BRYOPHYTES OF NORTHERN KURIL ISLANDS (NORTH-WEST PACIFIC)  
МОХООБРАЗНЫЕ СЕВЕРНЫХ КУРИЛ (СЕВЕРО-ЗАПАДНАЯ ПАЦИФИКА)  

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ВАДИМ АНДРЕЕВИЧ БАКАЛИН, ВАЛЕНТИНА ЯКОВЛЕВНА ЧЕРДАНЦЕВА

Abstract

The bryophyte flora of two northern Kuril islands, Paramushir and Shumshu, is studied. The compiled list includes 97 species and 4 varieties of liverworts and 154 species and 1 variety of mosses. The flora is characterized with the considerable proportion of East-Asian species. There is a great difference between these two islands in species composition: Shumshu is characterized with a great number of heliophytes, while Paramushir – with mountain species, mainly epilithic ones. Contemporary volcanic activity considerably affects the flora of Paramushir Island, primarily, due to occasional ashfalls resulting in destruction and degradation of a some of plant communities, as well as in supplying unoccupied substrates.

Introduction

The islands of the Greater Kurils, stretch from Hokkaido, Japan up to the Kamchatka Peninsula (from 43° N to 51° N), and are the result of volcanic and tectonic processes within the “Pacific Fire Ring” (Luchinski, 1974). Most of them have volcanic peaks up to 1600-1800 m alt., the highest being the Alaid Volcano – 2300 m elev. The present study concerns the two northernmost islands – Paramushir and Shumshu. These two islands are contrastingly different: Paramushir has numerous mountains, including Chikurachki Volcano, 1816 m elev. and Fuss Volcano, 1772 m elev., while Shumshu is rather flat, reaching only 209 m elev.

Data on the bryophyte flora of the Kurils are fragmentary, and for the two northernmost islands, Paramushir and Shumshu, they are quite inadequate. Only four liverwort species were reported from these two islands: Conocephalum conicum and Marchantia polymorpha (Horikawa, 1934) and Lophozia excisa and L. wenzelii (Noguchi, 1967); thus most of hepatic records are new. Mosses of both these islands were studied by Horikawa (1934) who recorded 7 species for Paramushir and 1 for Shumshu, Abramova (1960) – 3 species for Paramushir and Shumshu. These two islands are contrastingly different: Paramushir has numerous mountains, including Chikurachki Volcano, 1816 m elev. and Fuss Volcano, 1772 m elev., while Shumshu is rather flat, reaching only 209 m elev.

Study Area and Vegetation

According to data from the meteorological station located on Vasilyev Cape, the southern most point on Paramushir Island, the coldest months are January and February with the mean temperature –5.5°C, and the warmest month is August.

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+10°C. The absolute maximum registered on the islands is +23°C, while the mean of the absolute annual maxima is +19°C. The absolute minimum is -26°C, while the mean absolute annual minimum is -14°C. The Pacific coast of the islands is affected by the cold Kamchatka Current, whereas the coast of Sea of Okhotsk is influenced by the warm Soya Current. Mean day temperature passes 0°C in the second half of November and near the end of April. The frost-free period consists of about 120 days; however frost was registered in some years in all months except August. The summer is very humid: sunny days are few and the air humidity is usually 90-97%. Mean annual precipitation is 1200 mm, with most occurring in the summer. Winters are very snowy (almost all local houses have an extra door on the roof, as the street level door is buried under snow several times a winter). The wind conditions on the island are very inclement with winds reaching up to 40 m/sec usually several days a month. The highest wind speed recorded in the Kuriles was registered on Vasilyev Cape at 64 m/sec (Atlas..., 1967). The above data were obtained from sea level and there is no data for higher elevations in the Northern Kuriles. But in nearby Kamchatka the vertical temperature gradient is 5.5° per 1000m and snow accumulation increases by 300 mm per 100 m of elevation (Muraviov, 1985).

Due to the striking contrast between Paramushir and Shumshu their environments and vegetation is characterized separately.

**PARAMUSHIR ISLAND**

Paramushir Island is stretched from the north-east to the south-west for 101 km, its maximal width is 28 km and the mean width is 20-25 km. Three mountain ranges occur along the median part of the island: Vernadsky Range, Levinson-Lessing Range and Karpinsky Range (Fig. 1).

The mountains have sharp peaks, often reaching 600-1100 m elev., and two volcanoes are above
Bryophytes of northern Kuril Islands

Table 1. COLLECTING LOCALITIES

**Paramushir Island**
1. Ocean coast 3 km south of Severo-Kurilsk. 50°39’N – 156°08’E.
2. Second maritime terrace 2 km north of Severo-Kurilsk. 50°38’N – 156°08’E.
3. Kuzminka River 4 km upstream from its mouth. 50°42’N – 156°08’E.
4. Kuzminka River 7 km upstream from its mouth. 50°42’N – 156°07’E.
5. 5 km north-west of Kokhmayuri River mouth. 50°26’N – 155°45’E.
6. Right tributary of Kokhmayuri River 3 km upstream from its mouth. 50°26’N – 155°44’E.
7. 4 km south-west of Kokhmayuri River mouth. 50°25’N – 155°45’E.
8. 1 km north of Kokhmayuri River mouth along the ocean coast. 50°25’N – 155°44’E.
9. Antsiferovka Stream mouth (eastern slope of Antsiferov Mt.) 50°29’N – 155°46’E.
10. Antsiferovka Stream 2 km upstream from its mouth. 50°29’N – 155°45’E.
11. Antsiferov Mt. 50°29’N – 155°47’E.
12. 1.5 km south of Kokhmayuri River mouth. 50°28’N – 155°46’E.
13. The ridge divided the valleys of Kokhmayuri and Levaya Okhotnichya Rivers, ca. 4 km east from the coast. 50°28’N – 155°47’E.
14. Uppermost course of Levaya Okhotnichya River, ca. 5 km upstream from its mouth. 50°26’N – 155°49’E.
15. Upper course of Pravaya Okhotnichya River at the junction of its right and left head waters. 50°26’N – 155°49’E.
16. The top of Krutaya Mt. 50°26’N – 155°50’E.
17. North-eastern slope of a hill with the top 1.1 km east of Krutaya Mt. 50°26’ – 155°51’E.
18. Uppermost course of Okeanskaya River. 50°27’N – 155°52’E.
19. The right tributary of Kokhmayuri River flowing from the southern slope of Krutaya Mt. 50°25’N – 155°51’E.
20. Uppermost course of the left tributary of Kokhmayuri River. 50°25’N – 155°51’E.
21. Krutaya Mt., southern slope. 50°25’N – 155°51’E.
22. Levaya Okhotnichya River, 2 km upstream from its junction with Pravaya Okhotnichya River. 50°25’N – 155°50’E.
23. the left slope to valley of the Taina River approximately 3 km east of the coast of the Sea of Okhotsk. 50°20’N – 155°31’E.
24. Right slope of the valley of Taina River ca. 5 km from the ocean (slope of Chikurachki Volcano). 50°20’N – 155°33’E.
25. Left slope of the valley of Taina River ca. 5 km from the ocean (slope of Chikurachki Volcano). 50°19’N – 155°31’E.
26. Overgrown road from Shimayur River to the coast. 50°21’N – 155°33’E.
27. Tukharka River ca. 8 km upstream from its mouth. 50°15’N – 155°33’E.
28. Tukharka River ca. 6 km from its mouth, flood plain.. 50°13’N – 155°34’E.

**Shumshu Island**
29. Storozhevaya Mt., eastern slope. 50°43’N – 156°13’E.
30. The left head water of the Vesennyaya River. 50°42’N – 156°13’E.
31. The ruins of Shutovo Village. 50°41’N – 156°13’E.
32. Shutovaya River Valley between Baikovo and Shutovo, 3 km from the latter. 50°43’N – 156°12’E.
33. Baikovo Village. 50°42’N – 156°12’E.
34. Shutovskie Lakes. 50°42’N – 156°15’E.
35. The right head water of Vesennyaya River. 50°42’N – 156°15’E.
36. Mayatskaya River, upper course. 50°44’N – 156°21’E.

The main type of vegetation in Paramushir is thickets of *Alnus fruticosa* distributed from sea level up to the top of mountains not covered by recent volcanic deposits. These thickets reach up to 1100 m, forming very low, 30-50 cm shrubs. Below 600 m elev., Alnus grows as a more or less tall shrub, ca. 2 m. The herbaceous layer in the alder thickets is formed by *Calamagrostis langsdorffii*, *Dryopteris expansa*, *Aconitum septentrionale*, *Delphinium elatum*, *Senecio cannabifolia*, *Filipendula kamchatica*, etc. The only liverwort species common in such thickets are *Ptilidium pulcherrimum* and *Lophozia ventricosa*, some others are found significantly rarer. Somewhat richer is the species diversity of mosses: *Mnium thomsonii*, *Polytrichastrum alpinum*, *Trachycystis ussuriensis*, etc. are on ground, *Dicranum fragilifolium*, *Hymnup pallens*, *Sanionia uncinata*, etc. – on tree trunks. Other species occurring within the alder thickets are associated with the places with disturbed ground cover, like stream banks, etc.

*Pinus pumila* (Pall.) Regel, the important dominant tree of the subalpine belt in North-East Asia,
occupies a relatively large area, but is far less common than the alder. Usually, it is developed on tops of watershed ridges between parallel rivers flowing down the mountain slopes from the central ridge. Growing in relatively dry and windy environment the thickets of Pinus pumila lack almost any herbs and bryophytes; Ptilidium pulcherimum occurs here, but is rather rare.

Closer to mountain tops, 700-800 (-1100) m the Alnus elfin woods is replaced by meadows and tundra's. First the meadows and tundra patches occur on elevated places; gradually becoming the dominant type of vegetation (although in less dry and sheltered places alder reaches the tops). Along with the increasing of altitude and decreasing of soil humidity, meadows are replaced by heather tundra's composed of Phyllodoce, Empetrum, Loiseleuria, Arctous and other dwarf shrubs. These communities are the only type of zonal vegetation where liverworts play an important role in the vegetation composition. Lophozia pellucida var. rubrigemma, Cephalozia bicuspidata, Sphenolobus minutus occur upon mosses, and Diplrophyllum taxifolium mixed with mosses form pure bryophyte carpets or grow under dwarf shrubs. Among the mosses common to dwarf shrub tundra's are Dicranum spadiceum, Sanionia uncinata, etc.

At the same altitudes alpine gravelly barrens occur. In crevices among stones, on fine-grained soil and volcanic ash there are some liverworts

Starting from 600-700 m elev. and above, the nival communities are widely distributed near late and permanent snow-beds. Bryophytes dominate in this type of habitat. The most frequent bryophytes are species of Gymnomitron, Schistochilopsis, Marsupella, and Nardia. Pleurocladula albsencs, Anthelia juratzkana, Cephalozia bicuspidata, Arctoa fulvella, Klaeria starkei, Oligotrichum hercynicum are usually involved in community formation.

