Acta Biologica Sibirica
Vol 11 (2025): Acta Biologica Sibirica, 291-316
Articles

List of fungus gnats (Diptera: Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae) of the Republic of Mordovia (Russia)

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The annotated checklist includes 309 species from the families Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae, and Mycetophilidae. In addition to the previous records, 242 species have been recorded for the fauna of the Republic of Mordovia for the first time. Among these are species new to Russia (Orfelia boreoalpina, Mycetophila rudis, Neoclastobasis draskovitsae, Novakia scatopsiformis) and a species new to the Palearctic (Sciophila emarginata). The collection sites are described. For the first time, 242 species are recorded for the fauna of the Republic of Mordovia. Over the course of the study, 275 species were noted in the Mordovia Nature Reserve, 91 species in National Park "Smolny", and 47 species in other locations within the region. Data on trapping methods for the collected fungus gnats are provided. Comparative data on species abundance in neighboring regions are also discussed.

List of fungus gnats (Diptera: Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae) of the Republic of Mordovia (Russia)

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Academic editor: R. Yakovlev | Received 19 February 2025 | Accepted 7 March 2025 | Published 19 March 2025 |

http://zoobank.org/187FFE64-3BB4-453B-8825-33A685343BFC

Citation: Esin MN, Gavryushin DI, Ruchin AB (2025) List of fungus gnats (Diptera: Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae) of the Republic of Mordovia (Russia). Acta Biologica Sibirica 11: 291–316. https://doi.org/10.5281/zenodo.15037355

Keywords

Checklist, collecting nets, Europe, flies, Malaise traps, yellow pan traps

Introduction

In recent years, the decline in insect biodiversity has drawn public attention and increased the demand for intensified studies of regional entomofauna (New and Samways 2014; Ronquist et al. 2020; D'Souza et al. 2021; Dvořák et al. 2023; Rosa et al. 2024). Consequently, comparative studies of insect fauna and populations have become increasingly relevant and necessary in light of growing concerns about insect biodiversity conservation (Montgomery et al. 2021; Köthe et al. 2023; Prosvirov et al. 2024).

Among insects, Diptera occupies one of the leading positions in terms of both biodiversity and abundance within regional faunas (Plotnikov et al. 2013; Hubenov 2019; Dvořák et al. 2020; Gornostaev et al. 2022). Research on this order in specific regions spans several decades and depends on various factors, such as the availability of specialists, the use of diverse methods, comprehensive surveys of different biotopes, and the exploration of undisturbed habitats. In the Republic of Mordovia, the study of Diptera fauna has been particularly active over the past decade. During this period, new species for science have been discovered (MacGowan and Ruchin 2022; Zeegers et al. 2023), and numerous species have been recorded for the first time in Russia's fauna (Chursina and Ruchin 2018; Astakhov et al. 2019; Dvořák et al. 2020; Grichanov 2021; MacGowan et al. 2021; Ruchin et al. 2021; Lutovinovas et al. 2022; Zeegers et al. 2024).

As a result of these studies, the Diptera fauna of the Republic of Mordovia currently includes 1187 species from 71 families (Esin et al. 2023). However, not all families have been studied to date.

The aim of this study is to investigate the biodiversity of several families of fungus gnats using a variety of methods, conduct a comparative analysis of these groups within protected areas, and evaluate different research methods employed in faunistic studies of fungus gnats.

Materials and methods

The Republic of Mordovia is situated in the central part of the East European (Russian) Plain, between 42°11' and 46°45'E and 53°38' and 55°11'N. It is approximately equidistant from the western, northern, and southern seas, with a maximum extent of 298 km from west to east and 140 km from north to south, covering an area of 26,121 km². The region features diverse landscapes, with most of its territory located in the forest-steppe zone of the Volga Upland, transitioning to the Oka-Don Lowland in the west (Yamashkin 2012).

The Mordovia State Nature Reserve is situated between 54°42'N and 54°56'N, and 43°03'E and 43°37'E, in the central part of the East European Plain, along the southern boundary of the mixed and broadleaf forest zones (Milkov 1977). The National Park "Smolny" is located in the northeastern part of the Republic of Mordovia, between 54°43'N and 54°53'N, and 45°04'E and 45°37'E. The park lies within the landscapes of mixed forests on fluvioglacial and ancient alluvial plains along the left bank of the Alatyr River (Yamashkin 2000).

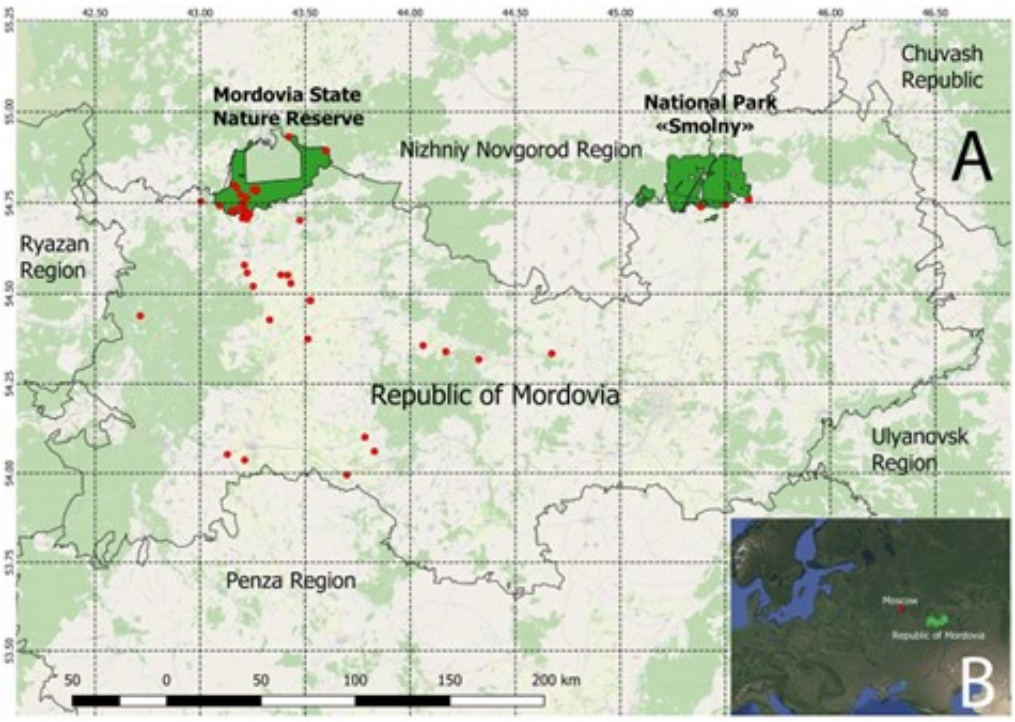

Figure 1. *Locations of the sampling sites (red dots) in the Republic of Mordovia (Russia) (**A**) and the location of the region in Europe (**B**).*

The material was collected in the Republic of Mordovia (Russia) during 2019–2024. The majority of data were gathered from two federal protected areas: Mordovia State Nature Reserve (MSNR) and the National Park "Smolny" (NPS). Insect collection was conducted using Malaise traps (Skvarla et al. 2021), pan traps (Csanády et al. 2021), light traps (Singh et al. 2022), and handheld sweep nets.

