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MOSS FLORA OF THE BASEGI STATE RESERVE (PERM PROVINCE, MIDDLE URAL MOUNTAINS)

ФЛОРА МХОВ ЗАПОВЕДНИКА "БАСЕГИ" (ПЕРМСКАЯ ОБЛАСТЬ, СРЕДНИЙ УРАЛ)

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Abstract

The Basegi State Reserve in Middle Ural is an area of 593 km^2 situated at 58° 44'-59'N and 58°20'-35'E, within an altitude range of 320-995 m. The list of mosses includes 201 species, with brief notes on their frequency and habitat preferences. The bryological composition of the main types of habitats and phytogeographic peculiarities are discussed.

Резюме

Заповедник Басеги находится на Среднем Урале, на 58° 44'-59' с. ш., 58°20'-35' в. д., абсолютные высоты от 320 до 995 м. Общая площадь заповедника вместе с охранной зоной составляет 593 км^2. Для этой территории выявлен 201 вид листостебельных мхов; дан их список с указанием высотного распределения и особенностей местообитаний. Обсуждается видовой состав основных растительных группировок, а также фитогеографические особенности данной флоры мхов.

INTRODUCTION

The Ural Mountains form a boundary between Europe and Asia. It is a meridionally oriented range of about 2500 kilometres from south to north, being several hundred kilometres from west to east. The highest point of Urals is Narodnaya Peak, 1895 m alt., in Northern Ural (65° N); some rather high peaks are also in Southern Ural, the highest of which is the Yamantau Peak – 1620 m alt. (54° N). The Middle Ural is the lowest part of Ural. It extends from 55° to 59° N, and has a highest point at Srednij Baseg Peak at 995 m alt. Due to rather gentle relief, this territory was much damaged by the total clear cuttings between 1940-1980s. Only few virgin forests remain within the proximity of the higher ridges with steep slopes. One of such relatively well-preserved areas in the Basegi Range received in 1981 an officially protected status. The Basegi State Reserve had at first 194 km^2, but since 1993 its area was expanded to 380 km^2, with also 213 km^2 in an associated, partly protected area. The total area under protection is now therefore 593 km^2.

In the course of a general floristic investigation in the reserve the third author had collected in 1981-1985 and in 1992-1993 about one thousand specimens of bryophytes which have been identified by himself with the subsequent additional revision by the first author. Then in June of 1994 A. Bezgodov and M. Ignatov had a joint field work in the Reserve and collected also about a thousand of specimens. The main collection is deposited at the Herbarium of Moscow State University (MW), with most of the duplicates available in MHA and in the Basegi State Reserve.

The bryophyte flora of Ural Mountains is relatively poorly known. Several more or less complete local floras were published for Polar and Subpolar Urals (Czernyadjeva, 1994; Kildyushevskij, 1956) and Southern Ural (Selivanova-Gorodkova & Schljakov, 1956). Recently the literature data on Polar and Sub-

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polar Urals were reviewed by Dyachenko (1989, 1994), resulting in useful checklists. Basing on literature and new original data Ignatova & Ignatov (1993) provided a checklist for the territory of Bashkiria, South Ural. For Middle Ural there are several publications about the mosses in Sverdlovsk (Ekaterinburg) Province (Trozenko, 1990; Dyachenko, 1987, 1990, and many other short publications by these authors listed in the catalogue of Afonina et al., 1990). For Perm Province, however, there is only one rather incomplete list of mosses for a small area near Kungur (Ignatov & Maslovsky, 1990). The present study, we believe, reveals the moss flora of this local area comprehensively. So, the list is supplemented by an essay on the general peculiarities of bryophytic composition of this area.

GENERAL AND BRYOPHYTIC VEGETATION OF THE STUDY AREA

The meridionally oriented Range Basegi includes three main peaks of 952 m (Severnyi Baseg, or Northern Baseg), 995 m (Srednij Baseg, or Middle Baseg) and 851 m (Yuzhnyj Baseg, or Southern Baseg), with some lower peaks. The elevations in between these peaks are at about 550-600 m. Lowest elevations are at the Usva River (330 m) and Vilva River (320 m), on northern and southern limits of the Reserve. Most of the territory is occupied by coniferous forest of *Picea obovata* Ledeb. and *Abies sibirica* Ledeb., with considerable occurrence of *Betula alba* L. Among broad-leaved trees only *Tilia cordata* L. has been recorded only once in a partly protected area, and therefore doesn't play any role in the vegetation cover. *Populus tremula* L. is very rare, forming a restricted pure stands only in southern part of reserve, on a S-facing slope toward the Vilva River. In *Abies* stand rather common are *Sorbus sibirica* and *Alnus incana* trees, which are an important phorophytes for epiphytic mosses.

Areas above 600-700(750) m alt. are almost treeless. This treelessness, however, is explained not by the general climatic inability of trees to grow. In places protected from wind *Betula alba* and conifers reach practically the uppermost elevations. However three factors: 1) numerous rock fields; 2) extensive tall-herb meadows (*Veratrum, Aconitum*, *Cirsium*, etc.); and 3) tundra vegetation on especially windy slopes, form the belt which reasonably can be called subalpine. We don't use the term alpine, which is mostly applied to the belt where trees can not grow at all. However, in some classifications mountain tundras of the Middle Urals are considered as alpine type of vegetation.

Rocks are mostly acidic, typically quartzites. In places with more dark and more basic diorites there are considerably richer epilithic mosses. Rock outcrops are represented mainly in subalpine zone and along Usva and Vilva Rivers, and much rarer in other parts of the reserve or along smaller creeks.

In mesic forests mosses rarely form a continuous carpet; usually ferns are dominant. Among them are common *Pleurozium schreberi, Brachythecium reflexum* and *Hylocomiastrum umbratum*. The latter species is exceedingly common here, occurring in different types of vegetation, at tree bases, rotten wood, litter, boulders, sometimes on bare loam at road sides. Probably nowhere in the world is this species so common – in most areas it is considered rare and rather stenotopic; less rare it is reported probably only in the Eastern Fennoscandia (Koponen, 1975). Another species of *Hylocomiastrum – H. pyrenaicum* also is not rare in practically all elevations, both on mineral (especially rocks) and organic (trunks, rotten logs, litter) substrata. Surprisingly, the typical dominant species of boreal forest, such as *Hylocomium splendens,* is not very common in the reserve. In the northern half of the reserve we failed to find at all one other widespread boreal moss, *Rhydidiadelphus triquetrus*.

