Arthropoda Selecta 13 (4): 219–224

A new genus and species of lithobiomorph centipede (Chilopoda: Lithobiomorpha: Anopsobiidae) from eastern Kazakhstan

Новый род и новый вид костянок (Chilopoda: Lithobiomorpha: Anopsobiidae) из Восточного Казахстана

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KEY WORDS: Anopsobiidae, taxonomy, new genus, new species, East Kazakhstan.
КЛЮЧЕВЫЕ СЛОВА: Anopsobiidae, систематика, новый род, новый вид, Восточный Казахстан.

ABSTRACT. *Dzhungaria gigantea* gen.n., sp.n. is described from the Dzhungarsky Alatau Mountains, eastern Kazakhstan. The new taxon possesses diagnostic characters of Anopsobiidae coupled with numerous primitive characters shared with Henicopidae and Lithobiidae, suggesting that *Dzhungaria* is a relictual taxon at the base of the Anopsobiidae.

РЕЗЮМЕ. Дано описание *Dzhungaria gigantea* gen.n, sp.n. из Джунгарского Алатау (Восточный Казахстан). Новая костянка обладает диагностическими признаками Anopsobiidae вкупе с многочисленными примитивными чертами, которые она разделяет с Henicopidae и Lithobiidae. Это предполагает, что *Dzhungaria* — реликтовый таксон в основании Anopsobiidae.

Introduction

The lithobiomorph family Anopsobiidae largely occurs in the Southern Hemisphere, while the Northern Hemisphere supports only four monotypic genera: *Rhodobius* Silvestri, 1933 (Europe), *Anopsobiella* Attems, 1938 (Vietnam), *Shikokuobius* Shinohara, 1982 (Japan) and *Ghilaroviella* Zalesskaja, 1975 (Tajikistan, Central Asia) [Silvestri, 1933; Attems, 1938; Zalesskaja, 1975, 1978; Shinohara, 1982]. Monophyly of the Anopsobiidae is well-supported by morphological data, and the group is likewise retrieved in most analyses that combine morphological and molecular sequence data [Edgecombe & Giribet, 2003].

The present paper is based on material of a new anopsobiid collected by S.I. Golovatch in the Dzhungarsky Alatau, eastern Kazakhstan. Type material is mainly deposited in the collection of the Zoological Museum of Moscow State University (ZMUM), with a few paratypes housed in the Perm State University (PSU) and the Australian Museum, Sydney (AM KS).

The following abbreviations are used in the text: P — praefemur, F — femur, T — tibia, Ts1 — tarsomere 1, Ts2 — tarsomere 2. All measurements are given in mm.

