

MOSS FLORA OF THE RYBACHY AND THE SREDNY PENINSULAS
(BARENTS SEA COAST, EUROPEAN RUSSIA)

ФЛОРА МХОВ ПОЛУОСТРОВОВ РЫБАЧИЙ И СРЕДНИЙ
(ПОБЕРЕЖЬЕ БАРЕНЦЕВА МОРЯ, ЕВРОПЕЙСКАЯ ЧАСТЬ РОССИИ)

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Abstract

Checklist of mosses of the Rybachy and Sredny peninsulas, the NW extremity of continental Russia, is presented. It includes 327 species, not counting dubious and erroneous records; 116 of them are newly reported for the area based on the field studies in 2008–2015, while 28 species recorded in the older publications remain not repeated by us. Four species are newly reported for the Murmansk Province: *Meesia hexasticha*, *Calcidicranella obtusifolia*, *Sphagnum talbotianum*, and *S. alaskense*; for three latter species, these are the westernmost localities in continental Europe (previously recorded for the Nenets Autonomous Okrug). Species are annotated with brief characteristic of ecology and distribution throughout the area based both on the original and literature data by Brotherus, Hayren, Elina, and Likhachev. The list of species is supplemented by brief phytogeographic consideration. In addition to widespread hypoarctic, boreal and arctic-montane species, the area is characterized by combination of calciphilous saxicolous species, generally rare in Murmansk Province, Arctic, suboceanic and hemiboreal species, that reflects wide distribution of base rich sedimentary rocks and Gulf Stream impact.

Резюме

Представлен список мхов полуостровов Рыбачьего и Среднего, расположенных на северо-западной оконечности континентальной России. Он включает 327 видов, без учета сомнительных и ошибочных указаний; 116 видов впервые приводятся для этого региона на основе полевых исследований 2008–2015 годов, а 28 видов, указанных в литературе, не были найдены повторно. Четыре вида впервые приводятся для Мурманской области: *Meesia hexasticha*, *Calcidicranella obtusifolia*, *Sphagnum talbotianum* и *S. alaskense*; для трех последних видов это самые западные местонахождения в континентальной Европе (ранее они приводились для Ненецкого автономного округа). Виды аннотированы краткими характеристиками экологии и распространения на территории региона на основе как оригинальных, так и литературных данных Бротеруса, Хайрена, Елиной и Лихачева. Список видов дополнен кратким фитогеографическим обзором. Помимо широко распространенных гипоарктических, бореальных и аркто-монтанных видов, для территории характерно сочетание кальцефильных видов, в целом редких в Мурманской области, арктических, субокеанических и гемибореальных видов, что отражает широкое распространение осадочных пород основного состава и влияние Гольфстрима.

KEYWORDS: moss, Barents Sea, biodiversity, subarctic, tundra

INTRODUCTION

The Rybachy and Sredny peninsulas constitute the northernmost part of mainland European Russia. Their total area is about 1200 km², and 70% of the peninsulas is occupied by the eponymous nature park.

The history of bryological studies in this area is not extensive; it began with the work of V.F. Brotherus. He took part in expedition in 1885 and identified late-nineteenth-century collections made by Finnish botanists and naturalists in various parts of Murmansk Province, in-

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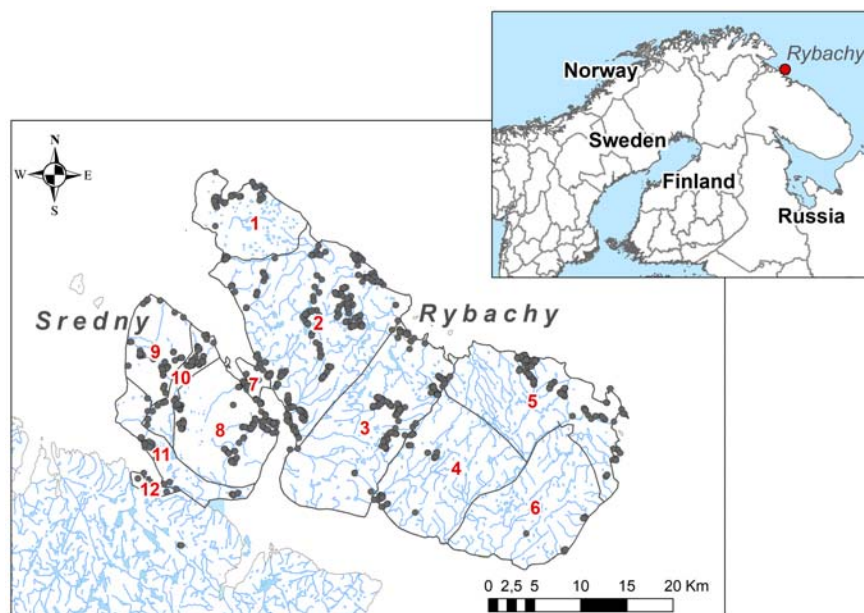


Fig. 1. Collection localities (black dots) and regionalization of study area (orographic districts):

1. Vaidaguba;
2. Skorbeevsky;
3. Zubovsky and Mount Motka;
4. Eastern and Moche River;
5. North-Eastern and Laush Bay;
6. Korabelny;
7. Mount Klubb;
8. South-Eastern;
9. North-Western;
10. Vykot River;
11. Lake District;
12. Mustatunturi.

cluding the Rybachy and Sredny peninsulas. The main collecting localities for the material were the Pummanki area on the Sredny Peninsula, Vaida-Guba, Zubovka, and Tsypnavolok on the Rybachy Peninsula. This information was later incorporated into the flora of mosses of Fennoscandia (Brotherus, 1923). For the peninsula area, he recorded 87 moss species, not including *Sphagnum*. The details and collection sites in the western part of Murmansk Province are discussed in detail in the article by Kozhin *et al.* (2019).

The next stage in the study of bryophytes in this region involves expeditions of E. Häyrén (1925–1937). His studies covered only the western part of the peninsulas: the vicinity of the villages of Malaya Volokovaya (Maattivuono), Zemlyanoye (Pummanki), Chervyanoye (Kervanto), and Vaida-Guba (Vaitolahti) (Häyrén, 1955). His species list includes records of 82 mosses.

Further bryological studies on the peninsulas were conducted by A.Yu. Likhachev in 1978 and 1981. These expeditions covered most of the peninsulas' territory, with the exception of the inaccessible southeastern part of the Rybachy Peninsula. Based on both the collected material and published literature data, a checklist of mosses of the area was compiled, comprising 173 species (Likhachev, 1986), of which 110 species were recorded exclusively from the author's own collections.

In 1988, during the study of mire ecosystems of the Rybachy Peninsula, G.A. Elina collected a moss assemblage comprising 41 species, including 16 species of *Sphagnum* (Elina *et al.*, 2000).

In 2007, O.A. Belkina conducted field studies along the coast of the southeastern part of the Rybachy Peninsula (the vicinity of Cape Konev and Cape Sharapov) as a part of an expedition organized by the Kola Center for Wildlife Conservation. The collected material comprised 106 moss species. The collection is stored in the herbar-

ium of the Polar-Alpine Botanical Garden-Institute (KPABG).

In 2008–2015, K.B. Popova and A.V. Razumovskaya collected mosses on the Rybachy and Sredny Peninsulas mostly as part of a vegetation study. Here, we summarize bryofloristic data available for the area including those originated from our collections, unpublished collections by O.A. Belkina, and records from the literature.

STUDY AREA

The study area is located in the northern part of Pechengsky District, Murmansk Province, and represents the northernmost extremity of mainland European Russia (N69.634° – N 69.955°, E 31.691° – E33.101°). It consists of two sections: the smaller southern Sredny Peninsula (with an area of about 230 km²) and the larger northern Rybachy Peninsula (with an area of about 960 km²) (Fig.1). Only the Sredny Peninsula is directly connected to the mainland; the Rybachy Peninsula is connected to it by a narrow isthmus approximately 4 km wide.

The bedrock is composed of Upper Proterozoic sedimentary rocks, including sandstones, shales, and conglomerates, in contrast to the predominantly granite bedrock of the mainland coast of Murmansk Province (Siedlecka & Siedlecki, 1968). Granites and granitoids occur in the studied area only as erratic boulders.

The dominant soil type is podzol enriched with aluminium (Al) and iron (Fe) (Koroleva & Pereverzev, 2007). Inland plateaus reach elevations of up to 300 m a.s.l., whereas the coast is characterized by abrasion landforms with a pediment plain lying at around 50 m a.s.l. (Miloserdov, 1971). The climate is oceanic. Due to the influence of the northern extension of the North Cape Current, climatic conditions are relatively mild compared to other regions at similar latitudes. Climatic data for the period preceding the first survey are partly available from the Vayda-Guba meteorological station,

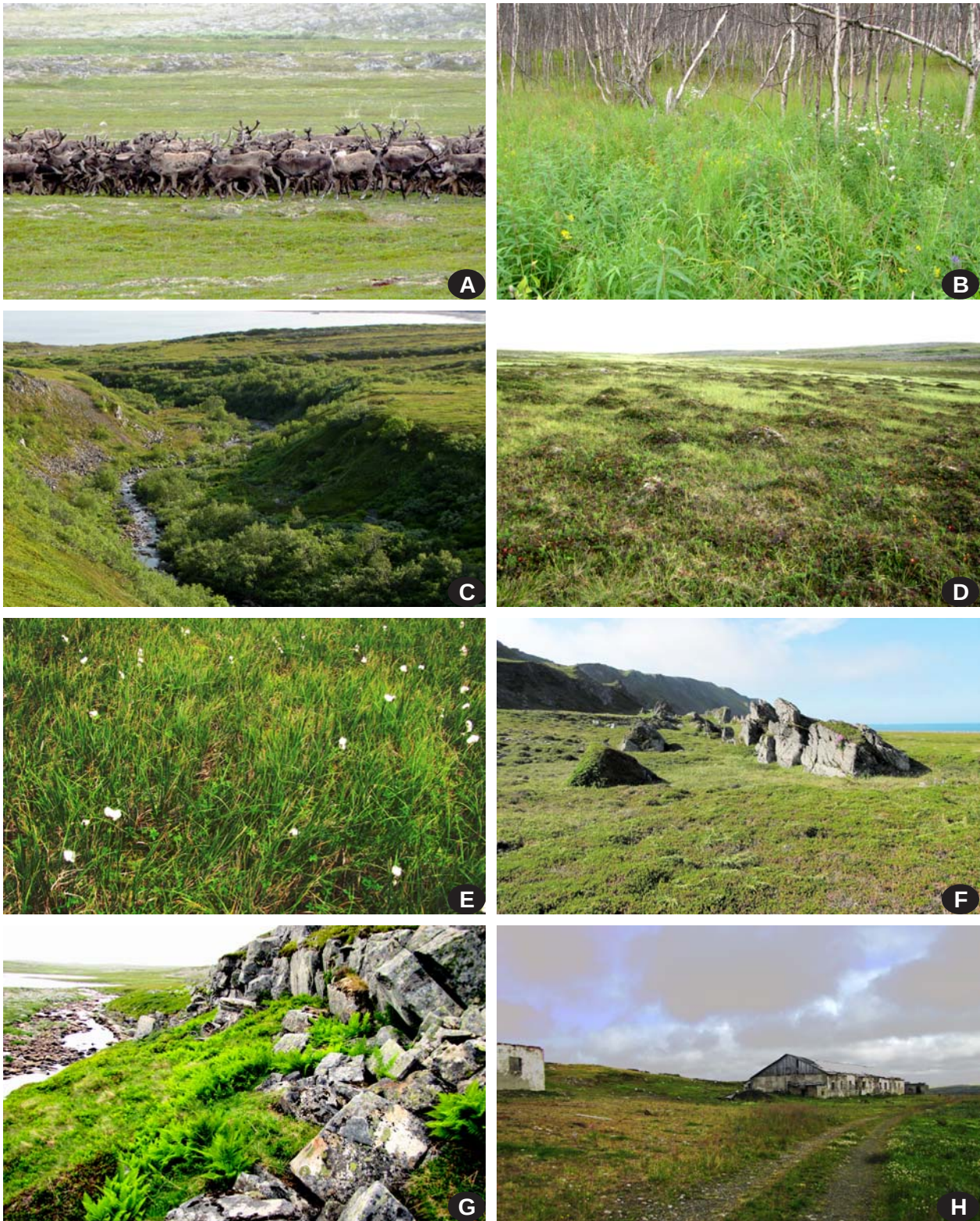


Fig. 2. Main moss habitat types. A: dwarf-shrub tundra, the main type of vegetation for reindeer pasturing; it is the habitat of many species of the genus *Dicranum*, such as *Dicranum acutifolium*, *D. elongatum*, and *D. flexicaule*; B: tall-herb birch krummholz; typical moss species are *Plagiomnium ellipticum*, *Pseudobryum cinclidioides*, and *Sciuro-hypnum latifolium*; C: brook valley vegetation of willow stands and meadows, where *Sciuro-hypnum reflexum*, *Sphagnum teres*, and *Climacium dendroides* occur; D: hummocky *Sphagnum*-dominated bog; the most common species are *Sphagnum fuscum*, *S. lindbergii*, and *S. subnitens*; E: cottongrass-sedge fen, the typical habitat of *Sphagnum warnstorffii* and *Sarmentypnum exannulatum*; F: rock outcrops and cliffs where *Tayloria lingulata*, *Amphidium lapponicum*, and *Bartramia ithyphylla* grow; G: late and semi-permanent snowbeds and nival communities, the habitat of *Campylium stellatum*, *Flexitrichum flexicaule*, and *Hylocomiastrum pyrenaicum*; H: abandoned settlement surrounded by the anthropogenic vegetation; *Pohlia nutans*, *Bryum creberrimum*, and *Ceratodon purpureus* were collected here.

situated in the northernmost part of the study area, including records of mean annual temperature and precipitation. Mean annual temperature increased from +1.2°C during the period before the first survey (1901–1930) (Kalela, 1939) to +2.4°C prior to the resurvey (2006–2016) (Kapfer & Popova, 2019). Average annual precipitation rose from 350 mm (1886–1935) to 772 mm (2006–2016). The growing season, defined by daily mean temperatures above +5°C, lasted 113–130 days during 1901–1930. Mean snow cover depth in winter was approximately 20 cm before the first survey and decreased to 17 cm in 2006–2016.

The study area lies within the Hypoarctic Tundra zone (Aleksandrova, 1977). Vegetation is dominated by dwarf-shrub tundra communities with *Empetrum nigrum* ssp. *hermaphroditum* and *Vaccinium* species. Extensive parts of the Sredny Peninsula, particularly in its southern sector and along river valleys, are occupied by birch krummholz. In addition to tundras and crooked birch woodlands, the most typical habitats are mires (bogs, hummocky bogs, and fens), floodplain willow thickets, coastal and floodplain meadows, rocky outcrops, and scree slopes (Fig. 2). We denote tall-herb meadow those where plants reach 60–100 cm high, to distinguish them from more common meadow communities where grasses and forbs do not exceed 20–40 cm high only.

