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NEW DAMAEID MITES (ACARI: ORIBATIDA: DAMAEIDAE) FROM EASTERN MONGOLIA

НОВЫЕ ВИДЫ ПАНЦИРНЫХ КЛЕЩЕЙ (ACARI: ORIBATIDA: DAMAEIDAE) ИЗ ВОСТОЧНОЙ МОНГОЛИИ

B. Bayartogtokh

Department of Zoology, Faculty of Biology, National University of Mongolia, Ulaanbaatar 210646, Mongolia; E-mail: bayar@iname.com

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Ключевые слова: панцирные клещи, Oribatida, Damaeidae, новые виды, Восточная Монголия

ABSTRACT

Two new species of oribatid mites belonging to the genus *Epidamaeus* are described from the eastern part of Mongolia. The first new species, *Epidamaeus nortoni* sp. n. can be readily distinguished form all known species of *Epidamaeus* by the very wide, but short notogastral setae, the presence of neotrichous setae on epimeral region II (four setae instead of one seta on each side), the very long epimeral and ano-genital setae, and the short sensilla. The second new species, *Epidamaeus microtuberculatus* sp. n. is distinguishable from other species of *Epidamaeus* by the very thin and relatively short notogastral setae, the thin and flagellate sensilla, the absence of the epimeral tubercles *E2a* and *E2p*, and the presence of conspicuously developed small tubercles at the bases of epimeral setae *1* and *2* series, *3a*, *3b* and *4c*.

РЕЗЮМЕ

Два вида панцирных клещей из рода *Epidamaeus* описаны как новые для науки из восточной части Монголии. Первый из новых видов, *Epidamaeus nortoni* sp. n., отличается от всех известных видов рода очень широкими и короткими щетинками нотогастра, неотрихией в районе эпимер II (4 щетинки вместо 1 с каждой стороны), длинными эпимеральными и ано-генитальными щетинками, короткими трихоботриями. Второй из новых видов, *Epidamaeus microtuberculatus* sp. n., отличается от других видов рода очень тонкими и короткими щетинками нотогастра, тонкими бичевидными трихоботриями, отсутствием туберкул *E2a* и *E2p* и присутствием небольших туберкул в основаниях эпимеральных щетинок серий 1, 2, 3a, 3b и 4c.

INTRODUCTION

The eastern part of Mongolia is occupied mostly by very large steppe landscape with short and tall grasses, which encompassing several strictly protected areas such as "Khalkh Numrug", "Mongol Daguur" and "Eastern Mongolia" national parks, "Ugtam", "Lkhachinvandad" and "Ganga Nuur" nature reserves. For the better understanding of the ecological processes occurring within the protected areas it is important to examine the biodiversity and composition of various soil organisms living there.

The study of oribatid mite biodiversity of Eastern Mongolia is subject of the ongoing research as part of the biodiversity assessments in various habitats in this region. Among soil microarthropods, the oribatid mites are one of the numerically dominant groups, and their descriptions should facilitate further ecological and biogeographical studies on the oribatid fauna of this region.

In the course of ecological and taxonomic studies of soil microarthropods of Eastern Mongolia, several interesting species of oribatid mites are found, including two new species belonging to the genus *Epidamaeus*. The descriptions of the new species are given below.

MATERIALS AND METHODS

The present work is based on the materials collected by the author from different habitats of Eastern Mongolia, during the field research. 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 Grandjean [1960] as applied by Norton [1979]. Body length is measured in lateral view, from the tip of the rostrum to the posterior edge of the 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 (μm), 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.

DESCRIPTIONS OF SPECIES

Epidamaeus nortoni sp. n.

Figs. 1, 2.

Diagnosis. Relatively large species with typical characters of *Epidamaeus*. Propodolateral apophysis *P* absent; prodorsal tubercles *Ba*, *Bp* and *Da* well developed; sensilla relatively short, distal half finely barbed; lamellar and interlamellar setae barbed; rostral setae smooth; notogastral setae, except posterior three pairs very thick, widened medially, darkly pigmented; setae p_1, p_2 and p_3 thin, smooth, longer than other notogastral setae; spinae adnatae large, widely spaced from each other and directed anterolateriad; tectum of podocephalic fossa not projected; ventral enantiophyses E_2 and V_1 well developed; tubercle *Sa* absent; epimeral region II with four setae; epimeral regions III and IV with three and four setae, respectively; tarsus IV with 15 setae.

