ON THE HEPATIC FLORA OF THE EASTERN SUBPOLAR URAL (KHANTY-MANSI AUTONOMOUS DISTRICT)

К ФЛОРЕ ПЕЧЕНОЧНИКОВ ВОСТОЧНОГО МАКРОСКЛОНА ПРИПОЛЯИНОГО УРАЛА (ХАНТЫ-МАНСИЙСКИЙ АВТОНОМНЫЙ ОКРУГ – ЮРГА)

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Abstract

An annotated list of hepatics of the Ner-Oika mountain (eastern Subpolar Urals in the Khanty-Mansi Autonomous District – Yugra, 64°30’ – 64°33’ N; 59°35’ – 59°38’ E) was compiled based on identification of ca. 800 specimens collected by Lapshina. It includes 97 species, eight of them are newly recorded for Urals (Hygrobiella laxifolia, Lophoziopsis polaris, Saccobasis polymorpha, Scapania brevicaulis, S. crassiretis, S. degenii, S. spitsbergensis, Solenostoma gracillimum) and 52 species are new for the district. New localities of hepatics rare in the Urals are revealed. A worldwide distribution of the treated species and some morphological peculiarities are discussed.

INTRODUCTION

A diversity of hepatics, their ecology and distribution in the Urals still remain poorly understood. The first comprehensive list of hepatics of Polar and Northern Urals was compiled by Zinovjeva (1973). It includes 130 species, but some of them were given erroneously (Konstantinova & Potemkin, 1996; Konstantinova et al., 2009). An annotated lists of hepatics were subsequently published for several Strict Nature Reserves situated in the Middle and Northern Urals, i.e., “Basegi” (Konstantinova et al., 2010), “Vishersky” (Konstantinova & Bezgodov, 2006), Pechora-Ilych Nature Reserve (Bakalin et al. 2001; Dulin, 2007), and for the Sob’ River valley in the Polar Urals (Konstantinova & Czernyadjeva, 1995). As a whole 156 species were registered for Northern Urals (Konstantinova et al., 2009). Most territories mentioned above are restricted to the western macroslope of the Urals, whereas data on hepatics of its eastern part are very limited (practically absent).

The Subpolar Urals is the part of Urals within the limits of the northern taiga subzone that is bordered in the north by the sources of Khulga River (65°40’N) and in the south by Tel’posis mountain (1694 m, 64°N). The Ner-Oika mountain is situated in the eastern Urals in the westernmost part of the Khanty-Mansi Autonomous District – Yugra. It is a part of a watershed and one of the highest and quite isolated peaks of Subpolar Urals (1645 m alt.). The nearest peaks are Mount Telposis that is 80 km to the south and Mount Narodnaya (1895 m alt.), the highest peak in the Subpolar Urals situated ca. 100 km to the north from Ner-Oika Mt.

The study area includes spurs of Ner-Oika and Zeika mountains divided by deep valleys of the tributaries of the Shchekuru’ya River (Fig. 1). The area is bordered in the east by the Shshekuru’ya River valley, in the south by the Kobyla-Yu River valley and in the north by the Dodovis Stream valley.

Bedrocks consist of metamorphic rocks (crystalline...

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Schists and quartzites and granites (Kemmerikh, 1970). Outcrops of schists are common at the bottom of steep slopes of stream valleys. Rock fields are quite common on slopes. There are no carbonate rocks in the area.

The climate is continental with long winters lasting about 7 months in the plains and about 9 months in mountains at height of 1000 m. The mean temperature of January is –19-23°C, minimal values reach –50-55°C. The mean temperature of July varies from 14-16°C in sub-montane plains to 5° at height of 1300-1400 m. The Ural Mts stretch from north to south blocking movement of humid Atlantic air masses and making their eastern slopes much drier than the western ones. Precipitation does not exceed 800 mm per year in the uplands whereas it can be 1500 mm on the western slopes. There are rare snowfields on the lee eastern slopes of the highest peaks (Kemmerikh, 1970).

Dark coniferous green moss forests with dominance of *Pinus sibirica*, *Larix sibirica* and *Betula pubescens* prevail in the forest belt. Secondary moss-herbs-birch forests with *Duscheckia fruticosa* in the understory are widespread as well (names of vascular plants are given following Czerpanov, 1995). At 400-500 m dark coniferous forests are replaced by brighter larch and birch forests mixed with meadows and dwarf shrub formations with *Betula nana* (yerniks). Alder stands with rock outcrops and mossy rocks are widespread on steep north facing slopes. In the lower part of a mountain tundra belt dwarf shrub-green moss and moss-lichen tundra alternate with meadows, yerniks and willow stands depending on moisture, thickness of snow cover, etc. Chionophila bryophyte dominated communities are not rare in appropriate sites, whereas grass spots at melted snow-beds are rather rare. Above 800-850 m dry debris-lichen moss tundra and rock fields prevail. Along a whole slope small patches of dwarf-shrub-*Sphagnum* bogs are not rare.

In 2013 E. Lapshina gathered 800 hepatic specimens on slopes of Mount Ner-Oika in the Subpolar Urals (Fig. 1-2). The studied area includes the upper part of the forest zone, subalpine and alpine (tundra) zones from 390 to 1035 m alt. Hepatics were not collected in the goltsy (polar desert belt).

**Species List**

The nomenclature follows Konstantinova, Bakalin et al. (2009), with some changes adopted from newer publications. We accepted the genus *Neoorthocaulis* (Söderström & al., 2010), the family Endogemmataceae with the single species *Endogemma caespitica* (Vilnet & al., 2011), the treatment of *Leiocolea* as *Mesopychia* (Váha & al., 2012), the treatment of *Cephalozia* and *Odontoschisma* in Vilnet & al. (2012) and Váha & al. (2013).

In the list, after the species name the presence of reproductive structures is given in parentheses (and. – androecia; gym. – gynoecia; per. – perianths or pseudoperianths; spor. – sporophytes; gem. – gemmae) and then collecting sites are enumerated. After them the number of localities where the species has been found and altitudinal range are given in parentheses. Altogether 30 localities were studied, but in the map some of them are combined, thus the map includes only 16 points. Then the species frequency is provided with the following categories: sporadic (sp., 4-6 localities), frequent (fr., 7-13 localities) and common (com., more than 13 localities). For rare species collected from 1-3 localities labels are cited. Asterisks before species name mean: * – new record for the District; ** – new record for the North Urals region (as it is defined by Konstantinova, Bakalin et al., 2009); *** – new record for the Urals.

Specimens are kept in the Herbarium of Yugra State University (Khanty-Mansiysk, Russia), duplicates in KPABG.

*a* *Anthelia juratzkana* (Limpr.) Trevis. (per., and., spor.) – 2-6, 8, 11, 12 (12: 450-950 m alt.), fr.: in extensive mats in snowbed communities, on cryogenic clay spots in tundras, on bare soil along streams or on road sides. Sometimes abundant, in pure mats or mixed with *Fuscocephaloziopsis albenscens*, *Marsupella sprucei* var. *ustulata*, *Gymnomitrium concinnatum*, *G. brevisimum*, *Nardia breidleri*, *Cephalozia bicuspidata*, *Nardia geoscyphus*, Pseudolophozia sudetica. *Barbilophozia barbata* (Schmidel ex Schreb.) Loeske – 11: at the base of rock in *Betula nana*-greenmoss tundra near timberline on north-eastern slope (64°33'47.5" N; 59°39'08.0" E, 570 m alt.), some stems among *Lophozia wenzelii* var. *greenlandica* (13-325) and *Lophozia wenzelii* (13-327/1).

