

Article

# Analysis of Oribatid Fauna of the East European Tundra with First Reported Data of Subpolar Urals

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**Abstract:** This study presents data on the oribatid mite fauna of the Subpolar Urals for the first time. Observations were made in the Lembekoyu River valley and 35 species of oribatid mites from 24 genera and 21 families were found. The analysis of taxonomic diversity and distribution of East European tundra oribatid mite species is presented based on available literature and the author's own research findings. The taxonomic list includes 163 species from 81 genera and 45 families. Ceratozetidae (15 species), Crotoniidae (14 species), Oppiidae (12 species), Suctobelidae (12 species), Damaeidae (9 species), Brachychthoniidae (8 species), Phthiracaridae (5 species), Humerobatidae (5 species), Achipteriidae (5 species), Puncitoribatidae (5 species), and Galumnidae (5 species) are the leading families, comprising more than 58% of all species. The zoogeographical structure of the fauna is dominated by widely distributed Holarctic, cosmopolitan, and semi-cosmopolitan species. The share of Palaearctic species is 23%. The specificity of the fauna of East European tundra manifests itself in the small group of Arctic species, both in the mainland tundra and on the Arctic islands. A complex of arctic-boreal species, widely distributed in the Eurasian sector of the Arctic, is distinguished.

**Keywords:** Arctic; Oribatida; faunistics; taxonomic diversity; distribution; checklist; arctic species; arctic-boreal species

## 1. Introduction

Interest in Arctic invertebrates has greatly increased in recent decades [1–14]. Coulson et al. [11] summarises data on the taxonomic composition of invertebrates from three archipelagos in the Barents Sea: Spitsbergen, Franz Josef Land, and Novaya Zemlya. One of the directions of modern research is to learn how invertebrates spread and what contributes to their faunistic diversity on the islands and archipelagos in the Arctic [15–18]. Makarova et al. [19] focused on 'eastern elements' in the invertebrate fauna of East European tundra, the so-called 'Siberian' species. An integrated assessment of biological diversity, including soil invertebrates, has been carried out in the large Arctic region, Nenets Autonomous District [20].

Attention is being paid to the study of taxonomic diversity of invertebrates, including oribatid mites, in anthropogenic altered soils in the Arctic and Sub-Arctic conditions and the application of this group of animals in bioindication [13,21–23]. Inventory of modern biodiversity and study of geographic trends of soil fauna diversity is important for biodiagnostics of natural communities under conditions of anthropogenic impact and forecasting changes in these communities in the long-term. In addition, the study of modern biodiversity is important for assessing the changes that take place in response to global warming.

In the European North-East, studies on oribatid mite fauna have been conducted both in the mainland tundra (plain and mountain tundra) and on the Arctic islands. The first data on Vaigach Island oribatid mites were presented in the form of a monograph by Koch [24], who processed the data

collected by Adolf Nordenskiöld during his Arctic expedition of 1875. Koch named eight species of oribatids found on the Vaigach Island, four of which he described as new to science. Subsequently, Trägårdh [25] identified three species from Nordenskiöld's collection, which were already named by Koch. Krivolutsky et al. [26] provided a list of oribatid species in the Russian Arctic sector known at the time of publication, which included data on the Vaigach and Kolguev Islands. Melekhina et al. [27] studied oribatid fauna in the nests of Lapland Bunting *Calcarius lapponicus* and reported nine species, nine genera, and six families of oribatids new to Vaigach Island. In total, 25 species of oribatid mites from 24 genera and 21 families were found in this study. The authors compiled a list of Vaigach oribatid mites (43 species, 34 genera, 25 families) and analysed the zoogeographic structure of the fauna and species distribution [27].

Melekhina and Zinov'yeva [28] collected samples in the north-western part of the Yugor Peninsula, on the Pai-Khoi Ridge. Oribatida from seven types of habitats of mainland tundra and mountain tundra, as well as one intrazonal plant community (motley grass meadow on the bank of the stream) were examined.

Data on the Bolshezemelskaya tundra have been collected mainly from around Vorkuta [29–31]. Melekhina and Krivolutsky [30] presented a list of oribatids of the Bolshezemelskaya tundra (33 species, 24 genera, 20 families). Peculiarities of the vertical distribution of oribatid mites in moss-lichen tundra with permafrost soil and in the tundra of dwarf birch with non-frost soil have also been reported [31]. Zubrii et al. [32] studied the plant communities near the thermal springs of Pym-Va-Shor located in the Bolshezemelskaya tundra in the Polar Pre-Urals. Samples from melted soil plots and watered mossy turfs were collected during the winter.

Research was also carried out in the Polar Urals in the area of Labytnangi [33], on the Rai-Iz Ridge [34]. Melekhina [35,36] obtained data in the vicinity of Lake Paga-Ty. Six types of mountain tundra habitats were surveyed: shrub-moss-lichen tundra, shrub-moss tundra, shrub-green-moss birch, grassy willow, horsetail moss willow, and motley grass in the hollow of the drain.

Sidorchuk [37] investigated the distribution of oribatid mites along with the vertical profile of the Malyy Paypudynskiy Ridge, from the floodplain to the belt of stony tundra. Samples were collected from the lower part of the Malaya Paypudyna River valley (settlement Polyarny, Labytnang district, YNAD), on the slope of the north-eastern exposure. Sidorchuk [37] found 82 species of oribatid mites in four types of plant communities, of which 46 were recorded for the first time in the region. The article provides a generalised list of oribatid mites of the Polar Urals (106 species, 61 genera, 34 families) taking into account all published data.

Melekhina conducted research at the tundra landscapes of the complex reserve 'Khrebtovy', located on the south-eastern slope of the Yenganepo Ridge (Polar Urals) [38]. Oribatida from seven types of habitats were examined: birch forest, larch sparse woodland, shrubby moss-lichen tundra, large bog, rocky outcrops, shrubby lichen tundra, and meadow complex.

Data on the mountain tundra oribatid fauna of the Northern Urals are also available. Melekhina [39] surveyed four types of plant communities (spruce, boggy grass-marsh, shrubby lichen, and stony lichen tundra) on the Yany-Pupu-Nyor mountain in the Pechora-Ilychsky Reserve. Melekhina [40] summarised her own research findings and those available in the literature on the taxonomic diversity of oribatids in the European North of Russia (in the taiga and tundra zones) and analysed the dynamics of diversity along the latitudinal gradient. In the Subpolar Urals, no research has been conducted on the oribatid mite fauna so far.

The purpose of this paper is to summarise the findings of the available literature and those of the author's own new research on the taxonomic diversity and distribution of oribatid mites in the East European tundra and to identify specific features of this fauna.

## 2. Materials and Methods

Observations were made in the Lembekoyu River valley ( $65^{\circ}16'46''$  N,  $60^{\circ}4'51''$  E), in zonal (lichen-moss tundra, moss-marsh tundra) and intrazonal (stream floodplain) communities. Sampling

was conducted in five plant communities: lichen-moss tundra 1, lichen-moss tundra 2, moss and dwarf birch tundra 1, moss and dwarf birch tundra 2 and grassy community in a creek valley. Field material was collected according to generally accepted methods [41]. Ten soil samples, each with dimensions 10 × 10 cm by 10 cm deep, were taken from all sites in June 2018. A total of 50 soil samples were collected. The soil samples were transported to the Institute of Biology (IB Komi SC UB RAS), Syktyvkar, and placed into Tullgren soil extractors. The microarthropod fauna was extracted under 40 Watt bulbs into 96% alcohol for seven-ten days until the soil was completely dry. The Oribatida were identified to species by morphological taxonomic characters [42]. A total of 2500 specimens of adult oribatid mites were identified up to the species level.

In this manuscript, the author summarises the results of her own research conducted earlier in the tundra zone of the European North-East and presented in publications [22,27–32,35,36,38,39], new data obtained in the Subpolar Urals, as well as all available literature information (Table 1, Figure A1). Taxonomies of oribatid mites and types of global distribution of the species follow Subías [43]. For the analysis of the geographical distribution of species, literary sources were used [1,7,11,30,44–50] and others. The term local fauna was used as understood by A.G. Tatarinov [51].