Banks of streams have tundra and alpine meadow communities. Liverworts exhibit the greatest species diversity here: Marsupella brevissima, Hygrobiella laxifolia, Aneura pinguis, Pleurocladula albsencs, Anthelia julacea, Pellia neesiana, Conocephalum conicum, Cryptocoleopsis imbricata, Nardia compressa, etc. Moss communities are formed by Arctoa fulvella, Brachythecium uncinifolium, Oligotrichum hercynicum, Andreea nivalis, etc. In the lower mountain belt, bryophytes are quite diverse on rocks in streams and on bare soil at slope base along streams, species include: Brachythecium rivulare, Bryum turbinatum, Calliergonella lindbergii, Pseudobryum cinclidioides, Cephalozia pachycaulis, Conocephalum conicum, Pellia neesiana, etc.

Wet meadows are common in river flood plains near the ocean coast. However, tall-herbs (Filipendula camtschatica (Pall.) Maxim., Senecio cannabifolus Less., Angelica ursina (Rupr.) Maxim., some sedges and Calamagrostis langsdorffii (Link) Trin. are very dense leaving no space for bryophytes.

The tallest trees in Paramushir are Salix udensis Trautv. et C.A. Mey. and Alnus fruticosa Rupr., sometimes reaching 7-8 m high and forming forest-like vegetation in flood plains along only one river. Tall herbs and Calamagrostis are common in the herb layer, and rather few mosses were found here: Bryhnia novaee-angliae is common on soil, and Amblystegium serpens, Brachythecium reflexum, Ulota drummondii occur on tree trunks.
Several small (20-100 sq. m) swamp-like communities were found in the upper most courses of streams. Aulacomnium palustre, A. turgidum, Rhytidiadelphus squarrosus, Sphagnum girgensohnii, Cephalozia bicuspidata, Harpanthus flotovianus, Pellia neesiana are typical to these habitats. There are no bogs of significant extent in the island now. Judging from the old topographic map and discussions with the local people an extensive moss-dominated bog existed in the area of the Tukharka River’s mouth. However, it has been buried by volcanic deposits from the Chukurachki Volcano eruption in 1986. In 2004 this place was represented by an extensive, ca. 3 x 5 km overmoistened field of pyroclastic deposits, where swamping process takes place. The vegetation cover of the field is represented by Calamagrostis langsdorffii, Juncus spp., Carex, in some places Salix udensis, Alnus fruticosa. Among the bryophytes are Solenostoma koreanum, Plectocolea subelliptica, Plectocolea infusca var. ovalifolia, Aneura pinguis, Jungermannia pumila, Pellia neesiana Scapania paludosa, Conocephalum japonicum as well as Dicranella palustris and Philonotis tomentella.

The bryophyte flora of rocky ledges in the canyon is relatively rich. There are some marchantiod xerophilous hepatics: Athalamia hyalina and Sauteria alpina; as well as leafy ones: Diplophyllum laxifolium, D. albicans, Radula complanata. Among the mosses found in these habitats there are Distichium capillaceum, Pohlia cruda, Oxystegus tenuirostris, etc.

The rocks of maritime terraces mostly consist of volcanic tufa and are one of the habitats for bryophytes. There is sort of a peculiar altitude inversion and some species that are more typical of tundra’s appear here. For example, Antheila juratzkana, Eremonothus myriocarpus, Herzogiella ascendens, Andreaea rupestris, Racemitrium fasciculare, Trachycystis flagellaris, etc. can be found on the eroded substrate that forms long talus slopes to the ocean coast. Liverwort species include: Aneura pinguis, Barbilophozia hatcheri, Diplophyllum laxifolium, Lophozia pellucida var. rubrigemma, Nardia geoscyphus, Blepharostoma trichophyllum, Plectocolea subelliptica, Nardia scalaris, etc.

There are three active volcanoes in Paramushir: Ebeko, Chukurachki and Fuss, the two former erupted several times during the last 100 years (last eruption on Chikurachki was in 2004, Ebeko in 1999). Contemporary volcanic activity is obvious in the southern and northern parts of the island (thermal springs, fumaroles, and hydro-sulfataras). However ash falls (cf. Fig. 2) affect the whole territories of the island.

Recent eruptions resulted in formation of extensive scoria fields, very dry and recovering very slowly.

One can observe formation of «chimeric» communities formed by the plants that survived the ash fall (grown through the ash layer) and by actively intruding exploratory species. For example, peculiar communities composed of «grown through» Empetrum nigrum L. and Pennelianthus frutescens (Lamb.) occur, however colonization of these substrata is greatly complicated because volcanic scoria and ash are too dry. Very few bryophytes are able to colonize these substrates. On dry fields of pyroclastic deposits in micro-depressions of substratum one can find Pohlia drummondii, Polytrichum piliferum, Racemitrium muticum, Marsupella, etc.

Another individual habitat is road sides. Along with the species typical to the habitats with disturbed vegetation cover, like Cephalozia spp., Isopaches bicornatus, there are also «riparian» species: Plectocolea subelliptica, Nardia breidleri.

SHUMSHU ISLAND

Shumshu Island is characterized with flat relief, but it is surrounded by abrupt high slopes up to 50-70 m tall. It is only in the river mouths where slopes to the coast are gentle. The island is 29 km long and 21 km wide; maximal altitude 209 m alt. Rivers in the island have usually slow current, reaching up to 12-15 km long (e.g. Yuzhanka, Vesennyaya). The island is quite wet and more than half of its territory is occupied by swamps and shallow round -lakes, perhaps, of karst origin. There are no outcrops of crystalline rocks.

The watershed habitats are occupied with an alternation of elfin wood, Dusheckia fruticosa, rarer Pinus pumila, both rarely exceed 1.5 m tall) and meadow communities. There are no forests and forest-like communities. Meadows are composed of tall herbs species (Filipendula kamtschatica, Angelica ursina), however they do not reach
their common height but are limited to about 1 m high. Bryophytes in elfin woods are rarely found and are limited to *Ptilidium pulcherrimum* (on branches) and *Brachythecium spp.* on soil.

As we pointed out above, the swamps distributed there are a reason of the great floristic peculiarity of this island among the islands of the Kurile Range. The main type of mires are, peat-moss and sedge-peat-moss. There are a lot of paludal species missing on the other islands of the Kurile Archipelago, they are taxa growing in *Sphagnum* carpets and *Drosera*, on bare peat of hollows or among the mosses: *Orthocaulis binsteadii, O. quadrilobus, Saccobasis polita, Cladopodiella fluitans, Calliergon stramineum, Dicranum leio- neoron, Scorpidium scorpioides*, etc.

The banks of rivers and sluggishly flowing streams are quite rich, but their richness is still much lower than that on Paramushir. Common are *Harpanthus flotovianus, Conocephalum conicum, Hygrohypnum bestii, Pohlia wahlenbergii, Pseudobryum cinclidioides, Racomitrium sudetica*, etc., i.e. mostly widespread boreal species and almost no montane species.

While studying the vegetation of the island, one can get an impression that plants on Shumshu grow much slower than on Paramushir. Thus, the Japanese roads remaining on Paramushir since the Second World War have been overgrown with alder everywhere, whereas on Shumshu they are still quite suitable for walking. The flora of the roadsides on Shumshu is somewhat richer than that on Paramushir and includes *Blepharostoma trichophyllum, Blasia pusilla, Solenostoma koreanum, Brachythecium albicans, Dicranella palustris, Pohlia drummondii*, etc. A number of arcto-montane species were found only on the roadsides: *Anthelia juratzkana, Nardia breidleri, N. scalaris*, etc.

On wet coastal cliffs composed of volcanic tufa, *Amphidium lapponicum, Brachythecium plumosum*, *Sanonia uncinata* and *Conocephalum japonicum* grow.

**LIST OF SPECIES**

As a result of our investigations, 97 species of liverworts has been found, including 50 species on Shumshu and 83 on Paramushir. Fourteen species were found on Shumshu only and 47 on Paramushir only. The correspondence number for mosses are 154 species, 130 on Paramushir and 69 on Shumshu Island, 84 being only on Paramushir and 25 only on Shumshu.

In the following list, the nomenclature of hepaticae follows Konstantinova & al. (1992), with some recent changes: Konstantinova & Vasiljev (1994), Bakalin (2001, 2003), Bakalin & al. (2001). The nomenclature of mosses mostly follows Ikawa (2004). Species name is followed by the indication of presence of sexual or asexual reproduction: ant. – antheridia, arch. – archegonia, per. – perianthia, spor. – sporophytes, gemm. – gemmae. Further are given altitudes/number of collecting localities – habitats and associated species. Information is presented separately for PA – Paramushir and SH – Shumshu. When the locality was significantly lower than the major altitudinal range, the isolated occurrence is shown in parentheses. In the end, few collecting numbers of Bakalin are cited (unless collector otherwise), and literature reference is given where available.

All specimens are kept in VLA (mosses and hepatics) and KPABG (hepatics).

**HEPATICAE**

*Aneura pinguis* (L.) Dumort. – **PA**: 10-70 m alt. / 1, 27 – In wet moss mats on cliffs along the seacoast; on fine-grained soil in wet shady crevices of rocks; on wet pyroclastic deposits on eroded slope to a stream. In pure mats or with *Conocephalum japonicum, Diplophyllum taxifolium, Hygrobiella laxifolia, Jungermannia pumila, Nardia geoscyphus, Pellia neesiana* and *Solenostoma koreanum*. K-75-6-04; K-114-1-04. – **SH**: 150-170 m alt. / 34, 36 – On peaty soil of overgrown hollows among hygrophilous mosses and sedges in moss-grass-dwarf-shrubs mires; on wet slopes to streams. Frequently with *Odontoschisma elongatum*, rarer with *Orthocaulis kunzeanus, Pleurocladula alboascens* and *Saccobasis polita*. K-125-15-04; K-129-25-04.

*Anthelia julacea* (L.) Dumort. ant., arch. – **PA**: 10-310 m alt. / 1, 8, 12, 19 – On fine-grained soil in the cliff crevices and gravelly barrens along the seacoast, river canyons, alpine heathlands. In pure mats, once collected with *Pellia neesiana*. K-89-2-04; K-94-3-04.

*A. juratzkana* (Limpr.) Trev. per., spor., ant. – **PA**: (40)360-925 m alt. / 9, 15-18 – On fine-grained soil in shady, wet or dry crevices in cliffs along river canyons, streams in tundra belt; on fine-grained soil in snow-bed communities of alpine heathlands; on soil and boulders along streams in tundra belt. In pure mats of frequently with *Lophozia sudetica*, and rarer

Athalamina hyalina (Sommerf.) S. Hatt. – PA: 400 m alt. / 19 – In shady wet crevices of cliffs along stream in tundra belt. In pure mats. K-104-6-04.


B. lycopodioides (Wallr.) Loeske – PA: (40)650-789 m alt. / 11, 12, 17 – On fine-grained soil among dwarf-shrubs in dwarf-shrub tundra; in rocky habitats in moss-lichen community; between boulders of gravelly barsens sliding to a seaweed meadow. In pure mats or with Tritomaria quinquedentata. K-93-1-04; K-100-13-04.


