Folia Cryptog. Estonica, Fasc. 61: 51–58 (2024)
https://doi.org/10.12697/fce.2024.61.07

# New records of lichens and allied fungi from the Leningrad Region, Russia. XIII. Mainly saxicolous species

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**Abstract:** Fourteen lichen species and three lichenicolous fungi were recorded for the first time for the Leningrad Region. The lichenicolous fungus *Sclerococcum australe* is new to Russia. *Arthopyrenia cinereopruinosa*, *Aspicilia grisea*, *Buellia miriquidica*, *Catillaria atomarioides*, *Lithocalla ecorticata*, *Miriquidica intrudens*, *Rhizocarpon intermediellum*, *Sclerococcum amygdalariae*, and *S. parasiticum* are new for North-Western European Russia.

**Keywords:** lichen diversity, crustose lichens, lichenicolous fungi, Karelian Isthmus, Hogland Island

## INTRODUCTION

This paper continues the series of publications on the diversity of lichens and allied fungi of St. Petersburg and the Leningrad Region (see e.g., Kuznetsova et al., 2007; Stepanchikova et al., 2010; Himelbrant et al., 2022) and deals mainly with the new records of saxicolous lichens and lichenicolous fungi associated with them. All the new records are from the western part of the Leningrad Region: some specimens were collected in Karelian Isthmus, but most of them are from Hogland Island. Hogland belongs to a group of remote islands in the Gulf of Finland (Suomenlahden ulkosaaret). It is famous for its landscape formed by rocky outcrops with heights of up to 175 m a. s. l., steep slopes and deep crevices, rocky beaches and cliffs along the shoreline. Rocky biotopes of Hogland are inhabited by peculiar lichen biota; some species are known in the Leningrad Region only from there.

Nowadays the revealed lichen biota of the Leningrad Region (LR) and St. Petersburg counts ca. 1210 species, of which 1020 are lichens, ca. 156 are lichenicolous fungi, and 34 are allied saprobic fungi.

## MATERIAL AND METHODS

The study of rocky biotopes in the Leningrad Region was organized by Anastasiya A. Filippova and Irina A. Sorokina, who selected and described the study locations. The lichen specimens were mainly collected by Irina S. Stepanchikova, Viktoriya V. Pankova, Dmitry E. Himelbrant, Agata A. Rodionova, Anna S. Zueva, and Zhanna O. Zholobova in 2020–2022. The specimens were deposited in the lichen herbarium of St. Petersburg State University (LECB). The field photo of *Umbilicaria cylindrica* was taken by Irina S. Stepanchikova using Olympus Tough TG-5 camera. High performance thin-layer chromatography (HPTLC) was performed mainly by Irina S. Stepanchikova and Agata A. Rodionova according to standard techniques using solvent systems A and C (Orange et al., 2001).

In the species list, the species are supplied with brief information on diagnostic characteristics and distribution in North-Western European Russia, Fennoscandia, and the Baltic countries. Lichen substances are given for HPTLC-analyzed species. The names of the main collectors are abbreviated as follows: DH – Dmitry E. Himelbrant, VP – Viktoriya V. Pankova, AR – Agata A. Rodionova, IS – Irina S. Stepanchikova, and AZ – Anna S. Zueva. The subdivision of the Leningrad Region (LR) was published in our previous paper (Stepanchikova et al., 2010); the biogeographical border between the eastern and western parts of the region is the Volkhov River (see Kuznetsova et al., 2007). The following abbreviations are used here: LR – Leningrad Region, WLR – Western Leningrad Region. The biogeographical provinces of Eastern Fennoscandia are abbreviated traditionally (Kotiranta et al., 1998): Ka – Karelia australis, Kl – Karelia ladogensis. All geographical coordinates are given in the spatial reference system WGS 84;