**Table 1.** Number of taxa of oribatid mites in the local fauna of East European tundra.

Local Fauna	Issue	Taxa		
		Species	Genera	Families
Kolguev Island	Krivolutsky et al., 2003	13	11	11
Vaygach Island	Koch, 1879	8	6	6
	Trägårdh, 1904	3	2	2
	Krivolutsky et al., 2003	25	23	18
	Melekhina et al., 2019	43	34	25
Yugor Peninsula	Melekhina and Zinovyeva, 2012	32	26	19
Bolshezemelskaya tundra	Melekhina, 1997	5	4	4
	Melekhina and Krivolutsky, 1999	33	24	20
	Goryachkin et al., 2011	22	22	18
	Zubrii et al., 2011	8	8	8
	Melekhina, unpublished	7	7	7
Polar Urals	Karpova and Poryadina, 1978	18	12	12
	Grishina, 1985	6	5	5
	Biodiversity, 2007	37	28	19
	Sidoruk, 2009	106	61	34
	The biological diversity, 2010	32	27	18
Subpolar Urals	Melekhina and Selivanova, unpublished	35	24	21
Northern Urals	Melekhina, 2005	25	22	14
a complete list of species	all published and new data	163	81	45

Synonyms follow Subías [43]. Synonyms of species were given when the author of a publication mentioned the species using a different name. For example, the species *Eupelops plicatus* (Koch, 1835) (=*Pelops auritus* Koch, 1839) was noted in Bolshezemelskaya tundra [30] and was named *Eupelops auritus* Koch, 1839. In some cases, a synonym was given if the authors of several publications cited synonyms.

### 3. Results and Discussion

#### 3.1. Taxonomic Diversity

##### 3.1.1. Subpolar Urals

This is the first report of oribatid mite fauna of the Subpolar Urals. In total, 35 species, 24 genera, and 21 families of oribatid mites were found (Table 2, Appendix B). The largest number of species was recorded in the families Crotoniidae, Oppiidae and Suctobelbidae. In the studied five plant communities, 11 to 18 species were found. *Heminothrus (H.) longisetosus*, *Nanhermannia (N.) sellnicki*, *Tectocephalus velatus* and *Melanozetes sellnicki* were common in different types of communities. The species *Malacothrus (M.) monodactylus*, *Heminothrus (P.) peltifer*, *Hypochthonius rufulus*, *Atropacarus (A.) striculus* and *Neoribates (N.) aurantiacus* were recorded only in the floodplain of the stream. The first two species are known to prefer high humidity habitats.

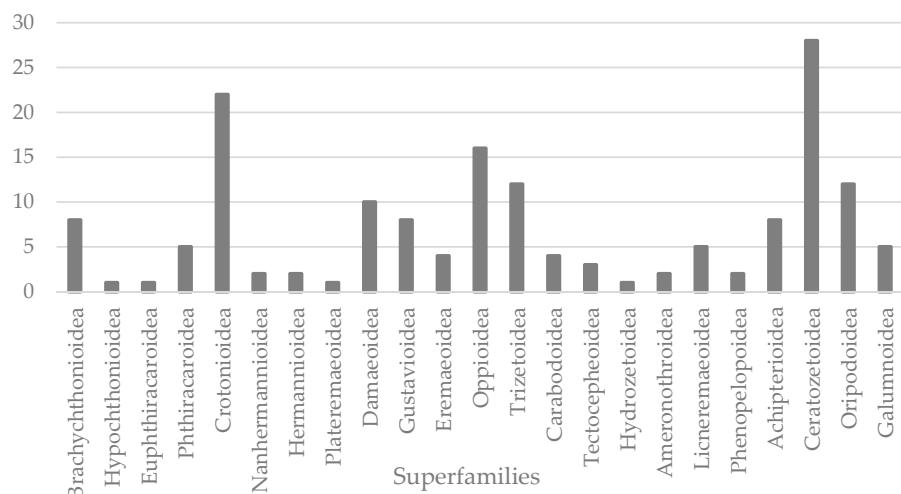
**Table 2.** The species composition of oribatid mites in the plant communities of the Subpolar Urals.

N	Species	L-m 1	L-m 2	M-d 1	M-d 2	Gras. Com.
1	<i>Liochthonius (L.) sellnicki</i>	+	+	+	–	–
2	<i>Hypochthonius rufulus</i>	–	–	–	–	+
3	<i>Atropacarus (A.) striculus</i>	–	–	–	–	+
4	<i>Malacothrus (M.) monodactylus</i>	–	–	–	–	+
5	<i>Nothrus borussicus</i>	+	+	–	–	–
6	<i>Nothrus pratensis</i>	–	–	+	–	+
7	<i>Camisia (C.) biurus</i>	+	–	+	–	–
8	<i>Camisia (C.) segnis</i>	–	–	+	–	–
9	<i>Camisia (E.) laponica</i>	–	–	–	+	–
10	<i>Heminothrus (H.) longisetosus</i>	+	+	+	+	–
11	<i>Heminothrus (P.) peltifer</i>	–	–	–	–	+
12	<i>Nanhermannia (N.) sellnicki</i>	–	+	+	+	+
13	<i>Tokukobelba compta</i>	–	+	–	–	–
14	<i>Damaeus (E.) bituberculatus</i>	–	+	–	–	–
15	<i>Ceratoppia bipilis</i>	+	–	–	+	–
16	<i>Ceratoppia quadridentata</i>	–	–	–	+	–
17	<i>Rhinoppia (R.) subpectinata</i>	+	+	–	–	–
18	<i>Oppiella (O.) nova</i>	+	–	+	–	–
19	<i>Oppiella (M.) neerlandica</i>	+	+	+	–	–
20	<i>Quadroppia (Q.) quadricarinata</i>	–	+	–	–	–
21	<i>Suctobelbella (S.) acutidens duplex</i>	–	+	–	–	–
22	<i>Suctobelbella (S.) latirostris</i>	+	–	–	–	–
23	<i>Suctobelbella (S.) singularis</i>	+	+	–	–	–
24	<i>Carabodes (C.) labyrinthicus</i>	–	+	–	–	–
25	<i>Carabodes (C.) marginatus</i>	–	+	+	+	–
26	<i>Carabodes (C.) subarcticus</i>	–	+	–	+	–
27	<i>Tectocephalus velatus</i>	+	+	+	+	+
28	<i>Parachipteria punctata</i>	–	–	+	–	+
29	<i>Ceratozetes (C.) gracilis</i>	+	–	–	+	+
30	<i>Melanozetes sellnicki</i>	+	+	+	+	–
31	<i>Diapterobates oblongus</i>	+	+	–	+	–
32	<i>Oribatula (O.) tibialis</i>	–	+	+	–	–
33	<i>Oribatula (Z.) exilis</i>	+	–	+	–	–
34	<i>Scheloribates (S.) laevigatus</i>	–	–	–	+	+
35	<i>Neoribates (N.) aurantiacus</i>	–	–	–	–	+
	total	15	18	14	12	11

Notes. L-m 1 lichen-moss tundra 1; L-m 2 lichen-moss tundra 2; M-d 1 moss and dwarf birch tundra 1; M-d 2 moss and dwarf birch tundra 2; Gras. com. grassy community in a creek valley; + and – The presence or absence of a species.

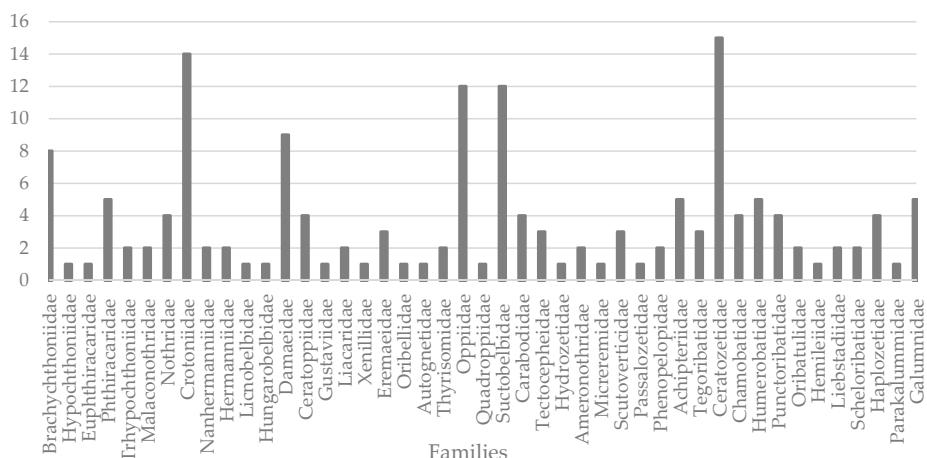
### 3.1.2. Total Number of Taxa at Different Levels

In total, 163 species of oribatid mites from 81 genera and 45 families were found in East European tundra (Table 1, Appendix B). Oribatid species found in the East European tundra are grouped into 23 superfamilies, with the majority of the species coming under six superfamilies. The leading superfamily is Ceratozetoidea, with 28 species from four families, followed by Crotonioidea (22 species, four families), Oppioidea (16 species, four families), Trizetoidea (12 species, one family), Oripodoidea (12 species, six families), and Damaeoidea (10 species, two families) (Figure 1). Eight species represent the superfamilies Brachychthonioidea (one family), Gustavioidea (three families), and Achipteroidea (two families). A similar distribution of species among superfamilies has been observed, for example, in Svalbard [7].