Taxonomic part

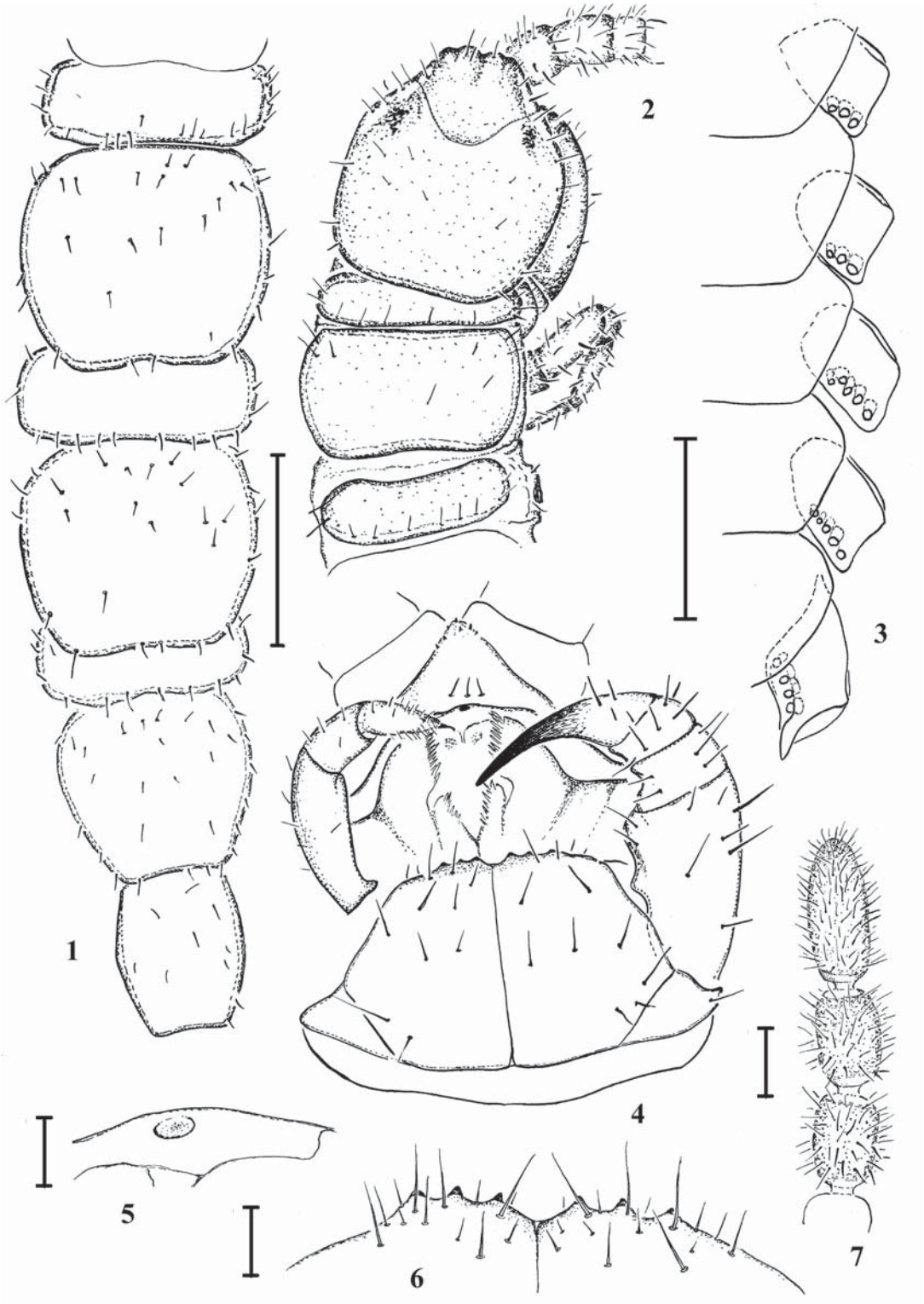
Dzhungaria **gen. n.**
Figs 1–16.

Type species. *Dzhungaria gigantea* **sp. n.**

DIAGNOSIS. The new genus differs from the other Palaearctic anopsobiids in the presence of coxal pores on leg-pair 11, bipartite tarsi on leg-pairs 2–15 (versus 13–15 only), the poorly-developed but evident coxoventral processes on legs 1–10, the presence of a distal spinose projection on the tibia of leg 13, and the large size, the largest in the family. From the geographically closest genus *Ghilaroviella*, it differs in the absence of an armed coxoventral process on leg-pair 14, the number of antennomeres (30–38 versus 16 in *Ghilaroviella*), 3+3 teeth (versus 2+2 in *Ghilaroviella*), less distinct differentiation of a single porodont, and the missing papillae on the internal side of the female gonopod.

