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NEW DATA ON THE MILLIPEDES (DIPLOPODA) FROM EAST KAZAKHSTAN (ALTAI)

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Julus kazakhus Mikhaljova, **sp. n.** and *Schizoturanius levis* Mikhaljova, **sp. n.** are described from East Kazakhstan, Altai. *Sibiriulus multinicus* Mikhaljova, 2001 is new to the fauna of Kazakhstan. The record of *Megaphyllum* aff. *sjaelandicum* (Meinert, 1868) from the Kazakhstan Altai (Golovatch, 1992) belongs to *M. sjaelandicum* (Meinert, 1868) which is new to the fauna of Kazakhstan.

KEY WORDS: Millipedes, taxonomy, fauna, new species, new records, Altai, Central Asia.

Е. В. Михалёва¹⁾, К. Улыкпан²⁾, У. Д. Буркитбаева²⁾. Новые данные о двупарноногих многоножках (Diplopoda) из Восточного Казахстана (Алтай) // Дальневосточный энтомолог. 2013. N 260. С. 1-11.

Из Восточного Казахстана (Алтай) описаны *Julus kazakhus* Mikhaljova, **sp. n.** и *Schizoturanius levis* Mikhaljova, **sp. n.** Впервые для фауны Казахстана указан *Sibiriulus multinicus* Mikhaljova, 2001. Указание из Казахстана (Алтай) *Megaphyllum* aff. *sjaelandicum* (Meinert, 1868) (Golovatch, 1992) относится к *M. sjaelandicum* (Meinert, 1868), который является новым для фауны Казахстана.

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INTRODUCTION

The knowledge of the millipede fauna of the Kazakhstan is still patchy and incomplete. Some faunistic information concerning the millipedes from certain localities in the region is contained in several publications (Enghoff, 1985; Golovatch, 1979; Golovatch & Wytwer, 2003; Lokšina & Golovatch, 1979; Read & Golovatch, 1994; Mikhajlova *et al.*, 2013). In addition, an undetermined species referred to as *Megaphyllum* aff. *sjaelandicum* was recorded from the environs of Ust-Kamenogorsk, East Kazakhstan, Altai (Golovatch, 1992). Up to now this species is not identified. However among the material recently collected in the environs of Ust-Kamenogorsk *Megaphyllum sjaelandicum* (Meinert, 1868) has been found. We believe that former undetermined species belongs to *Megaphyllum sjaelandicum*, taking into account the geographical evidence and the variability of latter species (see below). This species is new to Kazakhstan.

In addition, among the diplopod samples recently collected in East Kazakhstan (Altai), two species new to science and one species new to the fauna of Kazakhstan have been found. The descriptions of the new species and data on other collected species are presented below.

MATERIAL AND METHOD

Material treated here has been deposited in the collections of the Institute of Biology and Soil Science, Far Eastern Branch of the Russian Academy of Sciences, Vladivostok, Russia (IBSS), Pavlodar State University, Pavlodar, Kazakhstan (PU), and Zoological Museum, State University of Moscow, Russia (ZMUM), as indicated in the text.

Specimens were kept in 70–75% ethanol. In the process of studying the material, the gonopods and some other parts were dissected from a limited number of males and mounted in glycerin as temporary micropreparations. SEM micrographs were prepared at the Centre of Collective Use “Biotechnology and Gene Engineering” of the Institute of Biology and Soil Science, Far Eastern Branch of the Russian Academy of Sciences in Vladivostok, Russia using a Zeiss Evo 40 scanning electron microscope. Mounts for SEM were made through air-drying after transfer to acetone via 96% alcohol, mounting on stubs, and coating with gold and platinum. After examination, SEM material was removed from stubs and returned to alcohol, all such samples being kept at IBSS.

A “body segment formula” indicates the number of podous (including gonopod segment) and apodous segments in an individual. This formula is $x(-y)$ where x = sum of podous and apodous body segments excluding telson, y = number of apodous body segments before telson.

LIST OF THE SPECIES WITH DESCRIPTIONS OF NEW TAXA

Schizoturanius levis Mikhaljova, sp. n.