**Figure 1.** Distribution of species richness among different superfamilies of oribatid mites in the East European tundra (taxa are in a systematic order).

Leading families in the mite fauna are: Ceratozetidae (15 species), Crotoniidae (14 species), Oppiidae (12 species), Suctobelbidae (12 species), Damaeidae (nine species), Brachychthoniidae (eight species), Phthiracaridae (five species), Humerobatidae (five species), Achipteriidae (five species), Punctoribatidae (five species), and Galumnidae (five species). These 11 families comprise 58.6% of all species (95 species). Most families are represented by a small number of species (one to three) (Figure 2).



**Figure 2.** Distribution of species richness among different families of oribatid mites in the East European tundra (taxa are in a systematic order).

### 3.1.3. Characteristic Families Typical of Tundra Zone Species

It is possible to distinguish species characteristics of different families for the East European tundra. From Crotoniidae, *Heminothrus (Platynothrus) punctatus* and *Camisia (C.) horrida* are consistently found in the local tundra fauna. Both species are often found in the Eurasian sector of the Arctic [28]. *Camisia (C.) biverrucata*, *C. (C.) invenusta*, and *C. (Ensicamisia) lapponica*, are associated with high latitude. *Hermannia reticulata* and *H. scabra* Hermanniidae and *Ceratoppia bipilis* and *C. sphaerica* Ceratoppiidae are also characteristic of high latitudes. In the tundra zone, the holarctic species *Nothrus borussicus* Nothridae was often observed.

From Carabodidae, the most common species in the tundra are the circumpolar *Carabodes labyrinthicus* and the Palearctic *C. subarcticus* and *C. marginatus*. For high latitudes, there are Holarctic species *Oppiella (M.) neerlandica*, *O. (O.) splendens*, and *Moritzoppia unicarinata unicarinata* Oppiidae, and *Suctobelbella acutidens acutidens* Suctobelbidae. From Ceratozetidae, *Edwardzetes edwardsi* and *Ceratozetella sellnicki* are common at high latitudes. *Diapterobates notatus* and *Svalbardia paludicola* Humerobatidae are widely distributed in the Eurasian sector of the Arctic; they are found on the Arctic islands and archipelagos [11–13,17]. The first of these species has been noted as the most abundant in various plant communities in Svalbard [11–13].

This complex of species is characteristic of local fauna of the East European tundra, as well as of the tundra zone of Eurasia as a whole. The Holarctic species *Oribatula (O.) tibialis* and *O. (Z.) exilis*, the cosmopolitan *Tectocepheus velatus* and *Oppiella nova*, and the semi-cosmopolitan *Quadroppia quadricarinata* and *Scheloribates laevigatus laevigatus* also are widely distributed in the Arctic.

For 11 species in the list, Subías [43] indicates boreo-Alpine distribution. These are Holarctic species *C. (E.) lapponica*, *C. (C.) borealis*, *H. (P.) peltifer*, *H. (P.) humicola*, *E. edwardsi*, *Melanozetes mollicomus*, *Moritzoppia unicarinata clavigera*, *D. notatus*, *S. paludicola*, *Mycobates (Calyptozetes) sarekensis*, and *Oromurcia lucens*. For the Holarctic species *C. sphaerica*, *Melanozetes sellnicki*, *Ameronothrus lineatus*, *A. nigrofemoratus*, *Diapterobates variabilis*, and *Sphaerozetes arcticus*, boreal distribution is indicated. In conclusion, all these species are typical of the high latitudes of Eurasia.

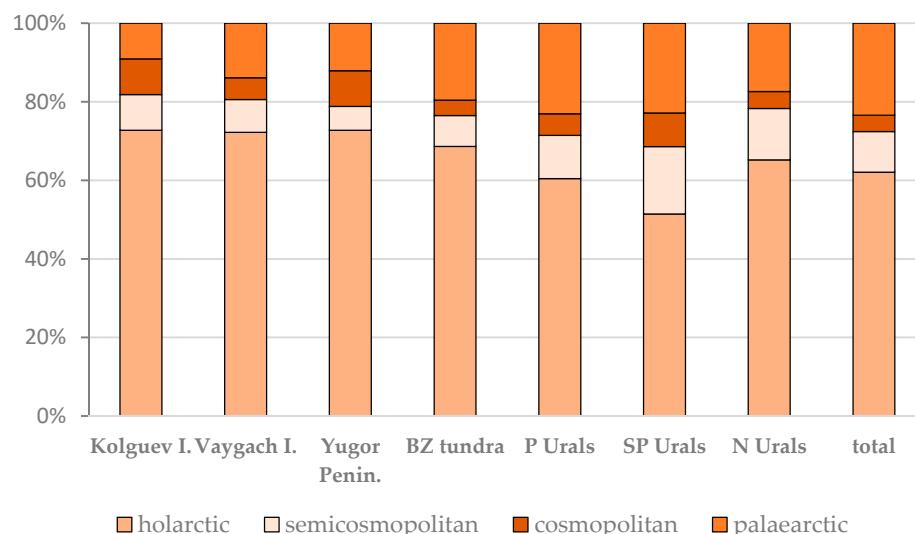
### 3.2. Types of Longitudinal Distribution

In this section, the Holarctic, Palearctic, cosmopolitan and semi-cosmopolitan species of oribatid fauna are distinguished by their longitudinal distribution. Holarctic species predominate the fauna (Figure 3). For comparison, in Spitsbergen, Holarctic species make up 50% of all species [7,11]. It has previously been noted that the European sector of the Arctic is characterised by an increase in the proportion of Holarctic oribatid species in the latitudinal gradient, from the taiga to mainland tundra to the Arctic islands and archipelagos [40]. Thus, in the taiga zone of the European North-East, the share of Holarctic species (41.5%) is the least [40].

The share of Palearctic species (34 species) in the local fauna was much smaller (23.4%) than that of Holarctic species. For comparison, in the taiga zone of the European North-East, Palearctic species make up 37.5% of the faunal list [40]. The highest share of Palearctic species is observed in the fauna of the Polar Urals and Bolshezemelskaya tundra (Figure 3).

The composition of the Palearctic species was specific to each local fauna. In total, five Palearctic species from Damaeidae were recorded, four of which were found only in the Polar Urals. Only one species, *Damaeus (E.) bituberculatus*, was distributed in three local faunas: in the Bolshezemelskaya tundra, the Polar Urals and the Northern Urals. This species is widely distributed in the taiga zone of the European North [44].

Some Palearctic species were noted only in the Polar Urals: *Liacarus (D.) neonominatus* (Liacaridae), *Eueremaeus oblongus silvestris* (Eremaeidae), *Exochocepheus laticuspis* (Scutoverticidae), *Bipassalozetes (B.) intermedius* (Passalozetidae), and *Suctobelbella (S.) subcornigera vera* (Suctobelbidae). In turn, other palearctic species, *Scutovertex neonominatus* (Scutoverticidae), *Berniniella (B.) bicarinata* and *Lauroppia falcata* (Oppiidae), and *Suctobelbella (S.) singularis* (Suctobelbidae), were recorded only in the Bolshezemelskaya tundra.



**Figure 3.** Relative species richness according to the longitudinal distribution of oribatid mites in the local fauna of East European tundra. Kolguev I.—Kolguev Island, Vaygach I.—Vaygach Island, Yugor Penin.—Yugor Peninsula, BZ tundra—Bolshezemelskaya tundra, P Urals—Polar Urals, SP Urals—Subpolar Urals, N Urals—North Urals.