*b* *B. lycocoides* (Wallr.) Lovas (per., and., spor.) – 3, 8, 10, 13-15 (7: 390-709 m alt.), fr.: in the ground layer and at the bottom of trees in dark coniferous and mixed *Vaccinium*-greenmoss and swampy forests, in alder bushes, as well as in dwarf shrub-greenmoss and moss-lichen tundras on humus-covered rocks and cliffs. Sometimes abundant. Without admixture of other liverworts or mixed with *Lophoziospis longidens*, *Lophozia cf. silvicola*, *L. ventricosa* var. *longiflora*, *Ptilidium pulcherimum*.

**(*)** *Biantheridion undulifolium* (Nees) Konstant. & Vilnet [Jamesoniella undulifolia (Nees) Müll. Frib.] (per.) – 9: dwarf shrub-ridge-*Sphagnum* bog on gentle slope of mountain (64°33'54.1" N; 59°35'38.5" E, 914 m alt.), among *Sphagnum* and green mosses (13-394/1); on dead *Sphagnum* among *Lophozia ventricosa* var. *longiflora* and admixtures of *Ptilidium ciliare*, *Cephalozia bicuspidata* (13-393/1). This species was previously known from one locality in Polar Urals (Konstantinova & Czernyadjeva 1995). The species is red-listed for Europe (Schumacker & Matriny, 1995) and in the world.

*B. pusilla* L. (gem.) – 1, 2, 3, 10 (5: 168-620 m), fr.: on moist clayish soil on road sides and on alluvium on banks of streams. Without admixtures of other species or mixed with *Pellia neesiana*, *Marchantia polymorpha* subsp. *montivagans*, *Scapania curta*, *Plectocolea hyalina*, *Solenostoma sphaerocarpum*, *Cephalozia bicuspidata*.

**(**) *Biantheridion undulifolium* (Nees) Konstant. & Vilnet [Jamesoniella undulifolia (Nees) Müll. Frib.] (per.) – 9: dwarf shrub-ridge-*Sphagnum* bog on gentle slope of mountain (64°33'54.1" N; 59°35'38.5" E, 914 m alt.), among *Sphagnum* and green mosses (13-394/1); on dead *Sphagnum* among *Lophozia ventricosa* var. *longiflora* and admixtures of *Ptilidium ciliare*, *Cephalozia bicuspidata* (13-393/1). This species was previously known from one locality in Polar Urals (Konstantinova & Czernyadjeva 1995). The species is red-listed for Europe (Schumacker & Matriny, 1995) and in the world.

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Blepharostoma trichophyllum (L.) Dumort. (per.) – 5, 6, 10, 12, 14, 16: in forests and subalpine alder bushes (Duschekia fruticosa), on decaying wood, on soil under deadfall, on mossy cliffs, under rocks, on bare soil and fine earth on banks of streams. Often with Fuscocephaloziopsis pleniceps, F. lunulifolia, Schistochilopsis opacifolia, Diplophyllum taxifolium, Lophozia ventricosa var. longiflora.

Calypogeia integristipula Steph. (gem.) – 14: in swampy birch-fir-Calamagrostis-Sphagnum-green moss forest (64°33'49.5" N; 59°40'42.9" E, 406 m alt.), in niches between roots of trees (13-357) with Lophozia cf. silvicola, Cephalozia bicuspidata and on humus and fine earth (13-365, 13-366, 13-367, 13-369/1, 13-370), without any admixture of other hepatics or mixed with Fuscocephaloziopsis pleniceps, F. lunulifolia, Blepharostoma trichophyllum.

C. muelleriana (Schiffn.) Müll. Frrib. – 5, 6, 10: dwarf shrub-Sphagnum bog within subalpine alder bushes on steep slopes of river valleys (64°34'05.2" N; 59°38'30.0" E, 510 m alt.), on dead Sphagnum (13-315, 13-316/1, 13-370) mixed with Mylia anomala, Neoorthocaulis binsteadii, Cephalozia bicuspidata, Fuscocephaloziopsis pleniceps.

C. sphagnicola (Arnell & J. Perss.) Warnst. & Loeske – 10: dwarf shrub-Sphagnum bog within subalpine alder bushes, on steep slope of river valley (64°34'05.2" N; 59°38'30.0" E, 510 m alt.), on dead Sphagnum (13-315, 13-316/1, 13-370) mixed with Mylia anomala, Neoorthocaulis binsteadii, Lophozia ventricosa var. longiflora, Cephalozia bicuspidata, Fuscocephaloziopsis pleniceps.

C. ambigua C.Massal. (gem.) – 3, 4, 6: (4: 620-808 m), sp.: on permafrost spots in moss-lichen tundra, on moist clay and alluvium along stream, on road side. Usually mixed with Scapania obcordata, Prasanthus suecicus, Anthelia juratzkana, Nardia breidleri, Scapania curta, Cephalozia

Fig. 1. Position of Ner-Oika Mountain and collecting localities:
1 – surroundings of geologist's settlement Ner-Oika, upper part of forest zone (64°34'16.6" N; 59°39'58.6" E; 400 m alt.);
2 – bottom of south-east slope of Tupaya Mt., upper part of forest zone (64°34'17.3"-64°34'18.3" N; 59°39'06.1"-59°38'45.3" E; 420-450 m alt.);
3 – south-east slope of Tupaya Mt., lower part of tundra belt (64°34'12.2"-64°34'28.2" N; 59°37'07.8"-59°38'18.5" E; 585-698 m alt.);
4 – top of mountain pass and concave northern slope of Tupaya Mt. to valley of Dodovis Stream (64°34'45.3"-64°34'48.2" N; 59°36'36.8"-59°36'38.5" E; 785-808 m alt.);
5 – eastern slope of northern spur of Ner-Oika Mt. (64°34'50.1"-64°34'56.6" N; 59°35'34.7"-59°36'12.5" E; 860-960 m alt.);
6 – valley of left tributary of Shaytanka River (64°34'10.4"-64°34'16.4" N; 59°37'00.3"-59°37'10.3" E; 640-665 m alt.);
7 – gentle north-eastern spur of Ner-Oika Mt. between two valleys that are sources of Shaytanka River (64°33'57.6"-64°34'04.9" N; 59°36'32.9"-59°36'51.2" E; 707-725 m alt.);
8 – headstream of left tributary of Shaytanka River (64°34'13.2"-64°34'21.1" N; 59°35'56.8"-59°36'32.6" E; 706-724 m alt.);
9 – eastern slope of Ner-Oika Mt. (64°33'52.3"-64°33'58.3" N; 59°34'48.4"-59°35'18.5" E; 914-1035 m alt.);
10 – valley of Shaitanka River, upper part of forest zone (64°34'05.2"-64°34'09.7" N; 59°38'30.0"-59°39'43.3" E; 450-512 m alt.);
11 – north-eastern slope of pass to Kobyla-Yu River including northern spur and valley Krustal'nyi Stream (64°33'09.6"-64°33'47" N; 59°38'16.3"-59°39'08.0" E; 570-685 m alt.);
12 – southern and south-eastern slopes of the spur of Ner-Oika mountain (64°32'29.8"-64°33'01.0" N; 59°37'16.3"-59°37'41.1" E; 603-703 m alt.);
13 – headstream of Kobyla-Yu River, upper part of forest zone (64°30'38.1"-64°31'18.5" N; 59°34'22.7"-59°35'02.7" E; 521-575 m alt.);
14 – bottom of north-eastern slope to Shchekurya River, upper part of forest zone (64°33'49.5" N; 59°40'42.9" E; 406 m alt.);
15 – right bank of Kobyla-Yu River near mouth (64°33'08.3" N; 59°42'50.4" E; 393m alt.), upper part of forest zone;
16 – 20 km east from Ner-Oika settlement, along the road to Saranpul town, forest zone (64°28'22.9" N; 59°52'23.9" E; 325 m alt.).

