

The lichens and allied fungi of the southern part of the Kenozersky National Park (Arkhangelsk Region, NW Russia)

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Abstract: The paper presents the first data on lichen diversity in the Kenozersky National Park (Arkhangelsk Region, Northwest Russia). As a result of the study, 263 species and 1 subspecies of lichens and allied fungi were found in the southern part of the national park. Seventeen lichen species are reported for the first time for Arkhangelsk Region. *Biatora albidula* is a new species for Northwest European Russia. Two recorded species are included in the Red Data Book of Russian Federation and 7 in the Red Data Book of Arkhangelsk Region. *Pycnothelia papillaria* can be recommended for inclusion to the Red Data Book of Arkhangelsk Region.

Keywords: middle boreal subzone, new records, protected area, taiga forests

INTRODUCTION

Currently, in the context of significant environmental transformation, the role of specially protected natural areas in the conservation and maintenance of the main types of natural landscapes, communities and biodiversity is becoming more and more important (Gray et al., 2016; Berteaux et al., 2018). Lichens are an integral component of boreal ecosystems known to be highly sensitive to habitat conditions (Nash, 2008). Lichenological studies of protected areas are traditionally of great interest due to the high preservation status of natural communities and their significant role in maintaining biodiversity and conservation of rare and protected species (Dymytrova et al., 2014). Lichen diversity can serve as an effective indicator for biomonitoring in natural ecosystems (Khastini et al., 2019). It is also used for assessing the scale of dynamic processes associated with both global and regional factors (McMullin et al., 2016; Brzezicki, 2017), forecasting the state of ecosystems and developing effective measures for their conservation (Waser et al., 2007; Zhang et al., 2016).

The Kenozersky National Park (KNP) was established in 1991 with the purpose to conserve the natural, historical, and cultural heritage of the Russian North. It is located in Kargopolsky and Plesetsky districts of Arkhangelsk Region near the south-eastern border of the Republic

of Karelia. The territory of the park has a long history of human use in the past and therefore differs from other protected areas in Northwest Russia by its high recreational attractiveness and the presence of vast anthropogenic landscapes formed over many centuries. There are a lot of monuments of wooden architecture. In 2004, the park was recognized by UNESCO as a biosphere reserve included in the World Network of Biosphere Reserves.

Lichen diversity of Arkhangelsk Region is still poorly studied compared to other regions of Russia (Tarasova et al., 2015, 2016). Similarly, the lichen biota of KNP is not properly studied. The aim of this study is to take an inventory of lichen diversity in the southern part of the Kenozersky National Park (Arkhangelsk Region, NW Russia).

MATERIALS AND METHODS

The study area is located in the south-western part of Arkhangelsk Region in the south of the Kenozersky National Park (Fig. 1). The total area of the park is 139.7 thousand hectares. Its territory extends from 61°40' to 62°10'N and from 37°50'–38°00' to 38°10'–38°30'E. The climate of the region is moderately continental. The average annual air temperature is 1.5°C in the south and 1.3°C in the north of the national park. The average annual precipitation is 597

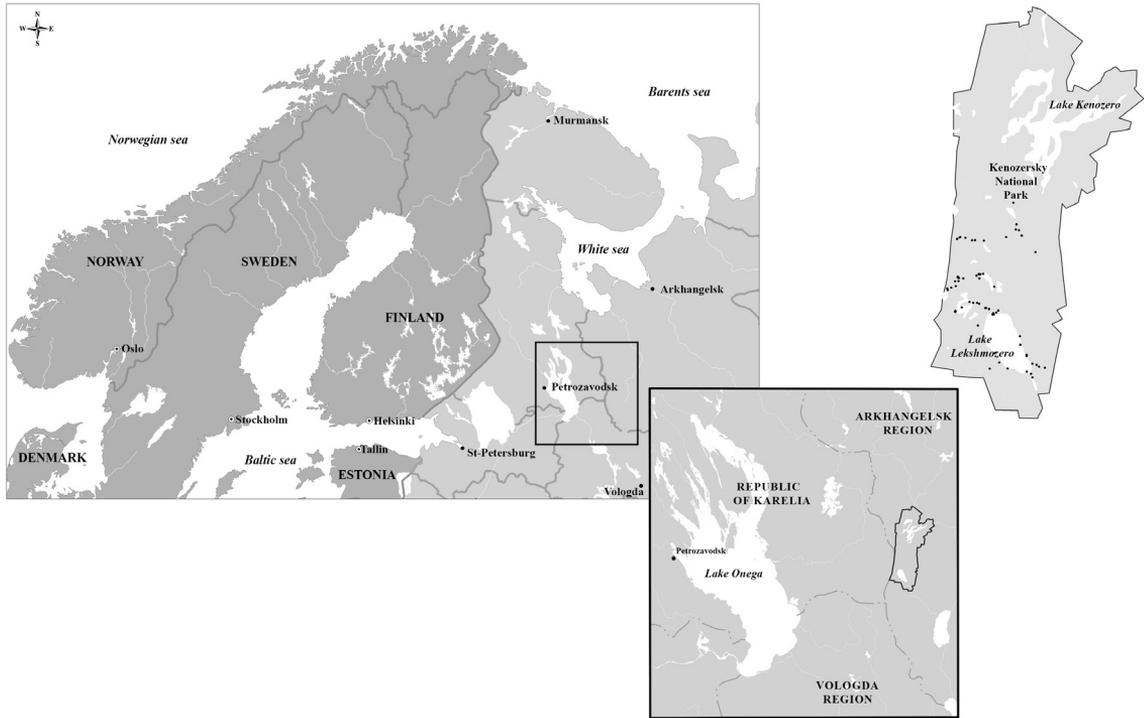


Fig. 1. The location of the study area (the Kenozersky National Park, Arkhangelsk Region, North-west Russia). Black points indicate the sampling sites.

and 564 mm, respectively. The growing season lasts for about 130 days. Frost-free period is 108 days. A stable snow cover lasts for 160 days (Razumovskaja et al., 2012).

The territory of the national park is characterized by high natural heterogeneity. Two important natural boundaries run along it: between the Baltic Shield and the East European Platform (from southwest to northeast), and the watershed between the basins of the Atlantic and Arctic oceans (from north to south; Kulikova et al., 2012). The so-called “Maselga Point” from the southern part of park is particularly unique, cause it is located in a place of intersection of two boundaries: the Atlantic-Arctic watershed and the water line between Fennoscandia and the Russian Plain (Kulikov et al., 2015).

The area of the national park stands out against the background of the plain environment with a complex geological structure and various forms of relief. The marginal part of the Baltic Shield, composed of Paleo- and Mesoarchean gneisses

and granitoids, runs along the northern and northwestern sides of the national park. The south, east, and northeast of the national park are located within the East European Platform, in the area of Vendian and Paleozoic sedimentary rocks (limestones and dolomites; Kulikova et al., 2012; Razumovskaja et al., 2012). Crystalline rocks come to the surface in the form of eskers or are covered by a cover of quaternary deposits of the Valdai glaciation. The height differences rarely exceed 200 m; the average height above sea level is 100–120 m (Kalutskov, 2017; Kulikova & Kulikov, 2017). There are two large lakes in the Kenozersky National Park: Lake Lekshmozero in the south of the park and Lake Kenozero in the north (Razumovskaja et al., 2012). Podzolic soils, common for the middle taiga, occupy about 75% of the national park area. Boggy soils of various types spread on the rest 25% of the area (Kalutskov, 2017).

The vegetation in the Kenozersky National Park is typical for the middle taiga subzone. Forest

cover 76% of the park territory (Torkhov, 2012). Herb-rich spruce forests and their derivatives such as birch and aspen forests dominate. Sphagnum raised and transitional bogs, as well as lowland bogs fed by springs are common. The Kenozero part of the park is characterized by the predominance of bilberry pine and spruce forests, as well as lingonberry pine forests. Herb-rich pine forests, spruce and aspen forests are confined to the steep slopes of moraine ridges, herb-rich spruce and aspen forests are located at their foot. Coastal vegetation is diverse along the shores of water bodies, and aquatic vegetation in shallow waters (Razumovskaja, 2018).

The vegetation of the park has been largely influenced by human activities in the past. The beginning of agricultural practices in the Kenozero region dates back to the 10th century. From that time until the middle of the 20th century the territory was densely, and most of the land presently covered by forests was used for agriculture (Razumovskaja et al., 2012). To a large extent, the forests of the national park are standing on previously burned areas resulted from slash-and-burn activities. It is evidenced by the pyrogenic origin of almost half of the forests. Thus, forests covering area of 49 thousand hectares are 80 to 100 years old. Intact forests older than 160 years occupy an area of only about 5.8 thousand hectares and have been preserved as fragments in low-lying wetlands unsuitable for agricultural activities (Torkhov, 2012). These forests are paludified spruce and pine forests with trees of age between 160 and 350 years (Byzova, 2016).