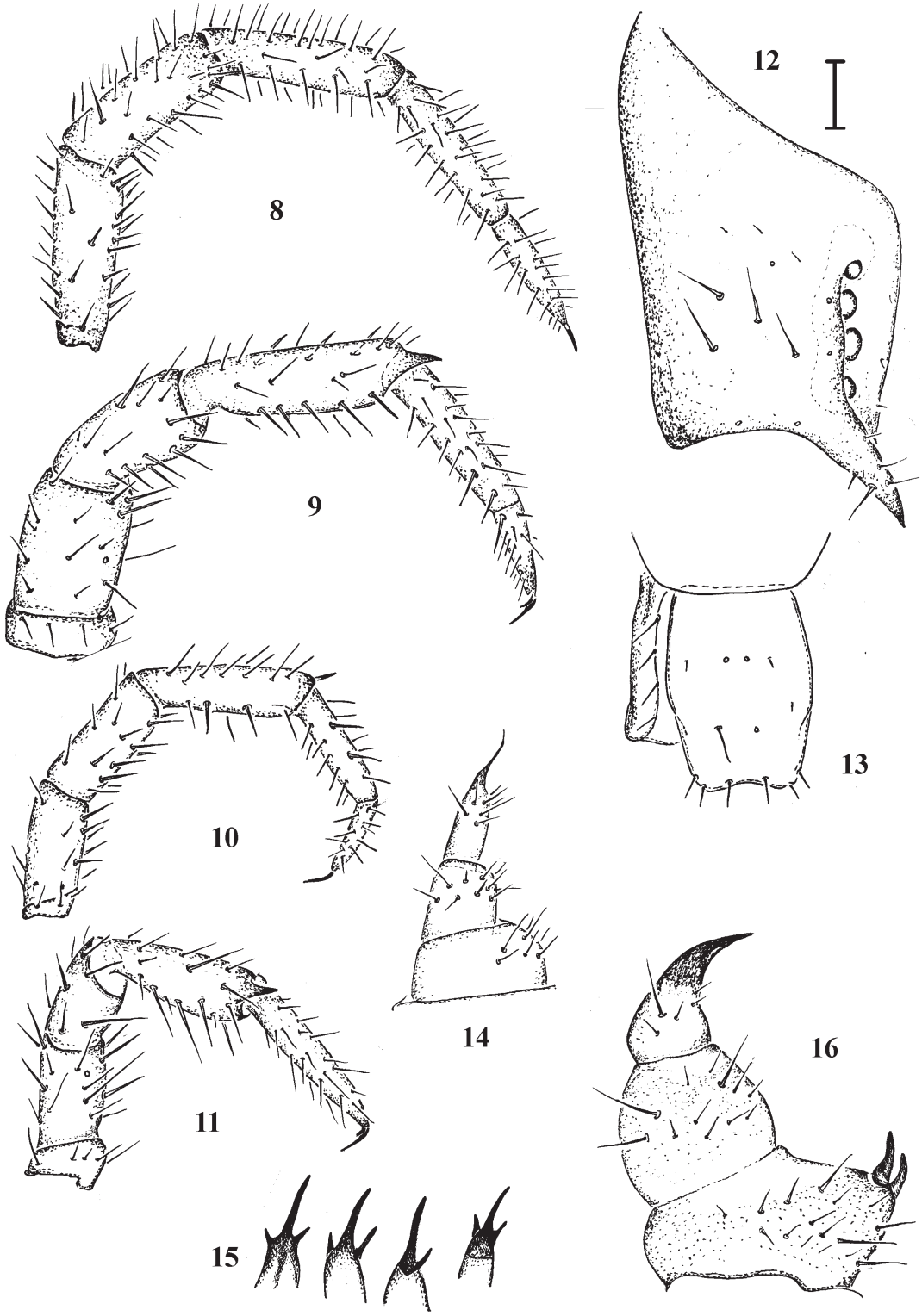
ETYMOLOGY. To emphasize the terra typica and the large size.

REMARKS. *Dzhungaria* is identified as a member of Anopsobiidae based on the absence of ocelli, the rounded posterior corners on all trunk tergites, the lack of a spiracle on the first pedigerous segment, and the development of a strong spinose process on the coxa of leg-pair 15. The first two characters are fixed in Anopsobiidae but also occur



