

## Four Species of Oribatid Mites (Acari: Oribatida) from Central and Southern Mongolia, with Notes on the Genera *Montizetes* and *Zachvatkinibates*

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### Abstract

In the present work four species of oribatid mites from central and southern parts of Mongolia are studied, and two of them, namely *Zachvatkinibates mongolicus* sp. nov. and *Montizetes serratus* sp. nov. are described as new to science. Two other species, *Kunstella foveolata* Krivolutsky and *Liebstadia pannonica* (Willmann) are recorded as new to the fauna of Mongolia, and the latter species is reported for the first time from Asia. Description of new and redescription of known species, and data on geographic distribution of known species are given. A new combination, *Montizetes tianshanensis* (Wen) comb. nov. is proposed. Identification keys to the world species of the genera *Zachvatkinibates* and *Montizetes* are provided.

**Key words:** Acari, Oribatida, *Zachvatkinibates*, *Montizetes*, *Kunstella*, *Liebstadia*, Mongolia

### Introduction

The study on biodiversity of oribatid mites of Mongolia is relatively recent and is the subject of ongoing research as part of biodiversity assessments in various ecosystems of the country. Among soil microarthropods, the oribatid mites are one of the numerically dominant groups in different natural habitats, and their description should facilitate further ecological and biogeographical studies on this fauna.

In the course of taxonomic and ecological studies of oribatid mites of Mongolia, several interesting species belonging to the genera *Zachvatkinibates* Shaldybina, *Montizetes* Kunst, *Kunstella* Krivolutsky and *Liebstadia* Oudemans are found from central and southern parts of the country.

The first genus studied here, *Zachvatkinibates* has been represented in Mongolia by single species, while two species of the second genus, *Montizetes* have been recorded previously from Mongolia (Balogh & Mahunka, 1965; Bayartogtokh, 1998; Bayartogtokh & Aoki, 1998).

The genus *Kunstella* is monotypical, and until the present moment it has been known to be distributed only in Mt. Gorny Altai, Southern Siberian region of Russia (Krivolutsky, 1974, 1995). However, the type species, *K. foveolata* is

found in the desert habitats of southern Mongolia, which is the second distributional record for this genus.

The last genus, *Liebstadia* is rather rich in Mongolia in terms of species richness, representing by four species (Bayartogtokh, 2001). The author adds one more species, *Liebstadia pannonica*, not only to the fauna of Mongolia, but also in Asia, which has been known before only from Europe.

### Materials and Methods

The present work is based on materials collected mostly by two our graduate students. Part of the material was collected from mountains Zuun Saikhan and Dund Saikhan in Gobi Gurvan Saikhan Nature Reserve area in the South Gobi Province, during the joint research conducting by the Faculty of Biology of the National University of Mongolia and the Faculty of Geography of the Philipps University of Marburg, Germany.

The other part of the study materials was collected from semidesert habitats in Mt. Ikh Gazryn Chuluu in the Middle Gobi Province, during field trip initiated by the Faculty of Biology, National University of Mongolia. In addition, some materials were collected from Mt. Bogdkhan, located close to the capital city Ulaanbaatar, and Mt. Khustai in Central Province.

The type locality and habitat characterization for each species are given in the respective "material examined" sections. All specimens used for this study are represented as adults.

The morphological terminology used in this paper is based on that (with a few modifications) generally developed by F. Grandjean (see Travé and Vachon, 1975 for references).

Body length is measured in lateral view, from the tip of rostrum to the posterior edge of notogaster. Notogastral length is measured in lateral aspect, from the anterior to the posterior edge. Notogastral width refers to the maximum width in dorsal aspect. All measurements are given in micrometers ( $\mu\text{m}$ ), and the average measurement values are given in parentheses after the range. The line drawings were made with the aid of a camera lucida attached to a compound microscope "PZO SK-14".

## Descriptions of Species

### *Zachvatkinibates mongolicus* sp. nov.

(Fig. 1)

**Diagnosis.** Medium in size; rostrum rounded; rostral setae long, distinctly barbed; lamellae narrow; lamellar cusps short, narrow; translamella wide; lamellar setae medium long, thin, smooth; interlamellar setae long, but thin, smooth; sensilli with minutely barbed elongate oval or club-shaped head; tutoria wide, distinctly widened in its posterior part, but narrowed anteriorly, distal end without tooth; notogastral setae medium long; pteromorphae smooth, bent downwards; posterior notogastral tectum with overlapping lobes.

**Measurements.** Six specimens were measured: body length 360-372 (366)  $\mu\text{m}$ ; width of notogaster 207-232 (220)  $\mu\text{m}$ ; length of notogaster 305-323 (313)  $\mu\text{m}$ .

**Integument.** Body color yellowish to reddish-brown. Cerotegument thin, roughened by minute granules. Lateral region of podosoma with small, but distinct granules.

**Prodorsum.** Rostrum rounded in dorsal view, without lateral dens. Rostral setae (*ro*) inserted laterally, about 52-56  $\mu\text{m}$  long, distinctly barbed, extending well beyond the tip of rostrum. Lamellae relatively narrow, converging anteriorly; lamellar cusps short, blunt at tip; translamella very wide. Lamellar setae (*le*) thin, smooth, about 17-20  $\mu\text{m}$  in length, reaching to the tip of rostrum. Interlamellar setae (*in*) approximately 71-76  $\mu\text{m}$

long, thin, smooth, extending beyond tip of rostrum, inserted on small apophyses on transverse ridge underneath of anterior tectum of notogaster. Bothridia (*bo*) cup-shaped, completely covered by the anterior tectum of notogaster. Sensillii (*ss*) about 36-41  $\mu\text{m}$  in length, minutely barbed, with relatively long elongate oval or club-shaped head and smooth narrow stalk. Tutoria wide, distinctly widened in its middle and posterior parts, but narrowed anteriorly, with distinct cusps distally, extending beyond the level of the insertion of rostral setae; distal end of tutorial cusps without tooth (Figs. 1A & C).

**Notogaster.** Oval, longer than wide, ratio of length and width 1.4:1. Anterior tectum of notogaster moderate in size, its margin nearly straight. A pair of heavily sclerotized longitudinal ridges present on the anterior margin of notogaster (between two bothridia). Pteromorphs well developed, bent downwards, immovable, line of desclerotization absent. Notogastral setae moderately long, thin, smooth. Porose areas nearly circular to oval; *Aa* largest, while *A<sub>1</sub>* smaller than the former and *A<sub>2</sub>* and *A<sub>3</sub>* much smaller than others. Notogastral lyrifissures *ia*, *im* and *ip* well visible in dorsal view, while *ih* and *ips* visible in lateral or ventral views. Opisthosomal gland opening (*gla*) located posterolaterad of seta *lp* in rather far distance (Fig. 1A). Posterior notogastral tectum with overlapping lobes (Figs. 1B & D).

**Gnathosoma.** Subcapitulum without mental tectum; hypostomal setae *a*, *h* and *m* medium long, smooth. Anterior margin of rutellum strongly sclerotized, with a few blunt teeth (Fig. 1D). Structure and setation of palps and chelicerae typical for genus.

**Epimeral region.** Surface of epimeral region smooth; apodemes *apo.2*, *apo.sj* and *apo.3* well developed, aligned obliquely, almost parallel to each other. Apodeme *apo.3* much shorter than two formers. Epimeral setae medium long, smooth, all setae approximately equal in length. Circumpedal carina well developed, reaching to lateral margin of ventral plate. Discidium triangular, distinctly projected distally (Fig. 1D).