Full coordinates of the capture sites are provided in the "Material" section and are also available through the Global Biodiversity Information Facility (GBIF) (Esin et al. 2024). Abbreviations used in the text include MSNR for Mordovia State Nature Reserve and NPS for National Park "Smolny" (Ichalki District).

New distributional records are indicated with asterisks as follows: (*) marks a new record for the Republic of Mordovia; (**) marks a new record for Russia; and (***) marks a new record for the Palaearctic region.

Specimens were identified by the second author. The following references were primarily used for species determination: Chandler (2022), Zaitzev (1994, 1999, 2003). Photographs of the specimens were taken by the second author using an eTREK DCM900 camera. Collected specimens are deposited in the collections of the Zoological Museum of Lomonosov Moscow State University (Russia). Additionally, a comprehensive species list for the fauna of Mordovia has been uploaded to the Global Biodiversity Information Facility (GBIF), which also documents details of the capture methods (Esin et al. 2024).

Results and discussion

The annotated checklist includes 309 species from the families Bolitophilidae (4 species), Diadocidiidae (3), Ditomyiidae (1), Keroplatidae (28), and Mycetophilidae (273) (Table 1). Among these are species new to Russia (*Orfelia boreoalpina*, *Mycetophila rudis*, *Neoclastobasis draskovitsae*, *Novakia scatopsiformis*), as well as a species new to the Palearctic region (*Sciophila emarginata*). Additionally, 242 species have been recorded for the first time in the fauna of the

Republic of Mordovia.

Table 1. Checklist of Fungus Gnats of the Republic of Mordovia

	Mordovia State Nature Reserve	National Park "Smolny"	Other district
Family Bolitophilidae			
**Bolitophila cinerea* Meigen, 1818	+	-	-
**Bolitophila acuta* Garrett, 1925	+	-	-
Bolitophila modesta Lackschewitz, 1937	+	-	-
**Bolitophila rossica* Landrock, 1912	+	-	-
Family Diadocidiidae			
**Diadocidia ferruginosa* (Meigen, 1830)	+	-	-
**Diadocidia setistylus* Papp, 2003	+	-	-
**Diadocidia spinosula* Tollet, 1948	+	-	-
Family Ditomyiidae			
**Ditomyia fasciata* (Meigen, 1818)	+	-	-
Family Keroplatidae			
Isoneuromyia semirufa (Meigen, 1818)	+	-	-
Keroplatus testaceus Dalman, 1818	+	-	-
Keroplatus tipuloides Bosc, 1792	-	-	+
**Macrocera anglica* Edwards, 1925	-	+	-
**Macrocera angulata* Meigen, 1818	+	-	-
Macrocera centralis Meigen, 1818	+	-	-
**Macrocera fascipennis* Staeger, 1840	+	-	-
**Macrocera inversa* Loew, 1869	-	+	-
**Macrocera longibrachiata* Landrock, 1917	+	+	-
**Macrocera lutea* Meigen, 1804	+	-	-
**Macrocera maculata* Meigen, 1818	+	-	-
**Macrocera phalerata* Meigen, 1818	-	+	-
**Macrocera pilosa* Landrock, 1917	+	-	-
**Macrocera pumilio* Loew, 1869	-	+	-
**Macrocera stigma* Curtis, 1837	+	-	-
**Macrorrhyncha rostrata* (Zetterstedt, 1851)	+	+	-
Monocentrota	+	-	-

lundstroemi Edwards, 1925			
Neoplatyura flava (Macquart, 1826)	+	-	-
Neoplatyura modesta (Winnertz, 1864)	+	+	+
***Orfelia boreoalpina* Salmela in Salmela & Kolcsár, 2017	+	-	-
**Orfelia discoloria* (Meigen, 1818)	+	+	-
Orfelia fasciata (Meigen, 1804)	+	-	-
Orfelia lugubris (Zetterstedt, 1851)	-	-	+
**Orfelia nemoralis* (Meigen, 1818)	+	+	+
**Orfelia nigricornis* (Fabricius, 1805)	+	+	-
**Orfelia ochracea* (Meigen, 1818)	+	+	-
Pyratula zonata (Zetterstedt, 1855)	+	-	-
**Urytalpa dorsalis* (Staeger, 1840)	+	-	-
Family Mycetophilidae			
**Acnemia nitidicollis* (Meigen, 1818)	+	+	-
**Allocotocera pulchella* (Curtis, 1837)	+	-	-
**Allodia ornaticollis* (Meigen, 1818)	+	+	-
**Allodia zaitzevi Kurina*, 1998	+	-	-
Allodiopsis domestica (Meigen, 1830)	+	+	+
**Allodiopsis rustica* (Edwards, 1941)	+	-	-
**Anatella dampfi* Landrock, 1924	-	+	+
**Anatella simpatica* Dziedzicki, 1923	+	+	-
**Anatella turi Dziedzicki*, 1923	+	-	-
Anatella unguigera Edwards, 1921	+	-	-
**Azana anomala* (Staeger, 1840)	-	+	-
**Boletina anderschi* Stannius, 1881	+	-	-
Boletina basalis (Meigen, 1818)	+	+	-
**Boletina bidenticulata* Sasakawa & Kimura, 1974	+	+	-
Boletina cincticornis (Walker, 1848)	+	-	-
Boletina dispecta Dziedzicki, 1885	+	-	-
Boletina dubia (Meigen, 1804)	+	-	-
Boletina gripha Dziedzicki, 1885	+	+	-
**Boletina griphoides* Edwards,	-	+	-

1925			
**Boletina lundstroemi* Landrock, 1912	-	+	-
Boletina moravica Landrock, 1912	+	+	-
**Boletina nigricans* Dziedzicki, 1885	-	+	-
Boletina nigricoxa Staeger, 1840	+	-	+
**Boletina nitida* Grzegorzek, 1885	+	+	-
**Boletina pallidula* Edwards, 1925	+	-	-
**Boletina populina* Polevoi in Zaitzev & Polevoi, 1995	+	+	-
**Boletina rejecta* Edwards, 1941	+	-	-
**Boletina sciarina* Staeger, 1840	+	+	-
**Boletina silvatica* Dziedzicki, 1885	-	+	-
Boletina trivittata (Meigen, 1818)	+	-	-
**Brachycampta alternans* (Zetterstedt, 1838)	+	-	-
**Brachycampta barbata* (Lundstrom, 1909)	+	+	-
**Brachycampta foliifera* (Strobl, 1910)	+	-	-
**Brachycampta grata* (Meigen, 1830)	+	-	-
Brachycampta neglecta Edwards, 1925	+	-	+
**Brachycampta persolla* Plassmann, 1972	+	-	-
**Brachycampta pistillata* (Lundstrom, 1911)	+	-	-
Brachycampta silvatica (Landrock, 1912)	+	-	-
**Brachypeza (Brachypeza) bisignata* Winnertz, 1864	+	-	-
**Brevicornu arcticoides* Caspers, 1985	+	-	-
**Brevicornu bellum* (Johannsen, 1912)	+	-	-
**Brevicornu fennicum* (Landrock, 1927)	+	-	-
**Brevicornu fissicauda* (Lundstrom, 1911)	+	-	-
Brevicornu fuscipenne (Staeger, 1840)	+	-	-
**Brevicornu griseicolle* (Staeger, 1840)	+	-	-
**Brevicornu serenum* (Winnertz, 1864)	+	-	-
Brevicornu sericoma (Meigen, 1830)	+	-	-
**Clastobasis alternans* (Winnertz, 1864)	-	+	-