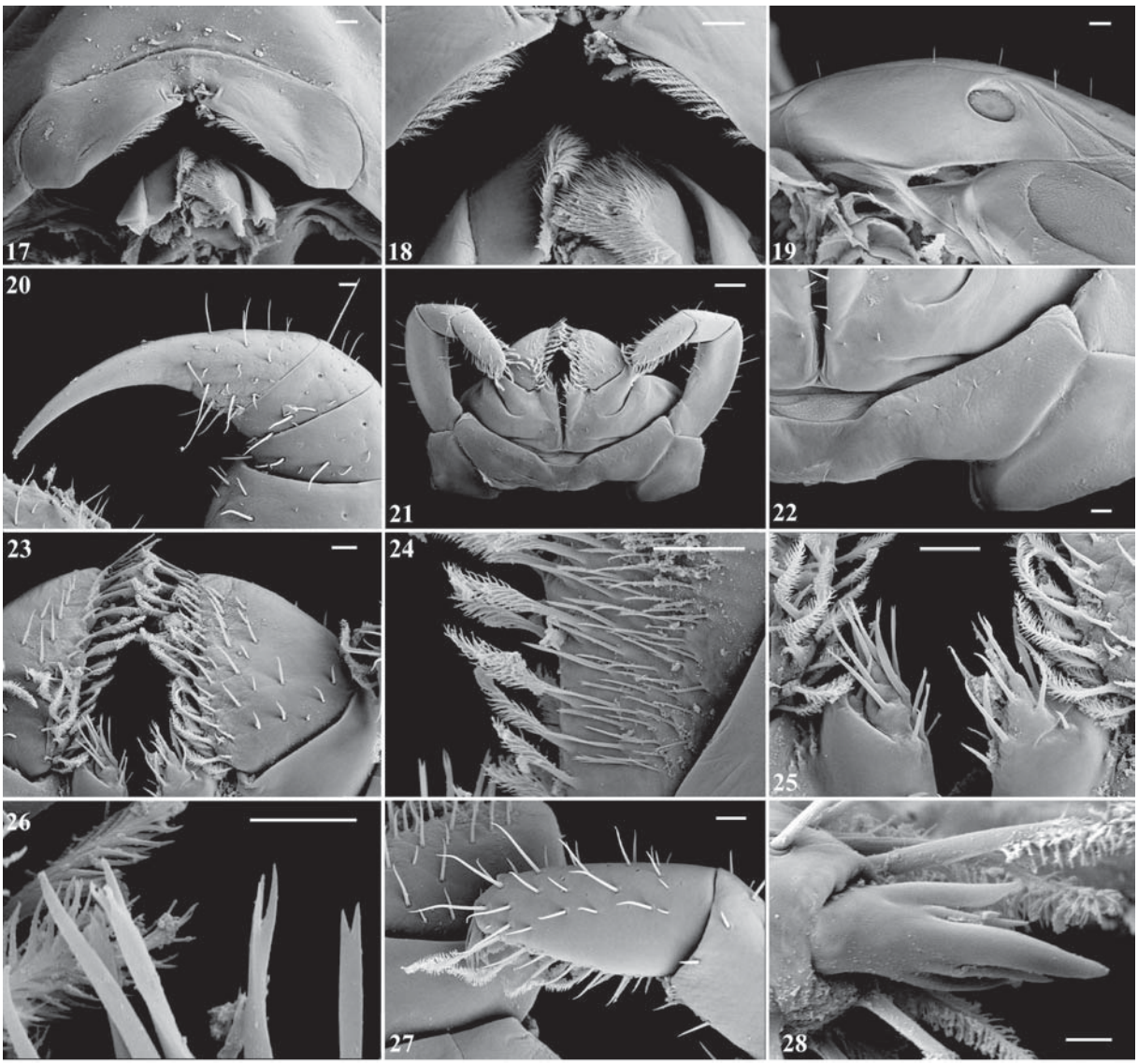
Figs 1–7. Diagnostic characters of *Dzhungaria gigantea* **sp.n.**, holotype ♂: 1 — tergites IX–XVI; 2 — head and tergites of maxillipede segment and pedigerous segments I and II, dorsal view; 3 — coxal pores of legs 11–15; 4 — head, ventral view; 5 — Tőmősváry's organ, lateral view; 6 — maxillipede coxosternite; 7 — antennomeres 33–35. Scale: 1–4 — 1.0 mm, 5–7 — 0.10 mm.

