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Crustaceans from small water bodies on islands of the Nenets Autonomous Area (European part of the Russian Arctic)

Ракообразные малых водоемов островов Ненецкого автономного округа (Европейская часть Российской Арктики)

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КЛЮЧЕВЫЕСЛОВА: Cladocera, Copepoda, арктические острова, фауна, биогеография.

ABSTRACT. Data on diversity of Crustacea (excluding Ostracoda) in small water bodies located on islands of the Nenets Autonomous Area are summarized based on original materials and published records. We have identified 59 taxa of crustaceans in original samples from 61 small water bodies located on Kolguev, Vaygach, Dolgy, Golets and Matveev islands. According to accumulation curves, the final species diversity is estimated by us incompletely. Additional efforts are necessary for more accurate description of local faunas. Among recorded groups, microcrustaceans (cladocerans and copepods) with broad ecological and geographical preferences are the leaders in the number of species. The investigated islands are characterized by oligodominant taxocoenosis containing only two taxa (*Chydorus belaevae* Klimovsky et Kotov, 2015 and *Acanthocyclops vernalis* (Fischer, 1853)). But all revealed taxa are interesting in the frame of further phylogeographic studies and analysis of the history of Arctic island colonization by invertebrates after the Last Glacial Maximum.

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РЕЗЮМЕ. На основе оригинальных и литературных данных обобщены сведения о разнообразии ракообразных (за исключением Ostracoda) малых водоемов островной части Ненецкого автономного округа. В доступных коллекционных образцах, отобранных из 61 малого водоема, расположенного на островах Колгуев, Вайгач, Долгий, Голец и Матвеев, мы выявили 59 видов ракообразных. В соответствии

с кривыми накопления, число видов было выявлено нами неполно, и для более точного описания локальных фаун необходимы дополнительные усилия. Среди выявленных групп, по числу видов лидируют микроракообразные (кладоцеры и копеподы) с широкими экологическими и географическими предпочтениями. Исследованные острова характеризуются олигодоминантным такоценозом, включающим только два вида (*Chydorus belaevae* Klimovsky et Kotov, 2015 и *Acanthocyclops vernalis* (Fischer, 1853)). Однако все выявленные виды интересны с точки зрения дальнейших филогеографических исследования и анализа особенностей колонизации арктических островов беспозвоночными животными после последнего ледникового максимума.

Introduction

Crustaceans (Arthropoda: Crustacea) inhabit aquatic and terrestrial ecosystems all around the world, including Arctic and Antarctic regions [Sher *et al*., 2000; Coulson *et al*., 2014; Novichkova, Azovsky, 2017; Díaz *et al*., 2019; Rogers, Thorp, 2019; Chertoprud *et al*., 2021]. Ecosystems of polar regions are considered to be particularly vulnerable to climate changes and anthropogenic impact [Díaz *et al*., 2019; Nazarova *et al*., 2021]. Crustaceans, especially cladocerans and copepods, reach high abundance and biomass there and play an important role in food chains. In recent years, micro- and macrocrustaceans have been studied intensively within the framework of ecological monitoring of Arctic and Antarctic ecosystems [Weider, Hobæk, 2000; Díaz *et al*., 2019; Jensen *et al*., 2019; Fefilova *et al*., 2022].

Current freshwater and terrestrial biota of the islands and archipelagoes located in the European part of Russian Arctic, as well as nearest continental areas, have been formed mainly after the last Glacial maximum [Haney, Taylor, 2003; Samchyshyna *et al*., 2008; Coulson *et al*., 2014; Bespalaya *et al*., 2021, 2022]. Despite a short period since deglaciation, these territories are inhabited by rather diverse communities. Two strongest taxonomic shifts in biological communities are shown for the continental part of Eastern European Russian Arctic during Late Holocene. These shifts corresponded to the end of the Little Ice Age (around 1880’s) and to the modern accelerating warming (since 1980’s) [Nazarova *et al*., 2021]. However emergence and naturalisation of thermophilic taxa in the continental part of the Russian Arctic require future investigation [Fefilova *et al*., 2022]. Unfortunately, a similar compilation is impossible now for the crustaceans inhabiting water bodies located in the island part of the Russian Arctic due to lack of paleolimnological data. Data on the diversity of recent crustacean taxocoenoses of the European part of the Russian Arctic also are incomplete [Bespalaya *et al*., 2021].

Among islands and archipelagos of the Barents Sea, crustaceans were collected and studied in different inland waters of Svalbard [Węławski, 1994; Coulson, 2000; Samchyshyna *et al*., 2008; Coulson *et al*., 2014; Chertoprud *et al*., 2017, 2021; Dimante-Deimantovica *et al*., 2018; Walseng *et al*., 2018; Jensen *et al*., 2019], Franz Josef Land [Scott, 1899; Węławski, 1994; Coulson *et al*., 2014], Novaya Zemlya [Vekhoff, 1997, 1998; Semenova, 2003; Leshko *et al*., 2008; Coulson *et al*., 2014; Bespalaya *et al*., 2021], Vaygach Island [Vekhoff, 1997, 2000; Semenova, 2003; Fefilova, 2008; Kochanova, Fefilova, 2017; Bespalaya *et al*., 2021], Kolguev Island [Chertoprud *et al*., 2021], Dolgy Island [Leshko *et al*., 2008; Fefilova, 2008; Kochanova, Fefilova, 2017] and Matveev Island [Vekhoff, 1997] mainly in the framework of short-term complex expeditions. More or less detailed observations, including a description of composition and structure of the crustacean communities in the inland waters, are available only for Svalbard, Novaya Zemlya and Vaygach Island (see review Chertoprud *et al*. [2017, 2021]; Dimante-Deimantovica *et al*. [2018]; Bespalaya *et al*. [2021]). Few species of Ostracoda from Novaya Zemlya and Vaygach Island were already studied at the beginning of the twentieth century [Aim, 1914]. At the same time, no one among previous researchers has discussed the completeness of biodiversity inventories in the studied islands.

The present study could be regarded as the next step towards a full description of crustacean fauna of islands and archipelagos of the European part of the Russian Arctic. The aim of the present work is to investigate the crustaceans (excluding Ostracoda) in original samples from Kolguev, Vaygach, Dolgy, Golets and Matveev islands.

Material and methods

Studied area. Kolguev, Vaygach, Dolgy, Golets and Matveev islands belong to the Nenets Autonomous Area (Arkhangelsk Area, European Russia).

Kolguev Island is located in the east of the Barents Sea. Its total area is about 5030 km^2. The island surface is represented by a bogged plain raised in its central part and covered by vegetation typical of tundra zone [Makarova, 2013; Lavrinenko, Lavrinenko, 2018]. The climate of Kolguev Island is milder than the climate of Vaygach, Dolgy, Golets and Matveev islands due to significant influence of the Gulf Stream [Nikiforov *et al*., 2023].

Vaygach Island is located on the boundary between the Barents and Kara Seas. Its total area is 3380 km^2. The relief of the island is rocky with small lakes and bogs. Vegetation of the island is represented by plants typical of Arctic tundra [Prokin *et al*., 2017].

Dolgy, Golets and Matveev islands are significantly smaller than Kolguev and Vaygach islands. They are located in the “Pechora Sea” = a south-east portion of the Barents Sea. Area of Dolgy Island is 152 km^2, Golets Island — 1.5 km^2. Matveev Island reaches 2 km in diameter. These islands have a notably flat topography (maximum elevation 18 m) with numerous freshwater and brackish lakes and bogs with typical tundra vegetation [Anufriev, 2006; Prokin *et al*., 2017; Mazei *et al*., 2018].

Studied material and its analysis. We analyzed 158 samples from 61 small water bodies of different types (more or less permanent lakes, temporary pools and water bodies of unknown status), located on Vaygach, Kolguev, Dolgy, Golets and Matveev Islands (Fig. 1A, B, see also Suppl. Table 1). The samples were collected by D.S. Dorofeev, P.M. Glazov, S. Krylenko and colleagues, Y.V. Bespalaya, O.V. Aksenova and A.G. Bush during different expeditions. The collection time covers a period

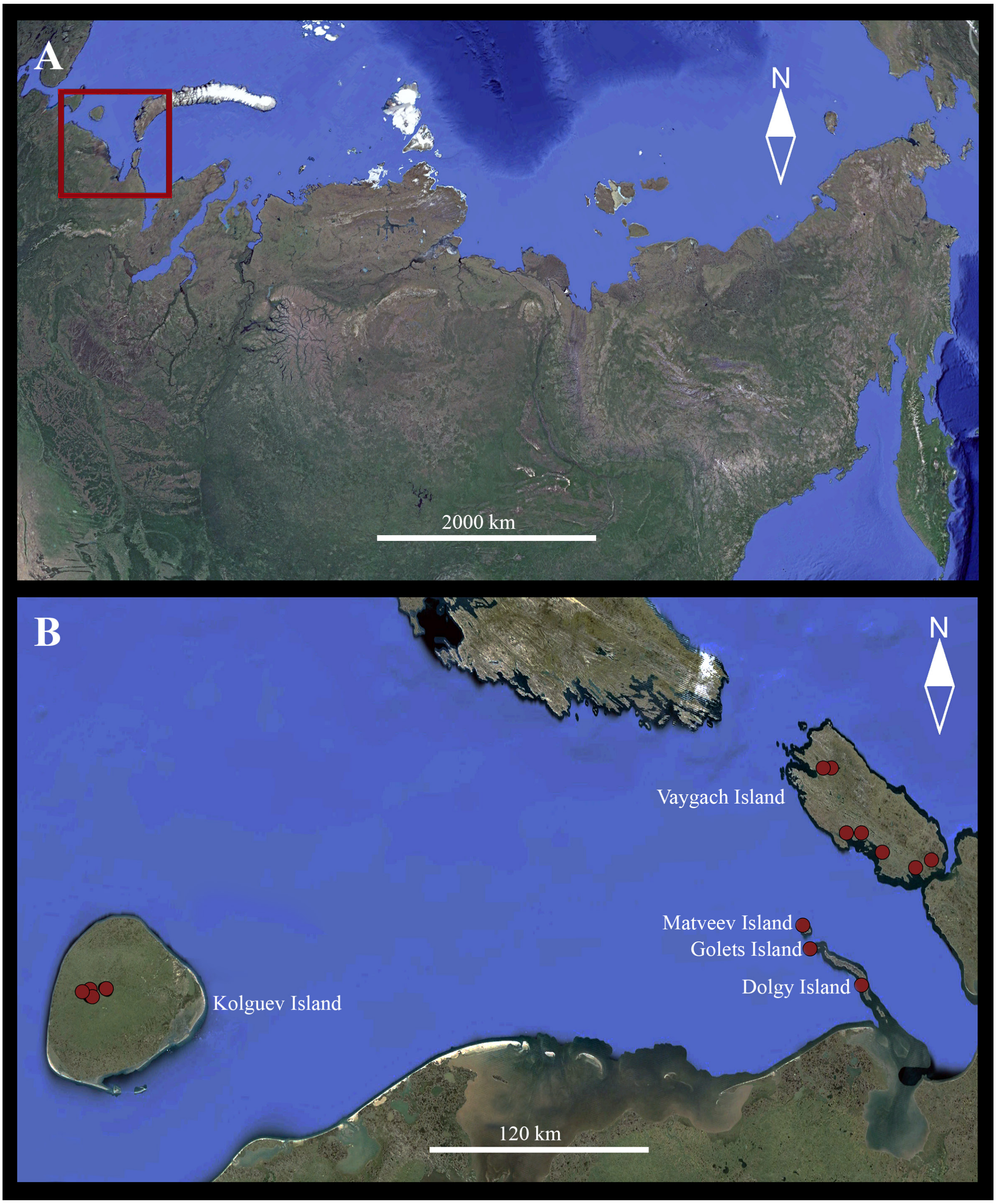

Fig. 1. A — a map with region of investigation; B — sampling sites.
Рис. 1. A — карта региона исследования; B — места отбора проб.