**Ano-genital region.** Surface of anal and genital regions smooth, anal aperture being larger than genital one. Genital setae medium long, approximately same in length; setae *g<sub>1</sub>*, *g<sub>2</sub>* and *g<sub>3</sub>* inserted along anterior margin of genital plates, *g<sub>6</sub>* inserted close to posterior margins. Distance between bases of aggenital setae (*ag*) nearly equal

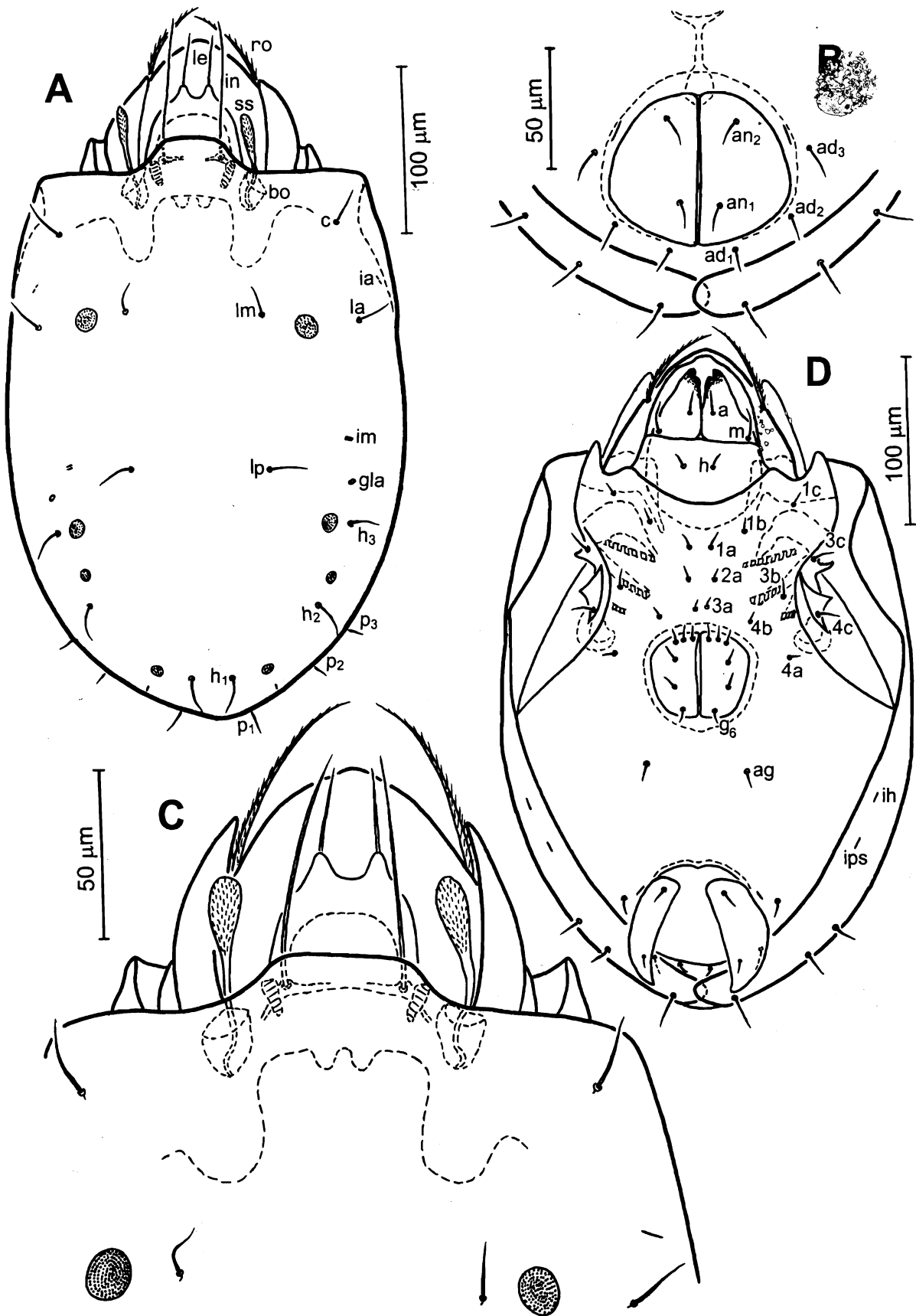


Fig. 1. *Zachvatkinibates mongolicus* sp. nov. A: Dorsal aspect of idiosoma; B: Anal and adanal regions, showing posterior notogastral tectum; C: Prodorsum and anterior part of notogaster; D: Ventral aspect of idiosoma.

to that between epimeral setae 4b-4b. Adanal lyrifissure (*iad*) small, situated adjacent and parallel to anterolateral margin of anal aperture (Figs. 1B & D).

**Legs.** Tibia I with small, but distinct dorsodistal projection, tibiae II-IV with relatively large dorsodistal projections. Structure and setation of legs typical for genus; formula of leg setation (including famulus): I (1-5-3-4-20); II (1-5-3-4-15); III (2-3-1-3-15); 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) and two paratypes (male and female), Ulaantolgoi area, Mt. Dund Saikhan, Gobi Gurvan Saikhan Mountains, District Bayandalai, South Gobi Province, semidesert, soil under *Artemisia santolinifolia* Turcz. & Bess., 26 July 2002, Col. Ts. Bolortuya; one paratype (female): Mt. Ikh Gazryn Chuluu, District Gurvansaikhan, Middle Gobi Province, semidesert, organic debris accumulated between rocks, 45°50'N, 107°10'E, 18 June 2002, Col. D. Narangarvuu. The holotype and paratypes are deposited in the collection of the Department of Zoology, National University of Mongolia, Ulaanbaatar, Mongolia. All specimens are preserved in alcohol.

**Remarks.** The new species, *Zachvatkinibates mongolicus* sp. nov. is easily distinguishable from most other known species of the genus by the very broad translamella, short lamellar cusps, very wide tutoria and the absence of line of desclerotization of pteromorphs. Among the known species of *Zachvatkinibates*, the Mongolian species, *Z. latilamellatus* Bayartogtokh & Aoki, 1998 resemble the new species in the character of lamellae, lamellar cusps and sensilli. However, *Z. mongolicus* sp. nov. is clearly differs from the latter species in the 1) posterior notogastral tectum with overlapping lobes as opposed to the not overlapping, but separated lobes of the posterior notogastral tectum in *Z. latilamellatus*; 2) absence of the line of desclerotization of pteromorphs as opposed to the presence of incomplete line of desclerotization in *Z. latilamellatus*; 3) much broad tutoria in comparison with narrow tutoria in *Z. latilamellatus*; 4) relatively long lamellar cusps as opposed to the almost indistinct cusps in *Z. latilamellatus*, and 5) smooth lamellar and interlamellar setae as opposed to the minutely barbed setae in the compared species.

Two species, *Z. tetrasklerosis* and *Z. epiphytos*

described by Behan-Pelletier (1988, 2001), known from North America have immovable pteromorphs. However, both the species, *Z. tetrasklerosis* Behan-Pelletier and *Z. epiphytos* Behan-Pelletier are different from *Z. mongolicus* sp. nov. in the 1) relatively long and narrow lamellae and translamellae; 2) much narrow tutoria; 3) relatively small anterior notogastral tectum; 4) thick and strongly barbed lamellar and interlamellar setae, and 5) different arrangement of notogastral setae, porose areas and lyrifissures.

**Etymology.** The specific name "*mongolicus*" refers to the name of country, which encompassing the type locality of this species.

### *Montizetes serratus* sp. nov.

(Figs. 2 & 3)

**Diagnosis.** Medium in size; tip of rostrum rounded, but its anterolateral margin with distinct serrations; costulae poorly developed, not reaching to the level of the insertion of lamellar setae; outside costulae on each side present a distinct longitudinal ridge, diverging anterolaterad; sensilli fusiform, sharply pointed distally and terminating in setiform prolongation; rostral, lamellar and interlamellar setae moderately long, finely barbed; exobothridial region tuberculated.

**Measurements.** In total 16 specimens were measured: body length 378-420 (393)  $\mu\text{m}$ ; width 201-220 (210)  $\mu\text{m}$ ; length of notogaster 256-286 (265)  $\mu\text{m}$ .

**Integument.** Body color yellowish brown. Surface of body and leg segments with relatively thin granular cerotegument. Distinctly tuberculated on exobothridial region, lateral part of prodorsum and around leg acetabula.