Blepharostoma trichophyllum (L.) Dumort. – PA: 10-789 m alt. / 1, 6, 8, 12, 17, 18 – In dry or wet shady cliff crevices in waterfall canyon, seaweed, mountain slopes; on volcanic ash deposits in the crevices of gravelly barsens in tundra belt. In pure mats or frequently with Diplrophyllum taxifolium, rarer with Anthelia juratzkana, Diplrophyllum albicans, Eremonotus myriacus, Leiocolea heterocolpos, Lophozia sudetica, Plectocolea obovata, P. subelliptica, Pleurocladula albescens, Preissia quadrata, Scapania mucronata and Tritomaria quinquedentata. K-89-6-04; K-100-10-04. – SH: 50-170 m alt. / 33, 34 – In the crevices of cliffs of caked metamorphosed tufta; on peaty bank of lake. With Nardia geoscyphus and Plectocolea subelliptica. K-124-4a-04; K-125-43-04.

Calypogeia muelleriana (Schiffn.) Mull.Frib. – PA: 40-310 m alt. / 10, 19 – On fine-grained soil along the slope to stream splashed by water in alder thickets, in full shade; on fine-grained soil in the crevices of gravelly barsens in a river canyon. With Cephalozia bicuspidata, C. pachycaulis, Pellia neesiana, Riccardia aeruginosa and Scapania irrigua. K-91-4-04; K-106-3-04. – SH: 158 m alt. / 36 – On smoothed peaty slope to river. With Pellia neesiana, Plectocolea subelliptica and Schistochilopsis opacifolia. K-129-20-04

Cephalozia bicuspidata (L.) Dumort. per., ant., spor. – PA: 40-728 m alt. / 224, 10, 15, 17, 19 – Among mosses and sedges in hollows of sedge-sphagnum mires; on eroded spots of fine-grained soil in subnival dwarf-shrub-lichen-moss tundras, on stones in snow-bed habitats and in streambeds of small streams and temporary springs; shady and wet cliff crevices; on wet decaying wood. Frequently with Lophozia sudetica and Pellia neesiana, rarer with Calypogeia muelleriana, C. pleniceps, Diplrophyllum taxifolium, Gymnomitrium apiculatum, Lophozia ventricosa var. ventricosa, Marsupella schpaelata, Moerckia blyttii, Nardia japonica, N. scalaris, Orthocaulis hyperboreus, Plectocolea obovata, P. subelliptica, Pleurocladula albescens, Prasanthus suecicus, Riccardia aeruginosa, Schistochilopsis incisa, Spheno-lobus minutus and Tritomaria quinquedentata. K-77-7-04; K-97-2-04. – SH: 98-170 m alt. / 29, 30, 34, 36 – On spots of fine-grained soil in dwarf-shrubs tundra; on stones along streams in dwarf-shrub-grass tundras; among mosses and sedges; on fine-grained soil along roadside. In pure mats or with Anthelia juratzkana, Cephalozia leucantha, Lophozia silvicola, L. sudetica, Mylia anomala, Nardia breidleri, N. geoscyphus, N. japonica, Orthocaulis kunzeanus, Pellia neesiana. Plectocolea obovata, Plectocolea subelliptica, Pleurocladula albescens, Scapania hyperborea, S. irrigua and Spheno-lobus minutus. K-125-26-04; K-120-15-04.


C. lunulifolia (Dumort.) Dumort. – PA: 50 m alt. / 5 – Among mosses in moss mats on a wet rocky slope on percolate water. With Lophozia savicziae. K-82-9-04.

C. pachycaulis R.M. Schust. per. – PA: 40, 360 m alt. / 10, 14 – On fine-grained soil along the slope to a stream splashed with water in alder thickets; on eroded spots of fine-grained soil in subnival dwarf-shrub-lichen-moss tundra, on a slope. With Calypogeia
muelleriana, Lophozia ventricosa var. longiflora, Pellia neesiana, Scapania irrigua and Tritomaria quinquedentata. K-91-4-04; K-96-4-04. Besides typical plants, some forms transitional to C. bicuspidata were collected. The shoots of the later form are characterized by one row of dorsal cells (versus two), but uniform cells in stem cross-section (versus strong differentiation to cortical and inner cells in C. bicuspidata).

C. pleniceps (Aust.) Lindb. ant., arch. – PA: 50 m alt. / 5 – In dry crevices on slope in moss-grass community developed on slowly flowing percolate water along a stream. In pure mats or with Cephalozia bicuspida, Lophozia ventricosa var. ventricosa and Tritomaria quinquedentata. K-82-15-04.


Chiloscyphus fragilis (A. Roth) Schiffn. – PA: 40-310 m alt. / 6, 12, 22 – In crevices in wet coastal cliff, on rocks along a riverbed occasionally splashed with water; on stones splashed with water along streams in alder thickets with Fillipendula camtschatica. In pure mats or with Jungermannia exsertifolia, Plectocolea subelliptica and Scapania undulata. K-94-2-04; K-84-7-04.


Conecephalum conicum (L.) Underw. – PA: 60 m alt. / 6 – On sandy bank of the stream in alder thickets with Fillipendula camtschatica, in full shade. In pure mats. K-84-9-04. – SH: [Horikawa, 1934].

C. japonicum (Thunb.) Grolle – PA: 10-43 m alt. / 1, 28 – On wet fine-grained soil in shady crevice of cliffs along the sea coast; on wet volcanic deposits in the flood-plain of a river in hydrophilous conditions. With Anemia pinguis, Jungermannia pumila, Pellia neesiana, Plectocolea infusca var. ovalifolia and Scapania paludosa. K-75-14-04; K-115-5-04. – SH: 5-98 m alt. / 29, 33 – On wet fine-grained soil along the side of an old road; on wet tufa cliffs along the sea coast and, probably, occasionally splashed with salt water. In pure mats or on roadside with Cephaloziella divaricata, Jungermannia pumila, Lophozia sudetica and Scapania hyperborea. K-120-7-04; K-128-7-04.

Cryptocoleopsis imbricata Amakawa per. – PA: (50)360-728 m alt. / 2, 15, 18 – On fine-grained soil and volcanic ash in snow-bed and subnival habitats; on wet crumbled tufa cliffs along the sea coast on second terrace. In pure mats, rarer with admixture of Anthelia juratzkana, Diplophyllum taxifolium, Lophozia sudetica and Pellia neesiana. K-97-4-04; K-97-1-04. – It is a little known species, a representative of monotypic genus. Earlier it was known only from two localities on Hokkaido Island (Japan): the Rishiri Bay and the Daisetsu Mountains, and used to considered as an endemic of Japan (Amakawa, 1959). Later it was revealed on Kamchatka at the distance of more than 1500 km from the earlier known (in Japan) part of the specific area to the north-east or at 12° to the north (Bakalin, 2005a). At the same time, it was suggested that the findings on Kamchatka were hardly a result of accidental bringing and the connection between the population of Kamchatka and Japan was accomplished through the mountainous islands of the Kurile Range, and that it was possible to find this species there as well. This presumption was confirmed by our studies on the North Kuriles. So the area of this species can, probably, be characterized as Montane East-Asian.

Diplophyllum albicans (L.) Dumort. – PA: (50)728-925 m alt. / 2, 16?18 – On crumbled tufa cliffs along a stream-bed near the sea coast; on fine-grained soil in wet cliff crevices; on fine-grained soil and volcanic ash in crevices of gravelly barrens in dwarf-shrub-lichen tundras. In pure mats or with Anthelia juratzkana, Blepharostoma trichophyllum, Lophozia sudetica, Nardia scalaris and Tetralophozia setiformis. K-77-13-04; K-103-19-04.
D. taxifolium (Wahlenb.) Dumort. per., gemm. – PA: 10-728 m alt. / 1, 3, 8710, 12, 14, 15, 18 – In the crevices in eroded slope of fine-grained soil along the seacoast and on moss mats; in shady, but more or less dry cliff crevices along streams, rivers, waterfall canyon; among stones gravelly barrens sliding to seacoast meadows; on a thin layer of fine-grained soil in crevices of gravelly barrens in lichen and dwarf-shrub tundras; on wet fine-grained soil along streambed in and in snow-bed communities. In pure mats or frequently with Blepharostoma trichophyllum, rarer with Anemia pinguis, Anthelia juratzkana, Barbilophozia hatcheri, Cephalozia biniculata, Cryptocoleopsis imbricata, Gymnomitron concinnatum, Leiocolea heterocoleos, Lophozia pellucida var. rubrigemma, L. sudetica, L. ventricosa var. longiflora, L. v. var. ventricosa, L. wenzelti, Moerckia blyttii, Nardia geoscyphus, N. japonica, N. scalaris, Pellia neesiana, Pleurocladula abelcens, Scapania mucronata, Schistochilopsis incisa, Sphenolobus minutus and Tritomaria quinquetentata. K-75-8-04; K-92-11-04. – SH: 116-180 m alt. / 30, 31, 36 – On eroded fine-grained soil along slope to stream in snow-bed habitats; on the side of an old road. In pure mats, rarer with Lophozia sudetica, Odontoschisma elongatum and Orthoaulis quadrilobus. K-121-6-04; K-129-4-04.

Eremonotus myriocarpus (Carr.) Lindb. et Kaal. per., ant. – PA: (10-40)728-789 m alt. / 1, 12, 17, 18 – On eroded fine-grained soil and tufa in crevices of coastal cliffs; on fine-grained soil and volcanic ash in wet and shady cliff crevices and crevices in gravelly barrens in tundra belt. In pure mats, rarer with Blepharostoma trichophyllum, Jungermannia pumila and Tritomaria quinquetentata. K-75-18-04; K-103-6-04.


Gymnomitron apiculatum (Schiiffn.) Mull.Frib. per., spor. – PA: 700-715 m alt. / 3, 17 – On spots of fine-grained soil in snow-bed habitats; on fine-grained soil in shady wet crevices in clifs along a river-bed. In pure mats or with Anthelia juratzkana, Cephalozia biculscida and Prasanthus sucicicus. K-101-5-04; K-79-4-04

G. concinnatum (Lightf.) Corda per., spor. – PA: 700-925 m alt. / 3, 16, 18 – On fine-grained soil in shady cliff crevices along streams in tundra belt; on fine-grained soil and pyroclastic deposits in dry and slightly shaded crevices in gravelly barrens in dwarf-shrub-lichen tundras. In pure mats or with Diplophyllum taxifolium and Gymnomitron pacificum. K-79-7-04; K-103-8-04.

G. pacificum Grolle per. – PA: 715-925 m alt. / 16, 17, 18 – On fine-grained soil and pyroclastic deposits in dry slightly shaded crevices in gravelly barrens in dwarf-shrub-lichen tundras; on stones of gravelly barrens in snow-bed habitats. In pure mats or with Gymnomitron concinnatum. K-99-12-04; K-101-7-04.

Harpantus flotovianus (Nees) Nees arch. – PA: 60 m alt. / 5 – Among mosses in moss tussocks and hollows in sedge-peat-moss mires. In pure mats or with Anemia pinguis, Jungermannia pumila and Plectocolea subelliptica. K-85-4-04; K-114-4a-04.

Hygrobiella laxifolia (Hook.) Spruce per., ant. – PA: 40-310 m alt. / 6, 10, 19 – On stones in stream-bed of permanent and temporary streams. In pure mats or with Anemia pinguis, Jungermannia pumila and Plectocolea subelliptica. K-85-4-04; K-114-4a-04.