from autumn of 2017 to summer of 2023. The samples were collected via small plankton nets with mesh size around 0.05 mm in the open water and littoral including mosses and macrophyte debris. The material was fixed in 96% ethanol and refrigerated before examination in the laboratory. Examination of Cladocera, Calanoida, Cyclopoida, Harpacticoida, Anostraca, Notostraca and Amphipoda from the samples was carried out under a stereoscopic microscope Olympus SZX2-ZB10 and a compound microscope Olympus BX41 (Olympus Corporation, Japan), equipped with a digital camera ToupCam E3ISPM05000KPA (Hangzhou ToupTek Photonics Company, China) and a camera lucida. We used both monographs and recent articles [Alekseev, Tsalolikhin, 2010; Kochanova, Fefilova, 2017; Rogers, Thorp, 2019; Korovchinsky *et al*., 2021] for accurate identification of cladocerans and copepods. Specimens of *Chydorus* were identified based on their male morphology.

Ostracods were found in all localities, but were not added to this study due to lack of males (that are necessary for accurate identification) in most of the investigated samples. Results of identification were incorporated into a database in Microsoft Excel 2007 format (Microsoft, USA).

Some taxa were investigated in detail under a scanning electron microscope TESCAN MIRA 3 LMH (Tescan, Czech Republic) according to previously described protocols [Kotov, 2013; Mityaeva *et al*., 2024]. Visualization of sampling points was carried out in DIVA-GIS 7.5 packet on the basis of geographical coordinates from the database.

Data processing was carried out in Microsoft Excel 2010. The completeness of crustacean species number estimation in the small water bodies of the investigated islands was assessed using non-parametric methods for extrapolation of species richness [Colwell, Elsensohn, 2014], implemented in the EstimateS 9.1 software package for OS Windows 10 environment. The detailed algorithm of data processing was described in Mityaeva *et al*. [2024].

The ecological and geographical preferences of each taxon were interpreted according to earlier published data on the crustaceans of Northern Eurasia [Alekseev, Tsalolikhin, 2010; Rogers, Thorp, 2019; Korovchinsky *et al*., 2021], as well as more detailed special reviews on some groups [Hessen *et al*., 2004; Fefilova, 2008; Lindholm *et al*., 2016; Kotov, 2016; Kochanova, Fefilova, 2017; Chertoprud *et al*., 2021; Sheveleva *et al*., 2021; Fefilova *et al*., 2022].

Results

We identified 59 taxa of crustaceans in 61 small water bodies located in the island part of the Nenets Autonomous Area (Table 1, Suppl. Table 1).

The class Hexanauplia was represented by copepods and included three orders (Cyclopoida, Calanoida and Harpacticoida), represented by four families and 16 genera (Table 2). The class Branchiopoda included four orders (Anomopoda, Ctenopoda, Anostraca and Notostraca), represented by nine families and 13 genera. Among them ten genera belonged to Cladocera, two genera — to Anostraca and a single genus — to Notostraca (Table 2). The class Malacostraca was represented by a single genus of Amphipoda (Table 2).

Genera *Daphnia* O.F. Müller, 1785 (seven species or 11.9% of all identified taxa) and *Cyclops* O.F. Müller, 1785 (six species or 10.2% of all identified taxa) were found to be most specious (Table 3, Fig. 2A). The genus *Eurytemora* Giesbrecht, 1881 included four species. Genera *Acanthocyclops* Kiefer, 1927, *Arctodiaptomus* Kiefer, 1932, *Diacyclops* Kiefer, 1927, *Eudiaptomus* Kiefer, 1932 and *Megacyclops* Kiefer, 1927 contained three species in each genus. Eight aforementioned genera composed 54.4% of all crustacean diversity in the investigated localities (Fig. 2A). Five genera contained two species in each genus, and each of the rest 17 genera contained a single species only (Table 3).

The largest species diversity (45 species) was recorded for Vaygach Island. Crustacean fauna of Kolguev Island included 39 species, Dolgy Island — 24 species, Golets Island — 9 species. The lowest species diversity (only four taxa) was recorded for Matveev Island (Table 1). Among identified taxa, only two species (*Acanthocyclops vernalis* (Fischer, 1853) and *Chydorus belaevae* Klimovsky et Kotov, 2015) were found in all five investigated islands. Three species (*Chydorus sphaericus* (O.F. Müller, 1776), *Daphnia* (*Daphnia*) *pulicaria* Forbes, 1893, *Heterocope borealis* (Fischer, 1851)) were found on four islands. Thirteen species were found on three islands, 19 species were found on two islands and 22 species were found only on a single island each (Table 1). Large-sized crustaceans (*Branchinecta paludosa* (O.F. Müller, 1851), *Gammarus lacustris* G.O. Sars, 1863, *Polyartemia* cf. *forcipata* S. Fischer, 1851, *Lepidurus arcticus* (Pallas, 1793)) were found only on Vaygach Island. *B. paludosa* also was found on Dolgy Island, and *G. lacustris* was found on Kolguev Island.

Eurythermal crustaceans inhabiting different water body types were represented by 31 species (or 52.5% of the revealed taxa); cold-tolerant, eurybiont crustaceans were represented by 19 species (32.2%); cold-tolerant oligosaprobic crustaceans were represented by seven species (11.9%) (Fig. 2B, Table 1). Eurythermal, oligosaprobic crustaceans were represented by a single species (*Holopedium gibberum* Zaddach, 1855).

By geographical distribution, among the identified species of the Crustacea, 26 species (or 44.1% of the revealed taxa) belonged to non-revised widespread complexes; 17 species (28.8%) were widespread Eurasian taxa; 12 species (20.3%) belonged to taxa inhabiting Arctic and Subarctic regions of Eurasia; two species (3.4%) belonged to non-revised Circumarctic taxa. A distribution range of *Megacyclops magnus* (Marsh, 1920) covers both Arctic and subarctic regions of Eurasia and North America (Fig. 2C, Table 1). Geographical preferences of *Megacyclops* sp.n. require further investigations.

All identifications (960 records for 158 samples) are represented in the Supplementary Table 1, they (with the exception of Ostracoda) were included in the subsequent analysis to assess the completeness of the species composition revealed. In each six variants of analysis for the predicted taxon richness, Chao1 was found to be the best model (Fig. 3A–F).

In the case of analysis of distribution for all microcrustaceans in all samples, the empirical number was 64, but Chao1 model predicted existence of 71 taxa. The empirical curve did not reach a plateau, although the model curve reached it (Fig. 3A). Therefore, the empirical number of taxa was not fully complete, but slightly differed from a real one.

In the case of Kolguev Island, the empirical number was 39, but Chao1 model predicted existence of 44 taxa, both empirical and model curve did not reach the plateau (Fig. 3B). Thus, we are still far from an adequate assessment of the diversity of Kolguev Island.

In the case of Vaygach Island, the empirical number was 46, but Chao1 model predicted existence of 49 taxa, empirical curve did not reach a plateau, although model curve reached the plateau (Fig. 3C). The crustacean diversity of Vaygach Island was studied by us more adequately.

In the case of our study of the cladocerans only, both empirical and predicted number was 19, both curves reached the plateau, indicating a 100% revealing of diversity for this group (Fig. 3D).

In contrast, in the case of copepods, the empirical number was 40, but Chao1 model predicted existence of

Table 1. Distribution of Crustacea between the investigated islands, with description of their ecological confinedness and geographical distribution.
Таблица 1. Распределение ракообразных по исследованным островам, с описанием их экологической приуроченности и географического распространения.

No. in order	**Taxon**	**Ecology**	**Distribution**	**Vaygach Island**	**Kolguev Island**	**Dolgy Island**	**Golets Island**	**Matveev Island**	**Occurrence of species on the islands**
Cladocera									
1	*Acroperus harpae* (Baird, 1834)	eurythermal, eurybiont	widespread in Eurasia	1	0	0	0	0	**1**
2*	*Biapertura affinis* (Leydig, 1860)	eurythermal, eurybiont	widespread in Eurasia	1	1	0	0	0	**2**
3	*Bosmina* (*Eubosmina*) *coregoni* Baird, 1857	eurythermal, eurybiont	widespread in Eurasia	1	1	1	0	0	**3**
4*	*Bosmina* (*Bosmina*) *longirostris* (O.F. Müller, 1785)	eurythermal, eurybiont	non-revised widespread complex	0	1	0	0	0	**1**
5*	*Chydorus belaevae* Klimovsky et Kotov, 2015	eurythermal, eurybiont	widespread in Eurasia	1	1	1	1	1	**5**
6	*Chydorus sphaericus* (O.F. Müller, 1776)	eurythermal, eurybiont	non-revised widespread complex	1	1	1	1	0	**4**
7	*Coronatella rectangula* (G.O. Sars, 1862)	eurythermal, eurybiont	non-revised widespread complex	0	1	0	0	0	**1**
8*	*Daphnia* (*Daphnia*) *cristata* G.O. Sars, 1862	cold-tolerant, eurybiont	widespread in Eurasia	0	1	0	0	0	**1**
9*	*Daphnia* (*Daphnia*) *galeata* G.O. Sars, 1863	eurythermal, eurybiont	non-revised widespread complex	0	1	0	0	0	**1**
10*	*Daphnia* (*Daphnia*) *lacustris* G.O. Sars, 1862	cold-tolerant, oligosaprobic	arctic and subarctic regions of Eurasia	0	1	0	0	0	**1**
11*	*Daphnia* (*Daphnia*) *longispina* (O.F. Müller, 1776)	eurythermal, eurybiont	non-revised widespread complex	1	1	0	0	0	**2**
12	*Daphnia* (*Daphnia*) *middendorffiana* Fischer, 1851	cold-tolerant, oligosaprobic	non-revised circumarctic	1	1	1	0	0	**3**
13	*Daphnia* (*Daphnia*) *pulex* Leydig, 1860	eurythermal, eurybiont	non-revised widespread complex	1	0	1	1	0	**3**

Table 1 (continued).
Таблица 1 (продолжение).