For a long period, the Rybachy and Sredny peninsulas were used primarily for fishing and for (semi-)domestic livestock husbandry, which led to the establishment of several small settlements (villages) (Kalela, 1939). The combined population of the four villages — Vaitolahti, Kervanto, Pummanki, and Maattivuono — increased from 292 inhabitants in 1882 to a maximum of 451 in 1939. The largest settlement on the Sredny Peninsula was Pummanki, founded in the 1850s, where the population reached up to 200 inhabitants and 150 cattle in the 1890s. Large territories were also used for summer reindeer herding, with reindeer numbers peaking in the early twentieth century. For example, as many as 3000 reindeers were recorded in the village of Maattivuono in 1913. By 1939, nearly every farm kept cattle and sheep, and some also maintained horses. Birch woodlands and willow scrubs surrounding the settlements were extensively cleared, while natural meadows and mires were regularly mown. These meadows were periodically fertilized every two to four years using algae, manure, or fish waste by residents. Areas surrounding villages on both the Sredny and Rybachy peninsulas served as pastures for cattle and sheep, although domestic reindeers were not raised there (Kalela, 1939). Following the transfer of the territory from Finland to Russia in 1939–1940, traditional land use practices, including fishing and livestock husbandry, ceased, and the settlements were abandoned. While the western part of the peninsulas was occupied by Finnish settlements, there was a Norwegian settlement at Tsypnavolok (the northeastern extremity of the Rybachy Peninsula) from 1850 to 1940.

Currently, there are no settlements on the peninsulas; however, there are two operating weather stations (Vayda-Guba and Tsypnavolok) and a lighthouse. Part of the area belongs to the border zone of the Russian Federation and has a restricted access. At the time of field data collection, a feral herd of about 400 reindeer was grazing on the peninsulas.

Changes in land-use regime and climate have led to significant shifts in the species composition of plant communities for vascular plants. The effect differed among habitat types; however, on average, community species composition became poorer, and vegetation has shifted away from grass- and herb-dominated vegetation typical for grazed grasslands and towards an increased growth of species indicating regrowth caused by land abandonment and climate change (Kapfer & Popova, 2019).

MATERIAL AND METHODS

Our study represents a logical continuation of the bryofloristic inventory of this territory. Field collections were carried out in 2008, 2009, 2011, 2014, and 2015. The survey covered almost the entire territory of the peninsulas, and part of the collections was also made in the adjacent mainland area. The dataset comprises 4311 records. The original collections were identified by E.A. Ignatova and V.E. Fedosov, several *Sphagnum* specimens were revised by A.V. Shkurko. The specimens are deposited in the herbaria of Moscow State University (MW) and the Polar-Alpine Botanical Garden-Institute (KPABG).

The regionalization of the studied territory was based on the orographic division proposed by Mityaev (2025). Some districts were merged because of the limited amount of collected material. Orographic differentiation is closely associated with gradients of environmental factors and the diversity of microhabitats and therefore may generally reflect floristic patterns as well.

The checklist presented below comprises 327 species. Of these, 116 taxa are reported for the first time for the peninsulas. We follow nomenclature accepted by Ignatov *et al.* (2017, 2018, 2020, 2022, 2025) and several further amendments.

Records known only from the historical data and not confirmed by recent collections are marked with an asterisk (*). All collectors who recorded a taxon are listed in square brackets: BR – Brotherus (1923) – data without exact locality and habitat information, H – Häyren (1955) – data without exact locality, L – Likhachev (1986) – data with habitat information, but often without locality, E – Elina *et al.* (2000) – data without locality and habitat information, B – Belkina (collections from 2007) – records without exact coordinate references, P – Popova (original data, collections of K. Popova and A. Razumovskaya). Collection localities are presented according to the legend in Fig. 1; collector(s) other than Popova and Razumovskaya are given in parentheses. For species recorded once or twice, full label data are provided. For the remaining species, collecting locality numbers are supplemented by description of habitats.

SPECIES LIST

- Amblystegium serpens* (Hedw.) Schimp. — [BR, H, B, P]. Sp. 1-3, 6(B), 10. Often on rocky substrates: cliffs, brick walls, pebble deposits.
- Amphidium lapponicum* (Hedw.) Schimp. — [BR, L, B, P]. Sp. 2, 5, 6(B), 7, 11. On moist cliffs.
- A. mougeotii* (Bruch & Schimp.) Schimp. — [B, P]. Rar. 2, 5, 6(B), 8, 11. On moist or shaded cliffs.
- **Andreaea alpestris* (Thed.) Schimp. — [BR]. 3(BR). Recorded for Zubovka.
- A. blyttii* Schimp. — [B]. Un. 6(B). Rybachy Peninsula, south-eastern coast: river 2 km NNE of Cape Sharapov, near its mouth, 76 m a.s.l. Gently sloping (20°) smooth rock outcrops with crevices along a river bank partly covered with crowberry heath, on rock.
- A. rupestris* Hedw. — [H, B, P]. Com. 1-3, 5, 6(B), 8, 10. On sandstone and granitoid rocky substrates, rock outcrops, and stony scree slopes.
- A. rupestris* var. *papillosa* (Lindb.) Podp. — [P]. Un. 2. Rybachy Peninsula, Skorbeevskaya Bay, rock massif along the eastern side of the bay, schistose cliffs; N69.871834°, E32.250327°.
- **Aongstroemia grevilleana* (Brid.) Müll. Hal. — [BR]. 10 (BR). Recorded for Pummanki.
- A. longipes* (Sommerf.) Bruch & Schimp. — [P]. Un. 5. Rybachy Peninsula, Cape Tsypnavolok, moist depression below a cliff; N69.719497°, E33.111185°.
- A. schreberiana* (Hedw.) Bonfim Santos & Fedosov — [P]. Rar. 3, 5. Pebble deposits, moist cliffs, moist roadsides.
- **Aplodon wormskioldii* (Hornem.) R.Br. — [BR]. 5(BR). Recorded for Tsypnavolok.
- Arctoa blyttii* (Bruch & Schimp.) Loeske — [BR, H, L, B, P]. Fr. 1-12. Primarily on rocky substrates (cliffs, outcrops, scree, and boulder fields) across a range of moisture conditions; also in tundra and along streams and lake shores, rarely in anthropogenic habitats.
- A. fulvella* (Dicks.) Bruch & Schimp. — [B, P]. Rar. 2, 4-5, 6(B), 11. On rocks.
- A. glacialis* (Berggr.) Fedosov, Jan Kučera & M. Stech — [BR, L, B, P]. Fr. 1-5, 6(B), 8, 9(BR). Dry cliffs and scree slopes, including partially overgrown ones, snow-bed vegetation communities.
- A. starkei* (F. Weber & D. Mohr) Loeske — [BR, H, L, B, P]. Com. 1-5, 6(B), 8-12. Primarily on rocky substrates (cliffs, rock outcrops, and scree, including sandstone and schist), in both dry and moist conditions; also in nival and tundra communities, wetlands (bogs), and along streams and lake shores; rarely in anthropogenic habitats.
- Aulacomnium palustre* (Wahlenb.) Schwägr. — [L, E, B, P]. Fr. 1-10. Moist and waterlogged willow thickets, sedge marshes, nival grasslands with *Nardus stricta*, hummocky bogs.
- A. turgidum* (Wahlenb.) Schwägr. — [P]. Un. 2. Rybachy Peninsula, Skorbeevskaya Bay, mouth of the Skorbeevskaya River, tundra meadow in a small depression; N69.871952, E32.253625.
- Barbula unguiculata* Hedw. — [L, P]. Un. 1(L), 2. Rybachy Peninsula, shore of Bolshoye Ozerko Bay, 400 m south of Larina Cape, vicinity of Bolshoye Ozerko tourist base. Dry roadside with shell limestone outcrops; N69.71562°, E32.171631°.
- Bartramia ithyphylla* Brid. — [H, L, B, P]. Com. 1-12. On rocks.
- Blindia acuta* (Hedw.) Bruch & Schimp. — [L, B, P]. Sp. 1-12. Moist cliffs and rocky banks of lakes and rivers.
- Blindiadelphus diversifolius* (Lindb.) Fedosov & Ignatov — [P]. Un. 9. Sredny Peninsula, left tributary of the Vykat River, 1.7 km east of Kuyakanyarvi Lake, on rocks; N69.770269°, E31.869817°. Poor specimen with uncertain identification.
- **Brachytheciastrum trachypodium* (Brid.) Ignatov & Huttunen — [BR, H]. 9(H). On wet shady rocks. Recorded for cliffs at the foot of Mount Sredny (Sredny peninsula) by Häyren (1955), and for Pummanki by Brotherus (1923).
- Brachythecium albicans* (Hedw.) Schimp. — [P]. Rar. 1, 7. Sredny Peninsula, the innermost part of the bay between Sredny Peninsula and Vestnika Cape, N69.730446°, E32.081547°; Rybachy Peninsula, Cape Kekursky, N69.941934°, E32.060944°. Coastal rocky habitats.
- B. campestre* (Müll. Hal.) Schimp. — [L, P]. Un. 2(L), 5. Rybachy Peninsula, vicinity of Lognavolok Cape, abandoned settlement, anthropogenic substrate under an abandoned building; N69.750375°, E32.918187°. Also recorded for Bolshoe Ozerko by Likhachev (1986).
- B. erythrorrhizon* Schimp. — [P]. Rar. 2, 5. On soil in tall-herb meadows and on a concrete wall of a ruined building.
- B. mildeanum* (Schimp.) Schimp. ex Milde — [L, B, P]. Sp. 2-5, 6(B), 7-10. In a variety of habitats: on soil in tall-forb eutrophic meadows, moist grass-forb willow thickets and birch stands, on dry sands, and in lowland bogs; on rocky substrates, including dry sandstone cliffs and concrete.
- B. rivulare* Schimp. — [H, P]. Rar. 8-11. Only on Sredny Peninsula, in fine-grained scree, overgrown pebble deposits in the floodplain, spring outflow of a stream, tall-herb birch krummholz.
- B. rutabulum* (Hedw.) Schimp. — [P]. Rar. 1, 3, 12. In *Dryas-Empetrum* tundras, overgrown scree on cliffs, grass-forb birch krummholz.
- B. salebrosum* (Hoffm. ex F. Weber & D. Mohr) Schimp. — [L, B, P]. Fr. 1-4, 6(B), 7-12. Primarily in nutrient-rich habitats: in tall-herb birch krummholz (both on soil and on tree trunks), in coastal, floodplain, and anthropogenic meadows, occasionally on cliffs, brick walls, and sandy dunes.
- **B. turgidum* (Hartm.) Kindb. — [BR, B]. Rar. 5(BR). Recorded for Tsypnavolok. 6(B). Rybachy Peninsula, south-eastern coast: Konev Cape (2.5 km ENE of Gorodetsky Cape). Coastal moist cliff above a meadow with chervil, beside a seabird colony. On a rock wall.
- B. udum* I. Hagen — [P]. Rar. 4, 5. Rybachy Peninsula, marine terrace along the western side of Laush Bay in sand along the bed of a temporary watercourse, N69.730207°, E33.064133°; Rybachy Peninsula, eastern coast of the peninsula, Bolshaya Korabelnaya Bay, on bare wood, N69.622508°, E32.530034°.
- Brideliella wahlenbergii* (Brid.) Fedosov, M. Stech & Ignatov — [H, L, E, B, P]. Sp. 2-5, 6(B). Rock outcrops, stony streambeds, hummocky bogs, aapa mires, and medium rich fens, coastal meadows, and nival communities.
- Bryoerythrophyllum recurvirostrum* (Hedw.) P.C. Chen — [H, L, B, P]. Rar. 5, 6(B), 7-9, 11. On sandstone cliffs.
- **Bryum algovicum* Sendtn. ex Müll. Hal. (= *Ptychostomum compactum* Hornsch.) — [BR]. 10 (BR). Recorded for Pummanki.
- B. amblyodon* Müll. Hal. (= *Ptychostomum inclinatum* (Sw. ex Brid.) J.R. Spence) — [BR, H, P]. Rar. 1, 3, 5, 9, 10(H). Rocky coastal habitats (metamorphosed sandstone and shale cliffs, ledges, upper-littoral slate surfaces), interdunal meadows and dry sands, high-level saltmarshes, abandoned concrete foundations. Also recorded for Pummanki and Isolahi (the bay to the north from Kijskij Cape).