**Prodorsum.** Tip of rostrum rounded, but anterolateral margins distinctly serrated and each side being with five or six small teeth, which well visible in lateral or dorso-lateral views (Figs. 2A & C). Rostral setae about 43-46  $\mu\text{m}$  long, barbed, inserted dorsally close together and extending well beyond the tip of rostrum. Costulae poorly developed, short, slender, not reaching to the level of insertions of lamellar setae. Outside of costula on each side present a dark longitudinal ridge, originating from basal part of costulae and diverging anterolaterally. Outside of these longitudinal ridges situated small granules and muscle sigillae (Figs. 2A & C). Lamellar setae barbed, about 40-44  $\mu\text{m}$  long and about 1.4 times as long as distance between

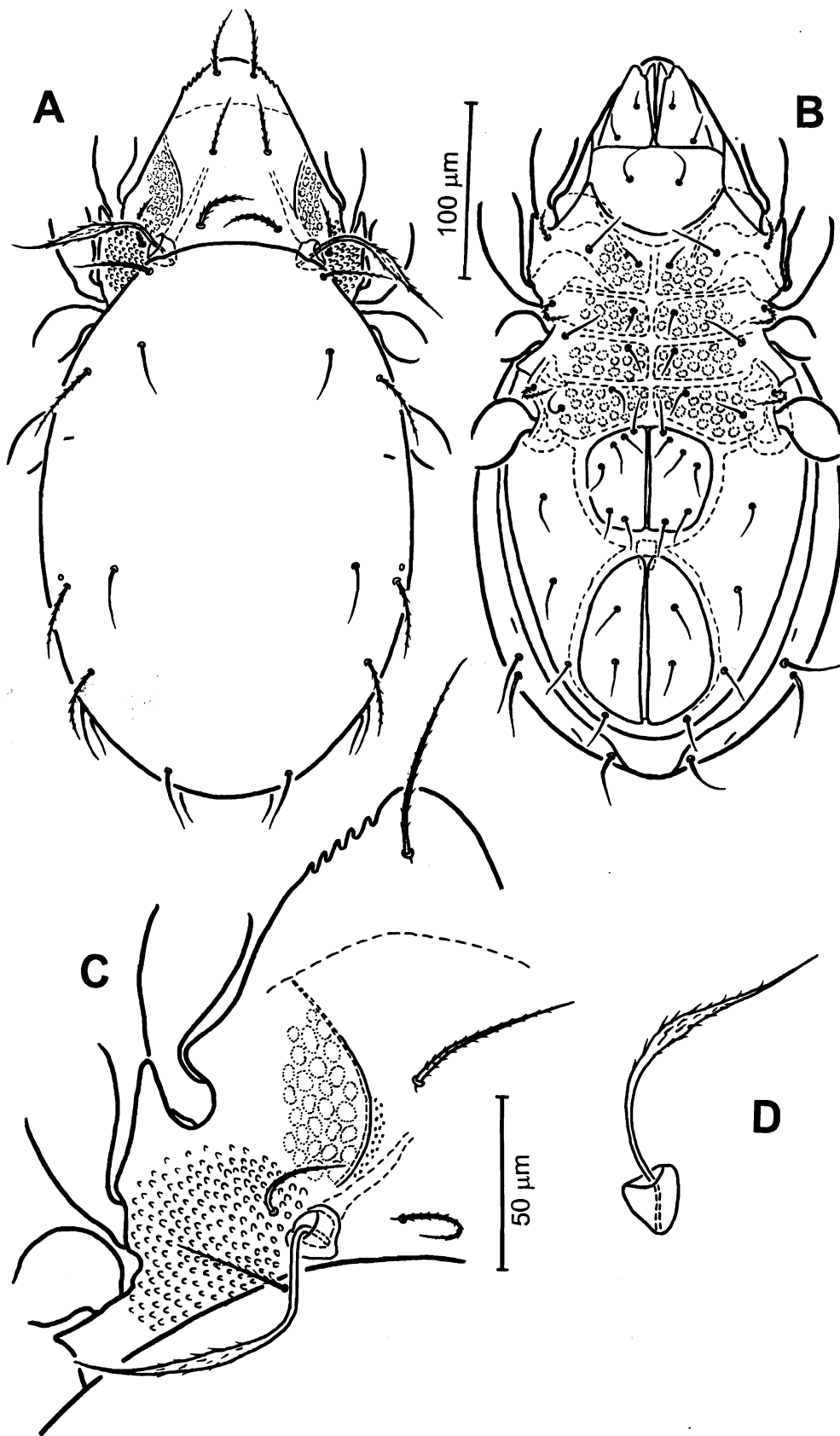


Fig. 2. *Montizetes serratus* sp. nov. A: Dorsal aspect of idiosoma; B: Ventral aspect of idiosoma; C: Dorsolateral view of prodorsum; D: Sensillum and bothridium.

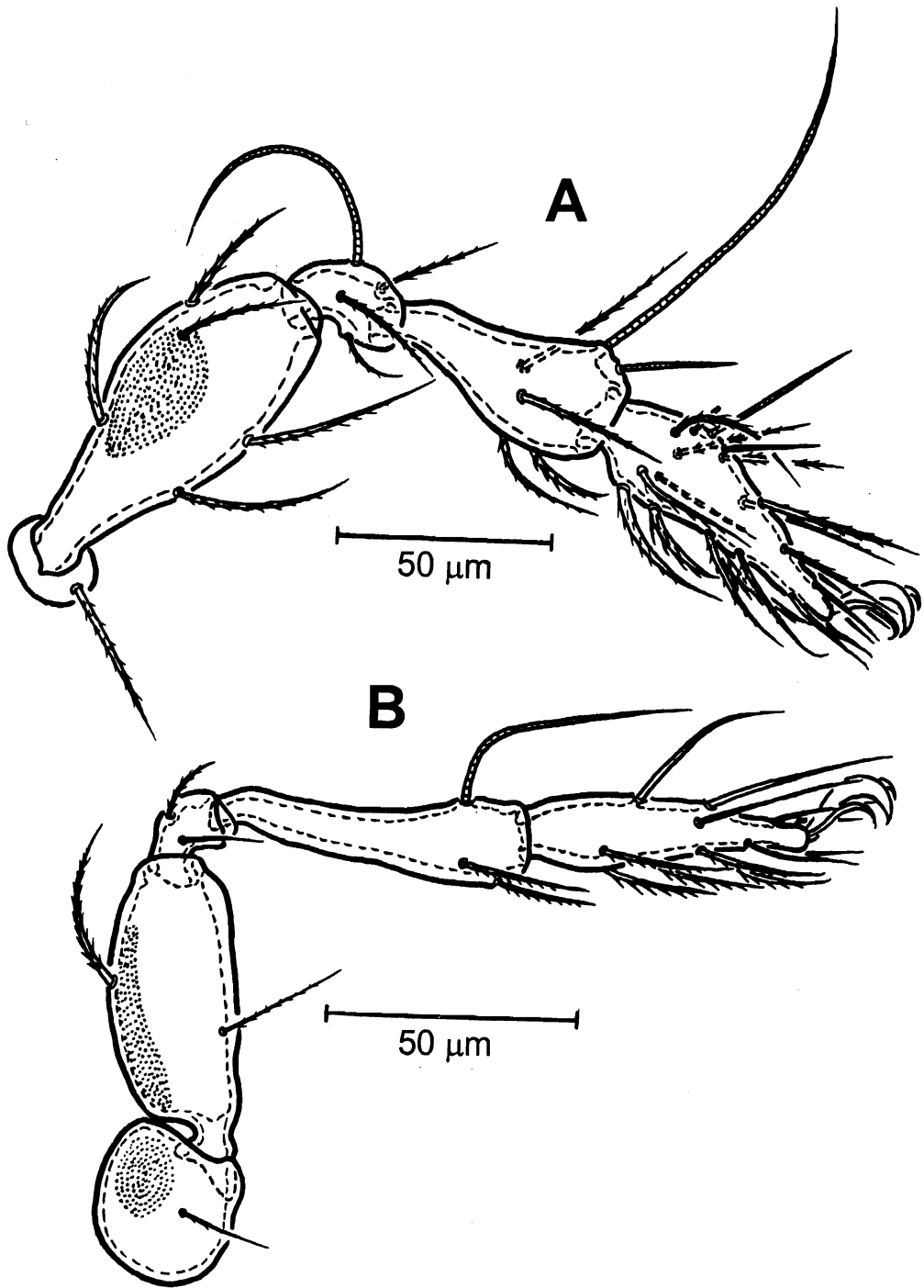


Fig. 3. *Montizetes serratus* sp. nov. A: Leg I (right, anti-axial view); B: Leg IV (left, anti-axial view).

their bases. Interlamellar setae barbed, about 31–35  $\mu\text{m}$  in length. Exobothridial setae barbed, 30–34  $\mu\text{m}$  long, slightly slender than other prodorsal setae. Bothridia directed anterolaterad, its posterior part concealed under anterior margin of notogaster. Sensilli 80–96  $\mu\text{m}$  long, fusiform, sharply pointed distally and terminating in setiform prolongation. Swollen portion of sensilli roughened with sparse barbs. Exobothridial region tuberculated (Figs. 2A, C & D).

