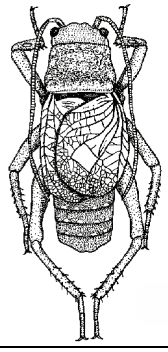

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NEW DATA ON THE FUNGUS GNATS (DIPTERA: KEROPLATIDAE AND MYCETOPHILIDAE) OF YAKUTIA WITH DESCRIPTION OF THREE NEW SPECIES

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Summary. New data on the fauna of the fungus gnats families Keroplatidae and Mycetophilidae of Yakutia is given. Thirty six species have been registered, including 20 species new to the region, bringing the total number of Yakut species to 86. Three species are reported for the first time from the Asian part of the Palaearctic region, and one species is new for Russia and Eurasia. Three species, *Macrorrhyncha nocticolor* **sp. n.**, *Docosia fasciculata* **sp. n.** and *Pseudexechia endybalensis* **sp. n.** are described from Yakutia. Species diversity in the republic and relative knowledge on the fauna of different regions are briefly discussed.

Key words: fungus gnats, taxonomy, new species, fauna, North-East Russia.

А. В. Полевой, Н. К. Потапова. Новые данные о фауне грибных комаров (Diptera: Keroplatidae и Mycetophilidae) Якутии с описанием трех новых видов // Дальневосточный энтомолог. 2023. N 478. С. 1-22.

Резюме. Приводятся новые данные о фауне грибных комаров семейств Keroplatidae и Mycetophilidae Якутии. Зарегистрировано 36 видов, в том числе 20 новых для региона, что позволило увеличить общее число якутских видов до 86. Три вида впервые обнаружены в азиатской части Палеарктического региона, один вид – в России и Евразии. Описаны три новых для науки вида: *Macrorrhyncha nocticolor* **sp. n.**, *Docosia fasciculata* **sp. n.** и *Pseudexechia endybalensis* **sp. n.** Кратко обсуждается видовое разнообразие и изученность фауны различных регионов республики.

INTRODUCTION

Yakutia is the largest region of Russia, with an area of 3 million sq. km. The territory of Yakutia falls mainly within tundra and taiga landscape zones, with two types of vegetation: arctic (26%) and boreal (74%) (Andreev, 1987). More than two thirds of the territory is occupied by mountains located in the east, southeast, and northwest of the region, while vast lowland plains lie in the north and center (Korzhuev, 1965).

The first information on fungus gnats of Yakutia was received by the Russian Polar Expedition (1900–1902). Three new species have been described from the materials collected on the island of New Siberia (Lundström, 1915). In 1925–1928, a commission for the study of the productive forces of the Yakut ASSR worked in the region, but these materials remained unexplored for a long time. Much later, after the treatment of specimens collected by N. Moskvin, an employee of the Yakut Local History Museum, the Mycetophilidae fauna of Yakutia was supplemented by one species from the vicinity of the village of Namtsy (Polevoi & Salmela, 2016).

After a long break, the collecting of fungus gnats in Yakutia resumed in the 1970–1980s. The well-known dipterologist K. Gorodkov (Zoological Institute of the Russian Academy of Sciences, St. Petersburg) visited Yakutia twice. He traveled along the lower courses of the rivers Lena (Kyusyur, Tiksi) and Yana (Nizhneyansk) in July and August 1957. In 1974, his route ran from the New Siberian Islands, via the Cherskii Ridge (Balagannakh on the Nera River) and the eastern part of Central Yakutia (Teplyi Klyuch) to the Aldan Highlands (Aldan) and the Stanovoy Ridge (Nagornyi). In the extensive material collected by him, specialists identified 14 species of fungus gnats (Blagoderov, 1992; Zaitzev, 1994; Polevoi & Salmela, 2016).

A notable contribution to the study of fungus gnats in the region was made by V. Blagoderov (formerly, the Paleontological Institute of the Russian Academy of Sciences, Moscow). In 1988–1989, he collected 50 species in the vicinity of Kyusyur, Zhigansk, and Kempendyai, and described three species new to science (Blagoderov, 1990, 1992). Finally, three species, including one new to science, were discovered in 1990 by researchers from the Institute of Animal Systematics and Evolution of the Polish Academy of Sciences (Krakow) in the vicinity of Dzhebariki-Khaya (Krzemińska & Klimont, 2011).

Thus, 66 species of fungus gnats from the families Bolitophilidae, Keroplatidae, and Mycetophilidae have been registered in Yakutia until recently. Here we present

the results of the treatment of recent materials from the territory of the republic, including a single specimen of a previously unpublished species found in the collection of the Zoological Institute of the Russian Academy of Sciences (St. Petersburg).

MATERIAL AND METHODS

Collecting localities (Fig. 1; Table 1) are distributed over seven biogeographical regions, delimited according to Vinokurov (2020), and briefly described below. Average temperatures are given according to Smirnova (1989).

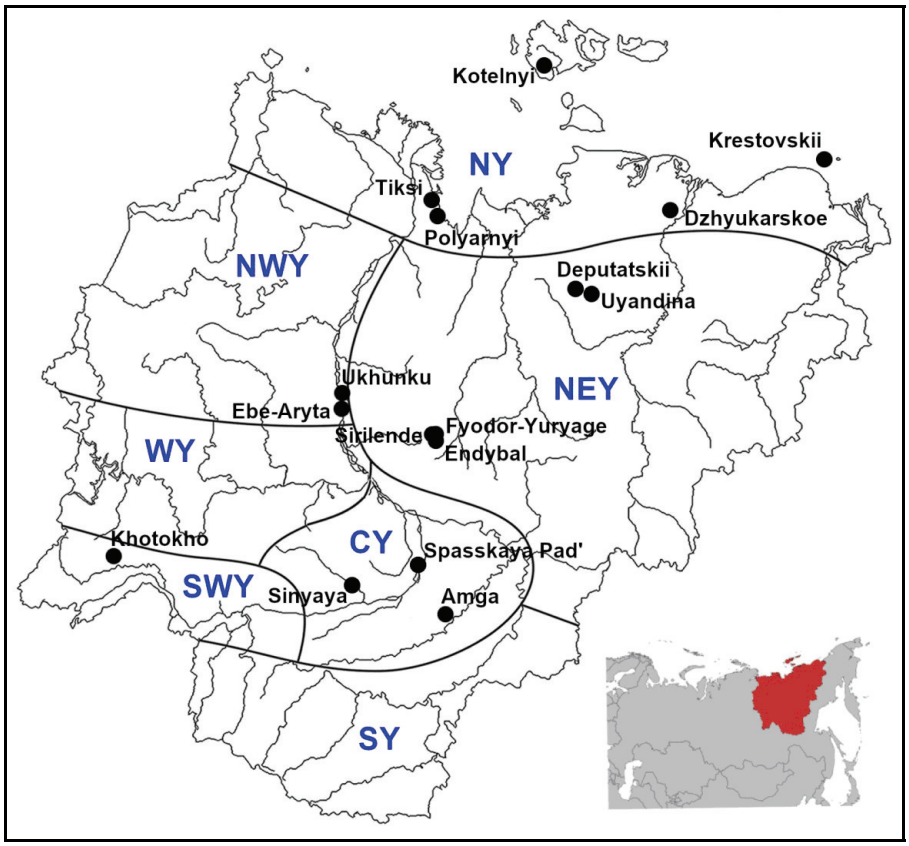


Fig. 1. Collecting localities in Yakutia.