- B. arcticum* (R. Br.) Bruch & Schimp. (= *Ptychostomum arcticum* (R. Br.) J.R.Spence) — [BR, P]. Un. 8, 3(BR). Sredny Peninsula, left tributary of the Korableyny River, at middle course, snowbed *Salix herbacea* community; N69.703634°, E32.043829°. Also recorded for Zubovka Bay.
- B. argenteum* Hedw. — [B, P]. Rar. 1-2, 5, 6(B), 8-9. Roadsides, roofs of abandoned buildings, nival communities, rock outcrops.
- **B. axel-blyttii* Kaurin ex H. Philib. (= *Ptychostomum axel-blyttii* (Kaurin ex H. Philib.) — [BR]. 10(BR). Recorded for Pummanki.
- **B. bimum* (Schreb.) Turner (= *Ptychostomum bimum* (Schreb.) J.R.Spence) — [BR, H]. 5(BR), 1(H). Recorded for Tspina-ovolok and Kervanto.
- **B. bryoides* (R. Br.) Ångstr. (= *Ptychostomum bryoides* (R. Br.) J.R. Spence) — [BR]. 10(BR). Recorded for Pummanki.
- Bryum caespiticium* Hedw. (= *Ptychostomum imbricatulum* (Müll. Hal.) Holyoak & N. Pedersen) — [H, L, P]. Sp. 2-3, 5, 7, 9-10. Coastal and floodplain habitats, including marine terrace meadows and salt-marshes, overgrowing pebble-sand substrates, and dry rocky slopes with dwarf-shrub tundra, on disturbed sites including trampled ground, abandoned buildings (on wood).
- B. capillare* Hedw. (= *Rosulabryum capillare* (Hedw.) J.R. Spence) — [P]. Rar. 2, 5. Coastal meadow on anthropogenic driftwood strandline habitats, and overgrowing pebble substrates in a stream floodplain.
- B. creberrimum* Taylor (= *Ptychostomum creberrimum* (Taylor) J.R. Spence & H.P. Ramsay) — [BR, L, P]. Rar. 1, 3, 5, 8. Rocky lakeshores with sandy semi-stabilized dunes on terraces, and moist SE-faced rocks, anthropogenic substrates including concrete building ruins.
- B. cyclophyllum* (Schwägr.) Bruch & Schimp. — [B]. Un. 6(B). Rybachy Peninsula, south-eastern coast: Konev Cape (2.5 km ENE of Gorodetsky Cape), a stream flowing down a steep slope with a coarse stony bed, divided into channels (coll. O. Belkina). A small admixture to *B. muehlenbeckii*.
- B. elegans* Nees ex Brid. (= *Rosulabryum elegans* (Nees ex Brid.) Ochyra — [H, L, P]. Rar. 2, 5, 9(H), 10 (H). Meadow on boulder scree of the third marine terrace (northwest-facing macro-slope), *Plantago*-dominated saltmarsh on gravel substrate, and roadside floodplain meadow. Also recorded for Pummanki and Pummankiniemi (Zemljanoi Cape).
- B. moravicum* Podp. (= *Rosulabryum moravicum* (Podp.) Ochyra & Stebel) — [P]. Un. 5. Rybachy Peninsula, bank of the Loki River, 800 m upstream the bridge, W-facing cliffs, in niches; N69.738835°, E32.937681°.
- B. muehlenbeckii* Bruch & Schimp. (= *Imbricabryum muehlenbeckii* (Bruch & Schimp.) N. Pedersen) — [BR, B]. Un. 1 (BR), 6(B). Rybachy Peninsula, south-eastern coast: Konev Cape (2.5 km ENE of Gorodetsky Cape), a stream flowing down a steep slope with a coarse stony bed, divided into channels (coll. O. Belkina). Also recorded for Pummanki.
- B. neodamense* Itzigs. (= *Ptychostomum neodamense* (Itzigs.) J.R. Spence) — [P]. Un. 2. Rybachy Peninsula, valley of an unnamed stream flowing into the bay between Maly Skorbeevsky and Maynavolok capes grass-dominated meadow on an E-faced slope near road; N69.846207°, E32.3757°. Poor specimen with uncertain identification.
- B. pallens* Sw. (= *Ptychostomum pallens* (Sw.) J.R.Spence) — [L, P]. Rar. 1, 2. Rybachy Peninsula, bank of an unnamed stream flowing into the bay between Maly Skorbeevsky and Maynavolok capes, waterlogged roadside, N69.848832°, E32.398667°; terraces above Vaida Bay near Nemetsky Cape, roadside, N69.92554°, E31.958849°.
- **B. pallescens* Schleich. ex Schwägr. (= *Ptychostomum pallescens* (Schleich. ex Schwägr.) J.R.Spence) — [H]. 1(H), 7(H), 10(H). Recorded for Pummanki and Kervanto, for Väliniemi (Isthmus between the Sredny and Rybachy peninsulas).
- B. pseudotriquetrum* (Hedw.) G. Gaertn., B. Mey. & Scherb. (= *Ptychostomum pseudotriquetrum* (Hedw.) J.R. Spence & H.P. Ramsay) — [H, L, E, B, P]. Com. 1-12. Riparian, coastal, and wetland habitats, including stream beds, pebble and gravel substrates, saltmarshes, sedge fens, willow and birch krummholz, meadows, and rocky cliff and gorge habitats; also on anthropogenic substrates including concrete and disturbed ground.
- B. rutilans* Brid. (= *Ptychostomum rutilans* (Brid.) J.R.Spence) — [P]. Un. 2. Rybachy Peninsula, floodplain of the Lonsky Stream, anthropogenic meadow on an embankment of a large SSE-faced trench near stream; N69.754453°, E32.149456°.
- B. weigeli* Biehler (= *Ptychostomum weigeli* (Biehler) J.R. Spence) — [BR, B, P]. Rar. 1(BR), 2, 3, 5(BR), 6(B), 8, 9, 10. Wet riparian and spring-fed habitats, including eutrophic tall-herb meadows, mossy spring outflows, willow thickets, overgrowing pebble-boulder banks, and willow-sedge mires.
- Buckia vaucheri* (Lesq.) D. Rios, M.T. Gallego & J. Guerra — [P]. Un. 5. Rybachy Peninsula, Cape Cherny, E-faced rock outcrops visited by birds (excrements and pellets); N69.771697°, E32.839662°.
- Bucklandiella microcarpa* (Hedw.) Bedn.-Ochyra & Ochyra — [L, B, P]. Com. 1-12. Primarily on rocky substrates (cliffs, rock outcrops, and scree, including sandstone and schist, often partially overgrown) under a range of moisture conditions; also in tundra and nival communities, as well as in floodplains, along streams and lake shores on pebble and sandy substrates.
- B. sudetica* (Funck) Bedn.-Ochyra & Ochyra — [H, L, B, P]. Sp. 1-3, 5, 6(B), 8. On various rocky substrates: cliffs, screes and rock fields, pebble deposits, and glacial erratics.
- Buxbaumia aphylla* Hedw. — [P]. Rar. 2, 8. Exposed soil banks, Sredny Peninsula, lower course of the Vykot River, 2 km southwest of the Pummanki settlement, N69.772128°, E31.931244°; Rybachy Peninsula, waterfall in the lower course of the Morozov Stream, N69.724349°, E32.184072°.
- Calcidicranella obtusifolia* (Berggr.) Fedosov, Ignatova & Jan Kučera — [P]. Un. 2. Rybachy Peninsula, shore of Bolshoye Ozerko Bay, 400 m south of Larina Cape, vicinity of the Bolshoye Ozerko tourist base, moist roadside with shell limestone outcrops, N69.71562°, E32.171631°.
- C. varia* (Hedw.) Bonfim Santos, Fedosov & Jan Kučera — [BR, P]. Un. 2, 3(BR). Rybachy Peninsula, bank of an unnamed stream flowing into the bay between Maly Skorbeevsky and Mainavolok capes, in the lower course, base rich cliffs, N69.852711°, E32.364081°. Also recorded for Zubovka bay.
- Calliergon cordifolium* (Hedw.) Kindb. — [H, P]. Sp. 1, 2, 3, 8, 10. Moist birch krummholz and willow thickets, meadows, overgrown floodplain pebble deposits.
- C. giganteum* (Schimp.) Kindb. — [BR, H, L, P]. Sp. 2-4, 7-8, 10. Rich and medium rich fens, waterlogged willow thickets, moist meadows.
- C. giganteum* subsp. *sibiricum* Ignatova & Czernyad. — [P]. Rar. 2, 10-11. Meadows and willow thickets along stream and river beds.
- C. megalophyllum* Mikut. — [P]. Un. 3. Rybachy Peninsula, valley of the Sredny Stream in its middle course, *Filipen-*

- dula meadow on the slope of the first river terrace; N69.737489, E32.589916.
- C. richardsonii* (Mitt.) Kindb. ex G. Roth — [BR, E, P]. Sp. 2-3, 5, 8-9. Hummocky and small-hummock bogs, lowland *Carex acuta* and *C. aquatilis* mire, moist *Nardus*-grasslands, moist birch krummholz and willow thickets, lake shores.
- Calliergonella lindbergii* (Mitt.) Hedenäs — [H, P]. Rar. 5, 10-11. On rocks and soil along water bodies, on tussocks in lowland mires.
- Campylium chrysophyllum* (Brid.) Lange — [L, P]. Rar. 2, 5. Rybachy Peninsula, 2 km east of Mount Klubb; tundra meadow, N69.754595°, E32.11798°; Rybachy Peninsula, eastern coast of the peninsula, Bolshaya Korabelnaya Bay, coastal cliffs, N69.684506, E33.095423. Also recorded for vicinity of Sergeev Cape.
- C. protensum* (Brid.) Kindb. — [BR, B, P]. Sp. 2, 3, 5, 11. Floodplain meadows, high salt marshes, on soil in birch krummholz and willow thickets.
- C. stellatum* (Hedw.) Lange & C.E.O. Jensen — [BR, H, B, P]. Fr. 1, 2, 5, 6(B), 7, 9, 10, 12. In tundra and nival communities (meadows and grasslands), in moist and wet habitats (fens, mires, and marshes), along streams, rivers, and lake shores, on coastal cliffs, and in birch and willow communities.
- **Catoscopium nigrum* (Hedw.) Brid. — [BR]. 1(BR), 5(BR). Recorded for Vaidaguba and Tsypnavolok.
- Ceratodon purpureus* (Hedw.) Brid. — [H, L, B, P]. Com. 1-12. Primarily on rocky substrates (cliffs, rock outcrops, and screes, including sandstone, schist, and coastal rocks), in both dry and moist conditions; also in tundra and meadow communities (including coastal and dune grasslands), on pebble and sandy substrates, in wetlands, and in anthropogenic habitats (roadsides and concrete ruins).
- Cinclidium arcticum* (Bruch & Schimp.) Schimp. — [P]. Rar. 3, 7. Rich and medium rich herbaceous fens; Rybachy Peninsula, valley of the Sredny River in its middle course, N69.737741, E32.589274; Isthmus between the Sredny and Rybachy peninsulas, bog at the southwestern foot of Klubb Mt., N69.74039°, E32.055782°.
- C. latifolium* Lindb. — [P]. Rar. 2-3, 12. Acidophilous alpine grasslands, moist sedge birch krummholz, sedge-*Menyanthes* mire.
- C. stygium* Sw. — [BR, L, E, B, P]. Sp. 1-5, 6(B), 7, 9-11. Primarily in wet habitats (rich and medium rich fens and mires, including sedge and willow communities), along streams and lake shores (including pebble substrates), as well as in tall-herb and nival meadows and birch stands; occasionally on coastal cliffs.
- C. subrotundum* Lindb. — [BR, P]. Rar. 1(BR), 3-4, 5(BR), 8. Medium rich herbaceous fen.
- Cirriphyllum piliferum* (Hedw.) Grout — [P]. Rar. 10. Sredny Peninsula, valley of the Vykat River in its lower course. Herbaceous birch krummholz, N69.767196, E31.927188; Sredny Peninsula, valley of the Vykat River, 5.5 km northwest of Lake Zemlyanoe. Birch krummholz with *Lactuca alpina*; N69.76887°, E31.928955°.
- Climacium dendroides* (Hedw.) F. Weber & D. Mohr — [P]. Fr. 1-12. Moist meadows, including anthropogenic ones, grass-forb *Empetrum*-dominated communities, moist willow thickets, riparian communities.
- Cnestrum glaucescens* (Lindb. & Arnell) Holmen ex Mogensén & Steere — [P]. Rar. 2. Dry cliffs and gravelly tundra.
- Codriophorus acicularis* (Hedw.) P. Beauv. — [H, L, P]. Un. 5, 10(H), 3(L). Rybachy Peninsula, Loki River bank, 500 m upstream of the bridge, moss community on a wet pebble slope along the watercourse; N69.742220°, E32.942917°. Also recorded for vicinity of Parapellon lake (Sredny Peninsula) in a dried-up stream bed.
- Conostomum tetragonum* (Hedw.) Lindb. — [H, P]. Sp. 2-6, 8. On cliffs and in nival *Salix herbacea*, *Nardus stricta* communities.
- Cratoneuron filicinum* (Hedw.) Spruce — [H, B, P]. Rar. 2(H), 5, 6(B), 10. Rybachy Peninsula, Loki River bank, moss community on a wet pebble slope along the watercourse, N69.742220, E32.94291652; Sredny Peninsula, 6.5 km north-northwest of Zemlyanoe Lake, vicinity of Karhuyarvi Lake, tall-fern birch krummholz, N69.777677°, E31.915093°. Also recorded for Sharapov Cape vicinity, Pummankiniemi (Zemljanoy Cape), and east coast of Bolshaya Volokovaya Bay.
- Cynodontium strumiferum* (Hedw.) Lindb. — [L, P]. Rar. 8, 11. On sandstone cliffs. Sredny Peninsula, lower left tributary of the Korabelny Stream, N69.71207°, E32.079182°; Sredny Peninsula, 2 km southwest of Parapellon Lake, shore of a small unnamed lake; N69.681101°, E31.795532°.
- C. tenellum* (Schimp.) Limpr. — [H, P]. Rar. 3, 5, 11. Cliffs, dark sandstone grottoes.
- Cyrtomnium hymenophylloides* (Huebener) T.J. Kop. — [P]. Un. 9. Sredny Peninsula, vicinity of the "Two Brothers" (Kiiperi-Ukko and Kiiperi-Akka) tors, coastal cliffs; N69.825546°, E31.770724°.
- Dichelyma falcatum* (Hedw.) Myrin — [H, P]. Rar. 1, 2, 5, 9. In small lakes, including temporary ones.
- Dichodontium pellucidum* (Hedw.) Schimp. — [BR, H, L, B, P]. Sp. 1-5, 6(B), 9, 11. Pebble banks along watercourses, moist cliffs, and banks of temporary streams.
- Dicranella cerviculata* (Hedw.) Schimp. — [BR, L, P]. Rar. 2-3, 8. Lichen and patchy tundra, mires, and banks of temporary streams.
- Dicranellopsis crispa* (Hedw.) Bonfim Santos, Siebel & Fedosov — [P]. Un. 1. Rybachy Peninsula, the innermost part of Vaida Bay, disturbed mire, in a track left by an all-terrain vehicle; N69.920886°, E31.982337°.
- D. subulata* (Hedw.) Bonfim Santos, Siebel & Fedosov — [BR, H, L, P]. Un. 2. Rybachy Peninsula, bank of the Morozov Stream in its lower course, upstream of the waterfall, floodplain meadow; N69.724036°, E32.186177°.
- Dicranum acutifolium* (Lindb. & Arnell) C.E.O. Jensen — [P]. Fr. 1-4, 7-10. In lichen-, moss-, and dwarf-shrub-dominated tundra and snowbed communities, including, patchy and hummocky tundra, screes and stony slopes, oligotrophic mires, coastal dwarf-shrub communities, floodplain and terrace meadows, and birch krummholz.
- D. angustum* Lindb. — [P]. Rar. 3-5. Floodplain meadows on stony banks, dwarf-shrub and lichen-*Empetrum* tundra, small-hummock sedge-*Menyanthes*-mires, rocky screes, sedge-dominated bogs and hummocks, waterlogged gentle depressions with high *Pedicularis* cover, and *Empetrum*-*Carex* tundra on slopes.
- D. bonjeanii* De Not. — [B, P]. Sp. 1-5, 6(B), 9, 11. In *Dryas*- and *Empetrum*-dominated tundra and nival communities, meadows, moss and lichen tundra, rocky slopes, sandstone and schist cliffs and screes, coastal cliffs, anthropogenic and grass-dominated meadows, and snowbeds on slopes and terraces.
- D. brevifolium* (Lindb.) Lindb. — [B, P]. Sp. 2-3, 5-6, 9. Hummocky and patchy dwarf-shrub and lichen tundra, nival and fern meadows, stony slopes, cliffs, and small waterlogged depressions.

