

MOSS FLORA OF THE YANA-ADYCHA PLATEAU (NORTH-EAST YAKUTIA)

ФЛОРА МХОВ ЯНО-АДЫЧАНСКОГО ПЛОСКОГОРЬЯ
(СЕВЕРО-ВОСТОЧНАЯ ЯКУТИЯ)

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Abstract

An annotated list of mosses of the Yana-Adycha Plateau (north-east Yakutia) is presented, including 173 species and 3 varieties of mosses from 83 genera and 34 families. The flora includes many rare xerophytic species: *Hilpertia velenovskyi*, *Pterygoneurum kozlovii*, *Syntrichia caninervis*, *Fabronia ciliaris*, *Coscinodon cribrosus*, *C. hartzii*. *Orthotrichum cupulatum* is a new addition to Yakutian flora.

Резюме

Представленный аннотированный список мхов Яно-Адычанского плоскогорья (Северо-Восточная Якутия) насчитывает 173 вида и 3 разновидности из 83 родов и 34 семейств. Среди них много редких ксерофитов: *Hilpertia velenovskyi*, *Pterygoneurum kozlovii*, *Syntrichia caninervis*, *Fabronia ciliaris*, *Coscinodon cribrosus*, *C. hartzii*. *Orthotrichum cupulatum* приводится впервые для Якутии.

KEYWORDS: mosses, North-east Yakutia, the Yana-Adycha Plateau

This paper provides data for the Yana River region, one of the least explored in Yakutia which is itself poorly studied for bryophytes. The study area is situated within the Yana-Adycha Plateau (Fig. 1) with relatively low (400-600 m) to medium-high (up to 1726 m) elevations. The mountains in the studied region are generally flat with some peaks with steep slopes. Geology of the plateau is quite complex, Upper Palaeozoic and Mesozoic sedimentary bedrocks are most common, but Mesozoic igneous rocks, mainly acid granites, also significantly contribute to rock diversity (Severnaya Yakutia, 1962).

The climate of the region is sharply continental with significant temperature fluctuations and low precipitation (mostly 150-300 mm a year) resulting in aridity (Atlas..., 1989). In Verkhoyansk annual precipitation is 175 mm, mean temperature of January is -44°C (min -60°C), in July $+15^{\circ}\text{C}$ (max $+37^{\circ}\text{C}$). Mean temperature in May

is $+3^{\circ}\text{C}$ (at nights -2°C , at daytime $+8^{\circ}\text{C}$), while $t_{\min} = -25^{\circ}\text{C}$ and $t_{\max} = +27^{\circ}\text{C}$.

According to the geobotanical classification, the region belongs to the northern taiga subzone (Andreev et al., 1987; Kuznetsova, 2005).

The dominant tree in the Yana-Adycha Plateau is *Larix cajanderi* Mayr. Larch forests reach up to 600-700 m elev.; above forest *Pinus pumila* (Pallas) Regel thickets occur, superseded by mountain tundra and fell-fields. South-facing slopes to bigger rivers have relic steppe landscapes where rare and new for Yakutia moss species have been found (Fig. 2). In the mouths of mountain rivers forests of *Chosenia arbutifolia* (Pall.) A. Skv. and *Populus suaveolens* Fisch. grow.

The previous publications on this territory mentioned only moss species dominating in plant communities (Sheludyakova, 1948). The present study is based on ca. 2000 specimens collected by the author in 2007-2009. The collections are

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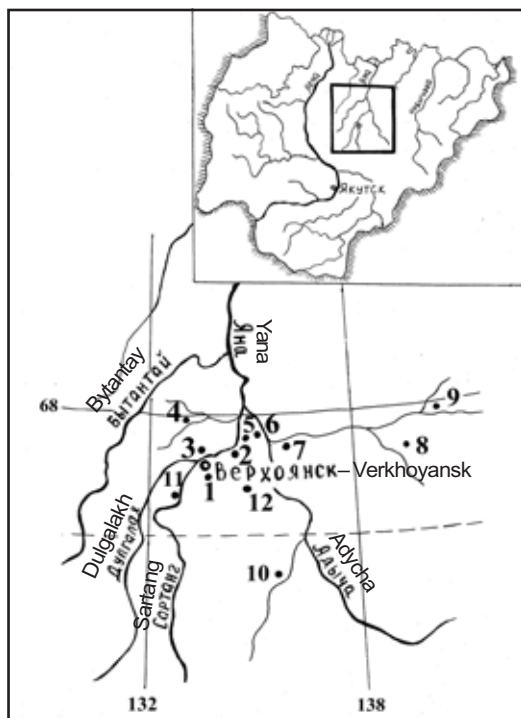


Fig. 1. Collecting sites of mosses:

1. Verkhoyansk vicinities (67°33' N – 133°28' E);
2. Batagai settlement vicinities (67°40' N – 134° 41' E);
3. Boronuk village vicinities (67°35' N – 133°36' E);
4. The Tykakh River basin (68°05' N – 134°14' E);
5. Western slope of the Kikhilyakh Ridge (67°58' N – 135°05' E);
6. Eastern slope of the Kikhilyakh Ridge (67°50' N – 135°05' E);
7. The Tuostakh River mouth (67°52' N – 135°38' E);
8. Ulakhan-Kuel (Tabalakh) village vicinities (67°33' N – 136°31' E);
9. The Tirekhtyakh River mouth (67°35' N – 137°06' E);
10. Tomtor (Borulakh) village vicinities (67°10' N – 134°41' E);
11. Balah (Arylakh) village vicinities (67°11' N – 132°47' E).
12. Mat'-Gora (Ynnakh) mountain (67°25' N – 134°52' E).

deposited in SASY Herbarium in Yakutsk. Some interesting records from this territory were published earlier (Isakova et al., 2008).

SPECIES LIST

The list includes 177 species and 3 varieties belonging to 83 genera and 34 families. The nomenclature is given according to Ignatov, Afonina, Ignatova et al. (2006). Numbers after species names refer to collecting sites as shown in Fig. 1. Thereafter altitudinal range is given in brackets, and habitats are characterized by type of vegetation and substrate. Presence of sporophytes is marked by S+. Species rare in Yakutia are marked with asterisk (*). For samples identified by other specialists, their names are given.

- Abietinella abietina* (Hedw.) M. Fleisch. – 3, 6, 9-11 – [220-850 m] *Larix* forests, fell-fields, rocks, steppes. On soil and rocks covered with thin soil.
- Amlystegium serpens* (Hedw.) Bruch et al. var. *serpens* – 4, 8 – [100-200 m alt.] *Larix* forests, *Salix* shrubs. On soil, fallen logs, base of tree trunks.
- var. *juratzkanum* (Schimp.) Rau & Herv. – 8, 12 – [200-370 m] *Larix* forests. On soil, fallen logs.
- Andreaea rupestris* Hedw. var. *rupestris* – 5, 6, 12 – [390-1270 m] Mountain tundra, *Pinus pumila* thickets, river banks. On rocks. S+.

– var. *papillosa* (Lindb.) Podp. – 6, 12 – [389-1253 m] *Pinus pumila* thickets, mountain tundra, river banks. On rocks. S+.

Arctoa fulvella (Dicks.) Bruch et al. – 5, 12 – [683-1248 m] *Pinus pumila* thickets, mountain tundra. On rocks with thin soil layer. S+.

Aulacomnium acuminatum (Lindb. & Arnell) Kindb. – 7, 9 – [140 m] *Larix* forests. On soil.

A. palustre (Hedw.) Schwäger. – 1, 2, 4, 5, 8, 9-11 [132-478 m] *Larix* forests, *Salix* shrubs, meadows. On soil, rocks with thin soil layer. S+.

A. turgidum (Wahlenb.) Schwäger. – 2-12 – [132-615 m] *Larix* forests, *Salix* shrubs, meadows, mountain tundra, river banks. On soil, rocks with thin soil layer. S+.

Barbula convoluta Hedw. – 4, 9, 11 – [127-235. m] Forests of *Larix*, *Chosenia* and *Populus*, *Salix* shrubs. On soil.

Bartramia ithyphylla Brid. – 5, 6, 12 – [861-1283 m] Forests of *Chosenia* and *Populus*, mountain tundra, stream banks. On soil, damp rocks and rocks. S+.

B. pomiformis Hedw. – 12 – [377 m] *Larix* forest. On soil, rocks with thin soil layer. S+.

Brachytheciastrum velutinum (Hedw.) Ignatov & Huttunen – 9 – [150 m] Rocks. On soil, rocks with thin soil layer. S+.

Brachythecium mildeanum (Schimp.) Schimp. – 1, 7-10 – [138-218 m] Forests of *Larix*, *Chosenia* and *Populus*, meadows. On soil.

B. cf. salebrosum (F. Weber & D. Mohr) Bruch et al. – 6 – [861 m] Mountain tundra. On soil, rocks with thin soil layer.

B. udum I. Hagen – 10 – [218 m] *Larix* forest. On soil.

Bryobrittonia longipes (Mitt.) D.G. Horton – 9 – [140 m] Forests of *Chosenia* and *Populus*. On soil.



A

Fig. 2. Steppe communities in the Yana River basin.

A – slopes where *Syntrichia caninervis* Mitt. and *Pterygoneurum* spp. were collected.



B

B – forestless slopes with steppe vegetation, the habitats of *Pterygoneurum subsessile*.