**Notogaster.** Oval, 1.5 times as long as wide, its anterior and posterior margins broadly rounded. A small humeral lobe slightly protruding on each side. Ten pairs of notogastral setae moderately long, seta *c*, *la*, *h*<sub>2</sub> and *h*<sub>3</sub> barbed, other notogastral setae thin and smooth. Lyrifissure *im* situated posterior to seta *la*, in far distance; opisthosomal gland opening *gla* situated just anterolaterad of seta *h*<sub>3</sub>. Lyrifissures *ih* and *ips* well visible in ventral view. Posteroventral end of notogaster distinctly narrowed. (Figs. 2A & B).

**Gnathosoma.** Infracapitular mentum slightly wider than long, without noticeable microtubercles. Hypostomal setae *h*, *m* and *a* medium long, thin, smooth (Fig. 2B). Chelicera relatively large, fixed and movable digits with few blunt teeth; setae *cha* and *chb* conspicuously barbed.

**Epimeral region.** Covered with round muscle sigillae. Coxisternal ridges *I*, *II*, *sj*, *III* and *IV* well developed. Epimeral setal formula 3:1:3:3; most of epimeral setae fine, but setae *1c*, *3c* and *4c* barbed; setae *1b* and *3b* distinctly longer than other epimeral setae.

**Ano-genital region.** Anal and genital apertures large, located close to each other. Six pairs of genital, one pair of aggenital, two pairs of anal and three pairs of adanal setae smooth, moderately long. Setae *g*<sub>1</sub>–*g*<sub>4</sub> situated close to anterior margin of genital plates, while *g*<sub>5</sub> and *g*<sub>6</sub> situated close to posterior margin. Distance between bases of aggenital setae nearly equal to that between *ad*<sub>3</sub>–*ad*<sub>3</sub>. Adanal lyrifissure *iad* located anterior to the level of anal setae *an*<sub>2</sub> and adjacent to lateral margins of anal plates.

**Legs.** All tarsi heterotridactylous, the median claw much thicker than the laterals; tibia I with very long solenidion  $\phi$ <sub>1</sub>, and short  $\phi$ <sub>2</sub> inserted nearly in front of  $\phi$ <sub>1</sub>. Femora I–IV and trochanters III and IV with large porose areas. Structure and setation of legs I and IV as shown in Figs. 3A & B.

**Material examined.** Holotype (male) and four paratypes (one male and three females): Gorge

Chuluut, Mt. Bogdkhan, 18 km south-east from the city Ulaanbaatar, larch forest (*Larix sibiricus*), 14 October 2002, Col. D. Narangarvuu; ten paratypes (six males and four females): Gorge Shajin Khurakh, Mt. Bogdkhan, 24 km south-east from the city Ulaanbaatar, larch forest (*Larix sibiricus*), 24 June 2002, Col. B. Bayartogtokh; five paratypes (three males and two females): Ulaantolgoi area, Mt. Dundsai Khan, Gobi Gurvan Saikhan Mountains, District Bayandalai, Province South Gobi, semidesert, soils under *Juniferus sabina* L., 26 July 2002, Col. Ts. Bolortuya. The holotype and paratypes are preserved in the collection of the Department of Zoology, National University of Mongolia, Ulaanbaatar, Mongolia.

**Remarks.** *Montizetes serratus* sp. nov. is easily distinguishable from other species of the genus by the serrated anterolateral margin of rostrum, which being with five or six small teeth on both right and left sides. All other known species of *Montizetes* have smoothly rounded rostrum, and only the members of the genus *Pantelozetes* Grandjean show such structure. However, the species of the latter genus are monodactylous.

In spite of the above mentioned principal difference, several species of *Montizetes* resemble the new species in the shape of lamellar cusps. They are *M. alpestris* (Willmann), *M. rarisetosus* Bayartogtokh and *M. tianshanensis* (Wen), known from Europe and Asia. However, the type species, *M. alpestris* described and redescribed by Willmann (1929, 1931; Kunst, 1971) from Europe is differs from *M. serratus* sp. nov. in the smooth sensilli and prodorsal setae as opposed to the distinctly barbed ones in the new species, and relatively long and strongly developed lamellar cusps as opposed to the poorly developed cusps in the new species. The second species, *M. rarisetosus* described by Bayartogtokh (1998) from Central Mongolia is different from *M. serratus* sp. nov. in the relatively thin and poorly barbed or smooth rostral, lamellar, interlamellar and exobothridial setae as opposed to the densely barbed prodorsal setae in the new species; fairly long and strongly developed lamellar cusps as opposed to the short and poorly developed cusps in the new species; relatively long and smooth notogastral setae *la*, *h*<sub>2</sub> and *h*<sub>3</sub> as opposed to the shorter and distinctly barbed setae in *M. serratus* sp. nov., and the presence of nine pairs of notogastral setae rather than ten pairs in the new species. The Chinese species, *M. tianshanensis* described by Wen (1989) from Mt. Tianshan is can be

differentiated from new species in the smooth notogastral setae  $la$ ,  $h_2$  and  $h_3$ ; different arrangement of notogastral setae, lyrifissures and opisthosomal gland openings and much larger body size.

**Etymology.** The specific name “*serratus*” refers to the serrated rostrum of the present species.

***Kunstella foveolata* Krivolutsky**  
(Figs. 4 & 5)

*Kunstella foveolata* Krivolutsky, 1974: 1883, fig. E.

*Kunstella foveolata*: Krivolutsky, 1975: 330, fig. 824; 1995: 204; Golosova *et al.*, 1983: 11; Krivolutsky *et al.*, 1984: 1021; Karppinen *et al.*, 1986: 91.

**Diagnosis.** Relatively large species; rostrum narrowed anteriorly and incised laterally; lamellae large, covering prodorsum except pedotectum I, fused medially, lateral margins with longitudinal striations; lamellar cusps large, nearly as long as basal part of lamellae, each cusp with large lateral and inner teeth; translamella narrow; lamellar setae moderately long, elongate leaf-shaped and sharply pointed distally; interlamellar setae short, smooth, widened medially and pointed distally; sensilli with minutely barbed elongate oval head; notogastral setae medium long, smooth, widened medially and pointed distally; notogaster and ventral plate foveate; lenticulus present; pteromorphae smooth, bent downwards, without line of desclerotization; adanal setae widened medially and pointed distally, other ventral setae thin.

**Measurements.** Six specimens were measured: body length 512-543 (524)  $\mu\text{m}$ ; width of notogaster 335-342 (338)  $\mu\text{m}$ ; length of notogaster 390-409 (396)  $\mu\text{m}$ .

**Integument.** Body color yellowish to dark-brown. Cerotegument fairly thick, microtuberculate over whole body and leg segments. Microtubercles forming distinct longitudinal striae on lateral parts of lamellae. Notogaster and ventral plate distinctly foveate.

**Prodorsum.** Rostrum narrowed anteriorly, incised laterally, which well visible after dissection or in ventral view (Fig. 4E). Rostral setae moderately long, distinctly barbed, reaching to the tip of rostrum, inserted ventro-laterally on distinct tubercles. Lamellae large, covering prodorsum except pedotectum I, fused medially, lateral margins with longitudinal striations. Lamellar cusps large,

nearly as long as basal part of lamellae, each cusp with large lateral and inner teeth. Translamella relatively narrow. Lamellar setae moderately long, elongate leaf-shaped and sharply pointed distally (Figs. 4A & C). Interlamellar setae short, smooth, widened medially and pointed distally. Exobothridial setae short, thin, smooth. Sensilli with minutely barbed elongate oval head and smooth narrow stalk. Bothridia large, partly covered by the anterior margin of notogaster (Figs. 4A & D).

