083A-130A-40B1-9BE7-752B1F0FB364

(Figs 3–5)

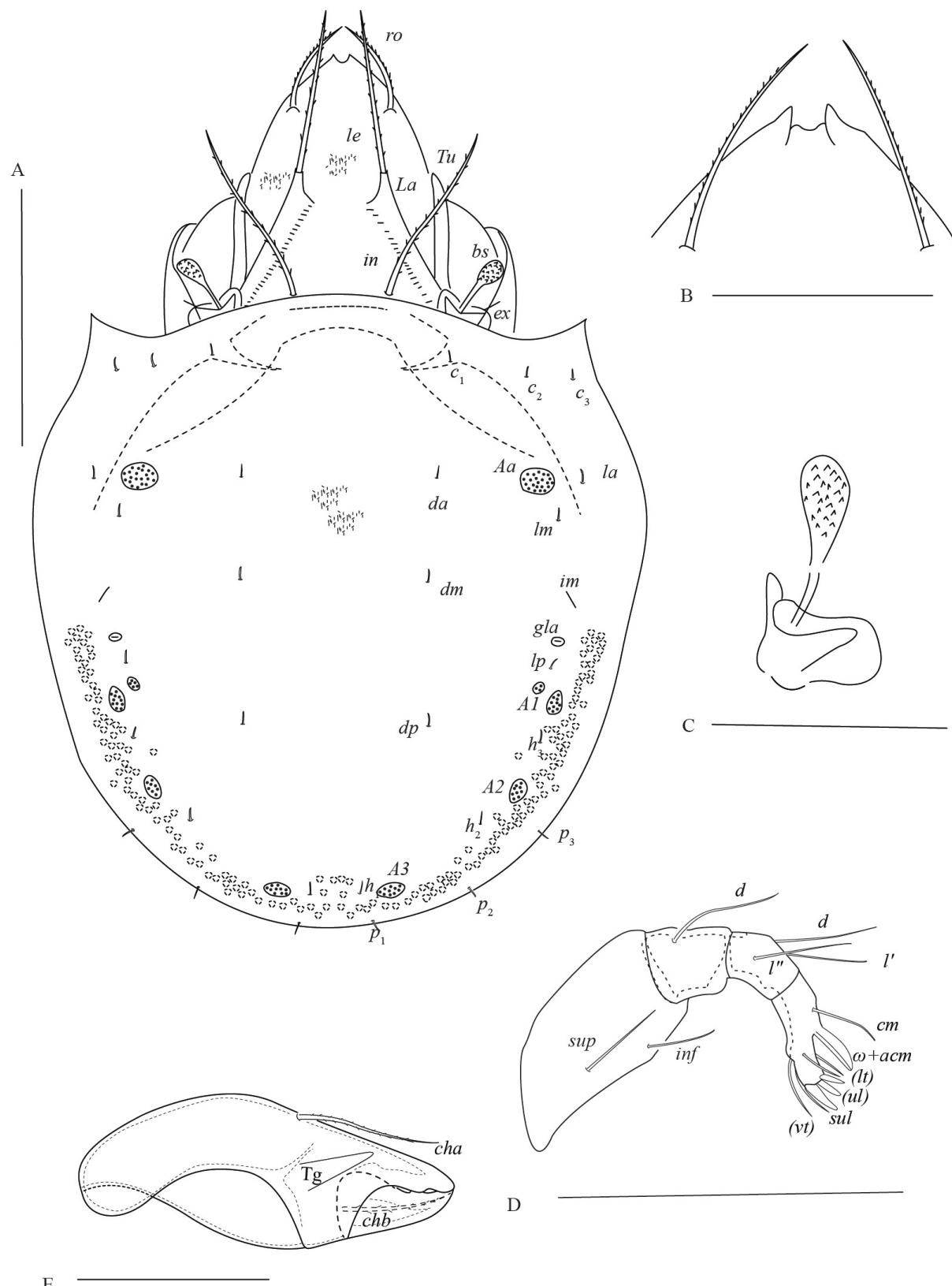


Figure 3 *Ghilarovizetes sichuanensis* sp. nov., adult: A – dorsal view (legs not shown); B – rostral seta and antero-dorsal view of rostrum; C – bothridial seta; D – palp, left, paraxial view; E – chelicera, left, paraxial view. Scale bar 200 µm (A), 100 µm (E, D), 50 µm (B, C)