Figs 1–4

MATERIAL. Holotype – ♂ (IBSS), Kazakhstan, Vostochno-Kazakhstanskaya oblast, Zaisan District, 1735 m, 17.VII 2011, leg. K. Ulykpan and U.D. Burkitbaeva. Paratypes: Kazakhstan, Vostochno-Kazakhstanskaya oblast, Zaisan District: 4 ♂, 6 ♀, 3 juveniles, 2 fragments (IBSS), 2 ♀ (PU), 1 ♂, 1 ♀ (ZMUM), together with holotype, 17.VII 2011, leg. K. Ulykpan and U.D. Burkitbaeva; 2 ♂ (PU), 1 ♂, 2 juveniles (IBSS), 1848 m, 8.VII 2011, leg. K. Ulykpan and U.D. Burkitbaeva; 2 ♂, 1 fragment (IBSS), 1680 m, 13.VII 2011, leg. K. Ulykpan and U.D. Burkitbaeva.

DESCRIPTION. MALE. Length 11–14 mm, width 0.9–1.0 mm. Coloration in alcohol pale pinkish beige, colour brighter in anterior and posterior body portions.

Head moderately densely setose, occiput covered with tiny hairs. Antennae clavate, in situ reaching to beginning of somite 3. Collum ovoid, considerably narrower than head with genae. Body growing considerably broader from segment 5–6, remaining parallel-sided until segment 16. Metazonites 2–4 somewhat shorter than subsequent ones. Edges of narrow, swollen paraterga laterally weakly rounded, smooth. Metazonital polygonal sculpture almost indistinct, strongly obliterated on midbody segments (Fig. 1). Metatergal setae tiny (they can not be seen in midbody segments), they more or less distinct in anterior and posterior parts of body. Prozona alveolate. Caudal projection of epiproct rather short, digitiform, rounded at tip, carrying two apical setae. Body moniliform.

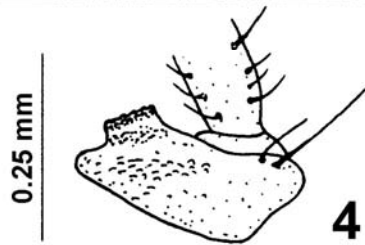
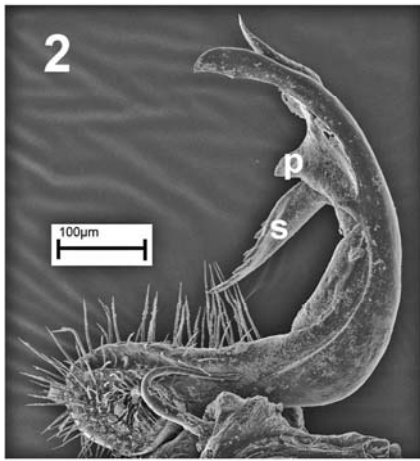
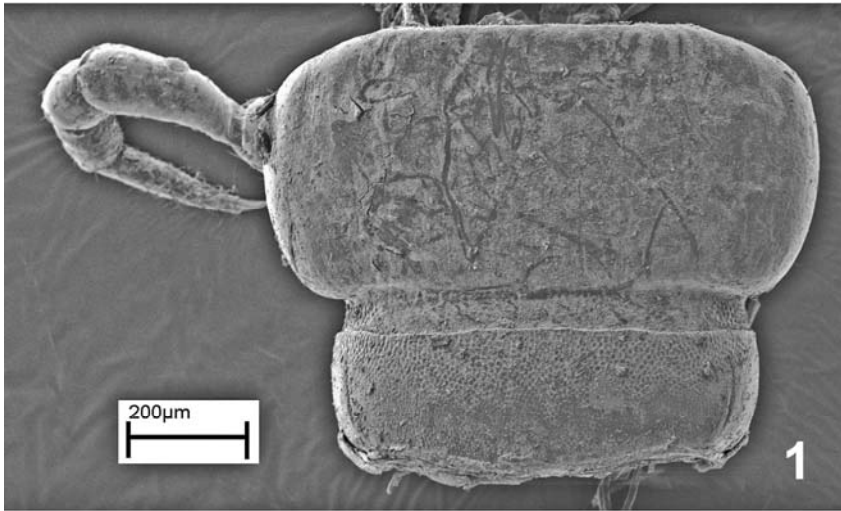
Leg pair 1 somewhat reduced as compared to other legs. Legs grow increasingly slender toward telson, ventrally more densely setose. Tarsus, postfemur, femur and praefemur with sphaerotrichs on ventral surface. Claws normal, without additional claws.