Epiphytic components are absent in most forest types and are restricted mostly to strongly inclined trunks. Here, and on other organic substrata of tree bases, rotten wood and litter, are the very characteristic *Brachythecium reflexum, Pohlia nutans, Dicranum fuscescens, D. scoparium, Sanionia uncinata, Plagiothecium denticulatum, P. laetum, Ptilidium pulcherrimum.* On litter also occur *Rhytidiadelphus subpinnatus, Rhodobryum roseum, Dicranum polysetum, Cirriphyllum piliferum, Mnium spinosum, Plagiothecium denticulatum, Plagiochila porelloides.* Wet to swampy conifer forests (with *Carex rostrata* Stokes*, Equisetum sylvaticum* L.*, Filipendula ulmaria* (L.) Maxim.) occupy very large areas. Here on peaty soil are common *Calliergon cordifolium, Plagiomnium ellipticum, Rhizomnium pseudopunctatum, Sphagnum girgensohnii, S. squarrosum, S. riparium, Brachythecium rivulare, Pellia neesiana*. Interesting is the presence of *Sphagnum aongstroemii*, a northern species, in spruce forest of such "average" moss composition. The mosses in forests on southern edge of the study area, near the Vilva River are somewhat more diverse – only here on tree trunks are found such more southern species as *Callicladium haldanianum, Orthotrichum obtusifolium, Hypnum pallescens, Pylaisiella selwynii, Myrinia pulvinata*. Here and also in Usva River are found *Orthotrichum speciosum* (on tree trunks) and *Eurhynchium hians* (on soil/litter in forests at lower elevations).

Open soil surfaces within forest vegetation are represented by soil clumps at the bases of fallen trees. Here are found *Dicranella heteromalla, Tetraphis*

pellucida, Schistostega pennata, Atrichum flavisetum. Polytrichastrum formosum, P. longisetum. The total absence of *Fissidens bryoides,* which is common in such habitats in southern taiga and hemiboreal, southern variants of spruce forests, is surprising.

Ombrotrophic *Sphagnum* bogs are rare in the reserve. The most widespread species in its treeless parts are *S. fallax* (on more open oligotrophic places) and *S. flexuosum* (more typical for transitional parts of such bogs). More rare are *S. angustifolium, S. magellanicum, S. russowii, S. capillifolium*. In more moist, central part of some bogs, *S. jensenii* (few times) and *S. lindbergii* and *S. papillosum* (only once each) were collected in hollows. The rich minerotrophic complex of species was found only in one bog at the foot of macroslope of Yuzhnyj Baseg Peak (66 quart.): *Paludella squarrosa, Tomentypnum nitens, Hamatocaulis vernicosus, Meesia triquetra, Sphagnum fuscum, S. warnstorfii, S. capillifolium, S. flexuosum, Campylium stellatum, Palustriella decipiens, Hypnum lindbergii, Philonotis fontana, Calliergon giganteum, Straminergon stramineum.*

The species composition on soil in mountain tundra is very poor, and only weedy cosmopolites like *Ceratodon purpureus, Pohlia nutans, Bryum* cf. *algovicum, Polytrichum piliferum, P. juniperinum,* or subcosmopilitan *Polytrichastrum alpinum, Hylocomium splendens, Pleurozium schreberi* are more or less widespread. On exposed rocks in subalpine zone the species composition is equally poor. Common here are *Andreaea rupestris* and *Racomitrium microcarpon*. On partly shaded rocks are many widespread species. However only a limited number of species were found exclusively above 600 m alt.: *Dicranoweisia crispula, Dicranum acutifolium, D. spadiceum, Grimmia affinis, G. elatior, G. incurva, G. montana, Myurella julacea*; the other grow at all the elevations.

Subalpine meadows practically lack bryophytes on soil – only such aggressive species as *Brachythecium reflexum, Plagiochila porelloides* and few others, survive in the dark under this very dense tall-herb vegetation. Peculiar, however, are sides of boulders and bases of lonely trees (often also associated with rocks). Very common here are species of Leskeaceae family: *Pseudoleskea incurvata, Lescuraea saxicola* and especially *Pseudoleskea radicosa*. The occurrence here of *Iwatsukiella leucotricha* is very interesting. It is more rare and grows on big rock overhangs and on trunks of *Sorbus* (both at bottom and above snow-line). Rather common on rocks on meadows are also *Brachythecium reflexum, Dicranum fuscescens, D. scoparium, Hylocomiastrum pyrenaicum*. Only in subalpine meadows on shaded rocks were found *Brachythecium erythrorrhizon*, *Tayloria serrata* and *Anomodon rugelii* (surprisingly this species doesn't grow on rock outcrops at lowest elevations where the other three species of the genus are abundant).

As mentioned above, the moss composition of sheltered rocks is rather identical at all the elevations. These includes *Pohlia longicollis, P. cruda, Encalypta* aff. *streptocarpa, Cynodontium tenellum, C. strumiferum, Saelania glaucescens, Rhabdoweisia crispata, Paraleucobryum longifolium, Plagiothecium laetum, P. cavifolium, Pterigynandrum filiforme, Grimmia muehlenbeckii, Distichium capillaceum, Andreaea rupestris, Syntrichia ruralis, Schistidium apocarpum, Mnium marginatum, Cyrtomnium hymenophylloides, Leskeella nervosa, Distichium capillaceum, Tortella tortuosa, T. fragilis, Amphidium lapponicum, Bartramia pomiformis, B. ithyphylla, Hedwigia ciliata, Abietinella abietina, Anomodon attenuatus, Neckera complanata, N. pennata, Homalia trichomanoides.*

Only on rock outcrops (mostly on diorites) along Vilva River banks are found *Anomodon longifolius, Brachythecium plumosum, B. populeum, Encalypta ciliata, Mnium spinulosum* (on humus among rocks), *Heterocladium dimorphum, Orthotrichum alpestre, Thuidium recognitum, Plagiomnium confertidens, Platygyrium repens, Pseudoleskeella tectorum, Schistidium strictum* (among hepatics – *Porella platyphylla* (L.) Pfeiff.)). On rocks along both Vilva and Usva Rivers are recorded: *Anomodon viticulosus, Bryoerythrophyllum recurvirostrum, Pohlia elongata, Leucodon sciuroides.*

The special type of habitat is represented by the wet banks of forest-roads and the cuvettes of highways. In abundance here are *Pogonatum urnigerum, Philonotis fontana* and *Ceratodon purpureus*, also not rare *Polytrichum juniperinum, P. piliferum, Ditrichum pusillum, D. heteromallum, Dicranella subulata, Atrichum tenellum, Pohlia andalusica, P. proligera, Bryum pallens;* in wetter boggy sites – *Pohlia wahlenbergii, Bryum weigelii, Sphagnum wulfianum, S. fallax, Straminergon stramineum, Scapania* spp.