C

C – Slope with forb-grass steppe vegetation in the vicinities of Tomtor village where *Hilpertia velenovskyi* (Schiffn.) R.H. Zander was found.

- Bryoerythrophyllum recurvirostrum* (Hedw.) P.C.Chen – 1, 4, 9, 10 – [127-265 m] *Salix* shrubs, mountain river banks, rocks, steppes. On soil, rocks with thin soil layer, fallen logs. S+.
- Bryum algovicum* Sendth. ex Müll.Hal. – 4 – [127 m] Meadows. On soil. S+. (Det. Zolotov).
- B. amblyodon* Müll.Hal. – 1, 11 – [146-219 m] In shrub communities, river banks, rocks, steppes. On soil, rocks with thin soil layer. S+. (Det. Zolotov)
- B. arcticum* (R.Br.) Bruch et al – 4, 9 [127 m] Forests of *Larix*, *Chosenia* and *Populus*, *Salix* shrubs. On soil. S+. (Det. Zolotov)
- B. argenteum* Hedw. – 1, 3, 4, 9-11 [117-300 m] Dry meadows, steppes, rocks, disturbed soil. On soil, rocks with thin soil layer.
- B. creberrimum* Taylor – 3, 7, 9, 10 – [138-218 m] Forests of *Larix*, *Chosenia* and *Populus*, steppes. On soil. S+. (Det. Zolotov)
- B. cryophilum* Mårtensson – 4 – [127 m] *Larix* forests, stream banks. On wet soil. (Det. Zolotov)
- B. cyclophyllum* (Schwägr.) Bruch et al. – 2, 4, 8, 9, 12 – [119-415 m] Forests of *Larix*, *Populus*, mountain river and stream banks. On wet soil.
- B. moravicum* Podp. – 9 – [150 m] Rock outcrops. On rocks with thin soil layer.
- B. neodamense* Itzigs. – 9 – [140 m] Bogs. S+. (Det. Zolotov)
- B. pseudotriquetrum* (Hedw.) P.Gaertn. B. Mey. & Scherb. – 2, 4, 6, 7, 9, 11, 12 – [127-861 m] Forests of *Larix* and *Populus*, meadows, rocky mountain tundra, stream banks. On soil, damp sites.
- B. turbinatum* (Hedw.) P. Gaertn. – 12 – [377 m] *Larix* forest. On soil. S+.
- Calliargon giganteum* (Schimp.) Kindb. – 1, 2, 4, 9-12 – [129-377 m] Forests of *Larix* and *Populus*, meadows, lake sides and river banks. On wet and moist soil, in water.
- C. richardsonii* (Mitt.) Kindb. – 4, 9 – [134 m] *Larix* forests, bogs. On soil, in water.
- Calliargonella cuspidata* (Hedw.) Loeske – 6 – [770-860 m] Meadows, rocky mountain tundra. In water, on soil.
- C. lindbergii* (Mitt.) Hedenäs – 1, 4, 9, 11, 12 – [117-700 m] Forests of *Larix*, *Populus* and *Chosenia*, mountain river and stream banks, bogs. On wet soil.
- Campyliadelphus chrysophyllus* (Brid.) S. Chopra – 10 – [199 m] Steppes. On soil.
- Campylium protensum* (Brid.) Kindb. – 8-10 – [209-221 m] *Larix* forests, stream banks. On soil, fallen logs.
- C. stellatum* (Hedw.) C.E.O. Jensen – 4, 6, 8, 9 – [127-644 m] *Larix* forests, meadows, stream banks. On soil, fallen logs, base of tree trunks.