Measurements. Body length 769–839 (807); length of notogaster 617–667 (629); width of notogaster 547–571 (560). In total 12 specimens were measured.

Integument. Body color deep reddish to dark brown. Surface of body and leg segments with thick granular cerotegument. Notogaster with exuvial scalps, leg segments and lateral part of body with dense fungi micelles and adherent debris.

Prodorsum. Rostrum rounded in dorsal view, but distinctly projecting anteroventrally in lateral view. Rostral seta (*ro*) thin, long, smooth. Lamellar seta (*le*) thicker and slightly longer than rostral seta, densely barbed. Interlamellar seta (*in*) nearly as long as rostral seta, barbed, directed posteriorly. Exobothridial (*ex*) seta smooth, twice shorter than rostral seta. Sensillus (*ss*) relatively short as long as interlamellar seta, thin, almost setiform along its length and its distal half barbed. Bothridium irregular funnel-shaped, with large opening, directed posterolaterad. Prodorsal tubercles *Ba*, *Bp* and *Da* well developed, pair of tubercles *Da* situated posteromediad of bothridia, while tubercles *Ba* and *Bp* widely spaced from each other and situated posterior to each bothridium. In place of tubercles *Dp* integument slightly thickened and looks like conspicuous transverse ridge (Fig. 1A, C). Propodolateral apophyses *P* absent.

Notogaster. Almost circular, slightly longer than wide; robust in lateral view (Fig. 1C). Anterior and posterior margins broadly rounded in dorsal view. Spinae adnatae large, directed anterolaterad in dorsal view, distance between their bases approximately equal to that between bothridia. Notogastral setae *c*, *la* and *h* series very thick, darkly pigmented, seta c_1 longer than others; setae of *p* series thin, smooth, slightly longer than seta c_1. Lyrifissures *ia*, *im*, *ih*, *ip*, *ips* and opisthosomal gland opening (*gla*) conspicuously developed, but all of them very small; *ih* and *ips* visible in lateral view, while *ip* visible only in posterior view (Fig. 1B, C).

Gnathosoma. Infracapitular mentum wider than long, without noticeable microtubercles. Hypostomal setae *h* and *m* long, seta *a* much shorter than two others, all of them thin, smooth (Fig. 1B). Structure of chelicera and palp typical for the genus as shown by Bayartogtokh [2000a].

Epimeral region. Tectum of podocephalic fossa not projected. Epimeral tubercles *E2a* and *E2p*, ventrosejugal tubercles *Va* and *Vp* broadly triangular in ventral view. Parastigmatic tubercle *Sa* absent, while tubercle *Sp* well developed, triangular, well visible in ventral view. Tubercle *E2p* bearing epimeral seta *2c*. Discidium well developed, subtriangular. Epimeral region II with four pairs of setae; setae *1b*, *2b*, *2c*, *2d*, *3b*, *3c*, *4a*, *4b*, *4c* and *4d* very long. Epimeral setal formula 3–4–3–4, all setae smooth (Fig. 1B).

Ano-genital region. Structure normal for genus; ano-genital setae long, smooth. Adanal lyrifissures (*iad*) situated obliquely, at a level a little anterior to anal setae an_2 (Fig. 1B).

Legs. Porose areas on trochanters and femora not evident. Most of setae on leg segments, except a few dorsal setae on distal part of tarsi and those on trochanters I and II darkly pigmented or densely barbed. Setae *d* on genua I, II and III much longer and stronger than their coupled solenidia σ. Tarsus IV with 15 setae. Formula of leg setation (including famulus): I (1–7–4–4–21), II (1–6–4–4–17), III (2–4–3–3–17); IV (1–4–3–3–15); formula of solenidia: 1 (1–2–2); II (1–1–2); III (1–1–0); IV (0–1–0). Structure and setation of legs I–IV as shown in Fig. 2.