Only a few Palearctic species were common to several local faunas. In addition to *D. (E.) bituberculatus* mentioned above, the species *Carabodes (C.) marginatus* was recorded in four mainland faunas: Polar Urals, Subpolar Urals, Yugor Peninsula, and Bolshezemelskaya tundra. The generalisate Palearctic species for two faunas: the Yugor Peninsula and the Vaigach Island was *Minunthozetes (M.) pseudofusiger*.

The share of cosmopolitan and semi-cosmopolitan species in the total fauna structure is 14.5%. In local faunas, they account for 13.9% to 18.2%. This is much higher than their share in the taiga zone, where they account for 9.5% of the total species [40].

It can thus be concluded that the findings of previous research [40] regarding the decrease in the proportion of Palearctic species and the increase in the proportion of Holarctic, cosmopolitan, and semi-cosmopolitan species in the oribatid fauna along the latitudinal gradient (from the taiga to mainland tundra to the Arctic islands and archipelagos) holds true.

A substantial number of species (20 species, 62.5%) are distributed circumpolar; they occur in high latitudes of both the Palearctic and Nearctic regions- in Alaska, Yukon, and Greenland [10,47,49]. These include *Liochthonius lapponicus*, *N. borussicus*, *Camisia horrida*, *C. biurus*, *H. (P.) punctatus*, *H. reticulata*, *C. bipilis*, *C. sphaerica*, *Moritzoppia neerlandica*, *M. unicarinata clavigera*, *S. acutidens acutidens*, *S. hammeri*, *O. tibialis*, *M. mollicomus*, *D. notatus*, *S. paludicola*, as well as cosmopolitan species *T. velatus*, *O. nova*, *C. gracilis* and semi-cosmopolitan species *Q. quadricarinata*.

### 3.3. Types of Latitudinal Distribution

#### 3.3.1. Arctic Species

In the composition of the oribatid fauna of the East European tundra, species with arctic, arctic-boreal, temperate, and polyzonal types of latitudinal distribution have been documented. For the East European tundra, as well as for the mainland tundra of the European part of Russia as a whole, only a single Arctic oribatid species is known until now – *S. paludicola*. In addition to the Eastern European sector, *S. paludicola* was found in the Kola Peninsula [50]. In the Arctic archipelagos of the Palearctic region, it was found in Spitsbergen [7,11] and Novaya Zemlya [1,11]; in northern Siberia, in Yamal and Taimyr [34,45]; and in the northern Far East, in Chukotka [48]. The species has a circumpolar distribution and is found in Greenland [49], Alaska, and Yukon [47]. The data obtained confirm earlier

conclusion about the small number of Arctic species in the Eastern European sector of the Arctic, both in the island and mainland regions [28,40].

The oribatid species *Sphaerozetes arcticus* Hammer, 1952, noted in the Polar Urals [35], should be referred to as an arctic-boreal species. In the European part of Russia, this species is rarely found. In addition to the Polar Urals, the species was recorded in the taiga zone, in the Arkhangelsk region [44]. In northern Siberia, it is more widespread, with its distribution covering the arctic-boreal zone, but most findings are in the tundra zone [45]. The species is found in Chukotka. Thus, it can be concluded that *S. arcticus* is characteristic of high latitudes. Subías [43] indicates a boreal distribution of this species.

The number of Arctic species is increasing on remote islands and archipelagos of the European Arctic sector. For example, on the Svalbard archipelago, where 81 species of oribatid mites are known [7,11], six Arctic species have been recorded. These are: *Autogneta (A.) kaisilai* Karppinen, 1967, *Sphaerozetes setiger* (Trägårdh, 1910), *Iugoribates gracilis* Sellnick, 1944, *Svalbardia paludicola*, *Ceratozetes (C.) spitsbergensis* Thor, 1934, and *Oribatella (O.) arctica arctica* Thor, 1930. The first of these species is noted only on Svalbard [43] and can be called conditional endemic to Svalbard.

For comparison, two Arctic species, *S. paludicola* and *Oribatella (O.) arctica arctica*, have been registered in the fauna of Novaya Zemlya. *Oribatella (O.) arctica arctica*, was observed in northern Siberia [34] and Chukotka [45], in addition to Spitsbergen. Therefore, it cannot be ruled out that this species may be found in the East European tundra in the future.

### 3.3.2. Arctic-Boreal Species

The tundra oribatid fauna includes a complex of arctic-boreal species occupying the Arctic islands and archipelagos, the continental part of the tundra zone, and the taiga zone of Eurasia. The base of this complex is represented by species that constitute the majority of tundra fauna, both in the European sector of the Arctic (mainland part and island part: Vaigach Island, Novaya Zemlya, and Spitsbergen), and in Siberia and the Far East, and, accordingly, contribute to the higher percentage of tundra fauna similarity in Eurasia. These species are *H. punctatus*, *C. sphaerica*, *H. reticulata*, and *D. notatus*, with a circumpolar distribution. On Vaigach Island, this list further includes *Ameronothrus lineatus*, *A. nigrofemoratus*, and *Oromurcia lucens*. Species *A. lineatus* in the European sector of the Arctic is also distributed in Spitsbergen and Kola tundra. Like *A. nigrofemoratus*, it is also a boreal species, while *Oromurcia lucens* (L. Koch, 1879), also found on Spitsbergen, is a boreal-alpine species, according to Subías [43].

In the biocoenoses of the Pai-Khoi Ridge (Yugor peninsula), the complex of arctic-boreal species is complemented by *Moritzoppia unicarinata clavigera*, *Pyroppia lanceolata*, and *Banksinoma setosa*. For the first of these species, Subías [43] indicates a boreal-alpine distribution. The species *B. setosa*, in addition to the Yugor peninsula, is noted in the North Urals. It is mainly located in the Siberian and Far Eastern sectors. The share of arctic-boreal species in different local faunas is not high, making up 7.7% to 18.6% of the total fauna. In the overall structure of the fauna, their contribution is 7.4%.

Some arctic-boreal species are also present in the Palaearctic mountain ranges, such as *D. notatus* in the Altai [46], *C. sphaerica* in the Tien Shan [46], and *M. unicarinata clavigera* and *P. lanceolata* in the Caucasus [41]. Arctic-boreal species *H. punctatus*, *D. notatus*, *Hermannia scabra*, *H. reticulata*, *A. lineatus*, and *C. sphaerica* are also found in the Western European tundra sector (Kola Peninsula) [50]. It can be thus concluded that the arctic-boreal species which are widely distributed along the longitudinal gradient of the European sector of the Arctic are all common. No arctic-boreal species specific to the Eastern European sector have been identified. In the European North-East, the complex of arctic-boreal species also includes *M. unicarinata clavigera*, *P. lanceolata*, *B. setosa*, *Sphaerozetes arcticus*, and *Peloribates pilosus*.

### 3.3.3. Temperate and Polyzonal Species

The largest number of species recorded in the East European tundra have a temperate or polyzonal type of latitudinal distribution. Temperate species typical of East European tundra are *Liochthonius*

*lapponicus*, *N. borussicus*, *O. (M.) neerlandica*, *C. labyrinthicus*, *C. marginatus*, *C. subarcticus*, *E. edwardsi*, and *M. mollicomus*.

Polyzonal species *C. horrida*, *C. biurus*, *N. borussicus*, *S. acutidens acutidens*, *S. acutidens duplex*, *C. bipilis*, *O. (O.) tibialis*, and *O. (Z.) exilis* were often found in local faunas of the tundra zone. Cosmopolitan species *T. velatus* and *O. nova* and semi-cosmopolitan species *Q. quadricarinata* and *S. laevigatus*, which in the latitudinal aspect are also distributed polyzonal [52], are common in the tundra. These polyzonal and temperate species that are common in the tundra zone, as well as the Arctic and arctic-boreal species, mentioned above, we call ‘species of northern complex’.

### 3.3.4. ‘Southern’ Elements within the Oribatid Fauna

Attention is also drawn to species which are mainly found in the lower latitudes. These species can be called ‘conditionally southern’. For example, *Hydrozetes thienemanni*, with a temperate type of distribution, was found only at Yugor Peninsula in the European sector of the tundra zone [28]. In the European part of Russia, it is distributed in taiga and coniferous/broad-leaved forests [41,44,52]. In the tundra zone of Eurasia, *H. thienemanni* was previously found only in Chukotka by Grishina [34].