* Cephalozia ambiguag C.Massal. (gem.) – 3, 4, 6: (4: 620-808 m), sp.: on permafrost spots in moss-lichen tundra, on moist clay and alluvium along stream, on road side. Usually mixed with Scapania obcordata, Prasanthus suecicus, Anthelia juratzkana, Nardia breidleri, Scapania curta, Cephalozia
bicuspidata, Pseudolophozia sudetica, Gymnomitrium concinnatum. The species mostly occurs with gemmae, sometimes very small plants (to 2-3 mm high) with numerous gemmae and underleaves are prevalent.

C. bicuspidata (L.) Dumort. (per., spor.) – 1-15 (27: 390-1035 m), com.: in forests, subalpine light forests and meadow-shrub communities, on clay spots in tundras, in dwarf shrub-sedge-Sphagnum bogs; on fine earth between rocks in rock fields and along streams. Usually mixed with other bryophytes. One of the most widespread hepatics in the studied area. The f. amphiagastriata was collected on permafrost spots in dwarf shrub-lichen tundra (13-462/2) and on alluvium covered rock on bank of stream (13-389).

Cephalozia arctogena (R.M. Schust.) Konstant. (per., and., spor., gem.) – 6, 11, 16 (4: 325-685 m), sp.: in cobble-mossland and dwarf shrub-moss tundras, mixed with mosses and in Salix-grass stands on diluvium slope on bare soil. In pure mats (13-328), with admixture of Scapania irrugia, Pseudolophozia sudetica (13-377/3) or mixed with Lophozia wenzelii var. groenlandica, Sphenolobus saxisicola. Pilidium ciliare. Found once on decaying wood in Picea-dwarf shrub-herb-moss fen, mixed with Blepharostoma trichophyllum, Fuscocephaloziosis pleniceps.

C. divaricata (Sm.) Schiff. (and.) – 1: on bank of stream (64°34′16.6″ N; 59°39′58.6″ E; 400 m alt.), on alluvium under herbs (13-211), mixed with Scapania subalpina, S. irrugia, Schistochilopsis opacifolia. 2: herbs-Vaccinium myrtillus-greenmoss tundra near timberline (64°34′16.1″ N; 59°38′18.5″ E; 585 m alt.), at the bottom of a rock mixed with Lophozia wenzelii var. groenlandica (13-230) and at the edge of a clay spot (13-231), mixed with Isopachus brencanus, Nardia geoscyphus, Marsupella sprucei, Solenostoma sphaerocarpum, 10: on rocky southfacing slope (64°34′06.3″ N; 59°38′02.6″ E; 537 m alt.), on coarse rock near waterfall (13-324), in pure mats.

C. grimsulana (J.B. Jack ex Gottsche & Rabenh.) Lacout. – 1: on bank of a stream (64°34′16.6″ N; 59°39′58.6″ E; 400 m alt.), on alluvium near trail (13-210), mixed with Scapania curta, Lophozia ventricosa t.l.

C. spinigera (Lindb.) Warnst. – 11: dwarf shrub-cotton grass-sedge-Sphagnum bog (64°33′37.3″ N; 59°38′56.4″ E; 534 m alt.), mixed with Lophozia silvicola, Pseudolophozia sudetica var. anomala (13-346).

C. spinigera (Lindb.) Warnst. – 11: dwarf shrub-cotton grass-sedge-Sphagnum bog (64°33′37.3″ N; 59°38′56.4″ E; 534 m alt.), mixed with Lophozia silvicola, Pseudolophozia sudetica var. anomala (13-346).

C. varians (Gottsche) Stehph. (per.) – 6: seepage on cliffs on steep sides of valley of brook (64°32′47.3″ N; 59°37′16.3″ E; 634 m alt.), some plants mixed with Pseudolophozia sudetica (13-467/2), 9: dwarf shrub (Salix-Betula nana)-sedge-Sphagnum bog (64°33′54.1″ N; 59°35′38.5″ E; 914 m alt.), at the bottom of rocks (13-395), mixed with Scapania degenii and Gymnocoela inflata. 13: riffle (64°30′41.1″ N – 59°35′38.5″ E; 914 m alt.), on rock in running water, abundant (13-419).

Chiloscyphus pallescens (Ehrh. ex Hoffm.) Dumort. – 10: on alluvium and rocks in the bed of a stream (64°34′08.5″ N; 59°39′32.7″ E; 460 m alt.), mixed with Scapania subalpina and Pellia neesiana (13-288).

C. polyanthos (L.) Corda – 14: in swampy birch-fir-Calamagrostis-Sphagnum-green moss forest with numerous shallow brooks (64°33′49.5″ N; 59°40′42.9″ E; 406 m alt.), on sides of a temporary stream, on peaty soil (13-373/1), mixed with Plectocolea obovata var. subelliptica, Cephalozia bicuspidata.

* Conocephalum conicum (L.) Dumort. – 10: dense herbaceous-fern-greenmoss alder bushes, on steep slope of a river valley with mossy schistose cliffs (64°34′06.9″ N; 59°39′24.2″ E; 470 m alt.), on soil, mixed with Cephalozia bicuspidata and Plectocolea obovata var. subelliptica (13-299).

* Diplophyllum albicans (L.) Dumort. – 9: depression in rock field on slope of mountain (64°33′54.5″ N; 59°35′01.8″ E; 1013 m alt.), on fine earth between rocks, mixed with Scapania spitsbergenensis, Gymnomitrium concinnatum (13-402/1), Marsupella emarginata (13-401/1), Lophozia wenzelii (13-401/2).

* D. obtusifolium (Hook.) Dumort. (per., and.) – 10: dense herbaceous-fern-greenmoss alder bushes, on the steep slope of a river valley with mossy schistose cliffs (64°34′06.9″ N; 59°39′24.2″ E; 470 m alt.), on rock, mixed with Pseudolophozia sudetica var. anomala (13-305).

* D. taxifolium (Wahlenb.) Dumort. (per., gem.) – 3, 5, 6, 10, 13, 15 (9: 390-950 m), fr: between rocks in rock fields, without any admixture or mixed with Tetralophozia setiformis, Marsupella emarginata, Scapania spitsbergenensis. Frequent as well on cliffs and between mossy rocks in alder bushes, mixed with Tritomaria quinquedentata, Blepharostoma trichophyllum, Mesopyctia gillmannii, Lophozia ventricosa s.l., less often on soil in herb-moss and moss-lichen tundras, mixed with Neoorthocaulis floerkei. The species was also collected in moist herbaceous forest in river valley, mixed with Marsupella boeckii, Gymnocoela inflata, Cephalozia bicuspidata, Scapania irrugia and on alluvium covered rocks and in stream beds, with Solenostoma sphaerocarpum, Plectocolea hyalina, Lophozia cf. silvicola, Pseudolophozia sudetica.

Endogemma caespitica (Lindemb.) Konstant., Vilnet & A.V. Troitsky [Solenostoma caespiticum (Lindemb.) Stehph.] (per.) – 2: on road side near timberline (64°34′17.3″ N; 59°39′06.1″ E; 450 m alt.), mixed with Solenostoma conferstissima, Nardia japonica, Scapania curta, S. scandica, Plectocolea hyalina (13-216/1).

Fuscocephaloziosis albenscens (Hook.) Vâna & L. Söderstr. [Pleuroncodes l denii (Hook.) Grolle] (per., and., spor.) – 3, 4, 6, 8, 10, 11, 13 (8: 620-785 m), fr: in snowbed communities where it sometimes is abundant, between rocks under snow fields and on rock fields, on banks of streams, in depressions near rocks in boggy tundra. Usually mixed with Pseudolophozia sudetica, Anthelia juratzkana, Marsupella brevisima, M. sprucei, Schistochilopsis opacifolia, Diplophyllum taxifolium, Lophozia wenzelii var. groenlandica, L. ventricosa var. longiflora, Cephalozia bicuspidata.