North Yakutia (NY). The region occupies the territory along the coasts of the Laptev and East Siberian Seas. It is located in the tundra and forest tundra zones, and characterized by a harsh climate with the high probability of summer frosts. The average temperature values near Tiksi reach -38.3°C in January and +8.9°C in July. Materials were mainly collected in the arctic and subarctic tundra.

Table 1. Collecting localities. The short locality name, used in the species list and map, is given in parentheses.

Locality	Coordinates	Habitat
North Yakutia		
New Siberian Islands, Island Kotelnyi (Kotelnyi)	74.909°N, 138.489°E	Polygonal arctic desert
Island Krestovskii (Krestovskii)	70.866°N, 160.589°E	Border line between tundra and loose rocks
Lake Dzhyukarskoe, 40 km N of Chokurdakh (Dzhyukarskoe)	70.943°N, 148.007°E	Herb rich–dwarf–*Salix* tundra
Vicinities of Tiksi (Tiksi)	71.693°N, 128.816°E	Stony tundra
Placer Polyarnyi (Polyarnyi)	71.285°N, 129.376°E	Green moss and *Cassiope* slope
North-West Yakutia		
River Lena, Island Ebe-Aryta, 80 km S of Zhihansk (Ebe-Aryta)	66.191°N, 123.807°E	*Equisetum–Salix* stand; herb rich meadow
River Ukhunku, 30 km NNE of Zhigansk (Ukhunku)	66.044°N, 123.593°E	
North-East Yakutia		
River Sirilende (Sirilende)	65.684°N, 130.057°E	Steppe herb rich meadow on slope
River Fyodor-Juryage (Fyodor-Juryage)	65.702°N, 130.168°E	Herb rich floodplain meadow
River Endybal, mouth (Endybal)	65.621°N, 130.277°E	Herb rich meadow in *Chosenia* stand; herb rich meadow
River Uyandina, Dyargalakh, 11 km SSE of Uyandi (Uyandina)	69.217°N, 141.016°E	herb rich meadow on slope
Deputatskii (Deputatskii)	69.341°N, 139.950°E	Tundra
	Central Yakutia	
River Sinyaya (Sinyaya)	61.599°N, 126.148°E 61.586°N, 126.177°E	Hummoky sedge meadow; herb rich meadow
Amga-Yakutsk highroad, 17 km from Amga (Amga)	60.95°N, 131.72°E	
Field station Spasskaya Pad', 25 km N of Yakutsk (Spasskaya Pad')	62.300°N, 129.667°E	*Larix* forest
	South West Yakutia	
River Khotokho, middle part (Khotokho)	61.032°N, 13.482°E 61.022°N, 113.430°E 61.064°N, 113.367°E	*Picea* and *Larix* forest; herb rich flood plain meadow

North-West Yakutia (NWY). The region covers the areas between the Anabar, Olenek, and Lena Rivers. Moss and moss-lichen *Larix* sparse forests dominate the vegetation in the area. The climate is characterized by low temperatures. The average temperatures in Zhigansk reach -39.3°C in January and +15.9°C in July. Materials were primarily collected in river valley forest complexes.

North-East Yakutia (NEY). A large region that occupies the territory of the Yana, Indigirka, and Kolyma River basins. It is separated from the western regions by a system of ridges in the Verkhoyansk mountain country. The area is dominated by northern taiga *Larix cajanderi* sparse forests (Kuznetsova, 2005). A significant part of this region is occupied by mountains, which results in low air temperatures. The average temperatures in Deputatskii reach -39.4°C in January and +11.6°C in July.

West Yakutia (WY). The region occupies the basin of the upper and middle courses of the Vilyui River. The climate is wormer than in the northern regions. The average temperatures, near Kempendyai reach -27.1°C in January and +24.7°C in July. The predominant communities in the region are *Larix* forests growing on dry sandy-loam soils.

Central Yakutia (CY). The region lies mainly within the Central Yakut Plain. According to the forest site delimitation (Scherbakov, 1975; Timofeev *et al*., 1994), it belongs to the Central Yakutia province of *Pinus* and *Larix* taiga. The region is characterized by low winter and high summer temperatures. In Yakutsk, the average temperature values reach -37.7°C in January and +25.2°C in July.

South-West Yakutia (SWY). The region occupies part of the Lena Plateau. It is characterized by more productive *Larix* forests, and its boundaries coincide with the distribution of *Abies sibirica* and *Pinus sibirica* (Kuznetsova, 2005). Average temperatures in Lensk reach -24.4°C in January and +24.7°C in July.

South Yakutia (SY). The northern boundary of the area passes above the middle course of the Aldan River, and crosses the Olekma and Tokko Rivers in their middle courses. Bordered from the south by the Stanovoi Ridge, and from the northeast by the Sette-Daban Ridge. The region occupies the southern mountain part of the middle taiga subzone, where predominating communities are represented by mountain forests with *Larix cajanderi* and a significant admixture of dark conifers (Kuznetsova, 2005). The average temperatures in Nagornyi reach -24.9°C in January and +22.1°C in July.

All materials were initially kept on cotton-wool layers. During the treatment, specimens were carefully removed from the layers and pinned. Terminalia have been dissected and treated using standard procedure (macerating in KOH, followed by neutralization in acetic acid, and placing in glycerin). Finally, dissected terminalia were moved to glycerin filled microvials and pinned together with the rest of the specimen. Z-stacked images of male terminalia were obtained with a Leica DM1000 compound microscope equipped with a LOMO MC-6.3 digital camera.

Images were combined using Helicon Focus software, and final plates were prepared in GIMP. The morphological terminology follows Matile (1990) for Keroplatidae and Søli (2017) for Mycetophilidae. Male terminalia parts are labeled

based on recent species descriptions in the appropriate genera (Kjærandsen, 2009; Kjærandsen & Chandler, 2011; Ševčík *et al*., 2020). Diagnostic characters are designated in the illustrations.

Selected specimens have been barcoded. Sequencing has been carried out at the Center for Biodiversity Genomics (University of Guelph, Canada), and results have been made available via a public dataset at the BOLDSYSTEMS portal (http://boldsystems.org). The search engine at the portal can be used to obtain details on the BOLD identification numbers (BINs) mentioned in the text as well as information on the tentative distribution of some species in the Holarctic region, based on DNA data.

