

ON THE MOSS FLORA OF UST-MAYA DISTRICT
(REPUBLIC SAKHA/YAKUTIA, EAST SIBERIA)

К ФЛОРЕ МХОВ УСТЬ-МАЙСКОГО УЛУСА
(РЕСПУБЛИКА САХА/ЯКУТИЯ, ВОСТОЧНАЯ СИБИРЬ)

M. S. IGNATOV¹, E. I. IVANOVA², E. A. IGNATOVA³ & K. K. KRIVOSHAPKIN⁴

М. С. ИГНАТОВ¹, Е. И. ИВАНОВА², Е. А. ИГНАТОВА³ и К. К. КРИВОШАПКИН⁴

Abstract

The result of study of collections from 16 localities in Ust-Maya District is presented. 253 species were found; their list is annotated by altitudinal and habitat data. Localities of some species extend their ranges considerably: *Plagiothecium berggrenianum*, *Hypnum saitoi*, *Indusiella thianschanica*, *Bardunovia baicalensis*, *Didymodon hedysarifomis*, etc. Nomenclatural novelties are: *Orthotrichum iwatsukii* Ignatov, nom. et stat. nov. [= *O. macounii* var. *japonicum* Iwats., *O. laevigatum* Zett. var. *japonicum* (Iwats.) Lewinsky] and *Pylaisia steerei* (Ando & Higuchi) Ignatov [= *Pylaisiella steerei* Ando & Higuchi].

Резюме

В сборах из 16 пунктов Усть-Майского улуса выявлено 253 вида мхов. Приводится список с указанием местообитаний и высотного распределения. Находки отдельных видов (*Plagiothecium berggrenianum*, *Hypnum saitoi*, *Indusiella thianschanica*, *Bardunovia baicalensis*, *Didymodon hedysarifomis* и др.) значительно расширяют их до сих пор известные ареалы. Предложены новое название и комбинация: *Orthotrichum iwatsukii* Ignatov, nom. et stat. nov. [= *O. macounii* var. *japonicum* Iwats., *O. laevigatum* Zett. var. *japonicum* (Iwats.) Lewinsky] и *Pylaisia steerei* (Ando & Higuchi) Ignatov, comb. nov. [= *Pylaisiella steerei* Ando & Higuchi].

INTRODUCTION

Present paper summarizes the result of recent field studies in the East Yakutia, the area which was previously quite insufficiently known for bryophytes. Two first authors collected mosses in 16 places (Fig. 1) in 2000, Krivoshapkin – near Solnechnyj (#9 in Fig. 1) in 1999; sufficient part of collection was identified by Ignatova.

The collecting localities are in Fig. 1. Most of collections were gathered in the Yudomo-Mayskoe Upland (1-3, 7-13) and in foothills of Sette-Daban Range (4-6). Few collections were made during several short stops along Aldan River (14-16), which are also included in the present list.

Sette-Daban is a southernmost part of Verkhojansky Range, a long (1500 km) moun-

tain chain from Arctic Ocean to about 60°N, along the right bank of Lena River and further southwards – along right bank of Aldan River.

Mountains of the studied area are rather low, the highest peak of Sette-Daban is 2403 m. The highest peak in the area we visited is 2184 m, but collections were made to 1900 m only, because above we found only lifeless rock fields.

Rocks of Sette-Daban are composed by dense sandy limestones, dolomites, schists, and in upper belts at places by granites.

Climate is sharply continental, mean temperature of January is –40–44°C, of July – +10–14°C, mean annual precipitation 400–500 mm, snow cover is 60–70 cm (in Solnechnyj, #9 in Fig. 1, ca. 600 m alt.; Altas..., 1989).

¹ – Main Botanical Garden of Russian Academy of Sciences, Botanicheskaya 4, Moscow 127276 Russia – Россия 127276 Москва, Ботаническая 4, Главный ботанический сад Российской Академии Наук

² – Institute of Biology of Permafrost-Zone, Lenina str. 41, Yakutsk 677000 Russia – Россия 677000 Якутск, Ленина 41, Институт биологических проблем криолитозоны СО РАН

³ – Moscow State University, Biological Faculty, Moscow 119899 Russia – Россия 119899 Москва, Московский государственный университет, Биологический факультет

⁴ – Yakutsk State University, Dept. of Botany, Belinskogo 58, Yakutsk 677016 Russia – 677016 Якутск, Белинского, 58, Якутский государственный университет, каф. ботаники

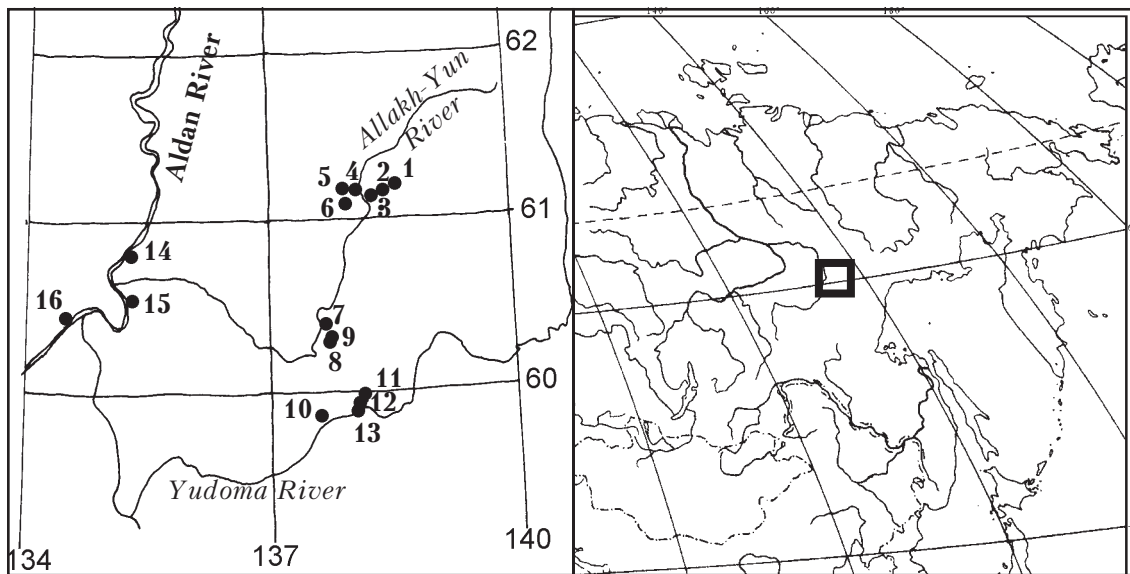


Fig. 1 Collecting localities of bryophytes. – Рис. 1. Места сборов мохообразных

Localities/elevation (m)	N (lat - long)	Местонахождение/высоты (м)
Semenchi-Yuryakh Creek, 1700-1900	1 (61°08'N-138°18'E)	ключ Семенчи-Юрях, 1700-1900
Tarbagannakh Creek, 1200-1600	2 (61°07'N-138°16'E)	ключ Тарбаганнах, 1200-1600
Tarbagannakh Creek, 700-1000	3 (61°06'N-138°10'E)	ключ Тарбаганнах, 700-1000
Allakh-Yun surroundings, 600	4 (61°08'N-138°03'E)	окр. пос. Аллах-Юнь, 600
Khatun-Yuryakh Creek, 650-850	5 (61°07'N-138°00'E)	ключ Хатун-Юрях, 650-850
Selyakh Creek, 700	6 (61°06'N-137°58'E)	ключ Селях, 700
Solnechnyj surroundings, 600-800	7 (60°20'N-137°35'E)	окр. пос. Солнечный, 600-800
Tom Creek, 6 km from mouth, 650	8 (60°14'N-138°39'E)	ключ Том, в 6 км от устья, 650
Tom Creek, near mouth, 600	9 (60°16'N-138°37'E)	ключ Том, близ устья, 600
Yugorenok Creek, 400	10 (59°45'N-137°37'E)	ключ Югоренок, 400
Medvezhij Creek, 650	11 (61°07'N-138°16'E)	ключ Медвежий, 400
Khlebnij Creek, 650	12 (61°07'N-138°16'E)	ключ Хлебный, 400
Shchel Creek, 650	13 (61°07'N-138°16'E)	ключ Щель, 400-550
Eldikan, 150	14 (60°45'N-135°08'E)	Эльдикан, 150
Ezhanzy, 150	15 (60°30'N-135°00'E)	Эжанцы, 150
Petrovavlovsk, 150	16 (60°25'N-134°30'E)	Петровавловск, 150

Permafrost is developed in all types of vegetation and soils. The only melted soils are beneath rivers.

The tree-line is at 900-1000 m. Above it rock-fields prevail. They are mostly very dry, rather rich in lichens, and poor in mosses and vascular plants. Very few mosses were found here (*Andreaea rupestris*, *Racomitrium canescens*, *R. lanuginosum*, *Hylocomium alaskanum*, *Rhytidium rugosum*, *Polytrichastrum alpinum*, etc.). Wet places in the upper courses of larger creeks, surrounded from three sides by cliffs (so-called "circuses"), have rather wet tundra, with constant presence of *Warnstorfia sarmentosa*, *Tomentypnum nitens*, *Aulacomnium palustre*, *A. turgidum*, *Bryum cryophilum*, *Polytrichastrum*

alpinum, *Sphagnum girgensohnii*, *Sanionia uncinata*, *Dicranum spp.*, *Pohlia spp.* and at places also more rare species like *Rhizomnium andrewsianum*. Wet rocks and cliffs, with a variety of microhabitats have a rather rich moss flora, including many rare species.

Especially outstanding was the only waterfall on Tarbagannakh Creek at 1400 m, where we found *Plagiothecium berggrenianum*, *Pohlia crudoides*, *Blindia acuta*, *Hygrohypnum polare*, etc.

Forest of *Larix cajanderi*¹ is the main type of vegetation below 900-1000 m. It was described in different publications (for example Tyulina, 1959; Kildyushevskij, 1960). Among several types of *Lar-*

¹ – Nomenclature of vascular plants is according to Cherepanov (1995).

ix forests, the most common in the study area are rather dry communities, with lichens and *Vaccinium vitis-idea*+*Ledum decumbens* shrublets. More mesic communities with continuous carpet of *Rhytidium rugosum*, and somewhat more rarely *Hylocomium splendens*, *Pleurozium schreberi*, *Tomentypnum nitens*, *Aulacomnium palustre* and *A. turgidum* are also common. *Betula exilis* (*B. nana* ssp. *exilis*) occurs everywhere, avoiding just very dense *Larix* stands. *Pinus pumila* grows in many places in forests, but pure dense stands it forms only on open steep slopes, where *Larix* can not survive. Bottoms of ravines, depressions and sometimes flat places have open *Larix* stands with dense *Sphagnum* hummocks. Also *Spagnum* is forming very peculiar communities on very steep (30-40°) slopes, which often have pure *Spagnum* carpet, with a variety of its species. In such places we have found also some interesting plants, for example *Cinclidium arcticum* and *Tomentypnum falcifolium*.

Larix forests are burned time by time, and old trees are rare. Consequently there are not so many epixylic bryophytes in this area. *Tetraphis* is a very rare moss in the area (as well as in other parts of Yakutia).

In flood valleys *Chosenia arbutifolia* and *Populus suaveolens* occur, but in most places we visited these species grow as short, thin trees, and without any epiphytic mosses. Only along Yudoma and Aldan Rivers (localities 11-16) we found at places tall trees (15 m and taller) of *Populus* and *Chosenia*, with rather numerous moss epiphytes (*Orthotrichum*, *Zygodon*, *Leskea*, *Myrinia*, *Pylaisia*, etc.). These localities – the only place in the area where we found also *Picea obovata*, which is close here to its NE limit.

Very peculiar are upper courses of small creeks. They have very steep slopes, so becoming canyon-like, and their upper parts usually have *Betula lanata* (*B. ermannii* ssp. *lanata*), which was found in such situation. Communities formed by this *Betula* are very peculiar despite very small area occupied by them. On soil and rotten logs are common *Plagiomnium medium* and *Brachythecium* cf. *albicans* (see below), and at places *Plagiothecium denticulatum* forms extensive pure carpets, especially on temporarily flooded rocks. This composition provides a great contrast to surrounding *Larix* forests with *Rhytidium*, *Hylocomium*, *Sphagnum*, etc.