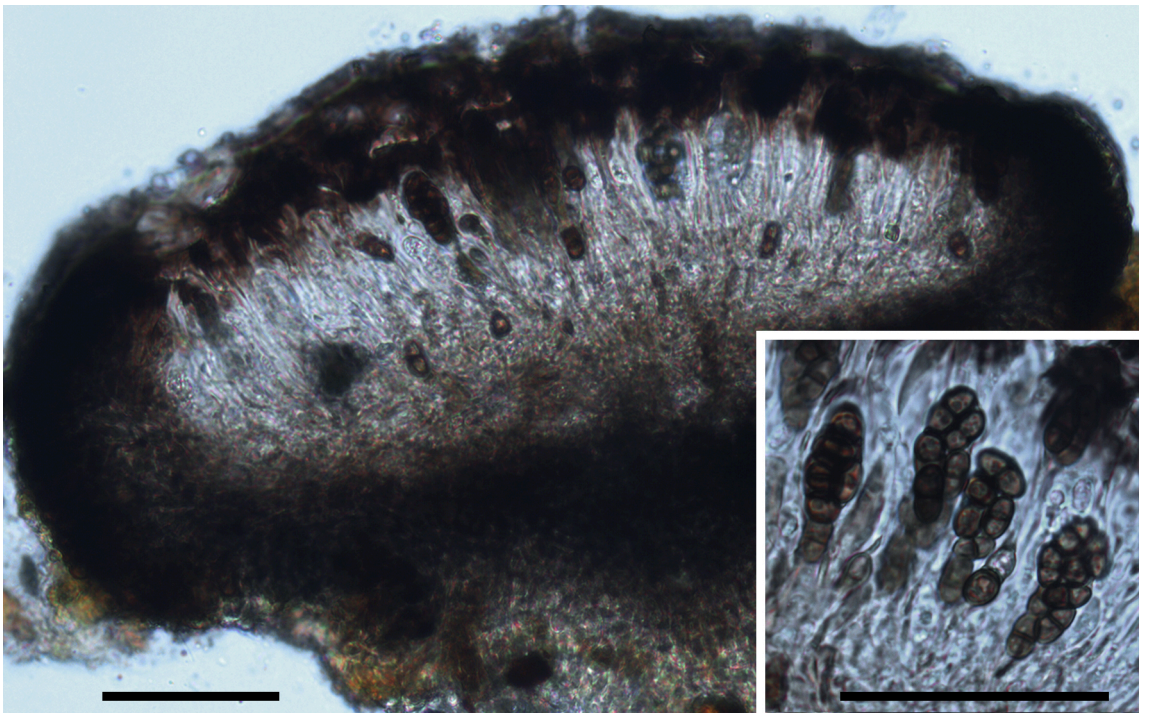

**Fig. 1.** *Sclerococcum australe*, cross section of apothecium. Scale bars = 50 µm.

coordinates are given in square brackets when specified approximately based on interactive maps. Lichenicolous fungi are marked with #. The nomenclature of taxa generally follows Westberg et al. (2021) for lichens and Diederich et al. (2018) for lichenicolous fungi.

## RESULTS AND DISCUSSION

Altogether 17 species are reported, including 14 lichens and three lichenicolous fungi. The lichenicolous fungus *Sclerococcum australe* is new to Russia. *Arthopyrenia cinereopruinosa*, *Aspicilia grisea*, *Buellia miriquidica*, *Catillaria atomarioides*, *Lithocalla ecorticata*, *Miriquidica intrudens*, *Rhizocarpon intermediellum*, *Sclerococcum amygdalariae*, and *S. parasiticum* are new for North-Western European Russia. *Gyalecta russula*, *Koerberiella wimmeriana*, *Lecidella scabra*, *Lithocalla ecorticata*, *Miriquidica nigroleprosa*, *Rhizocarpon expallescens*, and *Rinodina interpolata* are new for the Leningrad Region. All the records are located in WLR. Most records are saxicolous lichens or lichenicolous fungi in saxicolous communities, and 12 of them are from Hogland Island. Rocky biotopes in the Leningrad Region are most complicated communities in terms of lichen studies, therefore they are understudied in comparison to other biotopes. Moreover, Hogland Island which is situated in Baltic Sea has unique relief and the variety of habitats, therefore its lichen biota differs significantly from that of the mainland part of the region. It contains more saxicolous lichens, including maritime species. Some species occurring in Hogland, including *Umbilicaria cylindrica*, are more common in mountainous areas. Subsequent studies of Hogland lichen biota may reveal further new records.

