New data on the myriapod fauna (Myriapoda: Chilopoda, Diplopoda) of the Republic of Khakassia, central Siberia, Russia

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ABSTRACT. Based on a small material from the Republic of Khakassia, central Siberia, Russia, new information on the myriapod fauna is presented. Two lithobiid species, Lithobius (Ezembius) ostiacorum Stuxberg, 1876 and L. (Monotarsobius) nordenskioeldii Stuxberg, 1876, are recorded from Khakassia for the first time. Both the genus Teleckophoron Gulička, 1972 and its sole species T. montanum Gulička, 1972, as well as the family Kirkayakidae they belong to, are also new to the millipede fauna of Khakassia. The distributions of all species encountered are mapped.

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KEY WORDS: geophilomorph centipedes, lithobiomorph centipedes, millipedes, fauna, new records, Siberia.

Новые сведения о фауне многоножек (Myriapoda: Chilopoda, Diplopoda) Республики Хакасия, центральная Сибирь, Россия

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РЕЗЮМЕ. По небольшому материалу из Республики Хакасия (центральная Сибирь, Россия) приводится новая информация о фауне многоножек. Два вида костянок, Lithobius (Ezembius) ostiacorum Stuxberg, 1876 и L. (Monotarsobius) nordenskioeldii Stuxberg, 1876, впервые отмечены в Хакасии. Род Teleckophoron Gulička, 1972 с единственным видом T. montanum Gulička, 1972, а также семейство Kirkayakidae, к которому они принадлежат, также являются новыми для фауны многоножек Хакасии. Для всех видов выполнено картирование находок в исследуемом регионе.
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Introduction

The Republic of Khakassia is located in the central part of the Asian continent in the south of central Siberia. It spans about 460 km north to south and 200 km west to east (in its widest part), bordering on the Krasnoyarsk Province in the north, east and southeast, the Republic of Tyva in the south, the Republic of Altai in the southwest, and the Kemerovo Area in the west.

The Khakassian Republic is part of the Altai-Sayan region, being characterized by a pronounced variety of physical and geographical structures, as well as a highly diverse vegetation (Kostyakova et al., 2018). The landscape and orographic structures of the Republic vary considerably and range from its plain (Minusinskaya and Chulymo-Yeniseiskaya depressions) to montane parts, i.e. the eastern slopes of the Kuznetskii Alatau and the Abakanski Mountain Range, and the northern slopes of the Western Sayan Mountains (Semenov, Lysanova, 2016). The study area is subjected to a continental climate, with short summers and long and cold winters, with the average annual temperature of +0.8 °C. January is the coldest month (-18.6 °C), while July is the warmest month (+18.7 °C). The highest amount of annual precipitation (75–90%) falls in summer, the greatest annual level being confined to the mountains (up to 2000 mm), while the leeward slopes and interior depressions receive only 250 mm. July is the most humid month (67–82 mm), while both February and March are the driest ones (4–8 mm) (Kostyakova et al., 2018). Most of the watercourses in the Republic of Khakassia belong to the Yenisei River Basin, the Abakan River being the major tributary, while the northwestern part of the study area pertains to the Ob River Basin, the Tom, Belyi Iyus, Chiornyi Iyus, and Chulym rivers being involved. The vegetation of this territory is characterized by Pinus sylvestris L. and Larix sibirica Ledeb. forests, while the steppe belt supports forb-grass-sedge meadows (Kostyakova et al., 2018).

To date, based on literature data (Shear, 1990; Mikhaljova, 1993, 2000, 2017; Mikhaljova, Golovatch, 2001; Mikhaljova, Nefediev, 2003; Mikhaljova, Marusik, 2004; Nefediev, Nefedieva, 2017; Nefediev, 2018a, b, 2019a; Nefediev, Farzalieva, 2020), at least 19 species of Myriapoda are known to occur in the Republic of Khakassia, representing 11 genera, 7 families, and 5 orders. The present paper provides new records and a primary inventory of both Chilopoda and Diplopoda of the study area.

The distribution maps were composed using QGIS 3.14.15-Pi.

