

TRICHORIBATES ZINGERLEI, A NEW SPECIES OF ORIBATID MITE FROM THE SOUTHERN ALPS, ITALY (ACARI: ORIBATIDA: CERATOZETIDAE)

Badamdorj Bayartogtokh¹ and Heinrich Schatz²

1. Department of Zoology, Faculty of Biology, National University of Mongolia, Ulaanbaatar 210646, Mongolia (e-mail: bayartogtokh@num.edu.mn); 2. Institute of Ecology, Leopold-Franzens University of Innsbruck, Technikerstrasse 25, A-6020 Innsbruck, Austria (e-mail: heinrich.schatz@uibk.ac.at).

ABSTRACT - A new oribatid mite, *Trichoribates zingerlei* n. sp., collected from a high montane habitat on the Schlern/Sciliar massif in the Dolomites of South Tyrol (Italy) is described from adult specimens. This species has characteristic wide lamella, translamella and lamellar cusp, and the distal end of lamellar cusp strongly curved inward. The short, thin notogastral setae, small notogastral porose areas, short tutorium without dentations distally, and smooth clavate sensillus are additional characteristic features of the new species that distinguish it from other members of *Trichoribates*.

Key words - Acari, Oribatida, Ceratozetoidea, new species, Italy, Alps.

INTRODUCTION

The genus *Trichoribates* Berlese, 1910 is one of the most common and taxonomically diverse taxa of the oribatid mite family Ceratozetidae Jacot, 1925. It now comprises about 50 valid species, and most of them are distributed in the Northern hemisphere. A few species, such as *T. trimaculatus*, *T. novus* and *T. copperminensis*, have wide geographical ranges in the Holarctic region, but other species show more restricted distributions. Among the biogeographical realms, the Palaearctic region is distinguished from other regions by its high species richness in this genus (35 spp.), followed by the Nearctic region (17 spp.). Other biogeographical regions contain fewer than three species each.

Currently 26 species of *Trichoribates* are known from Europe (including the Caucasus). In the Alps we studied five species (Bayartogtokh and Schatz, 2008). One additional species was found recently, which is described here as new to science.

This work is based on material collected in a large-scale project on the Schlern/Sciliar massif in South Tyrol, Southern Alps (Schatz, 2008). Morphological terminology used in this work is based mostly on that of Grandjean (1936) as summarized and applied by Menke (1963), Behan-Pelletier (1985, 1986) and Hunt *et al.* (1998).

MATERIALS AND METHODS

Specimens were collected from litter and upper layer of soils in a pitfall trap and sieved samples. The lo-

cality and habitat characterization of the new species are given in the "material examined" section.

Specimens were cleared in lactic acid, mounted on temporary slides and preserved in alcohol. The line drawings were made using a camera lucida attached to the compound microscope. Body length was measured in lateral view, from tip of the rostrum to posterior edge of ventral plate, to avoid discrepancies caused by different degrees of notogastral distension. Notogastral length was also measured in lateral view, from anterior to posterior edge; notogastral width refers to the maximum width in dorsal aspect, excluding pteromorphs. Length of body setae was measured in lateral aspect. Unless noted differently, measurements are given as a range, with mean in parentheses. Setal formulae of legs are given as numbers per segment for appendages (from trochanter to tarsus), and as number per podosomal segment (I-IV) for epimeres.

DESCRIPTION OF SPECIES

Trichoribates zingerlei n. sp.
(Figs. 1-3)

Diagnosis - Rostrum smoothly rounded in dorsal view, with a nose-like protuberance dorsally; rostral, lamellar and interlamellar setae relatively short, finely barbed; lamella wide, with long and wide translamella; lamellar cusp wide, with short lateral dens, medial dens absent, distal end of lamellar cusp strongly curved inward; sensillus short, with clavate head; tutorium short,