Holarctic species *Malacothrus (Trimalaconothrus) tardus*, according to Subías [43], is absent in the northern Palaearctic region. It is found in the Polar Urals [35]. In the European part of Russia, it is found in the northernmost regions. This species was observed mainly in broad-leaved forests and steppe zone [41,44].

Palaearctic species *Eueremaeus oblongus silvestris* found in the Polar Urals [37] is not characteristic of the tundra zone. In the European part of Russia, it is mainly found in the zone of broad-leaved and coniferous/broad-leaved forests [41,52]. In Siberia, the species was observed in taiga forests and the Altai [45].

## 4. Summary

This publication presents a generalised taxonomic list of oribatid mites of East European tundra, based on available literature and new data. The checklist of East European tundra oribatid mites includes 163 species, 81 genera, and 45 families. This study presents data on the oribatid mite fauna of the Subpolar Urals for the first time. To date, 35 species, 24 genera, and 21 families of oribatids have been registered from this region.

The leading families in the fauna structure are Crotoniidae, Ceratozetidae, Oppiidae, Suctobelidae, Damaeidae, Brachychthoniidae, Phthiracaridae, Humerobatidae, Achipteriidae, Punctoribatidae, and Galumnidae. The greatest number of species is Holarctic. Circumpolar distributed species make 12.3% of the total. The share of Palaearctic species is low (23.4%), which distinguishes the fauna of the tundra zone from the taiga zone.

The specificity of the oribatid fauna of East European tundra manifests itself in the small group of Arctic species, both in the mainland tundra and on the Arctic islands. In the majority of local fauna, there is only one Arctic species, *Svalbardia paludicola*. *Sphaerozetes arcticus*, noted in the Polar Urals, that has been classified as an arctic-boreal species. It could also be called ‘conditionally arctic’, as it sometimes penetrates into the taiga zone.

The fauna of the East European tundra is characterised by a complex of arctic-boreal species, based on circumpolar species common with the Western European sector of the Arctic, as well as with the Siberian and Far Eastern sectors, such as *Heminothrus punctatus*, *Ceratoppia sphaerica*, *Hermannia reticulata*, and *Diapterobates notatus*. In different local faunas, this complex is complemented by species *Ameronothrus lineatus*, *A. nigrofemoratus*, *Banksinoma setosa*, *Pyroppia lanceolata*, *Moritzoppia unicarinata clavigera*, *Peloribates pilosus*, and *Oromurcia lucens*.

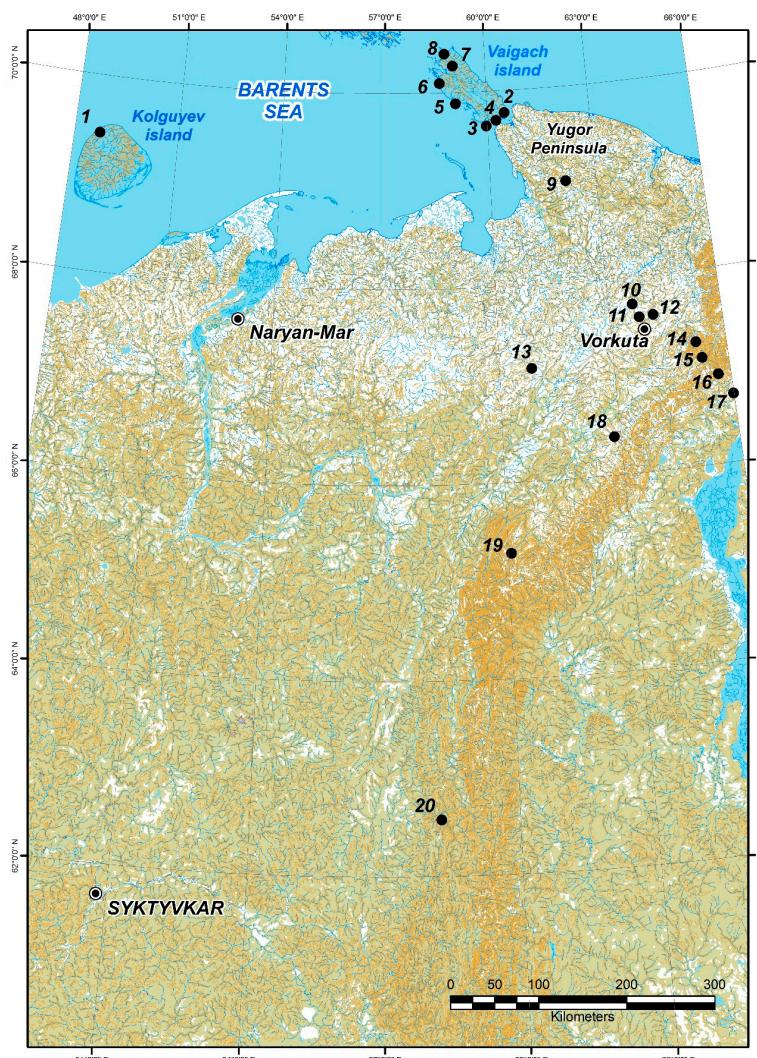
The largest number of species in the East European tundra is polyzonal. No species specific to the East European sector of the tundra zone was identified.

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## Appendix A



**Figure A1.** Localities within the region under consideration (see Table 1 for explanations). 1—Kolguyev Island (Krivolutsky et al., 2003), 2—Vaigach Island, Yugorskiy Shar (Koch, 1879), 3—Vaigach Island, Cape Greben' (Koch, 1879), 4—Vaigach Island (Trägårdh, 1904), 5 and 6—Vaigach Island (Krivolutsky et al., 2003), 7—Vaigach Island, Bolvansky mountain (Melekhina et al., 2019), 8—Vaigach Island, Old Polar Station (Melekhina et al., 2019), 9—Yugor Peninsula, Pai-Khoi Ridge (Melekhina and Zinov'yeva, 2012), 10—Bolshezemelskaya tundra, Vorgashor village (Melekhina, 1997), 11—Bolshezemelskaya tundra, Vorkuta (Melekhina and Krivolutsky, 1999), 12—Bolshezemelskaya tundra, Vorkuta (Goryachkin et al., 2011), 13—Bolshezemelskaya tundra, Pym-Va-Shor (Zubrii et al., 2012), 14—Polar Urals, complex reserve 'Khrebtovy', Yenganepe Ridge (The biological ..., 2010), 15—Polar Urals, Polyarny village (Sidorchuk, 2009), 16—Polar Urals, Rai-Iz Ridge (Grishina, 1985), 17—Polar Urals, Labytnangi village (Karpova et al., 1987), 18—Polar Urals, Paga-Ty Lake (Biodiversity ..., 2007; Melekhina, 2008), 19—Subpolar Urals, Lembekoyu River (Melekhina and Selivanova, unpublished), 20—Northern Urals, Yany-Pupu-Nyor mountain (Melekhina, 2005).

## Appendix B

Checklist of oribatid mites of the East European tundra\*

\*Note. After the name of a species its distribution in the East European tundra with references is given; global distribution follows Subías [43].

**Brachychthoniidae** Thor, 1934

*Brachychthonius bimaculatus* Willmann, 1936 Polar Urals [37]. Holarctic

*Liochthonius (Liochthonius) lapponicus* (Trägårdh, 1910) Yugor Peninsula [28], Bolshezemelskaya tundra [31]. Holarctic

*Liochthonius (L.) muscorum* Forsslund, 1964 Polar Urals [37]. Holarctic

*Liochthonius (L.) sellnicki* (Thor, 1930) Kolguev Island [26], Vaygach Island [26,27], Polar Urals [35], Subpolar Urals (new data). Holarctic

*Sellnickochthonius immaculatus* (Forsslund, 1942) Polar Urals [37]. Holarctic

*Sellnickochthonius zelawaiensis* (Sellnick, 1928) Bolshezemelskaya tundra [Melekhina, unpabl.], Polar Urals [37]. Holarctic

*Eobrachychthonius* sp. Vaygach Island [26].