The material treated here has been deposited in the collections of the Altai State University, Barnaul, Russia (ASU), the Perm State University, Perm, Russia (PSU), and the Zoological Museum of the Lomonosov Moscow State University, Moscow, Russia (ZMUM), as indicated below.

Taxonomic part

Class Chilopoda

Order Geophilomorpha

Family GEOPHILIDAE

Arctogeophilus macrocephalus

Folkmanová et Dobroruka, 1960

Map 1.

MATERIAL EXAMINED. 1♂ (ASU), Russia, south of central Siberia, Republic of Khakassia.

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КЛЮЧЕВЫЕ СЛОВА: многоножки-землянки, многоножки-костянки, двупарноносные многоножки, фауна, новые находки, Сибирь.
kassia, Beya District, ca. 6 air-km W of Maina, Ui River valley, 52.987139°N, 91.391917°E, Pinus sylvestris forest, ca. 400 m a.s.l., in litter, 21.IX.2019, leg. E.Yu. Shuryshev.

DISTRIBUTION. Originally described by Folkmanová & Dobroruka (1960) from the European part of Russia (Tatarstan Republic), A. macrocephalus is highly widespread from European Russia through Siberia and eastern Kazakhstan to the inland Russian Far East and Sakhalin Island (Zalesskaja et al., 1982; Volkova, 2016; Dyachkov, Tuf, 2019). In Siberia, this species has hitherto been recorded from the Kemerovo and Tomsk areas, the Altai and Khakassian republics, and the Altai and Krasnoyarsk provinces (Byzova, Chadaeva, 1965; Zalesskaja et al., 1982; Vorobiova, 1999; Rybalov, 2002; Vorobiova et al., 2002; Nefediev et al., 2017a, c, 2018; Nefediev, 2019a).

ORDER Lithobiomorpha

Family LITHOBIIDAE

Lithobius (Ezembius) ostiacorum

Stuxberg, 1876

Map 2.

MATERIAL EXAMINED (all Russia, south of central Siberia, Republic of Khakassia). 1 ♀ (PSU-1254), Shira District, near Efremkino, 54.469709°N, 89.445864°E, ca. 480 m a.s.l., VII–VIII.2004, leg. E.V. Miroshnichenko; 1 ♂, 2 juv. (ZMUM), Beya District, near Novonikolaevka, 53.194961°N, 91.295908°E, site 42, Padus avium, ca. 310 m a.s.l., soil samples, 25.V.1986, collector unknown; 1 ♀, 1 juv. (PSU-1465), same District, ca. 6 air-km W of Maina, Ui River valley, 52.987139°N, 91.391917°E,
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Map 2. Distribution of Lithobius (Ezembius) ostiacaorum (triangle) and L. (E.) princeps (circle) in the Republic of Khakassia. Previously known localities marked in black, new records given in white.

Карта 2. Распространение Lithobius (Ezembius) ostiacaorum (треугольник) и L. (E.) princeps (круг) в Республике Хакасия. Черным отмечены ранее известные места находок, новые находки отмечены белым.

Pinus sylvestris forest, ca. 400 m a.s.l., in litter, 21.IX.2019, leg. E.Yu. Shuryshev.

DISTRIBUTION. Originally described by Stuxberg (1876a, b) from the Yenisei River region (Krasnoyarsk Province), this species was redescribed by Eason (1976) using Stuxberg’s type material. Being widely distributed in Siberia, Lithobius (E.) ostiacaorum has hitherto been known from the Irkutsk and Kemerovo areas, the Altai and Krasnoyarsk provinces, and the Republic of Altai (Zalesskaja, 1978; Nefediev et al., 2017a, 2018, 2020b; Nefediev, Fazalieva, 2020). The southernmost records of this species are known from northern Mongolia (Poloczek et al., 2016, 2017).

REMARKS. This species is formally new to the fauna of the Republic of Khakassia.

Lithobius (Ezembius) princeps
Stuxberg, 1876

Map 2.