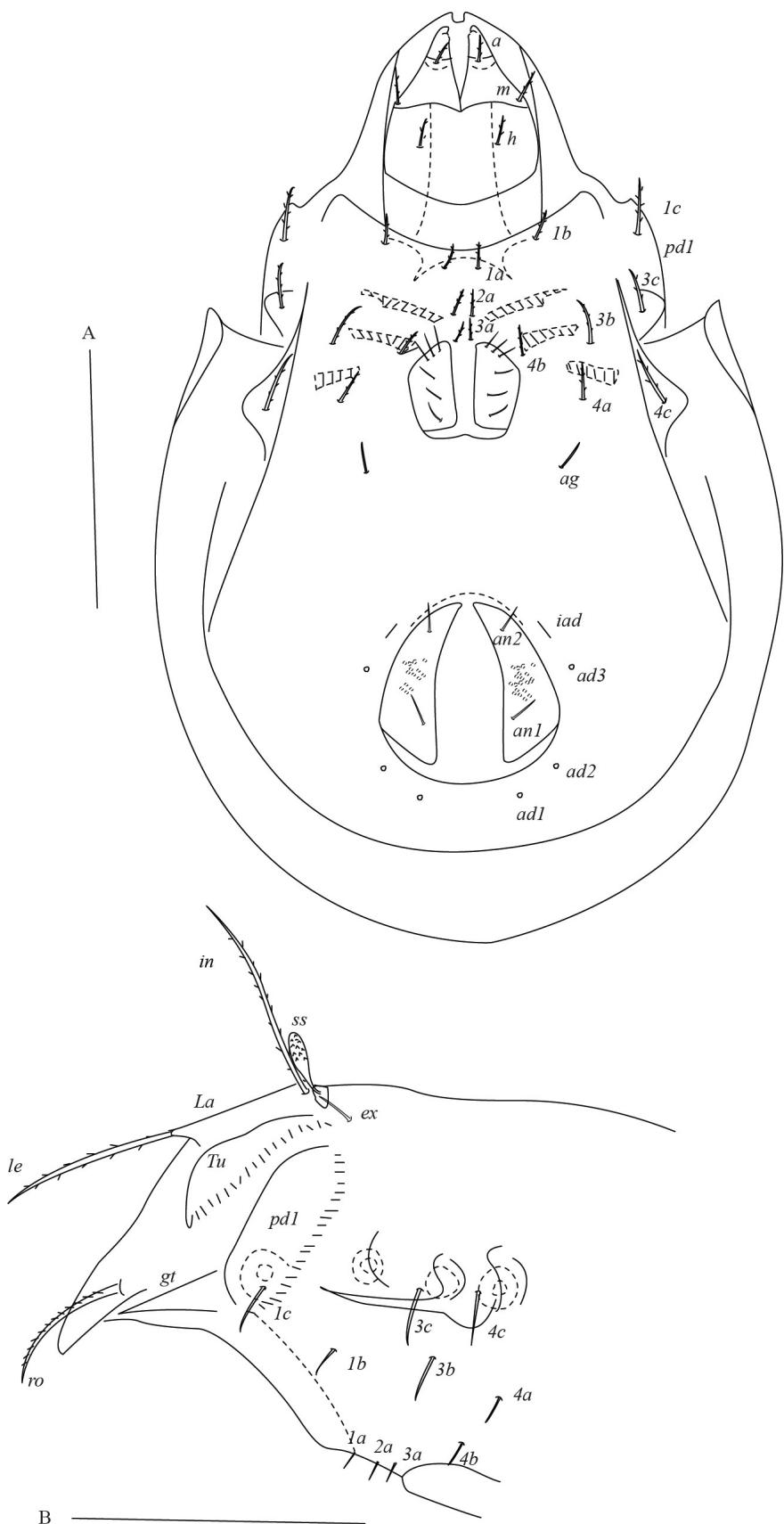


Figure 4 *Ghilarovizetes sichuanensis* sp. nov., adult: A – ventral view (palp and legs not shown); B – lateral aspect of podosoma (legs, subcapitulum, palp and notogaster not shown). Scale bar all 200 µm (A, B).