The field work was carried out by authors during 3 expeditions: in July 2011 (by V. Tarasova), in May 2018 (by A. Valekzhanin) and in August 2018 (by A. Pchelkin). Specimens were collected in the Kargopol sector of the national park in natural forest communities of different types and anthropogenic landscapes (Fig. 2).

The lichen diversity was studied on linear routes, which were developed based on forest plantation maps and satellite images to cover as many diverse habitat types as possible. To estimate the lichen species richness, various types of substrates were examined including trunks and branches of trees, shrubs, deadwood, mosses, soil and primitive soil covering the surface of the stones, rotting wood and stumps, dead trees,

boulders and also anthropogenic formations (buildings).

The collected material, a total of ~1230 lichen specimens, was identified using a standard microscopic technique and spot tests. The 22 specimens of the genus *Cladonia* and sterile crustose specimens were identified by a standard technique of thin-layer chromatography (TLC) in the Laboratory of Experimental Botany of Petrozavodsk State University (Petrozavodsk) using solvent systems A, B and C (Orange et al., 2001).

The cited specimens are deposited in the herbaria of Petrozavodsk State University (PZV), Institute of Geography RAS (IGRAS), Institute of Global Climate and Ecology (IGCE) and in the Kenozersky National Park.

RESULTS AND DISCUSSION

The 263 species and 1 subspecies of lichens and allied fungi (including 4 lichenicolous fungi and 3 non-lichenized fungi) belonging to 48 families and 101 genera were found in the southern part of the Kenozersky National Park. Crustose species were dominant (152 species), contributing to 59% to the total number of lichens. 53 fruticose (21%) and 51 foliose (20%) species were recorded.

Notes on new, rare or Red Data Book species

Among the recorded species 17 lichens are reported for Arkhangelsk Region for the first time: *Absconditella lignicola*, *Arthonia apatetica*, *Biatora albidula*, *Biatora chrysantha*, *B. meiocarpa*, *Calicium tigillare*, *Candelariella lutella*, *Chaenotheca chlorella*, *Felipes leucopellaeus*, *Lecanora umbrina*, *Melanohalea exasperata*, *Peltigera hymenina*, *Phaeophyscia nigricans*, *P. orbicularis*, *Placynthiella dasaea*, *Pycnothelia papillaria*, and *Xylopsora caradocensis*. *Biatora albidula* is a new species for Northwest European Russia. Four species (*Candelariella aurella*, *Megaspora verrucosa*, *Myriolecis crenulata*, *M. dispersa*) have been recorded earlier only from Arctic islands of Arkhangelsk Region.

Lobaria pulmonaria and *Bryoria fremontii* are included in the Red Data Book of Russian Federation. Seven recorded species (*Acolium karelicum*, *Bryoria fremontii*, *Chaenotheca brachypoda*, *C. phaeocephala*, *Evernia divaricata*, *Lobaria*

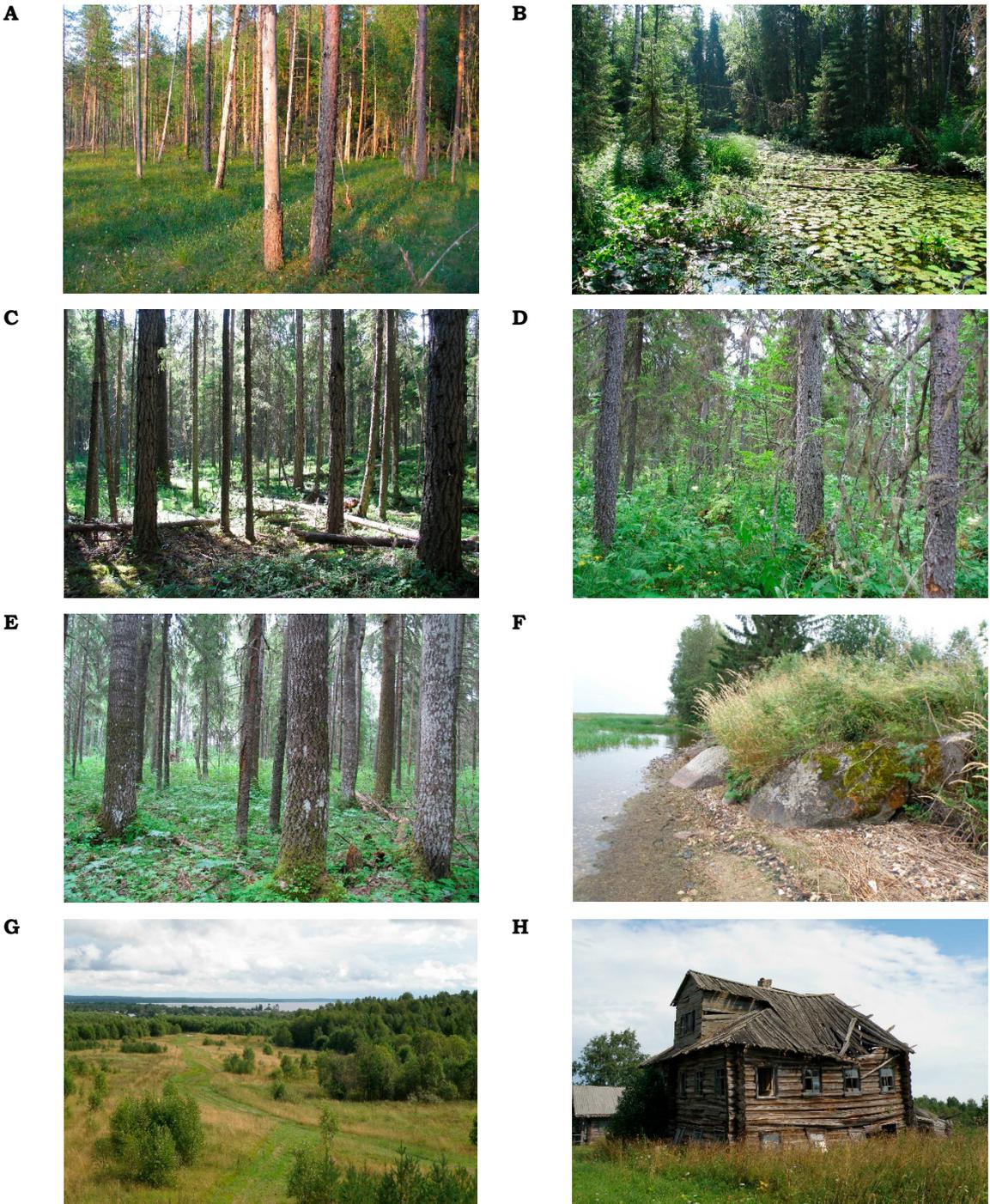


Fig. 2. Studied habitats: a – paludified peatmoss pine forest (locality № 5); b – paludified floodplain herb-rich spruce forest (locality № 7); c – bilberry feathermoss larch-spruce-pine forest (locality № 16); d – paludified herb-rich spruce forest (locality № 20); e – herb-rich aspen forest (locality № 22); f – individual boulders (locality № 25); g – the road along the route “Ancestral Trail” (locality № 35); h – roof of an abandoned house in Ivshinskaya village (locality № 47).

pulmonaria, *Pseudevernia furfuracea*) are included in the Red Data Book of Arkhangelsk Region (2020). Four species (*Acolium inquinans*, *Chaenotheca stemonea*, *Hypogymnia vittata*, *Rostania occultata*) are included in the list of taxa of Arkhangelsk Region that need special attention to their status in the natural environment and are recommended for biological monitoring (The Red Data Book of Arkhangelsk Region, 2020). *Pycnothelia papillaria* can be recommended for inclusion in the Red Data Book of Arkhangelsk Region. This species gravitates towards oceanic and suboceanic regions, is objectively rare in northwestern Russia, and is included in the Red Data Books of Leningrad Region (2000) and the Republic of Karelia (2020).

Lichen substrates and habitats in study sites

The substrate preferences analysis of lichens from studied communities revealed the predominance of the epiphytic group (corticolous and lignicolous) (185 species, 71%). Among the studied phorophytes, the richest lichen diversity (93 species, 36% of the lichen flora) was observed on the aspen trees. On the trunks and branches of spruce 68 species (26%) were found, on pine – 63 species (24%), on willow – 61 species (24%), on birch – 55 species (21%), on larch – 47 species (18%), on alder – 38 species (15%), on bird-cherry tree – 35 species (14%), on rowan – 34 species (13%), on juniper – 16 species (6%). On treated wood of buildings were presented 60 species, on dead wood – 41 species.