## THE SPECIES

Arthopyrenia cinereopruinosa (Schaer.) A. Massal. – Kingisepp District, Ka, Hogland, W shore between Vähänsomerikonlahti Bay and Mustakallio, 60°05'20.8"N 26°56'46.1"E, deep shady crevice in rock, on bark of *Sorbus aucuparia* L., 20.06.2020, DH, IS, & AR (LECB). – New to North-Western European Russia. The nearest locality in European Russia is in the

Kaliningrad Region (Dedkov et al., 2007). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, Finland (Westberg et al., 2021), Estonia (Randlane et al., 2023), Lithuania (Motiejūnaitė, 2017). The species is close to *Arthopyrenia analepta* (Ach.) A. Massal., from which it differs by ascospores with a distinct median constriction in both cells, and different conidia (not seen in our material) (Coppins & Orange, 2009).

Aspicilia grisea Arnold – Priozersk District, Kl, shore of Lake Ladoga N of Burnevo (former Norsniemi), "Kuzhechnoe" Proposed Protected Area, 61°06'23.9"N, 30°02'28.7"E, crack in rocky shore of Lake Ladoga, on vertical siliceous rocky wall, 07.09.2021, IS, AR, & AZ (LECB). The specimen contains norstictic acid (K+ yellow to red, forming crystals). – New to North-Western European Russia. The nearest locality in European Russia is in the Murmansk Region (Urbanavichus et al., 2008). Distribution in Fennoscandia and Baltic countries: Sweden (Westberg et al., 2021) and Estonia (Randlane et al., 2023). The species is characterized by thin cracked-areolate grey thallus with scattered soralia, and presence of norstictic acid in thallus (Foucard, 2001; Fletcher et al., 2009a). Apothecia in our material are poorly developed.

Buellia miriquidica Scheid. – Kingisepp District, Ka, Hogland, Limonnikova Bay (former Lettolahti), 60°02'43.5"N, 26°58'14.7"E, boulders surrounded by community of *Myrica gale* L., *Calluna vulgaris* (L.) Hull and separate young pines on rocky seashore, on siliceous rock, lichenicolous lichen on the thallus of *Schaereria fuscocinerea* (Nyl.) Clauzade & Cl. Roux, 04.07.2022, IS & VP (LECB). – New to North-Western European Russia. The nearest locality in Russia is in the Novaya Zemlya Archipelago (Andreev et al., 1996). Distribution in Fennoscandia and Baltic countries: Norway and Sweden (Westberg et al., 2021). The species is characterized by having grey thallus with I+ blue medulla, 2-celled ascospores, and inhabiting thalli of *S. fuscocinerea* (Foucard, 2001).

Catillaria atomarioides (Müll. Arg.) H. Kilias – Kingisepp District, Ka, Hogland, Cape Limonnikova (former Selkäapajanniemi), 60°02' 53.1"N, 26°57'57.3"E, rocky seashore, on siliceous rock, 04.07.2022, IS & VP (LECB, in the specimen of *Rhizocarpon intermediellum*); same area, 60°02'52.8"N, 26°57'47.2"E, rocky seashore, on siliceous rock, 04.07.2022, IS & VP (LECB); same area, W of the Southern Lighthouse (Valkiakallio), 60°00'50.9"N, 26°59' 41.4"E, upper part of seashore rocky slope, on siliceous rock, 06.07.2022, IS & VP (LECB). – New to North-Western European Russia. The nearest locality in European Russia is in the Murmansk Region (Melekhin, 2017). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, Finland (Westberg et al., 2021), and Estonia (Randlane et al., 2023). The species is highly similar to *Catillaria chalybeia* (Barrer) A. Massal., from which it differs by colourless hypothecium (Foucard, 2001).