F. lunifolia (Dumort.) Vâna & L. Söderstr. [Cephalozia lunifolia (Dumort.) Dumort.] (per., and.) – 10, 13, 14, 15 (4: 390-527 m), sp.: in moist and swampy forests, on decaying wood as well as on humus and peaty soil. Without admixture of another hepatics or mixed with Calypogeia integristipula, Barbilophozia hatcheri, Gymnocoela inflata, Diplophyllum taxifolium. In dwarf shrub-Sphagnum bog among Sphagnum, mixed with Mylia anomala, Neoorthocaulis binsteadii, Fuscocephaloziosis pleniceps, Calypogeia spagh- nicola.

F. pleniceps (Austin) Vâna & L. Söderstr. [Cephalozia pleniceps (Austin) Lindlb.] (per., spor.) – 3, 6, 10, 12-14, 16 (10: 390-703 m), fr: on decaying wood and on humus in swampy forests and alder bushes, on rocks and fine earth in crevices of mossy cliffs, in snowbed communities and grass-moss tundra in subalpine belt. Usually mixed with Blepharostoma
trichophyllum, Calypogea integrifolia, Schistochilopsis opacifolia, Diplorrhynium taxifolium, Mesophytocha gillmanii, Plectocolea obovata, Harpanthus florotianus, Scapania irigra. Collected once on dead Sphagnum in dwarf shrub-sedge-Sphagnum bog, mixed with Mylia anomala, Calypogea sphagnicola, C. muelleriana, Neorhodochaulis binstea, Fuscocephaloziopsis lunulifolia, Cephalozia bicuspida.  

Gymnocreria inflata (Huds.) Dumort. (per., and. – 5, 6, 9, 11, 12, 15: 6: 390-960 m), sp: in dwarf shrub-sedge-Sphagnum bogs, among Sphagnum and in small pools, in marshy tundra. Record in shaded niches on peat near rocks, in temporary pools in moist forests, sometimes on rocks in rock fields. In pure mats or mixed with Scapania paludicola, Odontoschisma elongatum, Fuscocephaloziopsis lunulifolia, F. albscecs, Scapania degenii, Scapania irigra.

* Gymnomitrion brevissimum (Schleich. ex Dumort.) Warnst. (spor.) – 3: in swodied community (64°34’14.4” N; 59°37’34.6” E; 636 m alt.), on ground floor (13-243), mixed with Anthelia juratzkana, Pseudolohozia sudetica, Fuscocephaloziopsis albscecs. 4: seepage at the bottom of slope of a stream valley (64°34’48.2” N; 59°36’38.5” E; 785 m alt.), mixed with A. juratzkana, F. albscecs (13-270/2). 6: on aluvium covered rocks along a stream (64°34’13.9” N; 59°37’03.2” E, 640 m alt.), single plants in mats of Pseudolohozia cf. sudetica (13-470/2) mixed with Lophozia wenzeli, Isopaches biconcates, Anthelia juratzkana.

* G. concinnatum (Lightf.) Corda (per., spor., gem.) – 4, 9, 11, 12 (4: 636-1013 m), sp.: on detritus-clay cryogenic spots in dwarf shrub-sedge-lichen tundra, on rocks in rock fields, on fine earth on cliffs. Usually mixed with Anthelia juratzkana, Prasanthus suecicus, Scapania obcordata, Cephalozia bicuspida, Pseudolohozia sudetica, Lophozia wenzeli, Nardia geoscyphus, N. breidleri, Sphenolobus minimus, Isopaches bicrenatus.

* G. coralloides Nees – 12: cliffs in valley of a stream (64°32’47.3” N; 59°37’16.3” E; 636 m alt.), on fine earth between rocks (13-465/1), mixed with Gymnomitrion concinnatum, Pseudolohozia sudetica.


*** (*) Hygrobiella laxifolia (Hook.) Spruce (per.) – 4: seepages at the bottom of slope in valley of a stream (64°34’48.2” N; 59°36’38.5” E; 785 m alt.), on fine earth (13-262/2, 13-256/2) mixed with Plectocolea obovata, Jungennaria borealis, Scapania subalpina, S. undulata, S. irigra, Cephalozia bicuspida. 11: on alluvium on bank of a stream (64°34’09.6” N; 59°38’37.1” E; 638 m alt.), rare in mats with dominance of Plectocolea obovata (13-346/2, 13-346/2, 13-347/2), mixed with Cephalozia bicuspida, Scapania undulata, Saccobasis polita, Harpanthus florotianus. 12: seepage on cliffs on steep slope of valley of stream (64°32’47.3” N; 59°37’16.3” E; 636 m alt.), with Jungennaria pumila (13-463/3).

Isopaches bicrenatus (Schmidel ex Hoffm.) H. Buch (per., gem.) – 2, 3, 6, 11 (6: 420-700 m), sp.: on debris-clay spots in dwarf shrub-green-moss and lichen tundras, on alluvium covered rocks along bed of streams. Mostly mixed with Pseudolohozia sudetica, Nardia geoscyphus, Cephalozia bicuspida, C. ambigua, Lophozia wenzeli, Scapania parvifolia, Anthelia juratzkana, Marsupelium sprucei var. ustulata, Gymnomitrion brevissimum. Once found on road side with Solenostoma sphaerocarpum, Nardia japonica.

** ** (*) Jungennaria borealis Damsh. & Vána (per., and.) – 4: seepages at the bottom of slope in valley of stream (64°34’48.2” N; 59°36’38.5” E; 785 m alt.), some stems among Hygrobiella laxifolia, Plectocolea obovata, Scapania subalpina, Scapania undulata, Cephalozia bicuspida. 11: bed of Khrustalnyi stream (64°33’09.6” N; 59°38’37.1” E; 638 m alt.), on alluvium covered rocks in the bed and on steep banks, in pure mats (13-339) and mixed with Scapania undulata, Plectocolea obovata (13-347/1). 12: seepages on schists cliffs on side of steep slope of valley of stream (64°32’47.3” N; 59°37’16.3” E; 636 m alt.), on fine earth, without admixture of other hepatics (13-464/1).

* J. pumila With. (per., and.) – 12: seepage at the bottom of slope in valley of stream (64°32’47.3” N; 59°37’16.3” E; 636 m alt.), on fine earth (13-463/2), with Hygrobiella laxifolia.

*** (***) Mesophytocha collaris (Nees) L. Söderstr. & Vána [Leioco cola collaris (Nees) Schljakov] (per., and.) – 12: seepage on schists on steep rocky slope to the valley of rivulet (64°34’47.3” N; 59°37’16.3” E; 636 m alt.), on fine earth (13-463/1, 13-463/3), with Jungennaria pumila and Schlakevianthus quadrilobus.

Lophocolea heterophylla (Schrad.) Dumort. – 16: Picea-Equisetum-herb-moss fen (64°28’22.9” N; 59°52’23.9” E; 325 m alt.), on decaying wood and peaty soil, with admixture of Fuscocephaloziopsis pleniceps, Blepharostoma triphyllum, L. kunzeana, L. collaris minor.

L. minor Nees (per., gem.) – 16: Picea-Equisetum-herb-moss fen (64°28’22.9” N; 59°52’23.9” E; 325 m alt.), on decaying stump, as admixture to Fuscocephaloziopsis pleniceps and Blepharostoma triphyllum.