J. exsertifolia Steph. per., spor. – PA: 40-60 m alt. / 2, 6, 5, 8, 10 – On stones in stream-bed on meadows, in alder thickets; in the stream-bed of temporary streams by the seacoast and in tundra belt. In pure mats, once found with Chiloscyphus fragilis. K-77-2-04; K-92-13-04. – SH: 116 m alt. / 30 – On stones in a stream-bed down a slope with alder thickets. With Chiloscyphus fragilis. K-121-16-04. – It is a little known species indistinctly delimited from Jungermannia eucordifolia. It is known in Japan (Amakawa, 1960) and in the Russian Far East on the Chukotka (Afonina, Duda, 1993), Kamchatka (Bakalin, 2003) and the Commander Archipelago (Bakalin, 2005b). The finding partly fills the Japan-Kamchatka gap in the area of the species.

J. polaris Lindb. per., ant., spor., arch. – PA: 789 m alt. / 17 – On fine-grained soil in wet crevices in cliffs down the slope to a stream. With Nardia geoscyphus and Preissia quadrata. K-100-3-04.

J. pumila With. per., spor., ant., arch. – PA: 10-400 m alt. / 1, 6, 19 – On coastal cliffs wetted with percolate water; in shady cliff crevices along stream-bed shaded by willows, in a waterfall canyon; on wet...


L. sudetica (Nees ex Huebener) Grolle var. sudetica gemm. – PA: (40-50)310-925 m alt. / 2, 4, 9, 11, 14?19, 22 – Among mosses on mossy meadows near the seacoast; on pyroclastic deposits and fine-grained soil among stones or on open places in alpine heathlands; in snow-bed habitats; in tundras of different types; in shady and sunny crevices of different degree of moistening on fine-grained soil or rocky substratum; on stones and fine-grained soil along river-bed and streams. In pure mats or with Anthelia juratzkana, Cephalozia bicuspidata, Marsupella sphacelata, M. sprucei, Moerkia blyttii, Pleurocladula albescens, Nardia japonica, rarer with Blepharostoma trichophyllum, Cryptocoleopsis imbricata, Diplophyllum albicans, D. taxifolium, Macrodiplotaxis plicatum, Marsupella emarginata, Nardia breidleri, N. scalaris, Schistochilopsis incisa, S. opacifolia, Sphenolobus minutus and Trinomaria quinquedentata. K-101-6-04; K-99-10-04. – SH: 98-170 m alt. / 29, 30, 34?36 – On fine-grained soil along the side of an old road; on eroded fine-grained soil down the slope to a stream; on stones along streambed in meadows; on spots of fine-grained soil of cryogenic origin in dwarf-shrub tundra. In pure mats or with Anthelia juratzkana, Nardia breidleri, rarer with Cephalozia bicuspidata, Cephalozia divaricata, Conocephalum japonicum, Diplophyllum taxifolium, Jungermannia pumila, Nardia geoscyphus, Nardia japonica, Pellia endiviifolia, Pleurocladula albescens, Scapania hyperborea and Scapania muronata. K-120-7-04; K-129-33-04.

? var. anomala (Schjlakov) Schljakov per., ant. – PA: 400-789 m alt. / 3, 17 – On stones in stream-bed of a temporary spring in dwarf-shrub tundra; on fine-grained soil in wet crevices in a cliff wetted with percolate water down the slope to a river. With Anthelia juratzkana and Nardia scalaris. K-80-2-04; K-100-7-04.

L. ventricosa (Dicks.) Dumort. var. ventricosa gemm. – PA: 40-600 m alt. / 3, 5, 9, 10, 13, 19 – On bases of living trunks of the alder; on mosses down a slope among alder thickets; in stream-bed of a temporary stream in dwarf-shrub tundras, on cliffs of river canyon. In pure mats or with Cephalozia bicuspidata, C. pleniceps, Diplophyllum taxifolium, Macrodiplotaxis plicatum, Nardia japonica, N. scalaris, Ptilidium pulcherrimum, Sphenolobus minutus and Trinomaria quinquedentata. K-95-2-04; K-90-18-04.


L. wenzelii (Nees) Steph. – **PA:** 360 m alt. / 15 – On wet fine-grained soil along a stream in snow-bed habitats in dwarf-shrub (*Fillodoce*)-grass-lichen tundra. With *Diplophyllum taxifolium* and *Nardia scalaris.* K-98-7-04 26.VII.2004. [Noguchi, 1967]

**Macrodiplophyllum plicatum** (Lindb.) H. Perss. – **PA:** (40)728 m alt. / 9, 18 – On volcanic ash in the crevices of gravelly barrens in lichen-dwarf-shrub tundras; on dry rocks along a stream. In pure mats or mixed with *Lophozia sudetica,* *L. ventricosa,* *Ptilidium ciliare,* *P. pulcherrimum,* *Sphenolobus minutus* and *Tritomaria quinquedentata.* K-103-5-04; K-90-5-04.

**Marchantia alpestris** (Nees) Burgeff – **PA:** 40 m alt. / 12 – On stones along a stream-bed on the slope of a coastal cliff. In pure mats. K-94-1-04.

**M. polymorpha** L. gemm. – **PA:** [Horikawa, 1934]. – **SH:** 50 m alt. / 33 – Among *Juncus* on waterlogged meadow. In pure mats. K-124-11-04.

**Marsupella alpina** (Gottschke ex Limpr.) H. Bern per., ant., arch., spor. – **PA:** 360-925 m alt. / 15, 16, 18 – On fine-grained soil and pyroclastic deposits of eroded slopes in tundra belt; along streams in snow-bed habitats; on spots of fine-grained soil and ponds of cryogenic origin in dwarf-shrub-lichen tundra. In pure mats. K-97-9-04; K-99-4-04.

**M. boeckii** (Austin) Lindb. ex Kaal. arch. – **PA:** 400 m alt. / 4 – On pyroclastic deposits in snow-bed habitats. In pure mats. K-81-14-04

**M. brevissima** (Dumort.) Grolle per., ant., spor. – **PA:** 646 m alt. / 18 – On fine-grained soil along a nival stream. In pure mats. K-102-5-04.

**M. emarginata** (Ehrh.) Dumort. per., ant. – **PA:** (40)646-728 m alt. / 10, 18, 19

On stones splashed with water along a stream-bed in alder thickets; along banks of a nival stream. In pure mats or with *Anthelia juratzkana,* *Lophozia sudetica,* *Moeckia blyttii,* *Nardia japonica,* *Pleurocladula albescens* and *Schistochilopsis incisa.* K-91-2-04; K-102-3-04.

**M. sphacelata** (Giesecke ex Lindenb.) Dumort. per., ant., arch., spor. – **PA:** (60) 300-400 m alt. / 3, 4, 6, 15 – On fine-grained soil in the stream-bed of a temporary spring in dwarf-shrub tundra; on pyroclastic deposits in alpine heathland; on stones splashed with water along a stream-bed in alder thickets; on wet fine-grained soil along a stream-bed in dwarf-shrub (*Fillodoce*)-grass-lichen tundra. In pure mats, rarer (forms in shaded places) with *Cephalozia bicuspidata,* *Lophozia sudetica* and *Pleurocladula albescens.* K-80-4-04; K-98-3-04.

**M. sprucei** (Limpr.) H. Bern. per., spor., ant. – **PA:** 88(on volcanic ash) 400-925 m alt. / 4, 16, 18, 25 – On pyroclastic deposits in snow-bed habitats and fine-grained soil along nival streams; on fine-grained soil in dry and slightly shaded crevices among stones in gravelly barrens in dwarf-shrub-lichen tundra; on caked volcanic deposits. In pure mats, rarer with *Anthelia juratzkana* and *Lophozia sudetica.* K-81-13-04; K-112-1-04.

**Moerckia blyttii** (Moeck) Brockm. ant., arch. – **PA:** 360-728 m alt. / 14, 17, 18 – On eroded spots of fine-grained soil in snow-bed habitats in subnival dwarf-shrub-lichen-moss tundra; along nival streams; on pyroclastic deposits in the crevices of gravelly barrens in lichen-dwarf-shrub tundra. Commonly mixed, frequently with *Lophozia sudetica,* as well as with *Anthelia juratzkana,* *Cephalozia bicuspidata,* *Diplophyllum taxifolium,* *Lophozia ventricosa* var. *longiflora,* *Marsupella emarginata,* *Nardia japonica,* *Orthocaulis hyperboreus,* *Pleurocladula albescens* and *Schistochilopsis incisa.* K-96-10-04; K-103-9-04.

**Mylia anomala** (Hook.) S. Gray gemm. – **SH:** 158 m alt. / 36 – Among mosses and stems of sedges; on tussocks in sedge-moss flood-plain mire. With *Cephalozia bicuspidata,* *C. leucantha,* *Lophozia silvicola,* *Lophozia ventricosa* var. *guttulata,* *Orthocaulis binsteadii,* *O. kunzeanus,* *Sphenolobus minutus.* K-129-3-04.

**Nardia breidleri** (Limpr.) Lindb. per., spor., ant. – **PA:** 360-925 m alt. / 4, 14, 16, 18, 19, 21 – On fine-grained soil along streams in alpine heathlands; on eroded fine-grained soil in snow-bed communities and along stream-bed of nival streams; on fine-grained soil in shaded and wet cliff crevices in rocky banks of rivers; in dry and slightly shaded crevices among stones on gravelly barrens in dwarf-shrub-lichen tundras. In pure mats or with *Lophozia pellucida* var. *rubrigemma,* *L. sudetica,* *Nardia geoscyphus,* *N. japonica,* *Pleurocladula albescens.* K-81-3-04; K-99-15-04. – **SH:** 116-170 m alt. / 30, 34, 36 – On eroded fine-grained soil down a slope in snow-bed habitats in flood-plain with dwarf-shrub-herb tundra; on the clayey side of an old road; on spots of fine-grained soil of cryogenic origin in dwarf-shrub tundra. With *Anthelia juratzkana,* *Cephalozia bicuspidata,* *Lophozia sudetica,* *Nardia geoscyphus,* *Pleurocladula albescens.* K-121-30-04; K-125-26-04.

**Nardia compressa** (Hook.) S. Gray – **PA:** 360 m alt. / 15 – On wet fine-grained soil along a stream-bed in nival habitats in dwarf-shrub (*Fillodoce*)-grass-lichen tundra. With *Schistochilopsis opaciolia.* K-98-6-04.

**N. geoscyphus** (De Not.) Lindb. per., ant., spor. – **PA:** 10-789 m alt. / 1, 12, 17, 19 – On fine-grained soil in shady crevices in a coastal cliff; on fine-grained...
soil in wet cliff crevices along rivers and rocky slopes of mountains; on eroded fine-grained soil along the banks of rivers and streams. In pure mats or with *Anorea pinguis, Anthelia juratzkana, Diplophyllum taxifolium, Jungermannia polaris, Nardia breideri, Pellia neesiana, Preissia quadrata, Tritomaria quinquedentata*. K-94-6-04; K-75-6-04. – **SH**: 50-180 m alt. / 29, 30, 31, 33, 34 – On wet fine-grained soil along the side of an old road and on eroded roadside; on wet cliffs composed of caked tufa along the seacoast; on eroded fine-grained soil along the slope to snow-bed place; on spots of fine-grained soil of cryogenic origin in dwarf-shrub tundra. With Anthelia juratzkana, *Blepharostoma trichophyllum*, Cephalozia bicuspidata, *Jungermannia pumila*, Lophozia sudetica, *Nardia breideri*, *N. japonica*, Pellia endiviifolia, Plectocolea infusca var. ovalifolia, *P. obovata*, Pleurocladula albescens, *S. hyperborea*, *S. irrigua*, *S. mucronata* and *Schistochilopsis incissa*. K-120-11-04; K-125-26-04.