Aquatic mosses are few, since suitable habitats are not common. *Fontinalis antipyretica* is locally common in streams, *F. dalecarlica* occurs in streams in rather shaded forests, *Dichelyma falcatum* – in similar habitat in only one place. *Hygrohypnum ochraceum* is the most common species of the genus, growing in many streams and rivers.

BRYOGEOGRAPHICAL PECULIARITIES OF THE FLORA

The richness of the moss flora of study area is rather average for Ural Mts, considering the absence of limestones. The general characteristics of the study area are as follow:

1. Most species are the frequent components of boreal bryofloras.

2. Alpine and arcto-montane species are not numerous, and many of them occur only at upper elevations (*Grimmia incurva, G. elatior, G. montana, Racomitrium microcarpon, Dicranoweisia crispula, etc.*). However, many alpine/ montane species penetrate along rock outcrops up to the lowest limits in this region *(Bartramia ithyphylla, Andreaea rupestris, Amphidium lapponicum*); some species of this group, for example *Orthotrichum alpestre*, occur only at lower elevations. *Dicranella subulata*, a species of the southern boundary in the Ural region, is fairly common and even weedy in all the suitable habitats along roads.

3. The continuous moss carpet formed by *Hylocomium splendens* under the conifer forest in northern taiga zone is absent in the study area. Some characteristic epixylic dominants of northern taiga in nearby European Russian North (*Dicranum fragilifolium, Oncophorus wahlenbergii, Isopterygiopsis pulchella*) are absent or very rare in Basegi. Upper open stands are characterized by the abundance of *Hylocomiastrum umbratum*, a disjunctive species, typically connected with montane conifer forests.

4. A large group of generally more southern species is confined to the lower elevations in the valley of Vilva River or Vilva and Usva Rivers, occurring on cliffs (*Anomodon viticulosus, A. attenuatus, A. longifolius, Leucodon sciuroides, Heterocladium dimorphum, Platygyrium repens*), soil (*Plagiomnium confertidens, Thuidium recognitum*), or trunks (*Pylaisiella selwynii, Orthotrichum speciosum, O. obtusifolium, Callicladium haldanianum, Hypnum pallescens*). At the same time, some southern species are found only in the subalpine zone. Especially uncommon are the four localities of *Anomodon rugelii*, a very rare moss in Ural, previously reported only from one locality in Bashkiria (Ignatova & Ignatov, 1993).

5. Eastern connections are represented by *Iwatsukiella leucotricha* and *Plagiomnium confertidens*, known in Ural on their western or north-western boundary. Recently *Iwatsukiella* was reported from Caucasus (Soldan, 1993).

6. Two species, *Pohlia annotina* and *Neckera complanata* have probably the eastern limit of their distribution in the study area.

7. Some widespread species were not found for unclear reasons, though they are known from the neighboring areas both to the south and north, west and east. The best examples are *Fissidens bryoides, Dicranella cerviculata, D. varia, Campylim hispidulum* s. l., *Hygrohypnum luridum, Helodium blandowii, Oncophorus wahlenbergii, Timmia megapolitana, Drepanocladus aduncus.* Their absence could hardly be explained by the absence of suitable habitats or not enough searching attention.

LIST OF MOSSES OF THE BASEGI RESERVE

The altitudinal range of species, in meters above sea level, is indicated inside square brackets after the species names in the following list.

Sphagnaceae

Sphagnum angustifolium (Russ. ex Russ.) C.Jens. [500-530] – Rare, in *Sphagnum* bogs, on hummocks.

S. aongstroemii C.Hartm. [480-500] – In wet spruce forest with numerous brooks.

S. balticum (Russ.) Russ. ex C.Jens. [425-530] – In *Sphagnum* oligotrophic and minerotrophic bogs, rather rare.

S. capillifolium (Ehrh.) Hedw. [425-860] – In bogs in subalpine zone and in minerotrophic bog with *Paludella* in forest zone.

S. centrale C.Jens. ex H.Arnell et C.Jens. [470-640] – In wet and swampy spruce forests, sporadically.

S. fallax (Klinggr.) Klinggr. [350-580] – One of dominants in treeless *Sphagnum* bogs in forest belt; occasionally in wet boggy cuvettes.

S. flexuosum Dozy et Molk [350-640] – One of the most common species in forest belt; typically grows in sedge swamps, in wet forests with *Vaccinium myrtillus*; in wet forests also on rotten logs.

S. fuscum (Schimp.) Klinggr. [425-530] – Rare, found only on hummocks in two bogs: (1) in a rather big oligotrophic bog near Severnyi Baseg Peak and (2) in minerotriphic bog with *Paludella*.

S. girgensohnii Russ. [300-930] – The most common species of the genus, typically growing in wet spruce forests, and occurring sporadically also in subalpine belt, in bogs and in wet places among rocks.

S. jensenii H.Lindb. [510-580] – Rather rare in sedge-*Sphagnum* bogs, in the central, especially moist parts with hollows.

S. lindbergii Schimp. ex Lindb. [550] – Only in one small bog near Basezhata Peak, in its central, more moist part, in hollows.

S. magellanicum Brid. [480-550] – Sporadically in *Sphagnum* bogs in forest zone and in wet spruce forests, on hummocks or nearly on flat places.

S. palustre L. [480] – The only collection was made in a sedge-*Sphagnum* bog in taiga, on hummock at tree base.

S. papillosum Lindb. [550] – The single collection was made with *S. lindbergii,* in the hollow of the central, moist part of treeless bog in forest zone.

S. riparium Aongst. [450-635] – Very common in wet spruce forests with sedges or *Equisetum* of *Phragmites*, and also at the edges of extensive *Sphagnum* bogs; practically absent above “tree-line”.

S. russowii Warnst. [480-930] – In segde-*Sphagnum* coniferous bogs and treeless *Sphagnum* bogs in forest zone and in wet places (often near dripping cliffs) above tree-line; also in wet sandy cuvettes

and beside big permanent pools on old roads.

S. squarrosum Crome [330-640] – Common in sedge-*Sphagnum* bogs, beside the brooks in forests, in wet spruce forests, mostly in eutrophic situation (for example, with *Filipendula ulmaria*); sometimes on wet rock outcrops.