Soil banks, rock outcrops and cliffs are quite diverse in this area. Shady ones have usually *Encalypta procera*, *E. rhaptocarpa*, *Pohlia longicollis*, *Leptobryum pyriforme*, *Myurella julacea*, *M. tenerrima*, *Orthothecium strictum*, *Isopterygiopsis pulchella*, *Cyrtomnium hymenophylloides*, *Brachythecium trachypodium*, *Saelania glaucescens*, *Distichium capillaceum*, *Tortula mucronifolia*, etc. Not rare is *Seligeria tristichoides*. More open and exposed cliffs are better represented along Yudoma River; very common here are many xerophytic mosses: *Molendoa sendtneriana*, *Didymodon rigidulus*, *Grimmia poecilostoma*, *Hypnum vaucheri*, and at places there are some rare xerophytes: *Indusiella thianschanica*, *Jaffueibryum latifolium*, *Stegonia latifolia*, *Aloina rigida*, *Funaria pulchella*, etc.

Mire vegetation is represented rather poorly, as in most parts of Yakutia. At places among open *Larix* stands are sedge+willow shrub' hummocks, which were found very dry in the end of August, but probably temporarily they are quite wet: in such places we found *Meesia hexasticha*, *Limprihtia revolvens*, *Hamatocaulis vernicosus*, *Campyllum stellatum*, *Climacium dendroides* etc. Another wetland rich in bryophytes is one wet meadow near Allakh-Yun settlement; it is dominated by *Calamagrostis* and *Carex*, and at places has hollows, which are permanently flooded and have *Calliergon megalophyllum*, *Calliergonella cuspidata*, *Cinclidium stygium*, *Campyllum stellatum*, *Tomentypnum nitens*, *Drepanocladus aduncus*, *D. sordidus*.

This area was intensively used for gold mining in the middle of XX century (now this industry is much reduced). So there are many track and caterpillar roads at all elevations. It was very interesting to find that some plants, very common on disturbed places above tree line (*Oligotrichum hercynicum*, *Psilopilum cavifolium*, etc.) are totally absent along the same roads when they drop to forest belt. Reciprocally, such road-side plants of forest belt, as *Pohlia prolifera*, *Aloina brevirostris* totally disappear above tree-line. Many interesting plants were found exclusively along roads: *Ditrichum pusillum*, *Philonotis arnellii*, *Tortula cernua*, and even one species, which is described as a new for science, *Barbula jacutica* (see Ignatova, 2001). Interesting also, that some relatively xerophytic species (*Tortella tortuosa*, *Didymodon rigidulus*) were found on peaty soil along roads in forests.

LIST OF SPECIES

Specimens are in MHA and herbarium of Institute of Biology of Permafrost Zone in Yakutsk. After each species in square brackets are its altitudes (in parenthesis are altitudes not documented by herbarium, but just by field observations, mostly for common species), then brief characteristic of habitats, and in the end in square brackets numbers of localities according to Fig. 1, and few voucher specimens. If not indicated otherwise – the number is a collecting number of Ignatov.

- Abietinella abietina* (Hedw.) Fleisch. – [550-1500 m] sporadic at lower elevations on dry rocky slopes; at upper elevations rare, on dry rocks [2, 13/00-17, 00-9].
- Aloina brevirostris* (Hook. et Grev.) Kindb. [550-900 m] along a road in valley, on dark-grey deposits of golden mining and on old road near tree-line, locally abundant [3, 8/00-6].
- A. rigida* (Hedw.) Limpr. – [400 m] rock outcrops on the bank of Yudoma River [11-12/00-11, 00-12].
- Amblystegium serpens* (Hedw.) B.S.G. – [150-600 m] sporadic on soil, trunks and rotten logs in forest in flood valleys, sometimes on rocks on rather dry slopes [4, 13-14/00-890, 00-5, 00-643].
- Amphidium lapponicum* (Hedw.) Schimp. – [800 m] found once on vertical walls and overhangs of wet shaded cliffs in narrow canyon [5/00-2].
- Andreaea blyttii* Schimp. – [1750-1900 m] in two places in great quantity; both are in the coldest parts of slope base, with persistent snow; growing on rocks, occasionally on soil nearby [1/00-851, 00-858].
- A. rupestris* Hedw. – [1400-1800 m] rather common on rocks and in rocky tundra above tree line, and never seen below the latter [1-2/00-10, 00-554, 00-855]. Some specimens can be identified as *A. alpestris* (Thed.) Schimp., but this taxon is rather indistinctly delimited from *A. rupestris* (for example 1/00-852, 00-854; 1800-1850 m, rocky tundra in uppermost elevations).
- Anoetangium aestivum* (Hedw.) Mitt. – [650 m] one collection on rocks [5/00-800].
- Anomobryum julaceum* (Gaertn. et al.) Schimp. – [400-600 m] on alluvium of Allakh-Yun and Yudoma Rivers; on open places, as well as in flood-valley forest of soil, sides of fallen logs and trunk bases; also on rock outcrops on river bank [4, 11, 13/00-15, 00-645].
- Arctoa fulvella* (Dicks.) B.S.G. – [1600-1800 m] relatively common, and at places abundant in upper elevations [1, 2/00-478, 00-644].
- Aulacomnium acuminatum* (Lindb. et H. Arnell) Kindb. – [600 m] sporadic in *Larix* forests on slopes; sporophytes found only once [8/00-20].
- A. palustre* (Hedw.) Schwaegr. – [(400-)-600-(1800) m] very common in different types of wet habitats (bogs, swamps, wet meadows) in forest zone and in tundra; in young *Larix* forests one of the pioneer mosses [4/00-18].
- A. turgidum* (Wahlenb.) Schwaegr. – [(400-)-600-800-(1800) m] very common in *Larix* forests, bogs and tundra, in young *Larix* forests one of the pioneer mosses penetrating under canopy; also one of the first invaders on sandy bars in flood valley of Yudoma River (which flooded once in few years) [4-5, 8/00-3, 00-23, 00-24].
- Barbula amplexifolia* (Mitt.) Jaeg. – [400-700 m] on cliffs faced to Yudoma River and some creeks, at temporary flooded level or shortly above it [6, 11-12/00-864, 00-567, 00-36].
- B. convoluta* Hedw. – [150-650 m] on fine dark-grey deposits from gold mining, and on gravelly bar of Aldan River [9, 15/00-33, 00-857].
- B. jacutica* Ignatova (description see in paper of Ignatova in this volume, p. 161) [1000 m] along old road near tree-line, on soil [2/1061].
- Bardunovia baicalensis* Ignatov & Ochyra – [400-700 m] two collections: from exposed cliff in lower course of Tarbagannakh Creek, and on soil bank to streamlet in flood-valley of small tributary of Yudoma River [3, 11/00-38, 00-39].
- Bartramia ithyphylla* Brid. – [1400-1750 m] rather common in tundra and on rocks above tree line [1, 2/00-559, 00-42].
- B. pomiformis* Hedw. – [1600 m] few places on rocks at upper elevations [2/00-558].
- Blindia acuta* (Hedw.) B.S.G. – [1400-1600 m] sporadic in alpine zone on wet cliffs, especially near permanent waterfalls [2/00-28, 00-46].
- Brachythecium cf. albicans* (Hedw.) B. S. G. – [450-1600] very common, especially in upper parts of narrow valleys of small creek, in communities with *Betula ermannii*; also on slopes in *Larix* forest, wet places in valley bottoms, etc. [2-3, 5, 7, 9-10/00-1057, 00-1058, 00-1063]. Our specimens are very close to *B. albicans* in most of microscopical features, but have rather different habit. They will be discussed in a special paper.
- B. cirrosum* (Schwaegr.) Schimp. (= *Cirriphyllum cirrosum* (Schwaegr.) Grout) – [500 m] only one collection on boulder in *Larix* forest on steep slope [13/00-25].
- B. erythrorrhizon* B. S. G. ssp. *asiaticum* Ignatov – [400-800 m] on rock outcrops on slopes and on fallen logs in flood valley forest [5, 8, 13/00-1046, 00-1047, 00-1050].
- B. mildeanum* (Schimp.) Schimp. ex Milde – [150-600 m] in boggy place near small pond at the edge of aeroport field in Eldikan, and few collections from flood valley forests and shrubs, on soil [4, 8, 14/00-893].

- B. rotaeanum* De Not. – [400 m] at base of *Populus* and its fallen logs in flood valley of Yudoma River [13/00-865, 00-1048, 00-1049].
- B. salebrosum* (Web. et Mohr) B.S.G. – [150-650 m] on fresh and decayed logs in *Larix* forests, occasionally at base of trunks [4, 7, 9, 15/00-866, 00-1072, 00-1073].
- B. trachypodium* (Brid.) B.S.G. – [400-1600 m] on rock outcrops, in moderately shady to open conditions [2, 6, 9-10, 12, /00-891, 00-1051, 00-1052].
- Bryobrittonia longipes* (Mitt.) Horton – [600-700 m] few collections on bars and soil banks just above river bars, along Allakh-Yun River and its small tributaries [4, 6/00-892, 00-646].
- Bryoerythrophyllum ferrucinascens* (Stirt.) Giac. – [400-600] on the bar of Allakh-Yun River, on soil among cliffs and occasionally along little-used roads in *Larix* forest [4, 12/0-1061; 00-1080; 00-671b].
- B. recurvirostrum* (Hedw.) Chen – [150-1600 m] very common on soil banks along roads, creeks, streams, and also on rock outcrops and cliff crevices [2-5, 8-10, 12-13, 15/00-566, 00-858, 00-860, 00-869].
- Bryum algovicum* Sendtn. ex C.Muell. – [400-650 m] on soil banks along streams, landslides near rock outcrops, in pits in *Larix* forest [4-5, 12/00-868; 00-1025, 00-1032, 00-1045].
- B. arcticum* (R. Br.) B. S. G. – [700-900 m] along old roads, and on bare soil among rock outcrops near disturbed places [3/00-1023, 00-1038, 00-1041].
- B. argenteum* Hedw. – [(150-)600 m] disturbed places near settlements [4/00-29].
- B. bicolor* Dicks. – [400 m] dry cliffs faced to Yudoma River, with *Indusiella* [12/00-867].
- B. caespiticium* Hedw. – [150 m] edge of airport field [14/00-1036].
- B. creberrimum* Tayl. – [400-900 m] along roads and small creeks, on open soil [3-4, 8, 12/00-1021; 00-1022, 00-1024; 00-1028].
- B. cryophilum* O. Maort. – [1500 m] rather common in wet places in tundras, especially along brooks [2/00-1041].
- B. cf. cyclophyllum* (Schwaegr.) B. S. G. – [400] one small collection at bank of stream in flood-valley forest [9/00-1030].
- B. intermedium* – [400-600 m] along roads and small creeks, on open soil [4, 12/00-1020a, 00-1037].
- B. laevifilum* Syed (*B. flaccidum* auct.) – [400-450] few collections on relatively wet cliffs at bank of Yudoma River [13/00-1039, 00-1040].
- B. lonchocaulon* C. Muell. (*B. cirrhatum* auct.) – [400] along old road in *Larix* forest and on rather wet cliffs at bank of Yudoma River [12/00-1034].
- B. pallens* (Brid.) Sw. ex Roehl. – [800 m] in narrow valley of small creek, on landslide near rock outcrops, wet and rather shady [5/00-872, 00-1044].
- B. pseudotriquetrum* (Hedw.) Gaertn. et al. – [150-1600 m] wet depression near pond at the edge of airport field, in wet tundra and cliffs in alpine zone, and also on rocks in streams [2, 4, 14/00-473, 1026, 00-1027].
- Calliergon cordifolium* (Hedw.) Kindb. – [400 m] in flood valley of Yudoma River and its small tributaries [12-13/00-908, 00-901].
- C. megalophyllum* Mikut. – [600-700 m] in grassy mire near Allakh-Yun settlement [4, 6/00-873, 00-894, 00-658].
- C. richardsonii* (Mitt.) Kindb. – [600 m] in grassy mire near Allakh-Yun settlement [4/00-906].
- C. stramineum* (Brid.) Kindb. – [600-1600 m] on very steep slopes among *Sphagna* in forest zone, and on cliffs in alpine zone [2, 8/00-656, 00-63].
- Calliergonella cuspidata* (Hedw.) Loeske – [600 m] in sedge hummocks with *Limprichtia* near Allakh-Yun settlement [4/00-64, 00-647, 00-909].
- C. lindbergii* (Mitt.) Hedenaes – [150-600 m] in flood valleys on soil and logs covered by alluvium [4, 13-15/00-512, 00-949, 00-958].
- Campylium chrysophyllum* (Brid.) J.Lange – [400 m] landslide at small creek bank [12/00-899].
- C. protensum* (Brid.) Kindb. – [400-600 m] grassy mire, wet cliffs [4, 12/00-912, 00-913].
- C. stellatum* (Hedw.) C.Jens. – [400-700 m] grassy mire, hummock with sedges and willow shrubs, along old road in forest, in wet *Larix* forest, on rotten log in flood valley, on rocks, but in most places in small quantity [4, 6-7, 10, 13/00-896, 00-895, 00-907].
- Ceratodon purpureus* (Hedw.) Brid. – [150-600 m] common, in disturbed places, river bars, rock outcrops [8, 12, 14-15/00-53, 00-62, 00-479].
- Cinclidium arcticum* B.S.G. – [600-700 m] in few places (in all of them in abundance) on steep slopes near cliffs and in open *Larix* forests, often near *Sphagnum* [6, 8/00-467, 00-468].
- C. stygium* Sw. – [600 m] one collection in swampy meadow near Allakh-Yun [4/00-472].
- Climacium dendroides* (Hedw.) Web. et Mohr – [600 m] depression in *Betula nana* shrubs with sedges [4/Ivanova 23.VIII.2001].
- Cnestrum alpestre* (Wahlenb.) Nyh. ex Mogensen – [1600-1750 m] rare on rocks in alpine zone [1, 2/00-652, 00-655].
- C. schisti* (Web. et Mohr) Hag. – [500-600 m] on rock outcrops on steep places in forest zone [8, 10/00-653, 00-654, 00-665].
- Conostomum tetragonum* (Hedw.) Lindb. – [1500-1800 m] not rare on rocks and soil near rocks in alpine zone [1, 2/00-48, 00-57, 00-59].
- Cratoneuron filicinum* (Hedw.) Spruce – [400-600 m] river and creek banks, and in hollow in grassy mire, rather rare [4, 11-12/00-898, 00-900, 00-911].

