

New records of caddis flies (Insecta: Trichoptera) for the Republic of Tuva, South Siberia, Russia

Новые находки ручейников (Insecta: Trichoptera) из Республики Тыва в Южной Сибири

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Ключевые слова: ручейники, Trichoptera, новые находки, фауна, Енисей, Республика Тыва, Южная Сибирь.

Abstract. 11 caddis fly species from 8 families are registered for the basin of Bol'shoi Yenisei River in Todzha Depression, Tuva. Currently, the caddis fly fauna in the Bol'shoi Yenisei River basin includes 44 species from 12 families, of which 8 species, *Stenopsyche marmorata* Navás, 1920, *Glossosoma nylanderi* McLachlan, 1879, *Setodes pulcher* Martynov, 1910, *Lepidostoma albardanum* (Ulmer, 1906), *Goera squamifera* Martynov, 1909, *Asynarchus contumax* McLachlan, 1880, *Asynarchus lapponicus* (Zetterstedt, 1840) and *Lenarchus bicornis* (McLachlan, 1880), are newly recorded for this area, and 5 species, *S. pulcher*, *Lepidostoma albardanum* (Ulmer, 1906), *G. squamifera*, *A. contumax* and *L. bicornis* are new for Tuva, and *L. bicornis* is new for Eastern Palearctic. In result, 99 caddis fly species are known for Tuva. Photographs of *S. pulcher*, *G. squamifera* and *L. bicornis* male genitalia are presented.

Резюме. Приведён аннотированный список 11 видов ручейников из 8 семейств, которые были собраны в бассейне р. Большой Енисей в Тоджинской котловине Тувы. Ручейники *Setodes pulcher* Мартынов, 1910, *Lepidostoma albardanum* (Улмер, 1906), *Goera squamifera* Мартынов, 1909, *Asynarchus contumax* McLachlan, 1880 и *Lenarchus bicornis* (McLachlan, 1880) впервые зарегистрированы для фауны Тувы, которая в итоге включает 99 видов. Три вида: *S. pulcher*, *G. squamifera* и *A. contumax* ранее не были известны из верхнего участка бассейна р. Енисей, а *L. bicornis* из бассейна р. Енисей. Вид *L. bicornis* впервые обнаружен в Восточной Палеарктике. В статье представлены фотоиллюстрации генитальных структур самцов *S. pulcher*, *G. squamifera* и *L. bicornis*.

Introduction

Twelve years have passed since the last review of the caddisfly fauna of the Republic of Tyva (Tuva) and 88 species were given [Zaika, 2009]. Later, six species were found in the Khemchik River basin, Bol'shoi Ye-

nisei (Bii-Khem) River basin and Malyi Yenisei (Kaa-Khem) River basin [Zaika, 2013, 2017; Kuzhuget, 2021].

In 2021 caddisflies were collected in the river basins in the Todzha Depression. Basin of Bol'shoi Yenisei River is located in the most humid part of Tuva with numerous lakes and swamps. The area of the drainage basin is 56 800 km². The river system of the Bol'shoi Yenisei drains the Todzha Depression, the mountain systems surrounding it, and belongs to the Tuvanian hydrological region. There are more than 40.000 lakes in the Bol'shoi Yenisei River basin [Resursy poverkhnostnykh vod..., 1973]. The Todzha Depression is the largest intermountain depression in the northeast of Tuva. It is surrounded from the north by the ridges of the Eastern Sayan, from the south by the Akademik Obruchev ridge, from the east by the northern tip of the Prikhubsugul'e Mountains. The bottom of the depression lies at absolute heights from 850 m in the west to 2000 m above sea level in the east [Geologiya SSSR..., 1966]. In the western part of the depression, the relief is flat, and in the rest of the hilly-ridged relief alternates with mid-mountain relief, and in some places it is significantly dissected by the valleys of numerous tributaries of the Bol'shoi Yenisei River [Srednyaya Sibir..., 1964].

Material and methods

The material was collected by V.V. Zaika on the left bank of the Bol'shoi Yenisei River 2 km above the mouth of the Toora-Khem River (52°28'12" N, 96°07'27" E), 23.07.2021 (Figs 1, 2).

Insects were collected in the ultraviolet trap (OS-RAM HWL (MBFT) 250W 225V Brasil k698) on the shore among coastal bushes.