S. warnstorfii Russ. [425-510] – Relatively rare in treeless oligotrophic and minerotrophic bogs.

S. wulfianum Girg. [310-350] – In wet depression in rather mesic spruce forest and also in wet cuvette of a road.

ANDREAEACEAE

Andreaea rupestris Hedw. [330-950] – Rather common in upper elevations, on lateral and upper surfaces of rocks. More rare in forest zone – found a few times on rock outcrops on the bank of Vilva.

A. *rupestris* var. *papillosa* (Lindb.) Podp. [700] – Was collected once on an overhang of wet rocks in subalpine zone.

POLYTRICHACEAE

Atrichum flavisetum Mitt. [400-530] – In conifer forests on soil covering upturned roots of fallen trees. Probably it is rather common, but in most places it is sterile and therefore impossible to differentiate from *A. undulatum* for sure. However all the fertile collections from such habitats have 2-6 sporogones per stem and nealy straight capsulles on delicate yellow setae.

A. tenellum (Roehl.) Bruch et Schimp. in B.S.G. [425-575] – Abundant and characteristic on wet and exposed soil banks in recently cleared cuvettes and road sides (with *Dicranella subulata, Ditrichum pusillum, Pogonatum urnigerum*).

A. undulatum (Hedw.) P.Beauv. [350] – With sporogones found only once on a vertical soil bank along a rarely used road across open *Betula* forest with mesic grassy cover. Several sterile specimens from the roadside probably belong to this species (alt. ca. 600 m).

Pogonatum urnigerum (Hedw.) P.Beauv. [330-575] – Abundant along practically all the roads and highways – on bare soil on their sides. Also very common on clear-cutting and the other types of secondary vegetation, as well as on naturally eroded slopes and at bases of fallen trunks; not found in subalpine belt.

Polytrichastrum alpinum (Hedw.) G.L.Sm. [300-925] – Widespread in subalpine zone in tundras and on rocks; rarer in forest belt, on shaded rock outcrops.

P. formosum (Hedw.) G. L. Sm. [450-770] – Scattered and in rather different habitats – on rotten wood, on rocks or on mineral soil in secondary forest.

P. longisetum (Sw. ex Brid.) G. L. Sm. [510-750] – Scattered in wet to mesic spruce forests, typically on soil covered upturned roots of fallen trees.

P. pallidisetum (Funck) G. L. Sm. [700-720] – On rocks outcrops in subalpine zone; on wet rock side and among *Pleurozium* and *Hylocomium* carpets.

Polytrichum commune Hedw. [500-930] – Common in both forest and subalpine belts, on minerals soil or in moss carpet of bogs and swamps (both on hummocks or in overflooded habitats).

P. juniperinum Hedw. [330-950] – Common in wide range of habitats – on soil in tundra, road and trail sides, clear-cuttings, rather dry rotten logs and stumps; usually in well-lighted habitats.

P. piliferum Hedw. [500-990] – Scatterd in open, rather dry habitats – in lichen tundra at ridge top, along roads, clear-cuttings, etc..

P. strictum Brid. [425-950] – In subalpine zone in lichen and shrubby tundras, rarer on rocks; in forest zone typically in *Sphagnum* bogs.

BUXBAUMIACEAE

Buxbaumia aphylla Hedw. [330-700] – Three collections from contrasting habitats: 1) near wet rocks on steep slope in subalpine zone; 2) on recently cleared side of road, with *Polytrichum piliferum* and *Cephaloziella* cf. *rubella;* 3) on wall of rarely used road in open grassy *Betula* stand (with *Atrichum undulatum).*

DITRICHACEAE

Ceratodon purpureus (Hedw.) Brid. [330-990] – Widespread along roads, on bare soil on clear-cuttings, on especially windy slopes in tundra; also on rocks and sometimes on trunks of living trees; typically in rather well lighted habitats.

Distichium capillaceum (Hedw.) Bruch et Schimp. in B.S.G. [330-775] – Rather rare but locally common on wet and shaded rock outcrops both in subalpine and forest belts.

Ditrichum cylindricum (Hedw.) Grout [330] – One collection on a slope toward Usva River, on soil among rocks.

D. heteromallum (Hedw.) Britt. [400] – Found in few places at southern boundary of the reserve, but in great abundance – along wet forest roads, on loamy sides, where it is dominant (or co-dominant with *Pogonatum urnigerum* and *Ceratodon purpureus*).

D. pusillum (Hedw.) Hampe [330-530] – Along wet forest roads, in several places (found in most places where we intentionally looked for it).

Saelania glaucescens (Hedw.) Broth. in Bomanss. et Broth. [330-375] – On relatively wet rocks outcrops (Usva and Vilva Rivers, Porozhnaya Creek).

DICRANACEAE

Cynodontium strumiferum (Hedw.) Lindb. [330-880] – Rather common on rocks in both subalpine and forest belts.

C. tenellum (Bruch et Schimp. in B.S.G.) Limpr.

[340-760] – Very common and abundant on rock outcrops at all the altitudes.

Dichodontium pellucidum (Hedw.) Schimp. [600] – On bank of a brook in spruce forest, only one collection.

Dicranella heteromalla (Hedw.) Schimp. [400-570] – Common at lower elevations; grows typically on soil covering upturned roots of fallen trees, in recent clear-cuttings, banks along roads.

D. subulata (Hedw.) Schimp. [330-530] – A common and constantly present species on loamy banks and along wet roadsides in forests.

Dicranoweisia crispula (Hedw.) Lindb. [720] – One collection on dry ledge of rock outcrops above tree line.

Dicranum acutifolium (Lindb. et H.Arnell) C.Jens. ex Weinm. [925] – One collection in shrubby-mossy tundra on Srednij Baseg Peak.

D. bergeri Bland. in Starke [530] – One collection in a not very big *Sphagnum* bog (23 quartal), under *Betula* tree.

D. bonjeanii De Not. [425-530] – Several collections – in minerotrophic bog, on wet trail across clear-cutting, on hummock with *Betula* tree in *Sphagnum* bog.

D. flexicaule Brid. (*D. congestum* Brid.) [330-950] – Rather common at upper elevations in various types of tundras and rocks above tree line; found several time at lower elevations, mostly on rocks, rare – at tree bases in forest.

D. fragilifolium Lindb. [330] – Found only on a slope facing Usva River, growing on both fresh fallen log and on rock outcrops.

D. fuscescens Turn. [330-770] – The most common species of the genus, growing typically on rotten logs and stumps and at bases of *Betula* and *Alnus* trunks; not rare also on rocks, especially in subalpine belt.

D. polysetum Sw. [400-750] – On soil in both subalpine and forest zones; in the former – in tundras, among rocks; in forest belt rather rare in wet conifer forests, more common in relatively open secondary *Betula* forest.