Terricolous lichens are the second dominant group (33 species, 13%). The saxicolous lichens are represented by the smallest number of species (30 species, 12%), but characterized by high substrate specificity (25 species were found on stones only). The largest number of lichen species was found on granite stones (23 species), and they were different from lichens found on the concrete walls (11 species). For example, species of the genera *Rhizocarpon*, *Porpidia*, *Tephromela* were found only on granite stones, while species *Calogaya decipiens*, *Myriolecis crenulata*, *M. dispersa* were observed on concrete walls. The *Protoparmeliopsis muralis* was found on limestone. Several species (17, 7%) were relatively nonspecific for substrates.

It should be noted that the identified species diversity of lichens and allied fungi for the Kenozersky National Park is still incomplete. For

example, neighboring protected areas host significantly more species, than presently recorded for the territory of the Kenozersky National Park (Appendix 1). Further research of lichen diversity in the Kenozersky National Park is required, including its northern part, as well as earlier collections should be revised.

LIST OF SPECIES

Taxa are arranged in alphabetical order; nomenclature of lichens, lichenicolous and non-lichenized fungi follows Nordin et al. (2011). For each species the localities, habitat types and substrates are listed. Lichen substances are given for TLC-analyzed specimens.

Abbreviations and symbols: # – lichenicolous fungi; + – non-lichenized fungi; ! – new species for mainland area of Arkhangelsk Region; !! – new species for Arkhangelsk Region (including arctic islands); RR – species included in the Red Data Book of Russian Federation (2008); RA – species included in the Red Data Book of Arkhangelsk Region (2020); RA(bs) – species included in the list of taxa of Arkhangelsk Region that need special attention to their state in the natural environment and are recommended for biological surveillance. Localities for species are marked by the numbers of sampling plots (1–68) according to Appendix 2.

!! ABSCONDITELLA LIGNICOLA Vězda & Pišut – 45: on standing dead birch wood (*Betula pendula* Roth.). This is a common boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).

ACAROSPORA MOENIUM (Vain.) Räsänen – 35: on concrete wall; 36: on stone.

ACOLIUM INQUINANS (Sm.) A. Massal. – 20: on snag of spruce (*Picea* sp.). RA(bs).

ACOLIUM KARELICUM (Vain.) M. Prieto & Wedin – 7: on snags and trunk of spruce. RA.

ALECTORIA SARMENTOSA (Ach.) Ach. – 3, 39: on snags of spruce.

ALYXORIA VARIA (Pers.) Ertz & Tehler – 4: on dead aspen bark (*Populus tremula* L.).

AMANDINEA PUNCTATA (Hoffm.) Coppins & Scheid. – 13: on birch bark; 45: on aspen and birch bark.

!! ARTHONIA APATETICA (A. Massal.) Th. Fr. – 61: on wood of standing dead spruce. This is a common boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).

ARTHONIA DISPUNCTA Nyl. – 66: on bark of willow (*Salix* spp.).

ARTHONIA MEDIELLA Nyl. – 45: on bark of birch.

ARTHONIA RADIATA (Pers.) Ach. – 49: on bark of aspen and old bird-cherry tree (*Padus avium* Mill.).

ASPICILLA CINEREA (L.) Körb. – 25, 35, 56: on stone.

ATHALLIA HOLOCARPA (Hoffm.) Arup et al. – 26: on concrete wall.

ATHALLIA PYRACEA (Ach.) Arup et al. – 24, 54: on bark of aspen.

BAEOMYCES RUFUS (Huds.) Rebert. – 30: on sandy soil.

!! BIATORA ALBIDULA Willey in Tuck. – 14: on bark of aspen. This species was previously known in Russia only from Republic of Altai, Chelyabinsk Region, Khabarovsk Territory, Trans-Baikal Territory (Palice et al., 2013), and Kostroma Region (Urbanavichus, 2019). Here it is reported first time for Northwest European part of Russia. So far it was reported from Germany, Norway, Sweden, and USA (Palice et al., 2013). Conf. D. Himelbrant.

BIATORA ALBOHYALINA (Nyl.) Bagl. & Carestia – 28: on bark of aspen.

!! BIATORA CHRYSANTHA (Zahlbr.) Printzen – 8: on bark of standing dead alder (*Alnus incana* (L.) Moench). This is a common boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), the Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).

BIATORA EFFLORESCENS (Hedl.) Räsänen – 8: on bark of standing dead alder; 20: on bark of willow; 29: on bark of rowan (*Sorbus aucuparia* L.).

BIATORA GLOBULOSA (Flörke) Fr. – 29: on bark of rowan.

BIATORA HELVOLA Körb. ex Hellb. – 5, 64: on bark of pine (*Pinus sylvestris* L.); 20: on bark of willow; 22, 24, 41: on bark of spruce and birch; 53: on bark of juniper (*Juniperus communis* L.).

!! BIATORA MEIOCARPA (Nyl.) Arnold – 24: on bark of birch. This is a common boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).

BIATORA OCELLIFORMIS (Nyl.) Arnold – 8, 49: on bark of standing dead alder; 20, 64: on bark of willow; 29: on bark of birch; 54: on bark of pine; 49, 52: on bark of bird-cherry tree.

BIATORA PALLENS (Kullh.) Printzen – 8: on bark of standing dead alder.

BIATORA VERNALIS (L.) Fr. – 28: on moss growing on bark of aspen.

BILIMBIA MICROCARPA (Th. Fr.) Th. Fr. – 4: on bark of standing dead aspen.

BILIMBIA SABULETORUM (Schreb.) Arnold – 49, 61: on bark of aspen.

BRYORIA FREMONTII (Tuck.) Brodo & D. Hawksw. – 5: on bark of pine; 44: on branches of spruce. RR, RA.

BRYORIA FURCELLATA (Fr.) Brodo & D. Hawksw. – 1, 3–14, 16, 19–24, 27–29, 32–34, 37–44, 49, 51: on branches and trunks of spruce, pine and birch.

BRYORIA FUSCESCENS (Gyeln.) Brodo & D. Hawksw. – 1, 3–16, 19–24, 27–29, 32–34, 37–44, 50–51, 60, 62: on branches and trunks of deciduous and coniferous trees.

BRYORIA NADVORNIKIANA (Gueln.) Brodo & D. Hawksw. – 3, 7, 10, 20, 54: on branches of spruce; 44: on branches of birch; 57: on decaying aspen; 60: on bark of larch (*Larix sibirica* Ledeb); 51, 53: on bark of pine.

BUELLIA DISCIFORMIS (Fr.) Mudd – 15, 49, 56, 67: on bark of willow, alder, bird cherry tree and on wood.

BUELLIA ERUBESCENS Arnold – 20, 64: on bark of willow; 29: on bark of rowan; 49: on decaying wood.

BUELLIA GRISEOVIRENS (Turner & Borrer ex Sm.) Almb. – 53: on bark of old bird cherry tree.

CALICIUM ADSPERSUM Pers. – 20: on bark of spruce.

CALICIUM DENIGRATUM (Vain.) Tibell – 15, 51: on treated wood.

CALICIUM GLAUCELLUM Ach. – 2: on treated wood; 61: on wood of old pine.

CALICIUM PARVUM Tibell – 51: on wood of old pine.

!! *CALICIUM TIGILLARE* (Ach.) Pers. – 44: on wood of old standing dead spruce. Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008). Species included in the Red Data Book of the Republic of Karelia (2020).

CALICIUM TRABINELLUM (Ach.) Ach. – 2, 13, 15, 51, 53: on treated wood.

CALICIUM VIRIDE Pers. – 1, 50: on bark of spruce; 15: on treated wood; 16: on bark of larch.

!! *CALOGAYA DECIPIENS* (Arnold) Arup et al. – 26: on concrete wall. This species reported from most regions of Russia (Urbanavichus, 2010). Previously known in Arkhangelsk Region without exact location (Handbook..., 2004). Species included in the Red Data Book of the Republic of Karelia (2020).

CALOPLACA CERINA (Hedw.) Th. Fr. – 24: on bark of aspen; 49: on bark of bird-cherry tree; 56: on bark of willow.

! *CANDELARIELLA AURELLA* (Hoffm.) Zahlbr. – 26: on concrete wall; 66: on bark of willow. This is a common boreal species reported from most regions of Russia (Urbanavichus, 2010). Previously known in Arkhangelsk Region only from its Arctic part (Deichmann-Branth, 1885; Heuglin, 1874).

!! *CANDELARIELLA LUTELLA* (Vain.) Räsänen – 24: on branches of aspen. This is a common boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).

CANDELARIELLA VITELLINA (Hoffm.) Müll. Arg. – 15: on treated wood; 24, 35, 46: on stones, treated wood and bark of aspen.

CANDELARIELLA XANTHOSTIGMA (Ach.) Lettau – 13: on bark of birch; 18: on roofing paper.

CATINARIA ATROPURPUREA (Schaer.) Vězda & Poelt – 3: on branches of spruce; 57: on bark of fallen dead aspen.

CETRARIA ISLANDICA (L.) Ach. – 30–32, 55: on soil.