Lophozia silvicola H. Buch (per., gem.) – 11: dwarf shrub-cotton grass-sedge-Sphagnum bog (33°37.3” N; 59°38’56.4” E; 634 m alt.), in mats with admixture of Cephalozia spinigera, Ptildium cilare, Lophozia propdulgulera (13-335). 13: subalpine alder bushes (64°30’42.3” N; 59°34’46.5” E; 614 m alt.), on soil and fine earth, on mossy rocks, with Barbliophyta hatcheri (13-428). Identifying the species without oil bodies is problematic. We only referred two specimens to it, leaving 15 specimens as Lophozia cf. silvicola.

L. ventricosa (Dicks.) Dumort. s.l.

– var. vernicosus [var. confusa] (Lindb. & H. Arnell) Evans (gem.) – 10: mossy clifs in subalpine alder bushes (64°34’06.9” N; 59°39’24.2” E; 470 m alt.), on alluvium, on fine earth (13-313/3), with Plectocolea obovata, Diplorrhynium taxifolium, Scapania parviflora.

– var. longiflora (Nees) Maccom (per., gem.) – 3, 5, 6, 8, 9, 10 (8: 460-914 m), fr.: mossy clifs in subalpine alder bushes, on fine earth between rocks, in dwarf shrub-sedge-Sphagnum bogs, in snowbed communities, on fine earth on mossy deciduous forest.
L. wenzelii (Nees) Steph. var. wenzelii (per., spor., gem.) – 1, 2, 4-6, 8, 9, 11, 13 (12: 390-1013 m), fr.: in tundras on soil at the bottom of rocks, in snowbed communities, on fine earth between rocks in rock fields and on banks of streams. Sometimes occurs without admixture of other hepatics but usually mixed with Pseudolophozia sudetica, Neoorthocaulis floerkei, Schistochilospis opacifolia, Anthelia juratzkana, Scapania parviflora, Gymnomitrium concinnatum, Diplophyllum albicans, Scapania. spitsbergensis, S. subalpina, S. irrigua.

– var. groenlandica (Nees) Bakalin (per., and, per., gem.) – 3, 5, 6, 9-11, 13-15 (14: 190-1013 m), fr.: in swampy forests, in tundras, on clay spots, at the bottom of rocks in snowbed communities, in dwarf shrub-cotton grass-sedge-moss bogs, between rocks in rock fields and in Salix-herb communities, on mossy rocks in valley and on banks of streams. Often mixed with Pseudolophozia sudetica, Diplophyllum taxifolium, Fuscocephaloziopsis albescens, Schistochilospis opacifolia, Gymnocolea inflata, Scapania irrigua, Cephalozia bicuspidata, Cephalozia curta, Blasia pusilla, Cephalozia bicuspida, Diplophyllum taxifolium, Marsupella emarginata, Fuscocephaloziopsis albescens, Lophozia wenzelii var. groenlandica.

Lophozia excisa (Dicks.) Konstant. & Vilnet [Lophozia excisa (Dicks.) Dumort.] (per., and, gem.) – 1, 3, 12 (6: 400-665 m), sp.: in ground layer among bryophytes, at the bottom of rocks, on spots of bare soil, on seepages on cliffs, on bare soil on banks of streams. Always mixed with other hepatics, most often with Pseudolophozia sudetica, Lophozia wenzelii, Neoorthocaulis floerkei, Isopaches bicrenatus, Scapania parviflora, S. subalpina, S. irrigua.

L. longidens (Lindb.) Konstant. & Vilnet [Lophozia longidens (Lindb.) Macoun] (per., spor., gem.) – 10, 11, 13, 14 (4: 390-614 m), sp.: on decaying wood and at the bottom of tree trunks in both drained and swampy forests, in subalpine alder communities, on mossy rocks on banks of streams, at the bottom of rocks in Betula nana-green moss tundras. Without admixture of other hepatics or mixed with Barbilophozia hatcheri, Lophozia cf. silvicola, Pitlidium ciliare.


** (*) L. propagulifera (Gottsche) Konstant. & Vilnet [Lophozia propagulifera (Gottsche) Stekh.] (gem.) – 3: snowbed meadow (64°34'12.2" N; 59°38'04.9" E; 610 m alt.), on fine earth at the bottom of rock (13-249), mixed with Barbilophozia hatcheri. 11: dwarf shrub-cotton grass-sedge-Sphagnum bog (64°33'37.3" N; 59°38'56.4" E; 638 m alt.), with Cephalozia spinigera and Pitlidium ciliare, in mats with dominance of Lophozia silvicola (13-335): 12: rock field (64°32'29.8" N; 59°37'20.5" E; 603 m alt.), on fine earth between rocks, with Neoorthocaulis floerkei (13-376, 13-375) and as few plants in mats with dominance of Gymnocolea inflata and admixture of Tritomaria quinquedentata.

This species was previously known from one locality in Polar Ural (Konstantinova & Czernyadjeva, 1995).

Marchantia polymorpha L. subsp. radulalis Bischl. & Boiss.-Dubej. [M. latifolia Gray, M. polymorpha auct. non L.] – 10: on bank of stream (64°34'08.5" N; 59°39'32.7" E; 460 m alt.), on fine earth on mossy rock (13-293), mixed with Harpanthus flotiovianus, Schistochilospis opacifolia, Fuscocephaloziopsis pleniceps, Pellia neesiana, Blepharostoma trichophyllum, Lophozia ventricosa var. longiflora, Plectoolea obovata.

M. polymorpha subsp. montivagans Bischl. & Boissel.-Dubej. [M. alpstris (Nees) Burgeff.] (per. and.) – 1, 8, 10, 15 (5: 390-709 m), fr.: on banks of streams on alluvium, in depression in flood plain forest, without admixture of other species or mixed with Pellia neesiana, Blasia pusilla, Scapania curta.

** (*) Marsupella apiculata Schiffn. [Gymnomitrium apiculatum (Schiffn.) Müll. Frib.] (per.) – 9, 11, 13 (4: 685-1013 m), sp.: in dwarf shrub-lichen-moss tundra, on cryogenic spots, with Prasanthus suecicus, Nardia geoscyphus, Solenostoma sphaerocarpum, Lophozia wenzelii var. groenlandica, Marsupella sprucei, Pseudolophozia sudetica, Cephalozia bicuspidata, Sphenolobus minutus, as well as on cliffs and on rocks in rock fields. Occurs both in pure turfs and mixed with Marsupella emarginata, Tetralophozia setiformis, Pseudolophozia sudetica. This species was previously known from one locality in Polar Ural (Zinovjeva, 1973).

* M. boeckii (Austin) Kaal. (per., and.) – 6, 9, 13, 15 (4: 390-1013 m), sp.: on fine earth between and under rocks in rock fields, in dwarf shrub-sedge-Sphagnum tundra, on peat in shaded niches of rocks, in river valley forest on side of small moist depression. Always mixed with other hepatics, mostly with Cephalozia bispicularis, Gymnomitrium inflata, Diplophyllum taxifolium, Marsupella emarginata, Fuscocephaloziopsis albescens, Lophozia sudetica, Scapania irrigua.

* M. emarginata (Ehrh.) Dumort. (per.) – 9, 13 (4: 575-1013 m), sp.: on fine earth on rocks and between rocks in rock fields. Usually mixed with Marsupella apiculata, Lophozia sudetica, Cephalozia bispicularis, Diplophyllum albicans, D. taxifolium, Scapania degenii, S. spitsbergenii, Tetralophozia setiformis, Marsupella boeckii.

* M. sprucei (Limpr.) Bernett (per. spor.) – 3, 4, 6 (5: 585-808 m), sp.: in ground layer in snowbed community, on cryogenic clay spots in dwarf shrub-moss and moss-lichen tundras. Mixed with Prasanthus suecicus, Anthelia juratzkana, Iso-paches bicrenatus, Nardia geoscyphus, Solenostoma sphaerocarpum, Scapania obovata, S. parviflora. Rarely also occurs on rocks covered with fine earth along rivulets, as admixture to Pseudolophozia cf. sudetica, Fuscocephaloziopsis albescens, Schistochilospis opacifolia.