- Ceratodon purpureus* (Hedw.) Brid. – 1-6, 9-12 – [117-961 m] Forests of *Larix* and *Populus*, shrub communities, mountain tundra, steppes, post-fire *Larix* forest communities, river banks. On soil, fallen logs, rocks with thin soil layer, disturbed soil. S+.
- Climacium dendroides* (Hedw.) F. Weber & D. Mohr – 1, 10 – [197 m] River banks, meadows. On moist soil.
- Conostomum tetragonum* (Hedw.) Lindb. – 5, 6, 12 – [221-1248 m] Mountain tundra, stream banks. On rocks with thin soil layer. S+.
- **Coscinodon cribrosus* (Hedw.) Spruce – 5 – [998 m] Middle reaches of the Yana River, west slope of the Kihilyakh Ridge, mountain tundra, in rock cracks. 7.VIII.2009.
- **C. hartzii* C.Jens. – 5, 12 – [700-1293 m] Mountain tundra, mountain river banks. On rocks with thin soil layer. Second record for Yakutia.
- Cratoneuron curvicaule* (Jur.) G.Roth – 4 – [119 m] Wet meadow. On soil. (Det. Ignatova).
- C. filicinum* (Hedw.) Spruce – 9 – [140 m] *Populus-Chosenia* forests, river banks. On moist soil, in water.
- Cynodontium strumiferum* (Hedw.) Lindb. – 2, 5, 7, 9, 11, 12 – [192-1283 m] *Larix* forests, *Pinus pumila* thickets, mountain tundra. On rocks with thin soil layer, rock crevices. S+.
- C. tenellum* (Schimp.) Limpr. – 2, 5, 7, 9, 11, 12 – [382-1293 m] *Larix* forests, mountain tundra, river banks. On soil, rocks with thin soil layer, rock crevices. S+.
- Dicranella humilis* Ruthe – 12 – [700 m] River banks. On soil.
- D. subulata* (Hedw.) Schimp. – 2 – [382 m] *Larix* forest. On soil.
- Dicranum acutifolium* (Lindb. & Arnell) C.E.O. Jensen. – 1, 2, 4-6, 9-12 – [176-1248 m] *Larix* forests, shrubs of *Duscheckia fruticosa*, mountain tundra. On rocks, soil.
- D. angustum* Lindb. – 11 – [145-650 m] *Larix* forest, mountain tundra, river banks. On soil.
- D. bonjanii* De Not. – 2, 5 – [204-1015 m] Shrubs of *Betula exilis*, rocky mountain tundra. On soil.
- D. elongatum* Schleich. ex Schwägr. – 2, 4-12 – [132-1293 m] *Larix* forests, shrubs of *Betula exilis*, wet meadows, mountain tundra, rocks. On soil, rocks, lithosoil. S+.
- D. flexicaule* Brid. – 2, 4-7, 9-12 – [124-1293 m] *Larix* forests, shrubs of *Pinus pumila*, mountain tundra, river banks. On soil, lithosoil.
- D. fuscescens* Turner – 2, 11, 12 – [145-1293 m] *Larix* forests, mountain tundra. On soil. S+.
- D. groenlandicum* Brid. – 2, 9, 11 – [192-235 m] *Larix* forests. On soil.
- D. laevidens* Williams – 2, 4-7, 9, 12 – [173-1283 m] *Larix* forests, shrubs of *Betula exilis*, mountain tundra, post-fire communities. On soil.
- D. cf. montanum* Hedw. – 7, 12 – [1253 m] *Larix* fo-