CETRARIA SEPINCOLA (Ehrh.) Ach. – 15: on branches of spruce; 16: on branches of larch; 24: on branches of birch; 55: on treated wood.

CHAENOTHECA BRACHYPODA (Ach.) Tibell – 4: on bark of standing dead aspen; 8: on bark of willow. RA.

CHAENOTHECA BRUNEOLLA (Ach.) Müll. Arg. – 2, 12–13: on treated wood.

!! *CHAENOTHECA CHLORELLA* (Ach.) Müll. Arg. – 15: on treated wood. This is a boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Stepanchikova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008). Species included in the Red Data Book of Murmansk Region (2014).

CHAENOTHECA CHRYSOCEPHALA (Turner ex Ach.) Th. Fr. – 7, 15, 20: on bark of spruce; 9: on bark of larch; 15, 17: on treated wood; 50 – on bark of old spruce.

CHAENOTHECA FERRUGINEA (Turner ex Sm.) Mig. – 5, 33, 40, 51, 54: on bark of pine; 7, 37: on bark of spruce and deadwood; 9, 16, 60: on bark of larch; 20: on bark of spruce; 54: on bark of old aspen.

CHAENOTHECA FURFURACEA (L.) Tibell – 4, 12: on soil on roots of fallen dead spruce trees.

CHAENOTHECA PHAEOCEPHALA (Turner) Th. Fr. – 13: on treated wood. RA.

CHAENOTHECA STEMONEA (Ach.) Müll. Arg. – 43: on base trunk of spruce. RA(bs).

CHAENOTHECA SUBROSCIDA (Eitner) Zahlbr. – 50: on bark of old spruce; 54: on bark of old pine.

CHAENOTHECA TRICHIALIS (Ach.) Th. Fr. – 12, 50: on bark of spruce; 16: on bark of larch; 20, 33: on bark of willow; 49: on treated wood; 61: on bark of old pine.

#CHAENOTHECOPSIS CONSOCIATA (Nádv.) A. F. W. Schmidt – 54: on thalli of *Chaenotheca chrysocephala* on bark of old pine.

#CHAENOTHECOPSIS EPITHALLINA Tibell – 16: on thalli of *Chaenotheca trichialis* on bark of larch; 20: on thalli of *Chaenotheca trichialis* on bark of willow.

#CHAENOTHECOPSIS PUSILLA (Ach.) A. F. W. Schmidt – 15, 49: on treated wood; 20: on wood of willow.

#CHAENOTHECOPSIS SAVONICA (Räsänen) Tibell – 9: on bark of larch.

CIRCINARIA CAESIOCINEREA (Nyl. ex Malbr.) A. Nordin et al. – 25, 36: on stone.

CLADONIA AMAUROCRAEA (Flörke) Schaer. – 30: on sandy soil.

CLADONIA ARBUSCULA (Wallr.) Flot. – 2, 46: on treated wood; 30: on sandy soil; 31, 55: on bare soil; 33, 34: on mossy stumps.

CLADONIA BACILLIFORMIS (Nyl.) Glück – 15, 24: on base of trunk of birch, 51; on base of trunk of pine; 49, 67: on treated wood.

CLADONIA BOTRYTES (K. G. Hagen) Willd. – 2, 13, 15, 17–18, 45, 49, 53: on treated wood; 24: on base of trunk of birch.

CLADONIA CENOTEA (Ach.) Schaer. – 12, 49: on deadwood; 15: on wooden buildings; 30: on sandy soil; 29, 34, 54, 59–61, 67: on base of trunk trees.

CLADONIA CHLOROPHAEA (Flörke ex Sommerf.) Spreng. – 24, 50, 55, 57–59, 65: on base of trunks of birch, on dead wood, on soil, on base of old spruce. The specimens contain fumarprotocetraric acid.

CLADONIA CONIOCRAEA (Flörke) Spreng. – 2–24, 27–29, 49, 53–55, 60, 65: on base of trunks of trees, deadwood and treated wood; 56: on soil.

CLADONIA CORNUTA (L.) Hoffm. – 2–22, 31–34, 55: on soil, base of trunks of trees, deadwood and treated wood.

CLADONIA CRISPATA (Ach.) Flot. – 18: on treated wood; 30, 54: on sandy soil.

CLADONIA CYANIPES (Sommerf.) Nyl. – 67: on dead wood.

CLADONIA DEFORMIS (L.) Hoffm. – 2–24, 29–34: on base of trunks of trees, deadwood and treated wood; 55: on soil.

CLADONIA DIGITATA (L.) Hoffm. – 1–23, 29–34, 51, 54, 60: on base of trunks of trees, deadwood and treated wood.

CLADONIA FIMBRIATA (L.) Fr. – 17: on sandy soil; 24, 32–34: on base of trunk of trees.

CLADONIA FURCATA (Huds.) Schrad. – 31: on soil.

CLADONIA GRACILIS subsp. TURBINATA (Ach.) Ahti – 17: on sandy soil; 49, 58, 67: on soil, deadwood and stone with thin soil layer.

CLADONIA GRAYI G. Merr. ex Sandst. – 56: on soil. The specimen contains grayanic acid.

CLADONIA MACILENTA Hoffm. – 2, 18: on treated wood.

CLADONIA MITIS Sandst. – 18; on treated wood; 27, 32, 55, 64: on soil, deadwood and stone with thin soil layer.

CLADONIA OCHROCHLORA Flörke – 2: on treated wood; 49: on deadwood.

CLADONIA PHYLLOPHORA Hoffm. – 15, 27, 30, 55: on soil.

CLADONIA PLEUROTA (Flörke) Schaer. – 24, 33, 53: on base of trunk of trees.

CLADONIA PYXIDATA (L.) Hoffm. – 27, 30: on soil and on base of pine trunk.

CLADONIA RANGIFERINA (L.) F. H. Wigg. – 2, 13, 17–18: on wooden buildings; 9, 30, 32, 40, 49, 55–56, 67: on soil.

CLADONIA REI Schaer. – 24: on base of trunk of birch.

CLADONIA STELLARIS (Opiz) Pouzar & Vězda – 2, 9, 13, 17–18, 27, 40, 67: on soil, deadwood and treated wood.

CLADONIA STYGIA (Fr.) Ruoss – 68: on sphagnum.

CLADONIA SUBULATA (L.) Weber ex F. H. Wigg. – 30: on soil.

CLADONIA SULPHURINA (Michx.) Fr. – 2–20, 27, 41, 45: on bases of trees, deadwood and treated wood.

CLADONIA UNCIALIS (L.) Weber ex F. H. Wigg. – 30: on soil.