**Notogaster.** Anterior margin wavy, anteromedian part slightly arched, but curved inward at the level of bothridia and laterad of pedotecta I; posterior margin broadly rounded; ratio of length and width 1.1:1. Surface of notogaster distinctly foveate; lenticulus present. Pteromorphs well developed, bent downwards, immovable, line of desclerotization absent. Notogastral setae moderately long, smooth, widened medially and pointed distally. Notogastral lyrifissures *im* well visible in dorsal view, while other lyrifissures not evident. (Fig. 4A).

**Gnathosoma.** Subcapitulum without mental tectum; hypostomal setae *a*, *h* and *m* medium long, smooth.

**Epimeral region.** Surface of epimeral region smooth; apodemes *apo.2*, *apo.sj* and *apo.3* well developed, two formers aligned obliquely, almost parallel to each other, while *apo.3* oriented transversely and much shorter than two formers. Epimeral setae moderately long, thin, smooth, all setae approximately equal in length. Setal formula 3-1-3-2, seta and *4c* not evident, one of the examined specimens showed two setae on each side of epimeral region 2, but it seems to be abnormal character. Circumpedial carina well developed, reaching to lateral margin of ventral plate. Pedotecta I and II large; lateral margins of ventral plate with a distinct angular projection on each side (Fig. 4B).

**Ano-genital region.** Anal aperture being slightly larger than genital one. Genital setae short, thin, approximately same in length, all setae inserted along inner margin of genital plates. Aggenital setae short, thin, distance between bases of aggenital setae slightly shorter than that between adanal setae. Anal setae slightly longer than genital setae, thin, smooth. Adanal setae widened medially, but pointed distally, nearly as long as anal setae. Adanal lyrifissure relatively large, situated adjacent and parallel to anterolateral margin of anal aperture (Fig. 4B).

**Legs.** All tarsi tridactylous, dorsal surface of



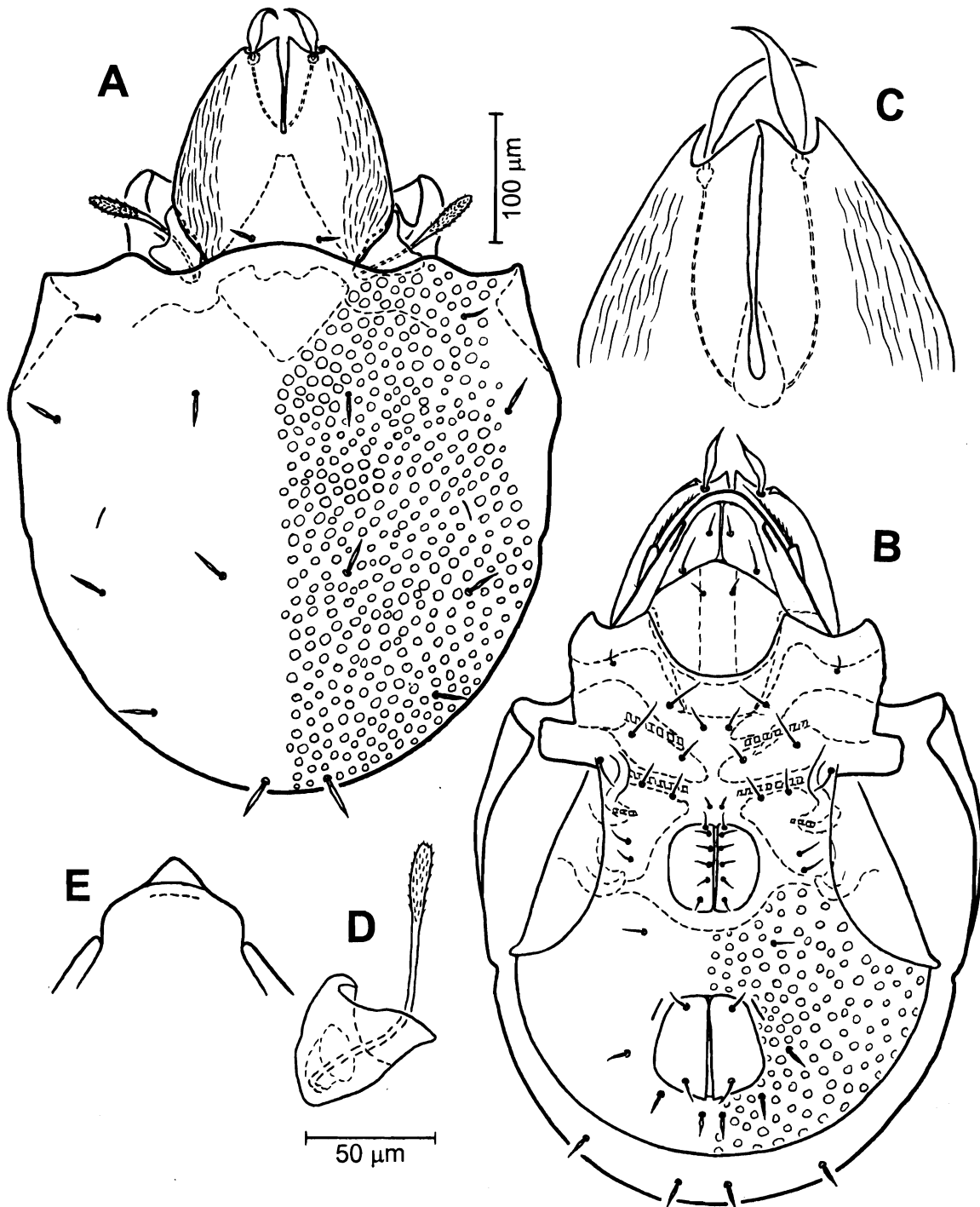


Fig. 4. *Kunstella foveolata* Krivolutsky, 1974. A: Dorsal aspect of idiosoma; B: Ventral aspect of idiosoma; C: Anterior part of lamellae; D: Sensillus and bothridium; E: Rostrum in ventral view.