- D. elongatum* Schleich. ex Schwägr. — [H, L, E, P]. Com. 1-12. Tundra (bushy, lichen, patchy, hummocky), nival meadows, forb meadows, rock outcrops, boulder and scree fields, rivers and lakes pebble shore, wetlands (fens, marshes, bogs), anthropogenic communities.
- D. flexicaule* Brid. — [BR, P]. Sp. 1-3, 5, 9-10. *Empetrum* moss tundra, shrub-lichen tundra, hummocky tundra and bogs, rocky outcrops (sandstone, quartzite), screes and stone fields, bare soil, caves.
- D. fuscescens* Turner — [BR, L, E, B, P]. Fr. 1-3, 5-10. Birch krummholz, tundra (dwarf-shrub, lichen, patchy, and *Empetrum*-dominated), nival meadows, bogs and hummocky mires, cliffs, gravelly shores, and anthropogenic communities.
- D. groenlandicum* Brid. — [P]. Rar. 2, 5, 12. Rocky outcrops, gravel deposits, grass-enriched *Empetrum*-tundra.
- D. laevidens* R.S. Williams — [P]. Sp. 2, 3, 5, 8, 9. Grasslands (including *Nardus*- and floodplain meadows), dwarf-shrub tundra, hummocky tundra and bogs, wet willow thickets, and anthropogenic grasslands.
- D. majus* Turner — [H, L, E, P]. Com. 1-12. Tundra (*Empetrum*, dwarf-shrub, and hummocky), snowbed and forb meadows, wetlands (hummocky, ridge-hollow, and sedge-cottongrass mires), willow and juniper thickets, birch woodlands, rocky outcrops and screes, gravelly stream valleys, dried lakebeds, and disturbed habitats.
- D. polysetum* Sw. — [L, P]. Fr. 1, 2, 3, 5, 6, 7, 8, 9, 10, 11. Dwarf-shrub and *Empetrum*-tundra (including hummocky and gravelly), snowbed communities and grasslands, bogs and mires (hummocky, ridge-hollow), birch woodlands and krummholz, floodplain meadows with willows, rocky outcrops, lake shores, and anthropogenic grassland.
- D. schljakovii* Ignatova & Tubanova — [P]. Un. 2. Rybachy Peninsula, 3.7 km west of Mountain May, dwarf-shrub moss-lichen tundra; N69.83366, E32.315864.
- D. scoparium* Hedw. — [BR, H, L, E, B, P]. Com. 1-12. Coastal pebble shores and cliffs, crowberry and dwarf-shrub tundra (including hummocky and gravelly), snowbed and forb meadows, bogs and wet depressions, willow thickets, birch woodlands and krummholz, rocky outcrops and screes, and anthropogenic grassland and disturbed sites.
- D. septentrionale* Tubanova & Ignatova — [P]. Rar. 2, 3. Hummocky bogs, *Empetrum*-tundra, snowbed communities, and overgrown rocky outcrops.
- D. spadiceum* J.E. Zetterst. — [H, E, P]. Rar. 2, 5, 9. Tundra and nival meadows (including *Dryas* communities), grasslands, hummocky *Empetrum*-tundra, screes, and rocky outcrops.
- D. undulatum* Schrad. ex Brid. — [P]. Un. 2. Rybachy Peninsula, lower course of the Lonsky Stream valley, snowbed community; N69.743464°, E32.136914°.
- Didymodon fallax* (Hedw.) R.H. Zander (= *Geheebia fallax* (Hedw.) R.H. Zander) — [P]. Un. 2. Rybachy Peninsula, shore of Bolshoye Ozerko Bay, 400 m south of Cape Larina, vicinity of Bolshoye Ozerko tourist base, roadside of a wet path with exposures of shell limestone; N69.715620°, E32.171631°.
- D. perobtus* Broth. — [P]. Un. 5. Rybachy Peninsula, Loka River bank, 500 m upstream from the bridge, dry cliffs; N69.741584, E32.941830.
- Dilutineuron fasciculare* (Schrad. ex Hedw.) Bedn.-Ochyra, Sawicki, Ochyra, Szczecińska & Plášek — [H, P]. Rar. 1(H), 2, 5, 6, 8. Rocky outcrops and coastal terraces, gravelly *Empetrum*-tundra, nival communities.
- Diobelonella palustris* (Dicks.) Ochyra — [BR, B, P]. Sp. 2, 3, 5, 6(B), 9. Wet gravelly tracks and streambeds, waterfall rocks and wet cliffs, lake shores and drained lakebeds, wet sedge meadows and grasslands, bog margins, springs, and exposed riverbanks.
- Distichium capillaceum* (Hedw.) Bruch & Schimp. — [BR, L, B, P]. Sp. 1, 2, 3, 4, 5, 6(B), 8, 9, 10, 11. Mainly rocky habitats — dry and wet cliffs, crevices, grottoes and caves, coastal rocks and terraces, and screes; also snowbed and grass communities on rocky slopes, lake shores, and spring areas.
- D. inclinatum* (Hedw.) Bruch & Schimp. — [L, P]. Rar. 1(L), 5, 7. Anthropogenic grasslands (roadsides, trampled sites) and coastal rocky habitats.
- Dirichium heteromallum* (Hedw.) E. Britton — [P]. Rar. 2, 5. Rybachy Peninsula, the valley of the Zapadnaya Mayka River in its upper reaches, a dark hollow in sandy cliffs; N69.803346°, E32.376598°; Rybachy Peninsula, Cape Cherny, moist coastal shale outcrops near a stream, N69.776521, E32.834097.
- D. pusillum* (Hedw.) Hampe — [P]. Un. 5. Rybachy Peninsula, Cape Cherny, medium blocky scree on north-facing slaty rocks; N69.773674°, E32.839244°. Single record based on small specimen. Additionally, Likhachev' (1986) record of *D. lineare* for the area may be based on misidentification of *D. pusillum*.
- Drapanium fastigiatum* (Brid.) Lange & C.E.O. Jensen — [P]. Rar. 2, 5, 7. Vertical rock faces (including sea cliffs) and coastal tall-herb meadows.
- Drapanocladus aduncus* (Hedw.) Warnst. — [BR, L, P]. Sp. 2, 3(BR), 5, 8, 10. Coastal saltmarshes and brackish wetlands, dune slacks, wet meadows, willow thickets, and disturbed roadside habitats. Additionally, Brotherus (1923) recorded this species for Pummanki as *D. polycarpus* (Blandow ex Voit) Warnst.
- D. polygamus* (Schimp.) Hedenäs — [BR, H, P]. Sp. 3, 5, 7, 8, 9, 10. Coastal saltmarshes (low-mid levels), brackish lagoons and estuaries, wet meadows, lake shores (on stones), willow-moss mires, roadside grass patches, and concrete substrates.
- **D. sendtneri* (Schimp. ex H. Müll.) Warnst. — [BR, L]. 1(L), 10(BR). Dwarf-shrub tundra, along a stream bank, on stones. Recorded for Pummanki and for Vaidaguba.
- **D. trifarius* (F. Weber & D. Mohr) Broth. — [BR]. 5(BR). Recorded for Tsipnavolok.
- Encalypta ciliata* Hedw. — [P]. Un. 9. Sredny Peninsula, left tributary of the Vykot River, 1.7 km E of Lake Kuyakanyarvi, dry cliffs; N69.770269°, E31.869817°.
- Fissidens adianthoides* Hedw. — [L, P]. 5(L), 9. Sredny Peninsula, small lake 1 km E of Lake Kuyakanyarvi, stony lake shore; N69.767647, E31.850992. Also recorded for the vicinity of Laush Bay and Bolshaya Korabelnaya Bay.
- **F. bryoides* Hedw. — [L]. 3(L). Rock habitats. Recorded for vicinity of Rocapakhta Mountain.
- F. osmundoides* Hedw. ex Bruch & Schimp. — [BR, H, L, B, P]. Sp. 2, 3, 4, 5, 6(B), 8, 11. Mainly rocky habitats (dry and wet slaty cliffs, canyons, gorges, grottoes, screes), also nival and tundra meadows, streambeds and floodplain meadows, lake shores and dried basins, and sedge mires.
- F. viridulus* (Sw.) Wahlenb. — [P]. Un. 5. Rybachy Peninsula, vicinity of Cape Chyorny. rocky bottom of a dried-up lake; N69.770829°, E32.834463°. Poor specimen with uncertain identification.

- Flexitrichum flexicaule* (Schwägr.) Ignatov & Fedosov — [BR, L, B, P]. Sp. 1, 2, 6, 8, 9, 10, 11, 12. Rocky and stony substrates (cliffs, screes, pebble beaches), tundra and snowbed communities (with *Dryas* and *Salix herbacea*), bogs and hummocky wetlands, temporary stream valleys, and disturbed or anthropogenic sites (overgrown roads, concrete ruins).
- Fontinalis antipyretica* Hedw. — [P]. Fr. 1-12. In stream channels and glacial lakes.
- F. dalecarlica* Bruch & Schimp. — [P]. Un. 9. Sredny Peninsula, Lake Kuyakanyarvi, lake shore; N69.765935°, E31.822531°.
- F. hypnoides* Hartm. — [P]. Un. 3. Rybachy Peninsula, Pyayva River channel, in the riverbed; N69.727858°, E32.430732°.
- Grimmia atrata* Miel. ex Hornsch. — [P]. Un. 2. Rybachy Peninsula, bay between Cape Maly Skorbeevsky and Cape Bolshoy Skorbeevsky, at the mouth of a stream, shale rock on a northeast-facing slope; N69.870786°, E32.35281°.
- G. donniana* Sm. — [P]. Unique. Mainland along the road to the Rybachy and Sredny Peninsulas, 1.7 km southeast of Lake Ustoyarvi, southern slope of the ridge; ruins of the military 'Nord' base. concrete building ruins; N69.58762°, E31.878158°. Not recorded on the peninsulas' territory.
- G. incurva* Schwägr. — [L, B, P]. Rar. 2, 3, 4(L), 6. Rocky high coastal terrace; wet sites on northeast-facing rocks; northeast-facing cliffs; outcrops of sandstone on south-facing slopes; shale boulder-strewn rocks on south-southeast-facing slopes.
- Gymnostomum aeruginosum* Sm. — [P]. Un. 5. Rybachy Peninsula, vicinity of Cape Chyorny, west-facing rocks; N69.771697°, E32.839662°.
- Hamatocaulis vernicosus* (Mitt.) Hedenäs — [P]. Rar. 2, 3, 9. Overgrown edge of a small lake (non-flooded part); tussock sedge-willow bog; coastal cliffs; wet sedge-birch thicket in a depression.
- Helodium blandowii* (F. Weber & D. Mohr) Warnst. — [E, P]. Rar. 1, 2, 3, 7. Coastal bogs, wet grasslands, sedge-willow mires, fens.
- **Herzogiella striatella* (Brid.) Z. Iwats. — [L]. Rar. 1(L), 2 (Konstantinova). 2-2.5 km E of Vauda-guba Settlement, 300-400 m of sea shore; edge of coastal terrace, shallow depression between rock outcrops with brook having gravelly bed; vertical soil bluff, under overhanging stems of crowberry; 1981, coll. A. Likhachev, KPABG(m)124940; ca. 4 km E of Skorbeevsky Settlement, dwarf shrub-lichen tundra with brooks, on rock, partially in water, 1981, coll. N.A. Konstantinova, KPABG(h)3489 (Rybachy Peninsula).
- **H. turfacea* (Lindb.) Z. Iwats. — [L]. 5(L). Wet dwarf-shrub tundra. Recorded for Cape Laush vicinity (Rybachy Peninsula).
- Heterocladia dimorpha* (Brid.) Ignatov & Fedosov — [L, P]. Rar. 2, 5. Forb communities and *Empetrum*-tundra on marine terraces in places with low snow melting.
- Hygrohypnella ochracea* (Turner ex Wilson) Ignatov & Ignatova — [BR, H, L, P]. Sp. 2, 4, 5, 8, 9, 10. In streams and rivers channels and along the banks of rivers and lakes.
- Hygrohypnum luridum* (Hedw.) Jenn. — [P]. Un. 9. Sredny Peninsula, left tributary of the Vykot River, 1.7 km east of Lake Kuyakanyarvi, fine-gravel scree, moist habitat; N69.770269, E31.869817.
- Hylocomiadelphus triquetrus* (Hedw.) Ochyra & Stebel — [B, P]. Rar. 2, 5, 6(B), 8, 10, 11. Floodplain and grass-forb meadows; riparian willow thickets; overgrowing riverine pebble substrates; *Empetrum*-dwarf-shrub tundra on marine terraces.
- Hylocomiastrum pyrenaicum* (Spruce) M. Fleisch. ex Broth. — [BR, P]. Sp. 1, 2, 3(BR) 5, 10. Willow and dwarf birch shrublands, tundra and snowbed meadows, grasslands, and sedge tussock mires in river floodplains.
- Hylocomium splendens* (Hedw.) Schimp. — [BR, H, L, B, P]. Com. 1-12. One of the most common species: tundra, meadows, wetlands and rocky habitats, including coastal and floodplain environments, occasionally on disturbed sites.
- Hymenoloma crispulum* (Hedw.) Ochyra — [H, B, P]. Com. 1-12. Predominantly rocky habitats (cliffs, outcrops, screes, boulder fields), with associated stony streambeds and pebble substrates, as well as tundra and meadow patches (including snowbed communities) and occasional wet or disturbed sites.
- Hymenoloma mulahaceni* (Höhn.) Ochyra — [P]. Rar. 2, 5. Rybachy Peninsula, bay between Cape Chyorny and Cape Stolbovoy, east of the Chyornaya River, on vertical thin-layered shale, north-facing exposure, raptor perch, N69.771313°, E32.866554°; Rybachy Peninsula, shore of a lake with an island in the basin of the Zapadnaya Mayka River, small blocky outcrops of quartz sandstone, N69.803772°, E32.355212°.
- Hymenostylium recurvirostrum* (Hedw.) Dixon — [P]. Rar. 1, 2, 5, 8, 9. Shale and sandstone cliffs of various exposures (including moist sites), in river valleys and along the coast.
- Hypnum cupressiforme* Hedw. — [P]. Un. 8. Sredny Peninsula, mouth of the Korabelny River, overgrowing pebble substrate along a stream bank; N69.714688°, E32.107919°.
- Isopterygiella pulchella* (Hedw.) Ignatov & Ignatova — [BR, H, B, P]. Rar. 1, 2, 6(B), 8, 9. Moist rock habitats (including cave walls and streamside cliffs), dry rocks, and willow thickets.
- Leptobryum pyriforme* (Hedw.) Wilson — [BR, B, P]. Rar. 1, 2, 5, 6(B), 9, 10. Anthropogenic habitats, including roadsides, disturbed soil patches, and concrete substrates.
- Leptodictyum riparium* (Hedw.) Warnst. — [B, P]. Rar. 6(B), 10. Sredny Peninsula, 6.7 km north-northeast of Lake Zemlyanoye, shore of Lake Karhuyarvi, tussocky lowland sedge bog, on tussocks, N69.780916°, E31.914291°; Sredny Peninsula, Cape Litke, salt-marsh, on storm wrack deposits, N69.708469°, E32.132773°.
- **Leskea polycarpa* Hedw. — [L]. 3(L). The wet wall of a small grotto. Recorded for Rokapahta.
- Lescurea incurvata* (Hedw.) E. Lawton — [BR, H, B, P]. Sp. 2, 3, 4, 5, 6(B), 8, 10. Meadows (including snowbed and tall-herb communities) on slopes and along temporary streams, rocky habitats (cliffs, dry and wet rocks) and stony screes.
- L. patens* (Lindb.) Arnell & C.E.O. Jensen — [H, L, B]. Un. 6(B), 9(H). Rybachy Peninsula, south-eastern coast: Cape Konev (2.5 km ENE of Cape Gorodetsky), 30° slope with rock outcrops, overgrown by moisture-loving forbs and *Rhodiola rosea*, but locally exposed. On the rock surface at the bedrock outcrop. Also recorded for Kiviaidantunturi (Sredny peninsula) and for Rokapachta on (Rybachy peninsula).
- L. radicata* (Mitt.) Mönk. — [L, B, P]. Rar. 1, 2, 6(B). Overgrowing scree on rocky slopes, alpine meadows with *Cicerbita alpina*, and rock outcrops (on the lateral surface of bedrock).
- L. saxicola* (Schimp.) Molendo — [BR, H, B, P]. Sp. 2, 3, 5, 6(B), 8, 9. Rocky and stony habitats (cliffs, screes, coastal outcrops), including pebble substrates in stream floodplains; birch communities; occasionally near anthropogenic structures.
- **Lewinskya pylaisii* (Brid.) F. Lara, Garilleti & Goffinet — [H]. 9(H). Rocky outcrops. Recorded for Pummanki and Lotamukka.