- CLADONIA VERTICILLATA (Hoffm.) Schaer. – 30, 55: on soil.
- CLIOSTOMUM LEPROSUM (Räsänen) Holien & Tønsberg – 20: on bark of spruce.
- COLLEMA FURFURACEUM (Arnold) Du Rietz – 20–21, 28: on bark of aspen.
- DERMATOCARPON MINIATUM (L.) W. Mann – 35: on stone.
- DIBAEIS BAEOMYCES (L. f.) Rambold & Hertel – 30: on soil.
- DIPLOSCHISTES SCRUPOSUS (Schreb.) Norman – 25: on mossy stone.
- EVERNIA DIVARICATA (L.) Ach. – 3: on branches of spruce. RA.
- EVERNIA MESOMORPHA Nyl. – 1–20, 23–24, 27–29, 32–34, 37–44, 51, 54: on bark of trees, deadwood, treated wood.
- EVERNIA PRUNASTRI (L.) Ach. – 14, 29, 49: on bark of alder.
- !! FELIPES LEUCOPPELLAEUS (Ach.) Frisch & G. Thor – 42: on bark of old alder. This is a species reported only from Northern European part of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Hermansson et al., 2002), Komi Republic (Hermansson et al., 1998), and Leningrad Region (Kuznetsova et al., 2007).
- FUSCIDEA PUSILLA Tønsberg – 8: on bark of standing dead alder; 43: on bark of spruce. The specimens contain divaricatic acid.
- GRAPHIS SCRIPTA (L.) Ach. – 49: on bark of aspen.
- GYALECTA FAGICOLA (Hepp ex Arnold) Kremp. – 11, 14: on bark of aspen; 21: on bark of birch; 20: on bark of willow.
- GYALECTA TRUNCIGENA (Ach.) Hepp – 22: on bark of aspen.
- GYALOLECHIA FLAVORUBESCENS (Huds.) Søchting et al. – 28: on bark of aspen.
- HYPOCENOMYCE SCALARIS (Ach.) M. Choisy – 2, 9, 13, 15–18, 24, 27, 45–46: on bases of trees of different species, treated wood and burnt wood, bark of pine and birch.
- HYPOGYMNNIA PHYSODES (L.) Nyl. – 1–67: on trunks, branches, decaying wood of trees of different species, treated wood and stones.
- HYPOGYMNNIA TUBULOSA (Schaer.) Hav. – 1–47, 49, 67: on trunks, branches, decaying wood of trees of different species, treated wood.
- HYPOGYMNNIA VITTATA (Ach.) Parrique – 7: on bark of birch. RA(bs).
- ICMADOPHILA ERICETORUM (L.) Zahlbr. – 7, 44: on deadwood of old stamps.
- IMSHAUGIA ALEURITES (Ach.) S. L. F. Mey. – 5, 10, 33–34, 51: on bark and branches of pine; 16: on branches of larch.
- JAPEWIA TORNOËNSIS (Nyl.) Tønsberg – 42: on branches of spruce.
- LECANIA CYRTELLA (Ach.) Th. Fr. – 29: on bark of rowan; 67: on bark of willow.
- LECANIA NAEGELII (Hepp) Diederich & van den Boom – 1: on bark of standing dead aspen; 29: on bark of rowan; 64, 67: on bark of willow.
- LECANORA AITEMA (Ach.) Hepp – 65: on fallen dead tree.
- LECANORA ALBELLULA (Nyl.) Th. Fr. var. ALBELLULA – 56: on bark of willow.
- LECANORA ALLOPHANA Nyl. – 1, 11, 20–21: on bark of aspen; 24, 29, 49, 54: on bark of aspen, rowan, birch.
- LECANORA ARGENTATA (Ach.) Malme – 24: on bark of aspen; 49: on bark of bird-cherry tree.
- LECANORA CARPINEA (L.) Vain. – 24: on bark of aspen; 49: on bark of bird-cherry tree.
- LECANORA CATEILEA (Ach.) A. Massal. – 24: on bark of aspen; 52: on bark of old bird-cherry tree.
- LECANORA CENISIA Ach. – 25, 36: on stones.
- LECANORA CHLAROTERA Nyl. – 14, 24: on bark of aspen.
- LECANORA CIRCUMBOREALIS Brodo & Vitik. – 15, 17: on treated wood.
- LECANORA HYPOPTA (Ach.) Vain. – 5: on snags of pine; 44: on bark of standing dead birch.
- LECANORA INTRICATA (Ach.) Ach. – 25: on stones.
- LECANORA PHAEOSTIGMA (Körb.) Almb. – 10: on branches of pine; 12: on branches of spruce; 51, 53: on bark of pine.
- LECANORA POLYTROPA (Ehrh. ex Hoffm.) Rabenh. – 25, 36: on stones.

LECANORA POPULICOLA (DC.) Duby – 20: on bark of willow; 24, 41: on bark of aspen.

LECANORA PULICARIS (Pers.) Ach. – 10: on bark of pine; 16: on bark and branches of larch; 29: on bark of rowan; 49, 65: on treated wood; 52: on bark of old bird-cherry tree.

LECANORA SYMMICTA (Ach.) Ach. – 2, 65: on treated wood; 20, 56: on bark of willow; 24, 33: on bark and branches of birch; 49: on bark of alder; 54: on bark of old aspen.

!! LECANORA UMBRINA (Ach.) A. Massal. – 18: on roofing paper. Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).

LECANORA VARIA (Hoffm.) Ach. – 15, 18, 47: on treated wood.

LECIDEA ERYTHROPHAEA Flörke ex Sommerf. – 20, 24, 49, 63: on bark of aspen; 49: on bark of alder.

LECIDEA LEPRARIOIDES Tønsberg – 16: on bark of larch.

LECIDEA NYLANDERI (Anzi) Th. Fr. – 3, 20, 50, 54: on bark of spruce; 5, 6, 53–54: on bark of pine; 16: on bark of larch; 27: on bark of spruce and pine; 49: on bark of treated wood; 67: on bark of birch; 49, 54: on bark of old aspen.

LECIDEA TURGIDULA Fr. – 3, 33–34: on bark of spruce; 5, 23, 53, 61: on bark of pine.

LECIDELLA ELAEOCHROMA (Ach.) M. Choisy – 1, 11, 14, 20–21, 24, 49: on bark of aspen.

LECIDELLA EUPHOREA (Flörke) Hertel – 24, 28: on bark and branches of aspen.

LEPRA ALBESCENS (Huds.) Hafellner – 28: on bark of aspen.

LEPRA AMARA (Ach.) Hafellner – 3, 8, 10–11, 14, 16, 20, 22, 41–43, 52, 63: on bark and wood of trees of different species.

LEPRA OPHTHALMIZA (Nyl.) Hafellner – 8: on standing dead alder; 20: on bark of willow.

LEPRARIA ELOBATA Tønsberg – 8: on standing dead alder; 42: on mossy base of trunk of aspen tree. The specimens contain atranorin, zeorin and stictic acid complex.

LEPRARIA JACKII Tønsberg – 60: on trunk of larch. The specimen contains atranorin, roccellic/angardianic, jackinic/rangiformic and norjackinic/norrangiformic acids.

LEPRARIA INCANA (L.) Ach. – 28–29, 59: on bases of trees, on mosses and stones. The specimens contain divaricatic acid, atranorin and zeorin.

LEPTOGIUM SATURNINUM (Dicks.) Nyl. – 4: on standing dead aspen; 11, 28, 49: on bark of aspen; 20: on bark of willow; 49: on bark of bird-cherry tree.

LOBARIA PULMONARIA (L.) Hoffm. – 4: on standing dead aspen; 8, 22: on bark of aspen; 20: on bark of willow; 37–39, 41–44: on bark of aspen and willow. RR, RA.

LOXOSPORA ELATINA (Ach.) A. Massal. – 6, 8, 16, 20, 39, 41–44, 53: on bark and wood of trees of different species.

! MEGASPORA VERRUCOSA (Ach.) Hafellner & V. Wirth – 21: on bark of aspen. This is a common species reported from most regions of Russia (Urbanavichus, 2010). Previously known in Arkhangelsk Region only from its Arctic part (Lynge, 1928).

MELANELIXIA SUBAURIFERA (Nyl.) O. Blanco et al. – 24: on bark and branches of aspen and birch; 53: on bark of bird-cherry tree.

!! MELANOHALEA EXASPERATA (De Not.) O. Blanco et al. – 13: on treated wood and on bark of birch. This is a boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008). Species included in the Red Data Book of Murmansk Region (2014).

MELANOHALEA EXASPERATULA (Nyl.) O. Blanco et al. – 29: on bark of rowan and willow.

MELANOHALEA OLIVACEA (L.) O. Blanco et al. – 3–14, 16, 20–22, 24, 27–29, 32–34: on bark of deciduous and coniferous trees.

MICAREA ELACHISTA (Körb.) Coppins & R. Sant. – 25: on mossy stump.

MICAREA MELAENA (Nyl.) Hedl. – 6: on bark of pine; 8–9: on burnt stumps; 34, 40: on bark of pine, spruce, deadwood and mosses.