No. in order	Taxon	Ecology	Distribution	Vaygach Island	Kolguev Island	Dolgy Island	Golets Island	Matveev Island	Occurrence of species on the islands
			Cladocera						
14*	*Daphnia* (*Daphnia*) *pulicaria* Forbes, 1893	cold-tolerant, eurybiont	non-revised widespread complex	1	1	1	1	0	**4**
15*	*Eurycercus* (*Teretifrons*) *chernovi* Bekker et Kotov, 2016	cold-tolerant, oligosaprobic	arctic and subarctic regions of Eurasia	1	0	0	0	0	**1**
16	*Eurycercus* (*Eurycercus*) *lamellatus* (O.F. Müller, 1776)	eurythermal, eurybiont	non-revised widespread complex	1	1	0	0	0	**2**
17*	*Holopedium gibberum* Zaddach, 1855	eurythermal, oligosaprobic	non-revised widespread complex	0	1	0	0	0	**1**
18	*Macrothrix hirsuticornis* Norman et Brady, 1867	cold-tolerant, eurybiont	non-revised widespread complex	1	1	1	0	0	**3**
19*	*Prendalona werestschagini* (Sinev, 1999)	cold-tolerant, oligosaprobic	arctic and subarctic regions of Eurasia	0	1	0	0	0	**1**
			Calanoida						
20	*Eurytemora affinis* (Poppe, 1880)	eurythermal, eurybiont	widespread in Eurasia	1	0	1	0	0	**2**
21	*Eurytemora gracilicauda* Akatova, 1949	eurythermal, eurybiont	arctic and subarctic regions of Eurasia	1	0	1	0	0	**2**
22	*Eurytemora raboti* Richard, 1897	cold-tolerant, eurybiont	arctic and subarctic regions of Eurasia	1	0	1	0	0	**2**
23	*Eurytemora gracilis* (G.O. Sars, 1898)	cold-tolerant, eurybiont	arctic and subarctic regions of Eurasia	0	1	0	0	0	**1**
24	*Heterocope borealis* (Fischer, 1851)	cold-tolerant, eurybiont	arctic and subarctic regions of Eurasia	1	1	1	0	1	**4**
25	*Heterocope saliens* Lilljeborg, 1863	cold-tolerant, eurybiont	arctic and subarctic regions of Eurasia	1	0	0	0	0	**1**
26*	*Arctodiaptomus acutilobatus* (G.O. Sars, 1903)	eurythermal, eurybiont	widespread in Eurasia	1	1	0	1	0	**3**

Table 1 (continued).
Таблица 1 (продолжение).

No. in order	Taxon	Ecology	Distribution	Vaygach Island	Kolguev Island	Dolgy Island	Golets Island	Matveev Island	Occurrence of species on the islands
Calanoida									
27	*Arctodiaptomus bacillifer* (Koelbel, 1885)	eurythermal, eurybiont	widespread in Eurasia	1	1	0	0	0	**2**
28	*Arctodiaptomus wierzejskii* (Richard, 1888)	eurythermal, eurybiont	widespread in Eurasia	0	1	1	0	0	**2**
29	*Diaptomus glacialis* Lilljeborg, 1889	cold-tolerant, eurybiont	arctic and subarctic regions of Eurasia	0	1	0	0	1	**2**
30*	*Eudiaptomus gracilis* (G.O. Sars, 1863)	eurythermal, eurybiont	widespread in Eurasia	1	1	0	0	0	**2**
31*	*Eudiaptomus graciloides* (Lilljeborg, 1888)	eurythermal, eurybiont	widespread in Eurasia	1	1	0	0	0	**2**
32*	*Eudiaptomus vulgaris* (Schmeil, 1896)	eurythermal, eurybiont	widespread in Eurasia	0	1	0	0	0	**1**
33	*Mixodiaptomus theeli* (Lilljeborg, 1889)	eurythermal, eurybiont	widespread in Eurasia	1	0	1	1	0	**3**
Cyclopoida									
34*	*Acanthocyclops americanus* (Marsh, 1893)	eurythermal, eurybiont	non-revised widespread complex	1	0	1	1	0	**3**
35	*Acanthocyclops vernalis* (Fischer, 1853)	cold-tolerant, eurybiont	non-revised widespread complex	1	1	1	1	1	**5**
36	*Acanthocyclops venustus* (Norman et T. Scott, 1906)	cold-tolerant, eurybiont	non-revised widespread complex	1	1	1	0	0	**3**
37	*Cyclops abyssorum* G.O. Sars, 1863	eurythermal, eurybiont	non-revised widespread complex	1	1	1	0	0	**3**
38*	*Cyclops kolensis* Lilljeborg, 1901	cold-tolerant, eurybiont	non-revised widespread complex	1	1	1	0	0	**3**
39	*Cyclops scutifer* G.O. Sars, 1863	cold-tolerant, oligosaprobic	non-revised widespread complex	1	1	0	0	0	**2**

Table 1 (continued).
Таблица 1 (продолжение).

No. in order	Taxon	Ecology	Distribution	Vaygach Island	Kolguev Island	Dolgy Island	Golets Island	Matveev Island	Occurrence of species on the islands
			Cyclopoida						
40*	*Cyclops sibiricus* Lindberg, 1950	cold-tolerant, eurybiont	arctic and subarctic regions of Eurasia	1	0	1	0	0	**2**
41	*Cyclops* cf. *strenuus* Fischer, 1851	eurythermal, eurybiont	non-revised widespread complex	1	1	1	0	0	**3**
42	*Cyclops vicinus* Uljanin, 1875	cold-tolerant, eurybiont	non-revised widespread complex	1	1	0	0	0	**2**
43*	*Diacyclops bisetosus* (Rehberg, 1880)	cold-tolerant, oligosaprobic	widespread in Eurasia	1	0	0	0	0	**1**
44	*Diacyclops crassicaudis* (G.O. Sars, 1863)	cold-tolerant, oligosaprobic	arctic and subarctic regions of Eurasia	1	0	0	0	0	**1**
45*	*Diacyclops languidoides* (Lilljeborg, 1901)	cold-tolerant, eurybiont	non-revised widespread complex	1	0	0	0	0	**1**
46	*Eucyclops serrulatus* (Fischer, 1851)	eurythermal, eurybiont	non-revised widespread complex	1	1	0	0	0	**2**
47*	*Megacyclops magnus* (Marsh, 1920)	cold-tolerant, eurybiont	arctic and subarctic regions of Eurasia and North America	1	0	1	0	0	**2**
48	*Megacyclops viridis* (Jurine, 1820)	eurythermal, eurybiont	non-revised widespread complex	1	1	1	0	0	**3**
49*	*Megacyclops* sp.n.	no data	no data	1	0	0	0	0	**1**
50*	*Paracyclops fimbriatus* (Fischer, 1853)	eurythermal, eurybiont	non-revised widespread complex	0	1	0	0	0	**1**
			Harpacticoida						
51	*Attheyella* (*Neomrazekiella*) *nordenskioldii* (Lilljeborg, 1902)	cold-tolerant, eurybiont	non-revised widespread complex	1	0	1	1	0	**3**
52*	*Attheyella* (*Neomrazekiella*) *dentata* (Poggenpol, 1874)	eurythermal, eurybiont	widespread in Eurasia	0	1	0	0	0	**1**

Table 1 (continued).
Таблица 1 (окончание).

No. in order	Taxon	Ecology	Distribution	Vaygach Island	Kolguev Island	Dolgy Island	Golets Island	Matveev Island	Occurrence of species on the islands
			Harpacticoida						
53	*Canthocamptus staphylinus* (Jurine, 1820)	eurythermal, eurybiont	widespread in Eurasia	1	0	0	0	0	**1**
54	*Moraria* (*Moraria*) *duthiei* (T. Scott et A. Scott, 1896)	cold-tolerant, eurybiont	non-revised widespread complex	0	1	0	0	0	**1**
55*	*Pesceus schmeili* (Mrázek, 1893)	eurythermal, eurybiont	widespread in Eurasia	1	1	0	0	0	**2**
			Anostraca						
56	*Branchinecta paludosa* (O.F. Müller, 1851)	eurythermal, eurybiont	non-revised widespread complex	1	0	1	0	0	**2**
57	*Polyartemia* cf. *forcipata* S. Fischer, 1851	cold-tolerant, eurybiont	arctic and subarctic regions of Eurasia	1	0	0	0	0	**1**
			Notostraca						
58	*Lepidurus arcticus* (Pallas, 1793)	cold-tolerant, eurybiont	non-revised circumarctic	1	0	0	0	0	**1**
			Amphipoda						
59	*Gammarus lacustris* G.O. Sars, 1863	eurythermal, eurybiont	non-revised widespread complex	1	1	0	0	0	**2**
			In total	**45**	**39**	**24**	**9**	**4**	

Taxa marked via (*) are new to the fauna of investigated islands.

Table2. Taxonomic structure of Crustacea found in the small water bodies located in the island part of the Nenets Autonomous Area.
Таблица 2. Таксономический спектр ракообразных, найденных в малых водоемах островной части Ненецкого автономного округа.

Class	Order	Family	The number of taxa	
			Genera	**Species**
Hexanauplia Oakley, Wolfe, Lindgren et Zaharof, 2013	Cyclopoida Burmeister, 1834	Cyclopidae Rafinesque, 1815	6	17
	Calanoida G.O. Sars, 1903	Temoridae Giesbrecht, 1893	2	6
		Diaptomidae Baird, 1850	4	8
	Harpacticoida G.O. Sars, 1903	Canthocamptidae Brady, 1880	4	5
Branchiopoda Latreille, 1817	Anomopoda G.O. Sars, 1865	Bosminidae Baird, 1845 emend. G.O. Sars, 1865	1	2
		Chydoridae Dybowski et Grohowski, 1894	5	6
		Daphniidae Straus, 1820	1	7
		Eurycercidae Kurz, 1875	1	2
		Macrothricidae Norman et Brady, 1867 emend. Smirnov, 1976	1	1
	Ctenopoda G.O. Sars, 1865	Holopediidae Sars, 1865	1	1
	Anostraca G.O. Sars, 1867	Branchinectidae Daday, 1910	1	1
		Chirocephalidae Daday, 1910	1	1
	Notostraca G.O. Sars, 1867	Triopsidae Keilhack, 1909	1	1
Malacostraca Latreille, 1802	Amphipoda Latreille, 1816	Gammaridae Leach, 1813	1	1
		In total	**30**	**59**

44 taxa, both empirical and model curve did not reach the plateau suggesting a worse studied diversity as compared to the cladocerans (Fig. 3E).

In case of large branchiopods (3 species found and 3 species predicted), both curves were very far from reaching the plateau, and their diversity was studied apparently inadequately (Fig. 3F).

Some of the found taxa with broad ecological and geographical preferences, as well as an interesting specimen of *Chydorus belaevae*, are illustrated in Figs. 4–8.

Discussion

We did not detect some previously recorded taxa in the region of study: five species of cladocerans (*Prendalona guttata* (G.O. Sars), 1862; *Camptocercus fennicus* Stenroos, 1898; *Daphnia* (*Daphnia*) *longiremis* Sars, 1862; *Eurycercus glacialis* Lilljeborg, 1887 and *Tretocephala ambigua* (Lilljeborg, 1900)), 19 species of copepods (*Acanthocyclops capillatus* (G.O. Sars, 1863); *Canthocamptus glacialis* Lilljeborg, 1902; *C. staphylinus*

Table 3. Generic structure of Crustacea found in the small water bodies located in the island part of the Nenets Autonomous Area.
Таблица 3. Родовой спектр ракообразных, найденных в малых водоемах островной части Ненецкого автономного округа.