D. scoparium Hedw. [330-930] – Common in both subalpine and forest belts, on trunks, rotten wood, soil and rocks.

D. spadiceum Zett. [700-880] – Rare in upper elevation, on soil or rocks in tundras.

Orthodicranum montanum (Hedw.) Loeske [330-850] – One of the most common species on both tree bases, rotten wood, rock outcrops and humus among rocks; on vertical walls of acidic rocks of quarzite forming extensive pure mats.

Paraleucobryum longifolium (Hedw.) Loeske [330-780] – Very common on rock outcrops in forest and subalpine zone, in tundra sometimes on soil.

Rhabdoweisia crispata (Dicks.) Lindb. [330-950] – Relatively common on wet shaded overhangs of rock outcrops.

ENCALYPTACEAE

Encalypta ciliata Hedw. [330] – Only on diorite rock outcrops on a S-facing slope toward Vilva River.

E. aff. *streptocarpa* Hedw. [330-720] – In several places on rock outcrops (mostly on diorites) in both subalpine and forest zones; all the specimens are sterile, and therefore indeterminable for sure between *E. procera* and *E. streptocarpa* (Horton, 1983).

POTTIACEAE

Bryoerythrophyllum recurvirostrum (Hedw.) Chen [330-375] – Rather rare on rock outrcops on banks of rivers and creeks.

Didymodon rigidulus Hedw. [375] – Only one locality on a schist outcrops at bank of Porozhnaya Creek.

Oxystegus tenuirostris (Hook. et Tayl.) A.J.E.Smith [330] – Only along Vilva River, on rock outcrops and inclined trunks of *Salix*, covered by muddy alluvium.

Tortella fragilis (Hook. et Wils. in Drumm.) Limpr. [330-640] – On relatively open S-facing rock outcrops, both in forest and subalpine zone; rare (2 collections).

T. tortuosa (Hedw.) Limpr. [375-700] – In similar habitats with *T. fragilis*, but more common.

Syntrichia ruralis (Hedw.) Web. et Mohr [330-750] – Open and well-lighted rocks in forest and subalpine belts.

GRIMMIACEAE

Grimmia affinis Hoppe et Hornsch. ex Hornsch. [610-720] – Two collections on rocks in upper elevations.

G. elatior Bruch ex Bals. et De Not. [700-720] – Three collections on rocks in subalpine zone.

G. incurva Schwaegr. [700-950] – Several collections on rocks in subalpine zone.

G. montana Bruch et Schimp. in B.S.G. [640-700] – Found four times on Yuzhnyj Baseg Peak, on rocks at the border of meadow and ridge top.

G. muehlenbeckii Schimp. [330-750] – The most common species of the genus – occurs in subalpine zone on rock outcrops, rock fields, on boulders in subalpine *Betula* stands, and also on rather xeric rocks on Vilva River bank (with *Hedwigia* and *Abietinella*).

Racomitrium aciculare (Hedw.) Brid. [350] – The only collection from the bank of Korostelevka Creek, on boulder covered by humus, 0.5 m above the water.

R. canescens (Hedw.) Brid. [425] – Rare, on wet trail across clear-cutting.

R. microcarpon (Hedw.) Brid. [600-880] – Very common in subalpine zone, typically on extensive rock fields and big rock outcrops.

Schistidium apocarpum (Hedw.) Bruch et Schimp. in B.S.G. [330-375] – On rather extensive rock outcrops along rivers and big creeks in forest zone.

S. rivulare (Brid.) Podp. [330-350] – On temporary overflooded rocks along Vilva River and Korostelevka, Porozhnaya, Malyi Baseg and Bolshoi Baseg Creeks.

S. strictum (Turn.) Mart. [330-375] – Rare, on exposed rock outcrops in forest zone.

FUNARIACEAE

Funaria hygrometrica Hedw. [330] – Rather rare (few collections), on soil banks along roads.

SPLACHNACEAE

Splachnum ampullaceum Hedw. [425] – Among *Sphagnum* species in minerotrophic bog.

Tayloria serrata (Hedw.) Bruch et Schimp. in B.S.G. [570-650] – At base of boulders in subalpine meadow; two findings in different parts of the reserve.

Tetraplodon angustatus (Hedw.) Bruch et Schimp. in B.S.G. [650] – Single collection on old destructed dung on wet rock outcrop in subalpine belt.

T. mnioides (Hedw.) Bruch et Schimp. in B.S.G. [650] – Two collections in similar habitats, one – intermixed with *T. angustatus*.

SCHISTOSTEGACEAE

Schistostega pennata Hedw. [400-700] – Not rare on soil covering upturned roots of fallen trees in mesic and wet spruce forests and also once found in cave in subalpine zone on Yuzhnyi Baseg Peak.

TETRAPHIDACEAE

Tetraphis pellucida Hedw. [480-530] – Common on rotten logs in forest belt, above tree-line not found.

BRYACEAE

Bryum sp. (cf. *B. algovicum* Sendtn. ex C. Muell.) – Rather common in mountain tundra; the juvenille sporogones do not allow exact identification.

Bryum argenteum Hedw. [775] – Exclusively rare – only one specimen was collected on rocks on top of Yuzhnyj Baseg Peak.

B. caespiticium Hedw. [330-660] – On sides of trail and rather open rock outcrops.

B. capillare Hedw. [425-780] – On soil along trails and on rocks and boulders.

B. elegans Nees ex Brid. [330-640] – On rocks in subalpine meadow and on rocky bank of Vilva river.

B. pallens (Brid.) Sw. ex Roehl. [350-575] – Wet places along roads, scattered.

B. pseudotriquetrum (Hedw.) Gaertn. et al. [380-660] – Scattered in differrent types of moist habitats – in minerotrophic bog, in sedge-conifer swamps, on wet road sides, boggy cuvettes, on dripping cliffs and so on.

B. subelegans Kindb. [330] – On rocks at banks of Vilva River.

B. weigelii Spreng. in Biehler [330-780] – Very common on all the open moist habitats in meadows, herbacous and sedge swamps and along wet roads in forests.

Pohlia andalusica (Hoehnel) Broth. [530-570] – Along roads across forests, on soil banks on wet, but sunny places; two findings in both southern and northern parts of the reserve.

P. annotina (Hedw.) Lindb. [510-530] – Practically in the same habitats as the preceding species.

P. crudoides (Sull. et Lesq.) Broth. [570] – One collection on soil bank along a road at medium elevation near Severnyi Baseg.