Material examined. Holotype (female) and six paratypes (two female and four males): Northern slope of the Mt. Shiliin Bogd, District Darigan-ga, Province Suhbaatar, soils under sweet-brier, 45°28′55″N, 114°35′03″E, elevation 1587 m a.s.l., 2.06.2003; three paratypes (two females and one male): District Erdene, Central Province, moun-

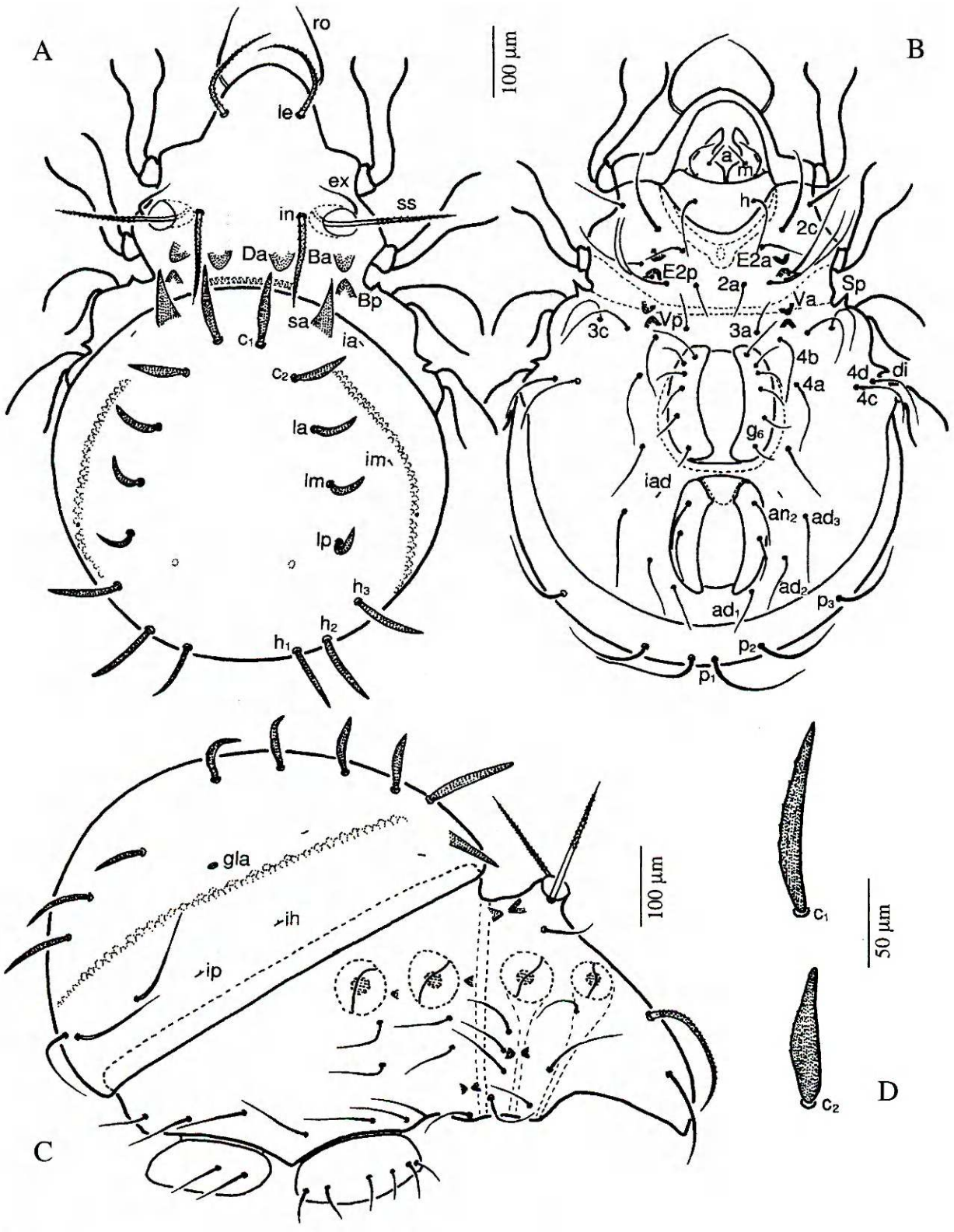

Fig. 1. *Epidamaeus nortoni* sp. n.: A — dorsal view, B — ventral view, C — lateral view.

tain-steppe, soils under birch trees, 47°35′58″N, 107°57′30″E, 1470 m a.s.l; 4.06.2003, coll. B. Bayartogtokh. The holotype and seven paratypes (alcohol preserved) are deposited in the collection of the Department of Zoology, National University of Mongolia, Ulaanbaatar, Mongolia and two paratypes are in the collection of the Zoological Museum of Moscow Lomonosov State University, Moscow, Russia.