Figs 1–2. General view of the Bol'shoi Yenisei River riverbed above the mouth of Toora-Khem River. 1 — habitat general view; 2 — location of light trap, marked with red circle. Photo by V.V. Zaika.

Рис. 1–2. Общий вид русла р. Большой Енисей выше устья р. Тоора-Хем. 1 — общий вид местообитания; 2 — место расположения светоловушки, отмеченное красным кружком. Фото В.В. Заики.

The studied material is deposited in the Centre of Collective Usage «Fauna of the Central Part of the Altai-Sayan Ecoregion» of Tuvanian Institute for the Exploration of Natural Resources SB RAS (Kyzyl, Russia).

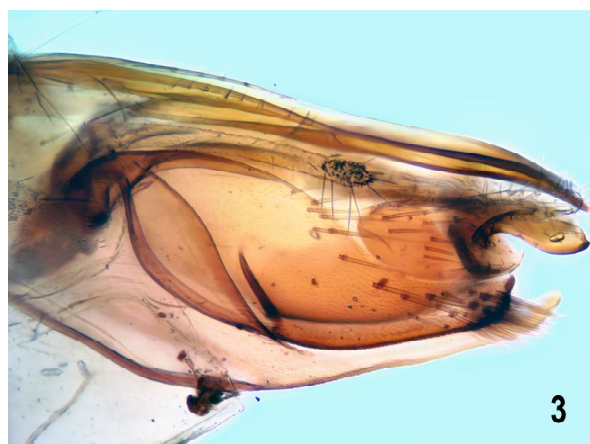
The male genital structures of *Goera squamifera* Martynov, 1909, *Setodes pulcher* Martynov, 1910, and *Lenarchus bicornis* (McLachlan, 1880) were photographed using a TouPCam 9.0 MP camera and Helicon Focus 7.0.2 image stacking software for combining frames in one focused image.

Information on the species distribution is based on published data [Andersen et al., 1993; Levanidova et

al., 1995; Gullefors, 2002, 2008; Arefina et al., 2004; Zaika, 2009, 2012, 2018; Višinskienė, 2009; Viidalepp et al., 2010; Ivanov, 2011; Andersen, Hagenlund, 2012; Makhov, Shilenkov, 2012; Palatov, Chertoprud, 2012; Vshivkova et al., 2013; Dragan, 2013, 2014, 2019; Ruiter et al., 2013; Ito, Nagasaka, 2014; Kendrick, Huryn, 2014; Chuluunbat et al., 2016; Pan'kov, Krashennikov, 2016; Smirnova et al., 2016; Tanida, Kuranishi, 2016; Yang et al., 2016; Zasyapkina, 2016; Mey et al., 2017; Loskutova, Rafikova, 2018; Houghton et al., 2018; Baturina, 2019; Matveev et al., 2019; Melnitsky, Ivanov, 2019; Salokannel et al., 2019; Park, Kong, 2020; Rozhkova et al., 2020; Smirnova et al.,

2020; Baturina, Efstifeeva, 2021; Vshivkova et al., 2021; Kuzhuget, 2021].

The following abbreviations are used for the regions of caddisfly species distribution in Russia: LEN — Leningradskaya Oblast; MUR — Murmanskaya Oblast; KAR — Respublika Karelia; MOS — Moskovskaya Oblast; MOR — Respublika Mordovia; NEN — Nenetskii Avtonomnyi Okrug; KOM — Respublika Komi; BAS — Respublika Bashkortostan; PER — Permskii Krai; YAN — Yamalo-Nenetskii Avtonomnyi Okrug; TYU — Tyumenskaya Oblast; CHE — Chelyabinskaya Oblast; NVS — Novosibirskaya Oblast; ALT — Altaiskii Krai; ALI — Respublika Altai; KEM — Kemerovskaya Oblast; KHK — Respublika Khakasiya; KYA — Krasnoyarskii Krai; TUV — Respublika Tyva; IRK — Irkutskaya Oblast; BUR — Respublika Buryatiya; ZAB — Zabaikalskii Krai; SAH — Respublika Sakha (Yakutia); AMU — Amurskaya Oblast; YEY — Evreiskaya Avtonomnaya Oblast; KHA — Khabarovskii Krai; MAG — Magadanskaya Oblast; KAM — Kamchatskii Krai; CHU — Chukotskii Avtonomnyi Okrug; PRI — Primorskii Krai; SAK — Sakhalinskaya Oblast.