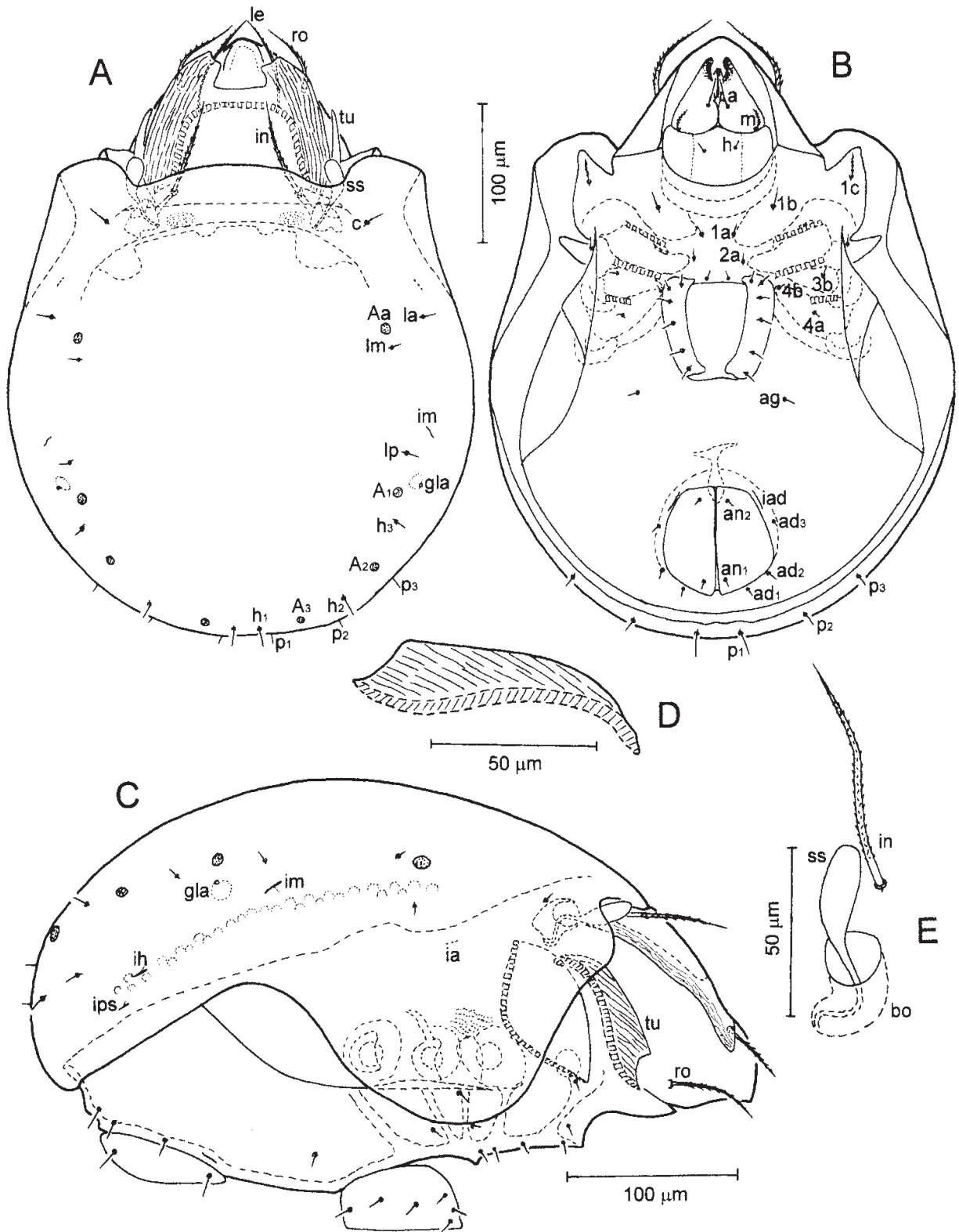


Fig. 1. *Trichoribates zingerlei* n. sp. (legs removed) - A. Dorsal view; B. Ventral view; C. Lateral view; D. Tutorium (lateral view); E. Sensillus, bothridium and interlamellar seta (lateral view) (Scale bar - same for A and B).

but broad, without dentation distally; ten pairs of short, thin notogastral setae; porose areas small, round to oval; epimeral seta *1c* finely barbed, other ventral setae smooth; setae *l''* of tibiae and genua I, II very thick, strongly barbed; genu I with a strong ventrodiscal projection. Body and leg segments with thick cerotegument presented by minute granules.

Measurements - Holotype: Body length 407 μm , length of notogaster 327 μm , width of notogaster 323 μm ; paratypes ($n = 2$): body length 395-418 (406) μm ; length of notogaster 312-334 (323) μm ; width of notogaster 312-323 (316) μm .

Integument - Body color yellowish brown. Surface of body and leg segments with thick cerotegument, roughened by minute granules. Faintly microtuberculate on prodorsum, notogaster, ventral plate, leg segments and subcapitular mentum.