Gonopods (Figs 2, 3) falcate, bifid distally, telopodites in situ crossing each other. Solenomere straight spine-shaped, tibiotarsus curved caudad, its distal part flat. Postfemoral region with small plate (**p**) and long external flat process (**s**) serrate laterally. Process **s** directed dorsally. At base of solenomere seminal groove with a characteristic loop, ending up on a micropilose pulvillus supplied with a subterminal accessory seminal chamber.

FEMALE. Length 9.5–10 mm, width 0.8–0.9 mm. Legs distinctly slenderer and shorter compared to male. Epigynal ridge behind leg pair 2 traceable. Coxa 2 with lateral prominence (Fig. 4). Vulva elongate, ovoid. Both valves and the operculum setose distally.

DIAGNOSIS. The species differs from congeners by the straight spine-shaped gonopod solenomere as well as gonopod postfemoral region with a long process serrate laterally and a small plate.

ETYMOLOGY. The specific epithet refers to the practically smooth surface of metatergites.



Figs. 1–4. *Schizoturanius levis* sp. n., male paratype (1–3), female paratype (4). 1 – midbody segment, dorsal view; 2 – gonopod, mesal view (**p** – gonopod plate; **s** – external process of gonopod); 3 – gonopod, lateral view; 4 – coxa 2.

***Julus kazakhus* Mikhaljova, sp. n.**

Figs 5–14

MATERIAL. Holotype – ♂ (IBSS), Kazakhstan, Vostochno-Kazakhstanskaya oblast, Katon-Karagaiskii District, 1202 m, 49°08'983''N, 86°00'605''E, forest-steppe, 20.VIII 2010, leg. K. Ulykpan. Paratypes: Kazakhstan, Vostochno-Kazakhstanskaya oblast, Katon-Karagaiskii District: 1 ♂, 3 ♀, 2 fragments (IBSS), together with holotype, 20.VIII 2010, leg. K. Ulykpan; 3 ♂ (one of them is possible intercalary male), 2 juveniles (one of them is subadult male) (IBSS), 1408 m, 49°09'404''N, 86°01'676''E, forest, 12.VIII 2010, leg. K. Ulykpan; 2 ♂, 3 ♀, 1 juvenile (subadult male), 1 fragment (PU), 1253 m, 49°09'113''N, 86°00'582''E, forest-steppe, 19.VIII 2010, leg. K. Ulykpan; 2 ♂, 5 ♀, 2 juveniles (subadult males) (IBSS), 1 ♂, 1 ♀ (ZMUM), 1470 m, 49°08'425''N, 85°57'724''E, forest-steppe, 22.VIII 2010, leg. K. Ulykpan.