Materials are stored in the following collections: FRIP – Forest Research Institute (Petrozavodsk, Russia), IBPC – Institute for Biological Problems of Cryolithozone (Yakutsk, Russia), ZISP – Zoological Institute (Saint-Petersburg, Russia).

THE LIST OF SPECIES

Thirty six species have been registered, including 20 species new for Yakutia. This brings the total number of Yakut species to 86. Three species reported for the first time from the Asian part of the Palaearctic region, and one species – from Russia and Eurasia. Three species described here as new for science. The family and subfamily order follows (Kjærandsen *et al*., 2007), species are listed in alphabetic order. Three species of *Exechia* similar to *E. spinuligera* Lundstrom, 1912 could not be reliably identified and not treated here, pending the revision of the whole group. Species reported for the first time from Yakutia are marked with an asterisk (*), those new to the Palaearctic region – with two asterisks (**).

Family Keroplatidae

Subfamily Keroplatinae

Tribe Orfeliini

***Orfelia lugubris* (Zetterstedt, 1851)**

MATERIAL. Sinyaya, 8.VIII 2018, 1 ♂, Yu. Ermakova [ZISP].

DISTRIBUTION. Europe: widely distributed, reaching Arkhangelsk region of Russia to the east (Jakovlev *et al*., 2014; Humala & Polevoi, 2022). First record from Yakutia and Asian part of the Palaearctic region.

Family Mycetophilidae

Subfamily Mycomyinae

***Mycomya* (*Mycomya*) *fornicata* (Lundstrom, 1911)**

MATERIAL. Endybal, 1.VIII 2015, 2 ♂, A. Popov [FRIP]; 1 ♂, Sirilende, 7.VIII 2015, A. Popov [IBPC]; Khotokho, 11.VIII 2018, 6 ♂, A. Burnasheva [FRIP, ZISP].

DISTRIBUTION. Palaearctic: Alpine region of the West Europe, East Fennoscandia (Karelia), North and East Russia (Jakovlev *et al*., 2014; Polevoi *et al*., 2020). In Yakutia earlier reported from NY: Kyusyur (Blagoderov, 1992), CY: Dzhebariki-Khaya (Krzemińska & Klimont, 2011), SY: Aldan (Zaitzev, 1994).

REMARKS. Assigned to BIN BOLD:AEO8048, with distance 7.61% to the nearest BIN, containing *Mycomya trivittata* (Zetterstet, 1838) from Europe and unidentified *Mycomya* from Canada.

***Mycomya* (*Mycomya*) *fuscata* (Winnertz, 1864)**

MATERIAL. Fyodor-Juryage, 10.VIII 2015, 1 ♂, A. Popov [IBPC].

DISTRIBUTION. Holarctic: mostly northern, possibly a boreal-mountainous (Jakovlev *et al*., 2014). In Yakutia earlier reported from NY: Kyusyur (Blagoderov, 1992).

******Mycomya* (*Mycomya*) *ornata* (Meigen, 1818)**

MATERIAL. Endybal, 1–2.VIII 2015, 2 ♂, A. Popov [FRIP, IBPC].

DISTRIBUTION. Palaearctic: widely distributed. First record from Yakutia.

Subfamily Sciophilinae

****Sciophila canadensis* Zaitzev, 1982**

Figs 2–7

MATERIAL. Kotelnyi, 2.VIII 2017, 1 ♂, A. Protopopov [FRIP].

DISTRIBUTION. Described and so far only known from Canada (Zaitzev, 1982). It is first record from Yakutia, Russia and the Palaearctic Region. DNA data and new record may suggest wider circumpolar distribution.

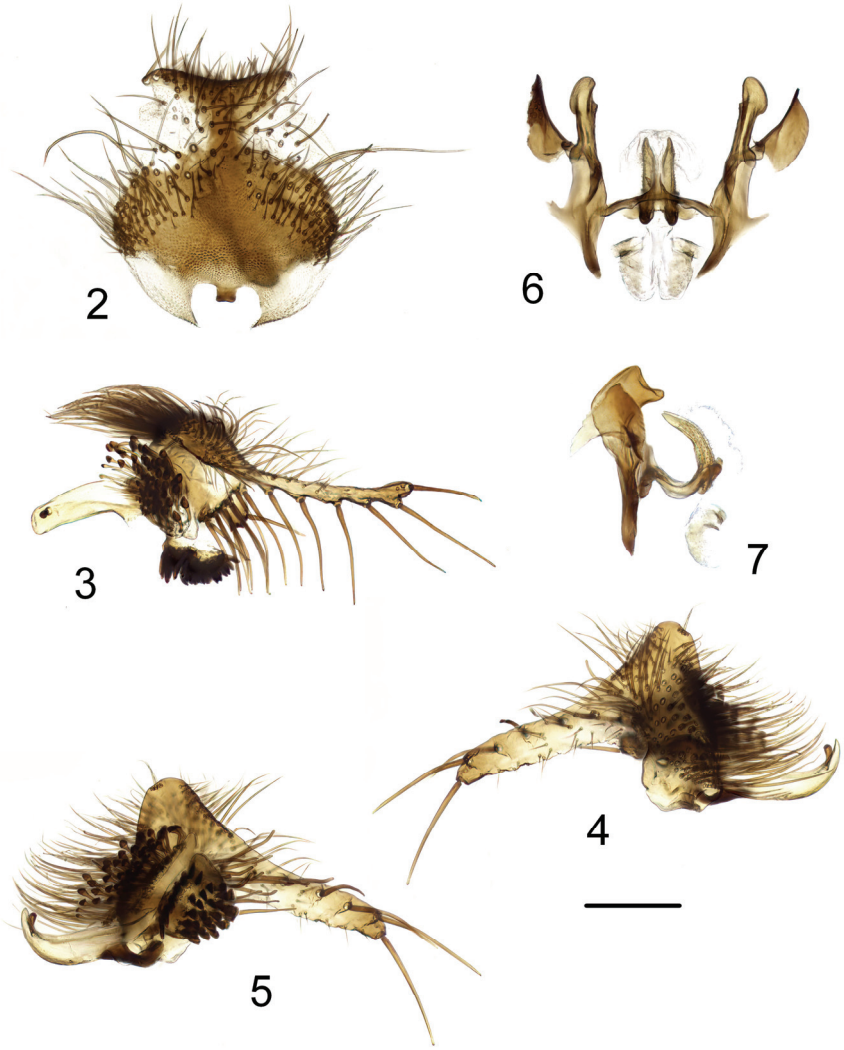
REMARKS. Assigned to BIN BOLD:ACR5851 along with unidentified *Sciophila* from Canada (Yukon Territory) and another specimen in private record, with distance 5.63% to the nearest BIN BOLD:ACR6891, containing unidentified *Sciophila* from Canada. The structure of male terminalia agrees well with figures by Zaitzev (1982: Fig. 5: 3, 4). The availability of genetically similar specimen from a place quite near one of the paratype's locality (Herschel Island) leaves no doubt about species identity. Here we illustrate additional details of male terminalia (Figs 2–7) not figured in the original description.