Mylia anomala (Hook.) Gray (per., and., gem.) – 10: dwarf shrub-Sphagnum bog in subalpine alder bushes, on steep slope to the river (64°34'05.2" N; 59°38'30.0" E; 505 m alt.), in Sphagnum turfs, mixed with Neoorthocaulis bistreadii, Calypogea sphagnicola, Fuscocephaloziopsis lunulifolia, F. pleniceps, Lophozia ventricosa s.l. (13-315, 13-316/1, 13-317).

** (*) Nardia breidleri (Limpr.) Lindb. (per., spor.) – 3: on clayish soil on road side in subalpine belt (13-476/2), mixed with Scapania curta, Blasia pusilla, Cephalozia bispicularis, C. ambigua, Plectoolea hyalina, Solenostoma sphaerocarpum. 6: on moist clay along the stream (13-381, 13-382), in mats without admixture of other hepatics or mixed with
Anthelia juratzkana, Pseudolophozia sudetica, Cephalaria bicuspidata. 12: seepages at the bottom of slope in valley of stream, on clayish fine earth (13-481/1, 13-481/2, 13-483/3, 13-481/4, 13-483/4), mixed with Anthelia juratzkana, Gymnomitrium concinnatum. N. geoscyphus (De Not.) Lindb. (per., and., spor.) – 3, 6, 8, 10, 12 (7: 512-709 m), fr.: in dwarf shrub-moss and moss-lichen tundras, on clayish soil on cryogenic spots, on soil in seepages, in subalpine belt, on fine earth on cliffs and on sandy alluvium on banks of streams. Usually mixed with Solenostoma sphaerocarpum, Cephalaria bicuspidata, Plectocolea hyalina, Anthelia juratzkana, Isopaches bicusrenatus, Scapania subalpina, S. blasia pusilla, Gymnomitrium concinnatum.

** N. japonica Steph. (per., ant.) – 2: on road side in upper part of forest belt (64°34'17.3° N; 59°39'06.1° E; 450 m alt.), (64°34'18.3° N; 59°38'45.3° E; 420 m alt.), mixed with Solenostoma confertissima, Scapania curta, S. scandica (13-216/2, 13-219/1, 13-222/2). 6: on fine earth covered rocks along a rivulet (64°34'13.9° N; 59°37'03.2° E; alt. = 640 m alt.), single plants in mats dominated by Lophozia cf. silvicola, mixed with Solenostoma sphaerocarpum, Diplophyllum taxifolium, Pseudolophozia sudetica (13-472/1, 13-472/2). 11: on sandy alluvium on bank of rivulet (64°33'13.3° N; 59°38'16.3° E; 669 m alt.), mixed with Fuscocephaloziopsis albsensis, Anthelia juratzkana, Pseudolophozia sudetica, Cephalaria bicuspidata (13-416). This species was previously known from one locality in Polar Ural (Konstantinova & Czernyadjeva, 1995).

* Neorthoaulis binstedti (Kaal.) L. Söderstr., De Roo & Hedl. [Orthocalis binstedti (Kaal.) H. Buch] (gem.) – 10: steep slope of the river valley, dwarf shrub-Sphagnum bog in subalpine alder bushes (64°34'05.2° N; 59°38'30.0° E; 510 m alt.), in ground layer on dead Sphagnum (13-315, 13-316/2), mixed with Mylia anomala, Fuscocephaloziopsis lunulifolia, Calypogea sphagnicola, Fuscocephaloziopsis pleniceps.


* Prasanthus succius (Gottsch.) Lindb. (per., spor.) – 4, 10, 11, 14 (5: 406-785 m), sp.: on fine earth and rocks on banks of streams, in seepages, at base of river valley slopes. Sometimes abundant. Without admixture of other hepatics or mixed with Scapania subalpina, S. undulata, S. paludosa, Hygrobiella laxifolia, Jungemannia borealis.Collected twice with numerous sporophytes (13-263, 13-267). The species was found once on fine earth in subalpine alder bushes in niches of mossy cliffs, mixed with Fuscocephaloziopsis pleniceps, Mesoptychia gillaminii, Tristomaria quinquendentata, Blepharostoma trichophyllum, Diplophyllum taxifolium, Lophozia ventricosa var. longiflora.

** O. francisci Hook. L. Söderstr. & Váňa [Cladophodiella francisci (Hook.) Jerg.] (gem.) – 11: dwarf shrub-lichen debris tundra (64°33'25.3° N; 59°38'49.5° E; 685 m alt.), on clay spots, mixed with Marsupella apiculata, Prasanthus succius, Pseudolophozia sudetica, Cephalaria bicuspidata, Sphenolobus minutus. This species was previously known from two localities in the Polar Ural (Zmovyjeva, 1973).
dens, Lophozia cf. silvicola. 14: swampy birch-fir Calamagrostis-Sphagnum-green moss forest (64°33′49.5″ N; 59°40′42.9″ E; 406 m alt.), at base of tree trunk (13-361), as admixture in mats with dominance of Barbarea vulgaris. Riccardia latifrons (Lindb.) Lindb. (and., per.) – 10: dwarf shrub-Sphagnum bog among subalpine alder bushes, on steep slope of stream valley (64°34′05.2″ N; 59°38′30.0″ E; 510 m alt.), on dead Sphagnum (13-317), mixed with Mylia anomala, Calypogeia sphagnicola, C. muelleriana, Neorthocaulis binsteadii. Cephalozia bicuspidata, Fucoxephaloziospis pleniceps.

* Saccobasis polita (Nees) H. Buch (per.) – 11: bed of the Khrustalny Stream (64°33′09.6″ N; 59°38′37.1″ E; 640 m alt.), on alluvium covered rocks in the bed and on steep banks of a stream (13-343/1, 13-346/1), without admixture of other hepatics or mixed with Harpanthus flotovianus. Plectocolea obovata, Scapania subalpina S. paludicola. 12: temporary stream near seepage in the subalpine belt (64°33′01.0″ N; 59°37′41.1″ E; 700 m alt.), on fine earth, pure mats without admixture of other species (13-348, 13-350).

*** (*): S. polymorpha (R.M. Schust.) Schljakov – 7: helleborine-tufted club-leaf (Veratrum lobelianum, Trichophorum caespitosum) community among dwarf shrub-herbaceous tundra (64°33′57.6″ N; 59°36′32.9″ E; 710 m alt.), some plants mixed with Nardia geoscyphus, Pseudolophozia sudetica (13-392/1).

* Scapania brevicaulis Taylor (gem.) – 8: Deschampsia-herbaceous tundra with Phyllodoce on south facing slope (64°34′18.8″ N; 59°36′15.7″ E; 724 m alt.), co-dominant in ground layer with Pseudolophozia sudetica and admixture of Cephalozia bicuspidata (13-412, 13-413).

*** S. crassiretis Bryhn (gem.) – 5: dwarf shrub-sedge-Sphagnum bog on gentle ledge on slope of mountain (64°34′50.1″ N; 59°35′34.7″ E; 960 m alt.), among Sphagnum without any admixture (13-280/1, 13-283) or mixed with Blepharostoma trichophyllum (13-281), or Sphenolobus minutus, Trichomania quinquedentata, Schljakovia kunzeana, Cephalozia bicuspidata, Gymnocolea inflata, Prtilidium ciliare (13-282).