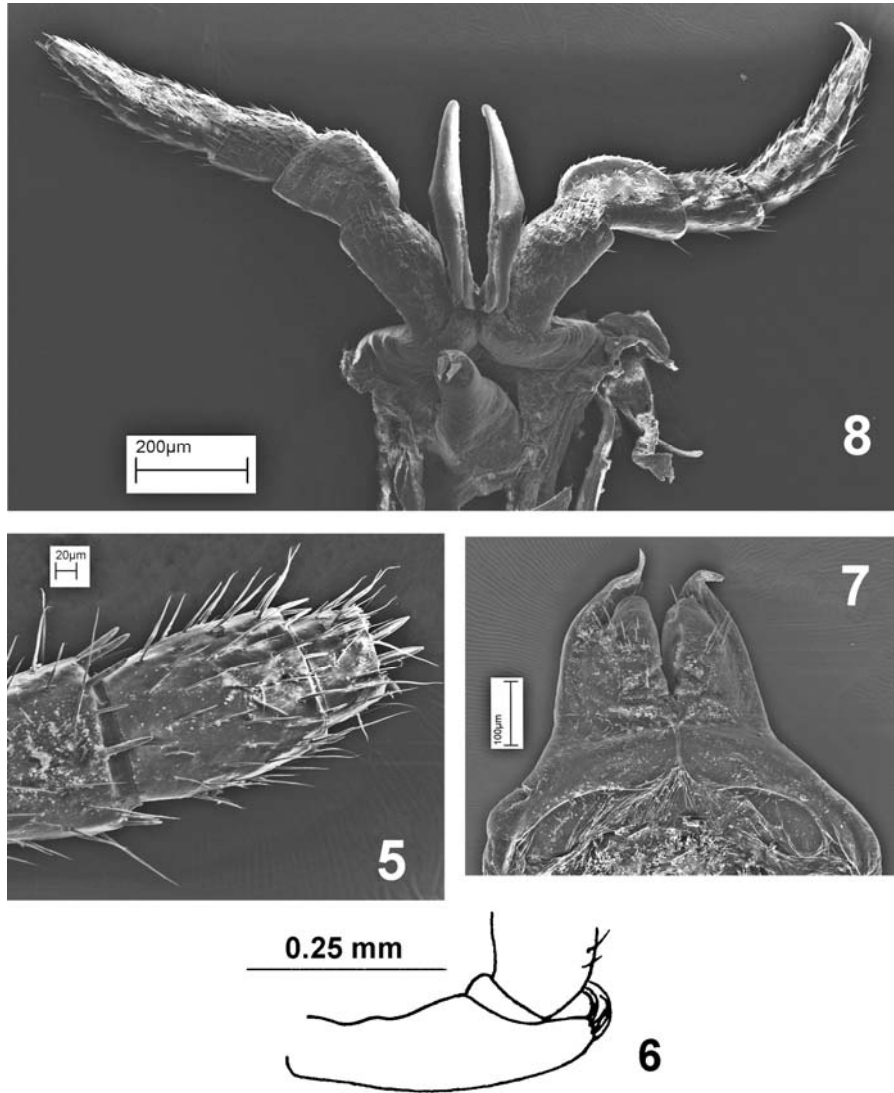
DESCRIPTION. MALE. Length 19–22 mm, vertical diameter 1.0–1.3 mm, with 47(–4), 48(–3), 49(–3) segments, excluding telson. Coloration dark brown with a reddish tinge. Ventral side lighter. Antennae dark brown, eye patches black. Legs dark brown with light brown or brown coxae and praefemurs.

Eye patches rounded, subtriangle, composed of 40–41 small ocelli. Epicranial setae 1+1, supralabral setae 2+2, 2+3, labral ones 7+7, 8+9, 9+9, 9+10. Genae unmodified. Antennae medium-sized, rather slender and clavate, in situ reaching to somite 5. Gnathochilarial normal; stipes with low knobs distally and basally; each lamella lingualis with 6 setae arranged longitudinally. Length ratios of antennomeres 2–7 as 3.3:2.5:2.5:3.1:1.7:1, width ratios as 1.1:1.2:1.2:1.3:1.3:1, respectively. Antennomeres 5 and 6 with incomplete distodorsal corolla of 6–7 sensory bacilli (Fig. 5).