- rests, mountain tundra. On soil.
- D. pseudacutifolium* Otnyukova – 2, 9 – [192-377 m] *Larix* forests, rocks. On soil, lithosol.
- D. spadiceum* J.E. Zetterst. – 1, 6, 11, 12 – [235-1266 m] *Larix* forests, rocky mountain tundra. On soil, rocks with thin soil layer. S+.
- D. undulatum* Schrad. ex Brid. – 1, 2, 4, 5, 7, 9 – [132-615 m] *Larix* forests, rocks. On soil.
- Didymodon rigidulus* Hedw. – Fr. 1, 3, 8, 11, 12 – [146-961 m] *Larix* forests, meadows, steppes. On soil, rocks with thin soil layer.
- Distichium capillaceum* (Hedw.) Bruch et al. – 4, 7, 9, 10, 12 – [124-377 m] *Larix* and *Populus* forests, shrubs of *Duschekia fruticosa* and *Salix*, mountain tundra, fell-fields, mountain river banks. On soil, rocks with thin soil layer.
- Ditrichum cylindricum* (Hedw.) Grout – 4, 11 – [124-475 m] *Larix* forests, *Salix* communities, dry meadows, steppes, river banks. On soil. S+.
- D. flexicaule* (Schwägr.) Hampe – 1, 9, 12 – [235-1248 m] *Larix* forests, shrubs of *Pinus pumila*, mountain tundra. On soil.
- Drepanocladus aduncus* (Hedw.) Warnst. – 1, 2, 4, 8-11 – [124-235 m] *Larix* and *Populus* forests, *Salix* shrubs, river banks. On wet and moist soil, in water.
- D. polygamus* (Bruch et al.) Hedenäs – 2, 4, 9 – [140-209 m] *Larix* and *Populus* forests, shrubs of *Duschekia fruticosa*. On soil.
- D. sendtneri* (Schimp. ex H. Müll.) Warnst. – 1, 9, 11 – [140 m] *Larix* forests, lake sides. On moist soil, in water.
- **D. sordidus* (Müll.Hal) Hedenäs – 8 – [201 m] The Tabalakh River basin, Ulakhan-Kuel village vicinities, in mossy-*Vaccinium vitis-idaea* larch open forest. On soil. 26.VII.2009. (Det. Ignatova).
- Encalypta ciliata* Hedw. – 9 – [140 m] *Larix* forests. On soil.
- E. rhapsocarpa* Schwägr. – 1, 6, 7, 9, 11 – [142-835 m] Rocks, steppes, mountain tundra. On soil, rocks with thin soil layer. S +.
- Eurhynchiastrum pulchellum* (Hedw.) Ignatov & Hutunén – 4, 7, 10, 11 – [138-550 m] *Larix* forests, shrubs of *Duschekia fruticosa*, mountain tundra. On deadfall, soil, rocks, base of tree trunks. S+.
- **Fabronia ciliaris* (Brid.) Brid. – 9 – [150 m] The Tirekhtyakh River mouth (the Tuostakh River basin). On rocks, rocks with thin soil layer. 5.VIII.2008.
- Fontinalis antipyretica* Hedw. – 10, 12 – [196-377 m] On underwater rocks in rivers and streams.
- var. *gracilis* Hedw. – 1, 4 – [117-129 m] On underwater rocks in streams, on pebbly alluvium.
- F. hypnoides* Hartm. – 4 – [117-134 m] On underwater rocks in streams, on pebbly alluvium.
- Funaria hygrometrica* Hedw. – 4, 9-12 – [128-683 m] *Larix* forests, *Salix* shrubs, meadows, steppes. In sites with disturbed vegetation and bare soil. S+.
- **Grimmia incurva* Schwägr. – 5, 12 – [550-1293 m] Mountain tundra. On rocks with thin soil layer, in rock crevices.
- G. longirostris* Hook. – 1, 3, 6, 7, 9, 12 – [200-1293 m] *Larix* forests, shrubs of *Pinus pumila*, mountain tundra, steppes, rocks. On soil, rocks with thin soil layer. S +.
- **G. mollis* Bruch et al. – 12 – [220-700 m] The Mat'-Gora Mt. (middle reaches of the Yana River). Mountain river banks, on rocks with thin soil layer. 4.VII.2009 and 7.VII.2009. (Det. Ignatova). The species is included in Red Data Book of the Republic of Sakha (Yakutia) (Red data..., 2000).
- **G. torquata* Drumm. – 5, 12 – [961-1248 m] Mountain tundra. On rocks with thin soil layer.
- Hamatocaulis lapponicus* (Norrl.) Hedenäs – 2, 12 – [415-700 m] *Larix* forests, river banks and lake sides, wet meadows. In water, on wet soil.
- H. vernicosus* (Mitt.) Hedenäs – 9, 10, 12, 13 – [700 m] In various types of open larch forests, wet meadows. In water of lakes, oxbow lakes, on wet soil.
- Hedwigia ciliata* (Hedw.) P. Beauv. – 9 – [140-150 m] Steppe, rocks, screes. On rocks with thin soil layer.
- **Hilpertia velenovskyi* (Schiffn.) R.H. Zander (= *Tortula velenovskyi* Schiffn.) – 10 – [170 m] Borulakh village vicinity (middle reaches of the Adycha River). On loamy soil on SE-faced slope with steppe vegetation. In admixture with *Pterygoneurum subsessile*, *Bryum argenteum*, *Dydimodon sp.*, 30.VI.2007 (Det. Ignatov). This is an exceptionally rare species. In the territory of Russia known for the Putorana Plateau (Abramov et al., 1990), the Republic of Kabardino-Balkaria (Kharzinov et al., 2006), the Republic of Altai (Pisarenko, 2007) and Buryatia (Afonina, 2008).
- Hygrohypnella ochracea* (Turner ex Wilson) Ignatov & Ignatova – 5, 10, 12 – [196-377 m] Stream banks, *Larix* forests. In water, on soil.
- H. polare* (Lindb.) Ignatov & Ignatova – 12 – [700 m] On moist soil, in water of mountain streams.
- Hygrohypnum luridum* (Hedw.) Jenn. – 12 – [389 m] Bank of mountain river. On wet soil.
- Hylocomium splendens* (Hedw.) Bruch et al. var. *obtusifolium* (Geh.) Paris – 5, 6, 8-10, 12 – [209-1266 m] *Larix* forests, mountain tundra, watersides. On soil, on rocks with thin soil layer.
- Isopterygiopsis pulchella* (Hedw.) Z. Iwats. – 2, 4, 5, 8, 10-12 – [124-1248 m] *Larix* forests, *Salix* communities, mountain tundra, mountain river banks. On rocks with thin soil layer, deadfall.
- Kiaeria starkei* (F. Weber & D. Mohr) I. Hagen – 6, 12 – [860-1248 m] Mountain tundra. On rocks with thin soil layer.