**Clastobasis loici* Chandler, 2001	+	-	-
**Coelophthinia loraasi* Kjaerandsen in Kjaerandsen et al. 2023	+	-	-
**Coelophthinia thoracica* (Winnertz, 1864)	-	+	-
Cordyla brevicornis (Staeger, 1840)	+	-	-
Cordyla crassicornis Meigen, 1818	+	+	+
Cordyla fasciata Meigen, 1830	-	+	+
Cordyla flaviceps (Staeger, 1840)	+	-	-
Cordyla fusca Meigen, 1804	+	-	+
Cordyla insons Lastovka & Matile, 1974	-	+	+
Cordyla murina Winnertz, 1864	+	-	+
**Cordyla nitens* Winnertz, 1864	+	+	-
Cordyla nitidula Edwards, 1925	+	+	+
**Cordyla parvipalpis* Edwards, 1925	+	-	+
Cordyla pusilla Edwards, 1925	-	-	+
**Cordyla semiflava* (Staeger, 1840)	+	-	-
**Cordyla sixi* (Barendrecht, 1938)	+	+	+
**Docosia gilvipes* (Haliday in Walker, 1856)	+	-	-
**Dynatosoma cochleare* Strobl, 1895	+	-	-
**Dynatosoma fuscicorne* (Meigen, 1818)	+	-	-
**Dynatosoma majus* Landrock, 1912	+	-	-
**Dynatosoma nigromaculatum* Lundstrom, 1913	+	-	-
**Dynatosoma nobile* Loew, 1873	+	-	-
**Dynatosoma reciprocum* (Walker, 1848)	+	-	-
**Dynatosoma rufescens* (Zetterstedt, 1838)	+	-	-
Dynatosoma thoracicum (Zetterstedt, 1838)	+	+	+
**Ectrepesthoneura bucera* Plassmann, 1980	-	+	-
**Ectrepesthoneura colyeri* Chandler, 1980	+	+	-
**Ectrepesthoneura hirta* (Winnertz, 1846)	+	+	-
**Ectrepesthoneura pubescens* (Zetterstedt, 1860)	+	-	-
Epicypta	+	+	+

aterrima (Zetterstedt, 1852)			
Epicypta fumigata (Dziedzicki, 1923)	+	+	-
**Epicypta scatophora* (Perris, 1849)	+	-	-
**Exechia chandleri* Caspers, 1987	+	+	-
**Exechia dizona* Edwards, 1924	+	+	-
Exechia dorsalis (Staeger, 1840)	+	-	+
**Exechia festiva* Winnertz, 1864	+	-	-
Exechia fusca (Meigen, 1804)	+	+	+
**Exechia macula* Chandler, 2001	-	+	-
**Exechia neorepanda* Lindemann, 2021	-	+	-
**Exechia nigrofusca* Lundstrom, 1909	+	-	-
**Exechia nigroscutellata* Landrock, 1912	+	-	-
**Exechia papyracea* Stackelberg, 1948	+	-	-
**Exechia parva* Lundstrom, 1909	+	-	-
**Exechia pseudocincta* Strobl, 1910	+	-	-
Exechia repanda Johannsen, 1912	+	+	+
**Exechia repandoides* Caspers, 1984	+	+	-
Exechia separata Lundstrom, 1912	+	-	+
**Exechia seriata* (Meigen, 1830)	+	+	-
**Exechia spinuligera* Lundstrom, 1912	-	+	-
**Exechia ussuriensis* Zaitzev, 2003	+	-	-
**Exechiopsis lackschewitziana* (Stackelberg, 1948)	+	-	-
**Exechiopsis pulchella* (Winnertz, 1864)	-	-	+
**Exechiopsis subulata* (Winnertz, 1864)	+	-	-
**Exechiopsis davatchii* Matile, 1969	+	-	-
**Exechiopsis membranacea* (Lundstrom, 1912)	+	-	+
**Exechiopsis seducta* (Plassmann, 1976)	+	-	-
Greenomyia mongolica Lastovka & Matile, 1974	+	-	+
**Grzegorzekia collaris* (Meigen, 1818)	-	+	-
**Impleta consorta* Plassmann,	+	-	-

1978			
**Leia bilineata* (Winnertz, 1864)	+	-	-
**Leia bimaculata* (Meigen, 1804)	+	+	-
**Leia cylindrica* (Winnertz, 1864)	+	+	-
Leia fascipennis Meigen, 1818	+	-	-
**Leia picta* Meigen, 1818	+	-	-
**Leia subfasciata* (Meigen, 1818)	+	-	-
**Leia winthemii* Lehmann, 1822	+	+	-
**Leptomorphus walkeri* Curtis, 1831	+	-	-
**Macrobrachius kowarzii* Dziedzicki, 1889	+	-	-
**Monoclona orientalis* Zaitzev, 1983	+	-	-
**Monoclona rufilatera* (Walker, 1837)	+	+	-
**Monoclona silvatica* Zaitzev, 1983	-	+	-
**Mycetophila adumbrata* Mik, 1884	+	-	-
Mycetophila alea Laffoon, 1965	+	-	+
Mycetophila attonsa Laffoon, 1957	+	-	-
**Mycetophila autumnalis* Lundstrom, 1909	+	+	-
**Mycetophila bialorussica* Dziedzicki, 1884	+	-	-
**Mycetophila blanda* Winnertz, 1864	+	-	+
**Mycetophila caudata* Staeger, 1840	+	+	-
**Mycetophila confluens* Dziedzicki, 1884	+	-	+
**Mycetophila confusa* Dziedzicki, 1884	+	-	-
**Mycetophila deflexa* Chandler, 2001	+	-	-
**Mycetophila dentata* Lundstrom, 1915	+	-	-
**Mycetophila distigma* Meigen, 1830	+	-	-
**Mycetophila dziedzickii* Chandler, 1977	+	-	-
**Mycetophila finlandica* Edwards, 1913	+	-	-
**Mycetophila forcipata* Lundstrom, 1913	+	-	-
**Mycetophila formosa* Lundstrom, 1911	+	-	-
Mycetophila fungorum (De Geer, 1776)	+	+	+
**Mycetophila*	+	-	-