Figs 3–4. *Goera squamifera* Martynov, 1909, male genitalia structures. 2 — lateral view; 3 — dorsal view. Photo by S.V. Dragan.

Рис. 3–4. Структуры гениталий самца *Goera squamifera* Martynov, 1909. 2 — сбоку; 3 — сверху. Фото С.В. Драгана.

Results

11 species of caddisflies from 8 families were collected from Bol'shoi Yenisei River basin in Tuva republic.

Glossosomatidae Wallengren, 1891

Glossosoma nylanderi McLachlan, 1879

Material. 1♀.

Distribution. Norway, Sweden, Finland, Russia: KAR, YAN, CHE, ALT, ALI, KYA, TUV, IRK, BUR, ZAB, AMU, YEY, KHA (southern part), PRI, SAK (Sakhalin island); Mongolia; China: Heilongjiang.

Note. Previously, this species was known in Tuva only from the Malyi Yenisei River basin [Zaika, 2012].

Goeridae Ulmer, 1903

Goera squamifera Martynov, 1909

Figs 3, 4.

Material. 1♂.

Distribution. Russia: ALI, TUV, IRK, SAH (southern part), AMU, YEY, KHA (southern part), PRI; North (DPRK) and South (ROK) Korea.

Note. This species is registered for Tuva and the upper part of the Yenisei River basin for the first time.

Hydropsychidae Curtis, 1835

Arctopsyche ladogensis (Kolenati, 1859)

Material. 1♀.

Distribution. Norway, Sweden, Finland, Latvia; Russia: LEN, MUR, KAR, NEN, KOM, PER, YAN, NVS, ALT, ALI, KHK, KYA, TUV, IRK, BUR, SAH, KHA (northern part), MAG, KAM; Kazakhstan: East Kazakhstan Region; Mongolia; South Korea (ROK); Canada; USA.

Note. This species is known for Tuva from the Khemchik River basin, Verkhniy, Bol'shoi and Malyi Yenisei River basins, and the Ubsu-Nur Lake basin [Zaika, 2012].

Hydropsyche newae Kolenati, 1858

Material. 35♀♀.

Distribution. Norway, Sweden, Finland, Russia: LEN, MUR, KAR, MOS, NEN, KOM, BAS, PER, YAN, NVS, ALT, ALI, KEM, KHK, KYA, TUV, IRK, BUR, ZAB, SAH, AMU, YEY, KHA (northern part), MAG, KAM, CHU, PRI, SAK (Sakhalin island), Kazakhstan: East Kazakhstan Region, Mongolia, China: Heilongjiang, North Korea (DPRK), Japan: Hokkaido.

Note. This species is registered for Tuva from the Khemchik River basin, Verkhniy, Bol'shoi, and Malyi Yenisei River basins and the Ubsu-Nur Lake basin [Zaika, 2012].

Lepidostomatidae Ulmer, 1903

Lepidostoma albardanum (Ulmer, 1906)

Material. 1♂.

Distribution. Russia: KHK, KYA (southern part), TUV, IRK, BUR, SAH (southern part), YEY, KHA (southern part), PRI, SAK (Sakhalin and Kunashir islands), Mongolia, China: Jilin, Heilongjiang, North (DPRK) and South (ROK) Korea, Japan: Tsushima island, Honshu.

Note. This species is newly registered for Tuva.

Leptoceridae Leach, 1815

Setodes pulcher Martynov, 1910

Fig. 5, 6.

Material. 1♂.

Distribution. Russia: NVS, TUV, IRK, AMU, YEV, KHA (southern part), PRI, China: Xinjiang, Jilin, Heilongjiang, North Korea (DPRK).

Note. This species is recorded for Tuva and the upper part of the Yenisei River basin for the first time.

Limnephilidae Kolenati, 1848

Asynarchus contumax McLachlan, 1880

Material. 1♂.

Distribution. Norway, Sweden, Finland, Estonia, Lithuania, Russia: MUR, ALI, KYA (northern part), TUV, SAH, MAG, KAM, CHU, SAK (Sakhalin island).

Note. This species is registered for Tuva and the upper part of the Yenisei River basin for the first time.

Asynarchus lapponicus (Zetterstedt, 1840)

Material. 4♂♂.