Subfamily Gnoristinae

***Boletina birulai* Lundstrom, 1915**

MATERIAL. Kotelnyi, 2–4.VIII 2017, 3 ♂, A. Protopopov [FRIP, ZISP].

DISTRIBUTION. Holarctic: USA, Canada and North Russia (Polevoi *et al*., 2020). In Yakutia known only from NY: New-Siberian Islands.



Figs 2–7. Details of male terminalia of *Sciophila canadensis* Zaitzev. 2 – tergite 9; 3 – gonostylus, caudal view; 4 – gonostylus, lateral view; 5 – gonostylus, mesial view; 6 – aedeagal apparatus, dorsal view; 7 – aedeagal apparatus, lateral view. Scale bar = 0.2 mm.

******Boletina dissipata* **Plassmann, 1986**

MATERIAL. Khotokho, 11.VIII 2018, 1 ♂, A. Burnasheva [ZISP].

DISTRIBUTION. Palaearctic: Fennoscandia, Austria and Slovenia (Kjærandsen *et al*., 2007). First record from Yakutia and Asian part of the Palaearctic Region. DNA data point to the presence and wide distribution of this species also in the North Nearctic.

******Boletina hedstroemi* **Polevoi et Hedmark, 2004**

MATERIAL. Fyodor-Juryage, 10.VIII 2015, 1 ♂, A. Popov [IBPC].

DISTRIBUTION. Palaearctic: Fennoscandia and North Russia (Polevoi *et al*., 2020). First record from Yakutia. DNA data point to the presence of this species also in the North Nearctic.

******Boletina jamalensis* **Zaitzev, 1994**

MATERIAL. Sirilende, 5–7.VIII 2015, 2 ♂, A. Popov [FRIP, IBPC].

DISTRIBUTION. Palaearctic: Fennoscandia and North Russia (Polevoi, 2013). First record from Yakutia.

******Boletina palmata* **Polevoi, 2013**

MATERIAL. Sirilende, 5.VIII 2015, 2 ♂, A. Popov [FRIP, IBPC].

DISTRIBUTION. Palaearctic: Fennoscandia and North Russia (Polevoi *et al*., 2020). First record from Yakutia. DNA data point to presence and wide distribution of this species also in the North Nearctic.

******Boletina pseudonitida* **Zaitzev, 1994**

MATERIAL. Sirilende, 7.VIII 2015, 1 ♂, A. Popov. [IBPC].

DISTRIBUTION. Palaearctic: North Fennoscandia, East and North East Russia (Polevoi & Barkalov, 2017). First record from Yakutia. DNA data point to presence of this species also in the North Nearctic.

***Boletina tiroliensis* Plassmann, 1980**

MATERIAL. Sirilende, 7.VIII 2015, 1 ♂, A. Popov. [IBPC].

DISTRIBUTION. Palaearctic: Austria, Fennoscandia and North Russia (Polevoi *et al.*, 2020). In Yakutia has been reported from SY: Nagornyi (Zaitzev, 1994).

******Katatopygia sahlbergi* **(Lundstrom, 1906)**

MATERIAL. Sirilende, 7.VIII 2015, 1 ♀, A. Popov [IBPC]; Fyodor-Juryage, 10.VIII 2015, 2 ♀, A. Popov [FRIP, IBPC].

DISTRIBUTION. Holarctic: widely distributed.

***Coelosia tenella* (Zetterstedt, 1852)**

MATERIAL. Sirilende, 7.VIII 2015, 1 ♂, A. Popov [IBPC].

DISTRIBUTION. Holarctic: widely distributed. In Yakutia earlier reported from NY: Kyusyr and WY: Kempendyai (Blagoderov, 1992).

Subfamily Leiinae

******Leia bilineata* **(Winnertz, 1864)**

MATERIAL. Amga, 13.VIII 1925, 1 ♂, L. Bianki [ZISP].

DISTRIBUTION. Palaearctic: widely distributed. First record from Yakutia.

***Leia nigricornis* Van Duzee, 1928**

MATERIAL. Fyodor-Juryage, 10.VIII 2015, 1 ♂, A. Popov [IBPC].

DISTRIBUTION. Holarctic: few scattered records from USA, Finland and East Russia. In Yakutia reported from NEY: Teplyi Klyuch (Polevoi & Salmela, 2016).

Subfamily Mycetophilinae

Tribe Exechiini

******Allodia septentrionalis* **Hackman, 1971**

MATERIAL. Dzhyukarskoe, 27.VI–2.VII 2017, 1 ♂, A. Burnasheva [FRIP].

DISTRIBUTION. Palaearctic: widely distributed. First record from Yakutia. DNA data suggest Holarctic distribution.

******Brevicornu fuscipenne* **(Staeger, 1840)**

MATERIAL. Ebe-Aryta, 15.VIII 2013, 1 ♂, A. Popov [FRIP].

DISTRIBUTION. Holarctic: widely distributed. First record from Yakutia.

***Cordyla murina* (Winnertz, 1864)**

MATERIAL. Polyarnyi, 21–23.VII 2018, 6 ♂, A. Burnasheva [FRIP, ZISP]; Spasskaya Pad', 24.VII–20.VIII 2003, 4 ♂, A. Popov [FRIP, ZISP].

DISTRIBUTION. Palaearctic: widely distributed. In Yakutia earlier reported from NWY: Zhigansk (Blagoderov, 1992).

REMARKS. In the interpretation of this species we follow Zaitzev (2003: Fig. 23: 2, 6).

***Exechia frigida* (Boheman, 1865)**

MATERIAL. Dzhyukarskoe, 22–27.VI 2017, 1 ♂, A. Burnasheva [ZISP]; Kotelnyi, 4.VIII 2017, 1 ♂, A. Protopopov [ZISP]; Polyarnyi, 21–23.VII 2018, 2 ♂, A. Burnasheva [ZISP]; Deputatskii, 10–11.VII 2009, 1 ♂, A. Stepanov [ZISP]; Krestovskii, 12–16.VIII 2021, 3 ♂, A. Burnasheva [FRIP].

DISTRIBUTION. Holarctic: widely distributed. In Yakutia earlier reported from NY: Kyusyur (Blagoderov, 1992).