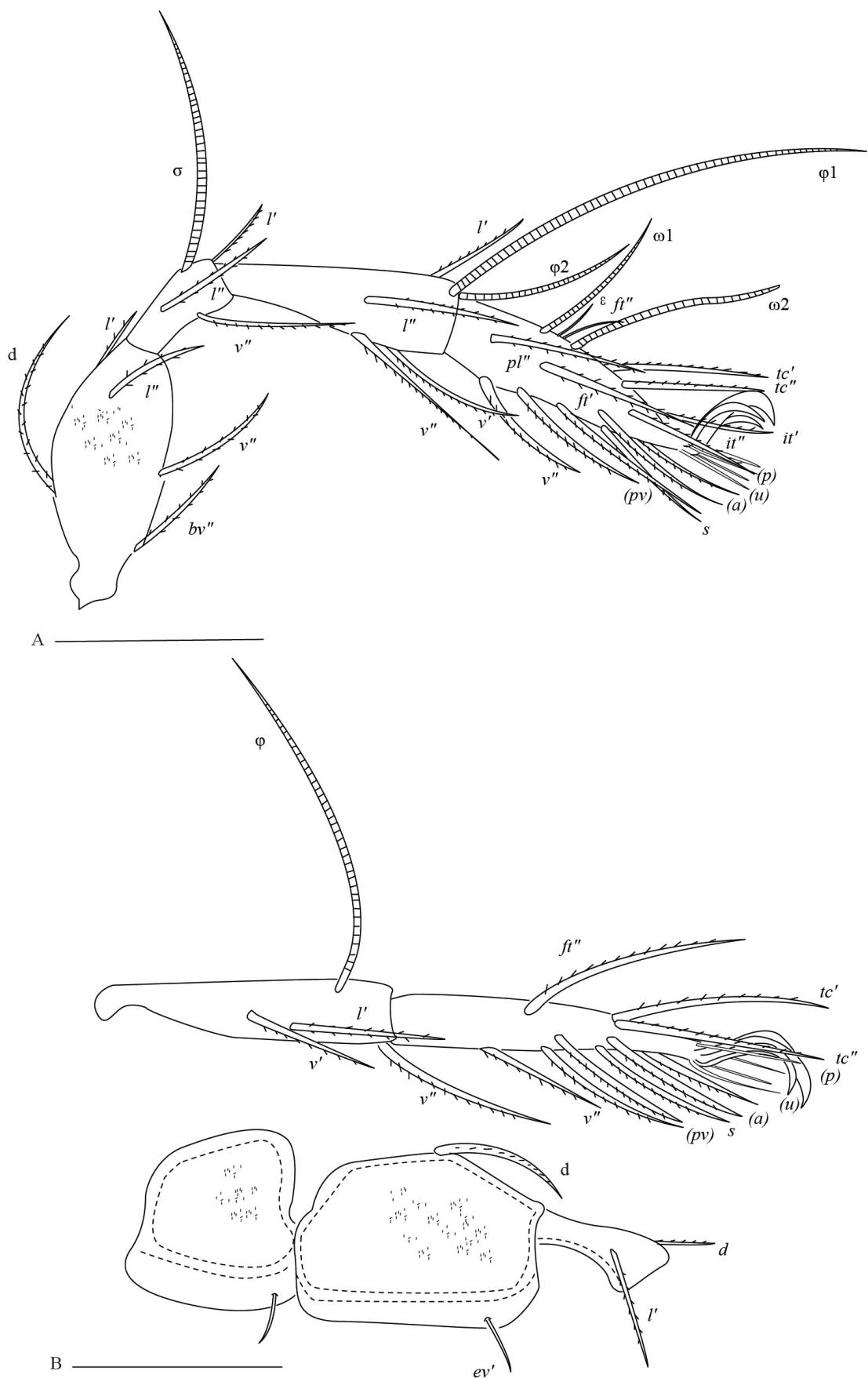


Figure 5 *Ghilarovizetes sichuanensis* sp. nov., adult: A – leg I, left, paraxial view; B – leg IV, right, antiaxial view. Scale bar 50 µm.

Material examined

Holotype (female) and five paratypes (females): Tangjiahe National Nature Reserve (Tangjiahe city, Sichuan province, China), above Huang Hai 1800 m, 32°31'33"N, 104°29'E (collected by Huang Rong and He Yuan).

Type deposition

The holotype and five paratypes are kept in 75% ethanol and deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Diagnosis

Body size 740–850 × 480–510. Rostrum concave medially. Lamella long and narrow, wider at base than base of cusps, translamella absent, cusp short with minute lateral tooth. Bothridial seta clavate with short, smooth stalk and barbed head. Five pairs of notogastral porose areas (porose areas *A1* divided into two parts), oval or rounded. Genal tooth long, reaching insertion of rostral seta. Notogastral setae minute. Epimeral setal formula: 3-1-3-3, slightly barbed. Gggenital and anoadanal setae smooth.

Description

Measurements — Body length: 740 (holotype), 740–850 (five paratypes); notogastral width: 480 (holotype), 480–510 (five paratypes).

Integument — Coloration brown or dark-brownish. Margin of notogaster and all parts of genital and anal plate surface microtuberculate. Prodorsum, postscutum, epimeral region, femora and genua I-IV micropunctate.