MATERIAL EXAMINED. 1 ♂ (PSU-1470), Russia, south of central Siberia, Republic of Khakassia, Askiz District, ca. 3 air-km SE of Nankhchul, Askiz River valley, near mouth of Portal River, 53.418861°N, 89.749639°E, Pinus sylvestris forest with Abies sibirica and Betula pendula, ca. 650 m a.s.l., in litter, 1.VIII.2019, leg. A.P. Pavlov.

DISTRIBUTION. This species was originally described by Stuxberg (1876a, b) from near the Podkamennaya Tunguska River (Krasnoyarsk Province), later redescribed by Eason (1976) using Stuxberg’s type material. This species was later recorded from eastern Kazakh-
Map 3. Distribution of Lithobius (Monotarsobius) fugax (circle), L. (M.) nordenskioeldii (asterisk) and Sibiriulus profugus (triangle) in the Republic of Khakassia. Previously known localities marked in black, new records given in white.

Khstan (Tuf, 2007; Tuf et al., 2010; Dyachkov, 2017, 2019), the Tyumen and Omsk areas, and the Republic of Khakassia, all Siberia (Sergeeva, 2010; Bukhkalpo et al., 2014; Nefediev et al., 2017b; Nefediev, Farzalieva, 2020).

**Lithobius (Monotarsobius) fugax**
Stuxberg, 1876

**Map 3.**

MATERIAL EXAMINED (all Russia, south of central Siberia, Republic of Khakassia). 1 ♀ (PSU-733), Shira District, ca. 3 air-km NW of Kommunar, Bolnichnyi Stream valley, 54.364722°N, 89.249167°E, bottom of rocky scree, ca. 840 m a.s.l., 30.VII.1999; 1 ♂, 2 ♀♀ (PSU-734), same District, ca. 10 air-km E of Shira, 54.513889°N, 90.143056°E, bank of Lake Shira, piles of stones and boulders, ca. 355 m a.s.l., 3.VIII.1999, all leg. P.S. Nefediev; 1 ♀ (PSU-1255), same District, near Efremkino, 54.469709°N, 89.45864°E, ca. 480 m a.s.l., VII–VIII.2004, leg. E.V. Miroshnichenko; 6 ♂♂ ♀♀, 1 ♀ (PSU-816), Altaiskii District, near Ochury, Ochurskii Bor, 53.159306°N, 91.609972°E, Pinus sylvestris forest, ca. 300 m a.s.l., 30.IX.2008, leg. D.I. Pogrebnyak.

DISTRIBUTION. Originally described by Stuxberg (1876a, b) from the Yenisei River region (Krasnoyarsk Province), this species was later redescribed by Eason (1976) with lectotype designation, and it was synonymized with Monotarsobius kaszabi Lokska, 1965, the latter species described from Mongolia. Lithobius
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(M.) fugax was later recorded from the Kemerovo Area and the Republic of Khakassia, both Siberia (Nefediev et al., 2020b; Nefediev, Farzalieva, 2020).

**Lithobius (Monotarsobius) nordenskioeldii**
Stuxberg, 1876
Map 3.

**MATERIAL EXAMINED.** 1 ♀ (PSU-1466), Russia, south of central Siberia, Republic of Khakassia, **Beya District**, ca. 6 km W of Maina, Ul River valley, 52.987139°N, 91.391917°E, Pinus sylvestris forest, ca. 400 m a.s.l., in litter, 21.IX.2019, leg. E.Yu. Shuryshev.

**DISTRIBUTION.** Originally described by Stuxberg (1876a, b) from the Yenisei River region (Krasnoyarsk Province) and later re-described by Eason (1976) using Stuxberg’s type material. This species was later recorded from the Republic of Altai, the Altai Province, and the Irkutsk Area (Nefediev et al., 2017a, 2018, 2020a; Nefediev, Farzalieva, 2020).

**REMARKS.** This is the first record of **L. (M.) nordenskioeldii** in the Republic of Khakassia.

Class Diplopoda
Order Julida
Family JULIDAE

**Sibiriulus profugus** (Stuxberg, 1876)
Map 3.

**MATERIAL EXAMINED.** 1 ♂ (ASU), Russia, south of central Siberia, Republic of Khakassia, **Beya District**, ca. 6 air-km W of Maina, Ul River valley, 52.987139°N, 91.391917°E, Pinus sylvestris forest, ca. 400 m a.s.l., in litter, 21.IX.2019, leg. E.Yu. Shuryshev.