- MICROCALICIUM AHLNERI* Tibell – 12: on stump; 15: on treated wood.
- MICROCALICIUM ARENARIUM* (Hampe ex A. Massal.) Tibell – 12: on soil on roots of fallen dead spruce.
- MICROCALICIUM DISSEMINATUM* (Ach.) Vain. – 12, 20: on bark of spruce; 16: on bark of larch; 43: on thalli of *Loxospora elatina* on bark of spruce.
- MYCOBILIMBIA CARNEOALBIDA* (Müll. Arg.) S. Ekman & Printzen – 4: on bark of standing dead aspen; 8: on bark of willow; 28, 49, 61: on mossy base on trunk of aspen.
- MYCOBILIMBIA EPIXANTHOIDES* (Nyl.) Vitik. et al. – 20, 22, 41: on mossy base of trunk of aspen.
- MYCOBILIMBIA TETRAMERA* (De Not.) Vitik. et al. ex Hafellner & Türk – 22: on bark of aspen.
- MYCOBLASTUS AFFINIS* (Schaer.) T. Schauer – 59: on bark of old birch.
- MYCOBLASTUS SANGUINARIUS* (L.) Norman – 3–10, 12, 16, 20–21, 40, 44, 53: on bark of deciduous and coniferous trees and deadwood.
- +*MYCOCALICIUM SUBTILE* (Pers.) Szatala – 13, 15, 49: on treated wood; 54: on bark of pines.
- ! *MYRIOLECIS CREMULATA* (Hook.) Śliwa et al. – 26: on concrete wall. This is a common species reported from most regions of Russia (Urbanavichus, 2010). Previously known in Arkhangelsk Region only from its Arctic part (Deichmann-Branth, 1885).
- ! *MYRIOLECIS DISPERSA* (Pers.) Śliwa et al. – 26: on concrete wall. This is a common species reported from most regions of Russia (Urbanavichus, 2010). Previously known in Arkhangelsk Region only from its Arctic part (Blytt, 1872; Lynge, 1928).
- MYRIOLECIS HAGENII* (Ach.) Śliwa et al. – 46–47: on bark of aspen and treated wood.
- MYRIOLECIS SAMBUCI* (Pers.) Clem. – 53: on bark of willow.
- NAETROCYMBE PUNCTIFORMIS* (Pers.) R. C. Harris – 22: on bark of aspen; 45: on bark of birch; 49: on bark of bird-cherry tree.
- NEPHROMA BELLUM* (Spreng.) Tuck. – 20: on bark of willow; 22, 28, 63: on bark of aspen.
- NEPHROMA PARILE* (Ach.) Ach. – 1, 8, 28, 63: on bark of aspen.
- NEPHROMA RESUPINATUM* (L.) Ach. – 11, 38, 43: on bark of aspen; 20: on bark of willow.
- OCHROLECHIA ALBOFLAVESCENS* (Wulfen) Zahlbr. – 53: on bark of pine, juniper and fallen dead pine.
- OCHROLECHIA MAHLUENSIS* Räsänen – 13, 66: on bark of birch; 14, 49, 63: on bark of alder; 15, 18, 58: on treated wood; 16: on bark of larch. The specimens contain gyrophoric and lecanoric acids.
- OCHROLECHIA MICROSTICTOIDES* Räsänen – 10, 12: on bark of spruce; 16: on bark of larch.
- OCHROLECHIA PALLESCENS* (L.) A. Massal. – 20: on bark of willow; 29: on bark of rowan, 63: on bark of aspen.
- PALICELLA FILAMENTOSA* (Stirt.) Rodr. Flakus & Printzen – 5: on snag of pine.
- PARMELIA SULCATA* Taylor – 1–44, 48–49, 54, 56, 60, 62, 67: on trunks, branches, decaying wood of different tree species, treated wood.
- PARMELIOPSIS AMBIGUA* (Wulfen) Nyl. – 1–44, 49–51, 53–54, 65: on trunks, branches, decaying wood of trees of different species, treated wood.
- PARMELIOPSIS HYPEROPTA* (Ach.) Arnold – 1–44, 51, 53, 56: on trunks and decaying wood of trees of different species, treated wood.
- PELTIGERA APHTHOSA* (L.) Willd. – 8: on mosses; 32: on soil, bases of trees.
- PELTIGERA CANINA* (L.) Willd. – 1, 17: on soil; 42–43: on bases of old trees.
- PELTIGERA DIDACTYLA* (With.) J. R. Laundon – 17, 30, 56: on sandy soil.
- !! *PELTIGERA HYMENINA* (Ach.) Delise – 2: on soil. This suboceanic species is reported from most regions of Russia (Urbanavichus et al., 2007). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Leningrad Region (Alexeeva, 2005), and Murmansk Region (Urbanavichus et al., 2008).
- PELTIGERA MALACEA* (Ach.) Funck – 55–56: on soil.
- PELTIGERA MEMBRANACEA* (Ach.) Nyl. – 56: on soil.
- PELTIGERA NECKERI* Hepp ex Müll. Arg. – 20: on bark of aspen and willow.
- PELTIGERA NEOPOLYDACTYLA* (Gyeln.) Gyeln. – 8: on mosses.

- PELTIGERA POLYDACTYLON (Neck.) Hoffm. – 33–34: on bark of aspen, mosses.
- PELTIGERA PRAETEXTATA (Flörke ex Sommerf.) Zopf – 20, 49, 63: on bark of aspen; 30: on sandy soil; 65: on decaying tree.
- PELTIGERA RUFESCENS (Weiss) Humb. – 30: on sandy soil.
- PERTUSARIA CARNEOPALLIDA (Nyl.) Anzi ex Nyl. – 49: on bark of alder.
- PERTUSARIA LEIOPLACA DC. – 22: on bark of aspen; 64: on bark of willow.
- PHAEOPHYSICIA CILIATA (Hoffm.) Moberg – 24: on bark of aspen.
- !! PHAEOPHYSICIA NIGRICANS (Flörke) Moberg – 26: on concrete wall. This is a species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).
- !! PHAEOPHYSICIA ORBICULARIS (Neck.) Moberg – 1: on bark of standing dead aspen; 26: on concrete wall. This is a boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008). Species included in the Red Data Book of Murmansk Region (2014).
- PHAEOPHYSICIA SCIASTRA (Ach.) Moberg – 18: on treated wood and roofing paper; 25: on stones.
- PHLYCTIS ARGENA (Spreng.) Flot. – 1, 3–4, 6–8, 11–12, 14, 16, 20–22, 28–29, 37–38, 49, 63: on bark of aspen and willow; 52: on bark of bird-cherry tree.
- PHYSCIA ADSCENDENS H. Olivier – 1, 21, 24: on bark of aspen.
- PHYSCIA AIPOLIA (Ehrh. ex Humb.) Fűrnr. – 24, 28: on bark of aspen.
- PHYSCIA ALNOPHILA (Vain.) Loht. et al. – 29: on bark of rowan; 56: on bark of willow.
- PHYSCIA CAESIA (Hoffm.) Fűrnr. – 1: on bark of aspen; 18: on roofing paper; 26: on concrete wall.
- PHYSCIA STELLARIS (L.) Nyl. – 1, 21, 24: on bark of aspen.
- PHYSCIA TENELLA (Scop.) DC. – 26: on concrete wall; 29: on bark of rowan.
- PHYSCONIA DISTORTA (With.) J. R. Laundon – 24: on bark of old aspen.
- !! PLACYNTHIELLA DASAEA (Stirt.) Tønsberg – 43: on soil on root of fallen dead spruce. This is a boreal species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).
- PLACYNTHIELLA ICMALEA (Ach.) Coppins & P. James – 2, 18, 47, 49, 65, 67: on treated wood; 5: on snag of pine.
- PLATISMATIA GLAUCA (L.) W. L. Culb. & C. F. Culb. – 1–44, 50, 52–54, 67: on trunks, branches, decaying wood of trees of different species, treated wood and stones.
- POLYCAULIONA CANDELARIA (L.) Frödén et al. – 13, 17: on treated wood; 23, 46: on bark of pine and treated wood.
- POLYCAULIONA POLYCARPA (Hoffm.) Frödén et al. – 23: on bark of pine.
- PORPIDIA CRUSTULATA (Ach.) Hertel & Knoph – 35–36: on stones.
- PORPIDIA MACROCARPA (DC.) Hertel & A. J. Schwab – 35–36: on stones.
- PORPIDIA TUBERCULOSA (Sm.) Hertel & Knoph – 15: on stones.
- PROTOPARMELIOPSIS MURALIS (Schreb.) M. Choisy – 25: on limestone.
- PSEUDEVERNIA FURFURACEA (L.) Zopf – 5, 68: on branches of pine; 33, 44: on branches and trunks of pine, spruce, aspen. RA.
- PSEUDOTHELOMMA OCELLATUM (Körb.) M. Prieto & Wedin – 13, 17: on treated wood.
- PSIROLECHIA LUCIDA (Ach.) M. Choisy – 43: on soil on roots of fallen dead spruce.
- PYCNORA SOROPHORA (Vain.) Hafellner – 10: on bark of pine.