Remarks. The new species, *Epidamaeus nortoni* sp.n. can be readily distinguished form all other known species of *Epidamaeus* by the very

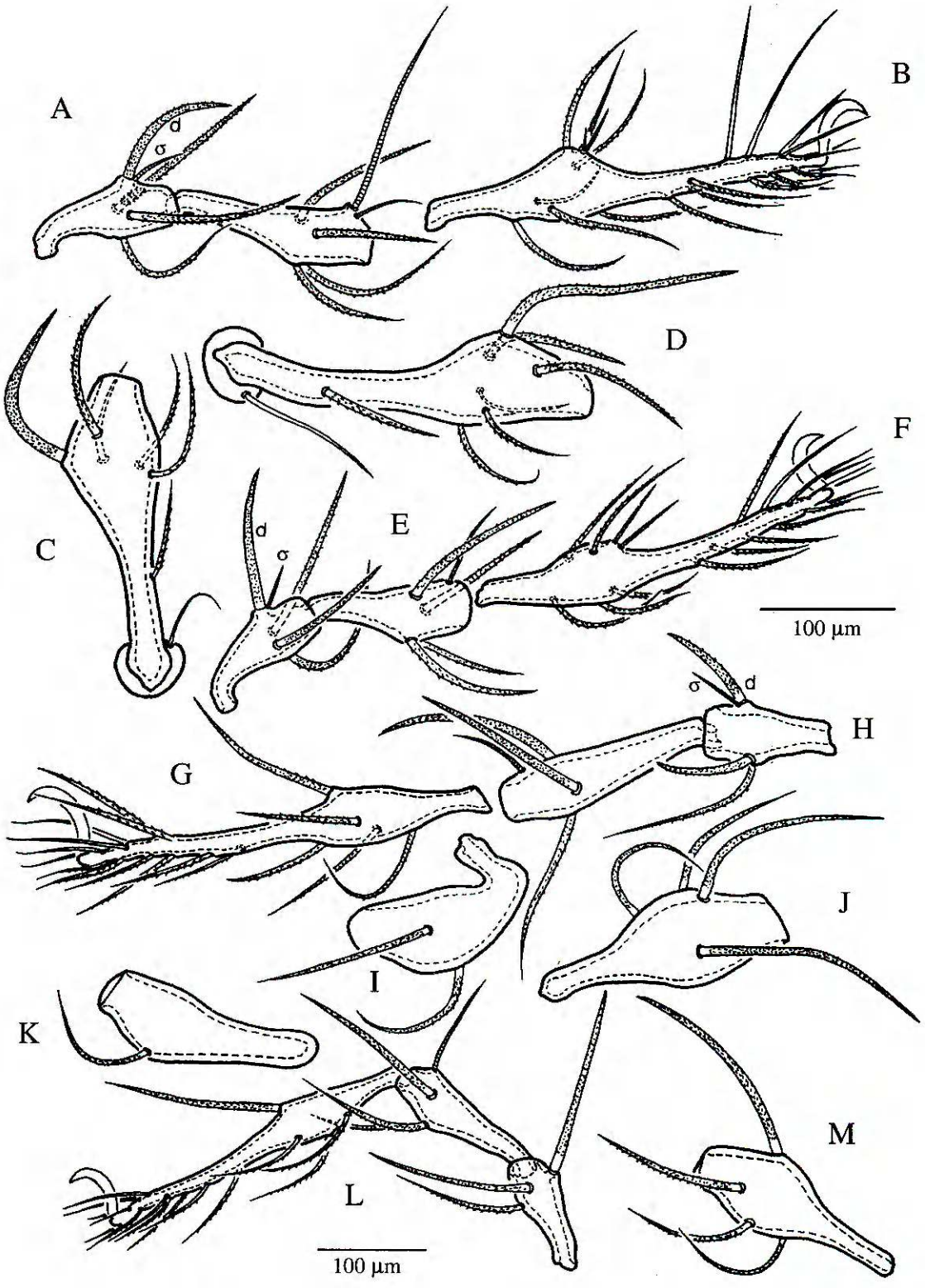

Fig. 2. *Epidamaeus nortoni* sp. n.: A — genu and tibia of leg I, B — tarsus of leg I, C — trochanter and femur of leg I, D — trochanter and femur of leg II, E — genu and tibia of leg II, F — tarsus of leg II, G — tarsus of leg III, H — genu and tibia of leg III, I — trochanter of leg II, J — femur of leg III, K — trochanter of leg IV, L — genu, tibia and tarsus of leg IV, M — femur of leg IV (all in right, antiaxial aspect).