S. curta (Mart.) Dumort. (per., spor., gem.) – 1-3, 6, 10, 12 (7: 400-640 m), fr.: on bare soil on banks of streams, on road sides, in Salix stands in valley of river, on fine earth at the bottom of cliffs. Sometimes without admixture of other species or mixed with Plectocolea hyalina, Solenostoma sphaerocarpum, S. confertissima, Cephalozia bicuspidata, Blasia pusilla, Nardia japonica, N. breidleri.

*** (*): S. degeni Schiff. ex Müll. Frib. (per., spor., gem.) – 5, 8, 9, 13 (6: 575-1013 m), sp.: between rocks in shaded niches in rock fields. In pure mats or mixed with Pseudolophozia sudetica, Marsupella emarginata, Gymnocolea infata, Scapania brevicaulis. S. degeni var. dacia (13-278), with mostly 2-celled gemmae was collected once.

* S. cf. hyperborea Jörg. – 5: rock field on gentle slope, on rocks (13-273, 13-274), several plants among Schljakovia kunzeana. 6: dwarf shrub (Salix Betula nana)-sedge-Sphagnum tundra (64°34′10.4″ N; 59°37′00.3″ E; 665 m alt.), on peaty soil (13-386), some plants mixed with Fucoxephaloziospis albens, Lophozia wenzelii var. groenlandica, Gymnocolea infata, Cephalozia bicuspidata, Scapania irrigua, Sphenolobus minutus, Schljakovia kunzeana.

S. irrigua (Nees) Nees (per., and., gem.) – 1, 4, 6, 7, 12, 13, 15 (8: 400-785 m), fr.: in moist swampy forests and tundra, on subalpine meadows, in seepages, on banks of streams, on moist road sides. Without admixture of other hepatics or mixed with Scapania subalpina, Fucoxephaloziospis pleniceps, Cephalozia bicuspidata, Gymnocolea infata, Plectocolea obovata, Lophozia wenzelii var. groenlandica, etc.

* S. kaurinii Ryan (gem., and., per.) – 9: deep depression in rock field (64°33′54.5″ N; 59°35′01.8″ E; 1013 m alt.), on fine earth between rocks (13-402/2), mixed with Tetralophozia setiformis.

S. mucronata H. Buch – 2: road side near timberline (64°34′17.3″ N; 59°39′06.1″ E; 450 m alt.), on bare soil (13-219/2), some plants among Solenostoma confertissima, Scapania curta, S. scandica.

* S. obcordata (Berggr.) S.W. Arnell (spor., gem.) – 3, 4, 6 (5: 620-808 m), sp.: on bare soil on cryogenic clay spots in lichen-green-moss and debris lichen tundra, more rarely in snowbed communities and clay alluvium along streams, with other hepatics. Mostly with Nardia geoscyphus, Anthelia juratzkana, Cephalozia bicuspidata, Fucoxephaloziospis pleniceps.

S. paludicola Goeske & Müll. Frib. – 6, 7, 11, 15 (4: 390-800 m), sp.: in wet depressions in dwarf shrub-cotton-grass-sedge-Sphagnum bogs, in swampy and moist forests in river valleys. Without admixture of other hepatics or mixed with Gymnocolea infata, Odontoschisma elongatun. The species was collected as single plants on dead Sphagnum in swampy tundra, mixed with Fucoxephaloziospis albenscens, Cephalozia bicuspidata, Schistochilopsis opacifolia, Lophozia wenzelii var. groenlandica.

* S. paludosa (Müll. Frib.) Müll. Frib.(and., spor.) – 1, 2, 4, 10, 11, 13, 14 (7: 400-785 m), fr.: on banks and in beds of streams, in moist and swampy forests, willow stands, in seepages. Often in turfs without admixture of other hepatics or mixed with Scapania subalpina, S. undulata, Harpanthus flotovianus, Pellia neesiana, Cephalozia bicuspidata.

* S. parvyfolia Warnst. (gem.) – 1, 2, 6, 10 (5: 470-665 m), sp.: on bare soil along road sides, in dwarf shrub-green-moss and lichen tundra, at bottom of rocks, rare in subalpine alder bushes, on fine earth in crevices and on ledges of cliffs, on bank of rivulets, on alluvium covered rocks. Some plants among other hepatics: Scapania curta, Pseudolophozia sudetica, Lophoziospis excisa, Schistochilopsis opacifolia, Solenostoma confertissima, Isopaches bicrenatus, Mesopachya gillmanii, Plectocolea obovata, Blasia pusilla.

S. scandica (Arnell & H. Buch) Macvicar (gem.) – 2: on road side near timberline (64°34′17.3″ N; 59°39′06.1″ E; 450 m alt.), on bare soil, mixed with Nardia japonica (13-216/2) and Solenostoma confertissima, Scapania curta, S. mucronata (13-219/2).

*** (*): S. spitsbergensis (Lindsb.) Müll. Frib. (per., and., gem.) – 9: in deep depression in huge rock field (64°33′54.5″ N; 59°35′01.8″ E; 1013 m alt.), on fine earth between rocks (13-402/1, 13-403). Without admixture of other hepatics or mixed with Diplphyllum albicans, Gymnomitrion concinnumatum, Lophozia wenzelii, Cephalozia bicuspidata.

S. subalpina (Nees ex Lindben) Dumort. (per. spor.) – 1, 4, 6, 8, 10, 12, 13 (10: 460-786 m), fr.: on alluvium and rocks on banks and in beds of streams. Usually without admixture of other hepatics or mixed with Plectocolea obovata, Fucoxephaloziospis albenscens, Scapania irrigua, Pellia neesiana.

* S. undulata (L.) Dumort. (per., and.) – 1, 4, 8, 11 (4: 400-785 m), sp.: on rocks and alluvium on banks and in beds of streams. Usually without admixture of any other hepatics.

*** (*) Schistochilopsis opacifolia (Culm. ex Meyl.) Konstant. (per., spor., gem.) – 1, 2, 6, 7, 9, 10 (8: 400-914 m), fr.: in

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subalpine alder bushes, on fine earth in crevices of mossy cliffs, on alluvium covered rocks on banks of streams, on bare soil near rocks in dwarf shrub-Sphagnum-green-moss boggy tundra and on dead Sphagnum turf in dwarf shrub-sedge-Sphagnum bogs. Without admixture of other hepatics or more often mixed with Fuscocephaloziopsis albenscens, Plectocolea hyalina, Nardia geoscyphus, Blepharostoma trichophyllum, Pseudolophozia sudetica, Lophozia ventricosa var. longiflora, Diplophyllum taxifolium, Cephalozia bicuspida. The species was only cited previously for Polar (Konstantinova & Czernyadjeva, 1995) and South Urals (Potemkin & Kalinauskaiie, 2008).

Schljakovia kunzeana (Huebener) Konstant. & Vilnet (per., gem.) – 5-7, 11, 16 (7: 325-960 m), fr.: on fine earth on rocks in rock fields, in sedge-moss-tundra. In pure mats without admixture of other hepatics or, more often, mixed with Ptilidium ciliare, Tritomaria quinquedentata, Lophozia ventricosa s.l., Sphenolobus minutus, Blepharostoma trichophyllum, Cephalozia bicuspida.

* Schljakovianthus quadrilobus (Lindb.) Konstant. & Vilnet – 12: Betula nana-herbaceous green moss tundra on south facing slope (64°33′00.4″ N; 59°37′33.4″ E; 680 m alt.), abundant in ground layer, with some admixture of Lophozia quinquedentata (13-355). On seepage on schistose cliffs on side of valley of stream, (64°32′47.3″ N; 59°37′16.3″ E; 636 m alt.), some plants with Mesopychia collaris (13-463/4).