Prodorsum (Figs. 1A, C, D, 2A) - Rostrum smoothly rounded in dorsal view, without lateral dens; a nose-like protuberance dorsally elevated above prodorsal shield (Figs. 1C, 2A). Rostral seta (*ro*) barbed, 54-58 μm in length, directed anteromedial, inserted laterally well anterior to distal end of tutorium. Lamellae wide, with longitudinal striations, slightly converging, connected by moderately long and wide translamella. Lamellar cusp very wide, wider than basal part of lamella, strongly curved inward, with short, blunt lateral dens (11-14 μm in length), medial dens absent (Figs. 1A, 2A). Lamellar seta (*le*) shorter (40-44 μm in length) and thinner than rostral seta, finely barbed. Interlamellar seta relatively short (70-75 μm in length), finely barbed, reaching level of translamella, its alveolus concealed under anterior margin of notogaster. Sensillus short, its exposed portion from bothridium 51-55 μm in length, with smooth, clavate head. Bothridium medium in size, bothridial scale absent, completely covered by notogaster. Tutorium broad, but relatively short, 96-104 μm in length, not reaching alveolus of rostral setae, with oblique striations, without dentation at distal end (Fig. 1C, D).

Notogaster (Figs. 1A, C, 3C) - Nearly as long as wide, anterior margin broadly rounded; lenticulus absent. Pteromorph well developed, curved ventrally, anterior portion protruding markedly, with rounded margin. Ten pairs of notogastral setae, short (9-13 μm in length), thin, nearly equal in length; seta *dp* absent. Porose areas small, round to oval, subequal in size. Lyrifissure *im*, *ia*, *ih*, *ip* and *ips* well developed, some visible only in either lateral or posterior view (Fig. 1C, 3C). Opisthosomal gland opening (*gla*) situated anterolateral to porose area *A1*.

Gnathosoma (Fig. 1B) - Subcapitular mentum conspicuously wider than long, without noticeable microtubercles. Hypostomal seta *m* distinctly barbed, setae *a* and *h* smooth (6-10 μm in length). Chelicera approximately 135 μm in length, with strongly sclerotized blunt teeth;

setae *cha* and *chb* barbed. Palp typical for family as shown by Bayartogtokh and Schatz (2008), palpal setation 0-2-1-3-10 including both ventral setae and solenidion ω of tarsus.

Epimeral region (Fig. 1B) - Epimeral setal formula: 3-1-3-2?, seta *4c* not evident (probably missing). Epimeral setae relatively short (10-12 μm in length), smooth, only seta *1c* finely barbed and slightly longer than others. Custodium reaching anterior margin of pedotectum II, discidium well developed, strongly projecting laterally. Pedotectum I large, its surface without striation.

Anogenital region (Figs. 1B, 3C) - Anal and genital plates smooth; all anogenital setae short (6-10 μm in length), thin, smooth. Distance between bases of aggenital setae conspicuously greater than that between adanal setae *ad3-ad3*. Seta *ad3* situated in paranal position, at level posterior to anal seta *an2*. Adanal lyrifissure *iad* long (10-12 μm), situated at same level as setae *an2*, adjacent to anterolateral margin of anal aperture. Postanal porose area narrowly elongate, longer than distance between bases of adanal setae *ad1-ad1* (Fig. 3C).

Legs (Figs. 2B, C, 3A, B) - Lateral claws thinner than medial claw, claws of leg IV slightly longer, but more slender than those of other legs. Tibia I with small, almost indistinct dorsodistal apophysis, bearing solenidion ϕ_2 . Solenidion ϕ_1 on tibia I very long. Genu I with strong ventrodiscal projection; femur and trochanter IV with distinct ventral keel or blade, distally rounded. Most leg setae distinctly barbed, except setae (*p*) or (*u*) on tarsi I-IV, and *v* on trochanter and femur IV. Setae *l''* of tibiae and genua I, II much thicker than other setae, strongly barbed. Formula of leg setation (including famulus): I (1-5-3-4-20); II (1-5-3-4-15); III (2-2-1-3-15); IV (1-2-2-3-12); formula of solenidia: I (1-2-2); II (1-1-2); III (1-1-0); IV (0-1-0).