Рис. 1–7. Диагностические признаки *Dzhungaria gigantea* **sp.n.**, голотип ♂: 1 — тергиты IX–XVI; 2 — голова и тергиты ногочелюстного и туловищных I и II сегментов, дорсально; 3 — коксальные поры на ногах 11–15; 4 — голова, вентрально; 5 — Темешвариев орган, латерально; 6 — коксостернум ногочелюсти; 7 — членики антенн 33–35. Масштаб: 1–4 — 1,0 мм, 5–7 — 0,10 мм.



Figs 8–16. Diagnostic characters of *Dzhungaria gigantea* **sp.n.**, holotype ♂ (8–15), ♀ (16): 8 — leg 15, lateral view; 9 — leg 11, lateral view; 10 — leg 14, lateral view; 11 — leg 1, lateral view; 12 — coxa 15, ventral view; 13 — tergite XVI; 14 — male gonopod, ventral view; 15 — claws of legs 14, 11, 15 & 1; 16 — female gonopod, ventral view. Scale: 8–10, 13 — 1.0 mm, 11,12, 14–16 — 0.10 mm.

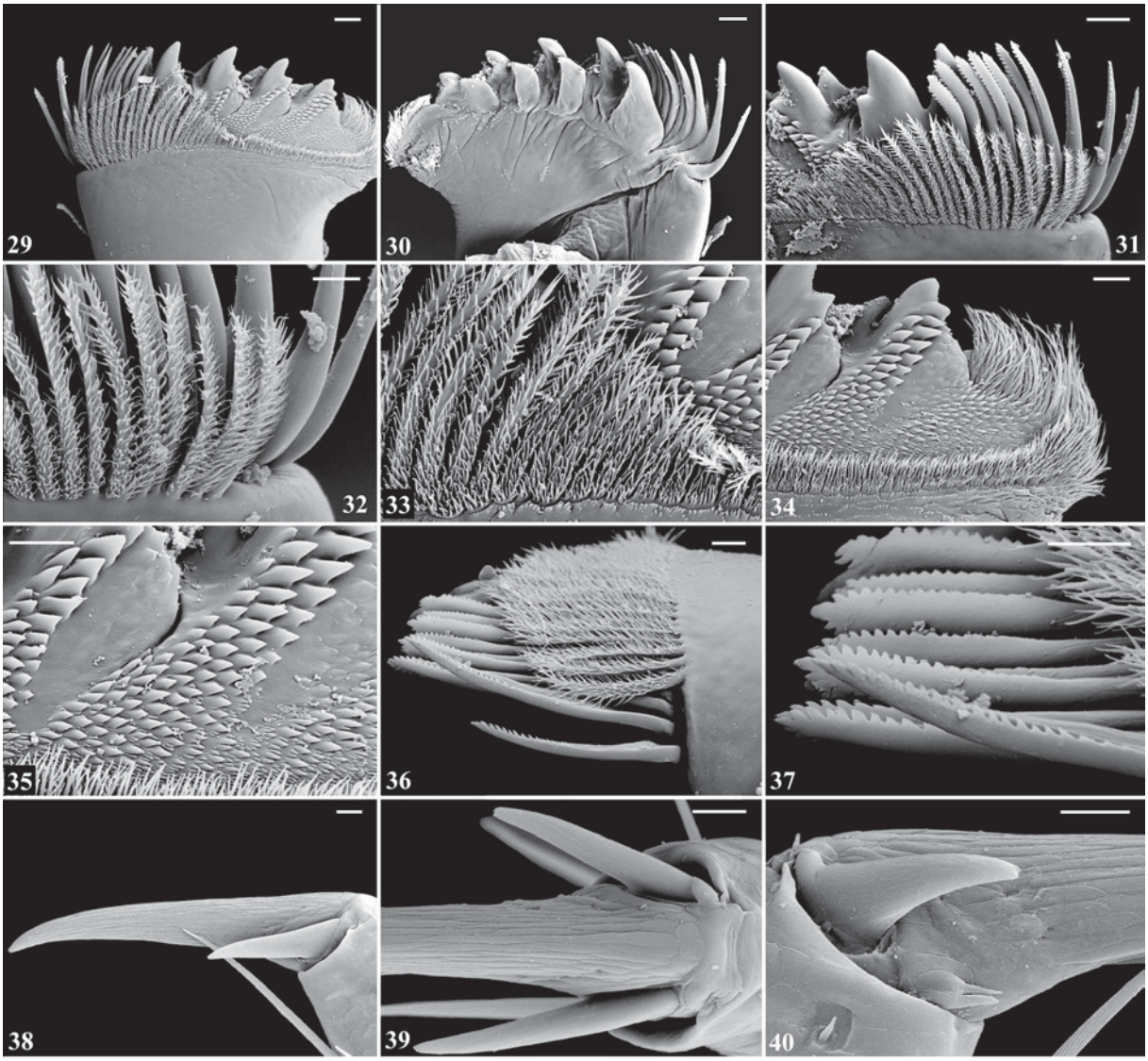
Рис. 8–16. Диагностические признаки *Dzhungaria gigantea* **sp.n.**, голотип ♂ (8–15), ♀ (16): 8 — нога 15, латерально; 9 — нога 11, латерально; 10 — нога 14, латерально; 11 — нога 1, латерально; 12 — тазик 15, вентрально; 13 — тергит XVI; 14 — гонопод самца, вентрально; 15 — коготки ног 14, 11, 15 и 1; 16 — гонопод самки, вентрально. Масштаб: 8–10, 13 — 1,0 мм, 11,12, 14–16 — 0,10 мм.