wide, but short notogastral setae, the presence of neotrichous setae on epimeral region II (four setae instead of one seta on each side), the very long epimeral and ano-genital setae, and the short sensilla.

Etymology. The present species is dedicated to Prof. Roy A. Norton, College of Environmental Science and Forestry, State University of New York, Syracuse, USA for his extensive contribu-

tion to the knowledge of systematics and evolution of oribatid mites.

Epidamaeus microtuberculatus sp. n.

Figs. 3, 4.

Diagnosis. Medium sized species with general characters of *Epidamaeus*. Propodolateral apophysis *P* absent; postbothridial tubercles *Ba* and *Bp* well developed; tubercles *Da* and *Dp* absent; sensilla long, flagellate distally; all prodorsal setae thin and smooth, except only very finely barbed lamellar setae; notogastral setae medium long, thin, lighter in color; setae c_1, c_2, *la* and *lm* very finely barbed; spinae adnatae moderate in size, widely spaced from each other and directed anterolaterad; tectum of podocephalic fossa slightly projected under pedotectum I; ventrosejugal tubercles *Va* and *Vp* conspicuously developed; epimeral tubercles *E2a* and *E2p* absent; parastigmatic tubercles *Sa* and *Sp* strongly developed; epimeral regions III and IV with three and four setae, respectively; setae of epimeral regions I, II and setae *3b*, *4c* situated on distinctly developed small tubercles; tarsus IV with 15 setae.

Measurements. Body length 548–617 (577); length of notogaster 378–454 (408); width of notogaster 350–419 (385). In total nine specimens were measured.

Integument. Body color yellowish brown. Surface of body and leg segments with thin cerotegument. Conspicuous microtubercles present on prodorsum and around leg acetabula. Adherent debris or exuvial scalps absent, legs and articulated part of body with small amount of fungi micelles.

Prodorsum. Rostrum rounded in dorsal view, but conspicuously projecting anteroventrally in lateral view. Rostral seta thin, moderate in length, smooth. Lamellar seta slightly longer than seta *ro*, very finely barbed. Interlamellar seta nearly as long as rostral seta, smooth, directed posterolaterally. Exobothridial seta short, thin, smooth. Sensillus long, thin, smooth, finely attenuate and conspicuously flagellate distally. Bothridium irregular funnel-shaped, with large opening, directed posterolaterad. Postbothridial tubercles *Ba* and *Bp* well developed, situated posterior to each bothridium. Tubercle *Bp* more wider in its base, but shorter than *Ba*. Dorsosejugal tubercles *Da* and *Dp* and propodolateral apophyses *P* absent (Fig. 3A).

Notogaster. Almost circular viewed perpendicular to circumgastric scissure, slightly longer than wide, and robust in lateral view (Fig. 1B, C). Anterior and posterior margins broadly rounded in dorsal view. Spinae adnatae moderate in size, widely spaced from each other and directed anterolaterad in dorsal view, distance between their bases approximately equal to that between interlamellar setae. Notogastral setae medium long, thin, not darkly pigmented, but lighter in color. Setae c_1, c_2, *la* and *lm* very finely barbed, while other setae smooth. Lyrifissures *ia*, *ih* and opisthosomal gland opening conspicuously developed. Lyrifissure *ih* visible only in lateral view, while lyrifissures *im*, *ip* and *ips* not evident (Fig. 3C).

Gnathosoma. Infracapitular mentum wider than long, without noticeable microtubercles. Hypostomal setae *h*, *m* and *a* medium long, setae *h* and *m* conspicuously barbed, *a* smooth (Fig. 3B). Structure of chelicera and palp typical for genus.