*N. japonica* Steph. per. – **PA**: 150-728 m alt. / 3, 4, 10, 11, 14, 15, 17?19 – On fine-grained soil along streams and submerged in the stream; on pyroclastic deposits of volcanic field; fine-grained soil spots of cryogenic origin in alpine heathlands, in snow-bed habitats. In pure mats or with *Anthelia juratzkana, Cephalozia bicuspidata, Diplophyllum taxifolium, Lophozia sudetica, L. ventricosa var. ventricosa, Marsupella emarginata, Moerckia blyttii, Nardia breideri, N. scalaris*, Pellia neesiana, Plectocolea subelliptica, Pleurocladula albescens, *Scapania paludicola*, *Schistochilopsis incisa* and *S. opacifolia*. K-101-2-04; K-98-8-04. – **SH**: 116 m alt. / 30 – On eroded fine-grained soil along the slope to a stream. With Anthelia juratzkana, Cephalozia bicuspidata, *Lophozia sudetica, Nardia geoscyphus, Pellia endiviifolia* and *Pleurocladula albescens*. K-121-3-04.

*N. scalaris* S. Gray ant., arch. – **PA**: (10)300-925 m alt. / 1, 3, 14?17, 19 – On eroded fine-grained soil in cliff crevices along the seacoast; on eroded spots of fine-grained soil in snow-bed slope in subnival dwarf-shrub-moss-lichen tundra; on wet fine-grained soil along a stream-bed and slowly flowing rivers; in temporary streams. Commonly with *Pellia neesiana, Nardia japonica* and *Lophozia sudetica*, rarer with Anthelia juratzkana, Cephalozia bicuspidata, *Diplophyllum albicans, D. taxifolium, Lophozia ventricosa var. ventricosa, L. wenzellii, Pleurocladula albescens* and *Schistochilopsis opacifolia*. K-75-10-04; K-99-14-04. – **SH**: 98-158 m alt. / 29, 36 – On wet fine-grained soil along the side of an old road; on peaty ground along the slope to a river. In pure mats. K-120-16-04; K-129-23-04.


*O. kunzeanus* (Huebener) H. Buch – **PA**: 40 m alt. / 12 – Among wet stones in gravelly barrers sliding to a seacoast meadow. With Lophozia pellucida var. rubrigemma. K-94-21-04. – **SH**: 158-170 m alt. / 34, 36 – Among mosses and stems of sedges of tussocks in sedge-grass-dwarf-shrub-moss mesotrophic mires. With *Anorea pinguis, Cephalozia bicuspidata, C. leucantha, Lophozia silvicola, L. ventricosa var. longiflora, L. ventricosa var. guttulata, Mylia anomala, Saccobasis polita* and *Sphenolobus minutus*. K-125-16-04; K-129-3-04.

*O. quadrilobus* (Lindb.) H. Buch – **SH**: 158 m alt. / 36 – Among mosses in hollows in sedge-moss floodplain mire. With Diplophyllum taxifolium and *Odontoschisma elongatum*. K-129-4-04.

*Pellia endiviifolia* (Dicks.) Dumort. per., spor. – **PA**: 50 m alt. / 2 – On wet fine-grained soil originated from eroded tufa cliffs near the stream. In pure mats. K-77-12-04. – **SH**: 116-170 m alt. / 30, 34 – On eroded fine-grained soil along the slope to a stream in dwarf-shrub-grass tundra. Among and on mosses. With Lophozia sudetica, *Nardia geoscyphus, Pellia japonica* and *Pleurocladula albescens*. K-121-29-04; K-125-28-04.

*P. neesiana* (Gottsche) Limpr. ant., arch., per., spor. – **PA**: 10-728 m alt. / 1, 5, 10?12, 14, 15, 17, 19 – On wet fine-grained soil in shady cliff crevices along the seacoast, canyon near rivers; among mosses on sedge-peat-moss mires at the sources of streams; on wet fine-grained soil in snow-bed habitats; on fine-grained soil and stones along streams and rivers in tundras, meadows and alder thickets. Commonly among and on leafy hepatic mats: Anthelia julacea,


P. obovata (Nees) Lindb. per., ant., arch., spor. – PA: 10-310 m alt. / 1, 6, 10, 19, 24 – On eroded fine-grained soil on cliffs splashed with water near the seacoast; in cliff crevices of river canyons; on stones splashed with water along a stream in alder thickets; on stones in flood-plain; on wet volcanic deposits near a streams. In pure mats or with Blepharostoma trichophyllum, Cephalozia bicuspidata or among the thalli of Preissia quadrata. K-75-17-04; K-86-6-04. – SH: 98-158 m alt. / 29, 30, 36 – On wet fine-grained soil along the side of an old road; on stones along slowly flowing stream in dwarf-shrub-grass tundra; on peaty soil along a river-bed. In pure mats or with Cephalozia bicuspidata, Nardia geoscyphus, Pellia neesiana, Scapania irigrua, S. paludosa. K-120-11-04; K-129-24-04.

P. subelliptica (Lindb. ex Kaal.) A.W. Evans per., ant., arch. – PA: 10-310 m alt. / 1, 6, 10, 19, 22, 27 – On wet eroded ground in cliff crevices along the seacoast; on stones and cliff along rivers or streams in open places or in alder thickets; on stones in the stream-bed of a small stream. In pure mats or with Blepharostoma trichophyllum, Cephalozia bicuspidata, Chiloscyphus fragilis, Hygrobiella laxifolia, Jungermannia pumila, Nardia japonica and Scapania undulata. K-75-13-04; K-114-4-04. – SH: 80-170 m alt. / 29, 34, 33, 36 – On wet fine-grained soil and clay ground along the side of an old road; on peaty banks of lakes and rivers. In pure mats or with Blepharostoma trichophyllum, Calypogeia muellneriana, Cephalozia bicuspidata, Jungermannia pumila, Pellia neesiana, Scapania irigrua, S. mucronata and Schistochilopsis opacifolia. K-120-2-04; K-129-20-04.

Pleurocladula albescens (Hook.) Grolle – PA: 360-789 m alt. / 4, 14, 15, 17, 18 – On wet fine-grained soil along a small stream originated from glacier in dwarf-shrubs(Filodode)-grass-lichen tundra; on eroded spots of fine-grained soil in snow-bed habitats; in margin of sphagnum mat on a rocky slope wetted with percolate water; on thin layer of wet volcanic ash in the crevices of gravely barrrens in lichen-dwarf-shrub tundra; on fine-grained soil along streams in alpine heathlands and in snow-bed communities. In pure mats, but more common with Anthelia juratzkana, Blepharostoma trichophyllum, Cephalozia bicuspidata, Diplophyllum taxifolium, Lophozia sudetica, L. ventricosa var. longiflora, Marsupella emarginata, M. sphacelata, Moreckia blyttii, Nardia breidleri, N. japonica, N. scalaris, Pellia neesiana, Schistochilopsis incisa, Sphenolobus minutus and Tritomaria quinquedentata. K-100-14-04; K-98-9-04. – SH: 116-170 m alt. / 30, 34, 36 – On eroded wet fine-grained soil along the slope to a stream in dwarf-shrub-grass tundra; on spots of fine-grained soil of cryogenic origin in dwarf-shrub tundra; on stones along streams and on the peaty bank of a river. In pure mats or with Aniera pinguis, Cephalozia bicuspidata, Lophozia sudetica, Nardia breidleri, N. geoscyphus, N. japonica, Odontoschisma elongatum, Pellia endiviifolia, P. neesiana, Schistochilopsis incisa. K-121-33-04; K-129-25-04.

Prasanthus suecicus (Gottsche) Lindb. – PA: 600 m alt. / 3 – On fine-grained soil in shady wet crevices of cliffs along a stream in alpine heathland. With Cephalozia bicuspidata and Gymnomitron apiculatum. K-79-4-04.

Preissia quadrata (Scop.) Nees spor. – PA: 60-789 m alt. / 6, 17, 19 – On fine-grained soil and in shady cliff crevices in canyons and stream-beds. Among and on leafy hepatics: Blepharostoma trichophyllum, Jungermannia polaris, Sauteria alpina, Nardia geoscyphus and Plectocolea obovata. K-86-6-04; K-104-5-04.

Ptilidium californicum (Austin) Pears. – PA: 60 m alt. / 5 – On horizontal part of the living trunk of an alder along the margin of sedge-peat-moss mire. In pure mats. K-83-18-04.

P. ciliare (L.) Hampe – PA: 40 m alt. / 9 – On flat well-exposed and dry rock. With Macrodiplotyum pli- catum and Sphenolobus minutus. K-90-20-04. – SH: 103 m alt. / 32 – Among lichens and Empetrum in
dwarf-shrub-lichen tundra along the terraced slope to a river. In pure mats K-123-3-04.


Radula complanata (L.) Dumort. – **PA:** 60 m alt. / 6 – In shady cliff crevices of river canyon. In pure mats and on moss mats. K-86-5-04.

*Riccardia aeruginosa* Furuki – **PA:** 310 m alt. / 19 – On fine-grained soil in the crevices of gravelly barrens along river canyon. With *Calyptogaea muelleriana,* *Cephalozia bicuspidata,* and *Pellia neesioides.* K-106-3-04. – **SH:** 170 m alt. / 34 – Among mosses and hepatics in sedge-grass-dwarf-shrub-moss mesotrophic mire near lake. With *Scapania irrigua,* *Scapania paludicola.* K-125-22-04. – It a lately described species (Furuki, 1991), its distribution has yet been poorly studied. It used to be considered (l.c.) as an endemic of Japan, but in the recent years we found it on Mednyj Island (the Commander Archipelago, Bakalin, unpublished data) and on the North Kuriles. In its distribution it is associated with rocky substrata in the mountain regions or grows in paludal communities of the lower altitude levels. According to the description by T. Furuki (1991) the landscape characteristics of this species in Japan is similar to that in our country, but there it is found on the southern islands where the zonal vegetation is represented with broad-leaved and dark-coniferous forests in the collection locations, but not with tundras and Japanese stone pine crooked forests like in Russia.


*Sauteria alpina* (Scop.) Nees – **PA:** 400 m alt. / 19 – In shady and wet crevices of cliffs along a stream. In pure mats or with *Preissia quadrata.* K-104-2-04.

*Scapania hyperborea* Joerg. per., gemm. – **SH:** 98-180 m alt. / 29, 31, 34 – On wet fine-grained soil along roadside. With *Cephalozia bicuspidata,* *Cephalozia divaricata,* *Conocephalum japonicum,* *Jungermannia pumila,* *Lophozia sudetica,* *Nardia geoscyphus,* *Odontoschisma elongatum* and *Pellia neesioides.* K-120-1-04; K-122-6-04.