Distribution. Norway, Sweden, Finland, Austria, Romania, Bulgaria (?), Russia: MUR, NEN, KOM, PER, YAN, TYU, ALI, KHK, KYA (northern part), TUV, IRK, SAH, MAG, KAM, CHU, Kazakhstan: East Kazakhstan Region, Mongolia, Canada, USA.

Note. This species is known in Tuva from the Verkhni Yenisei River basin, Khindigtik-Khol Lake basin only from larvae [Zaika, 2012].

Lenarchus bicornis (McLachlan, 1880)

Figs 7, 8.

Material. 2♂♂.

Distribution. Sweden, Finland, Poland, Estonia, Lithuania, Russia: LEN, MUR, KAR, MOR, YAN, CHE, TUV.

Note. This is the easternmost new registration of the species for Tuva and the Yenisei River basin.

Rhyacophilidae Stephens, 1836

Rhyacophila angulata Martynov, 1910

Material. 1♂.

Distribution. Russia: NVS, ALI, KEM, KHK, KYA, TUV, IRK, BUR, SAH (southern part), AMU, YEV, KHA (southern part), PRI, SAK (Sakhalin island), Kazakhstan: East Kazakhstan Region, Mongolia, China: Heilongjiang, North (DPRK) and South (ROK) Korea.

Note. *Rhyacophila angulata* is known for Tuva from the Verkhni Yenisei and Bol'shoi Yenisei river basins [Zaika, 2012].

Stenopsychidae Martynov, 1924

Stenopsyche marmorata Navás, 1920

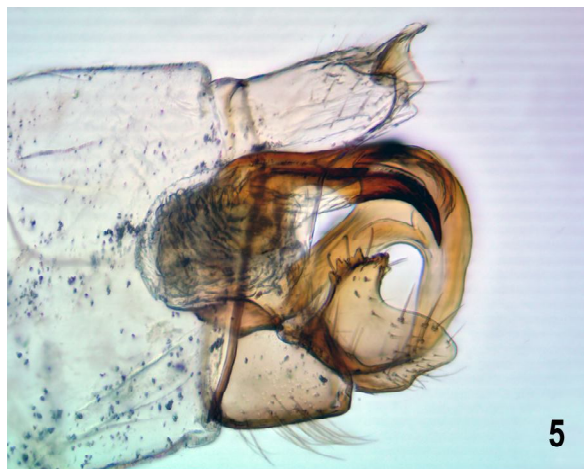
Material. 12♂♂, 4♀♀.

Distribution. Russia: NVS, ALT, ALI, KEM, KHK, KYA, TUV, IRK, BUR, SAH (southern part), AMU, YEV, KHA (southern part), PRI, SAK (Sakhalin, Iturup, Kunashir and Shikotan islands); Kazakhstan: East Kazakhstan Region, Mongolia, China, North (DPRK) and South (ROK) Korea, Japan.

Note. This species is known in Tuva only from the Verkhni Yenisei River basin [Grese, 1957].

Discussion

Currently, fauna of caddisflies in the Bol'shoi Yenisei River basin includes 44 species from 12 families [Zaika, 2012; Kuzhuget, 2021], of which eight species, *S. marmorata*, *G. nylanderi*, *S. pulcher*, *L. albardanum*, *G. squamifera*, *A. contumax*, *A. lap-*



Figs 5–6. *Setodes pulcher* Martynov, 1910, male genitalia structures. 5 — lateral view; 6 — dorsal view. Photo by S.V. Dragan.

Рис. 5–6. Структуры гениталий самца *Setodes pulcher* Martynov, 1910. 5 — сбоку; 6 — сверху. Фото С.В. Драгана.

ponicus and *L. bicornis*, are firstly registered for this area and five species, *S. pulcher*, *L. albardanum*, *G. squamifera*, *A. contumax* and *L. bicornis* for Tuva. In result, 99 caddisfly species are known for Tuva. *L. bicornis* is registered in the Eastern Palearctic for the first time.

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Figs 7–8. *Lenarchus bicornis* (McLachlan, 1880), male genitalia structures. 7 — caudal view; 8 — lateral view. Photo by S.V. Dragan.

Рис. 7–8. Структуры гениталий самца *Lenarchus bicornis* (McLachlan, 1880). 7 — каудально; 8 — сбоку. Фото С.В. Драгана.

wildlife».

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