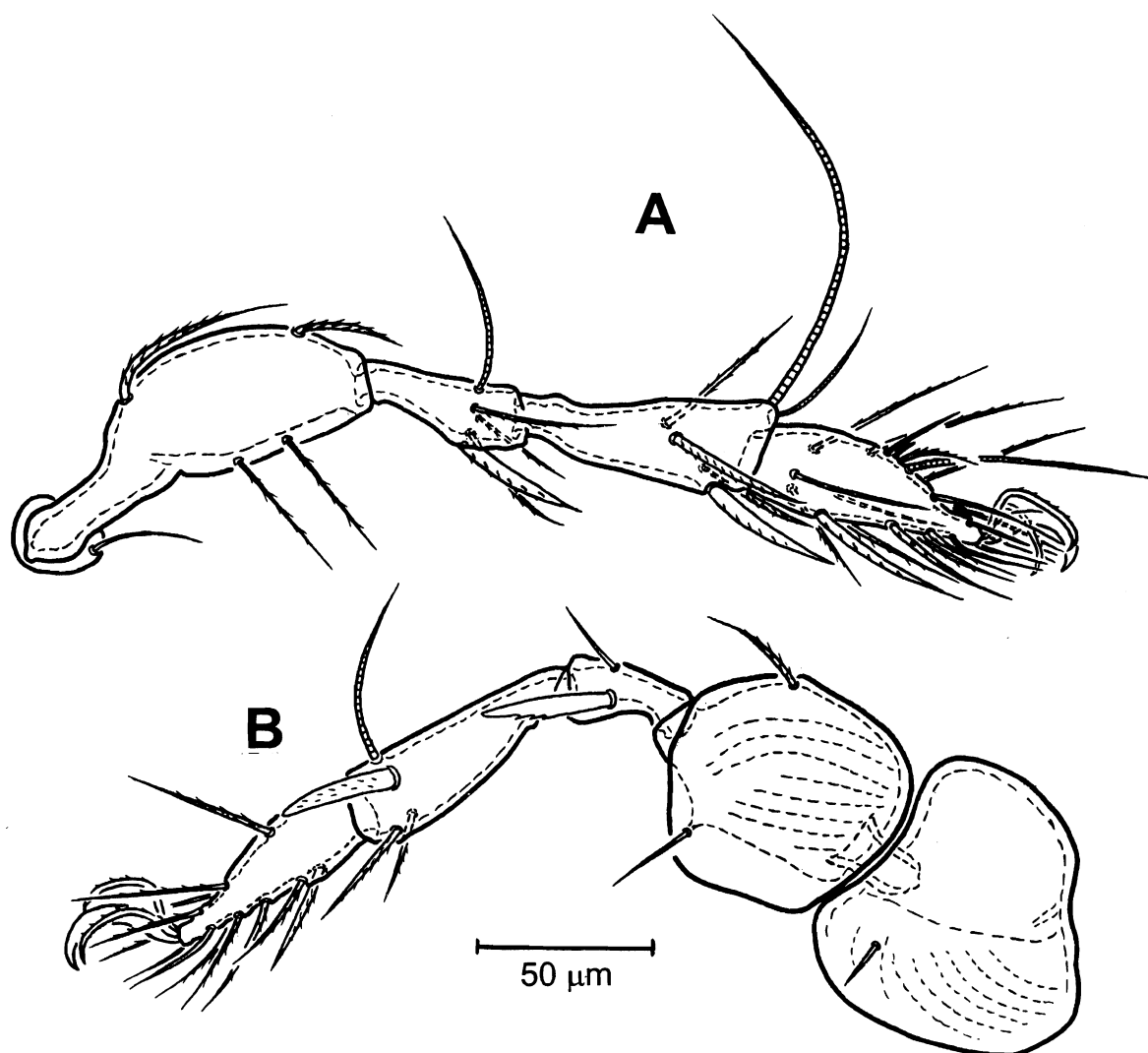


Fig. 5. *Kunstella foveolata* Krivolutsky, 1974. A: Leg I (right, antiaxial view); B: Leg IV (right, antiaxial view).

antiaxial and paraxial claws with distinct serrations. Femur and trochanter IV with longitudinal striations. Structure and setation of legs I and IV as shown in Fig. 5. Formula of leg setation (including famulus): I (1-5-3-4-19); II (1-5-3-4-15); III (2-3-1-3-15); 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.** One male and three females: Modot Shivert area, Mt. Zuun Saikhan, Gobi Gurvan Saikhan Mountains, District Khankhongor, South Gobi Province, semidesert, soils under birch grove (*Betula fusca* Pall. & Georgi.) with *Rebis rubrum* L and *Salix sp.*, 16 July 2002, Col. Ts. Bolortuya.

**Remarks.** Certain character states of the specimens examined here correspond well with those of the type specimens from South Siberia,

described by Krivolutsky (1974). The body size of the specimens studied here was relatively smaller than that of the type material from Siberia. Some supplementary characters are provided in the present redescription.

**Known distribution.** Russia: South Siberia, Mt. Gorny Altai (Krivolutsky, 1974, 1975, 1995; Golosova *et al.*, 1983; Krivolutsky *et al.*, 1984; Karppinen *et al.*, 1986), and Mongolia (present data).

***Liebstadia pannonica* (Willmann)**  
(Figs. 6 & 7)

*Protoribates pannonicus* Willmann, 1951: 165, fig. 35.

*Protoribates variabilis* Rajska, 1958: 429, figs. 1-

3; Sellnick, 1960: 69; Krivolutsky, 1962: 58; Mahunka & Mahunka-Papp, 2000: 47.

*Xylobates variabilis* (Rajski): Rajski, 1968: 118; Mahunka, 1991: 738.

*Rajskibates variabilis*: Balogh & Balogh, 1984: 281, fig. 21.

*Liebstaيدا variabilis*: Subias & Gil-Martin, 1995: 44.

*Liebstadia pannonica* (Willmann): Miko & Weigmann, 1996: 86, figs. 10-13, pl. 2; Mahunka & Mahunka-Papp, 2002: 212.

**Diagnosis.** Medium in size; rostrum protruding; lamellae typical for genus, sublamellae and prolamellae well developed; all prodorsal setae moderately long, distinctly barbed; sensilli with a densely barbed club-shaped head and a smooth, narrow stalk; notogaster broadly rounded posteriorly, but slightly protruding anteriorly, dorsosejugal suture distinct, but very fine; pteromorphs well developed, immovable, bent downwards.

**Measurements.** Body length 360-378 (370)  $\mu\text{m}$ ; width of notogaster 189-213 (201)  $\mu\text{m}$ ; length of notogaster 287-317 (302)  $\mu\text{m}$ .

**Integument.** Body color light yellowish-brown. Cerotegument very thin, being represented by very small granules. Lateral region of prodorsum with small, but densely arranged granules. Integument smooth.

**Prodorsum.** Rostrum protruding, smoothly rounded anteriorly. Rostral setae moderately long, conspicuously barbed. Lamellae relatively wide, but distinctly narrowed toward distal end. Sublamellae well developed, joined to the anterior part of bothridia. Prolamellae well developed, reaching to the insertions of the rostral setae (Figures 6C). Lamellar setae long, conspicuously barbed, and extending well beyond the tip of rostrum. Interlamellar setae nearly as long as lamellar setae, barbed. Insertions of interlamellar setae situated close to the median margin of lamellae, and connected with latter by sublamellae. Sensilli with densely barbed, club-shaped head, and a smooth, narrow stalk. Bothridium directed anterolaterad, posterior part concealed under anterior margin of notogaster; posterolateral scale of bothridium well developed (Figs. 6A, C & 7A).

**Notogaster.** Longer than wide, ratio of length and width 1:1.35. Surface of notogaster nearly smooth, but numerous muscle sigillae scattered along the lateral and posterior margins. Distinctly

protruding anteriorly, dorsosejugal suture distinct, but very fine, posterior margin of notogaster broadly rounded. Pteromorphs well developed, bent downwards. Ten pairs of medium long, thin notogastral setae. Porose area *Aa* slightly larger than others. Lyrifissures *ia*, *im*, *ih* and *ip* well developed, while *ips* not evident. Opisthosomal gland opening situated posterolaterad of setae *im* (Figs. 6A & C).

**Gnathosoma.** Subcapitulum, palps and chelicerae normal for the genus. Hypostome smooth, setae *h*, *m* and *a* medium long, thin and smooth.

**Epimeral region.** With a number of round muscle sigillae. Apodemes *apo.2*, *apo.sj* and *apo.3* well developed, two formers obliquely oriented, while latter transversely situated. Epimeral setae medium long, thin, smooth; setal formula: 3-1-3-3. Pedotecta I and II relatively small, blunt at tip, outer margin rounded. Discidium well developed, but relatively short, bearing seta *4c*. Carina circumpedalis well developed, reaching to the lateral margin of ventral plate (Figs. 6B & C).

**Ano-genital region.** Anal and genital apertures situated far from each other, the former one far larger than latter. Four pairs of genital and one pair of aggenital, two pairs of anal and three pairs of adanal setae; seta *ad<sub>3</sub>* in preanal position. Genital setae much shorter than other ano-genital setae. Adanal lyrifissures (*iad*) situated adjacent and parallel to anterolateral margin of anal aperture (Fig. 6B).

**Legs.** All tarsi monodactylous, dorsal surface of claws with slight serration. Femora II-IV have distinct, distally rounded ventral blades. Femur I with relatively small keel in its proximal quarter, around seta *v*". Femora I-IV and trochanters III and IV with large porose areas. All setae on leg segments distinctly barbed. On tarsus I solenidion  $\omega$ , slightly longer than  $\omega_2$ ; famulus  $\epsilon$  short and slender, situated behind  $\omega_1$ . Tibia I with very long and relatively thick solenidion  $\phi_1$ , and short, thin  $\phi_2$  inserted on distinctly projected apophysis. Formula of leg setation (including famulus): I (1-5-3-4-19); II (1-5-2-4-15); III (2-3-1-3-15); IV (1-2-2-3-12); the formula of solenidia: I (1-2-2); II (1-1-2); III (1-1-0); IV (0-1-0). Setation of legs I and II as shown in Figs. 7B & C.