***Exechia separata* Lundstrom, 1912**

MATERIAL. Sirilende, 7.VIII 2015, 1 ♂, A. Popov [IBPC]; Ukhunku, 25.VI 1992, 1 ♂, [ZISP]; Polyarnyi, 21–23.VII 2018, 8 ♂, A. Burnasheva [FRIP].

DISTRIBUTION. Holarctic: widely distributed. In Yakutia earlier reported from NY: Kyusyur and NWY: Zhigansk (Blagoderov, 1992).

******Exechia similis* **Lastovka et Matile, 1974**

MATERIAL. Endybal, 1.VIII 2015, 2 ♂, A. Popov [IBPC, ZISP].

DISTRIBUTION. Palaearctic: from Europe to West Siberia and Mongolia (Polevoi *et al*., 2020). First record from Yakutia. DNA data suggest circumpolar distribution.

***Exechia unimaculata* (Zetterstedt, 1860)**

MATERIAL. Endybal, 1–2.VIII 2015, 2 ♂, 2 ♀, A. Popov [FRIP, IBPC]; Polyarnyi, 21–23.VII 2018, 1 ♂, A. Burnasheva [ZISP].

DISTRIBUTION. Palaearctic: North Europe, North and East Russia (Polevoi *et al*., 2020). In Yakutia earlier reported from NY: Kyusyur (Blagoderov, 1992). DNA data suggest circumpolar distribution.

***Exechiopsis indecisa* (Walker, 1856)**

MATERIAL. Endybal, 1.VIII 2015, 1 ♂, A. Popov [IBPC].

DISTRIBUTION. Palaearctic: widely distributed. In Yakutia earlier reported from NY: Kyusyur (Blagoderov, 1992). DNA data suggest circumpolar distribution.

***Tarnania tarnanii* (Dziedzicki, 1910)**

MATERIAL. Tiksi, 19.VII 2018, 1 ♂, A. Burnasheva [ZISP].

DISTRIBUTION. Holarctic: widely distributed. In Yakutia earlier reported from NY: Kyusyur (Blagoderov, 1992).

Tribe Mycetophilini

****Mycetophila abbreviata* Landrock, 1914**

MATERIAL. Sinyaya, 12.VIII 2018, 1 ♂, Yu. Ermakova [ZISP].

DISTRIBUTION. Palaearctic: widely distributed. First record from Yakutia.

******Mycetophila evanida* Lastovka, 1972**

MATERIAL. Fyodor-Juryage, 10.VIII 2015, 1 ♂, A. Popov [FRIP]; Polyarnyi, 21–23.VII 2018, 1 ♂, A. Burnasheva [ZISP].

DISTRIBUTION. Holarctic: Greenland, North Russia, Mongolia (Polevoi *et al*., 2020). First record from Yakutia.

***Mycetophila fungorum* (De Geer, 1776)**

MATERIAL. Endybal, 1.VIII 2015, 1 ♂, A. Popov [IBPC].

DISTRIBUTION. Holarctic and Oriental: widely distributed. In Yakutia reported from NWY: Zhigansk and WY: Kempendyai (Blagoderov, 1992), but these records need confirmation as may refer to other species in *Mycetophila fungorum* group.

******Mycetophila riparia* Chandler, 1993**

MATERIAL. Spasskaya Pad', 20.VIII 2003, 1 ♂, A. Popov [FRIP]; Endybal, 2.VIII 2015, 1 ♂, A. Popov [FRIP]; Sirilende, 7.VIII 2015, 1 ♂, A. Popov [IBPC].

DISTRIBUTION. Holarctic: East Russia, USA (Polevoi *et al*., 2020). First record from Yakutia.

******Phronia exigua* **(Zetterstedt, 1852)**

MATERIAL. Spasskaya Pad', 20.VIII 2003, 1 ♂, A. Popov [FRIP]; Ebe-Aryta, 15.VIII 2013, 1 ♂, A. Popov [ZISP].

DISTRIBUTION. Holarctic: widely distributed. First record from Yakutia.

DESCRIPTIONS OF NEW SPECIES

Macrorrhyncha nocticolor **Polevoi, sp. n.**

https://zoobank.org/NomenclaturalActs/3205A079-F374-4555-A185-DE3988B2D4EE

Figs 8–14

TYPE MATERIAL. Holotype – ♂, **Russia**: Yakutia, River Uyandina, Dyargalakh, 11 km SSE of Uyandi, 69.217° N, 141.017° E, 175 m, 8.VIII 2017, A. Popov leg. [ZISP, INS_DIP_0001008].

DIAGNOSTIC CHARACTERS. Medium-sized species with almost completely black body, brownish legs and transparent wings. Resembles several European species (*Macrorrhyncha guichardi* Chandler, 1994; *M. veleka* Bechev, 1992; *M. geranias* (Loew, 1870); *M. atticae* Kurina, 2004) by black body color and bare mediotergite, but distinguished by the structure of male terminalia, especially the wide triangular dorsal process of gonocoxites, bearing 5 setae medially. Generally black North American *Macrorrhyncha coxalis* (Loew, 1870) has scutellum yellow laterally and darkened knob of halter, while in new species scutellum is completely black and halter is uniformly brown.

DNA BARCODE BIN REGISTRY. Uniquely assigned to BIN BOLD:AEO8712, with distance 7.22% to the nearest BIN BOLD:AEJ6886, containing unidentified Keroplatidae.

DESCRIPTION. Male. Head black. Face, clypeus and mouthparts black. Distance from ventral margin of eye to tip of labellum 1.8 times as long as eye height. Antenna black, fifth flagellomere 1.3 times as long as wide. Palpi black.

Thorax. Mesonotum black with yellow humeral callus. Thinly gray dusted but more or less shining in posterior view, with irregularly biserial ac, 2–4 serial ds and numerous setae along lateral margins. All setae are black. Pleurae black. Laterotergite and mediotergite bare. Scutellum black.

Wing. Length 3.83 mm. Wing hyaline, veins yellowish-brown. C extending approximately to the middle between tips of R5 and M1. Sc ending free opposite the base of Rs. Distance between tips of R1 and R4 about as long as R4. Radiomedial fusion 0.3 times as long as stem of M1-M2. All veins with macrotrichia, except bare Sc, Rs, R4, base of M1 and M2, stem of M1-M2, tb, mcu and basal part of Cu1b. Halter brown.

Legs brownish yellow. Fore tibia with 0–1 p and 1 pv setae; mid tibia with 6 ad, 0–1 d, 2–3 pd, 3 p, 6 pv, 1–3 av setae; hind tibia with 5 ad, 3 d, 5 pd, 5 p, 4 pv and 4 av setae. Tibial spurs blackish; fore, and mid tibia with one spur, hind tibia with two spurs of equal length. Ratio of tibia to basitarsus for fore and hind leg: 1.37; 1.68.

Abdomen black, with black hairs.