- Leptobryum pyriforme* (Hedw.) Wilson – 4, 5, 8-10, 12 – [127-787 m] Forests of *Larix*, *Populus* and *Chosenia*, *Betula fruticosa* and *Salix* shrubs, river banks. On soil. S+.
- Leptodictyum riparium* (Hedw.) Warnst. – 6 – [860 m] Mountain tundra. On soil.
- Leskea polycarpa* Hedw. – 12 – [377 m] In larch woodland of *Betula divaricata*-*Duscheckia fruticosa* type. On soil. S+.
- Meesia triquetra* (Jolycl.) Ångstr. – 4 – [134 m] In open mossy larch forest, on river banks. On wet soil.
- Mniun lycopodioides* Schwägr. – 12 – [1283 m] In lichen-mossy rocky mountain tundra. On soil.
- M. thomsonii* Schimp. – 5, 12 – [998-1283 m] Mountain tundra. On soil.
- **Myurella acuminata* Lindb. & Arnell – 10 – [176 m] Borulakh village vicinity (the Adycha River basin). In litter-mossy larch forest. On soil. 10.VII.2009. (Det. Ignatov). The species is listed in Red Data Book of the Republic of Sakha (Yakutia), category 3c, endemic species of Siberia (Red data..., 2000).
- M. julacea* (Schwägr.) Bruch et al. – 4, 9, 10 – [119-176 m] *Larix* forests, mountain tundra, rocks, wet meadows. On soil, rocks with thin soil layer.
- Neckera pennata* Hedw. – 9 – [150 m] On rocks.
- Ochyraea norvegica* (Bruch et al.) Ignatov & Ignatova – 12 – [389 m] Bank of mountain river.
- **Oligotrichum falcatum* Steere – 5, 6, 12 – [432-1248 m] *Larix* forests, mountain tundra. On rocks with thin soil layer. S+. The species is included in Red Data Book of the Republic of Sakha (Yakutia) (Red data..., 2000).
- Ortotrichum anomalum* Hedw. – 9 – [150 m] Rocks. On rocks. S+.
- **O. cupulatum* Brid. – 9 – [150 m] The Tirekhtyakh River mouth, the Tuostakh River basin. Rocky slope. On rocks with thin soil layer. 5.VIII.2008 (Det. Ukrainskaya). S+.
- O. speciosum* Nees – 9 – [150 m] Rock outcrops. On rocks. S+.
- Philonotis fontana* (Hedw.) Brid. – 9 – [140 m] In *Populus*-*Chosenia* forest. On soil.
- Plagiomnium curvatulum* (Lindb.) Schljakov – 12 – [377 m] *Larix* forests. On soil.
- P. ellipticum* (Brid.) T.J. Kop. – 1, 2, 4, 7-9, 11, 12 – [119-1248 m] Forests of *Larix* and *Populus*, *Salix* communities, wet meadows. On soil.
- Plagiothecium berggrenianum* Frisvoll – 5, 12 – [1009-1283 m] Mountain tundra. On rocks with thin soil layer.
- P. curvifolium* Schlieph. ex Limpr. – 5 – [998 m] Mountain tundra. On rocks with thin soil layer.
- P. denticulatum* (Hedw.) Bruch et al. – 5, 6 – [860-1015 m] Mountain tundra. On rocks with thin soil layer.
- P. laetum* Bruch et al. – 4-6, 10, 12 – [132-1283 m] *Larix* forests, mountain tundra. On rocks with thin soil layer.
- Pleurozium schreberi* (Brid.) Mitt. – 5, 6, 10, 12 – [861-1293 m] *Larix* forests, mountain tundra. On soil.
- Pogonatum dentatum* (Brid.) Brid. – 5, 6, 12 – [221-1248 m] Mountain tundra, rocks, river banks. On rocks with thin soil layer.
- P. urnigerum* (Hedw.) P. Beauv. – 6 – [860 m] Mountain tundra, river banks. On soil.
- Pohlia cruda* (Hedw.) Lindb. – 2, 4, 6, 7, 9, 10, 12 – [132-1253 m] *Larix* forests, river and stream banks, rocks, mountain tundra. On soil, lithosoil, rocks. S+.
- P. crudoides* (Sull. & Lesq.) Broth. – 4, 5, 6, 12 – [134-1248 m] *Larix* forests, mountain tundra. On soil.
- P. longicollis* (Hedw.) Lindb. – 12 – [960-1293 m] Mountain tundra. On rocks with thin soil layer. S+.
- P. nutans* (Hedw.) Lindb. – 1, 2, 4, 6, 9-12 – [132-1283 m] *Larix* forests, *Pinus pumila* thickets, river banks, mountain tundra. On soil, deadfall, rocks with thin soil layer, base of tree trunks. S+.
- P. proligera* (Kindb.) Lindb. ex Broth. – 12 – [377-475 m] *Larix* forests. On soil.
- Polytrichastrum alpinum* (Hedw.) G.L. Sm. – 5, 6, 12 – [770-1283 m] *Larix* forests, river banks, mountain tundra. On rocks with thin soil layer. S+.
- Polytrichum hyperboreum* Br. – 2, 4-6, 12 – [127-1293 m] *Larix* forests, shrubs of *Pinus pumila*, *Duscheckia fruticosa*, *Betula fruticosa*, river banks, meadows, mountain tundra. On soil. S+.
- P. jensenii* I. Hagen – 4, 7, 12 – [180-377 m] *Larix* forests, shrubs of *Betula fruticosa*. On soil. S+.
- P. juniperinum* Hedw. – 1, 2, 4-6, 10-12 – [143-1293 m] *Larix*, *Populus* and *Chosenia* forests, *Salix* communities, bogs, watersides, mountain tundra, rocks. On soil, rocks with thin soil layer. S+.
- P. piliferum* Hedw. – 3, 5, 6, 9, 12 – [192-1293 m] *Larix* forests, mountain tundra, rocks, steppes, post-fire communities. On bare soil, rocks with thin soil layer. S+.
- P. strictum* Brid. – 1, 2, 4-6, 8, 11, 12 – [132-1293 m] *Larix* forests, *Betula exilis* communities, watersides, mountain tundra. On soil, rocks with thin soil layer. S+.
- Pseudoleskeella papillosa* (Lindb.) Kindb. – 9 – [150 m] Rocks. On soil, rocks with thin soil layer.
- Psilopilum cavifolium* (Wilson) I. Hagen – 12 – [432 m] *Larix* forests. On rocks with thin soil layer.
- P. laevigatum* (Wahlenb.) Lindb. – 12 – [432 m] *Larix* forests. On rocks with thin soil layer.
- **Pterygoneurum kozlovii* Laz. – 3, 10 – [220-265 m] Borulakh village vicinities, the Adycha River basin, on steppe slope. On soil. 26.VI.2007. S+; 5 km SW of Verkhoyansk, on petrophytic steppe slope. On soil. 8.VII.2007. S+.