- !! *PYCNOTHELIA PAPILLARIA* (Ehrh.) Dufour – 17: on sandy soil; 30: on wood. This is a species reported from most regions of Russia (Urbanavichus, 2010). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), and Leningrad Region (Brenner, 1886). Species included in the Red Data Books of Leningrad Region (2000) and the Republic of Karelia (2020).
- !! *RAMALINA BALTICA* Lettau – 21: on bark of willow. This is a species reported in Russia only from Northern part of European Russia (Urbanavichus, 2010). Previously known in Arkhangelsk Region only from Kozhozero Reserve (Fadeeva, 2006), but specimens have been redefined as *Ramalina obtusata* (by T. Ahti and V. Tarasova, in 2019). Distribution in neighboring territories: the Republic of Karelia (Fadeeva et al., 2007), and Leningrad Region (Kuznetsova et al., 2007).
- RAMALINA FARINACEA* (L.) Ach. – 14, 37: on bark of aspen; 20: on bark of spruce and willow.
- RAMALINA POLLINARIA* (Westr.) Ach. – 17: treated wood.
- RAMALINA SINENSIS* Jatta – 11, 14, 24: on bark of aspen.
- RHIZOCARPON BADIOATRUM* (Flörke ex Spreng.) Th. Fr. – 25: on stone.
- RHIZOCARPON GEOGRAPHICUM* (L.) DC. – 25, 36: on stones.
- RHIZOCARPON GRANDE* (Flörke) Arnold – 25, 36: on stones.
- RHIZOCARPON HOCHSTETTERI* (Körb.) Vain. – 25: on stones.
- RINODINA ARCHAEA* (Ach.) Arnold – 18: on treated wood; 49: on wood.
- RINODINA SEPTENTRIONALIS* Malme – 29: on bark of rowan; 56, 67: on bark of willow; 63: on bark of aspen.
- ROPALOSPORA VIRIDIS* (Tønberg) Tønberg – 49, 52: on trunk of bird-cherry tree. The specimens contain perlatolic acid.
- ROSTANIA OCCULTATA* (Bagl.) Otálora et al. – 20: on bark of willow; 21: on bark of aspen. RA(bs).
- +*SAREA DIFFORMIS* (Fr.) Fr. – 44: on resin of spruce; 53: on bark of pines.
- +*SAREA RESINAE* (Fr.: Fr.) Kuntze – 27, 53: on resin of pine; 60: on bark of larch.
- SCOLICIOSPORUM CHLOROCOCCUM* (Graewe ex Stenh.) Vězda – 13: on branches of spruce; 15: on treated wood; 24: on bark of birch.
- SCOLICIOSPORUM UMBRINUM* (Ach.) Arnold – 58: on wood.
- SCYTIINIUM TERETIUSCULUM* (Wallr.) Otálora et al. – 4: on bark of standing dead aspen; 22: on bark of aspen.
- +*STENOCYBE PULLATULA* (Ach.) Stein – 8: on bark of standing dead alder; 49: on bark of alder.
- STEREOCAULON PASCHALE* (L.) Hoffm. – 27, 30: on soil.
- STEREOCAULON SAXATILE* H. Magn. – 55: on stone.
- STEREOCAULON TOMENTOSUM* Fr. – 27, 30, 33: on soil.
- STRANGOSPORA MORIFORMIS* (Ach.) Stein – 13, 17: on treated wood.
- TEPHROMELA ATRA* (Huds.) Hafellner – 36: on stone.
- TOENSBERGIA LEUCOCOCCA* (R. Sant.) Bendiksby & Timdal – 16: on branches of larch.
- TONINIOPSIS SUBINCOMPTA* (Nyl.) Kistenich et al. – 1, 41: on bark of aspen; 4: on bark of standing dead aspen; 20: on bark of willow.
- TRAPELIOPSIS FLEXUOSA* (Fr.) Coppins & P. James – 2, 23: on treated wood.
- TRAPELIOPSIS GRANULOSA* (Hoffm.) Lumbsch – 33: on wood of spruce.
- TUCKERMANNIOPSIS CHLOROPHYLLA* (Willd.) Hale – 1–67: on trunks, branches, decaying wood of different tree species and treated wood.
- USNEA DASOPOGA* (Ach.) Nyl. – 8, 12, 66: on branches of spruce; 16: on bark of larch; 20: on bark of willow and branches of spruce; 51: on bark of pine; 59: on bark of old birch.
- USNEA GLABRESCENS* (Nyl. ex Vain.) Vain. ex Räsänen – 9: on bark of larch; 12, 48; on branches of spruce.
- USNEA HIRTA* (L.) Weber ex F.H.Wigg. – 13: on bark of birch; 17, 15: on treated wood; 20: on branches of spruce; 51: on bark of pines.
- USNEA PERPLEXANS* Stirt. – 20: on branches of spruce.
- USNEA SUBFLORIDANA* Stirt. – 1, 3–12, 16, 20–22, 29, 32–34, 50, 53–54, 60, 62: on trunks and branches of trees of different species.

VIOLELLA FUCATA (Stirt.) T. Sprib. – 5: on snag of pine; 16: on bark of spruce.

VULPICIDA PINASTRI (Scop.) J.-E. Mattsson & M. J. Lai – 1–44, 49, 54, 65: on trunks, branches, decaying wood of trees of different species, treated wood and stones.

XANTHORIA PARIETINA (L.) Th. Fr. – 1, 24: on bark of aspen.

XYLOGRAPHA PALLENS (Nyl.) Harm. – 2, 18: on treated wood.

XYLOGRAPHA PARALLELA (Ach.: Fr.) Fr. – 23, 46: on treated wood.

XYLOGRAPHA TRUNCISEDA (Th. Fr.) Minks ex Re-dinger – 53: on wood.

XYLOGRAPHA VITILIGO (Ach.) J. R. Laundon – 20: on snags of spruce; 44, 53: on dead wood of pine.

!! XYLOPSORA CARADOCENSIS (Nyl.) Bendiksby & Timdal – 9: on burnt stump. Distribution in neighboring territories: the Republic of Karelia (Tarasova et al., 2013; Androsova et al., 2018), Komi Republic (Hermansson et al., 1998), Leningrad Region (Kuznetsova et al., 2007), and Murmansk Region (Urbanavichus et al., 2008).

XYLOPSORA FRIESII (Ach.) Bendiksby & Timdal – 12: on stump; 33, 53: on deadwood of pine.

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Appendix 1. Number of lichens and allied fungi in neighboring protected areas

Protected area	Taiga subzone, region	Area, km ²	Number of species	References
Kivach Nature Reserve	middle boreal subzone, the Republic of Karelia	110	386	Hermansson et al., 2002; Tarasova & Stepanchikova, 2016; Tarasova et al., 2017; Androsova et al., 2018
Lekshmokh Nature Reserve	middle boreal subzone, Arkhangelsk Region	250	96	Pchelkin, 2019
Paanajarvi-Oulanka National Park	northern boreal subzone, the Republic of Karelia, Finland	1045	443	Halonen, 1993
Pasvik Nature Reserve	northern boreal subzone, Murmansk Region	147	587	Urbanavichus & Fadeeva, 2018
Pechoro-Ilych Nature Reserve	northern and middle boreal subzones, the Komi Republic	7213	866	Hermansson et al., 2006
Vodlozersky National Park	northern and middle boreal subzones, the Republic of Karelia, Arkhangelsk Region	4683	473	Tarasova et al., 2021

Appendix 2. List of sampling plots

No.	Locality	Coordinates	Community	Collector, indetifier	Collection date
1	Morshichinskaya village, near the church on the shore of Lekshmozero Lake	63°45'58.9"N, 38°03'02.6"E	individual spruce and aspen trees	leg. & det. VT	11 July 2011
2	The Guzhevskaya Mill	61°49'29.3"N, 37°56'20.5"E	wooden buildings	leg. & det. VT	11 July 2011
3	—, —	61°49'30.2"N, 37°56'11.9"E	paludified peatmoss spruce forest	leg. & det. VT	11 July 2011
4	—, —	61°49'33.8"N, 37°56'11.9"E	horsetail peatmoss spruce forest	leg. & det. VT	11 July 2011
5	—, —	61°49'36.4"N, 37°56'12.2"E	paludified peatmoss pine forest	leg. & det. VT	11 July 2011
6	—, —	61°49'29.1"N, 37°56'12.9"E	bilberry feathermoss spruce forest	leg. & det. VT	11 July 2011
7	The route from the Guzhevskaya Mill to Bol'shoje Lebyazh'ye Lake	61°49'11.0"N, 37°56'20.3"E	paludified floodplain herb-rich spruce forest	leg. & det. VT	12 July 2011
8	—, —	61°48'42.1"N, 37°55'46.4"E	bilberry feathermoss spruce forest	leg. & det. VT	12 July 2011
9	—, —	61°48'32.3"N, 37°54'51.0"E	bilberry feathermoss larch-pine forest	leg. & det. VT	12 July 2011
10	—, —	61°48'28.1"N, 37°54'01.1"E	paludified peatmoss pine forest	leg. & det. VT	12 July 2011
11	—, —	61°48'19.8"N, 37°54'07.8"E	shore Bol'shoje Lebyazh'ye Lake	leg. & det. VT	12 July 2011
12	—, —	61°49'09.8"N, 37°55'38.6"E	paludified peatmoss spruce forest	leg. & det. VT	12 July 2011
13	Abandoned Guzhovo village	61°49'26.5"N, 38°00'35.0"E	wooden buildings	leg. & det. VT	13 July 2011
14	Near abandoned Guzhovo village	61°49'42.1"N, 37°59'59.4"E	herb-rich alder-aspen forest	leg. & det. VT	13 July 2011
15	The church in Khizhgora	61°49'50.0"N, 38°00'49.4"E	wooden buildings	leg. & det. VT leg. & det. AP	13 July 2011 8 August 2018
16	~0.8 km to the east from the Guzhevskaya Mill	61°49'26.1"N, 37°57'17.8"E	bilberry feathermoss larch-spruce-pine forest	leg. & det. VT	13 July 2011
17	Novoselovo village on the SE shore of Lekshmozero Lake	61°42'04.2"N, 38°10'15.6"E	wooden buildings	leg. & det. VT	14 July 2011
18	Kazarinovskaja village on the SE shore of Lekshmozero Lake	61°41'58.0"N, 38°10'15.5"E	wooden buildings	leg. & det. VT	14 July 2011
19	~2.5 km to the north from Novoselovo village	61°43'03.5"N, 38°08'59.9"E	bilberry feathermoss spruce forest	leg. & det. VT	15 July 2011
20	~3 km to the north from Novoselovo village	61°43'52.8"N, 38°08'52.4"E	paludified herb-rich spruce forest	leg. & det. VT	15 July 2011
21	~2.5 km to the north from Novoselovo village	61°43'02.9"N, 38°08'58.6"E	herb-rich birch forest	leg. & det. VT	15 July 2011
22	Southern shore of Lekshmozero Lake	61°40'27.9"N, 38°10'17.0"E	herb-rich aspen forest	leg. & det. VT	15 July 2011
23	Morshichinskaya village, near the pier and the visitor center	61°45'58.3"N 38°03'17.7"E	individual pine trees	leg. & det. AP	6 August 2018
24	The edge of the forest near the west shore of Lekshmozero	61°45'59.4"N 38°03'32.7"E	herb-rich aspen forest with birch	leg. & det. AP	6 August 2018
25	West shore of Lekshmozero Lake	61°42'13.6"N 38°03'46.7"E	individual boulders on the shore	leg. & det. AP	7 August 2018
26	North side of Morshichinskaya village	61°46'29.7"N 38°02'33.4"E	old concrete slabs	leg. & det. AP	7 August 2018