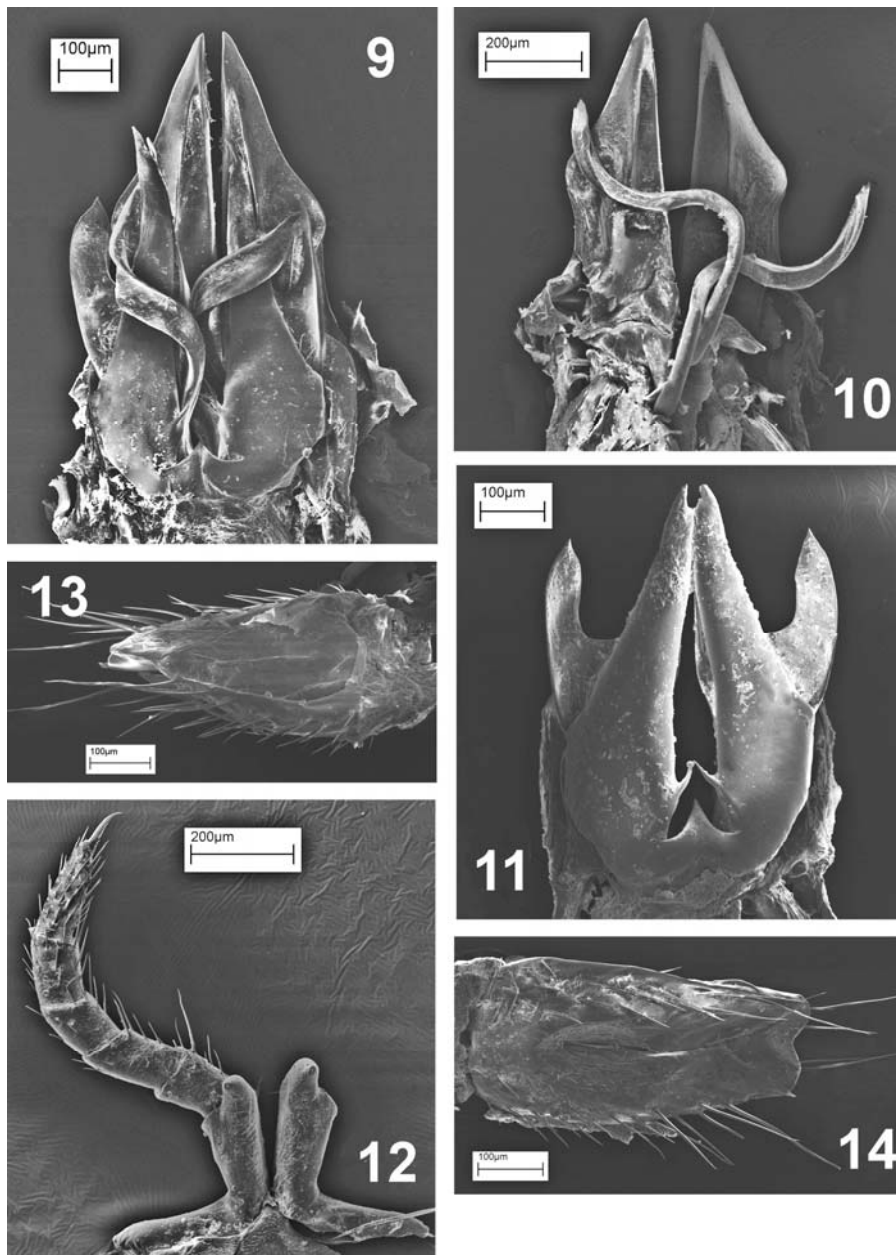
Body subcylindrical, slender, slightly compressed laterally. Somites 6 and 7 somewhat incrassate. Ventral edges of metazonites 7 somewhat deflected, forming a gonopodal opening. Ozopores small, lying behind suture between pro- and metazona without touching it. Metazona with striae practically reaching hind margin; 9–10 striae on metazonital surface between dorsal midline and ozopore. Caudal margins of metazona with minute, very sparse, barely visible setae, setae gradually growing denser, longer toward telson and head. Telson with sparse setae along caudal edge. Caudal projection of epiproct somewhat flattened dorsoventrally, subtriangular in dorsal view, covered with relatively long, dense setae along caudal edge and carrying a tiny claw-shaped process, the latter directed caudad. Anal valves densely setose. Anal scale subtriangular, setose only along caudal edge.

Legs relatively short and slender. Claws at base only with a long setoid filament ventrally, without additional small claws dorsally. Pregonopodal legs somewhat wider as compared with postgonopodal ones, which gradually become more slender toward the posterior end. Claws of pregonopodal legs at base with a long setoid filament ventrally, without additional small claws dorsally. Coxae 3–7 with process apically carrying long hair-like setae (Fig. 6); these coxal processes gradually becomes smaller and disappear posteriorly. Leg pair 1 (Fig. 7) subtriangular, with high coxites

pointed apically; coxite apex somewhat curved anteriorly. Rudiment of telopodite 1-segmented, with a group of setae laterally. Each coxa of leg pair 2 with large unciform outgrowth curved frontally, bearing long process caudally (Fig 8). Penes subconical.



Figs. 5–8. *Julus kazakhus* sp. n., male paratype. 5 – distal part of antenna; 6 – coxa 3; 7 – leg pair 1, front view; 8 – leg pair 2 and penes, caudal view.



Figs. 9–14. *Julus kazakhus* sp. n., male paratype (9–11), female paratype (12–14). 9 – gonopods, caudal view; 10 – gonopod promeres, caudal view; 11 – gonopod opisthomeres, caudal view; 12 – leg pair 2 (one of the legs omitted), front view; 13 – vulva, lateral view; 14 – vulva, ventral view.

Three pieces of gonopods (Figs 9–11) highly condensed. Promeres higher than opisthomeres, their flagella well-developed, ribbon-shaped, with somewhat distal broadening, tapering toward end, but not filiform. Promere with pointed apex, lateral prominence and caudal longitudinal crest, without telopodite remnant; mesomere subconical, rounded at apex. Opisthomere with thin mesal outgrowth at base, lateral part with strong, broad flat process pointed apically. Notch between solenomere and lateral process as deep as 1/3 opisthomere height.