- Cynodontium asperifolium* Lindb. et H. Arnell – [600-1400 m] rare on rocks in alpine and forest zones [2, 8/00-660, 00-661].
- C. strumiferum* (Hedw.) Lindb. – [1600 m] one collection on rocks in alpine zone [2/00-480].
- C. tenellum* (B.S.G.) Limpr. – [700-1750 m] sporadic on rocks in alpine and forest zones [1, 2, 5/00-663, 00-664].
- Cyrtomnium hymenophylloides* (Hueb.) Nyh. ex T.Kop. – [400-900 m] very common on wet rocks, rarer on soil [3, 5-6, 10, 13/00-50, 00-60, 00-471].
- Dichodontium pellucidum* (Hedw.) Schimp. – [600-800 m] rather rare on soil and rocks on banks of small tributaries of Allakh-Yun River, once in boggy hummock [3-4/00-492, 00-574].
- Dicranella crispa* (Hedw.) Schimp. – [400-650 m] in several places in sufficient quantity on soil banks near old roads and pits [5, 13/00-79, 00-679, 00-682].
- D. schreberiana* (Hedw.) Hilp. ex Crum et Anderson – [400-900 m] in many places along roads, in great quantity, more rarely on bare soil on rock outcrops and in meadow [3-4, 9, 12/00-674, 00-680, 00-684].
- D. subulata* (Hedw.) Schimp. – [600 m] one collection near old road in shrubby *Larix* forest [4/00-686].
- D. varia* (Hedw.) Schimp. – [400-900 m] at places along old roads, and once in wet meadow [4-5, 12/00-678, 00-681, 00-687].
- Dicranodontium denudatum* (Brid.) Britt. – [450-700 m] in canyon-like uppermost part of stream, and in flood valley forest; both times on wet shaded soil [7, 10/00-496, 00-486].
- Dicranoweisia crispula* (Hedw.) Lindb. – [1600-1800 m] sporadic in alpine zone [1-2/00-481, 00-498, 00-501].
- Dicranum acutifolium* (Lindb. et H. Arnell) C. Jens. ex Weinm. – [400-900 m] rather common in *Larix* forest on soil and fallen logs [3, 8, 10-12/00-920, 00-922, 00-923].
- D. angustum* Lindb. – [600-1750 m] in alpine zone in wet tundra; in forest zone in open mire in valley, in open *Larix* forests, on very steep slope among *Sphagna*, etc. [1-2, 4, 8/00-929, 00-930, 00-933].
- D. bergeri* Bland. – [450 m] one collection in *Larix* forest with *Sphagnum*, along a path [10/00-504].
- D. bonjeanii* De Not. – [600-1400 m] boggy *Larix* forest, on open places, and also boggy place in alpine zone [2, 4/00-489, 00-506, 00-491, 00-497].
- D. elongatum* Schleich. ex Schwaegr. – [800-1800 m] in alpine zone in rather wet tundra and on rocks, in forest zone on steep slope to small stream in forest and in boggy, rather open *Larix* stand [1, 3/00-490, 00-503, 00-925].
- D. flexicaule* Brid. – [1600 m] in rocky tundra in alpine zone [2/00-921, 00-938, 00-939].
- D. fragilifolium* Lindb. – [400-700 m] sporadic on rotten wood in forest zone, occasionally on moist soil and trunk bases [7, 10-11/00-70, 00-500, 00-688].
- D. fuscescens* Turn. – [450-600 m] *Betula ermannii* stand in narrow valley, *Larix* forest in narrow valley [9-10/Ivanova 3.IX.0002; 00-924].
- D. polysetum* Sw. – [450] rather dry *Larix* forest with *Vaccinium vitis-idea* [13/Ivanova 8.IX.0004].
- D. scoparium* Hedw. – [1800 m] only in uppermost elevation, in wet tundra [1/00-494].
- D. spadiceum* Zett. – [1800 m] on rocks in rock-field [1/00-576].
- Didymodon fallax* (Hedw.) Zander – [400 m] rocks at bank of Yudoma River and on wet soil along old road in forest [12/00-874].
- D. ferrugineus* (Schimp. ex Besch.) M. Hill. – [400 m] rocks at bank of Yudoma River [12/00-78a; 00-86].
- D. hedysarififormis* T. Otn. – [150 m] on *Alnus* trunk bases in valley of Aldan River [15/00-67, 00-932].
- D. rigidulus* Hedw. s. l. – [400-700 m] rather common on dry and very dry rocks in forest zone, and occasionally at base of *Chosenia* [4, 6, 12-13/00-68, 00-78, 00-96, 00-671]. Our material is very variable in respect of costa excursion, with some collections approaching to *D. validus* Limpr.; this group however needs more studies.
- Distichium capillaceum* (Hedw.) B.S.G. – [400-800 m] very common on soil banks and rock outcrops, occasionally on trunk bases in flood valley [5, 12-13/00-71, 00-75, 00-482].
- D. inclinatum* (Hedw.) B.S.G. – [600-700 m] two small populations found: on rock outcrop and on peaty soil bank not high above water at small creek bank [4, 6/00-82, 00-484].
- Ditrichum cylindricum* (Hedw.) Grout – [600-1500 m] at places on soil on roads, and at places on soil under upturned roots in forests on slope [2, 4, 9/00-69, 00-81, 00-672].
- D. flexicaule* (Schwaegr.) Hampe – [700 m] on wet open rock outcrops along Selyakh Creek [6/00-483, 00-485, 00-488].
- D. pusillum* (Hedw.) Hampe – [1300 m] on disturbed soil near old geological station [2/00-683].
- Ditrichum* sp. – [1600 m] on rocks of upper elevation [2/00-935, 00-936]. This species is somewhat similar to unidentified *Ditrichum* from Upper Bureya, discussed by Ignatov & al. (2000), but has smooth upper leaves.
- Drepanocladus aduncus* (Hedw.) Warnst. – [150-600 m] sporadic in wet grassy swamps in valleys, and in a wet pit in *Larix* forest [4, 14/00-915, 00-916, 00-919].
- D. sordidus* (C. Muell.) Hedenaes – [400-600 m] in wet meadow with grassy hollows [4, 13/00-511, 00-675, 00-918].

- Encalypta alpina* Sm. – [700 m] one collection from rock outcrop in forest [6/00-589].
- E. ciliata* Hedw. – [400-800 m] on rock outcrops in forest zone, mostly in partial shade of scattered trees [3, 10, 13/00-103, 00-114, 00-596].
- E. procera* Bruch – [400-800 m] rather common on wet shady to rather open rocks in forest zone [3, 5-6, 11/00-107, 00-112, 00-577].
- E. rhapsocarpa* Schwaegr. – [400-1500 m] very common on rocks and soil banks on open places, including very xeric ones [2, 6, 11-12/00-587, 00-588, 00-590].
- Entodon concinnus* (De Not.) Par. – [700 m] two collections – in moss carpet of *Larix* forest with *Tomentypnum* and on rather dry cliff [6/00-111, 00-113].
- Eurhynchium pulchellum* (Hedw.) Jenn. – [400-650 m] on trunk bases, rotten logs in forest at lower elevation and on soil in flood-valley *Populus* forests [9, 11, 13/00-102, 00-108, 00-110]. Plants in flood-valley of Yudoma River are unusually large for this species.
- Fissidens bryoides* Hedw. – [400 m] in flood valley of Yudoma River, on soil and alluvium above logs and trunk bases [13/00-940, 00-941].
- Funaria hygrometrica* Hedw. – [150-700 m] common on disturbed places [3-4, 14, 15/00-159, 00-161, 00-162]. Some collections have smaller plants with capsules with very short neck; however our material does not allow to understand if they comprise a distinct taxon, or an extreme variation of *F. hygrometrica*.
- F. pulchella* Philib. – [500 m] on xeric steppe slope to Yudoma River, in one place in small quantity [13/00-600].
- Grimmia longirostris* Hook. (= *G. affinis* Hoppe et Hornsch.) – [500-1500 m] sporadic on rocks above tree line, in rocky places on open steep slopes and in open *Larix* forests [2, 6, 8, 10/00-123, 00-129, 00-135].
- G. reflexidens* C. Muell. (= *G. sessitana* De Not.) – [1500-1800 m] on rocks above tree-line [1, 2/00-132, 00-133, 00-126].
- G. poecilostoma* Card. et Seb. (*G. tergestina* var. *poecilostoma* (Card. et Seb.) Loeske) – [400-500 m] locally common on xeric rocks along Yudoma; with sporophytes [11, 13/00-121, 00-124, 00-127].
- G. torquata* Hornsch. – [1450-1800 m] on side surfaces of rocks in alpine zone, locally in abundance [1-2/00-115, 00-118, 00-508].
- Gymnostomum aeruginosum* Sm. – [400-700 m] on shady rocks [6, 12/00-942, 00-943, 00-944].
- Hamatocaulis vernicosus* (Mitt.) Hedenaes – [600 m] mire with scattered shrubs in Allakh-Yun River valley [4/00-667, 00-954, 00-959].
- Helodium blandowii* (Web. et Mohr) Warnst. – [430-550 m] only two collections in wet *Larix* forest and hollow in flood-valley spruce forest [7, 10/00-138, 00-139].
- Hydrogrimmia mollis* (B.S.G.) Loeske – [1500 m] along streams in tundra, locally abundant [2/00-150, 00-152, 00-155].
- Hydrohypnum luridum* (Hedw.) Jenn. – [400 m] along small creek, tributary of Yudoma River, in temporarily flooded places [12/00-960].
- H. molle* (Hedw.) Loeske – [1750 m] in stream in tundra [1/00-961].
- H. norvegicum* (B.S.G.) Amann – [1600 m] on cliffs in alpine zone [2/00-952].
- H. ochraceum* (Turn. ex Wils.) Loeske – [650 m] on rocks in small stream [9/00-668].
- H. polare* (Lindb.) Loeske – [800-1600 m] rather common in streams and on wet cliffs at upper elevations, and occasionally in streams in forest zone [2, 5/00-525, 00-946, 00-950].
- Hylocomium alaskanum* (Lesq. et James) Aust. – [(400-)-650-(1900) m] very common in open communities and open *Larix* forests [5/00-145].
- H. splendens* (Hedw.) B.S.G. – [600 m] relatively rare in wet forests [4/00-147].
- Hymenostylium recurvirostre* (Hedw.) Dix. – [400-700 m] on rock outcrops, both open and shady, locally common, especially along Yudoma River banks [6, 13/00-141, 00-146, 00-149].
- Hypnum cupressiforme* Hedw. – [400-600 m] not common, on rock outcrops [8, 12/00-156, 00-518, 00-523].
- H. holmenii* Ando – [450-800 m] sporadic on rocks and among other mosses on slopes [5-6, 13/00-510, 00-516, 00-519, 00-524].
- H. pallescens* (Hedw.) P. Beauv. – [150 m] on trunks in flood valley of Aldan River [15/00-529].
- H. saitoi* Ando – [1750 m] one collection in alpine zone, of rocks [1/00-526].
- H. subimponens* Lesq. – [600 m] one collection on steep slope with scattered trees near emergent rock [8/00-514].
- H. vaucheri* Lesq. – [400-550 m] on xeric slopes to Yudoma River [12, 13/00-515, 00-531, 00-956].
- Indusiella thianschanica* Broth. et C. Muell. – [400-500 m] on xeric slopes to Yudoma River [11-13/00-279, 00-282, 00-280].
- Isoterygiopsis alpicola* (Lindb. et H. Arnell) Hedenaes – [750-1600 m] locally common in forest zone on soil banks rich in humus, usually wet and shaded, and also not rare on wet rocks in alpine zone [2, 5, 7/00-288, 00-289, 00-294].
- I. muelleriana* (Schimp.) Iwats. – [1450-1600 m] rare in alpine zone on rocks [2/00-298, 00-299, 00-304].
- I. pulchella* (Hedw.) Iwats. – [400-1600 m] rather common, on rocks, rotten logs, soil under root upturnings, etc. [2-3, 5, 7, 9-10, 13/00-287, 00-292, 00-301].