Figs 17–28. *Dzhungaria gigantea* **sp.n.**, paratype ♂, scanning electron micrographs: 17 — labrum; 18 — labral margin and hypopharynx; 19 — cephalic pleurite with Tomosvary's organ; 20 — distal part of forcipule; 21 — maxillae; 22 — coxa and sternite of maxillae II; 23 — distal articles of telopodites of maxillae I, ventral view; 24 — inner margin of distal article of first maxilla, dorsal view; 25 — coxal processes of first maxillae; 26 — laciniate setae on coxal process of first maxilla; 27 — tarsus and claw of second maxilla; 28 — claw of second maxilla.

Рис. 17–28. *Dzhungaria gigantea* **sp.n.**, паратип ♂, электронные микрофотографии: 17 — верхняя губа; 18 — граница верхней губы и гипофаринкс; 19 — головной плеврит с Темешвариевым органом; 20 — дистальная часть форципулы; 21 — максилла; 22 — тазик и стернит максиллы II; 23 — дистальный членик телоподита максиллы I, вентрально; 24 — внутренняя граница дистального членика максиллы I, дорсально; 25 — коксальные выросты максиллы I; 26 — щетинки на коксальном выросте максиллы I; 27 — лапка и коготь максиллы II; 28 — коготь максиллы II.

sporadically in the Henicopidae [e.g., within *Lamyctes* and *Paralamyctes* (*Haasiella*)], and the absence of a spiracle on segment I may be plesiomorphic (shared with Zygethobiini and Lithobiidae). The coxal process on leg 15 is a useful apomorphic character, observed in all anopsobiids and seen in the Henicopidae only in the apparent zygethobiine *Hedinobius* Verhoeff, 1934. *Dzhungaria* has a long, needle-like posteroventral spine on the pretarsus of legs 1–13, similarly developed to that of the Japanese anopsobiid *Shikokuobius* (Edgecombe, 2004, figs 3e, f). Numerous characters by which *Dzhungaria* differs from other Anopsobiidae are shared with Henicopidae and Lithobiidae, and are as such regarded as plesiomorphies. These primitive characters include the following: a high number of antennomeres (18 or fewer in other anopsobiids); exceptionally large body size; a Tőmősváry organ of moderate size (rather than greatly enlarged); divided tarsi along the length of the trunk; and the lack of a ventral prefemoral spine on leg 15. The mandible likewise possesses several plesiomorphic characters that are shared with non-anopsobiid lithobiomorphs. Amongst these are the fringe of branching bristles extending against the aciculae (versus terminating where the aciculae commence in other



Figs 29–40. *Dzhungaria gigantea* **sp.n.**, paratype ♂, scanning electron micrographs: 29, 30, 33–37 — left mandible; 31, 32 — right mandible; 29, 30 — gnathal edge, external and internal views; 31 — ventral part of gnathal edge; 32, 33 — fringe of branching bristles; 34 — dorsal part of gnathal edge; 35 — accessory denticles; 36, 37 — aciculae; 38–40, pretarsus of leg 14; 38 — anterior view; 39 — dorsal view; 40 — posterior view.