- P. ovatum* (Hedw.) Dixon – 6 – [218 m] Steppes. On bare soil. S+.
- P. subsessile* (Brid.) Jur. – 1, 3, 10, 11 – [146-300 m] Steppes. On dry soil. S+.
- Pylaisia polyantha* (Hedw.) Bruch et al. – 7, 9 – [138 m] *Larix* and *Populus-Chosenia* forests. On soil, deadfall, base of tree trunks. S+.
- Rhytidium rugosum* (Hedw.) Kindb. – 1, 4, 6, 10-12 – [140-1293 m] *Larix* forests, shrubs of *Betula fruticosa*, steppes, mountain tundra. On soil, rocks with thin soil layer, rocks.
- Saelania glaucescens* (Hedw.) Broth. – 2, 4 – [124-192 m] *Larix* forests, *Salix* communities. On soil. S+.
- Sanionia uncinata* (Hedw.) Loeske. 1-12 – [127-1253 m] *Larix* and *Populus-Chosenia* forests, shrub communities, watersides, mountain tundra, wet meadows. On soil, deadfall, decaying wood, rocks with thin soil layer, base of tree trunks. S+.
- **Schistidium flexipile* (Lindb. ex Broth) G. Roth – 9 – [150 m] The Tirektyakh River mouth, the Tuostakh River basin. On rocks, rocks with thin soil layer. 5.VIII.2008. (Det. Ignatova).
- **S. frigidum* H.H. Blom – 12 – [700-783 m] The Mat'Gora Mt., moss rocky mountain tundra, river bank, on rocks. 06.VII.09. S+. (Det. Ignatova).
- S. pulchrum* H.H. Blom – 6, 9, 12 – [787-867 m] Mountain tundra, rocks. On rocks with thin soil layer. S+.
- S. tenerum* (J.E. Zetterst.) Nyholm – Fr. 1, 3, 6, 7, 9, 11, 12 – [142-1293 m] Steppes, mountain tundra, rocks. On rocks with thin soil layer.
- Scorpidium revolvens* (Sw. ex anon.) Rubers – 9 – [140 m] Wet meadows. On soil.
- Sphagnum angustifolium* (C.E.O. Jensen ex Russow) C.E.O. Jensen – 2 – [173 m] Wet forests of *Larix*.
- S. aongstroemii* Hartm. – 12 – [221-1283 m] Wet forests of *Larix*, watersides, mountain tundra.
- S. balticum* (Russow) C.E.O. Jensen – 1, 2, 4, 12 – [134-1000 m] Wet forests of *Larix*, watersides, mountain tundra.
- S. capillifolium* (Ehrh.) Hedw. – 4 – [134 m] Wet forests of *Larix*.
- S. compactum* Lam. & DC. – 2, 12 – [377 m] Wet forests of *Larix*, bogs.
- S. contortum* Schultz – 12 – [377 m] Wet forests of *Larix*, bogs.
- S. fimbriatum* Wilson – 9 – [140 m] Wet forests of *Larix*.
- S. fuscum* (Schimp.) H. Klinggr. – 9 – [140 m] Wet forests of *Larix*.
- S. girgensohnii* Russow – 5, 6, 12 – [270-1283 m] Wet forests of *Larix*, watersides, mountain tundra.
- S. lenense* H. Lindb. ex L.I. Savicz – 2, 4, 5, 12 – [134-1253 m] Wet forests of *Larix*, watersides, mountain tundra.
- S. russowii* Warnst. – 7, 12 – [377-961 m] Wet forests of *Larix*, watersides.
- S. squarrosus* Crome – 7, 12 – [129-1000 m] Wet forests of *Larix*, watersides, mountain tundra.
- S. subsecundum* Nees – 4 – [140 m] Wet forests of *Larix*.
- S. warnstorffii* Russow – 1, 4 – [134 m] Wet forests of *Larix*.
- Splachnum luteum* Hedw. – 10, 11 – [218-235 m] Wet forests of *Larix*, shrubs of *Betula fruticosa*. On organic residuals. S+.