- L. rupestris* (Schleich. ex Schwägr.) F. Lara, Garilleti & Goffinet — [P]. Un. 2. Rybachy Peninsula, bay between Cape Maly Skorbeevsky and Cape Bolshoy Skorbeevsky, at the mouth of a stream, on a wave-washed grey shale sea stack, south-facing wall; N69.870575°, E32.356326°.
- Loeskyppnum badium* (Hartm.) H.K.G. Paul (= *Warnstorfia badia* (Hartm.) W.R.Buck & Goffinet) — [P]. Rar. 2, 3, 5, 7, 8. Wetland and riparian habitats, including hummocky bogs and medium rich fens, sedge–cotton-grass willow thickets, moist depressions, stream banks, and a mid-level coastal marsh influenced by tides.
- Meesia hexasticha* (Funck) Bruch — [P]. Un. 3. Rybachiy Peninsula, abandoned settlement Zubovka, 2 km southwest of the mouth of the Sredny River. Anthropogenic gravelly herb community on the top of the hill around the abandoned building, N69.755551°, E32.592245°.
- M. longiseta* Hedw. — [P]. Un. 3. Rybachy Peninsula, mouth of the Zapadnaya Mayka River, salt marsh, on silt; N69.798268, E32.483361.
- M. triquetra* (L. ex Jolycl.) Ångstr. — [BR, P]. Rar. 3, 5, 7, 8. Various types of mires and wetland habitats, ranging from mesotrophic to eutrophic, often dominated by sedges, cotton-grass, and willow.
- M. minor* Brid. — [P]. Rar. 1, 3, 5, 8, 11. Moist rocky habitats associated with streams and cliffs, including gorges, vertical rock outcrops, and waterfalls.
- Mnium blyttii* Bruch & Schimp. — [L, B, P]. Rar. 5(L), 6(B), 8. Sredniy Peninsula, gorge on the Korabelny River, gravel along the stream with grassy willow thickets, N69.702483°, E32.067972°; Rybachy Peninsula, south-eastern coast: small bay 3 km NNE of Cape Sharapov. Moss-covered rock outcrops, with a fissure between two cliffs containing soil at the bottom. Gravel along the stream with grassy willow thickets, on the sloping wall of the fissure, on soil. Also recorded for vicinity of Lognavolok Cape.
- M. lycopodioides* Schwägr. — [L, P]. Sp. 2, 3, 5, 8, 9, 12. A variety of dry and moist habitats on sandy dunes, rocks, herb communities, and krummholz, including juniper thickets, willow thickets, fern snowbed communities, and grasslands with *Nardus stricta*.
- M. spinosum* (Voit) Schwägr. — [L, P]. Rar. 2, 3, 5, 8, 10. Various riparian, meadow, and shrubland habitats on wet and stony substrates, often along rivers and streams, including willow thickets, meadows, and juniper or willow shrub communities.
- M. stellare* Hedw. — [L, B, P]. Rar. 2, 6(B), 9, 10. Meadow and shrubland communities on nutrient-rich soils: willow thickets, currant thickets, and meadows with *Filipendula*.
- M. thomsonii* Schimp. — [P]. Rar. 1, 9. Sredniy Peninsula, left tributary of the Vykot River, 1.7 km east of Lake Kuyakanyarvi, N69.770269°, E31.869817°; Rybachiy Peninsula, terraces above Vayda Bay on the side of Nemetsky Cape, N69.924974, E31.959381; on dry rocks.
- Myurella julacea* (Schwägr.) Schimp. — [BR, P]. Un. 5, 10 (BR). Rybachiy Peninsula, lower course of an unnamed stream east of the Chernaya River; rocky community (*Dryas octopetala*, *Alchemilla alpina*) on fine-gravel scree with southwest exposure, 40° slope; N69.769274°, E32.862203°. Also recorded for Pummanki.
- M. tenerrima* (Brid.) Lindb. — [BR, P]. Rar. 5, 9. Rybachiy Peninsula, lower course of an unnamed stream east of the Chernaya River, rocky community (*Dryas octopetala*, *Alchemilla alpina*) on fine-gravel scree with southwest exposure, 40° slope, N69.769274, E32.862203; Sredniy Peninsula, vicinity of the inselbergs 'Two Brothers' (Kiiperi-Ukko and Kiiperi-Akka), coastal cliffs, N69.825546°, E31.770724°.
- Niphotrichum canescens* (Hedw.) Bedn.-Ochyra & Ochyra — [BR, P]. Rar. 2, 5(BR). *Empetrum*-heaths, sand dunes with *Leymus arenarius*. Also recorded for Tsypnavolok.
- N. ericoides* (Brid.) Bedn.-Ochyra & Ochyra — [BR, P]. Rar. 2. Rybachy Peninsula, bay between Cape Maly Skorbeevsky and Cape Maynavolok, moist rocks along stream banks, N69.846812°, E32.410915°; Rybachy Peninsula, Skorbeevskaya Bay, marine terrace, moist rocks along stream banks, *Empetrum*-heath, N69.880564°, E32.250929°. Also recorded for Tsypnavolok.
- Oligotrichum hercynicum* (Hedw.) DC. — [BR, P]. Rar. 1(BR), 2, 3. Moist roadsides and disturbed ground, earthen banks, and dry rocky outcrops.
- Oncophorus integerrimus* Hedenäs — [P]. Sp. 2, 3, 5, 5, 9, 11. Snowbed grasslands and meadows on slopes; floodplain meadows; rocky habitats (cliffs, outcrops, glacially smoothed rocks), and pebble substrates.
- O. virens* (Hedw.) Brid. — [BR, H, L, B, P]. Sp. 2, 3, 4, 5, 6(B), 11. Floodplain and coastal meadows; mires (including tussocky sedge–cotton grass types); snowbed meadows on screes and rocks; rocky habitats (wet shale cliffs, outcrops); pebble substrates in river channels; dwarf-shrub tundra (crowberry communities).
- Orthothecium strictum* Lorentz — [P]. Un. 5. Rybachiy Peninsula, bank of the Loki River, 500 m upstream of the bridge, rocks with a small waterfall; N69.741584°, E32.941830°.
- Paludella squarrosa* (Hedw.) Brid. — [H, L, E, B, P]. Fr. 1-8, 10. Sedge- and willow-dominated lowlands and coastal fens, hummocky and sphagnum mires, with wet meadows along streams and lake shores.
- Palustriella commutata* (Hedw.) Ochyra — [L, B, P]. Rar. 2, 6 (B). Spring at the stream source; on an erratic boulder; on water-saturated soil.
- P. decipiens* (De Not.) Ochyra — [BR, B, P]. Rar. 1(BR), 5, 6(B). Moss-dominated riparian habitats associated with temporary stream flow, including wet gravel slopes, stream overflow zones, and shallow flowing water on slopes. Also recorded for Vaidaguba.
- P. falcata* (Brid.) Hedenäs — [BR, H, P]. Un. 1(BR), 5. Rybachiy Peninsula, unnamed stream to the east of the Chernaya River, floodplain meadow grazed by reindeer; N69.748252°, E32.909898°. Also recorded for Vaidaguba.
- Paraleucobryum longifolium* (Ehrh. ex Hedw.) Péterfi — [H, P]. Un. 9. Sredniy Peninsula, left tributary of the Vykot River, 1.7 km east of Lake Kuyakanyarvi, on rocks; N69.770152°, E31.867370°.
- Philonotis caespitosa* Jur. — [L, B, P]. Rar. 6(B), 9. Moist coastal cliff habitats, including forb meadows between cliffs and sea, rock crevices with oozing water, soil pockets at cliff bases and on rock walls.
- P. fontana* (Hedw.) Brid. — [H, L, E, B, P]. Fr. 1-5, 6(B), 8, 9, 12. Wet coastal and riparian habitats, including shale cliffs, stream channels, pebble substrates, lowland and tussocky sedge–willow bogs, mossy meadows, snowbed meadows, and small anthropogenic wetlands.
- P. seriatum* Mitt. — [B]. Un. 6(B). Rybachy Peninsula, south-eastern coast, Cape Konev (2.5 km ENE of Cape Gorodetsky), moist forb meadow, on soil, partly in a small streamlet.

- P. tomentella* Molendo — [H, L, B, P]. Sp. 2, 3, 5, 6(B), 8, 9, 10, 11. Floodplain and riparian meadows tussocky meadows, including grazed ones; stream and lake shores with pebble and boulder substrates; wet shale and sandstone cliffs, waterfalls, and moist rocks; sedge–willow and herbaceous fens; mossy and snowbed meadows; petrophytic communities on wet rocks.
- Plagiomnium affine* (Blandow) T.J. Kop. — [BR]. 5(BR). Recorded for Tsypnavolok.
- P. curvatulum* (Lindb.) Schljakov — [P]. Sp. 2, 3, 5, 7, 9, 10. Coastal and floodplain meadows, willow thickets, sedge fens, pebble substrates on marine terraces, and dune-associated herbaceous communities.
- P. cuspidatum* (Hedw.) T.J. Kop. — [P]. Rar. 7, 8. Floodplain and coastal meadows; herb willow stands; and sedge–willow fens (including tussocky types) along streams.
- **P. elatum* (Bruch et Schimp.) T.J. Kop. — [BR]. 5(BR). Recorded for Tsypnavolok by Brotherus (1923), as *Mnium seligeri* Jur.
- P. ellipticum* (Brid.) T.J. Kop. — [L, B, P]. Sp. 1, 2, 3, 4, 5, 6(B), 7, 8, 9, 10, 11. Meadows (coastal, floodplain, wet and anthropogenic) and herb willow and birch thickets; tussocky sedge fens; sandy and pebble substrates with temporary streams, on concrete and decaying wood.
- P. rostratum* (Schröd.) T.J. Kop. — [P]. Un. 1. Rybachy Peninsula, bay between Cape Koroviy and Cape Kiysky, coastal meadow above the storm ridge; N69.869507°, E31.986706°.
- Plagiothecium cavifolium* (Brid.) Z.Iwats. — [BR, L, B, P]. Sp. 2, 3, 5, 6(B), 8, 9, 10, 11. Predominantly rocky habitats (cliffs, outcrops, caves and grottoes, including moist sites near waterfalls), with screes and pebble substrates; occasionally meadows, shrub and birch stands, and disturbed ground.
- P. curvifolium* Schlieph. ex Limpr. — [P]. Un. 2. Rybachy Peninsula, bay between Cape Maly Skorbeevsky and Cape Maynavolok, valley of an unnamed stream. herb–*Empetrum* willow thicket; N69.846568°, E32.407778°.
- P. denticulatum* (Hedw.) Schimp. — [L, B, P]. Fr. 1–10. Meadows (including floodplain, snowbed and anthropogenic types); willow and birch stands; rocky habitats (wet cliffs, grottoes) and screes; pebble substrates along streams; and sedge fens in riparian zones.
- P. rossicum* Ignatov & Ignatova — [P]. Un. 2. Rybachy Peninsula, bay between Cape Maly Skorbeevsky and Cape Maynavolok, stone wall of a former firing position; N69.850621°, E32.407393°.
- Platydictya jungermannioides* (Brid.) H.A. Crum — [H, L, B, P]. Rar. 2, 6(B), 9. Rocky habitats (mainly dry cliffs and outcrops), including fine-gravel screes and coastal shale rocks.
- Platyhypnum alpestre* (Hedw.) Ochyra — [H, L, P]. Rar. 2, 5, 6, 10(H). Wet cliffs and rocks. Also recorded for Pummanki.
- P. cochleariifolium* (Venturi) Ochyra — [P]. Un. 10. Sredny Peninsula, Vykat River valley, 5 km northwest of Lake Zemlyanoye. overgrowing pebble substrate along a secondary channel of the Vykat River; N69.766222°, E31.930134°. Poor specimen with uncertain identification.
- P. duriusculum* (De Not.) Ochyra — [BR, B, P]. Rar. 2, 6(B), 9. On stones in fast-flowing river channels or in waterfalls.
- P. smithii* (Sw.) Ochyra — [H, L, B]. Un. 2(H), 6(B). Rybachy Peninsula, south-eastern coast: river 2 km NNE of Cape Sharapov, near its mouth, 70 m a.s.l. Coarse-stony river channel with fast current, Sphagnum and grasses along the banks. On a stone in the water. Also recorded for Suvja Stream (Syvājoki) and Pajvajoki Stream on Rybachy peninsula in snowbed community near a snow patch.
- **Plenogemma phyllantha* (Brid.) Sawicki, Plášek & Ochyra (= *Bryomyces phyllanthus* (Brid.) J.J. Atwood, W.R. Buck & Goffinet) — [H]. 9(H). Rock outcrop, in crevices. Recorded for Pummanki, Lotamukka (a small bay southwest of Cape Zemlyanoy).
- Pleurozium schreberi* (Willd. ex Brid.) Mitt. — [BR, L, B, P]. Com. 1–12. Hummocky bogs and wetlands; shrub and dwarf-shrub tundra (*Empetrum*, birch, willow, juniper); tundra and snowbed meadows; coastal and floodplain meadows; occasionally on slopes, dunes, and disturbed sites.
- Pogonatum dentatum* (Menzies ex Brid.) Brid. — [P]. Rar. 2, 8. Rocky habitats (including moist cliffs and shale outcrops) and dwarf-shrub tundra along temporary watercourses; occasionally on disturbed roadside exposures.
- P. urnigerum* (Hedw.) P. Beauv. — [H, L, B, P]. Sp. 1, 2, 3, 5, 6(B), 8, 11. Rocky and stony habitats (cliffs, gorges, screes, pebble and boulder substrates), including moist and dry rock surfaces; with floodplain meadows and occasionally disturbed sites.
- Pohlia andalusica* (Höhn.) Broth. — [P]. Rar. 5, 8. Sredny Peninsula, 400 m east of Lake Zemlyanoye, silty dried lake margins, N69.725159°, E31.862915°; Rybachy Peninsula, lower course of the Chyornaya River, near the road, shale cliffs forming river gorges, N69.764491°, E32.843573°. The second record with uncertain identification (poor specimen).
- P. beringiensis* A.J. Shaw — [P]. Rar. 2, 8. Pebble substrates in streambeds (including overgrowing), and meadow depressions with shrubs.
- P. bulbifera* (Warnst.) Warnst. — [P]. Rar. 2, 3, 6. On stones in streambeds; dried stony lake bottoms; and moist roadside substrates (pebble and fine ground).
- P. cruda* (Hedw.) Lindb. — [BR, H, L, B, P]. Fr. 1, 2, 3, 4, 5, 6(B), 8, 9, 10, 11. Rocky habitats (cliffs, outcrops, gorges, caves and grottoes), including wet and dry shale and sandstone surfaces, screes and pebble substrates; with associated floodplain meadows, mires, tundra, and occasionally disturbed anthropogenic sites.
- P. crudoides* (Sull. & Lesq.) Broth. — [P]. Rar. 2, 3. Dark cavities and narrow rock fissures in sandstone outcrops, and sandstone exposures within dwarf-shrub (*Empetrum*) tundra on river terraces.
- P. drummondii* (Müll. Hal.) A.L. Andrews — [BR, B, P]. Sp. 2, 3, 5, 6(B), 8, 9, 10(BR). Rocky and stony riverine habitats (screes, pebble and boulder substrates, riverbeds and floodplain margins), including dry and moist cliff faces; with crowberry–sand dune edges, willow–herb riparian stands, and wet roadside sites.
- P. elongata* Hedw. — [P]. Un. 2. Rybachy Peninsula, waterfall in the lower course of the Morozov Stream, light-colored vertical rock face; N69.724349°, E32.184073°.
- P. filum* (Schimp.) Mårtensson — [P]. Rar. 1, 2, 3, 8. Wet and dry roadside habitats, including anthropogenic disturbed grasslands, streambed pebble substrates, moist riparian rocks, and coastal meadows.
- P. longicolla* (Hedw.) Lindb. — [P]. Un. 2. Rybachy Peninsula, floodplain terrace of an unnamed stream flowing into the bay between Cape Maly Skorbeevsky and Cape Maynavolok, sandstone outcrops within *Empetrum*-tundra; N69.846771°, E32.404098°.
- P. ludwigii* (Spreng. ex Schwägr.) Broth. — [L, P]. Un. 2(L), 3. Rybachy Peninsula, mouth of the Rostoy Stream, pebble substrate in the stream floodplain; N69.683631°, E32.199218°. Also recorded for innermost part of Bolshaya Volokovaya Bay (Rybachy Peninsula).