S. *irrigua* (Nees) Nees ant. – **PA:** 10-50 m alt. / 1, 5, 10 – On moss mats in coastal cliff crevices; among mosses in mose草 grass community; on a rocky slope wet with percolate water; on fine-grained soil down a slope splashed with water in full shade of alder thickets. In pure mats or with *Calyptogaea muelleriana,* *Cephalozia pachycaulis,* and *Pellia neesioides.* K-75-7-04; K-91-4-04. – **SH:** 98-170 m alt. / 29, 34 – On wet fine-grained soil along the side of an old road. With *Cephalozia bicuspidata,* *Nardia geoscyphus,* *Plectocolea obovata,* *P. subelliptica,* and *Riccardia aeruginosa,* *Scapania paludicola.* K-120-10-04; K-125-22-04.


S. *mucronata* H. Buch – **PA:** 40-60 m alt. / 2, 8, 9 – In dry and shady cliff crevices of a waterfall and river canyons; on decaying wood near entrance into an old tunnel. In pure mats or mixer with *Blepharostoma trichophyllum* and *Diplophyllum taxifolium.* K-77-6-04; K-90-2-04. – **SH:** 80-180 m alt. / 31, 33, 36 – On the wet clayey side of an old road. In pure mats or with *Lophozia sudetica,* *Nardia geoscyphus,* *Plectocolea subelliptica,* *Schistochilopsis incisa.* K-127-2-04; K-122-9-04.

S. *paludicola* Loeske et Mull.Frib. ant. – **PA:** 50-200 m alt. / 2, 19 – Among wet mosses on mossy meadow patches between thickets of old alders; on stones covered by fine-grained soil along a slowly flowing tributary of a river. In pure mats, once with *Nardia japonica* mod. *taxifolia-viridis.* K-77-4-04; K-105-1-04. – **SH:** 158-170 m alt. / 34, 36 – On the peaty bank of a lake; among mosses of overgrown hollows in sedge-moss flood-plain and flood-lake mires. In pure mats or with *Odontoschisma elongatum,* *Riccardia aeruginosa,* *Scapania irrigua* and *Sphenobulus minutus.* K-125-42-04; K-129-13-04.

S. *paludosum* (Mull.Frib.) Mull.Frib. – **PA:** 43-400 m alt. / 2, 15, 19, 28 – On very moist coastal cliffs wetted with percolate water; among mosses in moss tussocks and hollows in sedge-moss mire in the flood-plain of a stream; on wet slopes to streams; on wet overgrown pyroclastic deposits; in anthropogenic habitats: on the wet walls of blocks at entrance into an old tunnel. In pure mats or (on pyroclastic deposits) with *Conocephalum japonicum,* *Jungermannia pumila* and *Plectocolea infuscus var. ovalifolia.* Besides the typical modifications, mod. *violacea* and mod. *viridis* were found as well. K-77-9-04; K-115-5-04. – **SH:** 116-158 m alt. / 30, 36 – On wet soil along a stream in a flood-plain covered with dwarf-shrub-grass tundra; on eroded fine-grained soil on the slope to a stream. With *Plectocolea obovata.* K-121-11-04; K-129-26-04.

S. *subalpina* (Nees ex Lindenh.) Dumort. gemm. – **PA:** 43-70 m alt. / 25, 27, 28 – On stones in a stream-bed;
among mosses and stems of sedges in sedge-peat-moss tundra in stream flood-plain; on fine-grained soil and pyroclastic deposits of eroded slope in a stream canyon; on overgrown wet pyroclastic deposits field. In pure mats. K-77-1-04; K-115-8-04.

*S. undulata* (L.) Dumort. ant., gemm. – **PA:** 60 450 m alt. / 6, 20 – On stones along a stream in full shade in alder thickets with *Fillipendula cantschatica*. In pure mats or with *Chiloscyphus fragilis* and *Plectocolea subelliptica*. K-84-1-04; K-107-2-04.


*Tetralophozia setiformis* (Ehrh.) Schljakov – **PA:** 728 m alt. / 18 – On pyroclastic deposits in the crevices of gravely barrens in lichen-dwarf-shrub tundra. With *Diplophyllum albicans*. K-103-7-04.

*Tritomaria quinquedentata* (Huds.) B. Buch – **PA:** (10-60)360-789 m alt. / 1, 5, 9, 11, 12, 14, 15, 17 – On sliding wet fine-grained soil in cliffs along the sea-coast; in dry and wet cliff crevices in tundra belt along river canyons; on soil among dwarf shrubs in dwarf shrub tundras; on spots of sliding fine-grained soil in snow-bed dwarf-shrub-moss-lichen communities; along a stream-bed of glacier streams. In pure mats or, more frequent, with *Barbiplophozia lycopodioides*, *Blepharostoma trichophyllum*, *Cephalozia bicuspidata*, *Cephalozia pachycaulis*, *Cephalozia pleniceps*, *Diplophyllum taxifolium*, *Eremonotus myriocarpus*, *Lophozia sudetica*, *L. ventricosa* var. *longiflora* and var. *ventricosa*, *Macrodiplophyllum plicatum*, *Nardia geoscyphus*, *Pellia neesiana* and *Pleurocladula albescens*. K-100-10-04; K-75-9-04.

**MUSCI**

*Amblystegium serpens* (Hedw.) Bruch & Schimp. in Bruch et al. – **PA:** 40 m alt. / 23 – On the trunks of the willow at the height of 1.5 m, in a flood-plain willow forest. K-110-4-04. [Minami et al., 2001] – **SH:** 5 m alt. / 33 – On tufa rocks. K-128-1-04.

*A. juratzkanum* Schimp. – **PA:** This species is published by Y. Minami et al. (2001).

*A. varium* (Hedw.) Mitt. – **PA:** This species is published by Minami et al. (2001).

*Amphidium lapponicum* (Hedw.) Schimp. – **SH:** 5 m alt. / 33 – On moist coastal cliffs. K-128-5-04. [Cherdantseva, 1986]
Andreaea nivalis Hook. – **PA**: 450-800 m alt. / 4, 20 – On fine-grained substratum along the bank of a stream, in alpine heathland, formed by stones and volcanic ashes; on rocks sprinkled by waterfall splashes. K-81-6-04; K-107-1. [Minami et al., 2001]

A. rupestris Hedw. – **PA**: (10)789 m alt. / 3, 8, 17 – On stones and rocky cliffs along the banks of waterways and on a ground water leakage. K-79-8-04; K-100-9-04.

Anomobryum filiforme (Griff.) A. Jaeger var. concinnum (Spr.) Loske – **SH**: 50 m alt. / 33 – On the quartz of an old monument. K-124-7-04.

Arctoa fulvella (Dicks.) Bruch & Schimp. in Bruch et al. – **PA**: 800 m alt. / 4 – On fine-grained substratum along the bank of a stream and on nival glades in alpine heathland, formed by stones and volcanic ashes. K-81-1-04. [Minami et al., 2001]

Aulacomnium palustre (Hedw.) Schwagr. – **PA**: 50 m alt. / 5 – In a moss and herb community on a weak ground water leakage. With *Hylocomium splendens*. K-82-6-04. [Noguchi, 1967; Minami et al., 2001] – **SH**: 116-158 m alt. / 30, 36 – On stones along the bank of a stream; on tussocks in a sedge and moss flood-plain swamp. With *Hylocomium striatum* *pyrenaicum*, *Racomitrium canescens*, *Sanionia uncinata*, *Tomentypnum nitens*. K-121-27-04; K-129-8-04. [Cherdantseva, 1986]

A. turgidum (Wahlenb.) Schwagr. – **PA**: 50 m alt. / 5 – In a moss and herb community on a weak ground water leakage. K-82-1-04.

Bartramia ithyphylla Brid. – **PA**: 728-926 m alt. / 16, 18 – In dry and weakly shaded crevices, on a thin layer of fine-grained soil in rocky tundras with dwarf shrubs and lichens. K-99-7-04; K-103-4-04.


Brachythecium albicans (Hedw.) Bruch & Schimp. in Bruch et al. – **SH**: 50-98 m alt. / 29, 33 – On fine-grained substratum on the side of an old road; on decaying logs along the left slope of the Baikovsky Stream. With *Pogonatum urnigerum*. K-120-6-04; K-124-14-04.

B. populeum (Hedw.) Bruch & Schimp. in Bruch et al. – **PA**: This species is published by Minami et al. (2001).

B. plumosum (Hedw.) Bruch & Schimp. in Bruch et al. – **SH**: 50 m alt. / 33 – On the vertical walls of a rock, formed by caked metamorphized tufa. K-124-2-04.

B. reflexum (Starke) Bruch & Schimp. in Bruch et al. – **PA**: 40-600 m alt. / 3, 5, 23 – On the trunks of the alder and the willow in an alder thicket and flood-land willow forest; among the brush of *Fillodoce* in dwarf shrub tundra. With *Sanionia uncinata*. K-83-17-05; K-80-7-04. [Cherdantseva, 1986] – **SH**: 116 m alt. / 30 – On sliding fine-grained substratum down the slope on the place of melted snowfield. K-121-38-04.

B. rivulare Bruch & Schimp. in Bruch et al. – **PA**: 50-100 m alt. / 1, 6, 7 – On moist stones splashed with water, at the base of a coastal cliff; on stones on the banks and in the stream-beds. K-78-04; K-88-1-04.

B. starkei (Brid.) Bruch & Schimp. in Bruch et al. – **PA**: 88 m alt. / 25 – On volcanic pyroclastic deposits of a pyroclastic deposits field being overgrown with the alder. K-112-2-04.

B. uncinifolium Broth. & Paris (*Cratoneurella uncinifolia* (Broth & Paris) H. Rob.) – **PA**: 715-728 m alt. / 15, 17, 18 – In a shady crevice of a rocky slide slope layered with fine-grained and in the niche under a stone of rocky placer in subnival and nival habitats; among the lichen cover in lichen and dwarf shrub tundra. K-97-8-04; K-103-22. [Minami et al., 2001]


Bryoerythrophyllum recurvirostrum (Hedw.) P.C. Chen – **PA**: 10 m alt. / 1 – In crevices among boulders lying at the base of a cliff. With *Pohlia drummondii*. K-75-3-04. – **SH**: This species is published by Cherdantseva (1986).

Bryoerythrophyllum recurvirostrum (Hedw.) P.C. Chen – **PA**: 10 m alt. / 1 – In crevices among boulders lying at the base of a cliff. With *Pohlia drummondii*. K-75-3-04. – **SH**: This species is published by Cherdantseva (1986).

Bryoxiphium norvegicum (Brid.) Mitt. ssp. japonicum (Berggr.) A.Love & D. Love (*B. savatieri* (Husn.) Mitt.) – **PA**: This species published by Cherdantseva (1986). – **SH**: This species is published by Cherdantseva (1986).