The number in order	Genus	The number of species
1	*Daphnia* O.F. Müller, 1785	7
2	*Cyclops* O.F. Müller, 1785	6
3	*Eurytemora* Giesbrecht, 1881	4
4	*Acanthocyclops* Kiefer, 1927	3
5	*Arctodiaptomus* Kiefer, 1932	3
6	*Diacyclops* Kiefer, 1927	3
7	*Eudiaptomus* Kiefer, 1932	3
8	*Megacyclops* Kiefer, 1927	3
9	*Attheyella* Brady, 1880	2
10	*Bosmina* Baird, 1845	2
11	*Chydorus* Leach, 1816	2
12	*Eurycercus* Baird, 1843	2
13	*Heterocope* G.O. Sars, 1863	2
14	*Acroperus* Baird, 1843	1
15	*Biapertura* Smirnov, 1971	1
16	*Branchinecta* Verrill, 1869 (sensu Rogers, Coronel, 2011)	1
17	*Canthocamptus* Westwood, 1836	1
18	*Coronatella* Dybowski et Grochowski, 1894	1
19	*Diaptomus* Westwood, 1836	1
20	*Eucyclops* Claus, 1893	1
21	*Gammarus* Fabricius, 1775	1
22	*Holopedium* Zaddach, 1855	1
23	*Lepidurus* Leach, 1819	1
24	*Macrothrix* Baird, 1843	1
25	*Mixodiaptomus* Kiefer, 1932	1
26	*Moraria* T. Scott et A. Scott, 1893	1
27	*Paracyclops* Claus, 1893	1
28	*Pesceus* Özdikmen, 2008	1
29	*Polyartemia* S. Fischer, 1851 (sensu Brendonck, Belk, 1997)	1
30	*Prendalona* Sousa, Elmoor-Loureiro et Santos, 2018	1
	In total	**59**

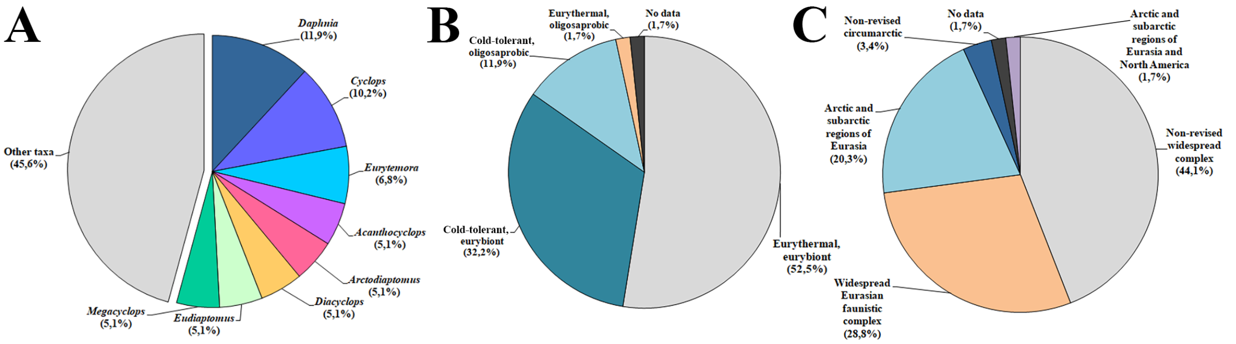

Fig. 2. A — distribution of revealed species between different genera; B — distribution of revealed species by their ecological confinedness; C — distribution of revealed species by their geographical preferences.

Рис.2. A — распределение выявленных видов по родам; B — распределение выявленных видов по экологической приуроченности; C — распределение выявленных видов по географической приуроченности.

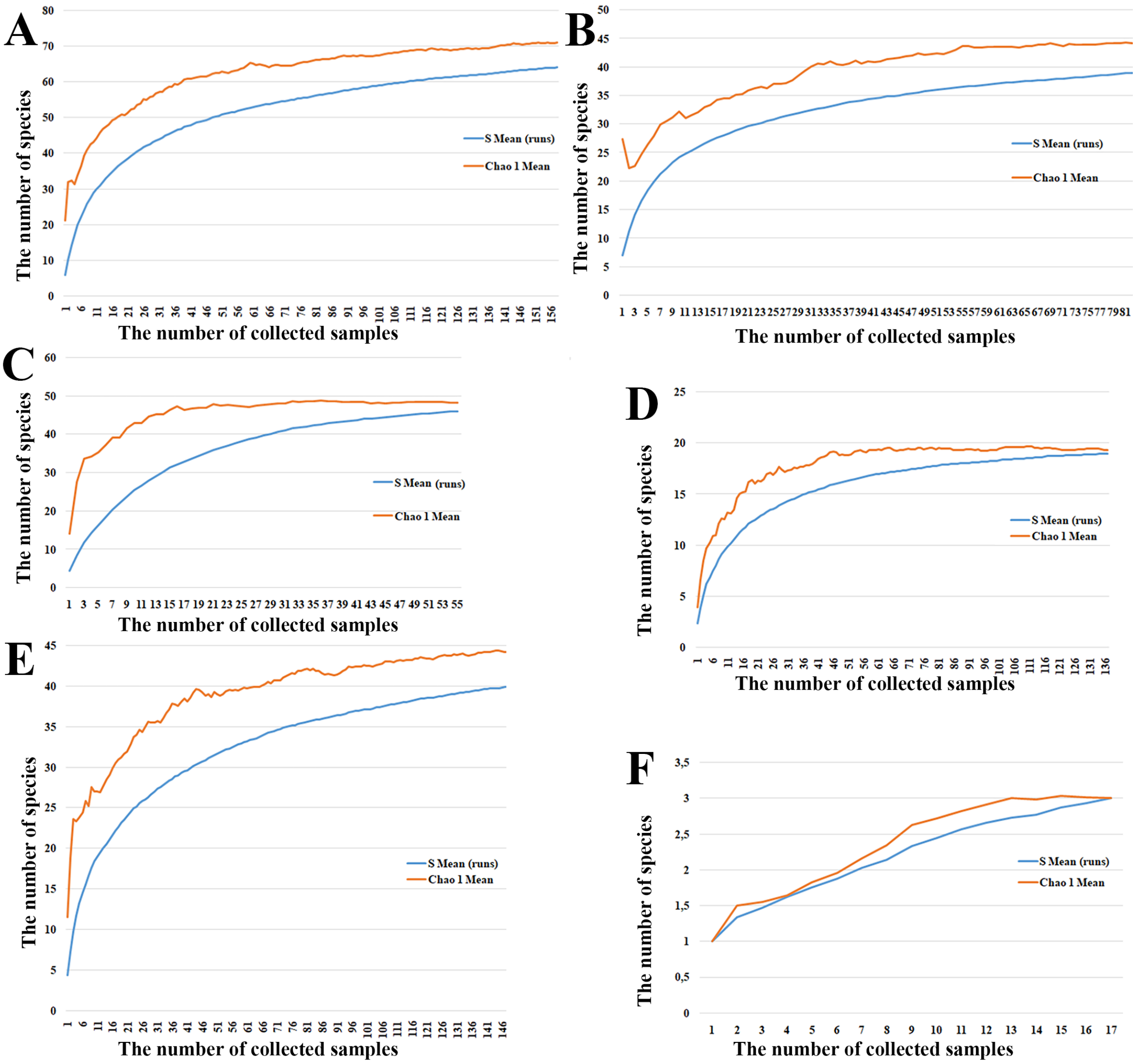

Fig.3. A–F — randomized assembler curves and taxa accumulation curves as the number of samples increases, plotted from the best model (Chao 1) for different variants. A — curves for all microcrustaceans and all samples; B — curves for all microcrustaceans from the water bodies of Kolguev Island only; C — curves for all microcrustaceans from the water bodies of Vaygach Island only; D — curves for cladocerans from all samples; E — curves for copepods from all samples; F — curves for large branchiopods (Notostraca + Anostraca) from all samples.

Рис.3. A–F — рандомизированные кривые сборщика и кривые накопления таксонов по мере увеличения числа проб, построенные по результатам применения лучшей модели (Chao 1) для разных вариантов. A — кривые для всех микроракообразных из всех проб; B — кривые для всех микроракообразных из водоемов острова Колгуев; C — кривые для всех микроракообразных из острова Вайгач; D — кривые для ветвистоусых ракообразных из всех проб; E — кривые для веслоногих ракообразных из всех проб; F — кривые для крупных жаброногих ракообразных (Notostraca + Anostraca) из всех проб.

(Jurine, 1820); *Eurytemora canadensis* Marsh, 1920; *Eucyclops speratus* (Lilljeborg, 1901); *Limnocalanus grimaldii macrurus* G.O. Sars,1863; *Maraenobiotus brucei* (Richard, 1898); *Mesochra lilljeborgi* Boeck, 1864; *M. pygmaea* (Claus, 1863); *Mesocyclops leuckarti* (Claus, 1857); *Microarthridion littorale* (Poppe, 1881); *Moraria insularis* Fefilova, 2008; *M. schmeili* Van Douwe, 1903; *Nannopus palustris* Brady, 1880; *Nitocra spinipes* Boeck, 1864; *N. typica* Boeck, 1864; *Onychocamptus mohammed* (Blanchard et Richard, 1891); *Tachidius discipes* Giesbrecht, 1881 and *T. longicornis* Olofsson, 1918); two species of Anostraca (*Artemiopsis bungei plovmornini* Jaschnov, 1925 and *Branchinectella media* (Schmankewitsch, 1873)) and 3 species of Amphipoda (*Monoporeia affinis* (Lindström, 1855); *Gammarus pellucidus* Gurjanova, 1930 and *G. pulex* (Linnaeus, 1758)) [Vekhoff, 1997, 1998, 2000; Fefilova, 2008; Leshko *et al*., 2008; Kochanova, Fefilova, 2017; Bespalaya *et al*., 2021; Chertoprud *et al*., 2021]. Also, we did not find any conchostracans. Note that they were recorded previously from Novaya Zemlya Archipelago [Coulson *et al*., 2014]. Anostracans also were not found during our survey, although they were present in some water bodies of Kolguev Island during other seasons (P. Glazov, personal observation).