*Eobrachychthonius latior* (Berlese, 1910) Bolshezemelskaya tundra [31]. Holarctic

**Hypochthoniidae** Berlese, 1910

*Hypochthonius rufulus* Koch, 1835 Polar Urals [37], Subpolar Urals (new data). Semicosmopolitan

**Euphthiracaridae** Jacot, 1930

*Acrotritia ardua* (Koch, 1841) Polar Urals [37]. Cosmopolitan

**Phthiracaridae** Perty, 1841

*Atropacarus (Atropacarus) striculus* (Koch, 1835) Vaygach Island [27], Bolshezemelskaya tundra [32]; Subpolar Urals (new data). Semicosmopolitan

*Phthiracarus* spp. Kolguev Island [26], Vaygach Island [27].

*Phthiracarus (Phthiracarus) boresetosus* Jacot, 1930 Polar Urals [37]. Semicosmopolitan

*Phthiracarus (P.) laevigatus* (Koch, 1844) Vaygach Island (as *Phthiracarus nitens* Nicolet, 1855) [26]. Palaearctic

*Phthiracarus (Archiphthiracarus) ligneus* Willmann, 1931 Vaygach Island [27]. Holarctic

**Trhypochthoniidae** Willmann, 1931

*Trhypochthonius cladonicolus* (Willmann, 1919) Bolshezemelskaya tundra [30], Polar Urals [37]. Palaearctic

*Trhypochthonius tectorum* s. str. (Berlese, 1896) Bolshezemelskaya tundra [32]; Polar Urals [37]. Cosmopolitan

**Malacothrididae** Berlese, 1916

*Malacothrus (Malacothrus) monodactylus* (Michael, 1888) Bolshezemelskaya tundra [32]; Polar Urals [37], Subpolar Urals (new data). Holarctic

*Malacothrus (Trimalaconothrus) tardus* (Michael, 1888) Polar Urals [35]. Holarctic

**Nothriidae** Berlese, 1896

*Nothrus* sp. Vaygach Island [27].

*Nothrus borussicus* Sellnick, 1928 Yugor Peninsula [28], Bolshezemelskaya tundra [30,31]; Polar Urals [35,37,38]; Subpolar Urals (new data); Northern Urals [39]. Holarctic

*Nothrus palustris* Koch, 1839 Bolshezemelskaya tundra [30,32]. Holarctic

*Nothrus pratensis* Sellnick, 1928 Bolshezemelskaya tundra [30], Subpolar Urals (new data). Holarctic

**Crotoniidae** Thorell, 1876

*Camisia (Camisia) biurus* (Koch, 1839) Yugor Peninsula [28], Bolshezemelskaya tundra [31]; Polar Urals [35,37], Subpolar Urals (new data); Northern Urals [39]. Holarctic

*Camisia (C.) biverrucata* (Koch, 1839) Polar Urals [37]. Holarctic

*Camisia (C.) borealis* (Thorell, 1871) Vaygach Island [26], Polar Urals [37]. Holarctic

*Camisia (C.) horrida* (Hermann, 1804) Vaygach Island [24], Yugor Peninsula [28], Bolshezemelskaya tundra [30], Polar Urals [35,37], Northern Urals [39]. Holarctic

*Camisia (C.) invenusta* (Michael, 1888) Polar Urals [37]. Palaearctic

*Camisia (C.) segnis* (Hermann, 1804) Polar Urals [37], Subpolar Urals (new data). Semicosmopolitan

*Camisia (C.) spinifer* (Koch, 1835) Polar Urals [37]. Semicosmopolitan

*Camisia (Ensicamisia) lapponica* (Trägårdh, 1910) Polar Urals [37]; Subpolar Urals (new data); Northern Urals [39]. Holarctic

*Heminothrus (Capillonothrus) capillatus* s. str. (Berlese, 1914) Kolguev Island (as *Heminothrus septentrionalis* Sellnick, 1944) [26]. Holarctic

*Heminothrus (Capillonothrus) thori* (Berlese, 1904) Polar Urals [37]. Holarctic

*Heminothrus (Heminothrus) longisetosus* (Willmann, 1925) Polar Urals [35,37,38]; Subpolar Urals (new data); Northern Urals [39]. Holarctic

*Heminothrus (Platynothrus) humicola* (Forsslund, 1955) Bolshezemelskaya tundra [31]. Holarctic

*Heminothrus (Platynothrus) peltifer* (Koch, 1839) Bolshezemelskaya tundra [31,32]; Polar Urals [35,37,38]; Subpolar Urals (new data); Northern Urals [39]. Semicosmopolitan

*Heminothrus (Platynothrus) punctatus* (L. Koch, 1879) Kolguev Island [26], Vaygach Island [26,27], Yugor Peninsula [28], Bolshezemelskaya tundra [30]. Holarctic

**Nanhermanniidae** Sellnick, 1928

*Nanhermannia (Nanhermannia) dorsalis* (Banks, 1896) Polar Urals [37]. Holarctic

*Nanhermannia (N.) sellnicki* Forsslund, 1958 Bolshezemelskaya tundra [32]; Subpolar Urals (new data); Northern Urals [39]. Palaearctic

**Hermanniiidae** Sellnick, 1928

*Hermannia (Heterohermannia) reticulata* Thörell, 1871 Vaygach Island [24–26], Yugor Peninsula [28], Holarctic

*Hermannia (Heterohermannia) scabra* (L. Koch, 1879) Vaygach Island [24,25]. Holarctic

**Licnobelidae** Grandjean, 1965

*Licnobelba latiflabellata* (Paoli, 1908) Kolguev Island (as *Licnobelba alestensis* Grandjean, 1931) [26]. Palaearctic

**Hungarobelbidae** Miko y Travé, 1996

*Tokukobelba compta* s. str. (Kulczynski, 1902) Yugor Peninsula (as *Belba (Belba) compta* (Kulczynski, 1902) [28], Polar Urals (as *B. (B.) compta* (Kulczynski 1902) [37], Subpolar Urals (new data). Palaearctic

**Damaeidae** Berlese, 1896

*Belba* spp. Kolguev Island [26], Bolshezemelskaya tundra [31]; Northern Urals [39].

*Belba (Belba) rossica* Bulanova-Zachvatkina, 1962 Polar Urals [35]. Palaearctic

*Damaeus (Damaeus) auritus* Koch, 1835 Polar Urals [37]. Palaearctic

*Damaeus (Epidamaeus)* sp. Polar Urals [37].

*Damaeus (Epidamaeus) bituberculatus* (Kulczynski, 1902) Bolshezemelskaya tundra [30], Polar Urals [37], Subpolar Urals (new data); Northern Urals [39]. Palaearctic

*Damaeus (Spatiodamaeus) boreus* Bulanova-Zachvatkina, 1957 Polar Urals [37]. Palaearctic

*Metabelba (Metabelba) pulverulenta* (Koch, 1839) Polar Urals [35]. Holarctic

*Porobelba spinosa* (Sellnick, 1920) Polar Urals [37]. Palaearctic

*Subbelba (Subbelba) montana* (Kulczynski, 1902) Polar Urals [37]. Palaearctic

**Ceratoppiidae** Grandjean, 1954

*Ceratoppia bipilis* s. str. (Hermann, 1804) Yugor Peninsula [28], Bolshezemelskaya tundra [30,31]; Polar Urals [35,37], Subpolar Urals (new data); Northern Urals [39]. Holarctic

*Ceratoppia sphaerica* (L. Koch, 1879) Vaygach Island [26], Yugor Peninsula [28], Polar Urals [34,37]. Holarctic