P. cruda (Hedw.) Lindb. [330-915] – Rather common on rock outcrops at all the elevations; one collection was made in spruce forest, at base of fallen trunk.

P. elongata Hedw. [330] – Only at lowermost elevations, on rock outcrops along Usva and Vilva Rivers, on humus on or among rocks.

P. longicollis (Hedw.) Lindb. [330-720] – Usually in deep crevices of rocks, both in forest and subalpine belts.

P. nutans (Hedw.) Lindb. [300-990] – Extremely common in both forests (on litter, tree bases and rotten wood) and above tree line (on soil and rocks); under unfavorite conditions at upper elevations the species became strongly modified – plants become smaller in all parts, leaves strongly appressed, more obtuse, carinate, stems dark-red, fragile and with numerous fragile branches. However the occurrence of transitional forms to typical *P. nutans* do not allow to segregate this expressions as a separate taxa.

P. proligera (Kindb. ex Breidl.) Lindb. ex H.Arnell [330-700] – Found in three places: 1) at 700 m alt. on wet rock outcrops on Severnyj Baseg Peak; 2) somewhat below, at 570 m alt. on low bank of a brook in spruce forest; 3) on rock outcrops along Usva River, 330 m alt..

P. wahlenbergii (Web. et Mohr) Andrews in Grout [300-620] – Very common along wet roads and brook banks, mostly in forest belt.

Rhodobryum roseum (Hedw.) Limpr. [330-600] – Not rare in forest zone, on litter in rather mesic conifer forests, occasionally on rock outcrops.

MNIACEAE

Cyrtomnium hymenophylloides (Hueb.) Nyh. ex T.Kop. [700-720] – Rare moss, found several times under deep overhangs of wet rocks in distal shaded part, usually with *Mnium marginatum*.

Mnium ambiguum H.Muell. [600] – Under overhangs

of rock outcrops on slope of Yuzhnyj Baseg Peak, only two collections.

M. hornum Hedw. [375-775] – Relatively common on rock outcrops and solitary boulders in forest and subalpine zones.

M. marginatum (Dicks.) Beauv. [330-735] – Under overhangs of rock outcrops in both subalpine and forest belts.

M. spinosum (Voit) Schwaegr. [550-925] – On soil and occasionally on rocks and on bases of *Sorbus* trunks in subalpine meadows and in conifer forests.

M. spinulosum Bruch et Schimp. in B.S.G. [330] – One collection on shaded rocks with humus layer, on the slope of Usva River.

M. stellare Hedw. [330-650] – Rare, under overhangs of rock outcrops.

Plagiomnium confertidens (Lindb. et H.Arnell) T.Kop. [330] – Only in the valley of Vilva River, on rocks and litter in mixed forest close to rock outcrops.

P. cuspidatum (Hedw.) T.Kop. [300-715] – In forest belt not rare in mesic forests on litter, rotten logs, at trunk bases (*Alnus, Sorbus, Betula, Picea*) and also on boulders; in subalpine belt – on rock outcrops and boulders in meadow.

P. ellipticum (Brid.) T.Kop. [425-640] – In subalpine zone rather rare in wet meadows; in wet forests at lower altitudes very common, especially in eutrophic swampy spruce forests and along brooks.

P. medium (Bruch et Schimp. in B.S.G.) T.Kop. [330-615] – On litter, fern hummock, soil and boulders in subalpine meadows and forests, often close to trails or roads.

Pseudobryum cinclidioides (Hueb.) T.Kop. [300-540] – Rather widespread, though rarely grows in abundance; mostly in swampy spruce forests, sometimes on wet rock outcrops.

Rhizomnium pseudopunctatum (Bruch et Schimp.) T.Kop. [425-750] – Common and abundant in wet swampy spruce forests, also along streams and in *Sphagnum* bogs; rare in subalpine zone, in wet depressions.

R. punctatum (Hedw.) T.Kop. [330-490] – In forest zone on soil banks near brooks, wet rock outcrops, on rotten wood.

AULACOMNIACEAE

Aulacomnium palustre (Hedw.) Schwaegr. [330-620] – Not rare in swampy forests, ombrotrophic bogs and grassy meadows (even not wet).

A. turgidum (Wahlenb.) Schwaegr. [500-570] – Two collections were made in rather untypical habitats: 1) at Severnyj Baseg Peak on old burned log beside small brook along a road across subalpine meadow; and 2) in southern part of the reserve in one old clear-cutting on old overgrowing road, in wet depression.

MEESIACEAE

Meesia triquetra (Richter) Aongstr. [425] – Only in minerotrophic bog with *Paludella, Tomentypnum,* etc.

Paludella squarrosa (Hedw.) Brid. [425] – In the minerotrophic bog, with *Meesia, Tomentypnum, Campylium stellatum,* etc.

BARTRAMIACEAE

Bartramia ithyphylla Brid. [330-770] – Sporadic on wet, more or less sheltered rock outcrops at all the elevations.

B. pomiformis Hedw. [640-720] – Like the preceding species.

Philonotis fontana (Hedw.) Brid. [330-640] – Rather common on banks of brooks and especially in wet sandy and loamy cuvettes of roads and trail sides during the early stages of succession; also in minerotrophic bog with *Paludella*.

P. fontana var. *seriata* (Mitt.) Kindb. [550-570] – Found in big quantities along two brooks and nearby meadows on eastern slope of Yuzhnyi Baseg; despite enormous abundance all the plants were sterile or with old setae (early June), but without perigoniae.

ORTHOTRICHACEAE

Amphidium lapponicum (Hedw.) Schimp. [330-700] – Rare on wet, "dripping" cliffs in both subalpine and forest belts.

Orthotrichum alpestre Hornsch. in B.S.G. [330] – On many diorite cliffs, but only in restricted areas of bank of Vilva River.

O. obtusifolium Brid. [330] – Relatively rare in aspen forest on S-facing slope of Vilva River, on trunks of aspen at 1.5-2.5 m and probably above.

O. speciosum Nees in Sturm [330] – Also very rare – found with the preceding species on *Populus tremula* and also on *Salix* at bank of Usva River.

FONTINALIACEAE

Dichelyma falcatum (Hedw.) Myr. [550] – One collection in small brook in conifer forest.

Fontinalis antipyretica Hedw. [570-600] – In brooks in forests, not often.

F. dalecarlica Bruch et Schimp. in B.S.G. [400-540] – In brooks in forests, found in three places, abundant in all of them.

CLIMACIACEAE

Climacium dendroides (Hedw.) Web. et Mohr. [330] – Rare in wet forests and in meadows at lower elevation.