- Iwatsukiella leucotricha* (Mitt.) Buck et Crum – [1600 m] the only finding on side wall of big rock at foot of cliff [2/00-278].
- Jaffuelobryum latifolium* Lindb. et H. Arnell ex Ther. – [500 m] one collection on xeric slope to Yudoma River [13/00-165].
- Kiaeria starkei* (Web. et Mohr) Hag. – [1600-1800 m] few collections from upper elevation, on rocks and soil in tundra [1-2/00-692, 00-691].
- Leptobryum pyriforme* (Hedw.) Wils. – [150-900 m] very common on different types of soil banks, especially along creeks and streams, and also under upturned roots [3, 4, 12, 14, 15/00-177, 00-173, 00-175].
- Leskea polycarpa* Hedw. – [150-400 m] two collections (despite of intentional search), on *Populus* trunk and rotten log in valley of Medvezhij Creek, a small tributary of Yudoma River, and also along Aldan River [11, 15/00-174, 00-169].
- Limprichtia cossonii* (Schimp.) Anderson et al. – [150-600 m] grassy mires near Allakh-Yun and Eldikan, and on gravely bar of small creek [4, 14/00-967, 00-657a].
- L. revolvens* (Sw.) Loeske – [400-700 m] more common, comparatively with the previous species, in boggy hummock and different kinds of mires and open wet forests [4-6, 10-11/00-966, 00-693, 00-694].
- Loeskyppnum badium* (Hartm.) Paul – [700-1750 m] rather rare, in boggy places in alpine zone and in open *Larix* forests [1, 2, 5/00-964, 00-695, 00-963].
- Lyellia aspera* (Hag. et Jens.) Frye – [600] among rocks on steep slope with *Betula lanata* [9/ Ivanova 3.IX.0001].
- Meesia hexasticha* (Funck) Bruch – [700 m] in open *Larix* forest in wet hollow [5/00-605].
- M. uliginosa* Hedw. – [500-1400 m] wet hollow in hummocks and *Larix* forests with *Sphagnum*, and on wet cliffs [2, 6, 10/00-603, 00-604, 00-606].
- Mnium blyttii* B.S.G. – [400 m] one collection in flood valley of creek, a tributary of Yudoma River, in shady forest, at base of fallen log [11/00-464].
- M. lycopodioides* Schwaegr. (incl. *M. ambiguum* H. Muell.) – [650-1600 m] in alpine zone on wet rock outcrops; in forest zone on rocks in narrow canyon-like spurs of small creeks [2, 7/00-272, 00-460, 00-461].
- M. spinosum* (Voit) Schwaegr. – [400-1400 m] few collections: among rocks in alpine zone, on rotten wood in flood-valley forest, etc. [2, 11/00-273, 00-274, 00-275].
- M. thomsonii* Schimp. – [400 m] rather rare in flood valley of Yudoma River and its tributaries, at trunk bases and steep banks of old river beds in forest [11, 13/00-271, 00-465].
- Molendooa sendtneriana* (B.S.G.) Limpr. – [400-700 m] on xeric rock outcrops to Yudoma River and Selyakh Creek, locally common [6, 12-13/00-229, 00-231, 00-249].
- Myrinia pulvinata* (Wahlenb.) Schimp. – [150-400 m] common on trees along Aldan River, and rather rare on *Populus* and *Chosenia* trunks along Yudoma River and its small tributaries [11-13, 15/00-233, 00-236, 00-244].
- Myurella acuminata* Lindb. et H. Arnell – [400 m] on several wet and shaded rock outcrops on slope at mouth of Khlebny Creek, a tributary of Yudoma River [12/00-257, 00-259].
- M. julacea* (Schwaegr.) B.S.G. – [400-800 m] common on rocks and soil banks on slopes, sometimes of rotten logs; not rare with sporophytes [3-6, 9, 12-13/00-238, 00-239, 00-243].
- M. tenerrima* (Brid.) Lindb. – [400-800 m] similar to previous species, but always sterile [3-6, 10-11/00-252, 00-263, 00-266].
- Neckera pennata* Hedw. – [400-700 m] on vertical and overhanging sides of rocks, and once at base of aspen (Medvazhij Creek) [7-8, 11-12/00-185, 00-188, 00-189].
- Oligotrichum hercynicum* (Hedw.) DC. – [1300-1400(-1600) m] common along roads in alpine zone [2/00-689].
- Oncophorus compactus* (B.S.G.) Schljak. – [1800 m] in rather dry tundra [1/00-535]. This species sometimes is included in *O. wahlenbergii* as a variety. In our collections however, alpine plants are markedly different from those from forest belt.
- O. virens* (Hedw.) Brid. – [450-700 m] along creeks and streams, on soil banks close to water and in abundance on fresh alluvium [4, 6, 10/00-198, 00-690, 00-208].
- O. wahlenbergii* Brid. – [400-650 m] on fallen logs, and once on roots in dry stream bed [9, 13/00-202, 00-533].
- Orthotrichum chryseon* (Schwaegr. ex Schult.) B.S.G. – [700-1600 m] relatively rare: on cliff in alpine zone and near creeks (in forest zone grows also in *Larix* forest on slope close to cliffs); in one place in forest belt with sporophytes [2, 6/00-207, 00-197, 00-205].
- O. strictum* Lor. – [400-800 m] relatively common on wet rock outcrops in forest zone [3, 5, 8, 10, 12, 13/00-213, 00-214, 00-217].
- Orthotrichum anomalum* Hedw. – [500 m] open steppe slope to Yudoma River [13/00-219].
- Orthotrichum iwatsukii* Ignatov, nom. nov. (*O. macounii* Aust. var. *japonicum* Iwats., J. Hattori Bot. Lab. 21: 240. 1959. – *O. laevigatum* Zett. var. *japonicum* (Iwats.) Lewinsky, J. Hattori Bot. Lab. 72: 42. 1972. Blocking name: *O. japonicum* Sull. et Lesq., Proc. Am. Ac. Arts Sc. 4: 277. 1859. – [400-700 m] on rocks on slopes, both open and in partial shade [6, 10, 12/00-209, 00-210]. See discussion on this species below.
- O. obtusifolium* Brid. – [150-400 m] on *Populus* and *Chosenia* trunks in flood-valley forests; in

- this habitat – the most common species of the genus [13, 15/00-196, 00-201, 00-599].
- O. pallens* Bruch ex Brid. – [1500 m] one collection on boulder in herbaceous community on S-facing slope in alpine zone; place seems rather warm due abundant snow in winter [2/00-203].
- O. sordidum* Sull. et Lesq. – [700 m] on trunks and twigs of *Betula lanata* in canyon-like, uppermost course of small creek; in this place in great quantity [7/00-206, 00-221].
- O. speciosum* Nees – [150-400 m] very rare in valley of small tributary of Yudoma River, on *Populus*; also along Aldan River on *Padus* and *Alnus* [11, 15/00-195, 00-212].
- Philonotis arnellii* Husn. – [450-900 m] several collections on peat or soil rich in humus along trails [3, 10/00-712, 00-714, 00-978, 00-671a].
- P. fontana* (Hedw.) Brid. – [600-1600 m] wet cliffs, wet soil along trails, swampy meadow [2, 4, 6, 13/00-609, 00-610]. Some very thin plants have short laminal cells, and can be referred to var. *caespitosa* (Jur.) Schimp. [00-607, 00-612, 00-434], taxon which needs further study for its limits from *P. fontana*.
- Physcomitrella patens* (Hedw.) B. S. G. – [15] sandy bar of Aldan River, very few shoots, one with capsule [150 m/00-1100].
- Plagiomnium curvatulum* (Lindb.) Schljak. – [1600 m] one collection at upper elevation, beside snowfield [2/00-447].
- P. cuspidatum* (Hedw.) T. Kop. – [400 m] on rotten log in *Populus+Picea* forest in flood valley [13/00-438, 00-439].
- P. ellipticum* (Brid.) T. Kop. – [150-600 m] in boggy forests, and sides of roads in forests [4, 10-11, 14/00-440, 00-452, 00-453].
- P. medium* (B.S.G.) T.Kop. – [400-800 m] rather common and abundant in upper courses of small creeks, in *Betula lanata* forests, on soil, fallen trunks and rocks – [5, 7, 9-10, 12/00-442, 00-445, 00-450, 00-455].
- Plagiopus oederiana* (Sw.) Crum et Anderson – [500-800 m] dry cliffs [3, 6, 8, 13/00-417, 00-424], 00-615].
- Plagiothecium berggrenianum* Frisvoll – [1400 m] once collected on wet rocks beside waterfall on Tarbaganakh Creek, above tree-line [2/00-879, 00-881].
- P. cavifolium* (Brid.) Iwats. – [400-1600 m] cliffs and rock outcrops, in niches and crevices; in flood valley of Yudoma River, on banks of old dry river beds [2, 7, 10-11, 13/00-970, 00-972, 00-974]. Plants from cliffs in alpine belt often have very long hair-points, and similar in this respect to *P. piliferum* (Sw. ex Hartm.) B. S. G. However these specimens have broad laminal cells and therefore identified as *P. cavifolium*.
- P. denticulatum* (Hedw.) B.S.G. – [700-1700 m] in alpine zone among rocks and on wet outcrop near waterfall; in forest belt in canyon-like upper courses of small creeks, on rocks in dry stream beds, sometimes forming extensive pure carpets [1-2, 7/00-880, 00-884, 00-887].
- P. laetum* B.S.G. – [650-800 m] on rocks within forest belt and on rotten logs [5, 9/00-476, 00-878].
- Pogonatum dentatum* (Brid.) Brid. – [1450 m] among rocks on rocky slope in alpine zone [2/00-733].
- P. urnigerum* (Hedw.) P.Beauv. – [600-1450 m] on sandy bars and banks of Allakh-Yun River, and along old road in alpine zone [2, 4-5/00-724, 00-726, 00-728].
- Pohlia andrewsii* Shaw – [(800)-1400-1500 m] soil banks along roads, both in forest and alpine zone, locally common [2/00-416, 00-750, 00-758].
- P. bulbifera* (Warnst.) Warnst. – [400 m] few collections on steep banks to old river beds in flood-valley forests of Yudoma River [11, 13/00-757, 00-759, 00-763].
- P. cruda* (Hedw.) Lindb. – [400-1300 m] very common of soil banks in forest belt, occasionally on bases of *Populus* tree [3, 5, 13/00-403, 00-404, 00-409].
- P. crudoides* (Sull. et Lesq.) Broth. – [1450-1700 m] few collections in alpine zone on rocks near waterfall and in one more place on wet rocks [1, 2/00-751, 00-754, 00-765].
- P. drummondii* (C.Muell.) Andrews – [1600-1750 m] in tundra and on rocks in alpine zone [1, 2/00-743, 00-755, 00-756].
- P. filum* (Schimp.) Maort. – [400 m] on fresh alluvium in flood-valley of Yudoma River [11/00-742].
- P. longicollis* (Hedw.) Lindb. – [400-1600 m] very common on rock outcrops at all elevations [2, 5, 7, 10/00-402, 00-405, 00-767].
- P. nutans* (Hedw.) Lindb. – [600-1800 m] in alpine zone in tundra, in forest zone mostly on fallen logs [1, 4, 9/00-747, 00-746, 00-760].
- P. proliger* (Kindb. ex Breidl.) Lindb. ex H.Arnell – [400-900 m] soil banks along roads and in flood-valley, on banks to old river beds of Yudoma River [3-4, 9, 13/00-406, 00-766, 00-408, 00-426].
- P. wahlenbergii* (Web. et Mohr) Andrews – [650 m] once in heavily disturbed place, near an artificial pond [8/00-749].
- Polytrichastrum alpinum* (Hedw.) G.L.Smith – [650-1800 m] rather common above tree line on rocks and in tundra, in forest zone – on wet rocky slopes of narrow valleys and among *Sphagna* on open steep slopes [1-2, 5, 7/00-720, 00-723, 00-740].
- P. alpinum* var. *septentrionale* (Brid.) G. L. Sm. – [1600] in crevices in alpine zone [2/Ivanova 25.VIII.0007].