gibbula Edwards, 1925			
**Mycetophila ichneumonea* Say, 1823	+	-	-
**Mycetophila idonea* Lastovka, 1972	+	-	-
**Mycetophila laeta* Walker, 1848	+	-	-
**Mycetophila lapponica* Lundstrom, 1906	+	-	-
**Mycetophila lastovkai* Caspers, 1984	+	-	-
**Mycetophila lobulata* Zaitzev, 1999	+	-	-
**Mycetophila lubomirskii* Dziedzicki, 1884	+	-	-
**Mycetophila luctuosa* Meigen, 1830	+	+	-
**Mycetophila magnicauda* Strobl, 1895	+	-	-
**Mycetophila marginata Winnertz,* 1864	+	-	-
**Mycetophila mohilevensis* Dziedzicki, 1884	+	-	-
**Mycetophila montana* Landrock, 1925	-	+	-
**Mycetophila moravica* Landrock, 1925	+	-	-
**Mycetophila nigrofusca* Dziedzicki, 1884	+	-	-
**Mycetophila ocellus* Walker, 1848	+	-	-
**Mycetophila pictula* Meigen, 1830	+	-	-
**Mycetophila plotnikovae* Zaitzev, 2004	+	-	-
**Mycetophila pseudoforcipata* Zaitzev, 1998	+	-	-
**Mycetophila pumila* Winnertz, 1864	-	+	-
***Mycetophila rudis* Winnertz, 1864	+	-	-
**Mycetophila ruficollis* Meigen, 1818	+	-	-
Mycetophila sepulta (Laffoon, 1957)	-	-	+
**Mycetophila sierrae* (Laffoon, 1957)	+	-	-
**Mycetophila sigillata* Dziedzicki, 1884	+	-	-
**Mycetophila sigmoides* Loew, 1869	+	-	+
Mycetophila signata Meigen, 1830	+	-	+
**Mycetophila signatoides* Dziedzicki, 1884	+	+	-
**Mycetophila sordida* van der Wulp, 1874	+	+	-
Mycetophila stolida Walker, 1856	-	-	+

**Mycetophila stricklandi* (Laffoon, 1957)	+	-	-
Mycetophila strigatoides Landrock, 1927	+	-	-
**Mycetophila stylata* (Dziedzicki, 1884)	+	-	-
**Mycetophila sublunata* Zaitzev, 1998	+	-	-
**Mycetophila subnigrofusca* Zaitzev, 1998	+	-	-
**Mycetophila subsigillata* Zaitzev, 1999	+	-	-
**Mycetophila sumavica* (Lastovka, 1963)	+	-	-
**Mycetophila telei* Zaitzev, 1999	+	-	-
Mycetophila triangulata Dziedzicki, 1884	+	-	-
**Mycetophila trinotata* Staeger, 1840	+	+	-
**Mycetophila uliginosa* Chandler, 1988	+	-	-
**Mycetophila unguiculata* Lundstrom, 1913	+	-	-
**Mycetophila unicolor* Stannius, 1831	+	+	-
Mycetophila unipunctata Meigen, 1818	+	-	-
**Mycetophila uschaica* Subbotina & Maximova, 2011	+	-	-
**Mycomya branderi* Vaisanen, 1984	+	-	-
**Mycomya circumdata* (Staeger, 1840)	+	-	-
Mycomya annulata (Meigen, 1818)	+	-	-
**Mycomya cinerascens* (Macquart, 1826)	+	-	-
**Mycomya danielae* Matile, 1972	+	-	-
**Mycomya dziedzickii* Vaisanen, 1984	+	-	-
**Mycomya egregia* (Dziedzicki, 1885)	+	-	-
**Mycomya flavicollis* (Zetterstedt, 1852)	+	-	-
**Mycomya marginata* (Meigen, 1818)	+	-	-
**Mycomya neohyalinata* Vaisanen, 1984	+	-	-
Mycomya occultans (Winnertz, 1864)	+	+	-
**Mycomya onusta* (Loew, 1869)	+	-	-
**Mycomya tumida* (Winnertz, 1864)	+	-	-
**Mycomya wankowiczii* (Dziedzicki, 1885)	+	-	-

**Mycomya affinis* (Staeger, 1840)	+	-	-
**Mycomya penicillata* (Dziedzicki, 1885)	+	+	+
**Mycomya trilineata* (Zetterstedt, 1838)	+	-	-
**Myrosia maculosa* (Meigen, 1818)	+	-	-
***Neoclastobasis draskovitsae* Matile, 1978	+	-	-
**Neoempheria bimaculata* (von Roser, 1840)	+	-	-
Neoempheria brevilineata Okada, 1939	+	-	-
Neoempheria pictipennis (Haliday, 1833)	+	+	-
**Neoempheria striata* (Meigen, 1818)	+	+	-
**Neoempheria winnertzi* Edwards, 1913	+	-	-
**Notolopha cristata* (Staeger, 1840)	+	-	-
***Novakia scatopsiformis* Strobl, 1893	+	+	-
**Palaeodocosia vittata* (Coquillett, 1901)	+	-	-
**Phronia biarcuata* (Becker, 1908)	+	-	+
**Phronia bicolor* Dziedzicki, 1889	+	-	-
**Phronia braueri* Dziedzicki, 1889	+	-	-
**Phronia cinerascens* Winnertz, 1864	+	-	-
**Phronia conformis* (Walker, 1856)	+	+	-
**Phronia coritanica* Chandler, 1992	-	+	-
**Phronia disgrega* Dziedzicki, 1889	+	-	-
**Phronia exigua* (Zetterstedt, 1852)	+	-	-
**Phronia forcipata* Winnertz, 1864	+	-	-
**Phronia forcipula* Winnertz, 1864	+	-	-
**Phronia longelamellata* Strobl, 1898	+	-	-
**Phronia nigricornis* (Zetterstedt, 1852)	+	+	-
**Phronia nitidiventris* (van der Wulp, 1859)	+	-	-
**Phronia obtusa* Winnertz, 1864	+	+	-
**Phronia siebeckii* Dziedzicki, 1889	+	-	-
**Phronia strenua* Winnertz, 1864	+	-	-
**Phronia taczanowskyi* Dziedzicki, 1889	-	+	-