FEMALE. Length 26–29 mm, vertical diameter 1.5–2.0 mm, with 51(–1), 51(–2) segments, excluding telson. Each coxa of leg pair 2 with small subconical process directed forward (Fig. 12). Vulvae as in Figs 13–14.

Juveniles. Length 8.0–18 mm, vertical diameter 0.6–1.0 mm, with 31(–5), 42(–5), 46(–3), excluding telson. Among them can be recognized subadult males with normal leg pair 1, leg pair 2 equipped with coxal processes curved apically (early stages with shorter processes), somite 7 somewhat incrassate.

In addition, among material is subadult male (only anterior portion) with 1.1 mm vertical diameter of body. It has underdeveloped gonopods, normal leg pair 1, long apically curved process on each coxa of leg pair 2, somewhat incrassate somite 7 and closed gonopodal opening; body coloration as in adult males. It is possible that this species is characterized by periodomorphosis, and this “subadult” male is intercalary.

DIAGNOSIS. The species differs from congeners from the Asian part of Russia mainly by the shape of gonopod promere with lateral prominence and pointed apex, single coxal processes of male leg pair 2 and configuration of gonopod opisthomere.

ETYMOLOGY. The specific epithet refers to Kazakhstan, the terra typica.

***Sibiriulus multunicus* Mikhaljova, 2001**

MATERIAL. Kazakhstan, Vostochno-Kazakhstanskaya oblast, Katon-Karagai-skii District: 2 ♂, 2 ♀, 1 fragment (PU), 1408 m, 49°09'404''N, 86°01'676''E, forest, 12.VIII 2010, leg. K. Ulykpan; 4 ♀, 2 juveniles (IBSS), 1299 m, 49°09'595''N, 86°01'635''E, forest-steppe, 13.VIII 2010, leg. K. Ulykpan; 1 ♂, 4 ♀, 1 juvenile (IBSS), 1202 m, 49°08'983''N, 85°59'876''E, forest-steppe, 17.VIII 2010, leg. K. Ulykpan; 4 ♂, 5 ♀, 2 juveniles (IBSS), 1202 m, 49°08'813''N, 86°00'012''E, 17.VIII 2010, leg. K. Ulykpan; 5 ♂, 4 ♀, 2 juveniles (IBSS), 1253 m, 49°09'113''N, 86°00'582''E, forest-steppe, 19.VIII 2010, leg. K. Ulykpan; 3 ♂, 6 ♀, 1 juvenile (IBSS), 1202 m, 49°08'983''N, 86°00'605''E, forest-steppe, 20.VIII 2010, leg. K. Ulykpan; 4 ♀, 1 juvenile (IBSS), 1390 m, 49°08'499''N, 85°57'670''E, *Larix* forest, 22.VIII 2010, leg. K. Ulykpan; 3 ♂, 4 ♀, 1 juvenile (PU), 1384 m, 49°08'556''N, 85°58'103''E, mountain steppe, 24.VIII 2010, leg. K. Ulykpan; 2 ♂, 6 ♀, 1 juvenile (IBSS), 1300 m, 49°08'650''N, 85°57'952''E, forest-steppe, 25.VIII 2010, leg. K. Ulykpan; 1 ♂ (IBSS), 1321 m, 49°08'502''N, 85°56'346''E, forest-steppe, floodplain meadow near mountain stream, 27.VIII 2010, leg. K. Ulykpan.

DISTRIBUTION. Russia: Siberia (Republic of Altai and the southeastern part of Altai Province), Kazakhstan (Vostochno-Kazakhstanskaya oblast).

REMARKS: This species is new for the fauna of Kazakhstan. It occurs in different habitats, including valley forests as well as forest-steppe, taiga forests and alpine meadows at 1200-2300 m.