Material examined - Holotype (female): Italy, Provincia di Bolzano, Schlern/Sciliar massif, scarp north of high plateau, in grass litter, dwarf-shrub and cushion plants (46°30,68' N, 11°35,31' E, 2220 m a.s.l., 01 July 2007; leg. Irene Schatz, pitfall trap). Paratypes (two females): *ibid.*, (same place as holotype, 04 August 2007, leg. Yvonne Kiss, sieving); *ibid.*, under *Pinus mugo* shrubs (46°30,72' N, 11°35,35' E, 2170 m a.s.l., 01 July 2007; leg. Irene Schatz, pitfall trap).

Type deposition - The alcohol preserved holotype and one paratype will be deposited in: Muséum d'histoire naturelle, de Genève, Switzerland; the other paratype specimen is in the collection of H. Schatz.

Remarks - *Trichoribates zingerlei* n. sp. is easily distinguishable from other species of *Trichoribates* by the very wide lamellar cusps, which are strongly curved inward, and the short, blunt lateral dens of lamellar cusps. Moreover, it is unique among other known species of *Trichoribates* by the relatively short tutoria, which do not reach the alveoli of rostral setae and lacking dentation, the

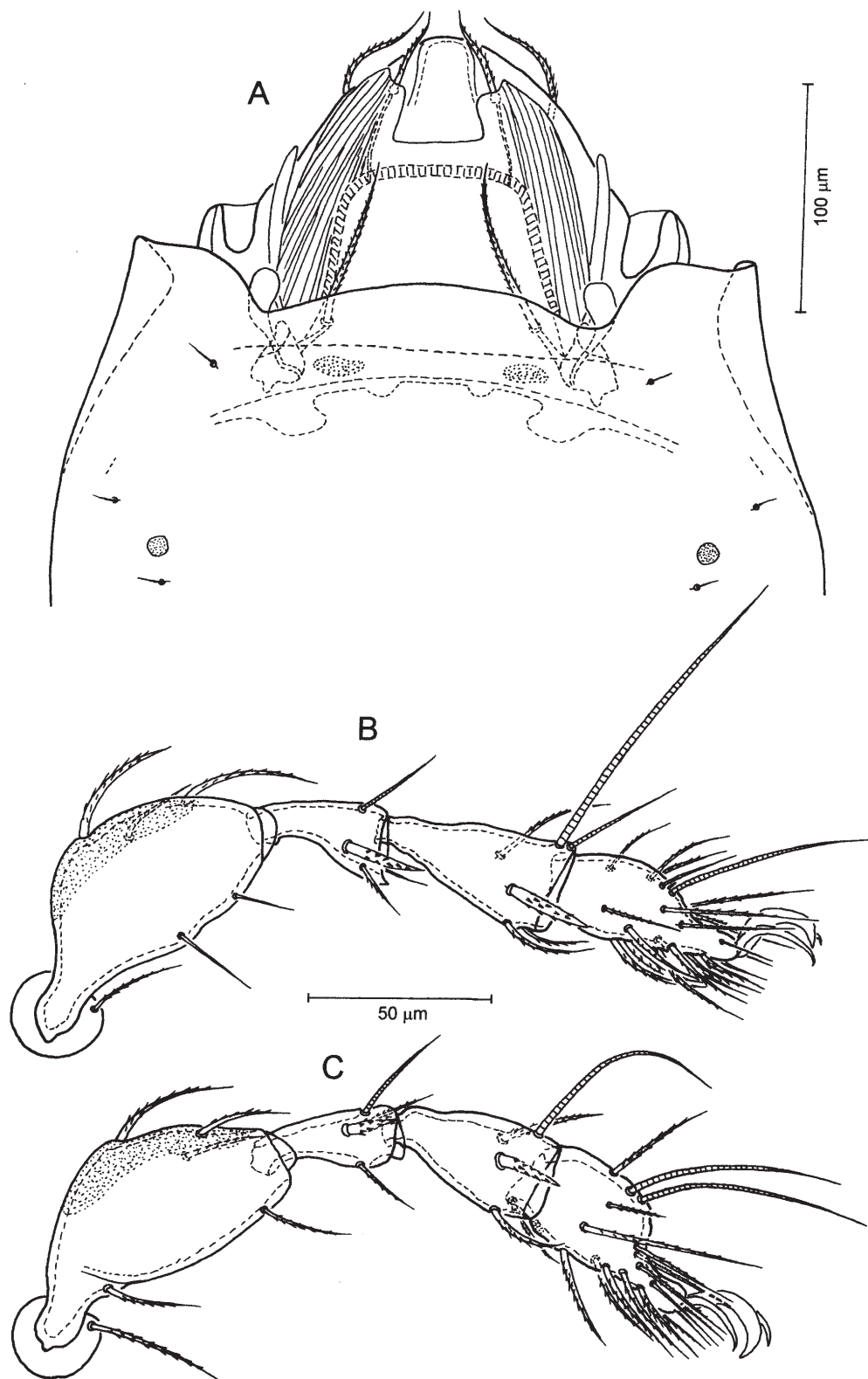


Fig. 2. *Trichoribates zingerlei* n. sp. - A. Prodorsum and anterior part of notogaster; B. Leg I; C. Leg II (right, antaxial view) (Scale bar - same for B and C).