**Phronia tenuis* Winnertz, 1864	+	-	-
**Phronia triangularis* Winnertz, 1864	+	-	-
**Phthinia mira* (Ostroverkhova, 1977)	+	+	-
**Phthinia winnertzi* Mik, 1869	+	-	-
**Platurocypta punctum* (Stannius, 1831)	+	+	-
Platurocypta testata (Edwards, 1925)	+	-	-
**Polylepta guttiventris* (Zetterstedt, 1852)	+	-	-
**Pseudexechia trivittata* (Staeger, 1840)	+	-	+
Rondaniella dimidiata (Meigen, 1804)	+	-	+
**Rymosia armata* Lackschewitz, 1937	+	-	-
**Rymosia bifida* Edwards, 1925	+	-	-
**Rymosia fasciata* (Meigen, 1804)	+	-	-
Rymosia signatipes (van der Wulp, 1859)	+	-	+
Sceptonia costata (van der Wulp, 1859)	+	-	+
Sceptonia demeijerei Bechev, 1997	+	+	+
**Sceptonia flavipuncta* Edwards, 1925	-	+	-
Sceptonia fumipes Edwards, 1925	+	+	-
**Sceptonia hamata* Sevcik, 2004	-	+	-
**Sceptonia longiseta* Sevcik, 2004	-	+	-
Sceptonia nigra (Meigen, 1804)	+	+	+
**Sceptonia thaya Sevcik*, 2004	+	+	-
****Sciophila emarginata* Zaitzev, 1982	+	-	-
**Sciophila fenestella* Curtis, 1837	+	-	-
**Sciophila thoracica* Staeger, 1840	+	+	-
**Sciophila varia* (Winnertz, 1864)	+	-	-
**Stigmatomeria crassicornis* (Stannius, 1831)	+	-	+
**Synapha vitripennis* (Meigen, 1818)	+	-	-
**Synplasta bayardi* (Matile, 1971)	-	-	+
Synplasta dulcia (Dziedzicki, 1910)	+	-	-
Synplasta exclusa (Dziedzicki, 1910)	+	-	-
**Synplasta gracilis* Winnertz,	+	-	+

1864			
**Tetragoneura pudogensis* Polevoi & Jakovlev, 2011	+	-	-
**Tetragoneura sylvatica* (Curtis, 1837)	+	-	-
**Trichonta apicalis Strobl, 1898*	+	-	-
**Trichonta beata* Gagne, 1981	+	-	-
**Trichonta flavicauda* Lundstrom, 1914	+	-	-
**Trichonta girschneri* Landrock, 1912	+	+	-
**Trichonta patens* Johannsen, 1912	+	-	+
**Trichonta perspicua* van der Wulp, 1881	+	-	-
**Trichonta submaculata* (Staeger, 1840)	+	-	-
**Trichonta tristis* (Strobl, 1898)	+	-	-
**Trichonta vitta* (Meigen, 1830)	+	+	-
**Zygomyia humeralis* (Wiedemann, 1817)	+	-	-
Zygomyia notata (Stannius, 1831)	+	+	+
Zygomyia pictipennis (Staeger, 1840)	+	-	-
**Zygomyia pseudohumeralis* Caspers, 1980	+	-	-
Zygomyia valida Winnertz, 1864	+	-	-
**Zygomyia vara* (Staeger, 1840)	+	-	+
Total of species	275	91	47

Table 1. *Checklist of Fungus Gnats of the Republic of Mordovia*

Note: * – first record from Republic of Mordovia; ** – first record from Russia; *** – first record from the Palaearctic region.

Family Keroplatidae

** ***Orfelia boreoalpina***

Fig. 2

Material. MSNR: cordon Inorskiy (54.7277°N, 43.1510°E), Malaise trap, 25–31.05.2021, 1♂, Leg. A. Ruchin, M. Esin; 3 km NW of Pushta (54.744°N, 43.204°E),

hand held sweep-net, 14.09.2023, 1♂, Leg. D. Gavryushin.

General distribution. West Palaearctic region (Germany, Finland). First record from Russia.

Remarks. The specimen was caught in a Malaise trap located at the boundary of a floodplain deciduous forest and a large forest clearing (Fig. 3). The clearing was characterized by diverse

herbaceous vegetation, predominantly grasses. The forest was mainly composed of oak with some linden and birch, and the second layer in cluded rowan and bird cherry.

The second specimen was found in a mixed old-growth forest with pine, spruce, birch, and linden. The shrub layer was well-developed, and the herbaceous vegetation consisted mainly of grasses and lily of the valley. Surrounding the area were swampy patches with moss, as well as mixed forests with pine and spruce. These habitats contained many stumps and fallen wood.

In Finland, this species was captured in a flooded herbaceous meadow with a rich variety of vascular plants. The meadow was surrounded by pine forest (Salmela and Kolcsár 2017). In Bavaria, its habitat was a mountainous forest dominated by coniferous species (Geiger et al. 2016).

Figure 2. *Orfelia boreoalpina Salmela in Salmela & Kolcsár, 2017, male hypopygium (ventral view).*

Figure 3. *Malaise trap located on the cordon Inorskiy (Mordovia State Nature Reserve) is a catch place for a large number of interesting species of fungus gnats.*

Family Mycetophilidae

** ***Mycetophila rudis*** **Winnertz, 1864**

Fig. 4

Material. MSNR: cordon Novenkiy (54.709°N, 43.212°E), yellow pan traps, 20– 28.08.2022, 1♂, Leg. K. Tomkovich; 3 km NW of Pushta (54.744°N, 43.204°E), hand held sweep-net, 14.09.2023,

1♂, Leg. D. Gavryushin; Pushta (54.71849°N, 43.23413°E), hand held sweep-net, 13.07, 16.07.2024, 3♂, Leg. D. Gavryushin.

General distribution. Europe and Oriental (Kjærandsen et al. 2007). First record from Russia (also known from Moscow region, Leg. D. Gavryushin, pers. comm.)

Remarks. The species was found in several localities within the Mordovia State Nature Reserve (MSNR). These habitats are moderately moist mixed forests with a significant presence of deciduous tree species, including aspen, alder, birch, and occasionally linden. These sites are characterized by an abundance of stumps and fallen wood.

In other regions, the species has also been recorded in coniferous plantations (Chandler 2022).

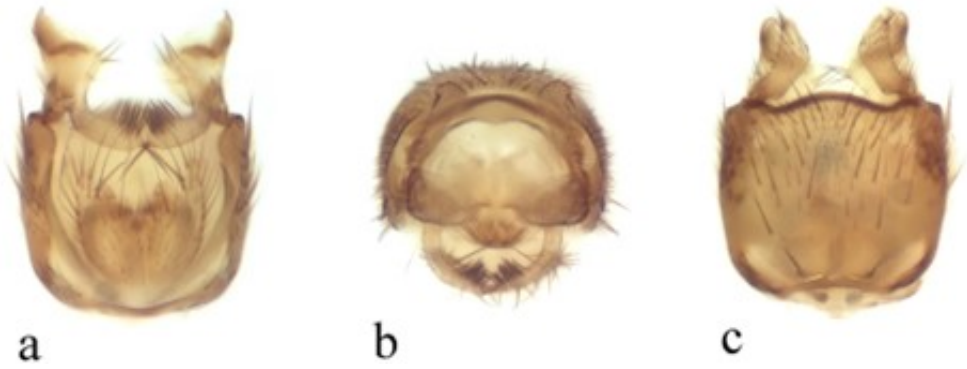

Figure 4. *Mycetophila rudis Winnertz, 1864, male hypopygium (**a** – dorsal view; **b** – caudal view; **c** – ventral view).*

** ***Neoclastobasis draskovitsae*** **Matile, 1978**

Fig. 5

Material. MSNR: cordon Inorskiy (54.7277°N, 43.1510°E), Malaise trap, 18– 22.06.2021, 1♂, Leg. A. Ruchin, M. Esin; Pushta (54.7195°N, 43.2234°E), Malaise trap, 27–30.06.2023, 1♀, Leg. K. Tomkovich.

