

New records of lichens and allied fungi from Lapponia petsamoënsis, Murmansk Region, Russia

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Abstract: Fourteen species of lichens, four lichenicolous and two non-lichenized calicioid fungi are reported for the first time from the biogeographic province Lapponia petsamoënsis (NW Murmansk Region, Russia); of these, *Buellia pulvereana*, *Endococcus brachysporus* and *Micarea coppinsii* are reported for the first time for Russia, *Rosellinula haplospora* is new to European Russia, and *Aspicilia mashiginensis*, *Chaenothecopsis rubescens*, *C. vainioana*, *Lecidea sudetica*, *Micarea micrococca*, *Porpidia pachyballina*, *Protoparmelia atriseda* and *Psorotichia schaeferi* are new to the Murmansk Region. Brief notes, mainly on habitats and distribution, are provided for all species listed.

Keywords: *Buellia pulvereana*, *Endococcus brachysporus*, *Micarea coppinsii*, Pasvik Nature Reserve, North-Western Russia

INTRODUCTION

The Pasvik Nature Reserve is located in the northwestern part of the Murmansk Region, in the biogeographic province Lapponia petsamoënsis on the east bank of the Paz River (Fig. 1) and has a land area of c. 117 km² (http://www.pasvik-inari.net/neu/eng/area_Pasvik_Zapovednik.html; Urbanavichus & Urbanavichene, 2017). Early lichenological exploration of the Lapponia petsamoënsis is connected with Finnish lichenologist Veli Räsänen, who published a detailed study on the lichens of Pechenga (“Petsamon jäkäläkasvisto”), listing more than 520 taxa (Räsänen, 1943). The most recent published additions to the Lapponia petsamoënsis lichen flora were from the Pasvik Reserve by, for example, Urbanavichus & Fadeeva (2017, 2018) and Urbanavichus & Urbanavichene (2017), and from other localities in Pechenga district by Konoreva et al. (2017). Among the 20 taxa listed here, the lichens *Buellia pulvereana* and *Micarea coppinsii* and the lichenicolous fungus *Endococcus brachysporus* are reported for the first time for Russia, the lichenicolous fungus *Rosellinula haplospora* for European Russia, while the lichens *Aspicilia mashiginensis*, *Lecidea sudetica*, *Micarea micrococca*, *Porpidia pachyballina*, *Protoparmelia atriseda* and *Psorotichia schaeferi*, as well as the non-lichenized calicioid fungi *Chaenothecopsis rubescens* and *C. vainioana* are new for the Murmansk Region. All reported taxa are new for the Lapponia petsamoënsis, the

current number of lichens, lichenicolous fungi and allied fungi for this biogeographical province totaling c. 810 taxa.

This article is the completion of the project “The Lichen Flora of the Pasvik Nature Reserve (Murmansk Region, NW Russia)”, which started in 2012 after the publication of the first list of lichens and allied non-lichenized fungi of Pasvik Reserve (Fadeeva et al., 2011); as a result, the known number of lichenized taxa for the Reserve is 520, as well as 42 lichenicolous taxa and 15 saprobic fungi. This is 44% of the taxa known from the Murmanian lichen flora. As regards growth form, the Pasvik lichen flora is dominated by crustose (included non-lichenized) taxa, which comprise about two-thirds (370 taxa) of the studied taxonomic diversity.

MATERIALS AND METHODS

Lichen collections were made by the first author in August 2017 (except for *Psorotichia schaeferi* which was collected in July 2014) mainly in pine forests and mountain tundra in the central part of the Pasvik Reserve. The material was microscopically studied and lichen substances analyzed by standard technique of thin-layer chromatography (TLC) in solvent systems A, B and C (Orange et al., 2001). Cited specimens are deposited in the Herbarium of the Institute of



Fig. 1. Location of the Pasvik Reserve and the biogeographic provinces in the Murmansk Region. The abbreviations of the biogeographic provinces: Lps – Lapponia petsamoënsis, Lt – Lapponia tulomensis, Lm – Lapponia murmanica, Lim – Lapponia imandrae, Lv – Lapponia varsugae, Lp – Lapponia ponojensis, Ks – Kuusamo (Regio kuusamoënsis), Kk – Karelia keretina.

the North Industrial Ecology Problems (INEP). The nomenclature follows Santesson's Checklist (Nordin et al., 2011).