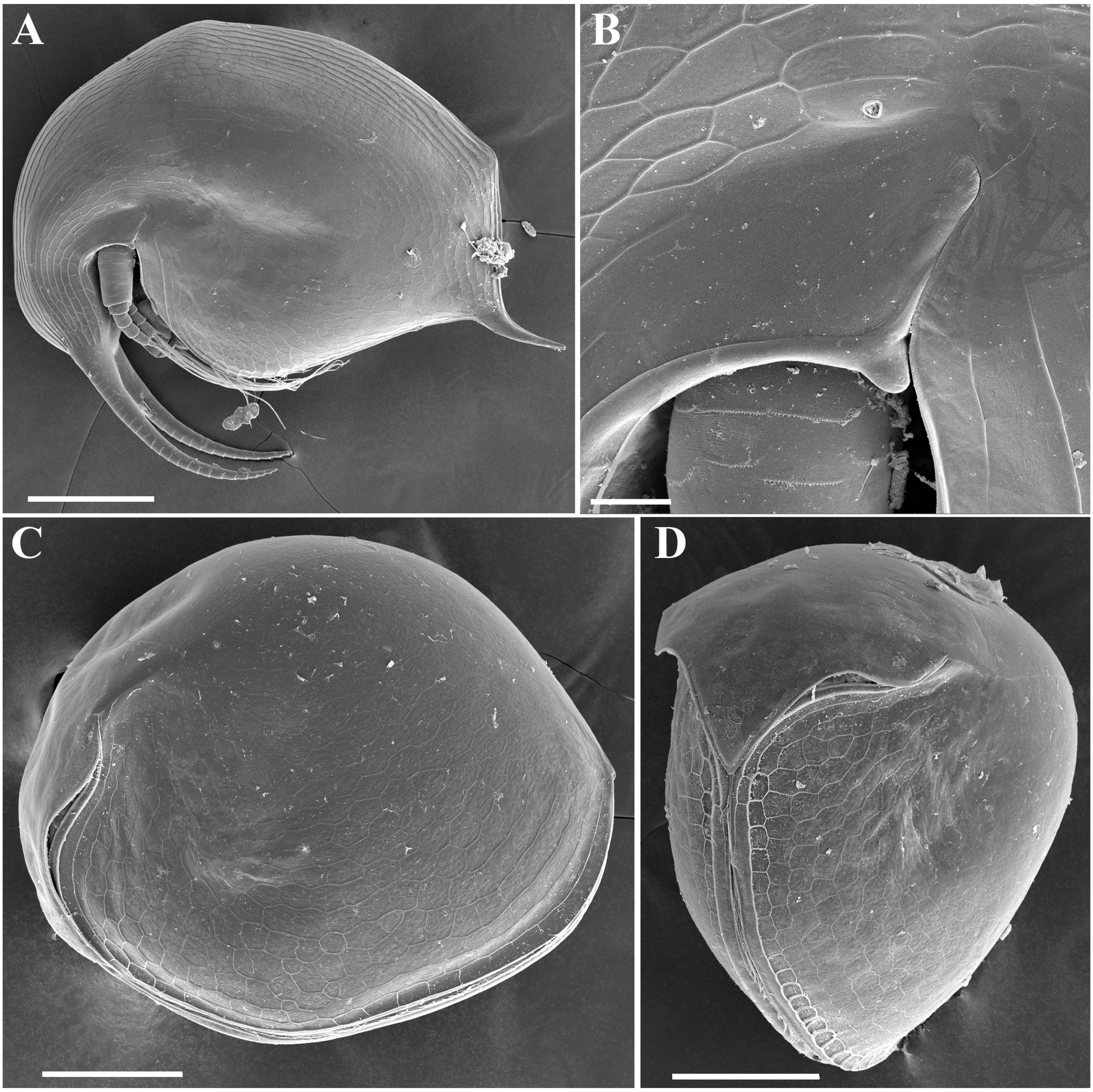

Fig. 4. A–B — general view and lateral head pore of *Bosmina* (*Eubosmina*) *coregoni* Baird, 1857 from the pool 2 located on Vaygach Island; C–D — general and anterior view of *Chydorus sphaericus* (O.F. Müller, 1776) from the unknown water body 16 located on Vaygach Island. Scale bars: A — 0.2 mm, C–D — 0.1 mm; B — 0.02 mm.

Рис. 4. A–B — общий вид и латеральная головная пора *Bosmina* (*Eubosmina*) *coregoni* Baird, 1857 из лужи 2 на острове Вайгач; C–D — общий вид и вид спереди *Chydorus sphaericus* (O.F. Müller, 1776) из безымянного водоема 16 на острове Вайгач. Масштабные отрезки: A — 0,2 мм, C–D — 0,1 мм; B — 0,02 мм.

We revealed 25 species new for the fauna of the investigated islands (see Table 1).

Among revealed taxa, records of *Chydorus belaevae* (Table 1, Fig. 5A–D), *Megacyclops* sp.n. and *Polyartemia* cf. *forcipata* are especially interesting. In our samples, *C. belaevae* was found together with *C. sphaericus*, but could be easily identified based on morphology of the rostrum and some features of gamogenetic females and males [Klimovsky, Kotov, 2015; Korovchinsky *et al*., 2021]. *Megacyclops* found in Vaygach Island will be described in a separate publication as a species new for science. Data on its ecological and geographical preference need to be clarified. Specimens of *Polyartemia* cf. *forcipata* should be compared to the type material, because some features important for identification do not correspond to the genus description according to Alekseev & Tsalolikhin [2010].

In the frame of our work, crustaceans of Golets Island were studied for the first time. Diversity of the crustaceans was studied in different extension due to different sampling efforts objectively related to the availability of islands only during a certain period of expeditions. Note that small islands were studied using a boat during vessel

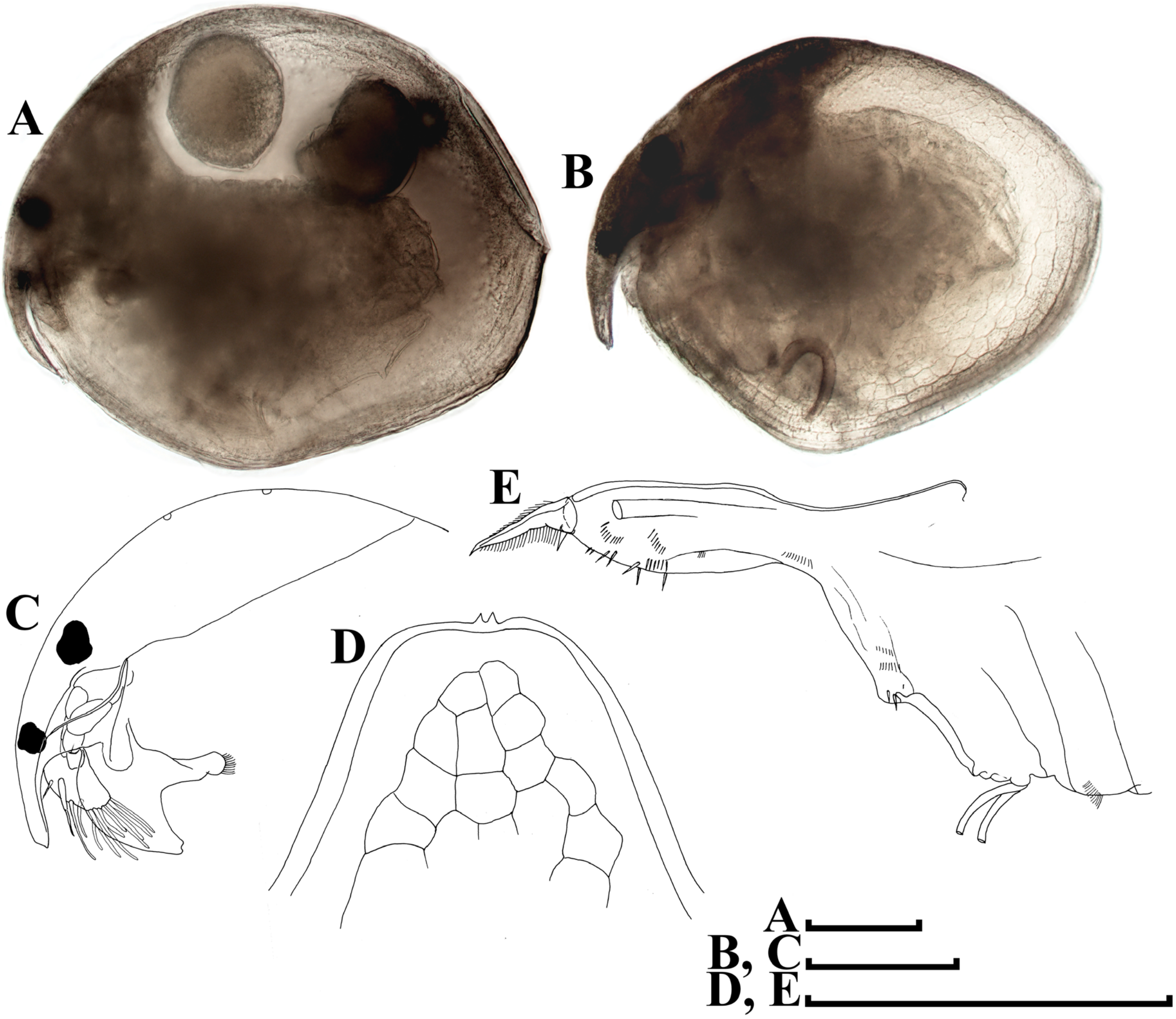

Fig. 5. A–E — *Chydorus belaevae* Klimovsky et Kotov, 2015 from the pool 1 with birds on Matveev Island. A — general view of ephippial female; B — general view of adult male; C — male head; D — anterior view of male rostrum; E — postabdomen of adult male. Scale bars: A–E — 0.1 mm.

Рис. 5. A–E — *Chydorus belaevae* Klimovsky et Kotov, 2015 из лужи 1 с птицами на острове Матвеев. A — общий вид эфиппиальной самки; B — общий вид взрослого самца; C — голова самца; D — рострум самца, вид спереди; E — постабдомен взрослого самца. Масштабные отрезки: A–E — 0,1 мм.

expeditions. Only the water bodies located near the sea shore were accessed. Missing taxa may be found in the future due to analysis of new samples collected in the certain water bodies throughout the vegetation season, from spring to autumn and addition of data on ostracods. The same situation, when the curve "cumulative species number vs. sampling effort" did not flatten out, and species list should be considered as incomplete, was obtained in the investigation of heterotrophic flagellates from freshwater biotopes of Dolgy and Matveev islands [Tikhonenkov, Mazei, 2007]. Of course, the incompleteness of species diversity assessment makes difficult any general conclusions on the fauna composition, rates of different faunistic and ecological groups etc. Nevertheless, publications of such incomplete species lists are important for estimation of some ecological trends and future faunistic studies of remote Arctic areas.

Difference in the crustacean species composition between relatively well studied Vaygach and Kolguev islands could be explained in part by climatic differences. Influence of the Gulf Stream makes the climate of Kolguev Island remarkably milder as compared to the climate of Vaygach Island [Nikiforov *et al*., 2023]. But according to predicted values, the number of crustacean species in Kolguev Island is 44 taxa vs. 49 taxa for Vaygach Island. The same comparable values of the species number were obtained for moths and butterflies of Vaygach and Kolguev islands [Kullberg *et al*., 2019].