- S. rubrum* Hedw. – 10 – [348 m] Forests of *Larix*. On organic residuals. S+.
- Stereodon holmenii* (Ando) Ignatov & Ignatova – 1, 5, 12 – [618-1283 m] *Larix* forests, mountain tundra. On soil, rocks with thin soil layer. (Det. Afonina).
- S. subimponens* (Lesq.) Broth. – 1, 2, 4, 6, 10 – [127-835 m] *Larix* forests, *Salix* communities, mountain tundra, rocks. On soil, rocks with thin soil layer, base of tree trunks.
- S. vaucheri* (Lesq.) Lindb. ex Broth. – 6 – [860 m] Mountain rocky tundra. On soil, rocks with thin soil layer. (Det. Afonina).
- Straminergon stramineum* (Dicks. ex Brid.) Hedenäs – 4, 5 – [134-270 m] *Larix* forests, river banks.
- **Syntrichia caninervis* Mitt. – 3 – [157 m] The Yana River basin, Boronuk village vicinities. On steppe slope with sandy loamy soil. 7.VII.2007.
- **S. laevipila* Brid. – 1 – [200 m] The Yana River basin, Boronuk village vicinities. On steppe slope. On soil. 7.VII.2007. (Det. Ignatov).
- S. ruralis* (Hedw.) F. Weber & D. Mohr – 1, 3-10 – [140-998 m] Shrubs of *Betula fruticosa*, mountain tundra, river banks, steppes, rocks. On soil, rocks, in rock crevices.
- Tetraplodon angustatus* (Hedw.) Bruch et al. – 1, 11, 12 – [235-1000 m] *Larix* forests, mountain tundra, steppe. On organic residuals. S+.
- T. mnioides* (Hedw.) Bruch et al. – 1, 11, 12 – [129-1283 m] *Larix* forests, mountain tundra, river bank. On organic residuals. S+.
- Timmia austriaca* Hedw. – 9 – [140 m] *Larix* forests, forests of *Populus* with an admixture of *Chosenia*. On soil.
- T. bavarica* Hessel. – 7, 9 – [138-150 m] *Larix* forests, forests of *Populus* with an admixture of *Chosenia*. On soil. S+.
- T. sibirica* Lindb. & Arnell – 9 – [140 m] Forest of *Populus* with admixture of *Chosenia*. On soil.
- Tomentypnum nitens* (Hedw.) Loeske – 2, 4, 8-11 – [134-377 m] *Larix* forests, shrubs of *Betula exilis*, river banks, wet meadows. On soil, lithosoil.
- Tortella fragilis* (Hook. & Wilson) Limpr. – 1, 9 – [235 m] *Larix* forests, steppes. On soil.
- Tortula mucronifolia* Schwägr. – 7, 9, 10 – [138 m] *Larix* forests, steppes. On soil. S+.

**T. muralis* var. *muralis* Hedw. – 3, 6 – [218-770 m]
The Adycha River basin, eastern slope of the Kikhilyakh Ridge. Mountain tundra. On rocks with thin soil layer. 7.VII.2007; middle reaches of the Yana River, 7 km NW of Boronuk village. Steppe slope. 15.VII.2007.

Ulota curvifolia (Wahlenb.) Lilj. – 12 – [961-1248 m]
Mountain tundra. In rock fissures. S+.

Warnstorfia exannulata (Bruch et al.) Loeske – 2, 4, 5, 7, 12 – [119-1248 m] *Larix* forests, mountain tundra, watersides.

W. fluitans (Hedw.) Loeske – 4, 11, 12 – [132-1266 m] *Larix* forests, mountain tundra, watersides.

W. tundrae (Arnell) Loeske – 12 – [700 m] Watersides.

Weissia sp. – 1, 10 – [200-265 m] Steppes. On soil.

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