- Polytrichum commune* Hedw. – [400] rather rare, in wet *Larix* forests [10, 11/Ivanova 6.IX.0001; 9.IX.00].
- P. hyperboreum* R.Br. – [1400 m] old road across rock field in alpine zone [2/00-734].
- P. piliferum* Hedw. – [1800 m] in dry tundra and on disturbed places [1/00-415].
- P. strictum* Brid. – [600 m] boggy hummock in Al-lakh-Yun River valley [4/00-414].
- Pseudobryum cinclidioides* (Hueb.) T.Kop. – [500 m] in wet forest in narrow valley of Yugorenok Creek [10/00-435].
- Pseudoleskeella nervosa* (Brid.) Nyh. – [1400 m] one collection in upper course of Tarbagannakh Creek, on boulder in herbaceous community; place is rather warm due to more snow layer in winter and S-facing microslopes [2/00-182].
- P. papillosum* (Lindb.) Kindb. – [400-1500 m] on rocks in open forests [2, 7, 11/00-704, 00-705, 00-707].
- P. tectorum* (Funck ex Brid.) Kindb. – [550 m] rather xeric rocky slopes to Yudoma River [13/00-698, 00-706].
- Psilopilum cavifolium* (Wils.) Hag. – [1500 m] sides of roads in alpine zone [2/00-715, 00-716].
- P. laevigatum* (Wahlenb.) Lindb. – [1500-1800 m] in wet tundra communities, banks of brooks, etc. [1/00-717, 00-718, 00-719].
- Pterigynandrum filiforme* Hedw. – [1600 m] sides of big rocks at base of tall cliffs [2/00-430, 00-431, 00-971].
- Pterygoneurum ovatum* (Hedw.) Dix. – [150 m] on soil on dry slope to Aldan River [16/00-419].
- Ptilium crista-castrensis* (Hedw.) De Not. – [550-1600 m] on steep open slopes dominated by *Sphagna*, among them and other mosses, and occasionally in other places in open mossy *Larix* forests [2, 8, 10/00-401, 00-413, 00-422]. Plants in open habitats have usually small size and very rich golden color, contrasting with more common and widespread forest phenotype.
- Pylaisia polyantha* (Hedw.) B. S. G. (*Pylaisiella polyantha* (Hedw.) Grout) – [150-400 m] on trunks of *Populus*, *Chosenia*, *Alnus*, and *Padus* [7, 13, 15/00-418, 00-700, 00-703].
- Pylaisia steerei* (Ando et Higuchi) Ignatov comb. nov. (*Pylaisiella steerii* Ando et Higuchi, Mem. New York Bot. Gard., 45: 211, Figs. 1-34. 1987). – [400-800 m] in the valley of Yudoma, at base of trunks [5, 11-13/00-701, 00-710, 00-711, 00-981].
- Racomitrium aquaticum* (Brid. ex Schrad.) Brid. – [1600 m] wet cliffs [2/00-536].
- R. canescens* (Hedw.) Brid. – [400-1800 m] on rocks and soil in tundra, and sandy bar of Yudoma river [1-2, 11/00-360, 00-349, 00-347, 00-351].
- R. lanuginosum* (Hedw.) Brid. – [1500 m] rocks and soil above tree line [2/00-354, 00-358].
- R. panschii* (C.Muell.) Kindb. – [1500 m] dry rocks along stream in alpine belt [2/00-537].
- R. sudeticum* (Funck) B.S.G. – [700-1800 m] on rocks in rock-fields in alpine zone, and also on steep rocky slopes within forest zone [1-2, 7/00-348, 00-356, 00-350, 00-355].
- Rhabdoweisia crispata* (Dicks.) Lindb. – [400-750 m] among rocks in more wet and shady conditions [7, 10, 13/00-343, 00-344, 00-353, 00-35].
- Rhizomnium andrewsianum* (Steere) T.Kop. – [1700-1750 m] wet tundra [1/00-345, 00-346, 00-457].
- Rhytidium rugosum* (Hedw.) Kindb. – [400-1600 m] very common on soil and rocks, one of dominants in *Larix* forests [1-13/Ivanova 23.VIII.0001].
- Saelania glaucescens* (Hedw.) Broth. – [400-1500 m] soil banks, occasionally at base of *Populus* [2, 4, 10, 13/00-314, 00-310, 00-311, 00-305].
- Sanionia uncinata* (Hedw.) Loeske – [150-1800 m] common in alpine zone, sporadic in forest zone on soil among other mosses, sometimes of fallen logs and trunks [1, 2, 15/00-319, 00-513, 00-669, 00-982].
- Schistidium apocarpum* (Hedw.) B.S.G. – [400-1450 m] on rocks, both temporarily flooded and high up above rivers [2, 8, 11, 12/00-327, 00-989, 00-994].
- S. rivulare* (Brid.) Podp. – [400-1400 m] rare on cliffs along Yudoma River and on rocks in streams in alpine zone [2, 13/00-321, 00-990].
- S. strictum* (Turn.) Maort. – [400-1500 m] common on rocks in forest zone and lower part of alpine zone [2, 6-8, 10, 12/00-308, 00-993, 00-997].
- Seligeria diversifolia* Lindb. – [500-850 m] on rocks on open places and in temporary streams (covering rocks) [5, 7-8, 13/00-538, 00-539, 00-547].
- S. tristichoides* Kindb. – [400-800 m] on strongly shaded rocks [3, 8, 13/00-542, 00-546, 00-545].
- Sphagnum aongstroemii* C.Hartm. – [600-1500 m] on very steep slopes with *Sphagna* [2, 5, 8-9/00-1005, 8 00-986].
- S. balticum* (Russ.) Russ. ex C.Jens. – [600-1300 m] in bogs in valley and very steep slopes with *Sphagna* [2, 4-5, 8-9/00-1006, 00-1009].
- S. compactum* DC. – [1000 m] *Carex*+*Salix* moist tundra [2/Ivanova 26.VIII.0001].
- S. fimbriatum* Wils. – [600 m] boggy *Larix* forest in valley [4/00-1007].
- S. fuscum* (Schimp.) Klinggr. – [700 m] on very steep slope with *Sphagna* [5/00-302, 00-315].
- S. girgensohnii* Russ. – [600-1800 m] rather common in wet tundra above tree line, also on cliffs, and on very steep slopes with *Sphagna* in forest belt [1-2, 5, 7-9/00-998, 00-1002, 00-1004].
- S. jensenii* H.Lindb. – [600 m] wet mire in valley, side of big hollow [4/00-1003].
- S. lenense* H. Lindb. ex Savicz-Ljubitskaya – [650] open *Larix* forest on slope [5/Ivanova 29.VIII.0004].