Gyalecta russula (Nyl.) Baloch et al. – Kingisepp District, Ka, Hogland, W part, Ratassomerikonkalliot, 60°03'05.1"N, 26°58'29.6"E, steep rocky slope of NWW exposure, on siliceous rock, 04.07.2022, IS & VP (LECB); same area, 60°03'04.5"N, 26°58'29.3"E, steep rocky slope of N exposure, on siliceous rock, 04.07.2022, IS & VP (LECB); Priozersk District, Kl, shore of Lake Ladoga N of Burnevo, "Kuzhechnoe" Proposed Protected Area, 61°06'23.9"N, 30°02' 28.7"E, crack in rocky shore of Lake Ladoga, on vertical siliceous rocky wall, 07.09.2021, IS, AR & AZ (LECB). – Distribution in North-Western European Russia outside of LR: Republic of Karelia (Fadeeva et al., 2007). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, and Finland (Westberg et al., 2021). The species is distinguished by smooth reddish thallus, apothecia superficially resembling perithecia, and spores 50–125 × 3–6 μm (Foucard, 2001; Gagarina, 2017).

Koerberiella wimmeriana (Körb.) Stein. – Kingisepp District, Ka, Hogland, S part, W of the Southern Lighthouse (Valkiakallio), 60°00'49.2"N, 26°59'44.0"E, rocky seashore, on siliceous rock, 02.07.2022, IS & VP (LECB); same area, E shore (SW of Lehtsatamanniemi), 60°00'54.0"N, 27°00'52.0"E, rocky slope with large stones, pine and juniper, on siliceous rock, 05.07.2022, IS & VP (LECB); same area, 60°00'55.1"N, 27°00'54.7"E, rocky seashore, on siliceous rock, 05.07.2022, IS & VP (LECB, in the specimen of *Porpidia tuberculosa* (Sm.) Hertel & Knoph. – Distribution in North-Western