HEDWIGIACEAE

Hedwigia ciliata (Hedw.) Beauv. [330-650] – Not frequent on more or less exposed and mesic to xeric rocks in both forest and subalpine belts.

LEUCODONTACEAE

Leucodon sciuroides (Hedw.) Schwaegr. [330] – On vertical walls of rock outcrops along Vilva and Usva Rivers.

NECKERACEAE

Homalia trichomanoides (Hedw.) Bruch et Schimp. in B.S.G. [330-700] – On overhangs of wet shaded rocks, in both subalpine zone (here in two places in very limited amount), and on outcrops on a slope of Vilva River (here not rare with *Neckera spp., Anomodon spp., Porella spp.*).

Neckera complanata (Hedw.) Hueb. [330-600] – Several collections on rock overhangs in both forest belt (on Vilva and Usva River banks) and in subalpine zone; typically grows in abundance.

N. pennata Hedw. [330-700] – Rather common on shaded to semi-exposed rock outcrops in forest zone.

N. pennata var. *tenera* C. Muell [330-700] – With var. *pennata,* but less common.

THELIACEAE

Myurella julacea (Schwaegr.) Schimp. in B.S.G. [700] – Found two times on Yuzhnyj Baseg Peak, on permanently wet rocks in subalpine zone.

PTERIGYNANDRACEAE

Pterigynandrum filiforme Hedw. [330-650] – Rock outcrops in forest and subalpine zones, sporadically.

MYRINIACEAE

Myrinia pulvinata (Wahlenb.) Schimp. [330] – Only one collection on trunk of *Populus tremula* in aspen forest on slope to Vilva River.

LESKEACEAE

Iwatsukiella leucotricha (Mitt.) Buck et Crum [600-700] – On overhangs of dry rocks in subalpine zone, and also on *Sorbus* trunk in rather open conifer forest. In the latter habitats – in sufficient quantity and with sporophytes (previously sporophytes were not known in Ural, Caucasus and Siberia).

Lescuraea saxicola (Schimp. in B.S.G.) Milde [640-780] – Rather widespread species on rocks in subalpine meadows and subalpine open stand of conifers, as well as on rock oputcrops; once collected at base of *Sorbus.*

Leskeella nervosa (Brid.) Loeske [330-720] – Several collections on rocks both in subalpine and forest belts; one collection on *Sorbus* trunk.

Pseudoleskea incurvata (Hedw.) Loeske [600-780] – Common on rocks in subalpine zone, especially on low boulders among tall herbs.

P. radicosa (Mitt.) Kindb. in Macoun [600-715] – Habitat preferences very similar with the preceding species.

Pseudoleskeella tectorum (Funck ex Brid.) Kindb. in Broth. [330] – Wet rock outcrops along Vilva River.

ANOMODONTACEAE

Anomodon attenuatus (Hedw.) Hueb. [330-700] – Common on shaded rock walls along Vilva River, and once collected on boulder in subalpine meadow.

A. longifolius (Brid.) Hartm. [330] – Shaded and wet rock walls along Vilva River.

A. rugelii (C.Muell.) Keissl. [600-680] – In subalpine meadow of two peaks, Severnyj Baseg and Yuzhnyj Baseg, two collections from each place.

A. viticulosus (Hedw.) Hook. et Tayl. [330] – Rock outcrops along Vilva and Usva Rivers, mostly on diorites.

THUIDIACEAE

Abietinella abietina (Hedw.) Fleisch. [330-750] – Widespread on rather dry rocks and soil, typically on open places.

Heterocladium dimorphum (Brid.) Schimp. in B.S.G. [330] – Only on rock outcrops (diorites and schists) on slopes of Vilva and Usva Rivers, on upper surfaces and overhangs of rather dry rocks.

Thuidium recognitum (Hedw.) Lindb. [330] – In grassy, rather dry meadow among *Betula* forest and also on cliffs along Vilva River.

HELODIACEAE

Palustriella decipiens (De Not.) Ochyra [425] – Only in minerotrophic bog with *Paludella.*

CRATONEURACEAE

Cratoneuron filicinum (Hedw.) Spruce [620] – Surprizingly rare in the reserve – the only collection was made on rocks at brook bank in forest.

AMBLYSTEGIACEAE

Amblystegium serpens (Hedw.) Schimp. in B.S.G. [330-450] – Rare, only on wet rock outcrops along Vilva River and at base of *Sorbus* trunk in forest.

A. serpens var. *juratzkanum* (Schimp.) Rau et Herv. [330-450] – On rocks with var. *serpens* and also on rotten logs.

Calliergon cordifolium (Hedw.) Kindb. [330-750] – Very common species in most types of wet to swampy forests, along brooks, wet roadsides, in wet meadows.

C. giganteum (Schimp.) Kindb. [425] – Very rare – collected only once on the minerotrophic bog with *Paludella, Meesia, Tomentypnum,* etc.

C. megalophyllum Mikut. [400] – Single collection in swampy spruce forest in permatent pool at base of fallen tree.

Calliergonella cuspidata (Hedw.) Loeske [ca. 500] – One collection in wet depression in spruce forest.

Campylium chrysophyllum (Brid.) J.Lange [375] – One collection on schist rocks on Porozhnaya Creek bank.

C. stellatum (Hedw.) C.Jens. [300-425] – Abundant in minerotrophic bog with *Paludella* and in only

two other places, at temporary overflooded banks of small creeks.

Hamatocaulis vernicosus (Mitt.) Hedenaes [425] – One locality in minerotrophic bog with *Paludella, Tomentypnum,* etc..

Hygrohypnum duriusculum (De Not.) Jamieson [350-640] – On rocky banks and in running water of small brooks in forest and in creeks; five findings.

H. ochraceum (Turn. ex Wils.) Loeske [330-570] – The most common aquatic moss in brooks, creeks and rivers with more or less fast water; found both in shaded forests and on open river banks; on rocks, rarer on submerged wood.

Sanionia uncinata (Hedw.) Loeske [300-720] – Very common on trunks, rotten logs, rocks; in both forest and subalpine belts.

Straminergon stramineum (Brid.) Hedenaes *(Calliergon stramineum* (Brid.) Kindb.) [500-930] – Rather widespread moss found in contrasting habitats – in hollow of complex bog in high mountains, in swamps in conifer forest, in big permanent pools on old roads, in recently cleared cuvettes of roads on sandy soil.

Warnstorfia exannulata (Guemb. in B.S.G.) Loeske [330-760] – Very common in moist places in bogs, in swampy conifer forests, big permanent pools, brook sides, depressions among meadows, etc.