Studied localities (all in Murmansk Region, Pechenga district, Pasvik Reserve):

1. Central part of the reserve, north-eastern part of the Kalkupya Mt., rocky outcrops above the timberline, 69°18'13.2"N, 29°23'16.5"E, alt. c. 200–215 m, 22.08.2017.
2. *Ibid.*, mountain-tundra belt, 69°18'05.4"N, 29°23'19.7"E, alt. c. 320 m, 22.08.2017.
3. *Ibid.*, south-eastern part of the Kalkupya Mt., pine and birch forest-tundra, 69°17'18.6"N, 29°20'11.9"E, alt. c. 280–300 m, 23.08.2017.
4. *Ibid.*, N foot of the Kalkupya Mt., old-growth pine forest with old willow trees, 69°18'40.0"N, 29°24'19.0"E, alt. c. 75 m, 24.08.2017.
5. *Ibid.*, N foot of the Kalkupya Mt., the east bank of the Paz River opposite to Nivasaari Island, old-growth pine forest, 69°18'47.4"N, 29°22'45.0"E, alt. c. 55 m, 26.08.2017.
6. *Ibid.*, S foot of the Kalkupya Mt., eastern shore of Lake Vouvatusjärvi, old-growth spruce forest, 69°16'19.3"N, 29°18'28.8"E, alt. c. 80 m, 27.08.2017.
7. Northern part of the reserve, pine forest and calciferous rocks on the SW slope of the unnamed mountain, 69°20'56.8"N, 29°46'33.2"E, alt. c. 130 m, 25.07.2014.

The following signs and abbreviations are used in the species list: ! – species new to Russia, !! – species new to Murmansk Region, # – lichenicolous fungi, + – saprobic fungi, MR – Murmansk Region.

THE SPECIES

- ASPICILIA GRISEA Arnold – 2: on rocks. The species was previously known in MR from Khibiny Mts and Lapponia imandrae (Urbanavichus et al., 2008). Formerly known in Russia only from MR and Komi Republic, North Ural Mts (Lavrinenko et al., 2005). Distribution in Fennoscandia: Sweden (Nordin et al., 2011).
- !!ASPICILIA MASHIGINENSIS (Zahlbr.) Oxner – 2: on rocks. This rare species in Russia was previously known only from Novaya Zemlya (Andreev et al., 1996). Rather widespread in Norway and Sweden (Nordin et al., 2011).
- !BUELLIA PULVEREA Coppins & P. James – 6: on branches and trunk of spruce. This species is usually sterile (our specimens are without apothecia); thallus powdery sorediate-granular, dull grey-green to brown-grey with distinct Pd+ yellow, C+ pink, KC+ red reactions, and UV+ yellow due to the presence of alectorialic acid (TLC). *B. pulverea* is a rather widespread species in Central and Western Europe (e.g. Diederich et al., 1991; Coppins et al., 2009; Wirth et al., 2013) and surprisingly, it has not yet been reported from Northern Europe. When lacking apo-