Prodorsum (Figs 3A-C) — Rostrum with medial indentation (clearly visible in dorso-anterior view). Seta *ro*, 71, barbed unilaterally, insertion close tip of rostrum. Lamella long and narrow, basal part wider than basal part of cusps, cusps small and narrow, with a lateral tooth; without translamella, with indistinct transverse line. Seta *le* sparsely barbed, 136-140, extending beyond tip of rostrum. Seta *in* sparsely barbed, 150-158, extending beyond tip of lamellar cusp, its insertions not covered by anterior margin of notogaster. Bothridial setae 47-51, with heavily barbed clavate head, rounded distally. Exobothridial setae 18-20, setiform, short and tiny.

Notogaster (Figs 3A-B) — Notogaster rounded, as long as wide, anterior margin weakly arched. Pteromorphs immovable. 15 pairs of notogastral setae, minute, 10-13, anterior notogastral setae (*c1*, *c2* and *c3*) placed in the same horizontal level. Five pairs of notogastral porose areas, porose areas *A1* divided into two parts, oval or rounded. Opisthonotal gland openings (*gla*) located directly above to seta *lp*. Lyrifissures *im* located middle of seta *lp* and seta *lm*.

Gnathosoma (Figs 3A, 3D, 3E) — Subcapitulum longer than wide (187–191 × 132–138). Subcapitular setae setiform, barbed, *m* (28–32) longer than *a* and *h* (20–25). Palp (length 147–153) with most setae barbed, formula of palp setae [trochanter to tarsus (+ solenidiono)]: 0-2-1-3-9(1). Cheliceral (length 187–191) seta *cha* longer (70-78) than *chb* (60-64), both barbed.