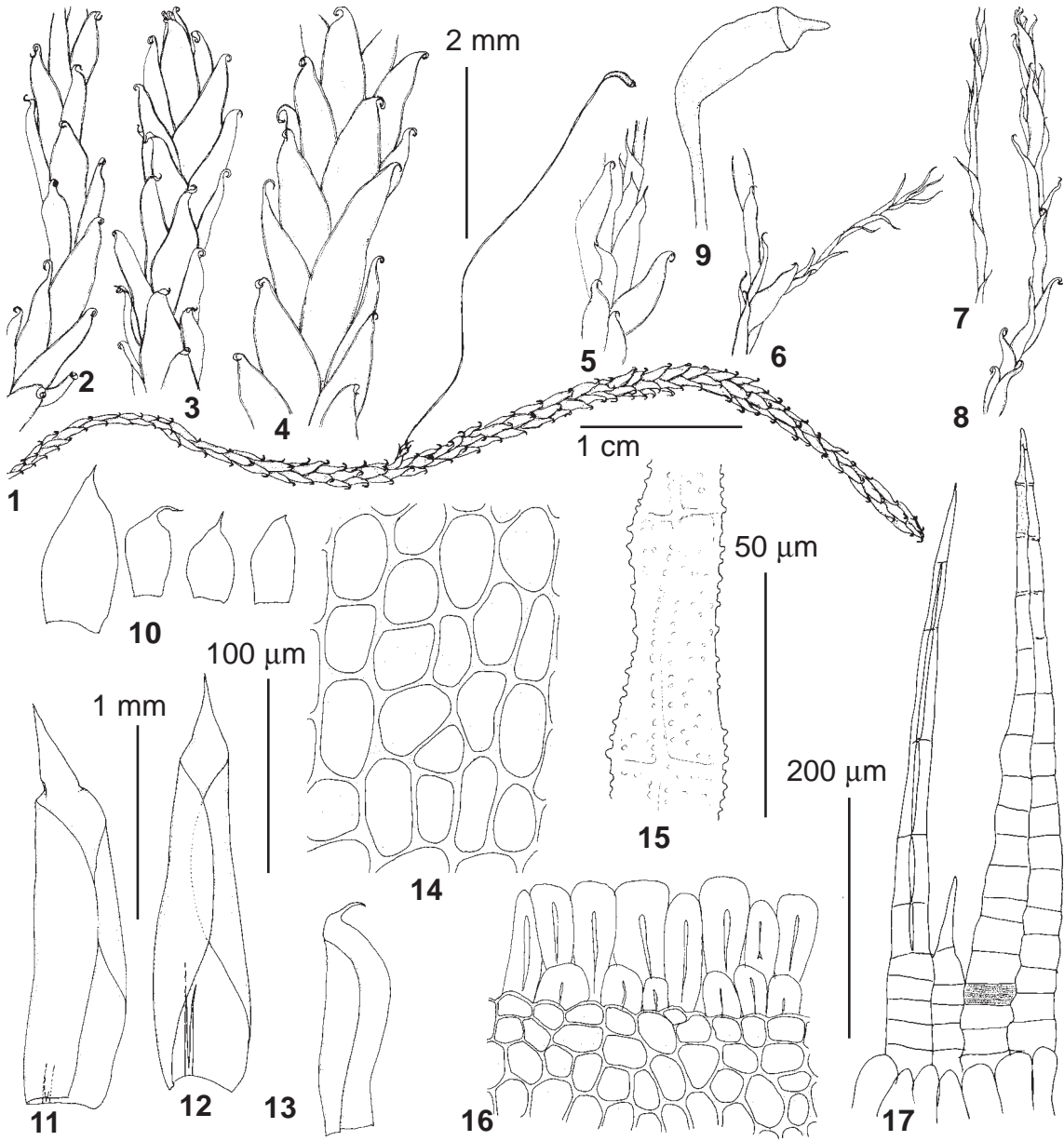
- S. magellanicum* Brid. – [600-700 m] on very steep slope with *Sphagna* [5, 8/00-324].
- S. orientale* Savicz – [600] in hollow in wet hummock with *Ledum* and *Vaccinium uliginosum* [5/Ivanova 29.VIII.0003].
- S. squarrosum* Crome – [600-750 m] in valley in hummocks, and on rocks near waterfall in narrow valley [4, 7/00-317, 00-1012].
- S. subsecundum* Nees – [600-700 m] wet mire in valley, side of big hollow [4-5/00-1001, 00-1011].
- S. teres* (Schimp.) Aongstr. ex Hartm. – [600 m] on very steep slope with *Sphagna* [8/00-1002].
- S. warnstorffii* Russ. – [600-700 m] on very steep slope with *Sphagna* [3-4, 8/00-983].
- S. wulfianum* Girg. – [600 m] in willow shrubs in valley [4/00-984].
- Splachnum* sp. – [600 m] few juvenile plants of this genus were found in grassy mire near Allakh-Yun settlement [4].
- Stegonia latifolia* (Schwaegr.) Vent. ex Broth. – [400-700 m] in two places, on open xeric rocks [6, 13/00-322, 00-323].
- Syntrochia ruralis* (Hedw.) Brid. – [400-1400 m] dry rocks [2, 10-12/00-313, 00-325, 00-387].
- Tetraphis pellucida* Hedw. – [450-700 m] very rare on strongly rotten wood [7-8, 10/00-366, 00-382, 00-389].
- Tetraplodon angustatus* (Hedw.) B.S.G. – [600-700 m] on soil, fallen logs and at wet rock outcrop, usually among other mosses [3, 6, 8-9/00-395, 00-399, 00-886].
- T. mnioides* (Hedw.) B.S.G. – [600 m] similar to previous species [4, 8/00-400, 00-396].
- Thuidium philibertii* Limpr. – [400 m] at base of *Populus* in flood valley [11/00-394].
- Timmia comata* Lindb. et H. Arnell – [400-800 m] rather common on rocks [3, 5, 6, 9, 12/00-618, 00-625, 00-628].
- T. megapolitana* Hedw. – [150-400 m] on soil and trunk bases in flood valleys of Yudoma and Aldan Rivers [13, 15/00-619, 00-629, 00-622].
- T. sibirica* Lindb. et H. Arnell – [650-1600 m] on rocks and cliffs [2, 5, 9/00-616, 00-631, 00-634].
- Tomentypnum falcifolium* (Ren. ex Nichols) Tuom. – [650 m] mossy *Larix* forest, among thick moss carpet [5/00-696, 00-697].
- T. nitens* (Hedw.) Loeske – [550-900(-1700) m] very common in mires and also *Larix* forests; only below tree line [3, 4, 6, 7/00-361, 00-1013].
- Tortella fragilis* (Hook. et Wils.) Limpr. – [400-700 m] on dry cliffs [6, 8, 12-13/00-373, 00-376, 00-393].
- T. tortuosa* (Hedw.) Limpr. – [600-700 m] rather rare on rock outcrops in forest zone, and occasionally on peaty soil along small old road in forest [5-6, 8/00-371, 00-377, 00-379].
- Tortula cernua* (Hueb.) Limpr. (= *Desmatodon cernuus* Hueb.) – [600 m] one collection on soil along old road in shrubby *Larix* forest [4/00-76].
- T. mucronifolia* Schwaegr. – [400-700 m] common on soil banks and rocks, both shaded and exposed [5, 8, 12-13/00-386, 00-398, 00-362].
- Ulota curvifolia* (Wahlenb.) Lilj. – [600-1750 m] few collections at upper elevations and on rocky slope among forest [1-2, 7/00-340, 00-342, 00-339].
- Warnstorfia exannulata* (B.S.G.) Loeske – [600-1400 m] in grassy mire in valley, and in alpine zone near waterfall (the only place above tree line); [2, 4/00-1018, 00-1019].
- W. sarmentosa* (Wahlenb.) Hedenaes (*Sarmentypnum sarmentosum* (Wahlenb.) Tuomik. et T. Kop.) – [400-1500 m] the most common species in streamlets and hollows in alpine zone; rare along stream in valley of Yudoma River [2, 11/00-318, 00-328, 00-330].
- Zygodon sibiricus* Ignatov & al. – [150-400 m] rather common in flood valley of Yudoma River and its small tributaries on trunks of *Populus* and *Chosenia*; sporophytes very rare; also in Aldan River valley [11, 13, 15/00-331, 00-337].

PHYTOGEOGRAPHIC NOTES

The general richness of species is rather high, 253 species, especially considering the rather heavy disturbance in the area due to gold mining in mid-XX century. Most of species are rather widespread, but some of them have interesting distributional patterns. Among them:

1. Northern element

Some species from Ust-Maya District are known in Russia in Arctic, and not known in South and South-East Yakutia (Stepanova & al., 1995; Ivanova, 1998; Ivanova & Ignatov, 1999), Upper Bureya River in Khabarovsk Territory (Ignatov & al., 2000) and Zeya Reserve in Amurstkaya Province (Abramova & al., 1987). Some of them also are not known in South Siberia, so in Ust-Maya District they have the southernmost localities: **Plagiothecium berggrenianum*, **Andreaea blyttii*, **Grimmia torquata*, **Psilopilum cavifolium*, *Mnium blyttii*, *Cinclidium arcticum*. Some other species are known in South Siberia (Altai, Sayan Mts.), but nevertheless in this longitudinal sector the present localities are the southernmost: **Rhizomnium andrewsianum*, **Psilopilum laevigatum*, *Orthothecium chryseon*, *Hypnum subimponens*. The occurrence of some principally arctic species can be explained by the very cold climate in this area, and also in rather continuous path to Arctic through Verkhoy-

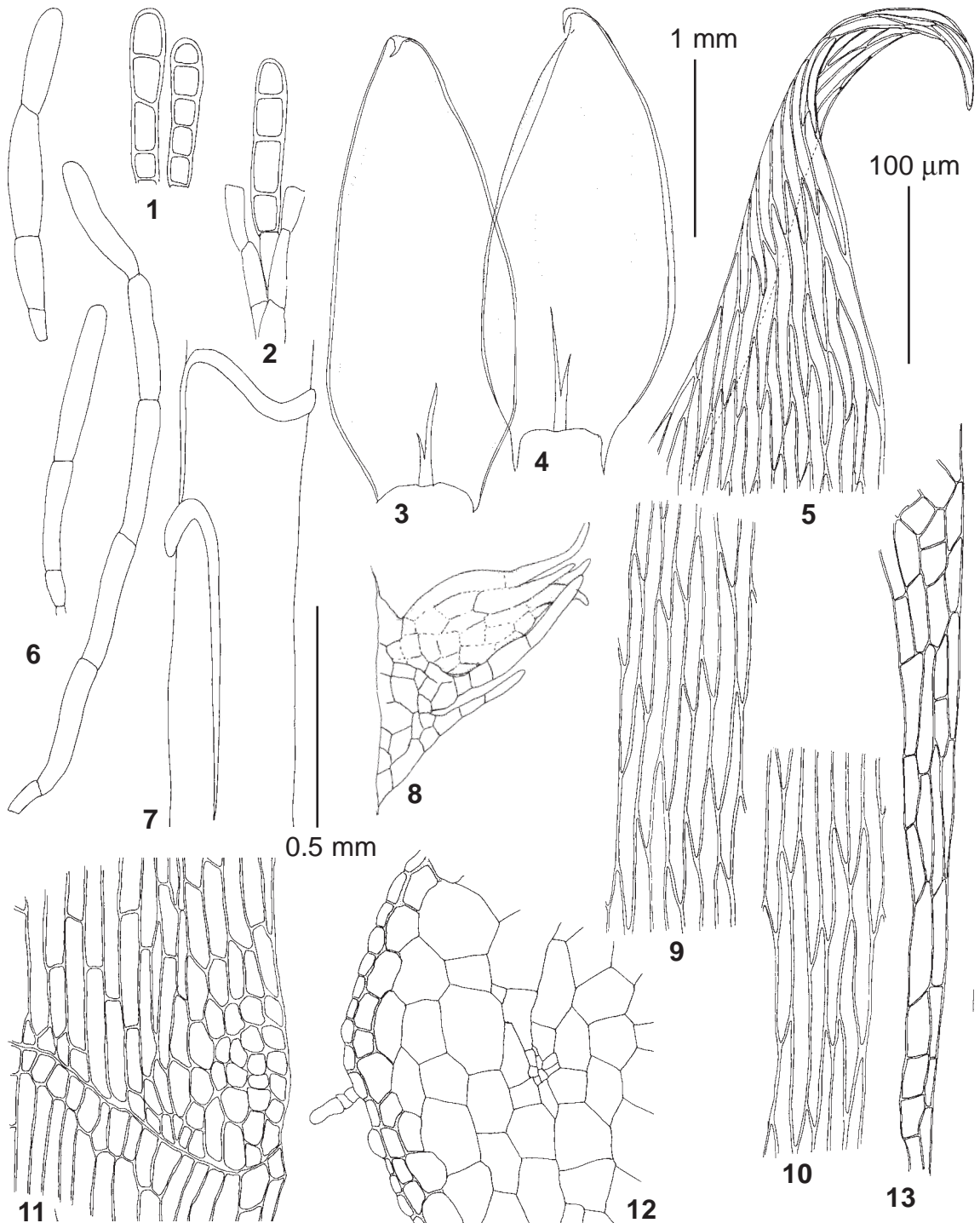


ansk Mt. Range. Most of these species occur only above tree-line (marked by asterisk), however some were found only at lower elevations.

Plagiothecium berggrenianum (Figs. 2-3) is one of the most interesting findings – this species was known so far only in high Arctic, and its distribution used as a nice example of real Arctic species (cf. Ignatov, 1993). The specimen of *P. berggrenianum* has rather big plants (hanging on rocks near waterfall), stem to 13 cm long; contrary to the previous descriptions (Frivoll, 1981; Ukrainskaya, 1996) it was found

to be autoicous in some shoots, though in other shoots only one sex was seen. Probably growing in tundra, shoots are decomposing fastly, so the junction between male and female parts are more difficult to find.