- thecia, *B. pulverea* might be mistaken for the rather polymorph and widespread in Northern Europe species *Pycnora sorophora* (Vain.) Hafellner (also containing alectorialic acid), which is distinguished by the presence of usually numerous pycnidia and weakly convex areoles with apical soralia, K+ yellow.
- CHAENOTHECA FERRUGINEA** (Turner ex Sm.) Mig. – 5: on lignum of pine. This rare species in MR, previously known only from Lapponia imandrae and Karelia keretina (Urbanavichus et al., 2008). Common species in Fennoscandia (Nordin et al., 2011).
- !!+CHAENOTHECOPSIS RUBESCENS** Vain. – 6: on bark of spruce. This is the northernmost locality in Europe. The nearest locality in NW Russia is the Pechero-Ilych Nature Reserve in Komi Republic (Hermansson et al., 2006). In Northern Europe known only from southern Finland (Nordin et al., 2011). The species is characterized by its non-septate spores, and the presence of a yellowish-red pigment which reacts K+ persistent red.
- !!+CHAENOTHECOPSIS VAINIOANA** (Nádv.) Tibell – 4: on bark of willow. Associated with *Trentepohlia*-containing *Arthonia vinosa* Leight. This is the northernmost locality in Europe. The nearest locality in NW Russia is the biogeographic province Karelia onegensis in Republic of Karelia (Fadeeva et al., 2007). Distribution in Fennoscandia: Norway, Sweden and Finland (Nordin et al., 2011).
- !#ENDOCOCCUS BRACHYSPORUS** (Zopf) M. Brand & Diederich – 3: on *Porpidia melinodes* (Körb.) Gowan & Ahti (thallus) on rocks. The species differs from *E. propinquus* Nyl. by its small spores each with a 1.5 µm thick septum (Sérusiaux et al., 1999). In Northern Europe known only from Sweden (Nordin et al., 2011).
- LECANORA ANOPTA** Nyl. – 2: on dry twigs of birch. This species in MR previously known only from Karelia keretina (Urbanavichus et al., 2008). It is characterized by its granular epihymenium, strongly inspersed hymenium with yellowish-brown grains and N+ reddish *cinereorufa*-green pigment (Wirth et al., 2013). Distribution in Fennoscandia: Norway, Sweden and Finland (Nordin et al., 2011).
- LECANORA CADUBRIAE** (A. Massal.) Hedl. – 6: on branches of spruce. Widespread in Northern Europe. The species was previously known in MR from Lapponia murmanica, Lapponia imandrae, Khibiny Mts and Karelia keretina (Urbanavichus et al., 2008). A common species in Fennoscandia (Nordin et al., 2011).
- LECIDEA PROMISCENS** Nyl. – 5: on rocks. This species in MR previously known only from Khibiny Mts and Lapponia varsugae (Urbanavichus et al., 2008). Distribution in Fennoscandia: only Finnmark in Norway and Sweden (Nordin et al., 2011).
- !!LECIDEA SUDETICA** Körb. – 5: on rocks. This rare species was previously known in NW Russia from Karelia kuusamoënsis and Karelia ladogensis in Republic of Karelia (Fadeeva et al., 2007). In Northern Europe known from southern Finland (Nordin et al., 2011). The species is a close relative of *Lecidea lapicida* (Ach.) Ach. var. *pantherina* Ach., but readily distinguished by its very thick (up to 1–1.5 mm) thallus with large (1–3 mm diam.) strongly convex areoles, with 3–8 µm thick epinecral layer (Wirth et al., 2013).
- !!MICAREA COPPINSII** Tønsberg – 5: on rocks. This is the northernmost locality in Europe. In Northern Europe known only from southern and central Norway (Nordin et al., 2011). The species is characterized by its discrete, rounded, convex, grey-green areoles, bursting apically to produce soralia; soralia green with farinose soredia, some with blue-green (K–, N+ red) pigmented hyphae; prothallus not evident; photobiont cells 4–7 µm diam. (Coppins, 2009). Apothecia absent in our specimens. Thallus and soralia C+ reddish, KC+ red, K–, Pd–, UV–; 5-O-methylhiasic acid [major], gyrophoric acid [trace], ± lecanoric acid [trace] (TLC).
- !!MICAREA MICROCOCCA** (Körb.) Gams ex Coppins – 4: on bark of willow. This is the northernmost locality in Europe. Rather widespread in southern Fennoscandia (Nordin et al., 2011). In NW European Russia known only from Leningrad Region (Konoreva & Chesnokov, 2017). Our specimen is characterized by: thallus poorly developed, goniocysts coalescing, green; small apothecia, 0.1–0.2 µm diam., convex to hemispherical, cream white or brownish, K–, C–; ascospores 0–1 septate, oblong-ellipsoid or obovoid, 8.5–10.2 × 2.5–3.4 µm (lacking TLC due to small specimen).

#MUELLERELLA VENTOSICOLA (Mudd) D. Hawksw. – 1: on *Rhizocarpon geographicum* (L.) DC. (thallus) on rocks. This species in MR previously known only from Lapponia ponojensis (Urbanavichus et al., 2008). Distribution in Fennoscandia: Norway and Sweden (Nordin et al., 2011).