**DISTRIBUTION.** This species was originally described as *Iulus profugus* from the area between Tomsk and Kansk (Stuxberg 1876a, b), later transferred to *Sibiriulus* Gulička, 1963 (Lokšina, Golovatch, 1979), redescribed based on material from both the Novosibirsk Area and the Republic of Khakassia (Mikhaljova, 1993), and finally it was sunk as a senior subjective synonym of *Cylindroiulus (Sibiriulus) dentiger* Gulička, 1963 (Mikhaljova, 2002), a form described from the Kemerovo Area (Gulička, 1963). Being the most widespread species of *Sibiriulus*, this species is presently known from the Tomsk, Novosibirsk and Kemerovo areas, the Altai and Krasnoyarsk provinces, the republics of Altai and Khakassia (Stuxberg, 1876a, b; Gulička, 1963; Byzova, Chadaeva, 1965; Mikhaljova, 1993, 2002, 2004, 2017; Mikhaljova, Golovatch, 2001; Babenko et al., 2009; Nefediev, 2002a, b; Mikhaljova, Nefediev, 2003; Mikhaljova et al., 2007, 2014; Nefediev, Nefedieva, 2007a, b, c, 2011, 2017).

Family NEMASOMATIDAE

**Orinisobates sibiricus** (Gulička, 1963)
Map 4.

**MATERIAL EXAMINED.** (all Russia, south of central Siberia, Republic of Khakassia). 14 ♀♂, 19 ♀, 2 juv. (ASU), **Ust-Abakan District**, ca. 12 air-km W of Ust-Byur, right board of Uibat River valley, 53.825765°N, 90.052647°E, Pinus sylvestris forest with Larix sibirica and Betula pendula, ca. 705 m a.s.l., in litter, 17.VII.2012, leg. A.B. Medvedev; 2 ♀♂, 6 ♀♀ (ASU), same locality, in litter, 18.VII.2012, leg. A.P. Pavlov; 3 ♀♂, 2 ♀♀, 3 exuviae (ASU), **Askiz District**, ca. 3.5 air-km SE of Nankhchul, Askiz River valley, near mouth of Portal River, 53.419057°N, 89.756044°E, edge of Picea obovata, Larix sibirica and Betula pendula forest, under stones, ca. 675 m a.s.l., 4.VIII.2018, leg. O.A. Makarenko; 1 ♀ (ASU), near same locality, 53.419056°N, 89.756056°E, under stones, in litter, 21.VI.2019; 1 ♀ (ASU), same locality, under stones, in litter, 1.VIII.2020, all leg. S.V. Dragan; 1 ♀ (ASU), **Beya District**, ca. 6 air-km W of Maina, Ul River valley, 52.987139°N, 91.391917°E, Pinus sylvestris forest, ca. 400 m a.s.l., in litter, 21.IX.2019, leg. E.Yu. Shuryshev.
DISTRIBUTION. Originally described as *Isobates sibiricus* by Gulička (1963) from the Kemerovo Area, this species was later transferred first to the subgenus *Orinisobates* (Gulička, 1972), and finally to the genus *Orinisobates* (Lokšina, Golovatch, 1979). The distribution of *O. sibiricus* is mostly confined to Siberia, Russia, viz. the Kemerovo and Irkutsk areas, the republics of Khakassia, Altai and Tyva, and the Krasnoyarsk, Altai and Zabaikalskii provinces (Gulička, 1963, 1972; Byzova, Chadaeva, 1965; Enghoff, 1985; Mikhaljova, 1993, 2002, 2004, 2016, 2017; Mikhaljova, Golovatch, 2001; Mikhaljova, Nefediev, 2003; Nefediev, Nefedieva, 2006, 2007a, b, 2013; Nefedieva, Nefediev, 2008; Nefediev et al., 2014, 2018; Nefedieva et al., 2015; Nefediev, 2018b). This species is also known from the Eastern Kazakhstan and Almaty areas (both Kazakhstan), and the Talas Area (Kyrgyzstan) (Enghoff, 1985).