General distribution. West Palaearctic region. Described from Hungary, also known from Czech Republic and Slovakia (Kurina et al. 2024). First record from Russia.

Remarks. The collection sites were similar to those of *Orfelia boreoalpina*. The species is associated with *Lactarius vellereus* and *Lactarius acerrimus* (Matile 1978) as well as the sporocarps of *Meripilus giganteus* (Roháček and Ševčík 2013).

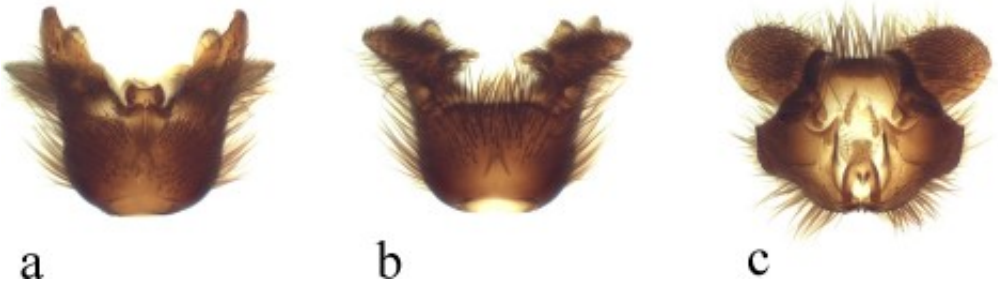

Figure 5. *Neoclastobasis draskovitsae Matile, 1978, male hypopygium (**a** – ventral view; **b** – dorsal view; **c** – caudal view).*

** ***Novakia scatopsiformis*** **Strobl, 1893**

Fig. 6

Material. NPS, cordon Mokrov (54.7591°N, 45.6124°E), Malaise trap, 17–24.08.2022, 24–29.08.2022, 2♀, G. Semishin; MSNR: Pushta (54.7195°N, 43.2234°E), Malaise trap, 19–31.07.2023, 1♂, Leg. K. Tomkovich; cordon Valzenskiy (54.7203°N, 43.2345°E), yellow pan traps, 12–20.08.2023, 1♀, Leg. K. Tomkovich.

General distribution. West Palaearctic region. Rare, mostly Mediterranean yet reaches as far north as Sweden. First record from Russia (also known from Moscow region, Leg. D. Gavryushin, pers. comm.)

Remarks. In the National Park "Smolny" (NPS), the specimen was collected in a Malaise trap located at the border of a pine forest (approximately 60-70 years old) and an open clearing. The shrub layer in the pine forest was poorly developed, with only a few rowan and bird cherry trees. The herbaceous vegetation was primarily composed of grasses. The clearing was characterized by a large variety of vascular plants. Both the pine forest and the clearing are situated on the second floodplain terrace, which is notably dry in this area. However, a floodplain meadow, typically flooded by spring runoff, is located 100 meters away (Fig. 7).

In the Mordovia State Nature Reserve (MSNR), the collection sites were similar to those for *Orfelia boreoalpina* and *Neoclastobasis draskovitsae*. In other countries, the species is described as inhabiting the coastal thickets of *Pinus brutia* (Kerr 2007).

*** ***Sciophila emarginata*** **Zaitzev, 1982**

Fig. 8

Material. MSNR, cordon Inorskiy (54.7277°N, 43.1510°E), Malaise trap, 20– 25.05.2021, 1♂, Leg. A. Ruchin, M. Esin.

General distribution. Nearctic region. First record from the Palaearctic region.

Remarks. The sampling site is similar to the habitat where *Orfelia boreoalpina* was found and where the Malaise trap was located.

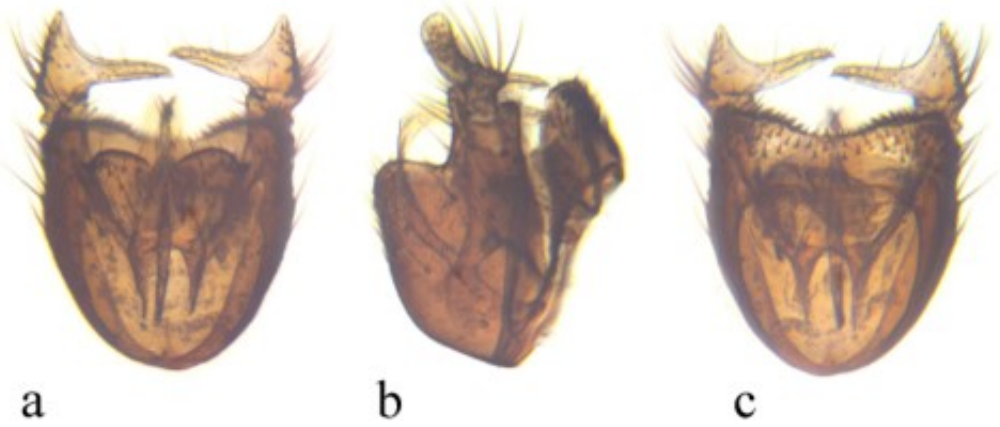

Figure 6. *Novakia scatopsiformis Strobl, 1893, male hypopygium (**a** – ventral view; **b** – lateral view; **c** – dorsal view).*

Figure 7. *Malaise trap located on the cordon Mokrov (National Park "Smolny") is a catch place for a large number of interesting species of fungus gnats.*

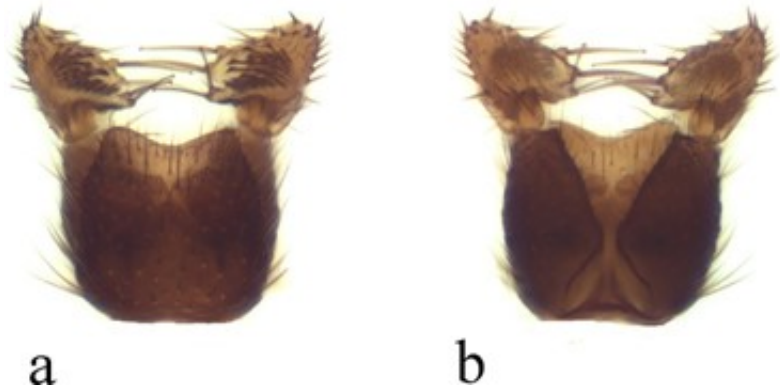

Figure 8. *Sciophila emarginata Zaitzev, 1982, male hypopygium (**a** – dorsal view; **b** – ventral view).*

Clastobasis loici **Chandler, 2001**

Fig. 9A

Material. MSNR, Pushta (54.708°N, 43.201°E), hand held sweep-net, 14.07.2024, 1♂, Leg. D. Gavryushin.

General distribution. Palaearctic region. Very rare, scattered records throughout Western and Central Europe, recently recorded from Japan and Georgia.

Remarks. The site of the finding is a wet deciduous forest, primarily composed of aspen, alder, and linden. The shrub layer and herbaceous cover are poorly devel oped due to high shading.