Lateral podosomal and epimeral regions (Figs 4A, 4B) — Pedotecta I well developed, concave, completely covering fovea pedales. Pedotecta II of medium size, scale-like, rounded anteriorly. Tutorium concave medially and wider distally. Genal tooth elongate triangular, distal end pointed and reaching insertion of seta *ro*. Custodium with a long free distal spine extending anteriad of pedotectum II. Epimeral setal formula 3-1-3-3. Epimeral setae setiform, thin, slightly barbed; setae *1c*, *3c*, *4c* and *3b* (44–48) longest, setae *4a*, *4b* and *1b* (24–27) longer than setae *1a*, *2a* and *3a* (19–22).

Anogenital region (Fig. 4A) — Six pairs of genital setae (16–18) tiny and smooth. One pair of aggenital (17-20) and two pairs of anal (22-26), three pairs of adanal setae. Lyrifissures *iad* on the same level as setae *an2*.

Legs (Figs 5A, 5B) —Tridactylous, medial claw slightly thicker than lateral claws. Formulas of leg setation and solenidia: I (1-5-3-4-18) [1-2-2], II (1-5-2-4-14) [1-1-2], III (2-2-1-3-14) [1-1-0], IV (1-2-2-3-13) [0-1-0]; homology of setae and solenidia as indicated in Table 2.

Table 2 Leg setation and solenidia of *Ghilarovizetes sichuanensis* sp. nov.

Leg	Tr	Fe	Ge	Ti	Ta
I	v'	bv'', v'', (l), d	(l), v', σ	(l), φ ₁ , φ ₂ , (v)	(ft), v', ε, (pv), s, (a), (u), pl', (tc), (it), (p), ω ₁ , ω ₂
II	v'	(l), d, v'', bv''	v', l'', σ	(v), (l), φ	s, (ft), v'', pv'', a'', (u), (tc), (it), (p), ω ₁ , ω ₂
III	l', v'	d, ev'	l', σ	(v), l', φ	(ft), s, (a), (u), it', (tc), (pv), (p)
IV	v'	d, ev'	d, l'	(v), l', φ	ft'', (pv), (a), (u), (tc), (p), v'', s

Etymology

This species is named from the collection province of holotype, Sichuan province.

Remarks

Ghilarovizetes sichuanensis sp. nov. the eighth species of the genus, is distinguishable from the type species, *Ghilarovizetes obtusus* Shaldbina, 1969 (see Shaldbina 1969), by (1) broad oval notogaster, (2) notogastral setae c1, c2 and c3 placed in the same horizontal level, (3) larger body size, (4) longer interlamellar setae, and (5) tutorium concave medially with wider distally. The new species differs from *Ghilarovizetes mariyamai* Hirauchi, 1999 (see Hirauchi 1999), by (1) far larger body size, (2) both parts of notogastral porose areas A1 strongly differ in size, (3) setae *in* longer than setae *le*, and (4) genal tooth long, reaching insertion of seta *ro*. The new species differs from *Ghilarovizetes longiporus* Ermilov et Martens, 2014 (see Ermilov et Martens 2014), by (1) notogastral porose areas A1 divided into two parts, (2) rounded notogastral porose A3 (3) without translamella and (4) exobothridial setae present. The new species differs from *Ghilarovizetes africanus* Mahunka, 1984 (see Mahunka 1984b), by (1) shorter lamellar cusps, (2) minute notogastral setae (3) tutorium concave medially with wider distally and (4) notogastral porose areas A1 divided into two parts. The new species differs from *Ghilarovizetes rostralis* Shaldbina, 1969 (see Shaldbina 1969), by (1) rostrum with medial indentation, (2) notogastral porose areas A1 divided into two parts, (3) longer interlamellar setae, and (4) without translamella. The new species differs from *Ghilarovizetes longisetosus* Hammer, 1952 (see Hammer 1952), by (1) rostrum with medial indentation, (2) larger body size, (3) tutorium concave medially with wider distally and (4) notogastral porose areas A1 divided into two parts. It is easily distinguishable from the new species, *Ghilarovizetes labaheensis* sp. nov., by (1) rostrum with medial indentation, (2) notogastral porose areas A1 divided into two parts, (3) the far larger body size, and (4) minute notogastral setae.

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