Order Chordeumatida

Family KIRKAYAKIDAE

*Teleckophoron montanum* Gulička, 1972

Map 4.

MATERIAL EXAMINED. 3 ♂♂, 1 ♀ (ASU), Russia, south of central Siberia, Republic of Khakassia, **Beya District**, ca. 4 air-km WSW of Bogoslovka, Ul River valley, 52.96222°N, 91.206111°E, mixed forest with *Pinus sylvestris*, *Picea obovata*, *Abies sibirica* and *Betula pendula*, ca. 600 m a.s.l., 22.VII.2019, leg. E.Yu. Shuryshev.
DISTRIBUTION. This species was originally described by Gulička (1972) from the environs of Lake Teletskoye, Republic of Altai, with the type material deposited in the personal collection of the author in Bratislava, Slovakia. The original description was too incomplete, and the illustrations were very schematic. Upon the request of S.I. Golovatch, the holotype was returned to Russia, but without gonopods. According to those reasons, *T. montanum* was listed among *nomina dubia* for a long time. New records of this species from the southern part of the Krasnoyarsk Province finally allowed for a redescriptions to be published (Mikhaljova, Golovatch, 2001).

REMARKS. The above record of *T. montanum* is formally new to the Republic of Khakassia.

**Order Polydesmida**

**Family POLYDESMIDAE**

*Schizoturanius tabescens* (Stuxberg, 1876)

Map 1.

MATERIAL EXAMINED. 1 ♀ (ASU), Russia, south of central Siberia, Republic of Khakassia, *Beya District*, ca. 4 air-km WSW of Bogoslovka, Uš River valley, 52.962222°N, 91.206111°E, mixed forest with *Pinus sylvestris*, *Picea obovata*, *Abies sibirica*, and *Betula pendula*, ca. 600 m a.s.l., 22.VII.2019, leg. E.Yu. Shuryshev.

DISTRIBUTION. Originally described as *Polydesmus tabescens* by Stuxberg (1876a, b) from the Yenisei River region (Krasnoyarsk Province), this species was later transferred to *Schizoturanius* Verhoeff, 1931 (Mikhaljova, 1993), and then proven to be a senior subjective synonym of *Turanodesmus salairicus* Gulička, 1963 (Mikhaljova, 2004). 

**Conclusions**

At present, the myriapod fauna of the Republic of Khakassia comprises at least 22 species from 12 genera, 8 families and 5 orders: *Geophilus proximus* C.L. Koch, 1847, *Arctogeophilus macrocephalus* Folkmanová et Dobrovoljová, 1960, *Escaryus japonicus* Attems, 1927, *E. koreanus* Takakuwa, 1937, *Lithobius (Chinobius) opinatus* (Zaleskaja, 1978), *L. (Ezembius) ostiogram* Stuxberg, 1876*, L. (E.) princeps* Stuxberg, 1876, *L. (Monotarsobiuss) curtipes* C.L. Koch, 1847, *L. (M.) fugax* Stuxberg, 1876, *L. (M.) nordenskioeldi* Stuxberg, 1876*, L. (M.) worogowensis* Eason, 1976, *Julius ghiharovi* Gulička, 1963, *Pacifius amurenensis* (Gerstfeldt, 1859), *Sibiriulus profugus* (Stuxberg, 1876), *Orinobates sibiricus* (Gulička, 1963), *Teleckophoron montanum* Gulička, 1972*, Altajosoma bakurovi* (Shear, 1990), *A. deplanatum* (Stuxberg, 1876), *A. kemeroavo* (Shear, 1990), *Shearia khakassica* Mikhaljova, 2000, *Schizoturanius clavatipes* (Stuxberg, 1876), and *S. tabescens* (Stuxberg, 1876). The first records from the Republic of Khakassia are marked with an asterisk (*).

The genus *Teleckophoron* Gulička, 1972*, and the family Kirkayakidae it belongs to, are formally new to the Republic of Khakassia.

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