Рис. 29–30. *Dzhungaria gigantea* **sp.n.**, паратип ♂, электронные микрофотографии: 29, 30, 33–37 — левая мандибула; 31, 32 — правая мандибула; 29, 30 — челюстной край с внешней и внутренней сторон; 31 — вентральная часть челюстного края; 32, 33 — бахрома из разветвленных щетинок; 34 — дорсальная часть челюстного края; 35 — дополнительные зубчики; 36, 37 — ацикулы; 38–40, предлапка ноги 14; 38 — спереди; 39 — дорсально; 40 — сзади.

anopsobiids), the relatively slender (rather than broad and flattened) bases of the ventralmost branching bristles in the fringe, and the development of the accessory denticles on the mandibular teeth as simple conical elements rather than as tuberculate scales. The presence of coxal pores on legs 12 and 13 is shared with *Ghilaroviella* and *Shikokuobius* (plesiomorphy shared with Henicopidae and Lithobiidae relative to the restriction of these pores to legs 14 and 15 in other Anopsobiidae), but the pores on leg 11 are unique to *Dzhungaria*; elsewhere in Lithobiomorpha, coxal pores on leg 11 are observed only in the henicopid *Zygethobius* Chamberlin. The combination of anopsobiid apomorphies and numerous primitive characters otherwise unknown in that clade suggest that *Dzhungaria gigantea* is sister group of all other Anopsobiidae and as such a highly relictual taxon. In general, as the mountains of eastern Kazakhstan are known to support numerous ancient floristic [e.g. Langenfeld, 1991] and faunistic [Golovatch & Wytwer, 2003] elements, the discovery of still one more, this time among lithobiomorph centipedes, is not too surprising.

Dzhungaria gigantea **sp.n.**

Figs 1–40.

MATERIAL. Holotype ♂, Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts, 6 km NE Rudnichnyi, Koksu River

Canyon, 1300–1400 m, 44°41'N, 78°58'E, *Betula, Populus, Picea* etc. forest, 09–10.VI.2001, leg. S. I. Golovatch (ZMUM). Paratypes: 1 ♀, same data as holotype (ZMUM); 11 ♂♂, 3 ♀♀ (ZMUM), 3 ♂♂, 1 ♀ (PSU), 3 ♂♂, 1 ♀ (AM KS), Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts., 7 km E of Lepsinsk, Chornaya River Kanyon, 1200–1400 m, 45°31'N, 80°43'E, *Betula, Malus, Populus* etc. forest, 13–15.VI.2001; 1 ♀, Eastern Kazakhstan, Almaty Area, Dzhungarsky Alatau Mts, Tyshkan River Canyon, 1700–1800 m, 44°30'E, *Picea* forest with *Salix, Berberis* etc. bush, 06–07.VI.2001, all leg. S.I. Golovatch (ZMUM).

DESCRIPTION. Holotype. Body 14 mm long, yellow, clothed with erect setae as in Figs 1 & 2. Head slightly elongate, length to breadth ratio 1.2:1 (Fig. 2); median notch strong. Longitudinal median furrow extending about one-quarter length to transverse suture.

Antennae about 4 times as long as head, with 35 moniliform antennomeres (observed range 30–38) covered with dense and short sensilla (Fig. 7), basal two antennomeres enlarged. Length to breadth ratio of terminal antennomere 1.7:1 (observed range 1.6–2.0:1). Ocelli absent. Tomosvary's organ moderately large, oblong-oval (Figs 5, 19). Labral margin gently concave where overhung by dense fringe of branching bristles (Fig. 18).

Maxillipede coxosternite broad, with scattered short or long setae and 3+3 acute teeth, lateral sides of coxosternite gently sloping; porodonts indistinctly differentiated from other setae. Medium notch wide, shallow (Fig. 6).