B. argenteum Hedw. – **PA**: 150 m alt. / 6 – In crevices of a rocky ledge shaded by riverside willow forest. K-86-2-04.

B. creberrimum Taylor – **PA**: This species is published by Cherdantseva (1986).


B. turbinatum (Hedw.) Turner (= *B. schleicheri* Schwagr.) – **PA**: 400 m alt. / 19 – On stones covered
with fine-grained substratum, along the bank of a cutoff meander. K-105-3-04. [Minami et al., 2001]

Calliergon cordifolium (Hedw.) Kindb. – **PA:** 30 m alt. / 1 – On the bank of a stream by the sea. 11.VIII.1997. Coll. Verkholat. [Cherdantseva, 1986; Minami et al., 2001] – **SH:** This species is published by Cherdantseva (1986).

C. richardsonii (Mitt.) Kindb. – **PA:** This species is published by Cherdantseva (1986), Minami et al. (2001). – **SH:** This species is published by Cherdantseva (1986).

C. stramineum (Brud.) Kindb. – **PA:** 60 m alt. / 5 – On moss tussocks and small cavities, on sedge-sphagnum bog in flood-lands of the upper reaches of a stream. K-83-8-04. – **SH:** 158 m alt. / 36 – In overgrown hollows in sedge and moss flood-land bog. K-129-12-04.

Calliergonella lindbergii (Mitt.) Hedenäs – **PA:** (10)100-500 m alt. / 6, 8, 14, 19 – On stones on the banks of streams and occasionally drying waterways. K- 84-8-04; K-105-11 04. – **SH:** 170 m alt. / 34 – On mesotrophic swamp with sedges, herbs, dwarf shrubs and mosses, among lakes. With Aulacomnium palustre and Sphagnum warnstorfii. K-125-3-04.


Climacium dendroides (Hedw.) F. Weber et D. Mohr – **PA:** 10 m alt. / 8 – In a herb and moss meadow-like community on the slope to the river bed. With D. majus var. orthophyllum, Rhytidiodelphus squarrosus. K-89-9-04. – **SH:** 60 m alt. / 23 – Vicinities of Chukurachki Volcano, willow forest in the valley of the Taina River, on soil. 3.VIII.2000. Coll. Verkholat.

Cratoneuron filicinum (Hedw.) Spruce – **PA:** (10)310 m alt. / 1, 19 – On fine-grained substratum of cliffs sprinkled by a brook; on stones in the bed of a small stream. K-75-20-04; K-106-12 04. – **SH:** 5 m alt. / 33 – On moist coastal cliffs formed by tufas, to the south of the mouth of the Baikovsky Stream. K-128-2-04.

Cyrtothium hymenophyllum (Bruch & Schimp. in Bruch et al.) Holmen – **PA:** This species is published by Minami et al. (2001).

Dichodontium pellucidum (Hedw.) Schimp. – **PA:** 50-400 m alt. / 1, 19 – On moist stones of coastal cliffs splashed with water; on a stone in the splash zone of a waterfall. K-78-2-04; K-104-9-04. – **SH:** 50-98 m alt. / 29, 33 – On fine-grained substratum along the side of a road; on a water-logged small meadow, among rushes, K-120-4-04; K-124-10-04.

Dicranella palustris (Dicks.) Crundw. ex E. Warb. – **PA:** 43-150 m alt. / 6, 24, 28 – On moist soil and volcanic pyrocalstic deposits down the slope near a stream and a water-logged pyrocalstic deposits field. In pure mats or with Philonotis fontana. K-85-3-04; K-111-7-04; K-115-2-04. – **SH:** 116 m alt. / 30 – On fine-grained substratum along the side of a road. K-121-36-04.

Dicranella subulata (Hedw.) Schimp. – **PA:** 40 m alt. / 1 – On stones with soil, 4.VIII.1978. Coll. A.I. Zavorotny. – **SH:** 180 m alt. / 31 – On the crumbled wall of an old road gauge. K-122-3-04.

Dicranoweisia crispsula (Hedw.) Milde – **PA:** (10)789 m alt. / 8, 17 – On stones in the bed of a dry stream; on an exposed and dry cliff ledges wetted by ground waters. K-89-14-04; K-100-2-04. [Cherdantseva, 1986; Minami et al., 2001]

Dicranum flexicaule Brid. – **PA:** 50 m alt. / 5 – In a moss and herb community on a weak ground water leakage. K-82-4-04. – **SH:** 103 m alt. / 32 – On tussocks among lichens and crowberry in dwarf shrub and lichen tundra. K-123-7-04

D. fragilifolium Lindb. – **PA:** 60 m alt. / 5 – On the trunk of the alder on the edge of a sedge and Sphagnum bog in flood-lands of the upper reaches of a stream. K-83-16-04. The specimens assigned to D. viride (Sull. & Lesq.) Lindb. (Minami et al., 2001) belong in this species.

D. fuscescens Turner – **PA:** This species is published by Minami et al. (2001).

D. hamulosum Mitt. – **PA:** This species is published by Minami et al. (2001).

D. laevidens R.S. Williams – **SH:** The specimens assigned to D. angustum Lindb. (Cherdantseva, 1986) belong in this species.


D. majus. var. orthophyllum A. Braun ex Milde – PA: (10)100-789 m alt. / 6, 8, 14, 17 – On the sandy bank of a stream in a thick shade among the thickets of the alder with the meadowsweet; among dwarf shrubs (mostly Fillodoce) in subnival tundra with dwarf shrubs, lichens and mosses; in herb-moss meadow-like and moss-lichen communities on the slope to a stream bed and at the base of a rocky ledge. With Sanonia uncinata, Rhytididiadelphus squarrosus, Climaciun dendroides. K- 84-11-04; K-100-12-04. – SH: 170 m alt. / 34 – On mesotrophic swamp with sedges, herbs, dwarf shrubs and mosses among lakes. K-125-1-04; K-125-5-04.


D. scoparium Hedw. – PA: This species is published by Cherdantseva (1986) and Minami et al. (2001).

D. spadiceum J.E. Zetterst. – PA: 728 m alt. / 18 – Among the lichen cover in lichen and dwarf shrub tundra. K-103-24-04; K-103-25-04.


Distichium capillaceum (Hedw.) Bruch & Schimp. in Bruch et al. – PA: 10 m alt. / 8, 12 – In rather dry and shady rock crevices in the walls of a canyon; on weakly moistened rock. K-89-1-04; K-94-5-04. [Cherdantseva, 1986] – SH: This species is published by Cherdantseva (1986).

Ditrichum heteromallum (Hedw.) Britt. – PA: This species is published by Minami et al. (2001).

Drepanocladus aduncus (Hedw.) Warnst. – SH: 50 m alt. / 33 – On a waterlogged small meadow, among rushes; on an old overgrown road. K- 124-8-04.


Herzogiella adscendentis (Lindh.) Z. Iwats. & W.B. Schofield – PA: 10-40 m alt. / 8, 9, 12 – In rather dry and shaded crevices in the walls of a canyon and rocky expositions; on the exposed side of the vertical wall of a coastal cliff. K-89-4-04; K-94-17-04.

H. turfacea (Lindb.) Z. Iwats. – PA: This species is published by Minami et al. (2001).


H. smithii (Sw. in Lilj.) Broth. – PA: 10 m alt. / 1 – On vertical cliffs wetted by a brook. K-75-21-04.


Hylocomium splendens (Hedw.) Bruch & Schimp. in Bruch et al. – PA: 50-360 m alt. / 5, 14 – In a moss and herb community on a weak ground water leakage; among dwarf shrubs (mostly Fillodoce) in subnival dwarf-shrub-lichen-moss tundra on the slope to the snowfield. In pure mats or with Aulacoomnium palustre. K-82-6-04; K-96-15-04. [Cherdantseva, 1986]


Isopterygiopsis pulchella (Hedw.) Z. Iwats. – PA: 728 m alt. / 18 – In shaded crevices of rocky mountains, on a thin layer of fine-grained soil. With Pohlia cru- da. K-103-12-04.


K. falcata (Hedw.) I. Hagen – PA: This species is published by Minami et al. (2001).
**Orthotrichum sordidum** (F. Weber et D. Mohr) I. Hagen – **PA:** 500-800 m alt. / 4, 10 – On fine-grained substratum along the bank of a stream; on stones and among them on the stony bottom of a nival valley. K-81-8-04; K-92-3-04. The specimens assigned to *Dicranodontium denudatum* (Brid.) Britt. ex R.S. Williams (Cherdantseva, 1986) belong in this species. [Minami et al., 2001] – **SH:** 116 m alt. / 30 – On sliding fine-grained substratum down the slope on the place of melted snowfield. K-121-2-04.

**Lescuraea saxicola** (Bruch & Schimp.) Milde – **PA:** 500 m alt. / 10 – On stones and among them on the stony nival valley. K-92-7-04.

**Leskea polycarpa** Ehrh. ex Brid. – **PA:** This species is published by Cherdantseva (1986).


**Mnium stellare** Hedw. – **PA:** This species is published by Minami et al. (2001).

**Mnium thomsonii** Schimp. – **PA:** 150 m alt. / 10 – On fine-grained substratum in thickets of the alder down the slope of the left bank, overflown with high waters. K-91-6-04.

**Oligotrichum aligerum** Mitt. – **PA:** This species is published by Minami et al. (2001).

**O. hercynicum** (Hedw.) Lam. & Cand. – **PA:** 800 m alt. / 4 – On fine-grained substratum along the bank of a stream and nival glades. K-81-2-04. [Cherdantseva, 1986] – **SH:** 180 m alt. / 31 – On the crumbled wall of an old road gauge. K-122-7 04.

**O. parallellum** (Mitt.) Kindb. – **PA:** 50-400 m alt. / 2, 15 – On the moist stone wall of the blocks by the entrance into an old tunnel; on fine-grained substratum in subnival habitats. K-77-11-04; K-97-6-04. [Cherdantseva, 1986] – **SH:** 116 m alt. / 30 – On sliding fine-grained substratum down the slope on the place of melted snowfield. K-121-37-04.

**Oncophorus virens** (Hedw.) Brid. – **SH:** 116-158 m alt. / 30, 36 – On stones along the bank of a small stream; on tussocks in sedge and moss-flood-land bog; at the base of tussocks in a dry tussock dwarf shrub and lichen tundra. With *Aularomnium palustre, Hylocomiastrum pyrenaicum, Racomitrium canescens, Sanionia uncinata, Sphagnum warnstorffii, Tomenypnum nitens.* K-121-27-04; K- 129-30-04.

**Orthotrichum sordidum** Sull. & Lesq. in Austin – **PA:** This species is published by Cherdantseva (1986).

**Oxystegus tenuirostris** (Hook. & Taylor) A.J.E. Smith – **PA:** 150-728 m alt. / 6, 18 – On a thin layer of fine-grained soil in shaded crevices of a river’s canyon and gravelly barrens in tundra belt. K-86-1-04: K-103-10-04.