Tetragoneura pudogensis

Fig. 9B

Material. MSNR, 3.5 km NW of Pushta (54.732 °N, 43.173 °E), hand held sweep-net, 12.09.2023, 1♂, Leg. D. Gavryushin.

General distribution. Northern Europe (Russia: Republic of Karelia; Finland).

Remarks. The specimen was found in a mixed forest with a predominance of deciduous trees (linden, aspen, oak). The shrub layer is very well-developed, consisting of young trees from the first layer. The herbaceous layer is poorly expressed. The forest floor is covered with a lot of fallen wood.

Grzegorzekia collaris **(Meigen, 1818)**

Fig. 9C

Material. NPS: cordon Mokrov (54.7591°N, 45.6124°E), Malaise trap, 24.06–5.07.2022, 1♂, G. Semishin; cordon Mitryashki (54.745°N, 45.503°E), hand held sweep-net, 26–29.07.2022, 1♂, Leg. K. Tomkovich.

General distribution. Palaearctic region. Rare; in Russia known from Republic of Karelia, also in Moscow region (Leg. D. Gavryushin, pers. comm.).

Remarks. One sampling site is similar to the habitat of *Novakia scatopsiformis*. The second sampling site is also located on the second floodplain terrace. However, the conditions in this habitat are more diverse, due to the variety of forest ecosystems: both pure pine forests and floodplain forests of linden, oak, and alder are present. Nearby, in the floodplain, there are lakes, and the evaporation from them creates high humidity.

Impleta consorta **Plassmann, 1978**

Fig. 9D

Material. MSNR: Pushta (54.721°N, 43.218°E), hand held sweep-net, 6.06.2023, 1♂, Leg. K. Tomkovich; Pushta (54.7191°N, 43.2236°E), on light, 23–24.07.2023, 2♂, Leg. K. Tomkovich.

General distribution. West Palaearctic region. Rare; in Russia known from Republic of Karelia.

Remarks. The sampling sites were several forest areas: an old-growth birch forest with well-developed herbaceous vegetation, located near a mixed forest with many oaks; a mixed forest of aspen, birch, and linden, with a well-developed shrub layer and herbaceous cover.

Macrobrachius kowarzii **Dziedzicki, 1889**

Fig. 9E

Material. MSNR, cordon Inorskiy (54.7277°N, 43.1510°E), Malaise trap, 27.09– 4.10.2021, 1♂, Leg. A. Ruchin, M. Esin.

General distribution. Europe. Very rare; in Russia known from Republic of Karelia, also in Moscow region (Leg. D. Gavryushin, pers. comm.).

Remarks. The specimen was captured in a Malaise trap located at the boundary of a floodplain deciduous forest and a large forest clearing (Fig. 3). The habitat description has been provided earlier.

Mycetophila telei **Zaitzev, 1999**

Fig. 9F

Material. MSNR: 5 km N Pushta (54.765°N, 43.222°E), hand held sweep-net, 14.09.2024, 1♂, Leg. D. Gavryushin; Pushta (54.7184°N, 43.2341°E), hand held sweep-net, 13, 14, 16.07.2024, 3♂, Leg. D. Gavryushin.

General distribution. Palaearctic region. Described from Altai Mts. (Russia), also known from Austria.

Remarks. Both localities are mixed forests located near bodies of water. Closer to the water, alder and aspen dominate, which are flooded by meltwater in the spring. Further from the water, on drier soils, pine predominates, along with linden and birch. In the second layer, young deciduous trees, as well as bird cherry, spindle, and rowan, are common. The herbaceous layer is poorly developed due to shading. The habitat contains many fallen logs. This is the second record of the species in Russia. The first record was made in the Altai (Zaitzev 1999).

Mycetophila uschaica

Fig. 9G

Material. MSNR: 0.5 km SW of Pushta (54.708°N, 43.223°E), hand held sweep-net, 10.09.2023, 1♂, Leg. D. Gavryushin; Pushta (54.7184°N, 43.2341°E), hand held sweep-net, 16.07.2024, 1♂, Leg. D. Gavryushin.

General distribution. Palaearctic region (Russia: Western Siberia: Tomsk region; Republic of Karelia, also known from Moscow region, Leg. D. Gavryushin, pers. comm.)

Remarks. The habitats are similar to those of *Mycetophila telei* and *Clastobasis loici*. In Karelia, the species was collected in a spruce forest dominated by *Vaccinium myrtillus* (Jakovlev et al. 2014). In the Mordovian habitats, *V. myrtillus* is present in the swampy areas, but the number of spruce trees in the forests is very low.

The region contains two federal protected areas: Mordovia State Nature Reserve and National Park "Smolny". In the Mordovia State Nature Reserve, 275 species were recorded during the studies, while 91 species were noted in National Park "Smolny", and 47 species were found in other localities of the region.

During the research, the highest biodiversity of fungus gnats was recorded in July and September, with the lowest biodiversity observed in October and Novem ber (Fig. 10).

Due to the vast diversity of insects and the wide range of data collection methods, insect fauna studies are generally not standardized. Therefore, using a variety of methods leads to the most comprehensive information on biodiversity (Montgomery et al. 2021; Grames et al. 2022). In our study, we also employed different collection methods, which reflected in the final results. Based on the data set analysis (Esin et al. 2024), we found that the highest species diversity of fungus gnats was captured using a hand-held sweep net (Fig. 11), while the lowest species diversity was captured using light traps. Despite the limited use of Malaise traps, they also provided good results in terms of the total number of species.

We compared the number of fungus gnat species in regions neighboring the Republic of Mordovia (Table 2). It was found that this group of families is poorly studied and unevenly researched (we have no data from the Ryazan, Nizhny Novgorod, and Penza regions). Apparently, this reflects difficulties in species identification and the limited number of studies on regional fauna.