- P. nutans* (Hedw.) Lindb. — [L, E, B, P]. Com. 1-12. Predominantly rocky and stony habitats (cliffs, sandstone and shale outcrops, scree, boulder fields), including coastal and riverine sites, with bogs (ombrotrophic and lowland), tundra and meadow communities, occasionally on sandy terraces, pebble substrates, and disturbed ecotopes.
- P. obtusifolia* (Vill. ex Brid.) L.F. Koch — [BR, H, P]. Un. 1(BR), 3(BR), 5. Rybachy Peninsula, bay between Cape Chyorny and Cape Stolbovoy, east of the Chyornaya River, on a rocky ledge of vertical thin-layered shale, north-facing exposure; raptor perch; N69.771313°, E32.866554°. Also recorded for Vaidaguba, Zubovka bay and Tsypnavolok.
- P. prolifera* (Kindb. ex Breidl.) Lindb. ex Arnell — [B, P]. Rar. 2, 3, 5, 6(B), 8, 9. Rocky habitats (cliffs and outcrops of various exposures) and pebble substrates in stream floodplains; also on concrete surfaces.
- P. wahlenbergii* (F. Weber & D. Mohr) A.L. Andrews — [L, B, P]. Fr. 1-12. Wet riparian habitats (stream channels, springs, mossy banks, pebble substrates), including floodplain meadows and sedge bogs; moist rocky habitats (cliffs, gorges, waterfall sites) and occasionally on disturbed roadside sites.
- Polytrichum alpinum* (Hedw.) G.L. Sm. — [H, L, B, P]. Fr. 1, 2, 3, 4, 5, 6(B), 7, 8, 9, 10, 11. Rocky and stony habitats (cliffs, sandstone outcrops, scree), including moist and dry sites; snowbed meadows on slopes; river pebbles, birch krummholz, bog patches, and anthropogenic habitats.
- P. cf. altaicum* Ignatov & G.L. Merr. — [P]. Un. 9. Sredny Peninsula, 1.5 km northeast of Lake Kuyakanyarvi, low-grass meadow in a stream floodplain; N69.775544°, E31.846241°.
- **P. sexangulare* (Flörke ex Brid.) G.L. Sm. — [BR, H]. 1(H), 5 (BR), 10(H, BR). Snowbed communities. Recorded for Pummanki, Tsypnavolok, and Kervanto.
- Polytrichum commune* Hedw. — [L, B, P]. Com. 1-12. Tundra, meadow and wetland habitats (including mires, sedge-willow and hummocky types, floodplain and snowbed meadows), with dwarf-shrub and birch-willow communities, and rocky and scree habitats on slopes; occasionally on lake shores and disturbed sites.
- P. hyperboreum* R. Br. — [B, P]. Rar. 1, 5, 6(B). Heath and tundra habitats with rocky microsites, including *Vaccinium-Empetrum*-tundra, overgrown old-road sites, and sloping rock surfaces with fine soil.
- P. juniperinum* Hedw. — [H, L, P]. Fr. 1, 2, 3, 4, 5, 6, 7, 8, 9, 11. Dwarf-shrub tundra, mires (hummocky, sedge-and cotton grass-dominated), snowbed communities; rocky and scree habitats, pebble and lake shore substrates, floodplain meadows, anthropogenic disturbed sites.
- P. longisetum* Sw. ex Brid. — [P]. Rar. 2. Rybachy Peninsula, vicinity of Cape Maly Skorbeevsky, small waterlogged area, overgrowing stream channel; N69.839584°, E32.320324°.
- P. longisetum* var. *anomalous* (Milde) G.L. Sm. — [P]. Un. 2. Rybachy Peninsula, 3 km northwest of Mount Perevalnaya, source of the Skorbeevka River, tussock sedge bog; N69.817194; E32.23479.
- P. piliferum* Hedw. — [H, L, P]. Sp. 1, 2, 3, 5, 8, 9. Dwarf-shrub and lichen tundra on slopes, with active and stabilized scree (including pebble, boulder and sand substrates), rocky outcrops and streamside cliffs, occasionally with overgrowing sand dunes and anthropogenic disturbance (old roads).
- P. strictum* Menzies ex Brid. — [H, L, E, P]. Sp. 2, 3, 5, 8, 9, 10. Tundra and wetland habitats, including hummocky and blanket bogs (sedge-and cotton grass-sphagnum types), dwarf-shrub and lichen tundra, snowbed communities, and shrub communities, occasionally in coastal meadows.
- P. swartzii* Hartm. — [P]. Rar. 9, 10. Sredny Peninsula, 660 m north of an abandoned military settlement, shore of an unnamed lake, birch-willow thickets along a boggy lake margin, N69.709793, E31.778275; Sredny Peninsula, 400 m southeast of Lake Kuyakanyarvi, dried lake bottom; N69.761012°, E31.831053°.
- Pseudobryum cinclidioides* (Huebener) T.J. Kop. — [H, L, B, P]. Com. 2, 3, 4, 5, 6(B), 7, 8, 9, 10. Riparian and wetland habitats, including floodplain meadows on pebble and gravel substrates, sedge and willow mires, and alder-birch and grass-dominated wetlands; with spring-fed and streamside communities, lake shore vegetation, and rocky habitats.
- Pseudoleskeella nervosa* (Brid.) Nyholm — [H, B, P]. Rar. 2, 6(B), 8, 10(H). Rocky habitats, mainly on exposed stone surfaces (bases of outcrops, sloping faces, ledges), with occasional dead willow stems, on rocky slopes with snowbed vegetation and overgrowing scree.
- Pseudoleskeella tectorum* (Funck ex Brid.) Kindb. ex Broth. — [B, P]. Rar. 2, 6(B). Rybachy Peninsula, bay between Cape Maly Skorbeevsky and Cape Maynavolok, on a southwest-facing rocky slope with snowbed vegetation and overgrowing scree, N69.850965°, E32.407127°; Rybachy Peninsula, south-eastern coast: Cape Konev (2.5 km ENE of Cape Gorodetsky), slaty cliffs of ESE exposure. Steep (nearly 70°) slope below a seabird colony, covered with herb vegetation and exposed rock walls with moss cushions. In the lower part of the cliff.
- Psilopilum cavifolium* (Wilson) I. Hagen — [P]. Un. 3. Rybachy Peninsula, 5 km northeast of Mount Pridorozhnaya, overgrowing vehicle track; N69.71969°, E32.478433°.
- Psilopilum laevigatum* (Wahlenb.) Lindb. — [P]. Rar. 2. Moist roadside vertical bank (25 cm high); overgrowing vehicle track on a canyon slope in dwarf-shrub tundra; wet roadside with pebble and fine-earth substrates.
- Racomitrium lanuginosum* (Hedw.) Brid. — [L, P]. Com. 1-12. Tundra habitats (*Empetrum*, lichen and patterned types) on marine terraces, with dry and rocky substrates (cliffs, scree, boulder fields) and sparse pebble deposits including snowbed and *Dryas*-dominated tundra communities along temporary watercourses.
- Rhabdoweisia fugax* (Hedw.) Bruch & Schimp. — [P]. Un. 4. Rybachy Peninsula, Eina Bay, hill east of the Bolshaya Eina River, south-facing slope, cliffs; N69.627838°, E32.435901°.
- Rhizomnium andrewsianum* (Steere) T.J. Kop. — [P]. Un. 3. Rybachy Peninsula, valley of the Sredny River in its middle course, forb meadow on pebble substrate; N69.73723, E32.590386.
- R. magnifolium* (Horik.) T.J. Kop. — [L, B, P]. Sp. 2, 3, 4, 5, 6(B), 8, 9, 10. Wet and mesic habitats, including birch krummholz and willow thickets, rich fens, lowland fens (tussocky types), spring-fed moss communities, floodplain, snowbed and slope forb meadows, lake shores.
- R. pseudopunctatum* (Bruch & Schimp.) T.J. Kop. — [BR, H, L, E, B, P]. Fr. 1, 2, 3, 4, 5, 6(B), 8, 9, 10, 11. Riparian and coastal wetlands, including fens, marshes, sedge mires, willow thickets, floodplain and meadow communities, with local pebble and rocky substrates, spring-fed sites, and anthropogenic grassland.
- R. punctatum* (Hedw.) T.J. Kop. — [L, P]. Sp. 2, 8, 9, 11. Overgrowing pebble substrates, tall-herb birch krummholz, wet shale cliffs with seepage, stream channels and floodplain

- meadows, sedge-sphagnum willow thickets, and the lower parts of south-facing cliffs.
- Rhodobryum roseum* (Hedw.) Limpr. — [P]. Sp. 2, 3, 5, 10. Floodplain and tall-herb meadows, including *Deschampsia*- and *Filipendula*-dominated types, herb willow thickets, and herbaceous to large-fern birch krummholz; snowbed meadows on slopes.
- Rhytidadelphus squarrosus* (Hedw.) Warnst. — [BR, L, B, P]. Fr. 1, 2, 3, 4, 5, 6(B), 7, 8, 9, 10, 11. Coastal and floodplain habitats, including marine-terrace and floodplain meadows, dune grasslands, *Empetrum*-tundra, willow and birch krummholz, overgrowing pebble substrates, marshes, and small brackish coastal pools; also on disturbed sites, concrete, and rotten wood.
- R. subpinnatus* (Lindb.) T.J. Kop. — [BR, L, P]. Sp. 2, 5, 8, 10, 12. Birch krummholz (including *Cicerbita alpina* and grass-dominated types) and herb willow thickets, disturbed anthropogenic meadows.
- Rhytidium rugosum* (Hedw.) Austin ex C.F. Parker — [B, P]. Un. 2, 6(B). Rybachy Peninsula, Skorbeevskaya Bay, rocky massif along the eastern shore, cliffs of slate, N69.871834°, E32.250327°; Rybachy Peninsula, south-eastern coast: Cape Konev (2.5 km ENE of Cape Gorodetsky), turf-covered, grass-dominated medium-stony scree on a SES-facing slope, on soil among grasses.
- **Saelania glaucescens* (Hedw.) Broth. — [Br]. 10(BR). Recorded for Pummanki.
- Sanionia orthothecioides* (Lindb.) Loeske — [P]. Rar. 2, 5, 11. Forb meadows, isolated granite boulders, and hummocky tundra on a high floodplain.
- S. uncinata* (Hedw.) Loeske — [H, L, E, B, P]. Com. 1-12. Coastal and inland habitats, including tundra (*Empetrum*, shrub, and hummocky types), birch krummholz and willow thickets, fens and bogs, floodplain and marine-terrace meadows (from low-to tall-herb and anthropogenic types), snowbed communities, and rocky environments (cliffs, screes, shale outcrops), with widespread gravel and pebble substrates along streams and coasts, as well as disturbed sites, concrete ruins, and driftwood.
- Sarmentypnum exannulatum* (Schimp.) Hedenäs (= *Warnstorfia exannulata* (Schimp.) Loeske) — [H, L, E, B, P]. Com. 1-12. Wetland and shore habitats, including sedge and cotton-grass mires, hummocky peatlands, lake and stream margins, marshes and wet hollows, with local thermokarst ponds.
- S. procerum* (Renauld & Arnell) Hedenäs (= *Warnstorfia procerum* (Renauld & Arnell) Tuom.) — [P]. Rar. 2, 3. Hummocky bog hollows and lowland tussock fens, with drying stony-silty lake beds and pebble substrates along stream channels.
- S. sarmentosum* (Wahlenb.) Tuom. & T.J. Kop. (= *Warnstorfia sarmentosa* (Wahlenb.) Hedenäs) — [H, L, E, B, P]. Com. 1-12. A wetland and riparian habitats, including bogs and fens (hummocky, small-hummock, sedge-cotton-grass, and willow types), lakeshore and stream-margin habitats, wet hollows and temporary watercourses, with local snowbed meadows and moist rock seepage sites.
- S. trichophyllum* (Warnst.) Hedenäs (= *Warnstorfia trichophylla* (Warnst.) Tuom. & T.J. Kop.) — [L, P]. Sp. 2, 3, 8, 10. Overgrowing lake margins and drawdown zones, with slow-stream beds, stony-silty lake bottoms, sedge fens, horsetail and *Alopecurus* shore communities, and local flat-hummock bog hollows.
- S. tundrae* (Arnell) Hedenäs (= *Warnstorfia tundrae* (Arnell) Loeske) — [L, P]. Rar. 2, 4. Rybachy Peninsula, gorge between Syuvya and Lokhi lakes, small waterlogged depression, N69.85192°, E32.09885°; Rybachy Peninsula, elevated central area near the source of the Bolshaya Eina River, wet mossy meadow along the lakeshore, N69.680868°, E32.564047°.
- Schistidium agassizii* Sull. & Lesq. — [BR, H, B, P]. Sp. 2, 3, 5, 6, 9, 10(H), 11. Rocky and stony riparian habitats, including waterfall cliffs, gorges, shale and sandstone outcrops, river and streambeds, and overgrowing pebble substrates; in water.
- S. confusum* H.H. Blom — [P]. Un. 5. Rybachy Peninsula, bay between Cherny and Stolbovoy capes east of the Chernaya River, on a rocky ledge of vertical thin-layered north-facing shales, bird perch; N69.771313°, E32.866554°.
- S. crenatum* (Thér.) W.A. Weber — [P]. Un. 9. Sredny Peninsula, left tributary of the Vykat River, 1.7 km east of Lake Kuyakanyavr, overgrowing pebble substrate in the channel of a temporarily drying stream; N69.770269°, E31.869817°.
- S. dupretii* (Thér.) W.A. Weber — [P]. Rar. 2, 3, 9. Rocky habitats on shale and sandstone outcrops, including sea-washed stacks, fissures and ledges, with crowberry heath on the first marine terrace.
- S. flexipile* (Lindb. ex Broth.) G. Roth — [P]. Rar. 1, 5, 8. Lakeside and riparian rocky habitats.
- S. frigidum* H.H. Blom — [B]. Un. 6(B). Rybachy Peninsula, south-eastern coast: Cape Konev (2.5 km ENE of Cape Gorodetsky). Dry south-southeast-facing cliffs, 2-10 m high, overgrown with willows and herb vegetation, in a rock crevice. Det. T.P. Drugova.
- S. maritimum* (Sm. ex R. Scott) Bruch & Schimp. — [H, B, P]. Sp. 2, 3, 5, 9, 10 (H). Coastal rocky habitats, including cliffs, shale outcrops, ledges and screes; occasionally in the stream channel.
- S. papillosum* Culm. — [P]. Rar. 1, 2, 8. Rocky habitats, including sandstone and shale cliffs in stream and river valleys.
- S. platyphyllum* (Mitt.) Perss. — [B]. Un. 6(B). Rybachy Peninsula, south-eastern coast, 3.5 km NE of Cape Sharapov, 20 m a.s.l. Smooth sloping (5-10°) rock slabs descending in vertical ridges toward a beach of rounded medium and large boulders. On a thick (1 cm) layer of soil in a rock depression. Det. T.P. Drugova.
- S. pulchrum* H.H. Blom — [B]. Un. 6(B). Rybachy Peninsula, south-eastern coast, about 2 km NNE of Cape Sharapov, 61 m a.s.l., east-facing cliffs (with *Woodsia*), in horizontal crevices. Det. T.P. Drugova.
- S. rivulare* (Brid.) Podp. — [B, P]. Rar. 2, 5, 6(B), 8, 9. Stream-side habitats, including sandstone outcrops, stream channels, stones, mossy slopes, and overgrowing pebble bars.
- S. sordidum* I. Hagen — [P]. Un. 8. Sredny Peninsula, mouth of the Korabelny Stream, cliff of grey shaly sandstones in a gorge; N69.714453°, E32.107785°.
- S. submuticum* Zick. ex H.H. Blom — [P]. Rar. 8, 11. Sredny Peninsula, coast of Malaya Volokovaya Bay, 2.8 km WSW of Lake Paropellon, moist shaly sandstones at a waterfall, N69.685216°, E31.77013°; Sredny Peninsula, 2.5 km SSE of Lake Zemlyanoye, overgrowing pebble substrate in a stream floodplain, N69.701228°, E31.873115°.
- Sciuro-hypnum curtum* (Lindb.) Ignatov — [P]. Sp. 2, 5, 8, 9, 10, 11. Lake shores, floodplain and riparian meadows, with birch and willow krummholz, fern stands, overgrowing pebble-boulder bars, and anthropogenic grasslands, including a meadow on a seashore bar in the splash zone.
- S. dovrense* (Limpr.) Draper & Hedenäs — [P]. Un. 5. Rybachy