No.	Locality	Coordinates	Community	Collector, identifier	Collection date
27	Western slope near the road to Morshichinskaya village	61°44'54.0"N 38°00'18.4"E	bilberry lichen-feathermoss spruce-pine forest	leg. & det. AP	7 August 2018
28	The isthmus between Vilno Lake and Maselskoe Lake	61°48'38.4"N 38°03'39.2"E	herb-rich aspen forest	leg. & det. AP	8 August 2018
29	Near the road from village of Maselga to Khizhgora	61°49'52.2"N 38°01'22.8"E	herb-rich spruce forest with birch and alder	leg. & det. AP	8 August 2018
30	Abandoned airfield ~1 km to the south of Ilekinskaya village	61°41'20.4"N 38°04'40.4"E	moss and lichen cover on sandy soil	leg. & det. AP	9 August 2018
31	Southern shore of Lekshmozero Lake	61°40'45.0"N 38°06'21.9"E	bare soil	leg. & det. AP	9 August 2018
32	The trail from Morshchinskaya village to hay meadow	61°46'20.5"N 38°04'27.2"E	feathermoss-lichen pine forest with birch	leg. & det. AP	9 August 2018
33	The forest near the "Trail of Anthills"	61°46'08.6"N 38°04'02.2"E	blueberry feathermoss birch-spruce-pine forest	leg. & det. AP	10 August 2018
34	—, —	61°46'05.0"N 38°03'26.1"E	herb-rich pine forest with birch	leg. & det. AP	10 August 2018
35	The road along the route "Ancestral Trail"	61°46'35.0"N 38°01'58.3"E	isolated stones on the road	leg. & det. AP	10 August 2018
36	The Nikolin Stone	61°46'34.8"N 38°01'48.6"E	isolated big stone	leg. & det. AP	11 August 2018
37	—, —	61°46'59.9"N 38°00'33.4"E	herb-rich aspen forest with birch and spruce	leg. & det. AP	11 August 2018
38	—, —	61°47'04.7"N 38°00'06.7"E	herb-rich aspen forest with birch and spruce	leg. & det. AP	11 August 2018
39	—, —	61°47'04.7"N 37°59'20.3"E	herb-rich aspen forest with birch and spruce	leg. & det. AP	11 August 2018
40	—, —	61°47'10.2"N 37°58'33.7"E	herb-rich pine forest with birch and spruce	leg. & det. AP	11 August 2018
41	~1 km to the south from Ivshinskaya village	61°41'13.3"N 38°11'25.1"E	herb-rich aspen forest with birch and spruce	leg. & det. AP	13 August 2018
42	~1,5 km to the south from Ivshinskaya village	61°41'06.9"N 38°12'17.8"E	herb-rich aspen forest with birch and spruce	leg. & det. AP	14 August 2018
43	~2 km to the south-east from Ivshinskaya village	61°40'56.9"N 38°12'47.5"E	herb-rich aspen forest with birch and spruce	leg. & det. AP	14 August 2018
44	6 km to the south-east from Ivshinskaya village	61°40'50.0"N 38°13'58.4"E	swampy spruce forest with birch	leg. & det. AP	15 August 2018
45	Near Ivshinskaya village	61°41'37.3"N 38°10'41.9"E	wood of standing dead birch	leg. & det. AP	15 August 2018
46	Old barns on the shore of Lekshmozero Lake	61°45'57.2"N 38°03'06.8"E	on treated wood	leg. & det. AP	15 August 2018
47	The roof of abandoned house in Ivshinskaya village	61°41'40.0"N 38°10'31.4"E	on treated wood	leg. & det. AP	15 August 2018
48	The road from the Porzhensky churchyard to Vidyagino village	61°56'43.78"N, 38°7'32.76"E	bilberry feathermoss aspen-pine-spruce forest	leg. AV, det. VT	22 May 2019
49	Hilly plain between Maloe Porzhensky Lake and Saremoh mire	61°54'8.53"N, 38°8'1.81"E	bilberry feathermoss spruce-birch-aspen forest	leg. AV, det. VT	24 May 2019
50	Near the Saremoh mire	61°53'34.48"N, 38°9'12.40"E	bilberry feathermoss birch-aspen forest	leg. AV, det. VT	24 May 2019
51	The Saremoh mire	61°53'33.13"N, 38°9'17.89"E	padutified peatmoss pine forest	leg. AV, det. VT	24 May 2019
52	Floodplain of the Vilenka River	61°53'25.50"N, 38°6'4.17"E	herb-rich willow-bird-cherry forest	leg. AV, det. VT	25 May 2019
53	Surroundings of Zheldozero Lake	61°53'22.32"N, 37°56'32.24"E	cowberry feathermoss pine forest	leg. AV, det. VT	26 May 2019

No.	Locality	Coordinates	Community	Collector, identifier	Collection date
54	The slope to the shore of Novgozero Lake	61°53'6.27"N, 37°59'6.49"E	herb-rich aspen-spruce forest	leg. AV, det. VT	26 May 2019
55	Steep slope to Maselgskoe Lake	61°49'50.72"N, 38°0'28.01"E	heatherry feathermoss-lichen pine forest	leg. AV, det. VT	27 May 2019
56	The foot of a large ridge near Khizhgora	61°49'51.03"N, 38°0'27.82"E	bare sandy soil	leg. AV, det. VT	27 May 2019
57	The bank of the Cholma River	61°39'54.10"N, 38°11'26.67"E	bilberry feathermoss pine forest	leg. AV, det. VT	28 May 2019
58	The bridge over the Cholma River	61°40'14.30"N, 38°11'8.79"E	sedge thickets	leg. AV, det. VT	28 May 2019
59	Western shore of Naglimozero Lake	61°46'15.73"N, 38°11'8.79"E	bilberry feathermoss aspen-spruce forest	leg. AV, det. VT	29 May 2019
60	Monastyrsky Island	61°46'38.30"N, 37°57'0.44"E	bilberry feathermoss aspen-spruce-larch forest	leg. AV, det. VT	29 May 2019
61	Creek valley near Naglimozero Lake	61°46'13.59"N, 37°55'36.93"E	paludified herb-rich aspen forest	leg. AV, det. VT	29 May 2019
62	West bank of Naglimozero Lake	61°46'15.36"N, 37°55'40.87"E	bilberry feathermoss spruce-pine forest	leg. AV, det. VT	29 May 2019
63	Naglimozero Lake shore	61°46'18.49"N, 37°55'41.86"E	herb-rich aspen-spruce forest	leg. AV, det. VT	29 May 2019
64	Creek valley near Naglimozero Lake	61°46'12.98"N, 37°55'40.88"E	paludifield herb-rich willow forest	leg. AV, det. VT	29 May 2019
65	Kaskozero Lake shore	61°40'44.51"N, 38°2'42.31"E	paludified floodplain herb-rich birch-spruce forest	leg. AV, det. VT	29 May 2019
66	The Kulgom brook	61°49'28.66"N, 37°56'20.96"E	paludified floodplain herb-rich willow-birch forest	leg. AV, det. VT	31 May 2019
67	Near the Water Mill	61°49'27.46"N, 37°56'25.63"E	tourist parking area	leg. AV, det. VT	31 May 2019
68	Near the Lekshmokh nature reserve	61°40'49.4»N 38°14'01.7»E	paludified peatmoss pine forest	leg. & det. AP	15 August 2018

Notes. The names of the collectors are abbreviated as follows: AP – Alexey Pchelkin, AV – Andrei Valekzhanin, VT – Viktoria Tarasova.