- Ceratoppia quadridentata* (Haller, 1882) Bolshezemelskaya tundra [30], Polar Urals [34,37], Subpolar Urals (new data). Holarctic
- Pyrooppia lanceolata* Hammer, 1955 Yugor Peninsula [28]. Holarctic
- Gustaviidae** Oudemans, 1900
- Gustavia microcephala* (Nicolet, 1855) Vaygach Island [27]. Palaearctic
- Liacaridae** Sellnick, 1928
- Adoristes (A.) ovatus poppei* (Oudemans, 1906) Yugor Peninsula [28]. Holarctic
- Liacarus (Dorycranosus) neonominatus* Subías, 2004 Polar Urals [34,37]. Palaearctic
- Xenillidae** Woolley et Higgins, 1966
- Xenillus (Xenillus) clypeator* Robineau-Desvoidy, 1839 Polar Urals (as *Cepheus latus* Nicolet, 1855 [37]). Holarctic
- Eremaeidae** Oudemans, 1900
- Eueremaeus oblongus* s. str. (Koch, 1835) Vaygach Island [27]. Holarctic
- Eueremaeus oblongus silvestris* (Forsslund, 1956) Polar Urals [37]. Palaearctic
- Tricheremaeus* sp. Polar Urals [37].
- Oribellidae** Kunst, 1971
- Proteremaeus* sp. Polar Urals [37].
- Autognetidae** Grandjean, 1960
- Autogneta (Conchogneta) traegardhi* Forsslund, 1947 Polar Urals [33,37]. Holarctic
- Thyrisomidae** Grandjean, 1954
- Banksinoma lanceolata* s. str. (Michael, 1885) Vaygach Island [27], Bolshezemelskaya tundra [31]; Polar Urals [37]. Holarctic
- Banksinoma setosa* Rjabinin, 1974 Yugor Peninsula [28], Northern Urals [39]. Holarctic
- Oppiidae** Sellnick, 1937
- Rhinoppia (Rhinoppia) subpectinata* (Oudemans, 1900) Polar Urals [35,37], Subpolar Urals (new data); Northern Urals (as *Medioppia tuberculata* (Bulanova-Zachvatkina, 1964) [39]). Holarctic
- Micropippia minus* s. str. (Paoli, 1908) Polar Urals [37]. Cosmopolitan
- Berniniella (Berniniella) bicarinata* (Paoli, 1908) Bolshezemelskaya tundra [30]. Palaearctic
- Dissorrhina ornata* s. str. (Oudemans, 1900) Bolshezemelskaya tundra [31]. Holarctic
- Lauroppia falcata* (Paoli, 1908) Bolshezemelskaya tundra [30]. Palaearctic
- Lauroppia fallax* (Paoli, 1908) Polar Urals [37]. Semicosmopolitan
- Lauroppia maritima acuminata* (Strenzke, 1951) Polar Urals [37]. Holarctic
- Oppiella (Moritzoppiella) neerlandica* (Oudemans, 1900) (=*Dameosoma translamellatum* Willmann, 1923) Vaygach Island (as *Oppia translamellata*) [26], Yugor Peninsula (as *Moritzoppia (Moritzoppiella) neerlandica* (Oudemans, 1900) [28], Bolshezemelskaya tundra (as *Lauroppia neerlandica* (Oudemans, 1900) [30] and [31]; Polar Urals (as *L. neerlandica* (Oudemans, 1900) [35] and [33,37,38]; Subpolar Urals (new data); Northern Urals (as *L. neerlandica* (Oudemans, 1900) [39]. Holarctic
- Oppiella (Oppiella) nova* s. str. (Oudemans, 1902) Vaygach Island [26,27], Yugor Peninsula [28], Polar Urals [33,37,38]; Subpolar Urals (new data). Cosmopolitan
- Oppiella (O.) splendens* (Koch, 1841) Kolguev Island [26], Vaygach Island [26], Polar Urals [37]. Holarctic
- Moritzoppia unicarinata* s. str. (Paoli, 1908) Vaygach Island [26], Polar Urals [33,37], Northern Urals [39]. Holarctic
- Moritzoppia unicarinata clavigera* (Hammer, 1952) Yugor Peninsula [28]. Holarctic
- Quadroppiidae** Balogh, 1983
- Quadroppia (Quadroppia) quadricarinata* (Michael, 1885) Vaygach Island [26,27], Yugor Peninsula [28], Bolshezemelskaya tundra [31]; Polar Urals [33,35,37,38]; Subpolar Urals (new data). Semicosmopolitan
- Suctobelbidae** Jacot, 1938

- Suctobelbella (Suctobelbella) acutidens* s. str. (Forsslund, 1941) Yugor Peninsula [28], Bolshezemelskaya tundra [30], Polar Urals [35,37]. Holarctic
- Suctobelbella (S.) acutidens duplex* (Strenzke, 1950) Yugor Peninsula (as *S. hammerae* Krivolutsky, 1965) [28], Bolshezemelskaya tundra (as *S. hammerae* Krivolutsky, 1965) [32]; Polar Urals [35], Subpolar Urals (new data). Holarctic
- Suctobelbella (S.) acutidens sarekensis* (Forsslund, 1941) Polar Urals [37] Holarctic
- Suctobelbella (S.) arcana* Moritz, 1970 Polar Urals [37]. Holarctic
- Suctobelbella (S.) latirostris* (Strenzke, 1950) Subpolar Urals (new data). Palaearctic
- Suctobelbella (S.) longicuspis* s. str. Jacot, 1937 Polar Urals [37]. Semicosmopolitan
- Suctobelbella (S.) longirostris* (Forsslund, 1941) Polar Urals [37]. Holarctic
- Suctobelbella (S.) palustris* (Forsslund, 1951) Bolshezemelskaya tundra [30]. Holarctic
- Suctobelbella (S.) singularis* (Strenzke, 1950) Bolshezemelskaya tundra [30], Subpolar Urals (new data). Palaearctic
- Suctobelbella (S.) subcornigera* s. str. (Forsslund, 1941) Polar Urals [37]. Semicosmopolitan
- Suctobelbella (S.) subcornigera vera* (Moritz, 1964) Polar Urals [37]. Palaearctic
- Suctobelba* spp. Vaygach Island [27], Bolshezemelskaya tundra [Melekhina, unpabl.].
- Suctobelba trigona* (Michael, 1888) Vaygach Island [26]. Holarctic
- Carabodidae** Koch, 1843
- Carabodes (Carabodes) areolatus* Berlese, 1916 Vaygach Island [27], Bolshezemelskaya tundra [30], Polar Urals [33–35]. Holarctic
- Carabodes (C.) labyrinthicus* (Michael, 1879) Kolguev Island [26], Vaygach Island [26], Polar Urals [35,37,38]; Subpolar Urals (new data). Holarctic
- Carabodes (C.) marginatus* (Michael, 1884) Yugor Peninsula [28]; Bolshezemelskaya tundra [31]; Polar Urals [33]; Subpolar Urals (new data). Palaearctic
- Carabodes (C.) subarcticus* Trägårdh, 1902 Yugor Peninsula [28], Polar Urals [35,37,38]; Subpolar Urals (new data); Northern Urals [39]. Palaearctic
- Tectocephidae** Grandjean, 1954
- Tectocephalus minor* Berlese, 1903 Kolguev Island [26]. Semicosmopolitan
- Tectocephalus velatus* s. str. (Michael, 1880) Kolguev Island [26], Vaygach Island [26,27], Yugor Peninsula [28], Bolshezemelskaya tundra [30], Polar Urals [33,35,37,38]; Subpolar Urals (new data); Northern Urals [39]. Cosmopolitan
- Tectocephalus velatus sarekensis* Trägårdh, 1910 Polar Urals [33,37]. Cosmopolitan
- Hydrozetidae** Grandjean, 1954
- Hydrozetes thienemanni* Strenzke, 1943 Yugor Peninsula [28]. Holarctic
- Ameronothridae** Vitzthum, 1943
- Ameronothrus lineatus* (Thorell, 1871) Vaygach Island [24]. Holarctic
- Ameronothrus nigrofemoratus* (L. Koch, 1879) Vaygach Island [24,25]. Holarctic
- Micreremidae** Grandjean, 1954
- Micreremus brevipes* (Michael, 1888) Polar Urals [37]. Palaearctic
- Scutoverticidae** Grandjean, 1954
- Scutovertex minutus* (Koch, 1835) Vaygach Island [27]. Holarctic
- Scutovertex neonominatus* Subías, 2004 Bolshezemelskaya tundra [Melekhina, unpabl.]. Palaearctic
- Exochocepheus laticuspis* (Balogh et Mahunka, 1965) Polar Urals [37]. Palaearctic
- Passalozetidae** Grandjean, 1954
- Bipassalozetes (Bipassalozetes) intermedius* (Mihelčič, 1954) Polar Urals [37]. Palaearctic
- Phenopelopidae** Petrunkevitch, 1955
- Eupelops plicatus* (Koch, 1835) (=*Pelops auritus* Koch, 1839) Bolshezemelskaya tundra (as *Eupelops auritus* Koch, 1839) [30], [31]; Polar Urals [35,37], Northern Urals [39]. Holarctic

*Eupelops torulosus* s. str. (Koch, 1839) Polar Urals [37]. Palaearctic

**Achipteriidae** Thor, 1929

*Campachipteria (Triachipteria) nivalis* (Hammer, 1952) (Achipteria) Polar Urals [35]. Holarctic

*Parachipteria punctata* (Nicolet, 1855) Vaygach Island [26], Polar Urals [35], Subpolar Urals (new data). Holarctic

*Achipteria* sp. Vaygach Island [30].