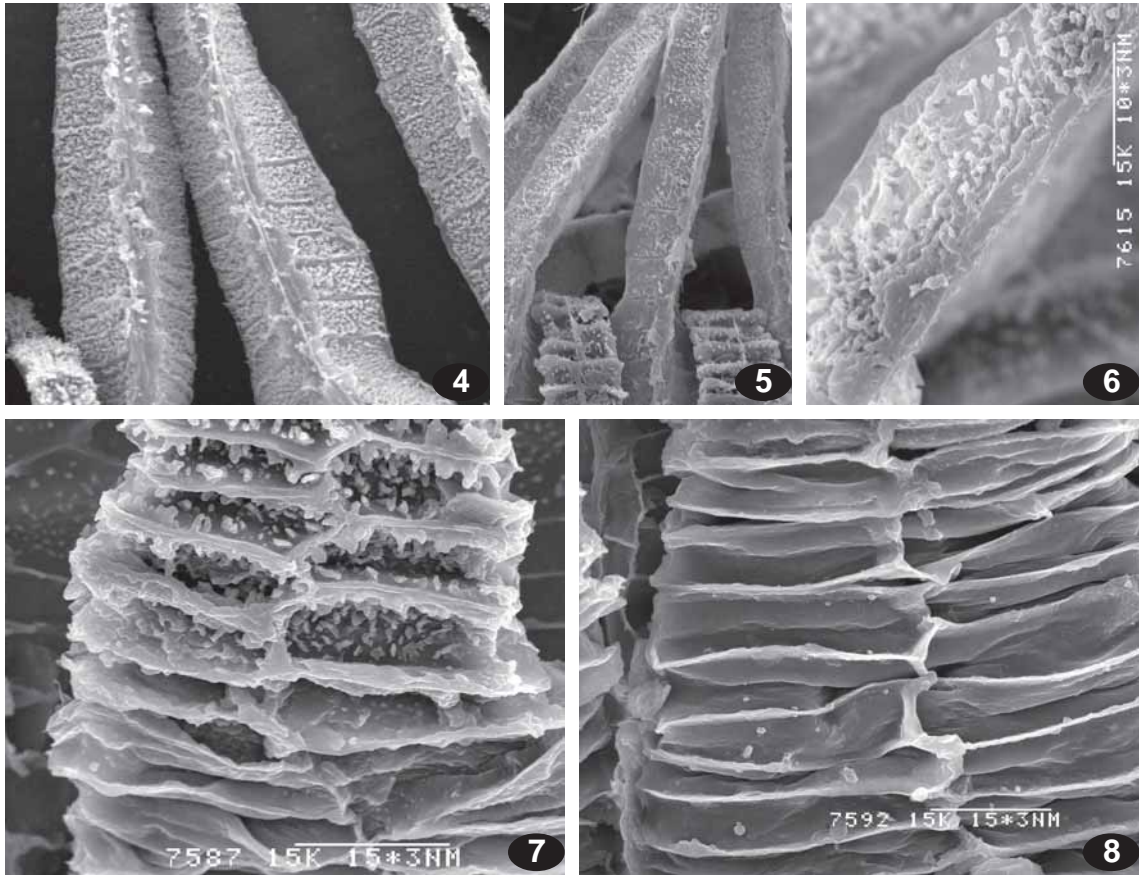
Grimmia torquata is a very common species in Arctic and in Kola Peninsula, but it is sharply declining southwards. Though this species is not rare in Chukotka (Afonina, pers. com.), it was not reported before from any part of Siberia. In Ust-Maya District this species was found only on rocks above tree-line.



Figs. 2 (opposite) and 3. *Plagiothecium berggrenianum* Frisvoll (from Yakutia Ignatov 00-879, MHA).

Fig. 2: 1 – habit; 2-4 – normally-wide shoots; 5 – perichaetium; 6-8 – thin ultimate shoots; 9 – capsule; 10 – perigonal leaves; 11-12 – inner perichaetial leaves; 13 – outer perichaetial leaf; 14 – exothecium; 15 – part of exostome; 16 – annulus and upper exothecium cells; 17 – part of peristome. Scale bars: 1 cm for 1; 2 mm for 2-9; 1 mm for 10-13; 200 μm for 16-17; 100 μm for 14; 50 μm for 15.

Fig. 3: 1-2 – brood gemmae; 3-4 – leaves; 5 – upper laminal cells; 6 – axillary hairs; 7 – leaf insertions; 8 – juvenile branch; 9-10 – mid-leaf cells; 11 – part of stem with leaf insertion and dormant branch bud; 12 – transverse stem section; 13 – leaf decurrency. Scale bars: 1 mm for 3-4; 0.5 mm for 7; 100 μm for 1-2, 5-6, 8-13.



Figs. 4-8. SEM micrographs of peristomes of (4, 7-8) *Pylaisia steerei* (Ando & Higuchi) Ignatov (from Yakutia, Ignatov 00-710, MHA) and (6-7) *P. polyantha* (Hedw.) Schimp. (Ural, Bezgodov, #254, MW). 4-6 – outer surface of endostome, 500x, 500x, 1100x ; 7 – outer surface of exostome in transition zone, 1400x; 8 – outer surface of lower exostome, 1100x.

2. North-Pacific element

The study of Ignatov & al., (2000) in Khabarovsk Territory, 900-1100 km south from the study area in Ust-Maya, revealed a number of North-Pacific species, i. e. those which occur in both Russian Far East and Western Coast of North America. Some of them were a subject of intensive search in this expedition too, but were not found: *Bartramiopsis lescurii* (James) Kindb., *Oligotrichum parallelum* (Mitt.) Kindb., *Echinophyllum sachalinense* (Lindb.) O'Brien (= *Helodium sachalinense* (Lindb.) Broth.), *Claopodium pellucinerve* (Mitt.) Besch., *Scouleria aquatica* Hook. The absence of them (except maybe only *Scouleria*) probably depends on too severe climatic conditions.

We found 5 species which have Asian–American distribution, but more common in North-Pacific Region.

Pylaisia steerei (Figs. 4, 7-9) – this species was described from Alaska (Ando & Higuchi, 1987) by only one specimen, which was found very distinct from widespread *P. polyantha* in clearly falcate leaves. Some other quantitative characters used in description seems less constant, at least in Asian Russia, where *P. polyantha* is rather variable. *Pylaisia* with strongly falcate leaves was found rather common along Yudoma River, where it grows at trunk (of both thick and thin, 10 cm in diameter) bases, never higher up on trunk (where quite typical *P. polyantha* was found). The similar plants were collected previously in Chukotka by Afonina (for example: Anadyr river, 20.VIII.1981 coll. Afonina, LE). The main difference of this species from widespread *P. polyantha* is strongly falcate leaves. Also this species has endostome more papillose than that in *P. polyantha*, but this character was studied in rather few specimens

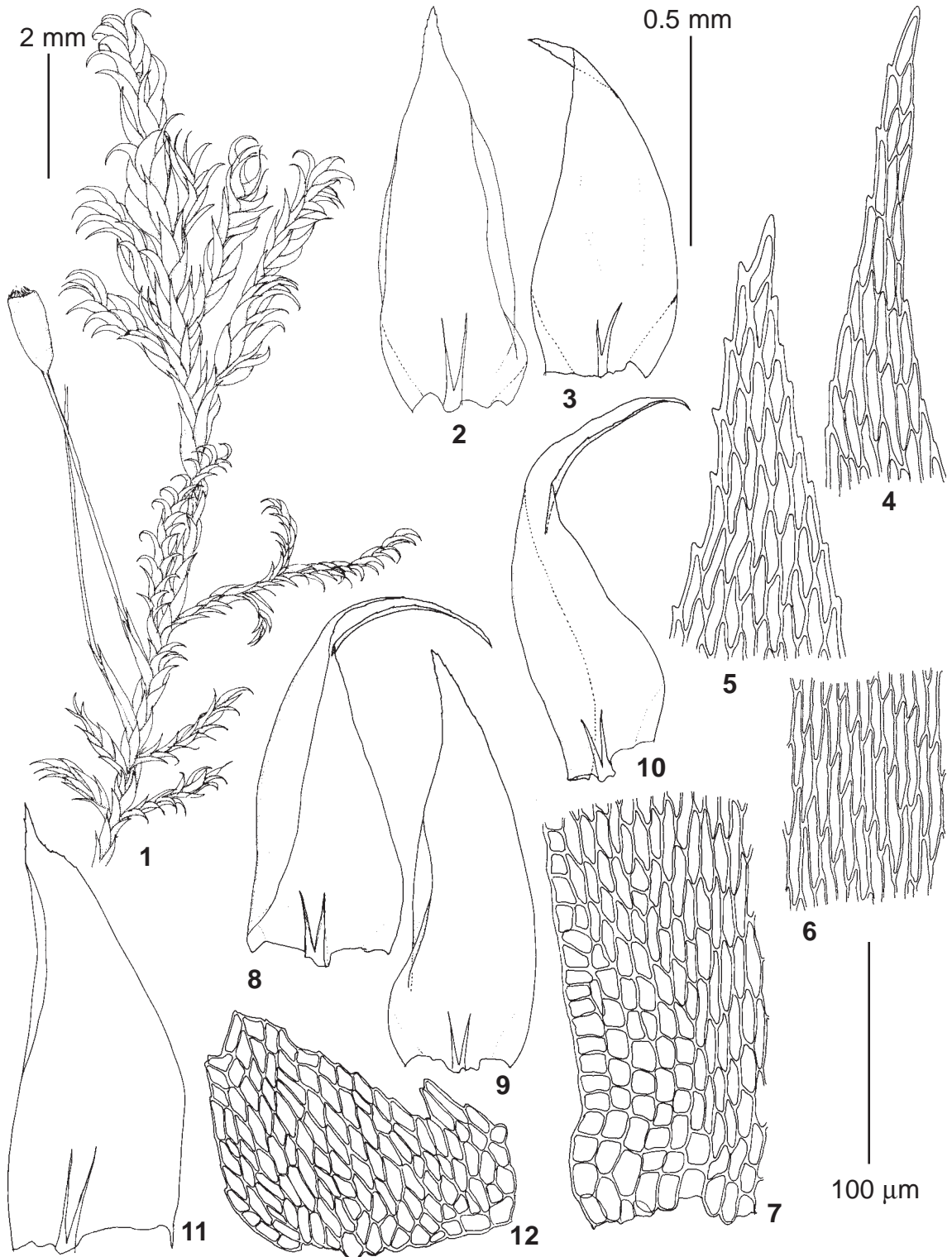


Fig. 9. *Pylaisia steerei* (Ando & Higuchi) Ignatov (from Yakutia, Ignatov 00-710, MHA). 1 – habit; 2-3 – branch leaves; 4-5 – upper laminal cells; 6 – mid-leaf cells; 7 – basal leaf cells; 8-10 – stem leaves; 11 – perichaetial leaf; 12 – pseudoparaphyllium. Scale bars: 2 mm for 1; 0.5 mm for 2-3, 8-11; 100 μm for 4-7, 12.

and can be used only after additional confirmation. We did not study the type of *P. steerei* yet, but the coincidence with its description seems allowing to use this name with just a little hesitation.

Lyellia aspera – distribution of this species in Russia was mapped by Afonina & Andreeva (1993), who demonstrated its mostly Arctic distribution, with some localities in Suntar-Khayata Range and upper Kolyma River. Subsequently it was found also in Upper Bureya area (Ignatov & al., 2000), which probably is the southernmost locality of this species. The present locality is in between Bureya and Suntar-Khayata, thus making the distribution along the coastal mountain ranges more continuous.

Barbula amplexifolia was first reported in Russia from Altai Mts. (Ignatov & Zander, 1993). That time only few localities of this species were known in the world: in Himalayas, Alaska, NW Territories of Canada and Arizona. Subsequently Mogensen & Zander (1999) referred *B. coraiensis* (Card.) Saito (Korea and Japan) to synonymy of *B. amplexifolia*, and reported it also from Eastern Greenland and British Columbia. In Ust-Maya District this species was found in many places on dark-grey schist cliffs along rivers, at level of maximal flooding. Due to exceptionally bright yellow-green color (similar to that of *Anoetangium thomsonii* Mitt.), this species is very easy to recognize in the field even from certain distance and evaluate its abundance.

Iwatsukiella leucotricha – Russian distribution of this species was mapped by Ignatov (1992). In Russian Far East it is common on trunks and fallen logs in forests. In Altai, Urals and Yakutia *Iwatsukiella* grows mostly in alpine zone on rocks.

Tomentypnum falcifolium – this species for a long time was known only in North America, but later Kossovich (1989) found it in Baikal area of South Siberia, then Vitt & al. (1990) reported it from North-Eastern China, and Krivoshapkin (1998) – from South-West Yakutia. In Ust-Maya District this species was found once in big quantity (in *Larix* forest with oligotrophic *Sphagnum* species and *Hylocomium*), and also in one more locality, in grassy mire, as an admixture to *T. nitens*. The only stable difference of *T. falcifolium* is the falcate leaf shape (Vitt & al., 1990); however this character is

known as an extremely variable one in Amblystegiaceae, so Crum & Anderson (1981) accepted this taxon only at the level of variety. Further observations on its variability are needed.