- Peninsula, vicinity of Cape Cherny, East-facing cliffs; N69.771697°, E32.839662°.
- S. glaciale* (Schimp.) Ignatov & Huttunen — [BR, P]. Rar. 8, 9. Sredny Peninsula, left tributary of the Vykot River flowing from Kuyakanyavr Lake, moss-dominated community along a stream bank, N69.759488°, E31.828058°; Sredny Peninsula, cliffs above the Korabelny River in its upper course, on moist rock, N69.682185°, E31.994763°.
- S. latifolium* (Kindb.) Ignatov & Huttunen — [BR, L, P]. Rar. 3, 8, 9, 11. Lakeshore and stream-valley habitats, including birch krummholz, grass-dominated and tall-herb willow thickets, and fern birch stands.
- **S. populeum* (Hedw.) Ignatov & Huttunen — [L]. 2(L). Snowbed community, on rocks. Recorded for Korovij Cape vicinity.
- S. reflexum* (Starke) Ignatov & Huttunen — [H, B, P]. Com. 1–12. Riparian, lakeshore, and coastal terrace habitats including birch and willow krummholz, fern birch stands, tall-herb and grass-forb floodplain meadows, with overgrowing pebble-boulder bars, screes, rocky outcrops, and anthropogenic grasslands, roadsides and abandoned concrete constructions.
- S. starkei* (Brid.) Ignatov & Huttunen — [L, B, P]. Rar. 2, 3, 6(B), 10, 11. A pebbly stream channel, cave walls, anthropogenic grasslands in old trenches, birch krummholz, on litter and decaying wood.
- Scorpidium cossonii* (Schimp.) Hedenäs — [BR, H, L, P]. Sp. 1(BR), 2, 3, 4, 5, 7, 8, 9, 12. Wetland and riparian habitats, including *Sphagnum* and sedge bogs/fens, floodplain and stream-side meadows, pebbly substrates and mossy stream channels, with moist rock faces, cave floors, and local coastal marsh.
- S. revolvens* (Sw.) Rubers — [H, L, E, B, P]. Fr. 1, 2, 3, 5, 6(B), 7, 8, 9, 11. Wetland and riparian habitats, including hummocky bogs, sedge fens, peatland hollows, spring-fed sites, and overgrowing pebble bars; with moist rock faces, coastal cliffs, and local lake-shore habitats.
- S. scorpioides* (Hedw.) Limpr. — [BR, H, L, P]. Sp. 1(BR), 2, 3(BR), 4, 5 (BR), 7, 9, 10, 11. Lakeshore, riverine and wetland habitats, including overgrowing lake margins and lake bottoms, pebble substrates in floodplains and streambeds, and sedge-cotton grass fens.
- Sphagnum alaskense* R.E. Andrus & Janssens — [P]. Rar. 2, 5, 10. Wetland and tundra mosaic, including birch-willow thickets along a boggy lakeshore, a drying stony-silty lake bottom, a floodplain tundra meadow, and a lowland tussock fen. Det. A.V. Shkurko.
- S. angustifolium* (Russow) C.E.O. Jensen — [E, P]. Rar. 2, 3, 8, 10. Hummocky and lowland peatlands (bogs and fens), including sedge-cotton grass mires, willow and dwarf birch (krummholz) wetland patches, and wet tundra communities.
- S. annulatum* H. Lindb. ex Warnst. — [P]. Un. 11. Sredny Peninsula, 2.7 km west of Lake Zemlyanoye, lakeshore habitat; N69.730242°, E31.775793°.
- Sphagnum aongstroemii* C. Hartm. — [P]. Un. 4. Rybachy Peninsula, left bank of the Eina River at its mouth, moist herb willow thicket; N69.636802°, E32.438128°.
- S. balticum* (Russow) C.E.O. Jensen — [E, P]. Rar. 4, 8, 10. Ombrotrophic peatlands, including dwarf shrub-lichen-*Sphagnum* bogs, hummocky bogs, sedge-cotton grass mires, and wet lakeshore birch-willow thickets.
- S. capillifolium* (Ehrh.) Hedw. — [P]. Sp. 1, 2, 3, 4, 5, 8, 9, 10. Floodplain meadows, bogs and fens (hummocky, sedge and cotton-grass types), willow thickets and birch krummholz, wet tundra and *Empetrum*-tundra, with local wet gravel path.
- S. centrale* C.E.O. Jensen — [E, P]. Rar. 2, 3, 9. Hummocky bogs, tussocky willow fens, on boulders.
- S. compactum* DC. — [E, P]. Sp. 2, 3, 4, 9, 10. Hummocky bogs and wet hollows, with *Empetrum*-horsetail tundra, marshy *Juncus filiformis*-communities, and exposed stony lake and temporary-waterbody bottoms.
- S. contortum* Schultz — [P]. Rar. 2, 5, 11. Lakeshore habitats, including shallow-water margins and sedge fens.
- S. cuspidatum* Ehrh. ex Hoffm. — [P]. Un. 2. Rybachy Peninsula, upper course of the Sredny River valley, stream bank habitat; N69.705943°, E32.521308°.
- S. denticulatum* Brid. — [P]. Un. 2. Rybachy Peninsula, upper course of the Skorbeevka River valley, wet hollow in a hummocky bog; N69.826776°, E32.238866°.
- **S. fallax* (H. Klinggr.) H. Klinggr. — [E]. Recorded for Rybachy Peninsula.
- S. fimbriatum* Wilson — [E, P]. Sp. 2, 3, 4, 9, 10. Riparian, lakeshore, and peatland habitats, including floodplain meadows at stream confluences, sedge and cotton-grass mires, ombrotrophic bogs, and willow thickets along stream banks.
- S. fuscum* (Schimp.) H. Klinggr. — [E, P]. Sp. 2, 3, 5, 7, 8, 9, 10. Ombrotrophic and oligotrophic peatlands, especially hummocky bogs with ridges and hollows, together with drying lake-shore and streamside habitats, marshy stream banks.
- S. girgensohnii* Russow — [B, P]. Rar. 2, 3, 5, 6(B) 12. Wetlands, including *Sphagnum*-willow thickets, *Nardus*-grasslands, sedge-cotton grass mires, and a temporary streams.
- S. inundatum* Russow — [P]. Un. 4. Rybachy Peninsula, marine terrace east of the Bolshaya Eina River valley, sedge-cotton grass mire; N69.63866°, E32.43859°.
- S. jensenii* H. Lindb. — [P]. Rar. 2, 4. Dry stony lake bed, cotton-grass mire, and a thermokarst tundra pond.
- S. lindbergii* Schimp. — [E, P]. Fr. 2, 3, 4, 5, 8, 9, 10. Peatland habitats, including ombrotrophic bogs, aapa mires, hummocky and flat-patterned mires, sedge-cotton-grass mires and wet hollows; with shrub tundra, floodplain meadow, and boggy lakeshores.
- S. majus* (Russow) C.E.O. Jensen — [E, P]. Rar. 2, 3. small drying lakes and overgrowing stream channels.
- **S. papillosum* Lindb. — [E]. Recoded for Rybachy Peninsula.
- S. platyphyllum* (Lindb. ex Braithw.) Sull. ex Warnst. — [P]. Sp. 2, 3, 4, 5, 8, 9, 12. Wetland and riparian habitats, including mesotrophic sedge-cotton-grass mires with willow, boggy hollows and flushes, lake shores and drying lake bottoms, and shallow streambeds.
- S. riparium* Ångstr. — [E, P]. Sp. 2, 3, 8, 10. Wetland and riparian habitats, including sedge-*Sphagnum* fens, eutrophic mires, small-hummock peatlands, willow thickets, shrubby meadow depressions, and boggy lake and stream margins.
- S. rubellum* Wilson — [P]. Rar. 1, 2, 3, 4, 10. Peatland and boggy tundra habitats, including small-hummock and tussock mires, sedge and willow fens, and boggy stream margins.
- S. russowii* Warnst. — [E, P]. Sp. 2, 3, 4, 5, 8, 9, 10, 11. Bogs and fens, sedge-cotton-grass mires, willow and dwarf-shrub thickets, *Empetrum*- and snowbed tundra community, with stream channels, boggy lake shores, and local lakeshore habitat.
- S. squarrosum* Crome — [E, B, P]. Sp. 1, 2, 3, 4, 5, 6(B), 8, 11. Riparian and floodplain habitats, including sedge-willow mires, bogs and fens, stream-side spring outflows, lakeshores,