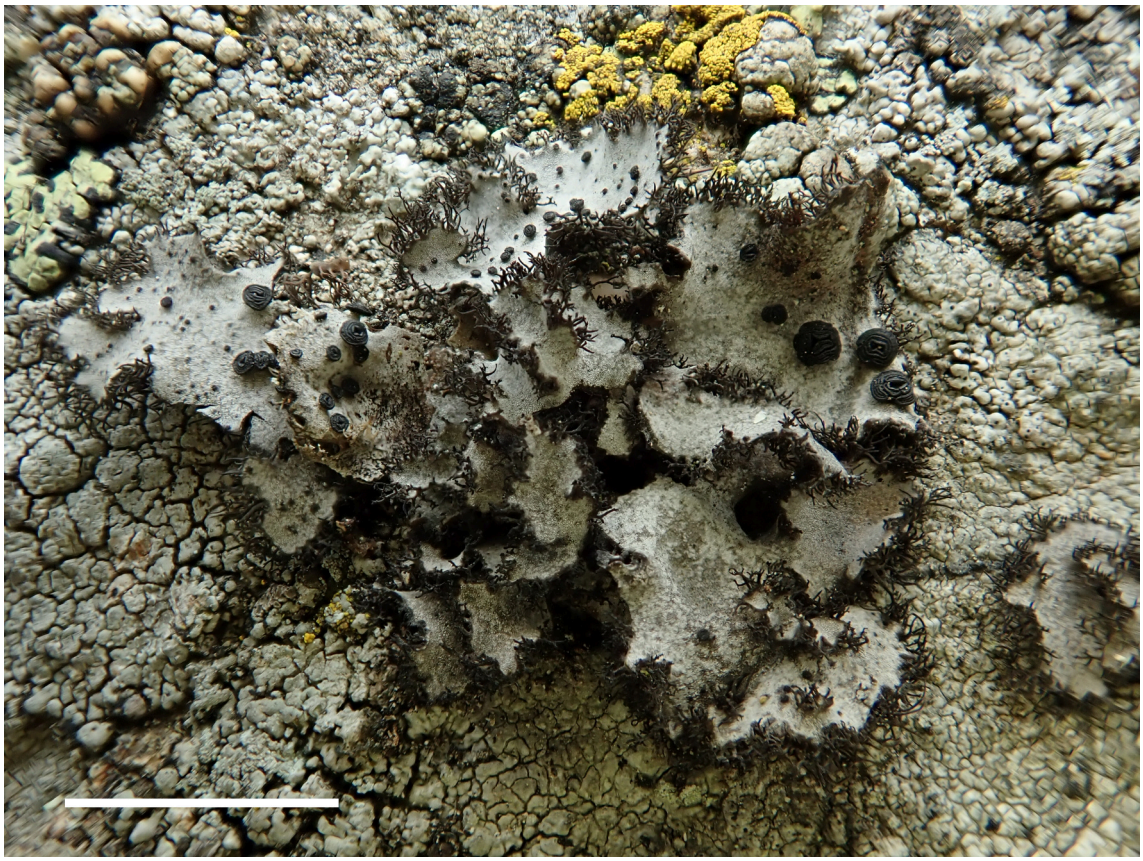

**Fig. 2.** *Umbilicaria cylindrica* on boulder on the top of Lounatkorkia. Scale bar = 1 cm.

European Russia outside of LR: Republic of Karelia (Fadeeva et al., 2007). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, and Finland (Westberg et al., 2021). The species is characterized by areolate thallus with isidia-like papillae on the surface (Foucard, 2001). Our material is sterile.

Lecidella scabra (Taylor) Hertel & Leuckert – Kingisepp District, Ka, Hogland, S part, W of the Southern Lighthouse (Valkiakallio), 60°00'48.0"N, 26°59'45.0"E, crevice in seashore rocks, on siliceous rock, 02.07.2022, IS & VP (LECB); same area, Cape Limonnikova (Selkäapajarankallio), 60°02'53.1"N, 26°57'57.3"E, rocky seashore, on siliceous rock, 04.07.2022, IS & VP (LECB); same area, 60°02'49.7"N, 26°57'45.9"E, rocky seashore, on siliceous rock, 04.07.2022, IS & VP (LECB). The specimens contain atranorin, thiophanic acid, and thuringione. – Distribution in North-Western European Russia outside of LR: Republic of Karelia (Fadeeva et al., 2007). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, Finland (?) (Westberg et al., 2021), and Estonia (Randlane et al., 2023). The species is characterized by thin to coarsely granulate greyish thallus, C+ orange, with scattered to confluent soralia (Foucard, 2001; Fletcher et al., 2009b).

Lithocalla ecorticata (J. R. Laundon) Orange – Priozersk District, Kl, NW of Kuznechnoe (former Kaarlahti), E shore of Lake Bolshoe Podgornoe (Lauttalampi), "Ojajärvi-Ilmenjoki" Proposed Protected Area, 61°09'34.6"N, 29°46'53.5"E, on vertical siliceous rock facing to lake, 10.09.2021, IS, AR, & AZ (LECB); same district, W of Shushinskoe Lake (Sylijärvi), 61°01'49.4"N, 29°41'51.4"E, vertical rocky slope, on siliceous

rock, 01.10.2022, DH & IS (LECB). The specimens contain usnic acid and zeorin. – New to North-Western European Russia. The nearest locality in European Russia is in the Arkhangelsk Region (Tarasova et al., 2016). Distribution in Fennoscandia and Baltic countries: Norway (Orange, 2020). The species is characterized by a leprose yellowish-green thallus and production of usnic acid and zeorin (Saag et al., 2009).

Miriquidica intrudens (H. Magn.) Hertel & Rambold – Kingisepp District, Ka, Hogland, S part, E shore, W of Alttarkallionniemi, 60˚01'17.0"N, 27˚01'18.4"E, rocky outcrops disturbed by fire, on siliceous rock together with *Rhizocarpon geographicum* (L.) DC. s. l., 05.07.2022, IS & VP (LECB). – New to North-Western European Russia. The nearest locality in European Russia is in the Murmansk Region (Zhdanov, 2011). Distribution in Fennoscandia and Baltic countries: Norway and Sweden (Westberg et al., 2021). The species is characterized by glossy brown areolate thallus with black marginal soralia, negative spot tests, the presence of miriquidic acid, and growing on thalli of crustose lichens, lichenicolous mainly on *R. geographicum* (Foucard, 2001; Giavarini et al., 2009).