***Megaphyllum sjaelandicum* (Meinert, 1868)**

MATERIAL. Kazakhstan, Vostochno-Kazakhstanskaya oblast, Katon-Karagaiskii District: 2 ♂, 11 ♀, 8 juveniles (IBSS), 1408 m, 49°09'404''N, 86°01'676''E, forest, 12.VIII 2010, leg. K. Ulykpan; 3 ♂, 5 ♀, 11 juveniles (PU), 1299 m, 49°09'595''N, 86°01'635''E, forest-steppe, 13.VIII 2010, leg. K. Ulykpan; 1 ♂, 3 ♀ (IBSS), 1184 m, 49°09'017''N, 85°59'855''E, steppe, 16.VIII 2010, leg. K. Ulykpan; 2 ♀ (IBSS), 1470 m, 49°08'425''N, 85°57'724''E, grass steppe, 16.VIII 2010, leg. K. Ulykpan; 2 ♂, 9 ♀, 6 juveniles (IBSS), 1202 m, 49°08'813''N, 86°00'012''E, 17.VIII 2010, leg. K. Ulykpan; 3 ♂, 5 ♀, 2 juveniles (IBSS), 1202 m, 49°08'983''N, 85°59'876''E, forest-steppe, 17.VIII 2010, leg. K. Ulykpan; 8 ♂, 12 ♀, 16 juveniles (IBSS), 1253 m, 49°09'113''N, 86°00'582''E, forest-steppe, 19.VIII 2010, leg. K. Ulykpan; 3 ♂, 1 ♀, 6 juveniles (IBSS), 1202 m, 49°08'983''N, 86°00'605''E, forest-steppe, 20.VIII 2010, leg. K. Ulykpan; 11 ♂, 8 ♀, 2 fragments (IBSS), 1270 m, 49°08'706''N, 85°57'708''E, steppe, 20.VIII 2010, leg. K. Ulykpan; 12 ♂, 13 ♀, 16 juveniles, 1 fragment (IBSS), 1390 m, 49°08'499''N, 85°57'670''E, *Larix* forest, 22.VIII 2010, leg. K. Ulykpan; 17 ♂, 26 ♀, 46 juveniles, 2 fragments (IBSS), 1470 m, 49°08'425''N, 85°57'724''E, forest-steppe, 22.VIII 2010, leg. K. Ulykpan; 6 ♂, 14 ♀, 35 juveniles (IBSS), 1384 m, 49°08'556''N, 85°58'103''E, mountain steppe, 24.VIII 2010, leg. K. Ulykpan; 5 ♂, 55 ♀, 42 juveniles, 2 fragments (IBSS), 1260 m, 49°08'712''N, 85°57'982''E, steppe, 24.VIII 2010, leg. K. Ulykpan; 3 ♂, 10 ♀, 24 juveniles (IBSS), 1300 m, 49°08'650''N, 85°57'952''E, forest-steppe, 25.VIII 2010, leg. K. Ulykpan; 7 ♂, 15 ♀, 5 juveniles (PU), floodplain meadow near mountain stream, 1321 m, 49°08'502''N, 85°56'346''E, forest-steppe, 27.VIII 2010, leg. K. Ulykpan; 4 ♂, 6 ♀, 3 juveniles (IBSS), 1438 m, 49°08'340''N, 85°55'965''E, *Larix* forest, 27.VIII 2010, leg. K. Ulykpan; 2 ♂, 13 ♀, 19 juveniles (IBSS), floodplain meadow near mountain stream, 1321 m, 49°08'502''N, 85°56'346''E, forest-steppe, 27.VIII 2011, leg. K. Ulykpan and U. Burkitbaeva.

DISTRIBUTION. Central and Eastern Europe, Ural, Russian and Kazakhstan Altai.

REMARKS. This species is distributed in Central and Eastern Europe, Urals and has been recorded in Republic of Altai by one male and one female (Mikhaljova *et al.*, 2007). Specimens from Republic of Altai differ from ones from European countries and the Urals by the presence of a small projection on mesal side of the gonopod promere, somewhat longer gonopod flagella and somewhat more obtuse

mesomere processes of gonopods in male. Examined specimens from Kazakhstan Altai are morphologically similar to the specimens from Republic of Altai, including structure of gonopod promere. However the length of their gonopod flagella appears to be variable. In addition, a restudy of the male from Republic of Altai, which is deposited in the collection of IBSS, shows that the apex of one of the two gonopod mesomere processes is obtuse. Apex of the second gonopod mesomere process is pointed like one in males from European countries and the Urals. Thus length of gonopod flagella and the degree of obtuseness of gonopod mesomere process can not be the distinguishing characters. Taking into account the morphological similarity and geographical proximity of the localities, specimens from Republic of Altai and Kazakhstan Altai belong to the same form which can be considered as variety of the species. The form differs only by the presence a small projection on mesal side of the gonopod promere in male.

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