Epimeral region. Tectum of podocephalic fossa slightly projected under pedotectum I, sometimes hardly visible. Ventrosejugal tubercles *Va* and *Vp* conspicuously developed, but *Vp* far smaller than *Va*. Epimeral tubercles *E2a* and *E2p* absent. Parastigmatic tubercles *Sa* and *Sp* strongly developed, *Sa* triangular in shape, while *Sp* rounded at tip. Epimeral regions III and IV with three and four setae, respectively; epimeral setae *1a*, *1b*, *1c*, *2a*, *3b* and *4c* situated on distinctly developed small tubercles. Tubercle *Vp* bearing epimeral seta *3a*. Discidium well developed, subtriangular. Epimeral setal formula 3–1–3–4, seta *1b* very long and distinctly barbed, other setae smooth (Fig. 3B).

Ano-genital region. Structure normal for genus; ano-genital setae medium long, all of them finely barbed. Adanal lyrifissures (*iad*) situated obliquely, at a level a little anterior to adanal setae ad_3 (Fig. 3B).

Legs. Trochanter IV with large porose area, other trochanters and femora with no evident porose areas. Most of setae on leg segments, except a few dorsal setae on distal part of tarsi and those on trochanters I and II finely barbed or darkly pigmented. Setae *d* on genua I and II almost equal in length to their coupled solenidia σ, while seta *d* on genu III much shorter than its coupled solenidia. Tarsus IV with 15 setae. Formula of leg setation (including famulus): I (1–7–4–4–20), II (1–6–4–4–17), III (2–4–3–3–17); IV (1–4–3–3–15); formula of solenidia: I (1–2–2); II (1–1–2); III (1–1–0); IV (0–1–0). Structure and setation of legs I–IV as shown in Fig. 4.

Material examined. Holotype (male) and seven paratypes (two females and five males): Mt. Lkhachinvandad, District Erdenetsagaan, Province Suhbaatar, organic debris and soils accumulated