Miriquidica nigroleprosa (Vain.) Hertel & Rambold var. nigroleprosa – Kingisepp District, Ka, Hogland, S part, W of the Southern Lighthouse (Valkiakallio), 60°00’49.2”N, 26°59’44.0”E, rocky seashore, on siliceous rock, 02.07.2022, IS & VP (LECB); same area, Popova Mt. (Lounatkorkia), E slope, 60°01’45.5”N, 27°00’10.5”E, upper part of seashore rocky slope, moss-lichen community, on siliceous rock, 03.07.2022, IS & VP (LECB); same area, Limonnikova Bay (Lettolahti), 60°02’43.5”N, 26°58’14.7”E, boulders surrounded by community of *Myrica gale*, *Calluna vulgaris* and separate young pines on rocky seashore, on granite boulder, 04.07.2022, IS & VP (LECB); same area, E shore SW of Lehtsatamanniemi, 60°00’54.0”N, 27°00’52.0”E, rocky slope with large stones, pine and juniper, on siliceous rock, 05.07.2022, IS & VP (LECB); same area, 60°00’55.1”N, 27°00’54.7”E, rocky seashore, on siliceous rock, 05.07.2022, IS & VP (LECB); same area, W of the Southern Lighthouse (Valkiakallio), 60°00’55.0”N, 26°59’38.9”E, lichen-moss community on rocks, on siliceous rock, 06.07.2022, IS & VP (LECB); Priozersk District, Kl, shore of Lake Ladoga E of Kuznechnoe, “Kuzhechnoe” Proposed Protected Area, 61°07’46.2”N, 29°57’18.0”E, open vertical rock with lichens, on siliceous rock, 09.09.2021, IS, AR, & AZ (LECB). The specimens contain miriquidic acid. – Distribution in North-Western European Russia outside of LR: Republic of Karelia (Fadeeva et al., 2007). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, and Finland (Westberg et al., 2021). The species is characterized by areolate grey thallus with soredia, developing from the upper surface, negative spot tests, and the presence of miriquidic acid (Foucard, 2001; Giavarini et al., 2009).

Rhizocarpon expallescens Th. Fr. – Priozersk District, Kl, shore of Lake Ladoga N of Burnevo, “Kuzhechnoe” Proposed Protected Area, 61°06’23.9”N, 30°02’28.7”E, crack in rocky shore of Lake Ladoga, on vertical siliceous rocky wall, 07.09.2021, IS, AR, & AZ (LECB). – Distribution in North-Western European Russia outside of LR: Republic of Karelia (Fadeeva et al., 2007). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, and Finland (Westberg et al., 2021). The species has whitish-grey thallus, negative spot tests, ascospores colourless, 2-celled, 14–20 × 6–10 µm (Foucard, 2001).

Rhizocarpon intermediellum Räsänen – Kingisepp District, Ka, Hogland, Cape Limonnikova (Selkäapajarankallio), 60°02’53.1”N, 26°57’ 57.3”E, rocky seashore, on siliceous rock together with *Tephromela atra* (Huds.) Hafellner and other crustose lichens, 04.07.2022, IS & VP (LECB). – New to North-Western European Russia. The nearest locality in European Russia is in the Murmansk Region (Melekhin, 2015). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, and Finland (Westberg et al., 2021). The species is characterized by pale yellow-green thallus, medulla K–, P–, I+ blue, flat apothecia with distinguishable margin, reddish brown epihymenium (K+ red), and brown submuriform ascospores 12–21 × 6–10 µm; often grows on other saxicolous crustose lichens (Foucard, 2001).

Rinodina interpolata (Stirt.) Sheard – Vyborg District, Ka, Berezovye Islands (Koiviston Saaret), Tsepnoj Island, central part, E shore,

60°22'27"N, 28°27'51"E, on granite boulder on seashore, 06.06.2014, DH, IS, & Gulnara M. Tagirdzhanova (LECB). – Distribution in North-Western European Russia outside of LR: Republic of Karelia (Fadeeva et al., 2007, as a synonym of *R. tephraspis* (Nyl.) Herre). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, Finland (Westberg et al., 2021), and Estonia (Randlane et al., 2023). The species is characterized by thin to thick grey to brown thallus, spores *Physcia*-type to *Physconia*-type, and inhabiting rocks (Mayrhofer & Moberg, 2002).