* Solenostoma conferristissim (Nees) Schljakov (per., and., spor.) – 2: road side near timberline (64°34′18.3″ N; 59°38′45.3″ E; 420 m alt.) and (64°34′17.3″ N; 59°39′06.1″ E.; 450 m alt.), mixed with Nardia japonica, Scapania curta, Lophozia ventricosa var. crassiretis, S. degenii, S. spitsbergensis var. crassiretis, S. apiculata, S. gracillimum, Cephalozia bicuspidata, Scapania spp., Anthelia juzek, Marsupella apiculata.

**(*) S. gracillimum (Sm.) R.M. Schust. (per.) – 3: dwarf shrub-shrub-green-moss tundra (64°34′28.2″ N; 59°37′07.8″ E; 698 m alt.), on bare clay spot (13-238), mixed with Anthelia juratzkana, Marsupella sprucei var. ustulata, Isopaches bicrenatus, Pseudolophozia sudetica, Nardia geoscyphus, Cephalozia ambigua.

**(*) S. cf. pusillum (C.E.O. Jensen) Steh. – 8: between rocks on bank of rivulet under snow field (64°34′13.2″ N; 59°35′56.8″ E; 709 m alt.), mixed with Lophozia cf. wenzelii, Cephalozia bicuspida, Scapania spp., Anthelia juratzkana (13-485). This species was previously known from one locality in Polar Ural (Konstantinova & Czernyadjeva, 1995).

S. sphaerocarpum (Hook.) Steh. (per., and., spor.) – 2-4, 6, 11, 12 (8: 420-785 m), fr.: on partly grass- and moss covered soil on road side, under willow on diluvium in valley of stream, on fine earth covered rocks along a rivulet, rarely on bare soil in tundra. Always mixed with other hepatics: Plectocolea hyalina, Isopaches bicrenatus, Scapania curta, Lophozia cf. silvicola, L. wenzelii var. groenlandica, Diplophyllum taxifolium, Pseudolophozia sudetica, Nardia japonica, Cephalozia bicuspida, Prasanthus suecicus, Marsupella apiculata.

**(*) – var. nanum (Nees) R.M. Schust. (per.) – 6: on alluvium covered rocks along a rivulet (64°34′13.9″ N; 59°37′03.2″ E; 640 m alt.), mixed with Schistochilopsis opacifolia, Cephalozia bicuspida, Fuscocephaloziopsis albenscens, Scapania curta (13-473/2). This variety was previously known from one locality in Polar Ural (Konstantinova & Czernyadjeva, 1995).

Sphenolobus minutus (Schreb.) Berggr. (per., gem.) – 4-6, 9-11 (8: 470-960 m), fr.: between mosses in ground layer or on clay spots in debris lichen and dwarf shrub-lichen-moss tundra; in crevices on mossy cliffs and on dwarf shrub-sedge-Sphagnum bogs. Sometimes without admixture of other hepatics but more often in bryophyte turfs. On the edge of dwarf-shrub spots in dwarf shrub-lichen tundra. F. grandis (Lindb.) Schljakov was collected once (13-462/1), mixed with Cephalozia bicuspida and Lophozia wenzelii.

* S. saxeolda (Schrad.) Steph. – 2, 4, 11, 13 (4: 450-808 m), sp.: in debris dwarf shrub-lichen and green moss-lichen tundra, among rocks in overgrown rock field. Usually mixed with Ptilidium ciliare, Tetralophozia setiformis, Tritomaria quinquedentata. Collected once on a huge rock on a road side near timberline.

* Tritomaria setiformis (Ehrh.) Schjakov – 2, 9, 11, 13 (7: 450-1035 m), fr.: on rocks in rock fields, sometimes on small rocks in debris lichen and dwarf shrub-moss-lichen tundra. Often without admixture of other hepatics. Collected once on a huge rock on a roadside near timberline.

** Tritomaria quinquedentata (Huds.) H. Buch (per.) – 5, 6, 10-13 (10: 450-960 m), fr.: on litter in subalpine alders, on ledges and in crevices of mossy cliffs, in Betula nana and herb-green moss tundra, on sedge-Sphagnum bogs. Frequent, sometimes abundant. Occurs without admixture of other species or mixed with Barbilophozia hatcheri, Ptilidium ciliare, Schljakovia kunzeana, Neorthochaulis floerkei, etc.

** DISCUSSION **

In our previous study on hepatics of the Khanty-Manzi Autonomous District we reported 83 species from plain regions that are prevalent in the district (Lapshina & Konstantinova, 2012). The present list counts 97 species collected in its mountain part; it includes 52 species new for the district, reaching the total number to 135. This study enriched the hepatic mainly by arcticmontane, arctoboreal-montane and montane species.

Nine species are new for the Urals. The most impressive new species is Hygrobiella laxifolia. The species is known as having an oceanic distribution (Konstantinova, 2000). It had been reported in Russia from Murmansk Province and Karelia in the West as well as from Kamchatka and the South Kurils in the East (Konstantinova et al., 2009). Finding the species on the eastern slopes of the Urals changes the knowledge about its distribution. The discovery of arcto-montane (Lophoziozopsis poloris, Saccobasis polymorpha, Scapania brevicaulis, S. crassiretis, S. degeni, S. spitsbergensis) and montane hepatics (Solenostoma gracillimum) in the Urals was quite predictable. It was recently shown that these hepatics are not rare in the arctic and northern mountains of this wildflower (Konstantinova et al., 2011).

The majority of hepatics new for the district are widespread arcto-montane species that are usually frequent (Anthelia juratzkana) or sporadic in many region (Cephalozia ambiguia, Gymnomitrium concinnatum, Marsupella apiculata, M. boeckii, M. sprucei, Prasanthus suecicus), but in the studied area they are rare (Gymnomitrium brevisimum, G. corallioides, Neorthochaulis birstaudii, Scapania brevicaulis). The second largest group of hepatics
that were found for the first time in Khanty-Mansi Autonomous District are arcto-boreomontane species. This group includes a number of calciphyllous species (*Mesoptychia collaris*, *M. gillmannii*, *Preissia quadrata*, *Schljakovianthus quadrilobus*) that are rare in the area because of the rarity of suitable habitats; some are not rare in the Arctic and mountains (*Trichomaria quinquedenta*, *Conocephalum conicum*, *Diplphysillum taxifolium*, *Lophoziosis propagulifera*) or in suboceanic regions (*Odontoschisma francisci*, *Nardia breidleri*, *Nardia japonica*, *Saccobasis polita*) but are generally rare in the studied region. Montane species are the third largest group among the species collected for the first time in the district. Most of them are rather common worldwide (*Diplphysillum albicans*, *Marsupella emarginata*, *Neoorthocalis floreki*, *Scapania paludosa*, *Scapania undulata*, etc.) and occur sporadically in the studied area.

Rarity of arcto-montane, arcto-boreomontane and montane species can be explained mainly by the relatively small area studied in the upper mountain belts.

One of an interesting characters of the flora is the presence of species that are known as predominantly oceanic and suboceanic (*Diplphysillum albicans*, *Endocerma caespiticia*, *Harpanthus flotovianus*, *Hygrobiella laxatia*, *Lepidozia reptans*, *ma caespiticia*, *Harpanthus floreki*, *Scapania paludosa*, *Scapania undulata*, etc.) and sporadic (*Biantheridion undulifolium*, *Ceratodon divergens*, *Diplophyllum taxifolium*, *Hygrobiella laxatifolia*, *Lepidozia reptans*, *ma caespiticia*, *Harpanthus floreki*, *Scapania paludosa*, *Scapania undulata*, etc.) occur sporadically in the studied area.

A low amount of boreal species and almost total absence of temperate species is explained mostly by under-collecting in lower part of forest belt. As a result, many species rare in Europe were collected (*Scapania brevicaulis*, *S. degenii*, and *S. spitzbergensis*). These species are red-listed in Europe (Schumacker & Váňa, 2005). All of them are rare in the studied area.

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