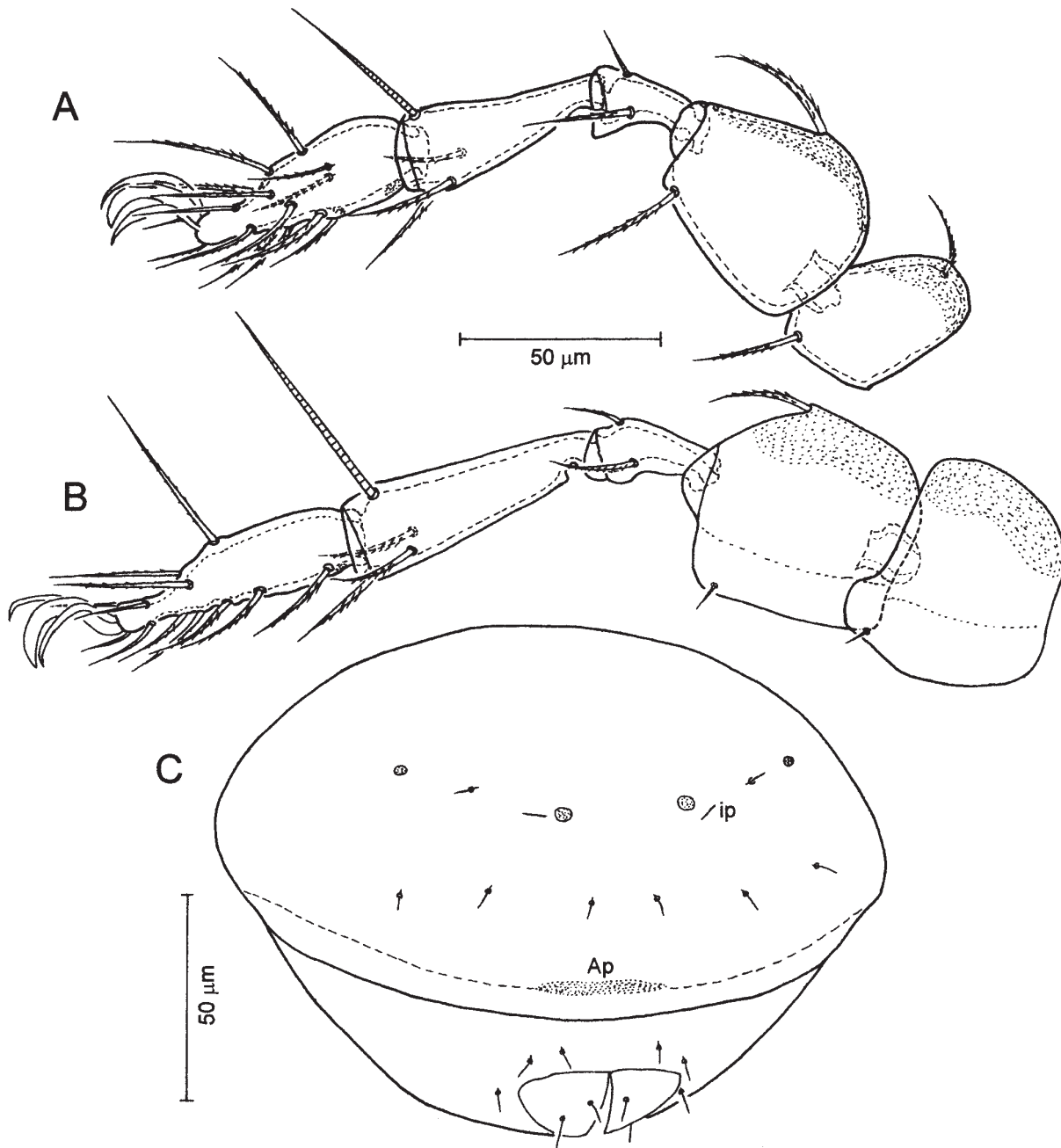


Fig. 3. *Trichoribates zingerlei* n. sp. - A. Leg III; B. Leg IV (right, antaxial view); C. Posterior view of opisthosoma (Scale bar - same for A and B).

short, thin notogastral setae, the small porose areas, and the short, smooth, clavate sensilli.