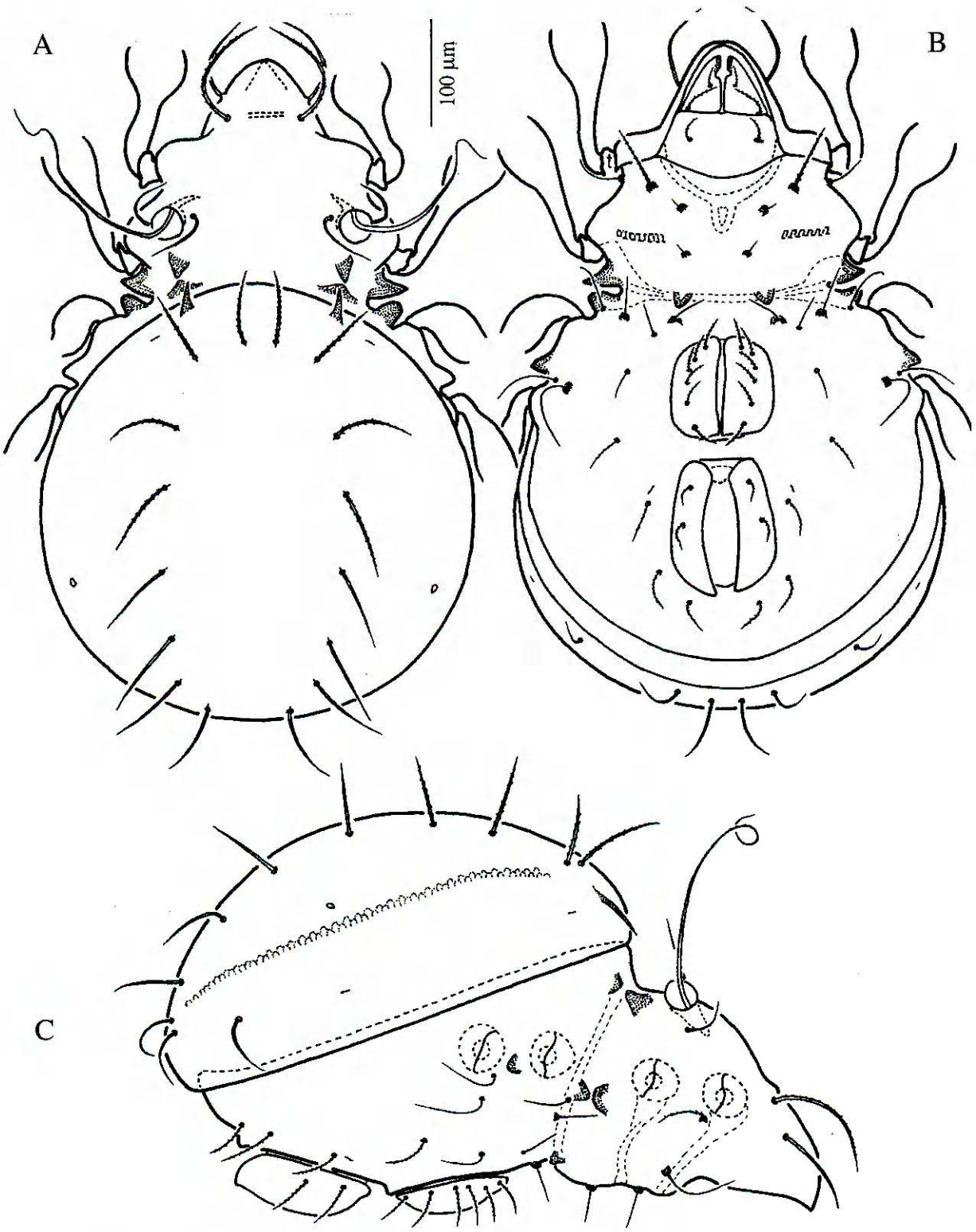

Fig. 3. *Epidamaeus microtuberculatus* sp. n.: A — dorsal view, B — ventral view, C — lateral view.

under shrubs, 45°40′54″N, 116°07′57″E, 1242 m a.s.l., 1.06.2003; one paratype (female): "Gurvan Golyn Bilchir" area, District Khalkh Gol, Province Dornod, southern slope of the hill, litter and soils under shrubs, 46°57′02″N, 119°30′51″E, 972 m a.s.l., 27.05.2003; one paratype (female): Mt. Yazaar, District Bayanmunh, Province Hentii, organic debris accumulated under *Amygdalis* sp., 46°43′57″N, 109°46′18″E, 1381 m a.s.l., coll. B. Bayartogtokh. The holotype and seven paratypes (alcohol preserved) are deposited in the collection of the Department of Zoology, National University