- and mossy canyon walls; occasionally meadows disturbed by reindeer grazing.
- S. subfulvum* Sjörs — [P]. Rar. 3, 7, 11. Wet hollows in a hummocky bog, sedge fens.
- S. subnitens* Russow & Warnst. — [P]. Sp. 2, 3, 8, 9, 10. Hummocky bogs, sedge-cotton-grass and willow fens, dwarf birch bogs, and lakeshores.
- Sphagnum subsecundum* Nees — [E, P]. Rar. 2, 3, 5. Mires and riparian habitats, including hummocky bogs, sedge backwaters, pebble streambanks, a waterlogged meso-eutrophic lakeshore, and cotton-grass *Sphagnum*-brown moss hollows.
- S. talbotianum* R.E. Andrus — [P]. Un. 3. Rybachy Peninsula, the valley of the Pyayva River, in its upper reaches, a lowland hummocky mire with willow, hummocks. N69.73443°, E32.425868°. Det. A. V. Shkurko.
- S. teres* (Schimp.) Ångstr. ex C. Hartm. — [E, B, P]. Sp. 2, 3, 4, 5, 6(B), 7, 9, 11. Wetlands and riparian habitats, including sedge-, cotton grass-and hummocky mires, willow-dominated floodplains, and streamside meadows, gravel bars, and periodically inundated stream channels, seepage slopes and wet anthropogenic habitats.
- S. cf. tescorum* Flatberg — [P]. Rar. 1, 2, 3, 5, 8. Riparian and wetland habitats including floodplain meadow, stream outlets, and sedge fens, willow-dominated marshy banks, lake drawdown zones with muddy-stony bottoms.
- S. tundrae* Flatberg — [P]. Un. 2. Rybachy Peninsula, lower course of the Skorbeevskaya River, below a waterfall, gravel bar on an islet in the middle of the river channel; N69.880564°, E32.250929°.
- S. warnstorffii* Russow — [E, B, P]. Fr. 2, 3, 4, 5, 6(B), 7, 8, 10, 11, 12. Wetland, tundra, and riparian habitats, sedge-, cotton-grass-, and *Sphagnum* fens and bogs, overgrowing oxbows and stream channels, moist rocky outcrops.
- **Splachnum sphaericum* Hedw. — [BR]. 5(BR). Recorded for Tsypnavolok.
- S. vasculosum* Hedw. — [BR, B, P]. Rar. 1(BR), 3, 4, 5, 6(B). Rock habitats near a stream, hummocky bogs, sedge-*Menyanthes* fens.
- Stereodon callichrous* (Brid.) Brid. — [BR, H, L, P]. Rar. 1(BR), 2, 3, 9. Meadow habitats including floodplain grasslands, herbaceous scree meadows below cliffs, lakeshore meadows, and streamside margins.
- S. pratensis* (W.D.J. Koch ex Spruce) E. Britton — [P]. Un. 5. Rybachy Peninsula, the elevated marine terrace of the bay between Cape Cherny and Cape Stolbovoy, a willow meadow dominated by *Salix myrsinites* along the shore of a periodically flooded dried-up lake; N69.770886°, E32.834192°.
- Straminergon stramineum* (Dicks. ex Brid.) Hedenäs (= *Warnstorffia straminea* (Dicks. ex Brid.) W.R. Buck & Goffinet) — [H, L, E, B, P]. Com. 1-12. A wetland-riparian habitats, sedge and cotton-grass mires, willow thickets, floodplain and lakeshore habitats, with tundra meadows, spring-fed sites, and anthropogenic grasslands.
- Streblotrichum convolutum* (Hedw.) P. Beauv. — [P]. Rar. 2. Anthropogenic meadow habitats, including forb and clover grasslands and low-growing roadside meadow on a marine terrace.
- Symblepharis cf. sinensis* Müll. Hal. — [P]. Sp. 1, 2, 3, 5, 7. Bogs and wet hollows, stream-channel and floodplain habitats, snowbed grasslands, and dry rocky cliffs.
- Syntrichia leptotricha* (Müll. Hal. & Kindb.) W.A. Kramer — [P]. Un. 9. Sredny Peninsula, vicinity of the 'Two Brothers' rock outcrops (Kiiperi-Ukko and Kiiperi-Akka). *Poa*-dominated meadow on a marine terrace; N69.821424°, E31.758471°.
- S. norvegica* F. Weber — [H, P]. Rar. 1, 2, 9. Coastal meadow on anthropogenic relief, pillbox roof, and dry cliffs.
- S. ruralis* (Hedw.) F. Weber & D. Mohr — [BR, B, P]. Sp. 1, 6(B), 10. Mainly coastal cliff and scree habitats on steep seabird-influenced slopes, including rock ledges, exposed rock walls, and grass-covered stony slopes; with local anthropogenic habitats such as floodplain meadows, roof of a pillbox.
- Tayloria lingulata* (Dicks.) Lindb. — [BR, H, P]. Sp. 1(BR), 2, 3, 4, 5, 8, 11. Coastal and riparian habitats, including sandstone and shale cliffs (dry to wet), lake margins, and a range of coastal and slope peatlands (sedge-cotton grass mires, wet hollows).
- **T. tenuis* (Dicks.) Schimp. — [L]. 3(L). Rocky habitats in s dwarf-shrub tundra. Recorded for the vicinity of Mount Peremetnaya.
- Tetraphis pellucida* Hedw. — [P]. Rar. 2, 3. Rybachy Peninsula, shore of a lake with an island in the Zapadnaya Mayka River basin, Earthen wall of a hummock at the edge of a bog, N69.803336°, E32.351953°; Rybachy Peninsula, 5.5 km north of Mount. Pridorozhnaya, near a three-road junction, hummocky bog (hummocks), N69.732490°, E32.436719°.
- Tetraplodon angustatus* (Hedw.) Bruch & Schimp. — [BR, B, P]. Rar. 2, 5, 6(B). Coastal rocky habitats, including unstable bird-cliff scree, crowberry-juniper heath on a stream terrace, and overgrowing boulder fields, on animal remains.
- T. mnioides* (Hedw.) Bruch & Schimp. — [H, L, B, P]. Sp. 2, 3, 5, 6(B), 8, 11. Rocky and tundra habitats, including screes and stony tundra on shaly rocks, hummocky bog hollows, and crowberry heath on marine terraces, with zoogenic sites (burrows, nests) and anthropogenic habitats (roadsides), on soil; on animal remains.
- **Timmia austriaca* Hedw. — [BR]. 10(BR). Recorded for Pum-manki.
- Tomentypnum nitens* (Hedw.) Loeske — [H, L, E, P]. Sp. 1, 2, 3, 4, 5, 7, 8. Wetland and meadow habitats, including sedge fens and sedge-*Menyanthes* mires with willow, mesotrophic mires margins, willow thickets (including *Sphagnum* types), floodplain and periodically flooded meadows, and tall-herb birch krummholz on marine terraces.
- Tortella alpicola* Dixon — [P]. Rar. 5. Rocky habitats, including shale cliffs and fine screes.
- T. fragilis* (Drumm.) Limpr. — [BR, B, P]. Rar. 1, 5, 6(B), 9. *Dryas*-dominated tundra and snowbed herb communities on marine terraces, with coastal cliff habitats.
- T. nitida* var. *fragilifolia* (Jur.) Köckinger & Hedenäs — [P]. Rar. 2. Rybachy Peninsula, bay between Cape Maly Skorbeevsky and Cape Bolshoy Skorbeevsky, at the mouth of a stream, north-facing cliffs, N69.870575°, E32.356326°; Rybachy Peninsula, upper course of the Zapadnaya Mayka River valley, cliffs along a stream flowing into a lake with an island, on blocky sandstone (east-facing), N69.810821°, E32.356791°.
- T. tortuosa* (Hedw.) Limpr. [BR, L, B, P]. Sp. 1, 2, 4, 5, 6(B), 11. Rocky riparian, lake-shore and coastal habitats (sandstone and shale cliffs, wet rocks, grottoes, caves, snowbed sites), with temporary stream channels (gravel and dry beds) and alpine meadow patches on slopes, occasionally on anthropogenic substrates (concrete ruins).
- Tortula hoppeana* (Schultz) Ochyra — [BR, L, B, P]. Rar. 5, 6(B). Rocky coastal habitats, including shale outcrops, moist

moderately lit rock grottoes, and bird-influenced cliff communities.

T. mucronifolia Schwägr. — [P]. Un. 1. Rybachy Peninsula, Vaida Bay, stone wall of a pillbox; N69.927456°, E32.002928°.

Trichodon cylindricus (Hedw.) Schimp. — [P]. Un. 2. Rybachy Peninsula, bay between Cape Maly Skorbeevsky and Cape Bolshoy Skorbeevsky, at a stream mouth, east-facing cliffs on a high marine terrace; N69.868114°, E32.355679°.

Warnstorfia fluitans (Hedw.) Loeske — [H, L, E, P]. Sp. 2, 4, 5, 9, 10, 11. Ombrotrophic and oligotrophic peatlands (including hummocky and small-hummock bogs), with sedge mires, lakeshores, and streamside willow thickets.

W. pseudostraminea (Müll. Hal.) Tuom. & T.J. Kop. — [P]. Sp. 2, 3. A peatland and riparian habitats, including hummocky bogs, sedge and cotton-grass fens, lowland willow bogs, mesotrophic and eutrophic fens, and boggy stream banks with silty substrates.

DUBIOUS RECORDS

Dicranoweisia cirrata (Hedw.) Lindb. ex Milde — [BR]. 10(BR). On soil among litter in moist willow thickets and birch krummholz, on coastal cliffs. Recorded for Pummanki, also recorded for Iso-Heinäsaari (Bolshoj Ajnov Island) by Häyren (1955). In Russia, this species is known from the Black Sea coastal area in the Caucasus and Crimea and from Kaliningrad Province, where it grows on trunks and rotten logs of *Juniperus*, *Cupressus* and some other trees, rarely also on rocks. In Scandinavia, it occurs in western and southern regions and grows on acidic rocky substrates. Its presence on Rybachy Peninsula is unlikely, but cannot be totally excluded.

Grimmia ovalis (Hedw.) Lindb. — [H]. 1(H). Coastal cliffs, snowbed habitats. Recorded for Kervanto, as a form with short seta. In the first half of 20th century the differences between *G. ovalis* and *G. affinis* Hornsch. (*G. longirostris*) were poorly understood. The occurrence of xerophytic *G. ovalis* in Murmansk Province in aforementioned habitats is unlikely; this record probably belongs to *G. longirostris*.

Meesia uliginosa Hedw. — [L, E]. Probably an erroneous record that should be referred to *M. minor*.

Plagiothecium succulentum (Wilson) Lindb. — Recorded for Rybachy Peninsula by Schljakov & Konstantinova (1982). The authors may have reported the species due to its similarity to a poorly developed form of *Plagiothecium cavifolium*.

Plagiothecium sylvaticum (Brid.) Schimp. — [BR]. 10 (Brotherus). Recorded for Pummanki. This name is currently applied to *P. platyphyllum* Mönk., which presence in Russia was not confirmed (Ignatov *et al.*, 2020). In the beginning of 20th century this name could be used for other species of *Plagiothecium*, so the identity of this record remains uncertain.

EXCLUDED SPECIES

Didymodon insulanus (De Not.) M.O. Hill. (= *Vinealobryum insulanum* (De Not.) R.H.Zander) — [L]. Recorded for Eina bay by Likhachev (1986); however, the voucher specimen is absent in KPABG.

Ditrichum lineare (Sw.) Lindb. — 1(L). On humus-rich soil at the site of a former campfire near a stream bank. Recorded by Likhachev (1986). According to Fedosov *et al.* (2025), this species occurs in Europe only in UK, this record may be based on species recently treated as *D. pusillum*.

Polytrichastrum fragile (Bryhn) Schljakov — Incorrectly cited by Likhachev (1986) with reference to Brotherus (1923).

DISCUSSION

Presented flora of the Rybachy and Sredny peninsulas includes 327 species. This large number probably reflects a long history of the bryofloristic exploration of the area and wide diversity of microhabitats. Although among saxicolous species acidophiles dominate, which is generally typical for Murmansk Province, basic rock outcrops support populations of many calciphylous species (*Cyrtomnium hymenophylloides*, *Distichium* spp., *Drepanium fastigiatum*, *Encalypta ciliata*, *Gymnostomum aeruginosum*, *Hymenostylium recurvirostrum*, *Myurella* spp., etc.), including rare in Murmansk Province *Blindiadelphus diversifolius* and *Didymodon perobtus*. Several small species of mosses typical for basic rock outcrops and bare ground along seashore (*Aloina brevirostris*, *Encalypta* spp., *Hennediella heimii*, *Pohlia atropurpurea*, *Stegonia latifolia*, *Tortula cernua*, etc.) could be expected there, but no occurrences were documented for them. They probably could have been omitted in the course of collecting, but even less conspicuous *Blindiadelphus diversifolius* was found. In general, these species are very rare on the Barents Sea shore of Murmansk Province. So, probably there are several natural reasons limiting distribution of these species in this area. Several widespread basiphylous species occur nearby in Waranger Peninsula: *Abietinella abietina*, *Encalypta alpina*, *E. procera*, *E. rhaptocarpa*, *E. streptocarpa*, *Stegonia latifolia*, *Tortula leucostoma*, etc., which may reflect wider distribution of basic or even calcareous rocks westward.

Four species are newly reported for the province: *Calcidicranella obtusifolia*, *Meesia hexasticha*, *Sphagnum talbotianum* and *S. alaskense*. *Calcidicranella obtusifolia* was recently resurrected at species level (Fedosov *et al.*, 2023); and its distribution remains insufficiently known. Along with Svalbard, where from the species was described, in Europe it was known only from Nenets Autonomous Okrug. This northern species is largely associated with the coastal areas of Arctic seas, so further records are expectable from the Barents Sea coast of Murmansk Province. *Meesia hexasticha* is not rare in Scandinavian highlands, while both species of *Sphagnum* were described rather recently and are known in Europe from just a few records. *Sphagnum talbotianum* has not been previously separated from *S. rubellum* and *S. warnstorfii*. It was recently found to be widespread in Asian permafrost areas; in Europe, it was reported from the Nenets Autonomous District (Shkurko *et al.*, 2023) and from Svalbard (Flatberg *et al.*, 2025). *Sphagnum alaskense* is very similar to *S. divinum* and *S. centrale*, and its distinction is often tricky. Since its description, it was believed to have an amphipacific distribution, although recently some northern records of these species appeared reaching the Nenets Autonomous District (Kotkova *et al.*, 2025). The locality in Rybachy Peninsula is the second one from Europe, but it is very likely that the

species is actually not rare along the Barents Sea coast of Murmansk Province; it could be not recognized earlier due to similarity with two other species widely distributed in European Russia.

Phytogeographic position of the Barents Sea coast area within Murmansk Province remains disputable (see the Study area section). Aleksandrova (1977) referred Barents Sea shore of Murmansk Province to tundra zone, although birch krummholz are also widely distributed here. The recent Circumpolar Arctic Vegetation Map (Raynolds *et al.*, 2019) do not include Barents Sea coast within Murmansk Province, i.e. do not consider it within Arctic. In the moss flora of the area several typical arctic species occur, e.g. *Aplodon wormskjoldii*, *Psilopilum* spp., *Splachnum vasculosum*, and *S. sphaericum*. Many other “northern” species (*Hamatocaulis vernicosus*, *Catoscopium nigrum*, *Cinclidium* spp., *Drepanocladus* spp., *Meesia* spp., *Scorpidium* spp. etc.), mostly occurring in base-rich boggy environments in the Arctic, Hypoarctic, rich fens in boreal zone and also in alpine belt in mountains, are common in Rybachy Peninsula. At the same time, widespread and common in Arctic and Hypoarctic species *Aulacomnium turgidum* and *Rhytidium rugosum* are known from the area by single or few records, while *Abietinella abietina* and *Thuidium* spp. were not collected at all.

“Northern” species are accompanied in the studied area by several thermophilous taxa, such as *Cirriphylum piliferum*, *Plagiomnium affine*, *P. curvatulum*, *Plagiothecium rossicum*, and *Sciuro-hypnum curtum*, mostly occurring in hemiboreal forests and decreasing northward. Their presence in the NW extremity of Murmansk Province is probably supported by Gulf Stream impact. Additionally, this impact allows several oceanic species to occur here, such as *Diobelonella palustris*, *Ditrichum pusillum*, *Grimmia atrata*, *Fontinalis hypnoides*, *Herzogiella striatella*, *Heterocladia dimorpha*, *Lewinskya pylaisii*, *Platyhypnum smithii*, *Plenogemma phyllantha*, and *Schistidium confusum*. Most of these species are very rare or are known only from historical collections; for instance, for *Plenogemma phyllantha* Häyren’ (1955) record is a single known record in European Russia. This shows that many oceanic species face here a limit of their distribution eastward.

Such a peculiar combination of Arctic, thermophilous hemiboreal and oceanic species was earlier recognized as a characteristic feature of the moss flora of a remote but very similar environmentally oceanic bryophyte flora of Bering Island (Fedosov *et al.*, 2012). Curiously, several species represent “Eastern” element; *Calcidicranella obtusifolia*, *Sphagnum alaskense* and *S. talbotianum* apparently reach Rybachy Peninsula on the western limit of their known distribution in Eurasia, but further studies are needed to evaluate their true distributions.

Fourteen species recorded on the Rybachy and Sredny Peninsulas are included in the regional Red Data Book

(Borovichev *et al.*, 2025): *Blindiadelphus diversifolius*, *Buckia vaucheri*, *Cnestrum glaucescens*, *Gymnostomum aeruginosum*, *Hamatocaulis vernicosus*, *Leskea polycarpa* (known only from historical records), *Lescurea patens*, *Meesia longiseta*, *Platyhypnum cochleariifolium*, *Rhabdoweisia fugax*, *Sciuro-hypnum dovrense*, *Sphagnum subnitens*, *Tortula mucronifolia*, and *Trichodon cylindricus*.

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