!!PORPIDIA PACHYTHALLINA Fryday – 3: on small flat stones. Formerly known in Russia only from Komi Republic, “Yugyd Va” National Park, Ural Mts (UPS L-144956). New to Fennoscandia. The species is characterized by (1) thick thallus composed of dispersed, white, convex areoles, (2) tuberculate blue-grey soralia, (3) numerous small ‘oil droplets’ when viewed in section, (4) the presence of the confluent acid (TLC), and (5) characteristic ecology, usually occurring on the upper surfaces of low, flat rocks at high altitude (Fryday, 2005). It is most likely to be confused with *P. tuberculosa* (Sm.) Hertel & Knoph which is also sorediate and contains confluent acid. However, *P. pachythallina* has a thicker, whitish thallus with a non-amyloid (I–) medulla.

!!PROTOPARMELIA ATRISEDA (Fr.) R. Sant. & V. Wirth – 1: on rocks with *Rhizocarpon* sp. Formerly known in Russia from Leningrad Region and Southern Siberia (Zhdanov, 2011). Rather widespread in Norway, Sweden and Finland (Nordin et al., 2011).

!!PSOROTICHIA SCHAEERERI (A. Massal.) Arnold – 7: on calciferous rocks. This is the northernmost locality in Europe. The nearest locality in Fennoscandia is the province Lapponia kittilensis in northern Finland (Nordin et al., 2011) and in NW Russia is the biogeographic province Karelia onegensis in Republic of Karelia (Fadeeva et al., 2007). New genus to the Pasvik Reserve.

RHIZOCARPON CINEREOVIRENS (Müll. Arg.) Vain. – 1: on rocks. The species was previously reported in MR only from Khibiny Mts and Lapponia imandrae (Urbanavichus et al., 2008). Distribution in Fennoscandia: Sweden (Nordin et al., 2011).

!!#ROSELLINULA HAPLOSPORA (Th. Fr. & Almq. ex Th. Fr.) R. Sant. – 5: on *Aspicilia cinerea* (L.) Körb. (thallus) on rocks. New to European Russia. This is the second report of this species for Russia; in Asiatic Russia, it has recently been reported from Zabaikal’skii

Territory (Zhurbenko & Yakovchenko, 2014). Rather widespread in Norway and Sweden (Nordin et al., 2011). New genus to the Pasvik Reserve.

#TAENIOLELLA ROLFII Diederich & Zhurb. – 1: on *Cetraria nigricans* Nyl. (thallus) on soil. Rather widespread in MR – Lapponia tulomensis, Lapponia murmanica, Lapponia imandrae, Khibiny Mts and Kuusamo (Urbanavichus et al., 2008). Distribution in Fennoscandia: Norway, Sweden and Finland (Nordin et al., 2011).

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REFERENCES

- Andreev, M., Kotlov, Y. & Makarova, I. 1996. Checklist of lichens and lichenicolous fungi of the Russian Arctic. *The Bryologist* 99: 137–169. <https://doi.org/10.2307/3244545>
- Coppins, B. J. 2009. *Micarea* Fr. (1825). In: Smith, C. W., Aptroot, A., Coppins, B. J., Fletcher, A., Gilbert, O. L., James, P. W. & Wolseley, P. A. (eds). *The lichens of Great Britain and Ireland*. London, pp. 583–606.
- Coppins, B. J., Scheidegger, C. & Aptroot, A. 2009. *Buellia* De Not. (1846). In: Smith, C. W., Aptroot, A., Coppins, B. J., Fletcher, A., Gilbert, O. L., James, P. W. & Wolseley, P. A. (eds). *The lichens of Great Britain and Ireland*. London, pp. 228–238.
- Diederich, P., Sérusiaux, E. & van den Boom, P. P. G. 1991. Lichens et champignons lichénicoles nouveaux ou intéressants pour la flore de la Belgique et des régions voisines. V. *Lejeunia* 136: 1–47.
- Fadeeva, M. A., Dudoreva, T. A., Urbanavichus, G. P. & Ahti, T. 2011. *Lichens of the Pasvik Strict Nature Reserve (annotated checklist)*. Apatity. 80 pp. (In Russian).
- Fadeeva, M. A., Golubkova, N. S., Vitikainen, O. & Ahti, T. 2007. *Conspectus of lichens and lichenicolous fungi of the Republic of Karelia*. Petrozavodsk. 194 pp. (In Russian).