Figs 8–10. Male terminalia of *Macrorrhyncha nocticolor* sp. n. 8 – ventral view; 9 – lateral view; 10 – dorsal view. Scale bar = 0.2 mm.

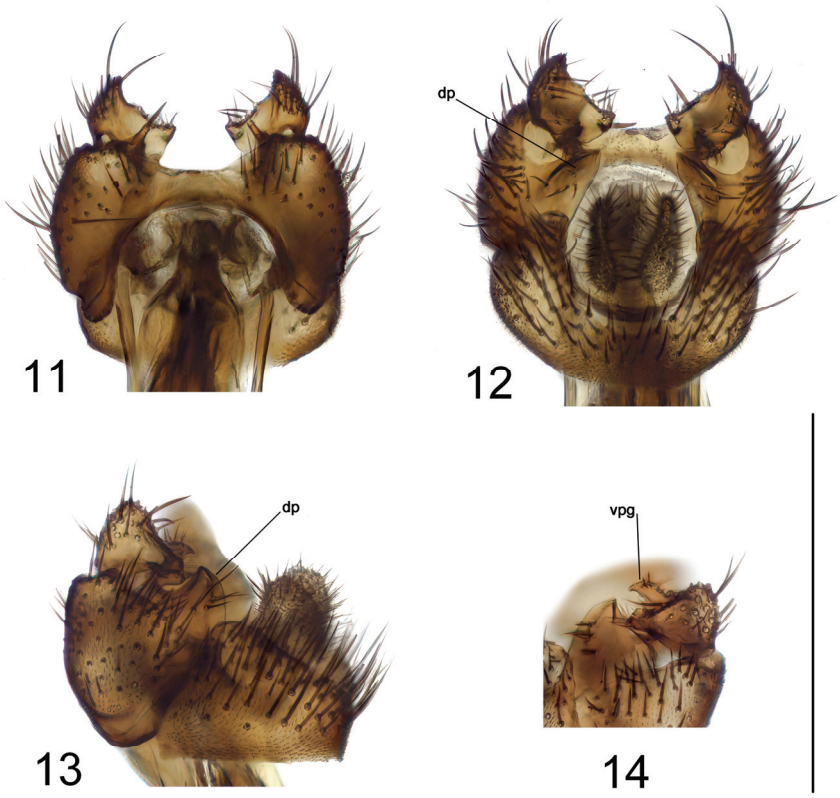
Terminalia black. Gonocoxites with median bridge about one fourth as high as the height of gonocoxite (Figs 8, 11); inner process short with a strong apical seta (Fig. 11); dorsal process triangular, bearing five setae medially (Figs 12, 13). Tergite 9 rounded, concave posteriorly (Fig 10, 12). Gonostylus with three strong setae on inner surface and ventral process projecting mesially (Figs 12, 14). Aedeagal complex long, with laterally compressed membranous plate and three pairs of associated apodemes (Figs 8–10).

TAXONOMIC REMARKS. Possibly closely related species *Macrorrhyncha coxalis* has been described by a single female (Loew, 1870: 132). Johannsen (1910) mentions one male from Canada, but provides only brief description of male terminalia, which is not sufficient for adequate comparison with new species.

DISTRIBUTION. So far known only from the type locality in the North-East Yakutia.

HABITAT AND BIOLOGY. Collected in herb rich meadow on slope. Larval biology unknown.

ETYMOLOGY. The species epithet (from Latin *nocticolor* – night colored) refers to black body color.



Figs 11–14. Male terminalia of *Macrorrhyncha nocticolor* sp. n. (enlarged). 11 – ventral view; 12 – dorsal view; 13 – lateral view; 14 – gonostylus, lateral view. Abbreviations: dp – dorsal process of gonocoxites; vpg – ventral process of gonostylus. Scale bar = 0.2 mm.

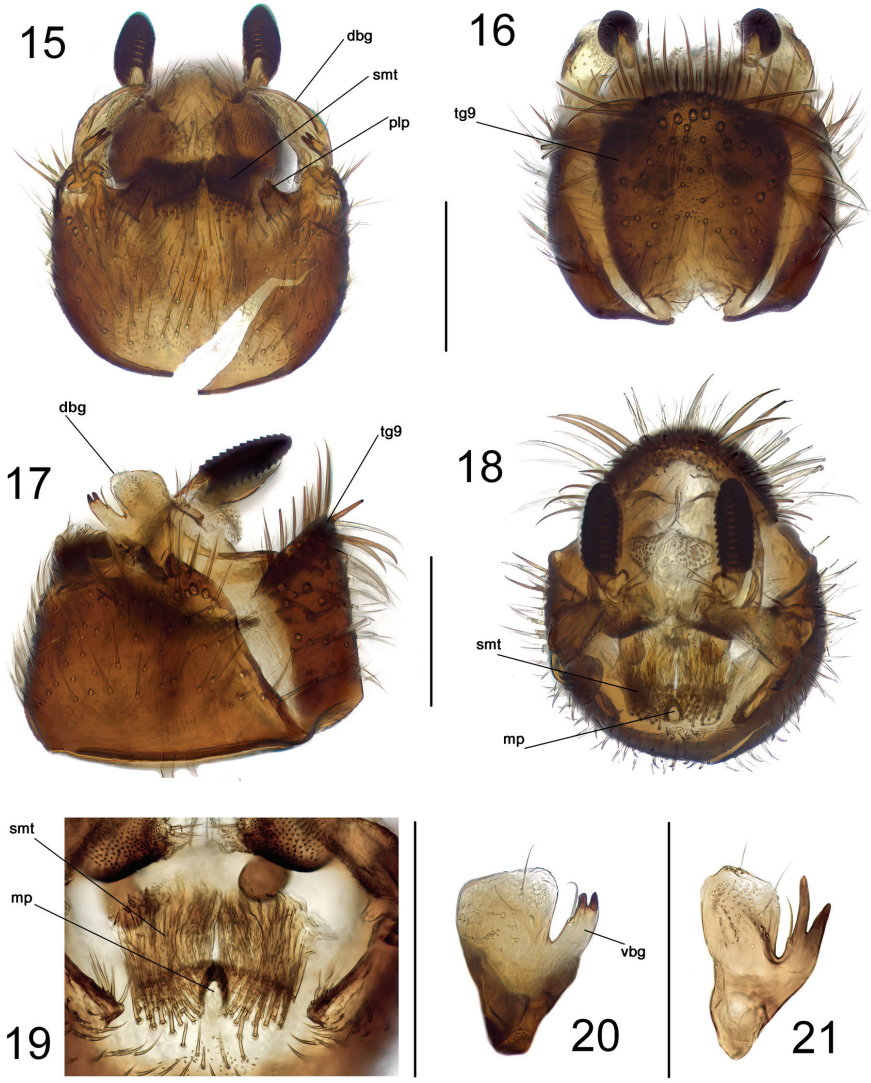
***Docosia fasciculata* Polevoi, sp. n.**

https://zoobank.org/NomenclaturalActs/219F5214-51D5-4D05-BA69-2F6413EF180F

Figs 15–20

TYPE MATERIAL. Holotype – ♂, **Russia**: Yakutia, River Khotokho, middle part, 61.064° N, 113.367° E, 315 m, 15.VIII 2018, A. Burnasheva leg. [ZISP, INS_DIP_0001009].