3. Southern element

Some areas of Yakutia are rather rich in southern species, for example South-Eastern Yakutia, 56-59°N (where were found: *Leucodon pendulus* Lindb., *Platygyrium repens* (Brid.) B. S. G., *Pylaisia selwynii* Kindb., see Ivanova & Ignatov, 1999) and also the area of Lenskie Stolby, 61°N (where were found: *Trachycystis ussuriensis* (Maack et Regel) T. Kop., *Anomodon minor* (Hedw.) Fuernr. ssp. *integerrimum* (Mitt.) Iwats., *Plagiomnium confertidens* (Lindb. et H. Arnell) T. Kop., *Fabronia ciliaris* (Brid.) Brid., *Brachythecium buchananii* (Hook.) Jaeg., *Entodon schleicheri* Demet., *Homalia trichomanoides* (Hedw.) B. S. G., etc. – Krivoshapkin & al., in prep.).

The studied area in Ust-Maya District has a continuous mountain areas along Okhotsk Sea coast to southern regions, rather rich in East Asian species, like Upper Bureya River. Though the latter is situated ca. 1000 km to the south from Ust-Maya, the climatic conditions are somewhat similar: both areas have very low winter temperatures and strong permafrost. However southern element in the studied moss flora is very poor.

Only in *Picea+Populus* forest along Yudoma and Aldan Rivers we found *Orthotrichum speciosum*, *O. obtusifolium*, *Zygodon sibiricus*, *Fissidens bryoides*, *Plagiomnium cuspidatum*, *Leskea polycarpa*, *Myrinia pulvinata*, *Thuidium philibertii*, *Brachythecium rotaeanum*. Note, that most of these species have scattered localities in more northern areas of Siberia: *Myrinia* and *Leskea* reach the Lower Lena River, *Orthotrichum speciosum* occurs in many parts of Arctic, etc.

The northernmost locality was found for *Hypnum saitoi*. Ignatov & al. (2000) mapped its known distribution, which includes Honshu and Hokkaido in Japan, upper courses of Zeya and Bureya Rivers (main left Amur tributaries) and SE Yakutia. Probably this species will be found in other mountains of Yakutia.

4. Xeric element

Distribution of species of this group was discussed by Bardunov (1989) for South Siberia, and by Murrey (1992) for Alaska. Quite

recently Krivoshapkin (2000) revealed *Indusiella* and *Jaffueliobryum* in xeric area of Central Yakutia, at Lenskiye Stolby. That was very interesting, but not so surprising, since in that area annual precipitation is only 250 mm. However in Ust-Maya area annual precipitation is 400-500 mm, so it was quite unexpected to find here both *Indusiella* and *Jaffueliobryum*, on cliffs along the banks of Yudoma River. Other xeric species in this area are:

Bryum bicolor – is a species with principally southern distribution. In European Russia it occurs mainly in steppe zone (Zolotov, 2000). This finding at Yudoma River (on xeric cliffs with *Indusiella*) is the first locality of this species from Siberia.

Funaria pulchella – Ignatov & Afonina (1992) cited this species only for Caucasus, while *F. muhlenbergii* Turn., a close species, was reported, among others, for South Siberia and southern part of Far East. Goldberg (2000) found *F. pulchella* in Urals, using the revision of this group for Europe by Crundwell & Nyholm (1974). We revised Asian collections in MHA (Altai and Amurskaya Prov.: Zeisky Reserve), and found that all of them have entire leaves, and therefore belong to *F. pulchella*. Probably, *F. muhlenbergii* is absent in Asian Russia. *F. pulchella* was found on slopes to Yudoma River, only once, in small quantity.

Grimmia poecilostoma – Muños & Pando (2000) accepted this taxon at species level, not as a variety of *G. tergestina*, as was suggested in many other publications. The latter one rarely produces sporophytes, which is the only reliable character to distinguish these two species. Yakutian material often has sporophytes, and can be identified for sure.

Aloina rigida and *Stegonia latifolia* – two other xeric species, found at slopes of Yudoma.

5. Miscellaneous interesting and little known species

Isopterygiopsis alpicola – until recently this species was known from upper Yenisey River (Lindberg & Arnell, 1890) and Fennoscandia (Nyholm, 1965). Ignatov & al. (1996) found it in one locality in Altai, and reported it also from the middle course of Yenisey River and Amurskaya Province. Later *I. alpicola* was found rather common in Upper Bureya River (Ignatov & al., 2000). The further collections

from Ust-Maya District ensure, that this species is not rare in Eastern Siberia.

Myurella acumianta – this species was described from the lower course of Yenisey River (Lindberg & Arnell, 1890), and until recently was known only from there (Ignatov & Ochyra, 1995). Recently Afonina & Krivoshapkin (1998) revealed it from SW Yakutia, and later it was found also from Suntar-Khayata Range (Ivanova, in prep.), showing, that its range in Siberia is quite wide. In Ust-Maya District this species was found in only one place, on wet shaded rocks on steep slope in mossy forest, in rather big quantity.

Bardunovia baicalensis was described from a single collection made in the northern part of Irkutsk Province (Ignatov & Ochyra, 1995). This is the second record of this species, ca. 1500 km from the type locality. It grows on shaded rock outcrops and soil banks in forest belt. Also *Bardunovia* was found in Lenskie Stolby National Park, Central Yakutia (Krivoshapkin & al., in prep.).

Orthotrichum iwatsukii [*O. macounii* var. *japonicum* Iwats., *O. laevigatum* Zett. var. *japonicum* (Iwats.) Lewinsky] – this taxon was for a long time recognized at the level of variety. Lewinsky (1992) found plants in SE Asia (Japan, China/Tibet, Nepal, India/Himalayas) different from arctic plants, comprising type variety of *O. laevigatum*. Subsequently this taxon was found as a rather common plant in Altai (Ignatov & Lewinsky-Haapasaari, 1994), then in South Yakutia (Ivanova, 1998, as *O. laevigatum*), and in Caucasus (MHA, coll. E. Ignatova, det. Lewinsky-Haapasaari). The rather developed segments of endostome and narrow leaves, the main differential characters of this taxon from *O. laevigatum* s. str., are constant throughout this big range, so in our opinion, this taxon merits a specific rank.

Hypnum holmenii – this species was described by Ando (1994) just recently, but it was found already in many parts of Russia (Afonina, in prep.). In Yakutia this is probably the most common species of the sect. *Hamulosa*.

Didymodon hedysariformis – was just recently described from Tuva Republic of South Siberia (Otnyukova, 1998), and was known only from there. In Tuva this species was reported from basalts and sandstones, while in Yakutia we found it at base of trunk (covered by alluvium) on the low, temporarily flooded bank of Aldan River.

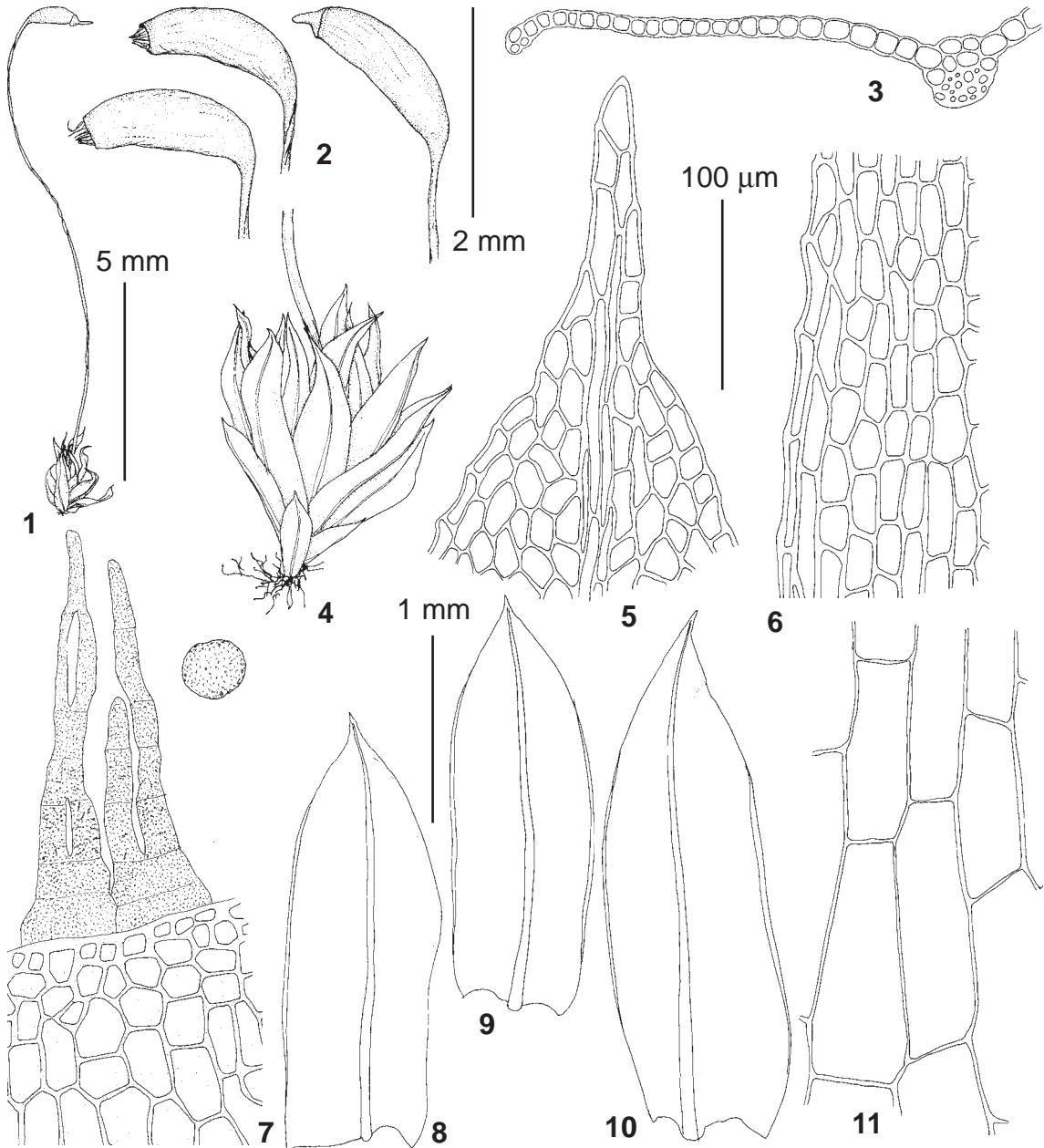


Fig. 10. *Tortula cernua* (Hueb.) Limpr. (from Yakutia, Ignatov 00-76, MHA). 1, 4 – habit; 2 – capsules; 3 – transverse leaf section; 5 – upper laminal cells; 6 – mid-leaf cells; 7 – part of peristome and spore; 8-10 – leaves; 11 – basal leaf cells. Scale bars: 5 mm for 1; 2 mm for 2, 4; 1 mm for 8-10; 100 µm for 3, 5-7, 11.

Tortula cernua. Specimen from Ust-Maya District (Fig. 10) has narrow long capsules, which was considered as a key character for separation of *Tortula ucrainica* (Laz.) Zander (= *Desmatodon ucrainicus* Laz.). The latter species was described from forest-steppe area of Ukraine, and subsequently reported from Caucasus, Russian Far East and Middle Asia (Bachurina & Melnichuk, 1988; Bardunov & Cherdantseva, 1982; Mamat-

kulov & al., 1998). In all of these regions *T. ucrainica* was reported as a very rare moss, known from a single or very few localities. Lazaranko & Lesnyak (1972) found that *T. ucrainica* is the autopolyploid of *T. cernua*. This poses a question – if Siberian population is a result of migration from Carpatians, or a result of another autopolyploidization of *T. cernua*, which is not a frequent, but rather widespread in Siberia. However this

hardly can be answered basing on morphology only. Other collections of this species from Yakutia in MHA have invariably long capsules, while in Altai this character is rather variable.

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nyj settlement, gold-mine company "Yurskaya". Consultations in identification were received from O. M. Afonina (*Hypnum*), V. I. Zolotov (*Bryum*), Otnyukova (*Dicranum*); suggestions on identity of our specimen with *Plagiothecium berggrenianum* were provided by Afonina, Ochyra and Ukrainskaya. This work was partly supported by Russian Foundation for Basic Researches, grants 99-04-48198 & 00-04-68103.

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