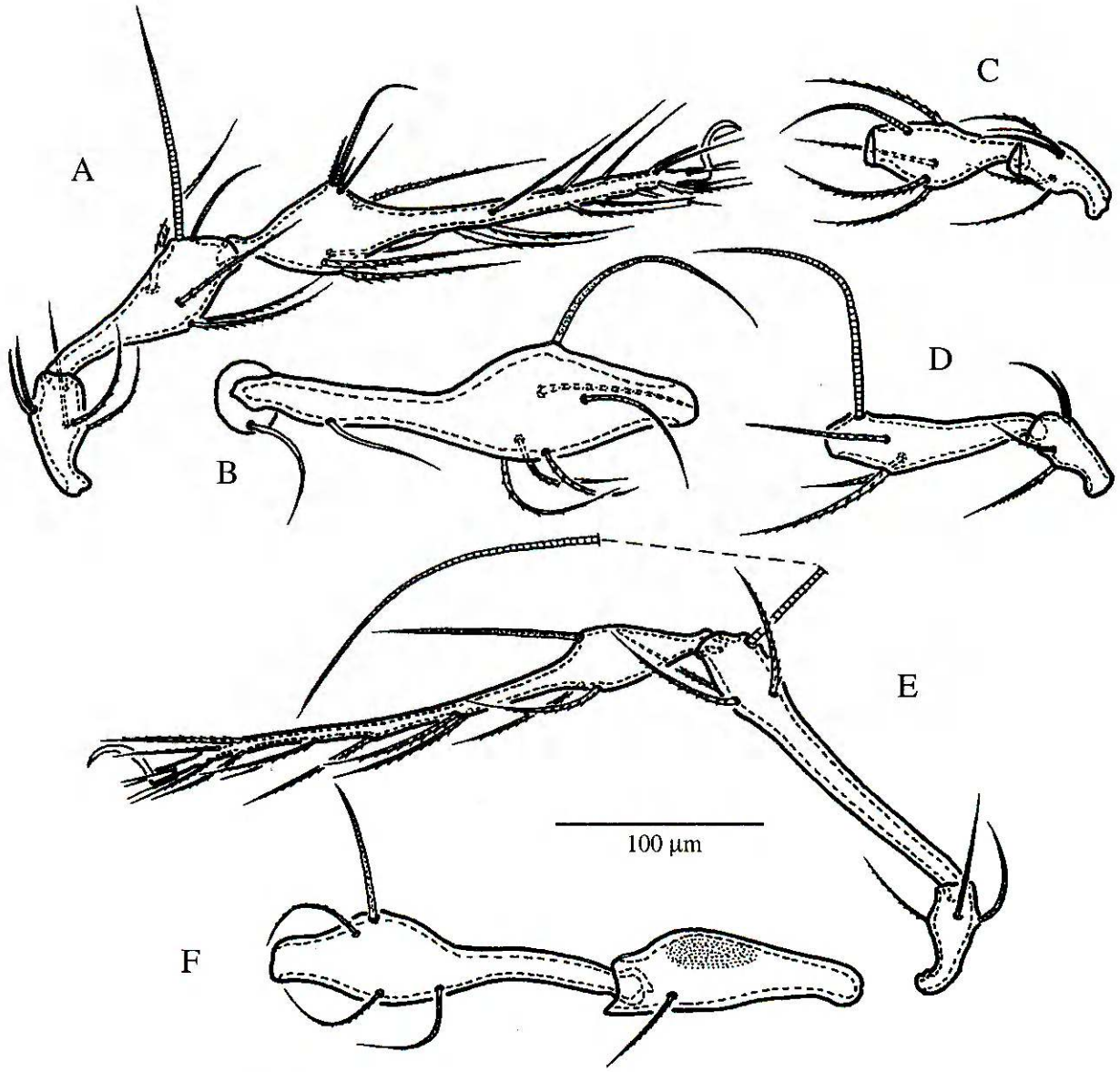

Fig. 4. *Epidamaeus microtuberculatus* sp. n.: A — genu, tibia and tarsus of leg I, B — trochanter and femur of leg I, C — genu and tibia of leg II, D — genu and tibia of leg III, E — genu, tibia and tarsus of leg IV, F — trochanter and femur of leg IV (all in right, antiaxial aspect).

of Mongolia, Ulaanbaatar, Mongolia and two paratypes are in the collection of the Zoological Museum of Moscow Lomonosov State University, Moscow, Russia.

Remarks. *Epidamaeus microtuberculatus* sp. n. is easily distinguishable from most of known species of *Epidamaeus* by the very thin and relatively short notogastral setae, the thin and flagellate sensilla, the absence of the epimeral enantiophysis *E2*, the presence of slightly developed tectum of podocephalic fossa, and the presence of conspicuously developed tubercles at the bases of epimeral setae *1* and *2* series, *3a*, *3b* and *4c*. Among the known species of *Epidamaeus* the following species are somewhat similar to the new species in general resemble. They are *E. koyukon* described by Behan-Pelletier and Norton [1985] from North America, *E. tenuisetosus* and *E. brevisetosus* described by Bayartogtokh [2000b, 2001] from Mongolia.

The first species, *E. koyukon* is differs from the new species in the very short interlamellar setae; the absence of postbothridial tubercles *Ba*, *Bp* and ventrosejugal tubercles *Va* and *Vp*; the smooth, but relatively thicker notogastral setae, and the absence of small tubercles on the epimeral region.

The Mongolian species, *E. tenuisetosus* is clearly distinguishable from *E. microtuberculatus* sp. n. by the absence of tubercles *Bp* and *Vp*; the not flagellate, but nearly straight sensilla; the far longer

spinae adnatae; not rounded, but elongate triangular shape of parastigmatic tubercle *Sp*, and the absence of small tubercles on the epimeral region.

The second species known from Mongolia, *E. brevisetosus* is can be distinguished from new species by the relatively thick and darkly pigmented notogastral setae; the absence of tubercles *Bp*, *Va*, *Vp* and discidium; presence of only three setae on epimeral region IV; the much smaller subtriangular parastigmatic tubercle *Sp*, and the absence of small tubercles on the epimeral region.

Etymology. The specific name "microtuberculatus" refers to the presence of conspicuously developed numerous small tubercles on the epimeral region.

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