DIAGNOSTIC CHARACTERS. Small species with black body, partly darkened legs and transparent wings. Resembles *Docosia landrocki* Lastovka et Sevcik, 2006 and *D. caucasica* Kurina et Kirik, 2021 by dense submedian tufts of



Figs 15–21. Male terminalia of *Docosia* spp.: *D. fasciculata* sp. n. (15–20) and *D. mulleri* Plassmann (21). 15 – ventral view; 16 – dorsal view; 17 – lateral view; 18 – caudal view; 19 – posteroventral margin of gonocoxites, dorsocaudal view; 20, 21 – gonostylus, lateral view. Abbreviations: dbg – dorsal branch of gonostylus; mp – median process of gonocoxites; plp – posterolateral process of gonocoxites; smt – submedian tuft of modified setae; vbg – ventral branch of gonostylus. Scale bars = 0.2 mm.

modified setae on posteroventral margin of conocoxites (Kurina & Kirik, 2021: Figs 2 B, 3 B). Differs from both species by the shape of gonostylus. The latter is similar to that of *D. mulleri* Plassmann, 1986 (Fig. 21), but lacking deep apical excision on its ventral branch. Most of the Nearctic species of *Docosia* are poorly documented, but as we can judge from available descriptions and illustrations (Johannsen, 1912; Garrett, 1925; Van Duzee, 1928; Fisher, 1937; Taber, 2011, 2012, 2018) none of them is similar to new species.

DESCRIPTION. Male. Head, face and clypeus black. Three ocelli placed almost in line; lateral ocellus almost touching compound eye, separated from eye margins by less than half of their own diameter. Mouthparts black, palpi dark brown. Scape and pedicel dark brown (flagellum missing).

Thorax. Mesonotum, pleurae and scutellum black, with pale setae. Laterotergite and mediotergite bare. Haltere dark yellow.

Wing (partly missing). Length ca. 3 mm. Preserved part hyaline. Sc pale yellow, ends in R1. Radial veins and r-m dark brown.

Legs (partly missing). All coxae yellow and darkened basally. Trochanters blackish. Femora mostly yellow, fore and mid femur dark along entire ventral margin, hind femur darkened ventrally at base. Tibiae mostly yellow; fore and mid tibia darkened dorsally. Fore tarsus seem darker because of dense setae. Spur of fore and mid tibia yellow. Ratio of tibia to basitarsus for fore leg: 1.37.

Abdomen black with pale hairs.

Terminalia dark brown. Posteroventral margin of gonocoxites with short median and posterolateral processes; dense tufts of modified setae placed between them (Figs 15, 18); the setae in tufts are flattened and curved apically (Fig. 19). Tergite 9 slightly longer than wide; posterior margin rounded, bearing strong setae (Fig. 16). Gonostylus: dorsal branch trapezoid in lateral view; ventral branch bearing two short apical spines and one subapical seta (Figs 17, 20). Cercus with 13 combs of retinacula (Figs 17, 18).

DISTRIBUTION. So far known only from the type locality in the South-East Yakutia

HABITAT AND BIOLOGY. Collected in herb-rich flood plain meadow. Larval biology unknown.

ETYMOLOGY. The species epithet (from Latin *fasciculus* – bundle, packet, bunch) refers to distinctive submedian agglomerations of modified setae.

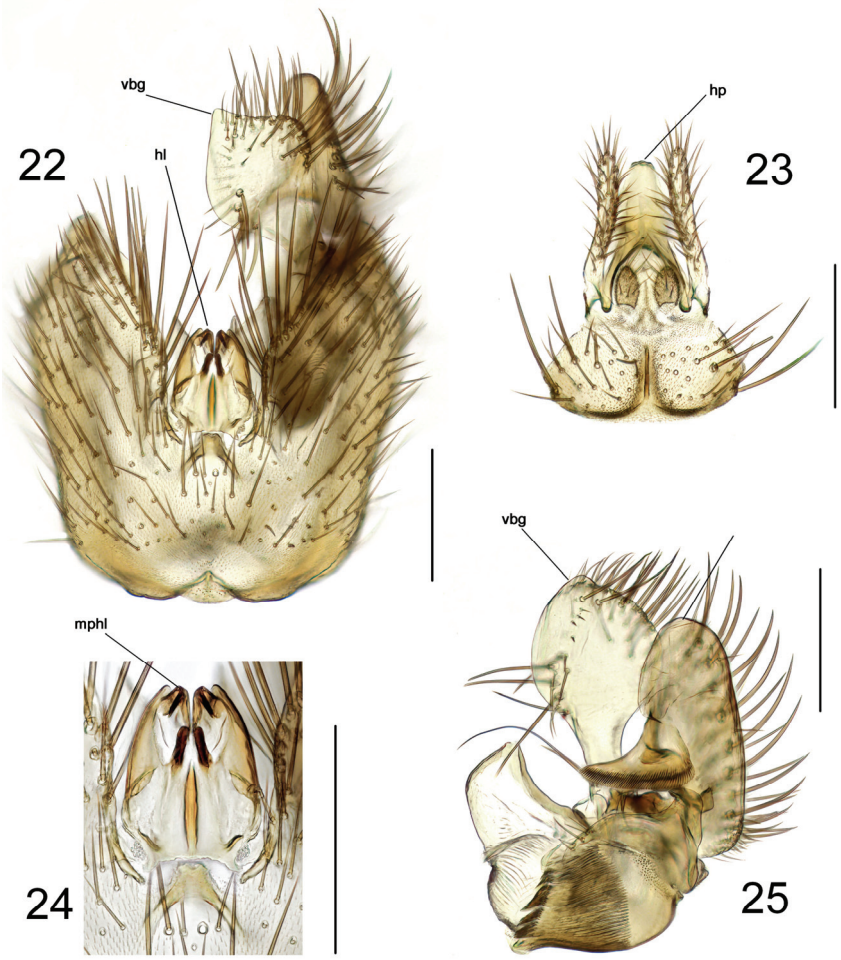
***Pseudexechia endybalensis* Polevoi, sp. n.**

https://zoobank.org/NomenclaturalActs/BD78E0BA-B135-4BC7-9DCC-717857DA190C

Figs 22–25

TYPE MATERIAL. Holotype – ♂, **Russia**, Yakutia, mouth of River Endybal, 65.621° N, 130.277° E, 730 m, 1.VIII 2015, A. Popov leg. [ZISP, INS_DIP_ 0001010].