Not sampling bias, but other reasons, could be regarded as an explanation for better species assessment in the cladocerans as compared to copepods. First of all, the number of revealed cladocerans was significantly smaller as compared to the copepod species number in the same set of samples (Suppl. Table 1). Secondly, the

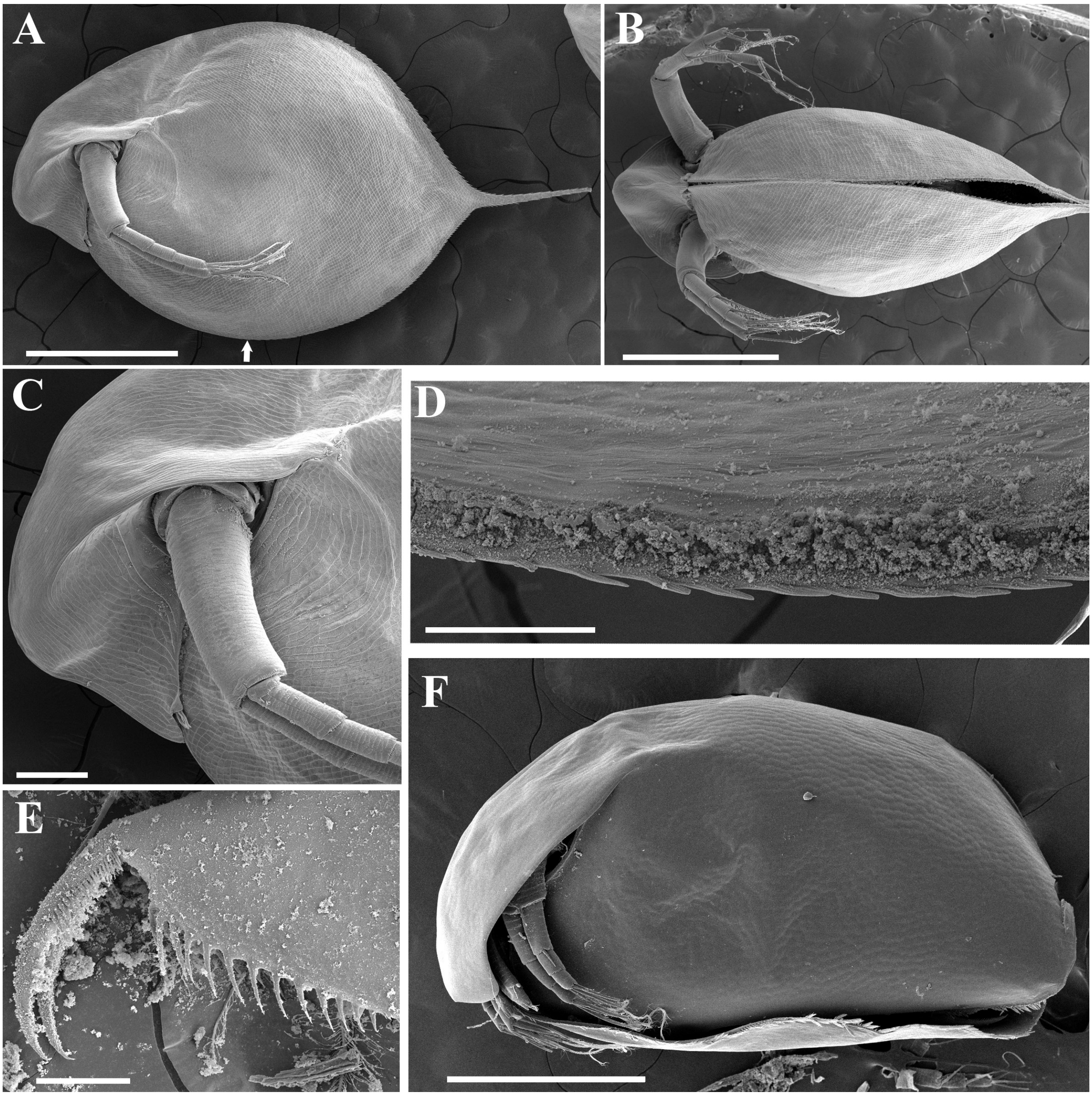

Fig. 6. A–E — *Daphnia* (*Daphnia*) *middendorffiana* Fischer, 1851 from the unknown water body 1 on Kolguev Island. A — general view; B — ventral view; C — lateral view of head with aesthetascs; D — armature of central portion of valve; E — postabdominal claw; F — general view of *Eurycercus* (*Eurycercus*) *lamellatus* (O.F. Müller, 1776) from the unknown water body 14 on Vaygach Island. Scale bars: A–B — 1 mm, C — 0.2 mm; D–E — 0.1 mm.

Рис. 6. A–E — *Daphnia* (*Daphnia*) *middendorffiana* Fischer, 1851 из безымянного водоема 1 на острове Колгуев. A — общий вид; B — вид с вентральной стороны; C — голова с эстетасками, вид сбоку; D — вооружение центральной части створки; E — постабдоминальный коготок; F — общий вид *Eurycercus* (*Eurycercus*) *lamellatus* (O.F. Müller, 1776) из безымянного водоема 14 на острове Вайгач. Масштабные отрезки: A–B — 1 мм, C — 0,2 мм; D–E — 0,1 мм.

cladoceran distribution patterns are less distinct relative to that in the copepods: Kotov [2016] separated few faunistic complexes in Northern Siberia, with a low (if not fully absent) local endemism in contrast to a higher copepod endemism, especially in the Arctic islands [Hołyńska, Sługocki, 2023].

The revealed taxocoenosis structure with predominance of microcrustaceans (cladocerans and copepods) in contrast to macrocrustaceans (Anostraca, Notostraca, Amphipoda) is typical of small shallow water bodies located on Arctic [Dimante-Deimantovica *et al*., 2018; Chertoprud *et al*., 2017, 2021] and Antarctic [Díaz*et al*., 2019] islands under hard climatic conditions. Although the revealed faunistic spectra of Crustacea are different in Arctic and Antarctic regions, the authors agree that these faunas are formed by colonists from the nearest areas [Novichkova, Chertoprud, 2015; Díaz *et al*., 2019].

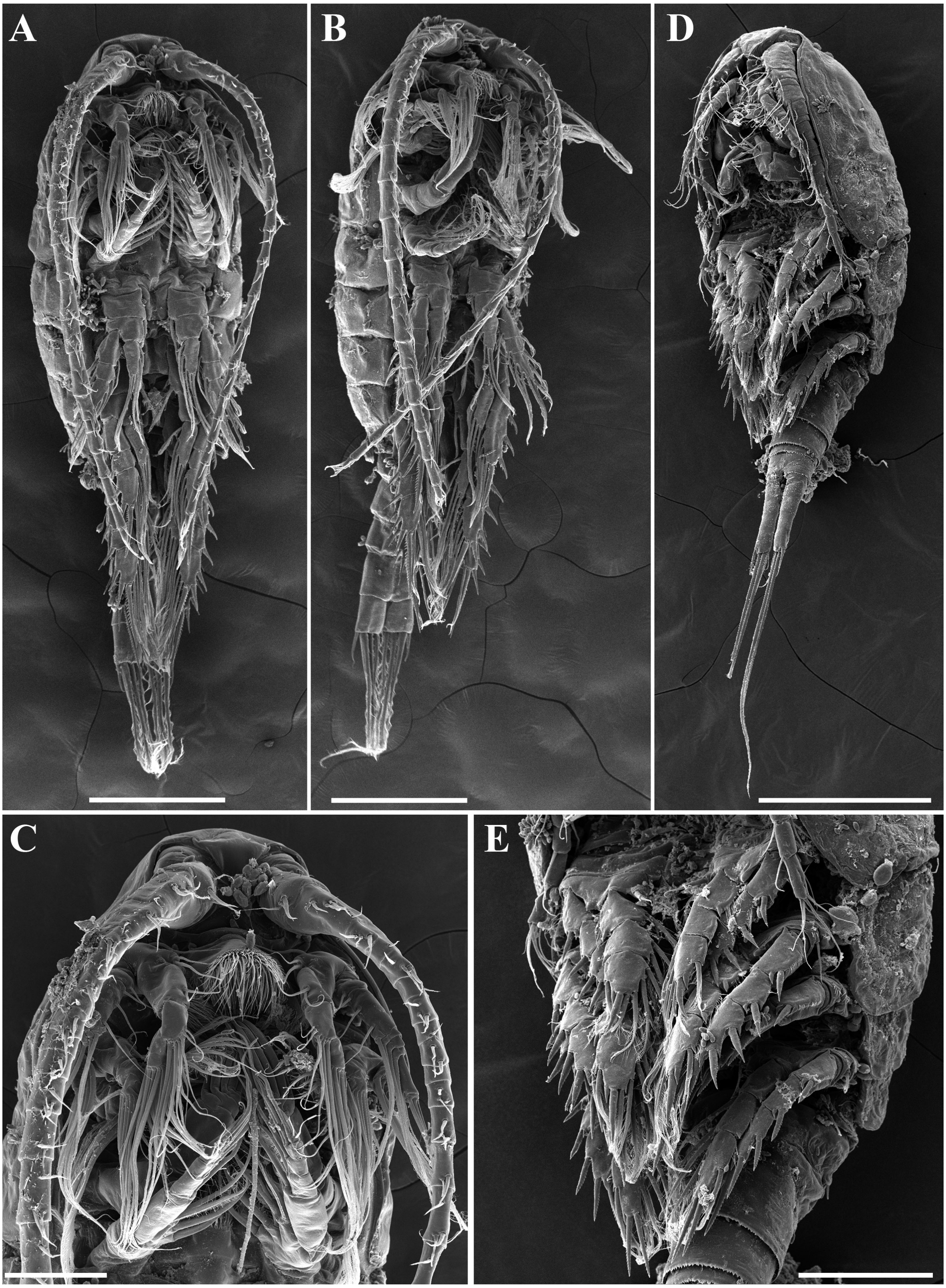

Fig. 7. A–C — ventral and lateral views, antennae and mouth parts of *Heterocope borealis* (Fischer, 1851) from the lake 1 on Vaygach Island; D–E — lateral view and thoracic legs of *Megacyclops viridis* (Jurine, 1820) from the unknown water body 23 on Vaygach Island. Scale bars: A–B, D — 0.5 mm; C, D — 0.2 mm.

Рис. 7. A–C — вид с брюшной стороны и сбоку, антенны и ротовые конечности *Heterocope borealis* (Fischer, 1851) из озера 1 на острве Вайгач; D–E — вид сбоку и торакальные конечности *Megacyclops viridis* (Jurine, 1820) из безымянного водоема 23 на острове Вайгач. Масштабные отрезки: A–B, D — 0,5 мм; C, D — 0,2 мм.