The European species *T. monticola* (Trägårdh, 1902) resembles the new species in having wide lamellar cusps. However, the original description by Trägårdh (1902) and redescrptions by Schweizer (1956), Shal'dybina (1975), Pavlitshenko (1994), and materials studied by us (Bayartogtokh and Schatz, 2008) show significant differences between these two species. Thus, *T. monticola*

clearly differs from *T. zingerlei* n. sp. in having straight lamellar cusps, long tutoria extending anterior to the alveoli of rostral setae, far longer interlamellar setae reaching the tip of the rostrum, the much larger notogastral porose areas and barbed sensilli.

Etymology - This species is dedicated to our friend and colleague, Dr. Vito Zingerle, director of the Museo di Scienze Naturali Alto Adige, Bolzano, Italy, who generously encouraged our collaborative work.

Distribution - The few specimens of *Trichoribates zingerlei* n. sp. were found on the Schlern massif (Dolomites) in the Southern Alps in subalpine habitats on dolomitic rocks, in grass litter under *Carex firma* and in soil under dwarf-shrubs (*Pinus mugo*, *Erica carnea*, *Juniperus communis*, *Salix reticulata*) and cushion plants (*Saxifraga* sp., *Dryas octopetala*, *Silene acaulis*) (Schatz, 2008; Wilhalm, 2008).

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REFERENCES

- Bayartogtokh, B. and H. Schatz. 2008. Oribatid mites of the genera *Trichoribates* and *Jugatala* from the Central and Southern Alps, with notes on their distribution (Acari: Oribatida: Ceratozetidae). *Zootaxa* (in press).
- Behan-Pelletier, V. M. 1985. Ceratozetidae of the western North American arctic. *Canad. Entomol.* 117: 1287-1366.
- Behan-Pelletier, V. M. 1986. Ceratozetidae (Acari: Oribatei) of the western North American subarctic. *Canad. Entomol.* 118: 991-1057.
- Grandjean, F. 1936. Les oribates de Jean Frédéric Hermann et de son père (Arachn. Acar.). *Ann. Soc. Entomol. France*, 105: 27-110.
- Hunt, G. S., R. A. Norton, J. P. H. Kelly, M. J. Colloff and S. M. Lindsay. 1998. An Interactive Glossary of Oribatid Mites. CSIRO Publishing, Melbourne, CD-ROM.
- Menke, H. G. 1963. Revision der Ceratozetidae, *Ceratozetes peritus* Grandjean (Arach., Acari, Oribatei). *Senck. Biol.* 44(2): 141-154.
- Pavlitshenko, P. G. 1994. A Guide to the Ceratozetoid Mites (Oribatei, Ceratozetoidea) of Ukraine. *Nat. Acad. Sci. Ukraine, Kiev*, 144 pp. (in Russian).
- Schatz, H. 2008. Hornmilben (Acari: Oribatida) im Naturpark Schlern - Rosengarten (Südtirol, Italien). *Gredleriana*, 8 (in press).
- Schweizer, J. 1956. Die Landmilben des Schweizerischen Nationalparks. 3. Teil, Sarcoptiformes Reuter 1909. *Ergebnisse der wissenschaftlichen Untersuchung des Schweizerischen Nationalparks, Neufolge, Liestal*, 5: 213-377.
- Shaldybina, E. S. 1975. Superfamily Ceratozetoidea. pp. 275-319. *In: Gilyarov, M. S. and D. A. Krivolutsky (Eds.), A Key to the Soil-inhabiting Mites. Sarcoptiformes. Nauka, Moskva* (in Russian).
- Trägårdh, I. 1902. Beiträge zur Kenntnis der schwedischen Acaridenfauna. I. Lappländische Trombididen und Oribatiden. *Kongliga Svenska Vetenskaps-Akademien, Handlingar*, 28: 1-26.
- Wilhalm, T. 2008. Die Farn- und Blütenpflanzen des Schlern (Südtirol, Italien). *Gredleriana*, 8 (in press).