**Material examined.** Two specimens: Mt. Khustai, District Altanbulag, Central Province, mountain-steppe, soils under *Stipa grandis*, 11 April 1996, Col. U. Aibek.

**Remarks.** Sensilli of the specimens studied here

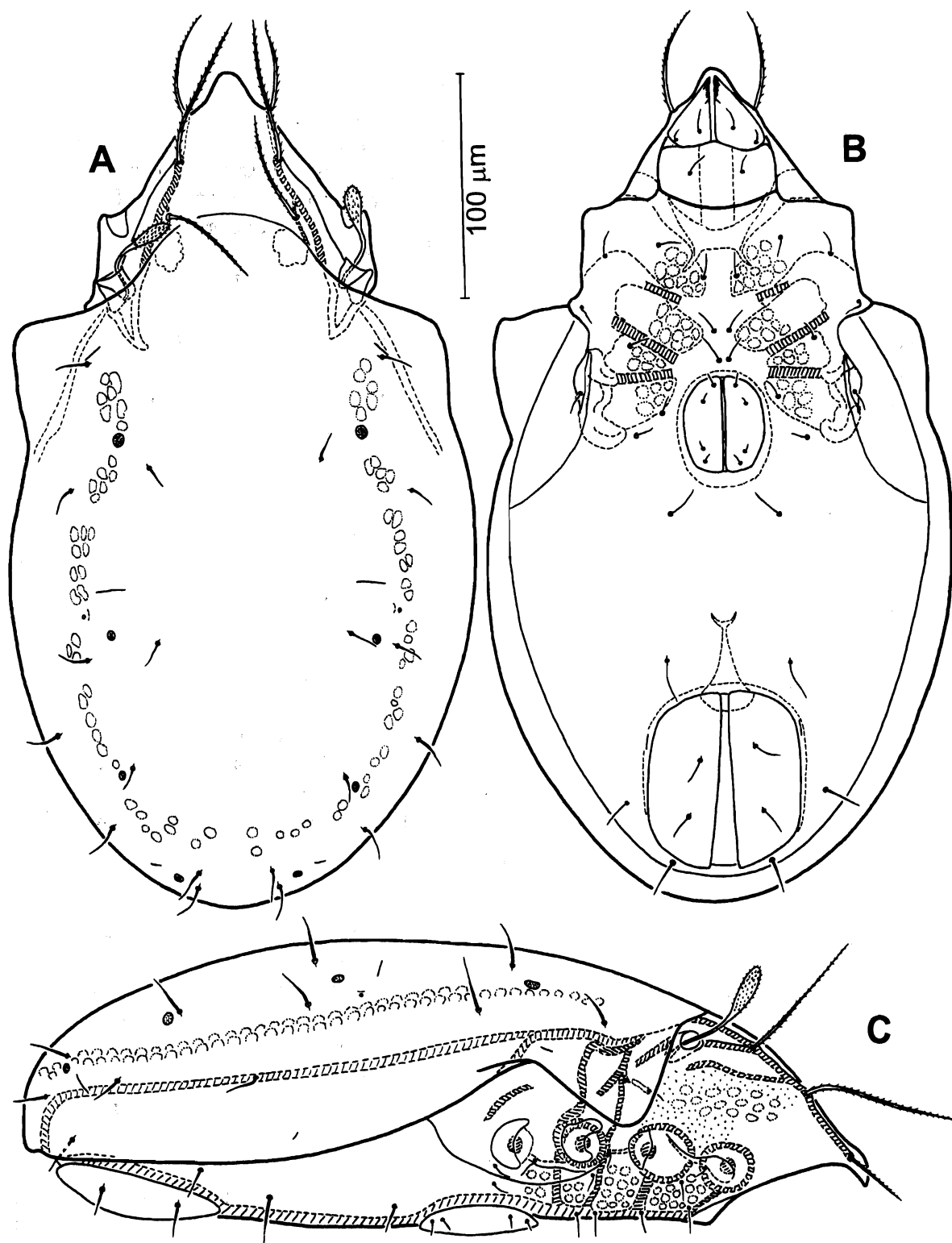


Fig. 6. *Liebstadia pannonica* (Willmann, 1951). A: Dorsal aspect of idiosoma; B: Ventral aspect of idiosoma; C: Lateral aspect of idiosoma.

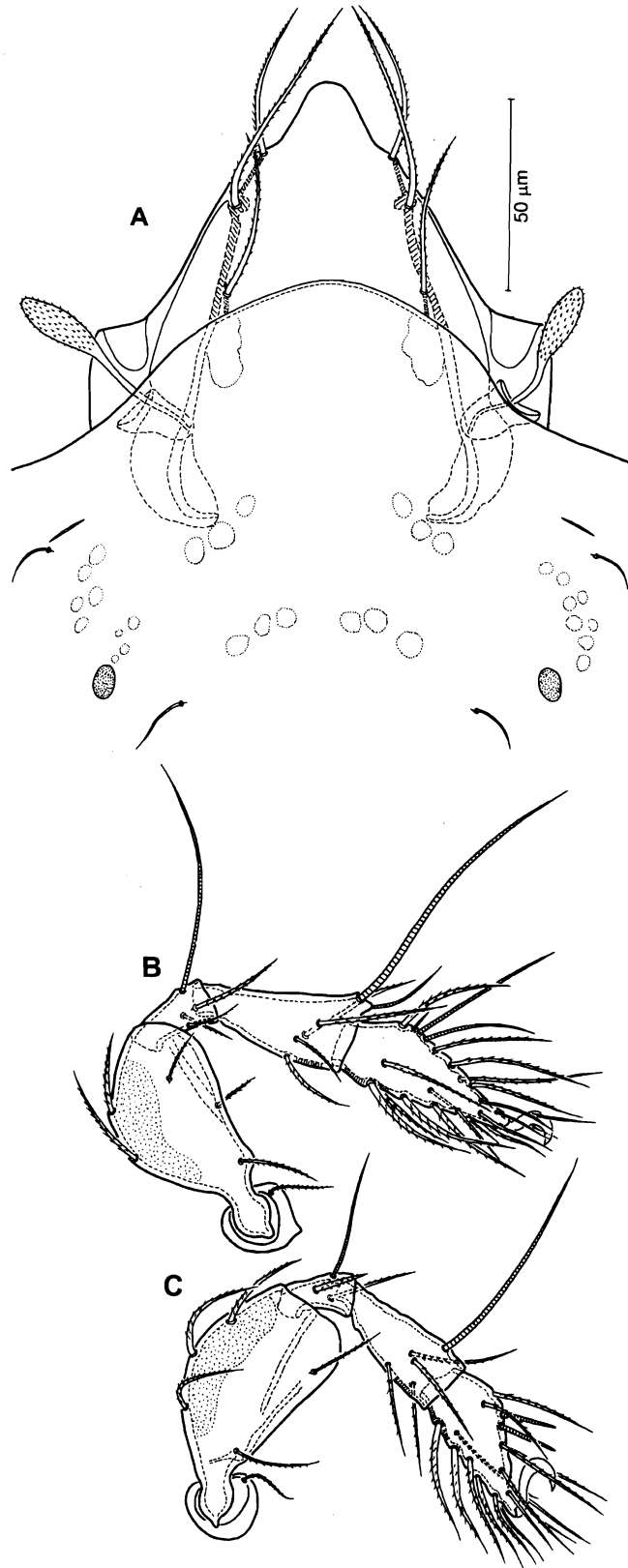


Fig. 7. *Liebstadia pannonica* (Willmann, 1951). A: Prodorsum; B: Leg I (right, antiaxial view); C: Leg II (right, antiaxial view).

were somewhat slender than those in the type material. The dorsosejugal suture was very fine, but continuous in the Mongolian material rather than completely absent or incomplete dorsosejugal sutures in the European material as shown by Willmann (1951), Rajski (1958) and Miko & Weigmann (1996). Excepting for these points the features of the examined specimens are accord well with those of the European material.