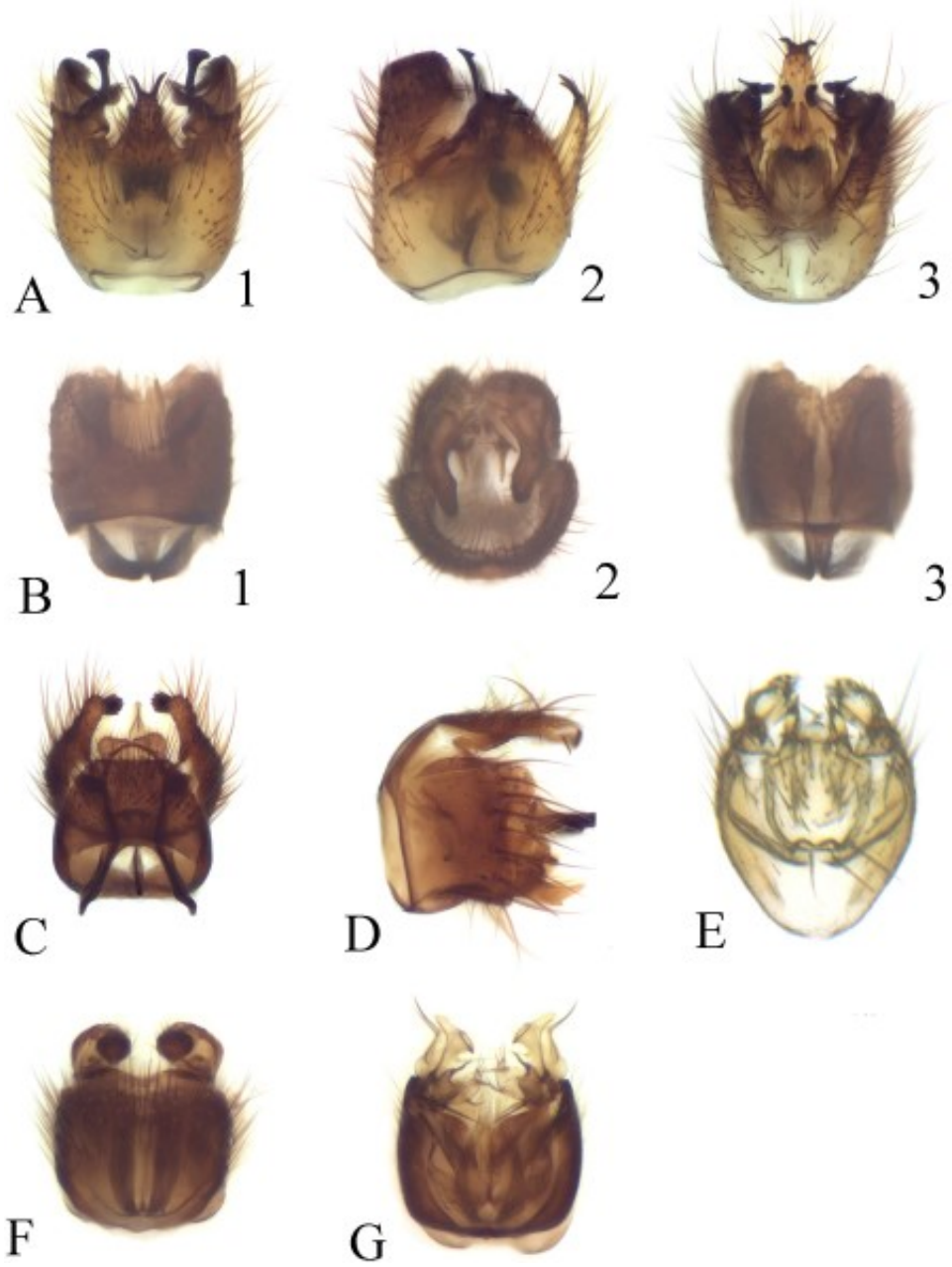

Figure 9. *Rare species fungus gnats, male hypopygium:* ***A*** *– Clastobasis loici Chandler, 2001 (1 – dorsal view; 2 – lateral view; 3 – ventral view);* ***B*** *– Tetragoneura pudogensis Polevoi & Jakovlev, 2011 (1 – dorsal view; 2 – oblique caudal view; 3 – ventral view);* ***C*** *– Grzegorzekia collaris (Meigen, 1818) (dorsal view);* ***D*** *– Impleta consorta Plassmann, 1978 (lateral view);* ***E*** *– Macrobrachius kowarzii Dziedzicki, 1889 (ventral view);* ***F*** *– Mycetophila telei Zaitzev, 1999 (ventral view);* ***G*** *– Mycetophila uschaica Subbotina & Maximova, 2011 (ventral view).*

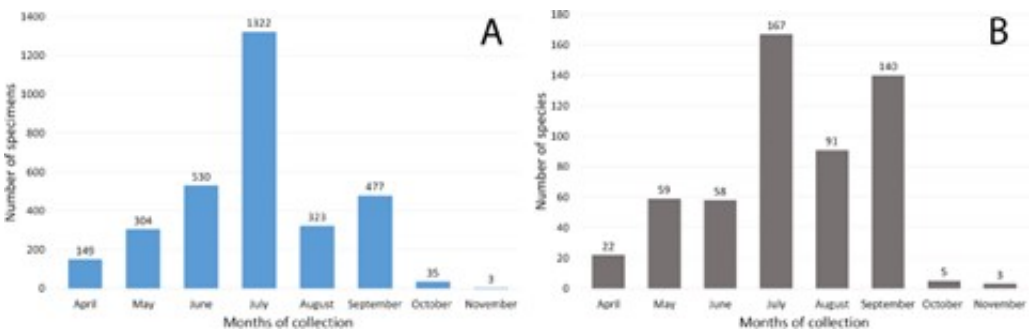

Figure 10. *Seasonal species diversity (****A****) and the number of specimens (****B****) of fungus gnats in the Republic of Mordovia,*

collected using all trapping methods.

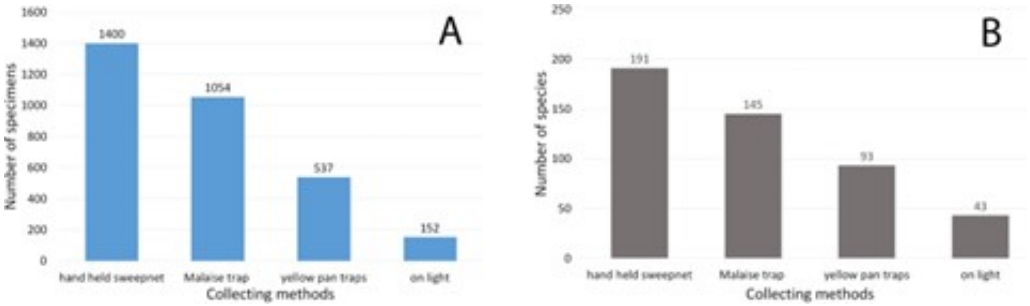

Figure 11. *Species diversity (**A**) and number of specimens (**B**) of fungus gnats in the Re public of Mordovia, collected using different trapping methods.*

Table 2. Comparative biodiversity of studied fungus gnat families in several regions of Russia

Regions	1	2	3	4	5	References
Chuvash Republic	-	-	-	-	5	Borisova et al. 2018; Esin, Egorov 2023
Republic of Mordovia	4	3	1	28	273	Our data; Esin et al. 2023
Samara region	2	-	-	1	8	Lyubvina 2022
Ulyanovsk region	-	-	-	-	5	Ruchin et al. 2023
Volgograd region	-	-	-	1	-	Ruchin et al. 2023
Voronezh region	-	-	-	-	5	Ruchin et al. 2023

Table 2. *Comparative biodiversity of studied fungus gnat families in several regions of Russia*

Notes: 1 – Bolitophilidae, 2- Diadocidiidae, 3- Ditomyiidae, 4 -Keroplatidae, 5 - Mycetophilidae

Acknowledgements

This article was funded by the Russian Science Foundation, grant number 22-14- 00026. The research on the territory of the Mordovia State Nature Reserve and National Park “Smolny” was carried out with the financing of the State Assignment of the Ministry of Natural Resources and Ecology of the Russian Federation on the topic of research work No 1-25-31-4.

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