**Paludella squarrosa** (Hedw.) Brid. – **SH:** 158-170 m alt. / 34, 36 – On mesotrophic swamp with sedges, herbs, dwarf shrubs and mosses among lakes; on a moist peat slope of a river. With *Dicranum leioneuron, Limprichtia revolvens.* K-125-23-04; K-129-27-04. [Cherdantseva, 1986]

**Philonotis fontana** (Hedw.) Brid. – **PA:** 150 m alt. / 6 – On soil down the slope, on a spring leakage. With *Dicranella palustris.* K- 85-1-04; K-85-3-04. [Horikawa, 1934; Cherdantseva, 1986; Minami et al., 2001] – **SH:** 98 m alt. / 29 – On fine-grained substratum along the side of a road. K-120-5-04. [Cherdantseva, 1986]

**P. tomentella** Molendo in Lorentz – **PA:** 43 m alt. / 28 – On a water-logged overgrown pyroclastic deposits field. K-115-2-04; K-115-3-04.

**P. yezoana** Besch. & Cardot – **PA:** 150 m alt. / 6 – On soil down the slope to the river, on a spring leakage. K-85-2-04.

**Plagiommum acutum** (Lindb.) T.J. Kop. – **PA:** This species is published by Minami et al. (2001).

**P. medium** (Bruch & Schimp.) T.J. Kop. – **PA:** This species is published by Cherdantseva (1986).

**Plagiobryum squarrosum** (Brid.) Z. Iwats. – **PA:** 50 m alt. / 5 – In rather dry niches in a moss and herb community on a weak ground water leakage. K-82-12-04. [Minami et al., 2001]

**P. denticulatum** (Hedw.) Bruch & Schimp. in Bruch et al. – **PA:** 50-60 m alt. / 2, 5 – On the crumbled vertical moist ledges to the stream bed, formed by metamorphized tufa-like sediments; on the trunk of the alder on the edge of sedge-sphagnum swamp. K-77-16-04; K- 83-20-04. [Cherdantseva, 1986].

**P. nemorale** (Mitt.) A. Jaeger – **PA:** 50 m alt. / 1 – On moist thickly shaded soil in thickets of the alder. K-76-1-04.

**Pleurozium schreberi** (Brid.) Mitt. (Calliergonella schreberi (Brid.) Grout ) – **PA:** 50 m alt. / 5 – In a moss and herb community on a weak ground water leakage. K-82-7-04; K-82-8-04. [Noguchi, 1967; Minami et al., 2001] – **SH:** 103-170 m alt. / 32, 34 – On tussocks among lichens and crowberry in dwarf shrub and lichen tundra; on mesotrophic swamp with sedges, herbs, dwarf shrubs and mosses among lakes. With *Sanionia uncinata, Sphagnum squarrosum.* K-123-5-04; K-125-36-04. [Cherdantseva, 1986]

**Pogonatum dentatum** (Brid.) Brid. (P. capillare (Michx.) Brid.) – **PA:** 10 m alt. / 1 – On soil in a

P. jensenii I. Hagen – PA: This species is published by Cherdantseva (1986).


P. strictum Brid. (P. alpestre Hoppe.) – PA: This species is published by Noguchi (1967), Cherdantseva (1986).

P. piliferum Hedw. – PA: 40 m alt. / 25 – On a pyroclastic deposits field overgrown with the alder. K-112-2-04. [Minami et al., 2001]

P. sexangularue Brid. – PA: This species is published by Cherdantseva (1986), Minami et al. (2001).


Ptilium crista-castrensis (Hedw.) De Not. – PA: 50 m alt. / 5 – In a moss and herb community on a weak ground water leakage. K-82-7-04.


R. lanuginosum (Hedw.) Brid. – **PA:** 40 m alt. / 9 – On a flat step of a ledge of rocky exposition 1-2m high, in well-lit and dry plot of northern exposition of a flat step of a cliff. K-90-17-04. – **SH:** 103 m alt. / 32 – On tussocks among lichens and crowberry in dwarf shrub and lichen tundra. K-123-4-04. [Cherdantseva, 1986]

R. muticum (Kindb. in Macoun) Frisvoll – **PA:** 40-500 m alt. / 10, 14, 25 – On stones and among them on the stony nival valley; among dwarf shrubs (mostly *Fillodoces*) in dwarf-shrub - lichen - moss tundra; on a pyroclastic deposits field overgrown with the alder. K-92-4-04; K-112-6-04. [Cherdantseva, 1986; Minami et al., 2001] – **SH:** 50-170 m alt. / 32, 33, 36 – On tussocks in dwarf shrub and lichen tundra in flood-lands of the upper reaches of a stream; on vertical walls of rocks formed by caked metamorphized tufa; on tussocks in sedge and moss flood-land bog. With *Aulacomnium palustre*, *Hylocomiastrum pyrenaeicum*, *Pleurozium schreberi*, *Racomitrium canescens*, *Tomentypnum nitens*. K-123-5-04; K-129-8-04. [Cherdantseva, 1986]

*Rhytidiadelphus squarrosus* (Hedw.) Warnst. – **PA:** 300-925 m alt. / 3, 10, 16 – On fine-grained substratum in shaded wet niches; on stones and among them on the stony bottom of a nival valley; on the open surface of a stone and in dry and weakly shaded crevices among stones in dwarf shrub and lichen tundra. K-79-2-04; K-99-6-04. The specimens assigned to *R. heterostichum* (Hedw.) Brid. (Minami et al., 2001) belong in this species. [Cherdantseva, 1986] – **SH:** 116 m alt. / 30 – On stones along the bank of a small stream. K-121-27-04.

*Rhizomnium nudum* (Britt. & R.S. Williams) T.J. Kop. – **PA:** 100-360 m alt. / 10, 14, 19 – On fine-grained substratum in thickets of the alder down the slope of the left bank of a stream; among dwarf shrubs (mostly *Fillodoces*) in subnival dwarf-shrub - lichen - moss tundra; on shady slope overgrown with the alder descending to a stream. K-105-10-04. – **SH:** This species is published by Cherdantseva (1986).

*R. pseudopunctatum* (Bruch & Schimp.) T.J. Kop. (Mnium pseudopunctatum Bruch & Schimp.) – **PA:** This species is published by Horikawa (1934).

*Rhytidiadelphus squarrosus* (= *R. subpinnatus*) (Lindb.) T.J. Kop. – **PA:** 10-50 m alt. / 5, 8 – In a wet moss-herb and herb-moss meadow-like communities on the slope faced to a stream. With *Climacium dendroides*, *Dicranum majus var. orthophyllum*. K-82-10-04; K-89-10-04. [Cherdantseva, 1986; Minami et al., 2001] – **SH:** 158 m alt. / 36 – On a moist peat slope to a river. K-129-22-04.

*Rigidialedphus robustus* (Lindb.) Nog. – **PA:** 650 m alt. / 11 – On soil among dwarf shrubs in dwarf shrub tundra. K-93-8-04. – **SH:** This species is published by Cherdantseva (1986).

Sanionia uncinata (Hedw.) Loeske (*Drepanoclados uncinatus* (Hedw.) Warnst.) – **PA:** (10)60-728 m alt. / 5, 6, 12, 18 – On the trunk of the alder on the edge of a sedge-sphagnum bog; on the sandy bank of a stream in thickets of the alder with meadowsweet; among the stones of a rocky placer sliding down to a maritime meadow; among the lichen cover in lichen and dwarf shrub tundra. With *Brachythecium populiferum, Dicranum majus var. orthophyllum, Hypnum plicatum, Tortula ruralis*. K-83-17-05; K-103-21-04. [Abramova, 1960; Cherdantseva, 1986; Minami et al., 2001] – **SH:** 50-170 m alt. / 32, 33, 36 – On tussocks in dwarf shrub and lichen tundra in flood-lands of the upper reaches of a stream; on vertical walls of rocks formed by caked metamorphized tufa; on tussocks in sedge and moss flood-land bog. With *Aulacomnium palustre*, *Hylocomiastrum pyrenaeicum*, *Pleurozium schreberi*, *Racomitrium canescens*, *Tomentypnum nitens*. K-123-5-04; K-129-8-04. [Cherdantseva, 1986]


Schistidium papillosum Culm. – **PA:** This species was wrongly identified as *S. apocarpum* (Cherdantseva, 1986).

*S. platyphyllum* (Mitt.) Pers. – **SH:** 5 m alt. / 33 – On moist coastal clffs formed, to the south of the Baikovsk Stream. K-128-6-06.

*S. rivulare* (Brird.) Podp. – **PA:** 150 m alt. / 6 – In shaded rock crevices. K-86-3-04.

Scorpidium scorpioides (Hedw.) Limpr. – **SH:** 170 m alt. / 34 – On mesotrophic swamp with sedges, herbs, dwarf shrubs and mosses, among lakes. K-125-4-04.

*Sphagnum angustifolium* (Russow) C.E.O. Jensen – **PA:** This species is published by Noguchi (1967).

*S. capillifolium* (Ehrh.) Hedw. – **PA:** This species is published by Horikawa (1934).

*S. centrale* C.E.O. Jensen – **SH:** This species is published by Cherdantseva (1986).


*S. contortum* Schultz – **PA:** 60 m alt. / 5 – On tussocks and in small depressions on a flat sedge-sphagnum bog in flood-lands of the upper reaches of a stream. K-83-10-04.

*S. fallax* (H. Klinggr.) H. Klinggr. – **PA:** 60 m alt. / 5 – On tussocks and in small depressions on sedge-sphagnum bog in flood-lands of the upper reaches of a

*S. fimбриatum* Wilson in Hook – **PA**: This species is published by Cherdantseva (1986).

*S. girgensohnnii* Russow – **PA**: 50-500 m alt. / 5, 10, 15 – In a moss and herb community on a weak ground water leakage; on stones and among them on the stony nival valley; on fine-grained substratum in subnival habitat. K-82-3-04; K-97-5-04.

*S. lindbergii* Schimp ex Lindb. – **PA**: This species is published by Cherdantseva (1986).

*S. papillosum* Lindb. – **PA**: This species is published by Horikawa (1934).

*S. quinquefarium* (Lindb.) Warnst. – **SH**: 158 m alt. / 36 – On tussocks in sedge and moss flood-land bog. Growing along with *Sphagnum subsecundum*. K-129-6-04.

*S. riparium* Aongstr. – **PA**: This species is published by Cherdantseva (1986).

*S. russowii* Warnst. – **PA**: This species is published by Cherdantseva (1986).

*S. squarrosum* Crome in Hoppe – **PA**: 60 m alt. / 5 – On tussocks and in small depressions on sedge-*Sphagnum* bog in flood-lands of the upper reaches of a stream. With *Polytrichastrum longisetum*, *S. fallax*. K-83-6-04. – **SH**: This species is published by Cherdantseva (1986).


*S. tenellum* Ehrh. ex Hoffm. (S. molluscum Bruch) – **PA**: This species is published by Horikawa (1934).


*T. drummondii* (Hook. & Grev.) Brid. – **PA**: 30 m alt. / 23 – On the trunks of the willow at the height of 1.5 m, in a flood-plain willow forest with trees up to 10m high. K-110-1-04.

*Warnstorfia examinulata* (Schimp.) Loeske (*Drepanocladus examinulatus* (Bruch & Schimp.) – **SH**: This species is published by Cherdantseva (1986)

*W. fluitans* (Hedw.) Loeske (*Drepanocladus fluitans* (Hedw.) Warnst.) – **PA**: 10 m alt. / 1 – On waterlogged sites in a alder thicket with reed-grass. 22.VII.1997. Coll. Verkholat. [Cherdantseva, 1986]

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