**Distribution.** Europe: Austria (Willmann, 1951; Sellnick, 1960; Schatz, 1983; Miko & Weigmann, 1996); Germany (Miko & Weigmann, 1996); Poland (Rajski, 1958, 1968; Sellnick, 1960; Niedbała & Olszanowski, 1997); Czech Republic (Miko & Weigmann, 1996); Slovakia (Karppinen *et al.*, 1992; Miko & Weigmann, 1996); Hungary (Mahunka, 1991; Mahunka & Mahunka-Papp, 2000, 2002); Spain (Subias & Gil-Martin, 1995); Russia (Krivolutsky, 1962; Karppinen & Krivolutsky, 1982; Golosova *et al.*, 1983); Latvia (Karppinen & Krivolutsky, 1982); Estonia (Karppinen & Krivolutsky, 1982); Ukraine (Karppinen *et al.*, 1992), and Asia: Mongolia (present data).

### Discussion

Although the author studied in this work four species belonging to different genera, I would like to briefly discuss here about taxonomy of those genera. The first genus studied here, *Zachvatkinibates* was erected by Shaladybina (1973), with the type species *Z. nemoralis* Shaladybina from Russia. *Zachvatkinibates* is a small genus, and until the recent time it was known only from Central Asia and Russian Far East, representing by three known species described by above author (*Z. nemoralis* Shaladybina, *Z. maritimus* Shaladybina and *Z. volgini* Shaladybina). Later, Behan-Pelletier (1988) recorded and redescribed *Z. maritimus* from North America, and at the same time she described another species, *Z. tetrasklerosis*. More recently, Bayartogtokh & Aoki (1998) and Behan-Pelletier (2001) described two more species, *Z. latilamellatus* and *Z. epiphytos* from Mongolia and North America, respectively. Thus, the genus is consisting now of seven species including a new species described here.

The following key will distinguish the adults of known species of *Zachvatkinibates* Shaladybina.

### Key to the known species of the genus *Zachvatkinibates*

1. Pteromorphs movable, with line of desclerotization . . . . . 2
  - Pteromorphs immovable, without line of desclerotization . . . . . 5
2. Lamellae short, wide; translamella very wide, short, its width nearly equal or greater than length . . . . . 3
  - Lamellar long; translamella narrow, relatively long, its width less than length . . . . . 4
3. Sensilli elongate oval, densely barbed, long, reaching to the level of translamella; anterior tectum of notogaster straight in median part . . . . . *Z. latilamellatus* Bayartogtokh & Aoki, 1998
  - Sensilli nearly capitate or club-shaped, finely barbed or smooth, not reaching to the level of translamella; anterior tectum of notogaster narrowed and almost triangular in median part . . . . . *Z. volgini* Shaladybina, 1973
4. Rostrum smoothly rounded; sensilli elongate oval, finely barbed, long, reaching to the level of translamella; anterior tectum of notogaster large, widely rounded . . . . . *Z. nemoralis* Shaladybina, 1973
  - Rostrum with dentations on anterior and anterolateral margins; sensilli club-shaped, heavily barbed, short, not reaching to the level of translamella; anterior tectum of notogaster small, nearly triangular . . . . . *Z. maritimus* Shaladybina, 1973
5. Lamellae not strongly converging anteriorly, lamellar cusps widely spaced from each other, translamella longer than width; lamellar and interlamellar setae thick, barbed . . . . . 6
  - Lamellae strongly converging anteriorly, lamellar cusps situated very close to each other, translamella wider than length; lamellar and interlamellar setae thin, smooth . . . . . *Z. mongolicus* sp. nov.
6. Notogaster weakly foveate; interlamellar area with distinct longitudinal striae; tuturia triangular distally, translamella very narrow and long . . . . . *Z. epiphytos* Behan-Pelletier, 2001
  - Notogaster without foveae; interlamellar area without longitudinal striae; tuturia blunt distally, translamella relatively wide and short . . . . . *Z. tetrasklerosis* Behan-Pelletier, 1988

Concerning the second genus studied here, Kunst (1971) proposed *Montizetes* as a subgenus

of *Pantelozetes* Grandjean, and later Pérez-Iñigo (1984) evaluated it as an independent genus. This is also one of the small genera of oribatid mites, encompassing five known species as *M. alpestris* (Willmann), *M. abulensis* Pérez-Iñigo, *M. delamellatus* Pérez-Iñigo, Jr., *M. mongolicus* (Balogh & Mahunka) and *M. rarisetosa* Bayartogtokh. The first three species are known from Europe, while two latter species are recorded in Mongolia (Willmann, 1929; Balogh & Mahunka, 1965; Pérez-Iñigo, 1982; Pérez-Iñigo, Jr., 1990; Bayartogtokh, 1998).

Wen (1989) described a species, *Gemmazetes tianshanensis* from northwest China. The species is being with tridactylous tarsi, which is the typical character of *Montizetes*. Not only the number of claws, but also the other characters of this species are typical for *Montizetes*. Therefore, I am including this species in the latter genus and proposing a new combination, *Montizetes tianshanensis* (Wen) comb. nov. Thus, the genus *Montizetes* is consisting now seven species with Palaearctic distribution, including a new species described here.

The following key can be used for identification of adults of known species of the genus *Montizetes* Kunst.

Key to the known species of the genus  
*Montizetes*

1. Sensilli fusiform, sharply pointed distally and terminating in setiform prolongation . . . . . 2
- Sensilli elongated oval, not pointed distally . . . . . 5
2. Anterolateral margin of rostrum not serrated, but smoothly rounded . . . . . 3
- Anterolateral margin of rostrum serrated, each side with five or six teeth. . . . .
- . . . . . *M. serratus* sp. nov.
3. Notogaster with ten pairs of setae . . . . . 4
- Notogaster with nine pairs of setae . . . . .
- . . . . . *M. rarisetosus* Bayartogtokh, 1998
4. Sensilli and all prodorsal setae distinctly barbed; costulae poorly developed . . . . .
- . . . . . *M. tianshanensis* (Wen, 1989)
- Sensilli and prodorsal setae smooth, costulae well developed . . . . .
- . . . . . *M. alpestris* (Willmann, 1929)
5. Lamellar costulae well developed, reaching to the bases of lamellar setae . . . . . 6
- Lamellar costulae absent . . . . .
- . . . . . *M. delamellatus* Pérez-Iñigo Jr., 1990
6. A pair of longitudinal ridges present outside of

- lamellar costulae; sensilli minutely barbed; notogastral setae long . . . . .
- . . . . . *M. abulensis* Pérez-Iñigo, 1984
- Longitudinal ridges absent outside of lamellar costulae; sensilli roughly barbed; notogastral setae short . . . . . *Montizetes mongolicus* (Balogh & Mahunka, 1965)

The third genus studied here, *Kunstella* is monotypical, and the type species, *K. foveolata* Krivolutsky has been described from a pine forest in Southern Siberia. Until the present moment it has been known to be distributed only in Mt. Gorny Altai, Southern Siberian part of Russia (Krivolutsky, 1974, 1975, 1995; Golosova *et al.*, 1983; Krivolutsky *et al.*, 1984; Karppinen *et al.*, 1986). Moreover, Krivolutsky *et al.* (1984) considered the species *K. foveolata* as a relict-endemic species of South Siberia. However, it is very interesting to note that the species, *K. foveolata* is found in the semidesert habitats of southern Mongolia, which is the second distributional record for this genus.

The last genus studied here, *Liebstadia* is rather rich in Mongolia in terms of species richness, representing by 4 species (Bayartogtokh, 2001). The author reported here another species, *Liebstadia pannonica*, which was known previously only from Europe. The species is newly recorded not only in the fauna of Mongolia, but also in Asia. The identification key to adults of the known species of *Liebstadia* is can be found in Bayartogtokh (2001).

### Acknowledgements

I would like to express my gratitude to Ms. Ts. Bolortuya and Ms. D. Narangarvuu, for their effort in collecting the soil microarthropods from central and southern Mongolia, which being the main part of the materials used in this study. Thanks also due to members of the field expedition from Philipps University of Marburg, Germany, for their encouragement and cooperation.

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(Accepted: January 2003)