*Achipteria (Achipteria) nitens* (Nicolet, 1855) Polar Urals [37]. Holarctic

*Anachipteria (Anachipteria) howardi* (Berlese, 1908) Polar Urals [37]. Holarctic

**Tegoribatidae** Grandjean, 1954

*Scutozetes lanceolatus* Hammer, 1952 Bolshezemelskaya tundra [30]. Holarctic

*Tegoribates latirostris* (Koch, 1844) Bolshezemelskaya tundra [30]. Palaearctic

**Ceratozetidae** Jacot, 1925

*Ceratozetella (Ceratozetella) sellnicki* (Rajski, 1958) Vaygach Island [26], Polar Urals [37]. Palaearctic

*Ceratozetes* sp. Polar Urals [38].

*Ceratozetes (Ceratozetes) gracilis* s. str. (Michael, 1884) Yugor Peninsula [28], Subpolar Urals (new data). Cosmopolitan

*Edwardzetes (Edwardzetes) edwardsi* (Nicolet, 1855) Yugor Peninsula [28], Bolshezemelskaya tundra [30], Polar Urals [37,38]. Holarctic

*Fuscozetes fuscipes* (Koch, 1844) Bolshezemelskaya tundra [32]; Polar Urals [35]. Holarctic

*Fuscozetes pseudosetosus* Shal'dybina, 1975 Bolshezemelskaya tundra [Melekhina, unpabl.]. Holarctic

*Fuscozetes setosus* (Koch, 1839) Polar Urals [33]. Holarctic

*Melanzetes* sp. Polar Urals [37].

*Melanozetes mollicomus* (Koch, 1839) Yugor Peninsula [28], Northern Urals [39]. Holarctic

*Melanozetes sellnicki* (Hammer, 1952) Kolguev Island (as *Fuscozetes sellnicki* Hammer, 1952) [26], Vaygach Island (as *Fuscozetes sellnicki* Hammer, 1952) [26], Polar Urals [37], Subpolar Urals (new data). Holarctic  
*Trichoribates* sp. Polar Urals (as *Murcia (M.)* sp.) [37].

*Trichoribates (T.) novus* s. str. (Sellnick, 1928) Yugor Peninsula (as *Murcia nova* Sellnick, 1928) [28], Bolshezemelskaya tundra [31]; Polar Urals (as *Murcia (M.) nova* Sellnick 1928) [35]. Holarctic

*Trichoribates (T.) berlesei* (Jacot, 1929) Vaygach Island [27], Bolshezemelskaya tundra (as *Trichoribates trimaculatus* Koch, 1835) [30]. Holarctic

*Oromurcia lucens* (L. Koch, 1879) Vaygach Island [24]. Holarctic

*Trichoribates (Latilamellobates) incisellus* s. str. (Kramer, 1897) Bolshezemelskaya tundra [Melekhina, unpabl.], Northern Urals [39]. Holarctic

*Sphaerozetes arcticus* Hammer, 1952 Polar Urals [35]. Holarctic

**Chamobatidae** Thor, 1937

*Chamobates (C.) cuspidatus* (Michael, 1884) Bolshezemelskaya tundra [31]; Polar Urals [35]. Holarctic

*Chamobates (C.) lapidarius* (Lucas, 1849) Vaygach Island [26]. Palaearctic

*Chamobates (C.) pusillus* (Berlese, 1895) Vaygach Island (as *C. borealis*) [26]. Palaearctic

*Chamobates (Xiphobates) voigtsi* (Oudemans, 1902) Polar Urals [37]. Palaearctic

**Humerobatidae** Grandjean, 1971

*Diapterobates humeralis* (Hermann, 1804) Polar Urals [35,37]. Holarctic

*Diapterobates notatus* (Thorell, 1871) Kolguev Island [26], Vaygach Island [24,26,27], Yugor Peninsula [28]. Holarctic

*Diapterobates oblongus* (L. Koch, 1879) Subpolar Urals (new data); Northern Urals [39]. Palaearctic

*Diapterobates variabilis* s. str. Hammer, 1955 Polar Urals [37]. Holarctic

*Svalbardia paludicola* Thor, 1930 Yugor Peninsula [28], Bolshezemelskaya tundra [Melekhina, unpabl.], Polar Urals [37]. Holarctic

**Punctoribatidae Thor, 1937**

*Mycobates (Mycobates) monodactylus* Shal'dybina, 1970 Polar Urals [33,35,37]. Palaearctic  
*Mycobates (Calypozetes) patrius* Shal'dybina, 1970 Polar Urals [35]. Palaearctic  
*Mycobates (Calypozetes) sarekensis* (Trägårdh, 1910) Polar Urals [37]. Holarctic  
*Minunthozetes (M.) pseudofusiger* (Schweizer, 1922) Vaygach Island [26], Yugor Peninsula [28]. Palaearctic  
*Punctoribates (P.) punctum* (Koch, 1839) Bolshezemelskaya tundra [30]. Semicosmopolitan

**Oribatulidae Thor, 1929**

*Oribatula (Oribatula) tibialis* (Nicolet, 1855) Vaygach Island [26], Yugor Peninsula [28], Bolshezemelskaya tundra [30], Polar Urals [33–35,37], Subpolar Urals (new data); Northern Urals [39]. Holarctic  
*Oribatula (Zygoribatula) exilis* s. str. (Nicolet, 1855) Vaygach Island [24,27], Yugor Peninsula [28], Bolshezemelskaya tundra [30], Polar Urals [35,37], Subpolar Urals (new data); Northern Urals [39]. Holarctic

**Hemileiidae J. et P. Balogh, 1984**

*Hemileius (Hemileius) initialis* (Berlese, 1908) Bolshezemelskaya tundra (as *Scheloribates confundatus* Sellnick, 1928) [30]; Polar Urals (as *S. confundatus* Sellnick, 1928) [35] and [38]. Semicosmopolitan

**Liebstadiidae J. et P. Balogh, 1984**

*Liebstadia (L.) pannonica* (Willmann, 1951) Bolshezemelskaya tundra (as *Protoribates pannonicus* Willmann, 1951) [30]. Holarctic

*Liebstadia (L.) similis* (Michael, 1888) Kolguev Island [26], Vaygach Island [26,27], Polar Urals [35,37]. Holarctic

**Scheloribatidae Grandjean, 1933**

*Scheloribates (S.) laevigatus* s. str. (Koch, 1835) Vaygach Island [27], Yugor Peninsula [28], Subpolar Urals (new data); Northern Urals [39]. Semicosmopolitan

*Scheloribates (S.) pallidulus latipes* (Koch, 1844) Polar Urals [35,37,38]; Northern Urals [39]. Semicosmopolitan

**Haplozetidae Grandjean, 1936**

*Peloribates* spp. Vaygach Island [26,27].

*Peloribates (Peloribates) canadensis* Hammer, 1952 Polar Urals [37]. Holarctic

*Peloribates (P.) europaeus* Willmann, 1935 Bolshezemelskaya tundra [30]. Holarctic

*Peloribates (P.) pilosus* Hammer, 1952 Bolshezemelskaya tundra [30], Northern Urals [39]. Holarctic

**Parakalummidae Grandjean, 1936**

*Neoribates (Neoribates) aurantiacus* (Oudemans, 1914) Polar Urals [35,37], Subpolar Urals (new data). Holarctic

**Galumnidae Jacot, 1925**

*Galumna (Galumna) dimorpha* Krivolutskaja, 1952 Bolshezemelskaya tundra [Melekhina, unpabl.]. Palaearctic

*Galumna (G.) rossica* Sellnick, 1926 Polar Urals [37]. Palaearctic

*Pergalumna* sp. Bolshezemelskaya tundra [33].

*Pergalumna (P.) nervosa* s. str. (Berlese, 1914) Bolshezemelskaya tundra [30]. Holarctic

*Pilogalumna* sp. Polar Urals [35].

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