DIAGNOSTIC CHARACTERS. Medium-sized brown species with, yellow legs and transparent wings. Belongs to *trisignata* group (Kjærandsen, 2009). Resembles *Pseudexechia tuomikoskii* Kjaerandsen, 2009 by the structure of male terminalia, but distinguished by the following characters (Figs 22–25): hypandrial lobe with medial projections not protruding beyond the apex of the lobe; tip of dorsal branch not whitish, ventral branch of gonostylus with small subtriangular apical projection and strong ventrolateral blunt (not fan-tipped) setae; hypoproct truncate apically (cf. Kjærandsen, 2009: Fig. 8 A–C).



Figs 22–25. Male terminalia of *Pseudexechia endybalensis* sp. n. 22 – ventral view; 23 – tergite 9; 24 – hypandrial lobe; 25 – gonostylus, mesial view. Abbreviations: hl – hypandrial lobe; hp – hypoproct; mphl – median projection of hypandrial lobe; vbg – ventral branch of gonostylus. Scale bar = 0.2 mm.

DESCRIPTION. Male. Head dark brown. Three ocelli in a shallow triangular arrangement. Lateral ocellus almost touching the margin of compound eye. Face and clypeus dark brown, mouthparts and palpi yellow. Antenna dark brown except yellow scape, pedicel and basal half of the first flagellomere. Fifth flagellomere about as long as broad.

Thorax. Mesonotum brown, thinly dusted. Scutellum brown. Pleurae brown except antepronotum, proepisternum and area around prothoracic spiracle. Laterotergite with few setae posteriorly, mediotergite bare. Halter yellow.

Wing. Length 3.29 mm. Veins brownish. Costa not produced beyond the tip of R5. Sc short, ends in R1. M-stem 1.06 as long as r-m. Base of posterior (M_4-CuA) fork lies distally to base of M1-M2 fork. R1 and R5 setose, other veins bare.

Legs (partly missing). Coxae, trochanters, femorae, tibiae and tarsi yellow. Mid tibia with 3 longer and 17 shorter a, 3 pd and 3 p. Ratio of tibia to basitarsus for mid leg: 1.18. Tibial spurs yellow.

Abdomen brown with brownish hairs.

Terminalia brown. Gonocoxite slightly longer than wide, with deep funnel shaped apical excavation, bearing numerous strong setae along mesial margin (Fig. 22). Hypandrial lobe subovate, median projections not produced beyond the apicolateral corners (Fig. 24). Gonostylus (Fig. 25): dorsal branch widely rounded apically, more or less uniformly sclerotized; dorsointernal branch forming a lamellate fan; ventral branch shaped as rounded spatula, with slightly protruding angular tip, ventrolaterally with 5 blunt-tipped setae; internal branch forming, striated cushion; anterior branch subrectangular, projecting caudally. Tergite 9 (Fig. 23) wide, with strong median suture. Pseudocercus long, setose. Cercus forming setose ovate knob. Hypoproct relatively long, truncate apically.

DISTRIBUTION. So far known only from the type locality in the North-East Yakutia.

HABITAT AND BIOLOGY. Collected in herb rich meadow in *Chosenia* stand. Larval biology unknown.

ETYMOLOGY. The Species epithet refers to the type locality, Endybal River.

DISCUSSION

The uneven sampling of the Yakut territory does not yet allow us to compare the fauna of different biogeographical regions adequately. We can only note that the northern parts of the republic are relatively well studied, while the data from the southern parts are practically absent (Fig. 26).

The observed diversity of fungus gnats is surprisingly low, given the rather long history of Diptera studies in Yakutia. In some northern regions of the Asian part of Russia, even relatively short-term researches revealed approximately the same or significantly greater species richness (Polevoi & Barkalov, 2017; Polevoi *et al*., 2020). In the well-studied northern regions of Europe, the number of known species exceeds 700–800 (Kjærandsen *et al*., 2007; Jakovlev, 2014; Kjærandsen & Søli, 2020). Earlier, it was noted that the fauna of some groups of Diptera was impoverished in

Yakutia, compared to the northern areas of the European part of Russia, probably due to extremely cold winters (Gorodkov, 1978). However, in our case, the reason is rather the practical absence of specialized studies. In fact, there is one faunistic work (Blagoderov, 1992), containing more or less substantial species list. In the other materials, fungus gnats were apparently only an incidental group. Taking into account the huge territory and landscape diversity, the currently known number of species may constitute only about one tenth of the potential fauna of Yakutia. Although some untreated materials may presumably be found in the collection of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg, it is difficult to expect serious progress in this area without additional targeted sampling using appropriate methods.

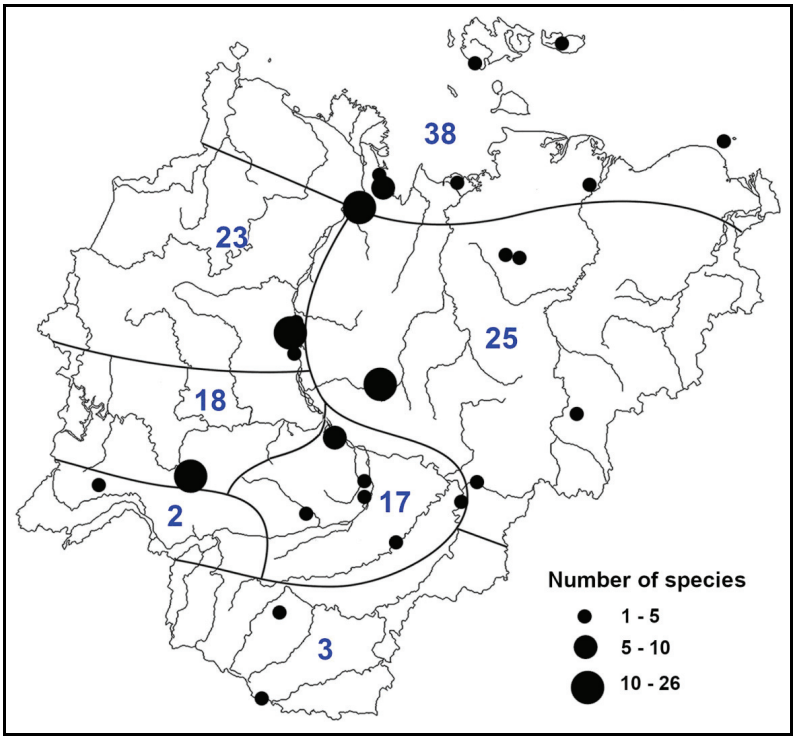


Fig 26. Ranked number of species recorded from different locations and total number of species known in biogeographic regions of Yakutia.

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