Mandible with 10 aciculae (Fig. 31), each with up to 20 mostly blunt serrations along both margins on its distal half (Fig. 37). Fringe of branching bristles skirts all but ventral one or two aciculae (Figs. 32, 36); ventral bristles narrow-based, densely branching along their length; fringe abruptly narrowing against second paired teeth (Fig. 33). Accessory denticles developed as bands of triangular elements separated by a nearly smooth field on the dorsal part of each tooth (Fig. 35). Furry pad composed of many mostly simple bristles (Fig. 34).

First maxilla with minute triangular sternite (Fig. 22). Coxal process bearing cluster of 12 setae at apex (Fig. 25), mostly simple, several with bifid or trifid tips (Fig. 26). Inner margin of distal article of telopodite fringed by about 24 mostly paired plumose bristles (Fig. 23). Numerous simple setae scattered over inner half of distal article on its ventral side; dense field of simple and laciniate, setiform spines on dorsal side (Fig. 24). Apex of distal article with cluster of long, simple spines.

Second maxillary claw with five digits; median digit long, thick, outer digits shorter, intermediate digits slender (Fig. 28).

Spiracles present on body segments III, V, VIII, X, XII and XIV.

All legs beset with usual spiniform setae placed largely ventrally and becoming reduced on all legs from praefemur to tarsus: on leg 15, on P & F; on leg 14, on P, F & T; on leg 1, on P, F, T & Ts. Tibiae 1–13 with an armed dorsolateral process (Figs 9 & 11). Leg 15 with an armed coxoventral process (Fig. 12). Length of leg 14, 4.40 mm, P 1.80, F 0.80, T 1.15, Ts1 0.95, Ts2 0.6; that of leg 15, 6.00 mm, P 1.35, F 1.25, T 1.40, Ts 1.25, Ts2 0.75 (observed range leg 14, 4.50 (3.55–5.00) mm, P 0.90 (1.00–0.75), F 0.95 (1.05–0.70), T 1.15 (1.25–0.95), Ts1 0.95 (1.10–0.75), Ts2 0.55 (0.65–0.40); that of leg 15 5.80 (5.00–6.80) mm, P 1.30 (1.15–1.50), F 1.25 (1.10–1.45), T 1.40 (1.25–1.65), Ts1 1.15 (0.90–1.40), Ts2 0.70 (0.50–0.80)), length ratio of tarsomeres 1 to 2 on all legs 1.5–1.7:1. Legs 1–14 with anterior and posterior accessory claws, leg 15 with one accessory claw (absent in some specimens). Accessory claws moderately divergent, with parallel ridges and grooves but without scales. Main claw with scales well defined along its length, including its proximodorsal part (Fig. 39); a few rimmed pores above accessory claws. Posteroventral spine needle-like, about two-thirds length of main claw on legs 1–13, on leg 14 a short spine equal in length to its subsidiary spine (Fig. 40). Claws of legs 1, 11, 14 & 15 as in Fig. 15.

Coxal pores on legs 11–15 small, rounded, separated from one another by <1–1.5 their diameter; formula 34554, more usual 3(2)34(3)4(3), with a much smaller inner pore. Male gonopod 3–segmented, without setae on internal surface. Gonopod segment 1 with seven setae, segment 2 with ten, segment 3 with seven or eight (Fig. 14). Terminal filament nearly as long as third article of gonopod.

Female. Body 13–15 mm long. Diagnostic characters as in male, but the number of coxal pores 345(6)55. Length of legs 14 & 15 and length ratio of tarsomeres 1 to 2 on all legs about same as in male.

Gonopods without setae on internal surface, with slender setae on external surface, with 2+2 conical and curved spurs and simple claws; spurs closely spaced (Fig. 16).

DISTRIBUTION. Only the terra typica.

ACKNOWLEDGEMENTS. The first author is most grateful to Dr. Sergei I. Golovatch (Moscow) for his material and constant guidance. This work has been supported through grants 04-04-96000 and 04-04-96065 of the Russian Foundation for Fundamental Research. Sue Lindsay (Australian Museum) assisted with electron microscopy.

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