#Sclerococcum amygdalariae (Triebel) Ertz & Diederich – Priozersk District, Kl, shore of Lake Ladoga N of Burnevo, "Kuzhechnoe" Proposed Protected Area, 61°06'23.9"N, 30°02'28.7"E, crack in rocky shore of Lake Ladoga, vertical siliceous rocky wall, on thallus of *Amygdalaria panaeola* (Ach.) Hertel & Brodo, 07.09.2021, IS, AR, & AZ (LECB). – New to North-Western European Russia. The nearest locality in European Russia is in the Murmansk Region (Urbanavichus et al., 2008). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, and Finland (Westberg et al., 2021). The species is characterized by having medium brown hypothecium, 8-spored asci, 1-septate ascospores not exceeding 11 µm in length, and inhabiting *Amygdalaria* spp. (Ihlen et al., 2004).

#Sclerococcum australe (Triebel & Hertel) Ertz & Diederich – Kingisepp District, Ka, Hogland, Cape Limonnikova (Selkäapajarankallio), 60°02'53.1"N, 26°57'57.3"E, rocky seashore, on thallus of sterile crustose lichen (cf. *Porpidia* sp.) on siliceous rock, 04.07.2022, IS & VP (LECB, in the specimen of *Rhizocarpon intermediellum*; Fig. 1). – New to Russia. Distribution in Fennoscandia and Baltic countries: Sweden (Westberg et al., 2021). The species is characterized by having pale brown to brown hypothecium, apically branched dark-capped paraphyses, 8-spored asci, 1-septate brown ascospores sized (7.5)–9.5–11.5–(13.5) × (4)–4.5–5.5–(6) µm, and having a wide range of hosts among crustose saxicolous lichens (Triebel, 1989; Ihlen et al., 2004). Our material fully corresponds to the description. *Sclerococcum homoclinellum* (Nyl.) Ertz & Diederich is quite similar to *S. australe*, but it differs in paler hypothecium and inhabiting thalli of lecanoroid lichens (Triebel, 1989; Ihlen et al., 2004).

#Sclerococcum parasiticum (Flörke) Ertz & Diederich – Kingisepp District, Ka, Hogland, W shore, Pahanronkallio, 60°01'30.8"N, 26°58'55.5"E, young aspen forest in deep crevice, on thallus of *Pertusaria pertusa* (Weigel) Tuck. on bark of *Populus tremula* L., 06.05.2021, DH, IS, AR, & Zh. Zholobova (LECB). – New to North-Western European Russia. The nearest locality in European Russia is in the Republic of Komi (Zhurbenko et al., 2012). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, Finland (Westberg et al., 2021), and Estonia (Randlane et al., 2023). The species is characterized by having brown hypothecium, 8-spored asci, up to 3-septate brown ascospores, and growing on *Ochrolechia* and *Pertusaria* spp. (Ihlen et al., 2004).

Umbilicaria cylindrica (L.) Delise ex Duby – Kingisepp District, Ka, Hogland, S part, top of Popova Mt. (Lounatkorkia), ca. 160 m a. s. l., 60°01'39.4"N, 26°59'46.3"E, large siliceous boulder on rock, on granite boulder, 04.05.2021, DH, IS, AR, & Zh. Zholobova (LECB; Fig. 2). – Distribution in North-Western European Russia outside of LR: Republic of Karelia (Fadeeva et al., 2007). Distribution in Fennoscandia and Baltic countries: Norway, Sweden, Finland (Westberg et al., 2021), and Estonia (Randlane et al., 2023). The species can be distinguished from other Baltic *Umbilicaria* spp. by grey thallus with numerous black rhizinomorphs in peripheral part of its lower surface (Davydov, 2017).

## ACKNOWLEDGEMENTS

Authors thank Irina A. Sorokina who inspired the study of saxicolous communities in the Leningrad Region, Elena A. Glazkova who helped us to organize the expeditions, Anna S. Zueva who collected several specimens, and all other participants of the fieldwork. We appreciate valuable comments and corrections suggested by Dr. Tiina Randlane and Dr. Rolands Moisejevs.

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