- Fryday, A. M. 2005. The genus *Porpidia* in northern and western Europe, with special emphasis on collections from the British Isles. *Lichenologist* 37: 1–35. <https://doi.org/10.1017/S0024282904014628>
- Hermansson, J.-O., Pystina, T. N., Ove-Larsson, B. & Zhurbenko, M. P. 2006. Lichens and Lichenicolous Fungi of the Pechoro-Ilychski Nature Reserve. *Flora and Fauna of Nature Reserves* 109: 1–79. (In Russian).
- Konoreva, L. A. & Chesnokov, S. V. 2017. Distribution in Russia some species of the genus *Micarea* Fr. In: *Biodiversity: approaches of study and conservation. Proceedings of the International Scientific Conference dedicated to 100th anniversary of the Department of Botany of Tver State University*. Tver, pp. 169–172. (In Russian).
- Konoreva, L. A., Frolov, I. V. & Chesnokov, S. V. 2017. Lichens and allied fungi from the Pechenga district and surroundings (Lapponia petsamoënsis, Murmansk Region, Russia). *Folia Cryptogamica Estonica* 54: 17–23. <https://doi.org/10.12697/fce.2017.54.04>
- Lavrinenko, O. V., Plusnin, S. N., Urbanavichus, G. P. & Urbanavichene, I. N. 2005. Lichens of the mountain-tundra zone in the Pechora-Ilych Reserve. *Novitates Systematicae Plantarum Non Vascularum* 38: 213–225. (In Russian, English summary).
- Nordin, A., Moberg, R., Tønberg, T., Vitikainen, O., Dalsätt, Å., Myrdal, M., Snitting, D. & Ekman, S. 2011. *Santesson's Checklist of Fennoscandian Lichen-forming and Lichenicolous Fungi*. Ver. April 29, 2011 <http://130.238.83.220/santesson/home.php> (1 February 2018).
- Orange, A., James, P. W. & White, F. J. 2001. *Microchemical methods for the identification of lichens*. London. 101 pp.
- Räsänen, V. 1943. Petsamon jäkäläkasvisto. *Annales Botanici Societatis Zoologicae-Botanicae Fennicae «Vanamo»*. 18(1): 1–110.
- Sérusiaux, E., Diederich, P., Brand, A. M. & van den Boom, P. P. G. 1999. New or interesting lichens and lichenicolous fungi from Belgium and Luxembourg VIII. *Lejeunia* 162: 1–95.
- Urbanavichus, G. P. & Fadeeva, M. A. 2017. Additions to the lichen flora of the Pasvik Reserve (Murmansk region) based on records of 2015–2016. *Transactions of Karelian Research Centre of RAS. Ser. Biogeography* 6: 61–69. (In Russian, English summary). <https://doi.org/10.17076/bg581>
- Urbanavichus, G. P. & Fadeeva, M. A. 2018. New records for lichen flora of Pasvik Reserve (Murmansk region). *Uchenye zapiski Petrozavodskogo gosudarstvennogo universiteta* 3: 104–110. (In Russian, English summary).
- Urbanavichus, G. & Urbanavichene, I. 2017. New records and noteworthy lichens and lichenicolous fungi from Pasvik Reserve, Murmansk Region, Russia. *Folia Cryptogamica Estonica* 54: 31–36. <https://doi.org/10.12697/fce.2017.54.06>
- Wirth, V., Hauck, M. & Schultz, M. 2013. *Die Flechten Deutschlands*. Band 1. 672 pp.
- Zhdanov, I. S. 2011. The genus *Protoparmelia* (Parmeliaceae) in Russia: key to the species. *Novitates Systematicae Plantarum Non Vascularum* 45: 159–167. (In Russian, English summary).
- Zhurbenko, M. P. & Yakovchenko, L. S. 2014. A new species, *Sagediopsis vasilyevae*, and other lichenicolous fungi from Zabaikal'skii Territory of Russia, southern Siberia. *Folia Cryptogamica Estonica* 51: 121–130. <https://doi.org/10.12697/fce.2014.51.14>