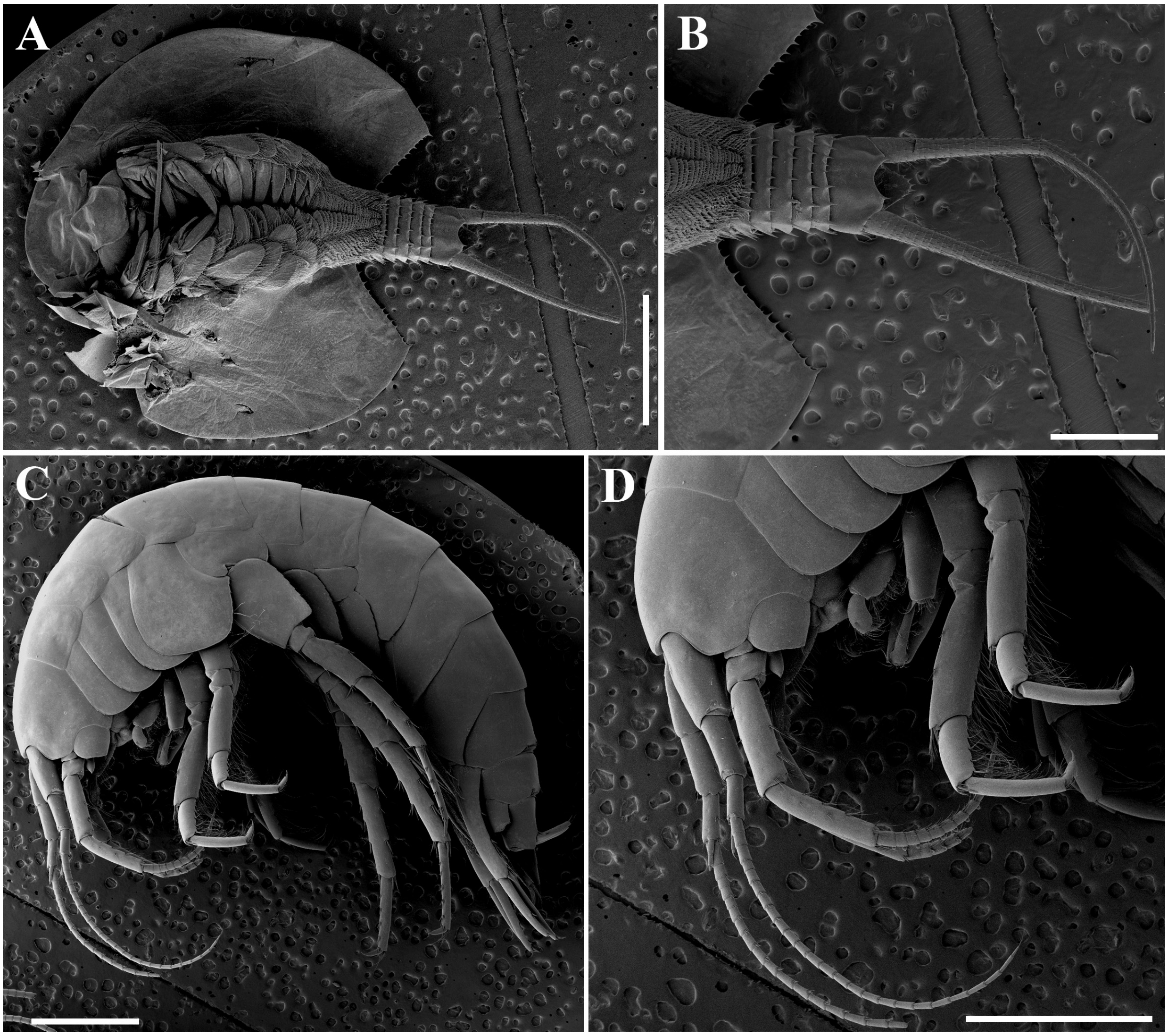

Fig. 8. A–B — ventral view and posterior portion of *Lepidurus arcticus* Pallas, 1793 from the Lake Talatinskoe on Vaygach Island; C–D — lateral view and anterior portion of *Gammarus lacustris* G.O. Sars, 1863 from the lake 3 on Vaygach Island. Scale bars: A, C–D — 2 mm; B — 1 mm.

Рис. 8. A–B — вид с брюшной стороны и задняя часть *Lepidurus arcticus* Pallas, 1793 из озера Талалатинское на острове Вайгач; C–D — вид сбоку и передняя часть *Gammarus lacustris* G.O. Sars, 1863 из озера 3 на острове Вайгач. Масштабный отрезки: A, C–D — 2 мм; B — 1 мм.

Eurythermal eurybiont and non-revised widespread species compose a significant portion of the revealed crustacean species. The same patterns with predominance of species with broad ecological and geographical preferences were detected in some other groups of invertebrates, inhabited islands of the European part of Russian Arctic (e.g. for heterotrophic flagellates [Tikhonenkov, Mazei, 2007], testate amoebae [Mazei *et al*., 2018], mollusks [Bespalaya *et al*., 2015, 2021, 2022; Vinarski *et al*., 2021], arachnids [Makarova, 2013; Nekhaeva, 2020], insects [Potapov *et al*., 2017; Prokin *et al*., 2017; Kullberg *et al*., 2019]).The genetic data obtained for some invertebrates of the Novaya Zemlya Archipelago and Vaygach Island confirmed a hypothesis that the invertebrate fauna of these territories was formed as the result of recent species immigration after the Last Glacial Maximum [Bespalaya *et al*., 2021].

In the case of Crustacea, the predominance of eurybiont and non-revised widespread species also indicates a necessity of reconsideration for ecological and geographical preferences of some taxa and their deep revisions via modern morphological and genetic methods. Preliminary genetic data published on the large branchiopod species with circumpolar distribution ranges, *Lepidurus arcticus* [Hessen *et al*., 2004] and *Branchinecta paludosa* [Lindholm *et al*., 2016], revealed several phylogroups. Their history corresponded to different past events, mainly related to ice sheet transformations. Therefore, all crustacean taxa revealed during our work are interesting in the frame of future taxonomic and phylogeographical studies and analysis of patterns of the Arctic island colonisation by invertebrates.

Conclusions

In the frame of our work, data on the diversity of the Crustacea (excluding Ostracoda) in the small water bodies of the island part of the Nenets Autonomous Area were summarised. In our samples, we have identified 59 taxa of crustaceans in 61 small water bodies, located on Kolguev, Vaygach, Dolgy, Golets and Matveev islands. According to the accumulation curves, the species number assigned by us is incomplete, suggesting under-sampling. Additional efforts are necessary for more accurate description of local faunas. Among recorded groups, microcrustaceans (cladocerans and copepods) with broad ecological and geographical preferences are the leaders on the number of species in the fauna of the studied region. The investigated islands are characterised by oligodominant taxocoenoses which usually include only two taxa (*Chydorus belaevae* Klimovsky et Kotov, 2015 and *Acanthocyclops vernalis* (Fischer, 1853)). But all revealed taxa are interesting in the frame of further phylogeographical studies and analysis of the Arctic islands colonization by invertebrates after the Last Glacial Maximum.

Compliance with ethical standards
CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.
Ethical approval: No ethical issues were raised during our research.

Supplementary data. The following Excel-tables are available online.
Supplementary Table 1. List of crustacean identifications from all samples.

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References

Aim G. 1914. Beiträge zur Kenntnis der nördlichen und arktischen Ostracodenfauna // Arkiv för Zoologi. Bd.9. P.1–19. [in German]

Alekseev V.R., Tsalolikhin S.Y. 2010. [Guide of freshwater zooplankton and zoobenthos of European Russia. Zooplankton, vol 1]. Moscow: KMK Sci. Press. 495 p. [In Russian]

Anufriev V.V. 2006. [Ornithofauna of the Pechora Sea islands] // Arctic Environmental Research. Vol.1. P.70–79 [in Russian].

Bespalaya Y., Bolotov I., Aksenova O., Kondakov A., Gofarov M., Paltser I. 2015. Occurrence of a *Sphaerium* species (Bivalvia: Sphaeriidae) of Nearctic origin in European Arctic Russia (Vaigach Island) indicates an ancient exchange between freshwater faunas across the Arctic // Polar Biology. Vol.38. P.1545–1551. https://doi.org/10.1007/s00300-015-1656-5

Bespalaya Y., Przhiboro A., Aksenova O., Berezina N., Gofarov M., Kondakov A., Kurashov E., Litvinchuk L., Sokolova S., Spitsyn V., Shevchenko A., Tsiplenkina I., Travina O., Tomilova A. 2021. Preliminary study of the benthic fauna in lakes of the Novaya Zemlya Archipelago and Vaigach Island (the Russian Arctic) // Polar Biology. Vol.44. No.3. P.539–557. https://doi.org/10.1007/s00300-021-02817-4

Bespalaya Y.V., Travina O.V., Tomilova A.A., Khrebtova I.S., Aksenova O.V., Aksenov A.S., Vinarskii M.V., Kondakov A.V., Nekhaev I.O., Palatov D.M., Spitsyn V.M., Shevchenko A.R., Bolotov I.N. 2022. Species diversity, settlement routes, and ecology of freshwater mollusks of Kolguev Island (Barents Sea, Russia) // Inland Water Biology.Vol.15. No.6. P.836–849. https://doi.org/10.1134/S1995082922060025

Chertoprud M.V., Palatov D.M., Dimante-Deimantovica I. 2017. Macrobenthic communities in water bodies and streams of Svalbard, Norway // Journal of Natural History. Vol.51. No.47–48. P.2809–2825. https://doi.org/10.1080/00222933.2017.1395092

Chertoprud M.V., Krylenko S.V., Lukinych A.I., Glazov P.M., Dubovskaya O.P., Chertoprud E.S. 2021. Specific features of the macrozoobenthic communities of small Arctic Lakes in Eurasia // Inland Water Biology. Vol.14. P.401–414. https://doi.org/10.1134/S1995082921030056

Colwell R.K., Elsensohn J.E. 2014. EstimateS turns 20: statistical estimation of species richness and shared species from samples, with non-parametric extrapolation // Ecography. Vol.37. P.609–613. https://doi.org/10.1111/ecog.00814.

Coulson S.J. 2000. A review of the terrestrial and freshwater invertebrate fauna of the High Arctic archipelago of Svalbard // Norwegian Journal of Entomology. Vol.47. P.41–63.

Coulson S.J., Convey P., Aakra K., Aarvik L., Ávila-Jiménez M.L., Babenko A., Biersma E.M., Boström S., Brittain J.E., Carlsson A.M., Christoffersen K., De Smet W.H., Ekrem T., Fjellberg A., Füreder L., Gustafsson D., Gwiazdowicz D.J., Hansen L.O., Holmstrup M., Hullé M., Zmudczyńska-Skarbek K. 2014. The terrestrial and freshwater invertebrate biodiversity of the archipelagoes of the Barents Sea; Svalbard, Franz Josef Land and Novaya Zemlya // Soil Biology and Biochemistry. Vol.68. P.440–470. https://doi.org/10.1016/j.soilbio.2013.10.006

Dimante-Deimantovica I., Walseng B., Chertoprud E., Novichkova A. 2018. New and previously known species of Copepoda and Cladocera (Crustacea) from Svalbard, Norway–who are they and where do they come from? // Fauna Norvegica. Vol.38. P.18–29. https://doi.org/10.5324/fn.v38i0.2502

Díaz A., Maturana C.S., Boyero L., De Los Ríos Escalante P., Tonin A.M., Correa-Araneda F. 2019. Spatial distribution of freshwater crustaceans in Antarctic and Subantarctic lakes // Scientific Reports. Vol.9. No.1. Art.7928. https://doi.org/10.1038/s41598-019-44290-4

Fefilova E.B. 2008. [New species of the genus *Moraria* (Copepoda, Harpacticoida) and a new subspecies of the genus *Eurytemora* (Calanoida) from islands of the Barents Sea] // Zoologicheskiy Zhurnal. Vol.87. No.4. P.393–402 [in Russian].

Fefilova E., Dubovskaya O., Frolova L., Abramova E., Kononova O., Nigamatzyanova G., Zuev I., Kochanova E. 2022. Biogeographic patterns of planktonic and meiobenthic fauna diversity in inland waters of the Russian Arctic // Freshwater Biology. Vol.67. No.1. P.78–94. https://doi.org/10.1111/fwb.13624

Haney R.A., Taylor D.J. 2003. Testing paleolimnological predictions with molecular data: the origins of Holarctic *Eubosmina* // Journal of Evolutionary Biology. Vol.16. P.871–882.

Hessen D.O., Rueness E.K., Stabell M. 2004. Circumpolar analysis of morphological and genetic diversity in the Notostracan *Lepidurus arcticus* // Hydrobiologia. Vol.519. P.73–84. https://doi.org/10.1023/B:HYDR.0000026486.16615.06

Hołyńska M., Sługocki Ł. 2023. Freshwater microcrustaceans (Copepoda: Cyclopidae) on islands: a review // Hydrobiologia. Vol.850. P.183–201. https://doi.org/10.1007/s10750-022-05053-x

Jensen T.C., Walseng B., Hessen D.O., Dimante-Deimantovica I., Novichkova A.A., Chertoprud E.S., Chertoprud M.V., Sakharova

E.G., Krylov A.V., Frisch D., Christoffersen K.S. 2019. Changes in trophic state and aquatic communities in high Arctic ponds in response to increasing goose populations // Freshwater Biology. Vol.64. No.7. P.1241–1254. https://doi.org/10.1111/fwb.13299

Klimovsky A.I., Kotov A.A. 2015. Cladocera (Crustacea, Branchiopoda) of Central Yakutia 3. Taxa from the *Chydorus sphaericus* s. l. species group (Anomopoda, Chydoridae) // Zoologicheskiy Zhurnal. Vol.94. No.11. P.1257–1267.

Kochanova E.S., Fefilova E.B. 2017. Morphological variability and teratology of Palearctic freshwater Harpacticoida (Crustacea: Copepoda) // Invertebrate Zoology. Vol.14. No.2. P.148–153. https://doi.org/10.15298/invertzool.14.2.08

Korovchinsky N.M., Kotov A.A., Sinev A.Yu., Neretina A.N., Garibian P.G. 2021. [The water fleas (Crustacea: Cladocera) of Northern Eurasia. Vol.2. Taxonomic Part]. Moscow: KMK Sci. Press. 544 p. [In Russian]

Kotov A.A. 2013. [Morphology and phylogeny of Anomopoda (Crustacea: Cladocera)]. Moscow: KMK Sci. Press. 638 p. [In Russian]

Kotov A.A. 2016. [Faunistic complexes of the Cladocera (Crustacea, Branchiopoda) of Eastern Siberia and Far East of Russia] // Zoologicheskiy Zhurnal. Vol.95. No.7. P.748–768 [in Russian].

Kullberg J., Filippov B.Y., Spitsyn V.M., Zubrij N.A.,Kozlov M.V. 2019. Moths and butterflies (Insecta: Lepidoptera) of the Russian Arctic islands in the Barents Sea // Polar Biology. Vol.42. P.335–346. https://doi.org/10.1007/s00300-018-2425-z

Lavrinenko O.V., Lavrinenko I.A. 2018. [Zonal vegetation of the plain East European tundras] // Rastitel'nost Rossii. No.32. P.35–108 [in Russian].

Leshko Y.V., Fefilova E.B., Baturina M.A., Hohlova L.G. 2008. [Aquatic invertebrates of the islands Vaigach and Dolgiy] // Trudy Komi nauchnogo tsentra UrO RAN. Vol.184. P.102–117 [in Russian].

Lindholm M., d'Auriac M.A., Thaulow J., Hobæk A. 2016. Dancing around the pole: holarctic phylogeography of the Arctic fairy shrimp *Branchinecta paludosa* (Anostraca, Branchiopoda) // Hydrobiologia. Vol.772. P.189–205. https://doi.org/10.1007/s10750-016-2660-7

Makarova O.L. 2013. Gamasid mites (Parasitiformes, Mesostigmata) of the European Arctic and their distribution patterns // Entomological Review. Vol.93. P.113–133. https://doi.org/10.1134/S0013873813010156

Mazei Y.A., Tsyganov A.N., Chernyshov V.A., Ivanovsky A.A., Payne R.J. 2018. First records of testate amoebae from the Novaya Zemlya archipelago (Russian Arctic) // Polar Biology. Vol.41. P.1133–1142. https://doi.org/10.1007/s00300-018-2273-x

Mityaeva K.Y., Neretina A.N., Garibian P.G., Kotov A.A., Petrovskiy A.B. 2024. Fauna and local associations of waterfleas (Crustacea: Branchiopoda: Cladocera) in small water bodies of Moscow City // Arthropoda Selecta. Vol.33. No.4. P.480–492. https://doi.org/10.15298/arthsel.33.4.05

Nazarova L.B., Frolova L.A., Palagushkina O.V., Rudaya N.A., Syrykh L.S., Grekov I.M., Solovieva N., Loskutova O.A. 2021. Recent shift in biological communities: a case study from the Eastern European Russian Arctic (Bolshezemelskaya Tundra) // Polar Biology. Vol.44. No.6. P.1107–1125.https://doi.org/10.1007/s00300-021-02876-7

Nekhaeva A.A. 2020. On the spider fauna (Arachnida: Aranei) of the Kanin Peninsula and Kolguev Island, Nenets Autonomous Okrug, Russia // Arthropoda Selecta. Vol.29. No.3. P.387–398. https://doi.org/10.15298/arthsel. 29.3.12

Nikiforov S., Ananiev R., Jakobsson M., Moroz E., Sokolov S., Sorokhtin N., Dmitrevsky N., Sukhikh E., Chickiryov I., Zarayskaya Y., Razumovskiy A., Semiletov I. 2023. The extent of glaciation in the Pechora Sea, Eurasian Arctic, based on submarine glacial landforms // Geosciences. Vol.13. No.2. Art.53. https://doi.org/10.3390/geosciences13020053

Novichkova A.A., Chertoprud E.S. 2015. Fauna of microcrustaceans (Cladocera: Copepoda) of shallow freshwater ecosystems of Wrangel Island (Russian Far East) // Journal of Natural History. Vol.49. No.45–48. P.2955–2968. https://doi.org/10.1080/00222933.2015.1056269

Novichkova A.A., Azovsky A.I. 2017. Factors affecting regional diversity and distribution of freshwater microcrustaceans (Cladocera, Copepoda) at high latitudes // Polar Biology. Vol.40. P.185–198. https://doi.org/10.1007/s00300-016-1943-9

Potapov G.S., Kolosova Y.S., Zubriy N.A., Filippov B.Y., Vlasova A.A., Spitsyn V.M., Bolotov I.N. 2017. New data on bumblebee fauna (Hymenoptera: Apidae, *Bombus* Latr.) of Vaygach Island and the Yugorsky peninsula // Arctic Environmental Research. Vol.17. No.4. P.346–354. https://doi.org/10.17238/issn2541-8416.2017.17.4.346

Prokin A.A., Makarova O.L., Petrov P.N. 2017. Water beetles (Coleoptera) of coastal areas of the Bolshezemelskaya Tundra, extreme northeastern Europe // Aquatic Insects. Vol.38. No.4. P.197–218. https://doi.org/10.1080/01650424.2017.1387270

Rogers D.C., Thorp J.H. 2019. Thorp and Covich's Freshwater Invertebrates: Vol.4: Keys to Palaearctic Fauna. New York: Academic Press. 920 p.

Samchyshyna L., Hansson L.A., Christoffersen K. 2008. Patterns in the distribution of Arctic freshwater zooplankton related to glaciation history // Polar Biology. Vol.31. P.1427–1435. https://doi.org/10.1007/s00300-008-0482-4

Scott T. 1899. Report on the marine and freshwater Crustacea from Franz-Josef Land, collected by Mr. William S. Bruce, of the Jackson-Harmsworth Expedition // Zoological Journal of the Linnean Society. Vol.27. No.174. P.60–126. https://doi.org/10.1111/j.1096-3642.1899.tb01421.x

Semenova L.M. 2003. Distribution and zoogeography of ostracods (Crustacea, Ostracoda) in waterbodies of the Novaya Zemlya Archipelago and Island Vaigach // Inland Water Biology. Vol.2. P.20–26.

Sheveleva N.G., Podshivalina V.N., Mirabdullayev I.M., Chertoprud E.S., Lazareva V.I., Bayanov N.G. 2021. The Genus *Heterocope* Sars 1863 (Copepoda, Calanoida) in Russia: morphology and distribution // Biology Bulletin. Vol.48. P.984–1003. https://doi.org/10.1134/S1062359021070281

Scher O., Defaye D., Korovchinsky N.M., Thiéry A. 2000. The crustacean fauna (Branchiopoda, Copepoda) of shallow fresh water bodies in Iceland // Veztnik Zoologii. Vol.34. No.6. P.11–25.

Tikhonenkov D.V., Mazei Y.A. 2007. Heterotrophic flagellates from freshwater biotopes of Matveev and Dolgii Islands (the Pechora Sea) // Protistology. Vol.4. No.1. P.327–337.

Vekhoff N.V. 1997. Large branchiopod Crustacea (Anostraca, Notostraca, Spinicaudata) of the Barents Region of Russia // Hydrobiologia. Vol.359. No.1. P.69–74. https://doi.org/10.1023/A:1003116432010

Vekhoff N.V. 1998. [Crustaceans of water bodies of seaside areas of the eastern coast of Novaya Zemlya archipelago] // Biologiya vnutrennikh vod. No.1. P.14–20 [in Russian].

Vekhoff N.V. 2000. [Crustaceans of small water bodies of islands in the eastern part of the Barents Sea and Kara Gate Strait] // Biologiya vnutrennikh vod. No.2. P.42–48. [in Russian]

Vinarski M.V., Bolotov I.N., Aksenova O.V., Babushkin E.S., Bespalaya Y.V., Makhrov A.A., Nekhaev I.O., Vikhrev I.V. 2020. Freshwater mollusca of the Circumpolar Arctic: a review on their taxonomy, diversity and biogeography // Hydrobiologia. Vol.848. P.2891–2918. https://doi.org/10.1007/s10750-020-04270-6

Walseng B., Jensen T., Dimante-Deimantovica I., Christoffersen K.S., Chertoprud M., Chertoprud, E., Novichkova A., Hessen D.O. 2018. Freshwater diversity in Svalbard: providing baseline data for ecosystems in change // Polar Biology. Vol.41. P.1995–2005. https://doi.org/10.1007/s00300-018-2340-3

Weider L.J., Hobæk A. 2000. Phylogeography and arctic biodiversity: a review // Annales Zoologici Fennici. Vol.37. No.4. P.217–231.

Węławski J.M. 1994. *Gammarus* (Crustacea, Amphipoda) from Svalbard and Franz Josef Land. Distribution and density // Sarsia. Vol.79. No.2. P.145–150. https://doi.org/10.1080/00364827.1994.10413553

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