W. fluitans (Hedw.) Loeske [500] – In overflooded depression in old clear-cutting.

W. pseudostraminea (C.Muell.) Tuom. et T.Kop. [930] – One collection in sedge-*Sphagnum* bog in mountain tundra, in slow-flowing brook.

BRACHYTHECIACEAE

Brachythecium albicans (Hedw.) Schimp. in B.S.G. [330-650] – Several collections were made on rocks or soil on open places, mostly near roads, but always in wet or moist conditions – habitats uncommon for this xerophytic and psammophytic species.

B. erythrorrhizon Schimp. in B.S.G. [375-650] – Few records on rock outcrops in subalpine zone, on soil under tall-herbs canopy in meadows and in coniferous forest.

B. mildeanum (Schimp.) Schimp. ex Milde [510] – Wet places in meadows and along a road, rare.

B. oedipodium (Mitt.) Jaeg. [330-570] – In conifer forests of lower elevations, typically in *Oxalis* and fern types, on litter or strongly decaying wood.

B. plumosum (Hedw.) Schimp. in B.S.G. [330-350] – On wet rocks at banks of Vilva River and Korostelevka Creek, rare, but locally grows in big quantity.

B. populeum (Hedw.) Schimp. in B.S.G. [330] – Only on shaded rock outcrops on steep woody slope to Usva River.

B. reflexum (Starke in Web. et Mohr) Schimp. in B.S.G. [330-780] – Widespread and abundant species in most forest types (on trunks, decaying wood and litter); in subalpine zone the species grows in open stands, on rock outcrops and on soil and boulders in tall-herb meadows.

B. rivulare Schimp. in B.S.G. [330-700] – Very common moss characteristic for all wet types of conifer forests and meadows, along brooks and creeks, on wet sides of trails.

B. salebrosum (Web. et Mohr) Schimp. in B.S.G. [330-685] – Rather common in conifer forests, typically on rotten logs and stumps and on rocks, less frequent on litter or on living trunks of *Betula, Sorbus* and *Salix*. Also this species grows as a weed along roads.

B. starkei (Brid.) Schimp. in B.S.G. [470-750] – On litter and rotten wood in conifer forests and on meadows, also on rocks covered by soil layer. Habitat preferences are practically the same as those of *B. reflexum*; to distinguish this pair of species from each other seems not always possible.

Cirriphyllum piliferum (Hedw.) Grout [375-735] – Rather sporadic and growing in limited abundance on litter, rotten wood and fern hummocks in conifer forests (including subalpine open stands); also at bases of trunks and on soil covering upturned roots of fallen trees.

Eurhynchium pulchellum (Hedw.) Jenn. [330] – Rare moss in the region – found only once on rocks along S-facing slope of Usva River.

Tomentypnum nitens (Hedw.) Loeske [425] – Only in minerotrophic bog with *Paludella*.

PLAGIOTHECIACEAE

Plagiothecium cavifolium (Brid.) Iwats. [330-720] – Practically on all the rock outcrops, on wet shaded sides of rocks or on soil nearby; occsionally on trunks covered by alluvium in flood valley and on soil along old trails.

P. denticulatum (Hedw.) Schimp. in B.S.G. [330-915] – Very common in both forest and subalpine zones; in the former – at tree bases, on rotten logs and on litter, rare on rocks; in the latter – on soil under rock overhangs and in crevices, occasionally also on exposed rock surfaces.

P. laetum Schimp. in B.S.G. [330-760] – In the same habitats as the preceding species and in general more frequent on rocky substrates.

P. latebricola Schimp. in B.S.G. [510] – One collection in *Oxalis* + ferns spruce forest, on rotten *Betula* log.

HYPNACEAE

Callicladium haldanianum (Grev.) Crum [330] – One collection in *Betula* forest on S-facing slope of Vilva River, at base of *Betula* trunk.

Hypnum cupressiforme Hedw. [330-775] – Widespread on rock outcrops in rather mesic conditions, typically on side surfaces of rocks.

H. lindbergii Mitt. [330-640] – Open banks of brooks, creeks and rivers, wet sides of roads, also in minerotrophic bog with *Paludella*.

H. pallescens (Hedw.) P.Beauv. [330] – Only in the valley of Vilva River – on rock outcrops (both mesic and xeric), and at bases of trunks of *Padus* and *Betula*.

Isopterygiopsis pulchella (Hedw.) Iwats. [330] – On shaded rocks on slope to Usva River.

Platygyrium repens (Brid.) Schimp. in B.S.G. [330] – On rocks along Vilva River, on open diorite outcrop.

Ptilium crista-castrensis (Hedw.) De Not. [330-450] – In forest belt, among moss carpet in mossy conifer forests, on fallen logs, soil banks, rocks; scattered on all the territory.

Pylaisiella polyantha (Hedw.) Grout [330-650] – In forest and subalpine belts, on trunks of *Populus tremula, Betula alba, Sorbus aucuparia, Salix caprea,* sometimes on rocks and on boadrs of roof.

P. selwynii (Kindb.) Crum et al. [330] – Very rare, only on several trunks of old *Populus tremula.*

HYLOCOMIACEAE

Hylocomiastrum pyrenaicum (Spruce) Fleisch. in Broth. [300-925] – Relatively common species in both forest and subalpine belts, growing in subalpine meadows (on soil and rocks), rock outcrops, in forests, on fallen logs, at base of *Alnus* trunks, on boulders, occasionally on litter.

H. umbratum (Hedw.) Fleisch. in Broth. [500-735] – One of the most common species in subalpine zone (on rocks and especially in open stands) and in conifer forest, on litter, fallen logs, rocks, occasionally even on sides of wet forest roads.

Hylocomium splendens (Hedw.) Schimp. in B.S.G. [330-925] – Common (though rarer than preceding species) in both forest and subalpine zones, on rocks, rotten wood and litter; in broad range of habitats.

Pleurozium schreberi (Brid.) Mitt. [330-925] – One of the most common species in the reserve – grows typically on litter and rotten wood in forests, as well as on rock outcrops; occurs also in tundras on the ridge top.

Rhytidiadelphus subpinnatus (Lindb.) T.Kop. [330-640] – Rather rare on litter in mesic conifer forests, but much more frequent in wet overflooded habitats in forest and along roads, sometimes with *Warnstorfia exannulata* in extensive permanent pools.

R. triquetrus (Hedw.) Warnst. [330-720] – In southern part of reserve found on rotten wood in spruce forest, on rock outcrop, at base of *Sorbus* in subalpine open stand, on soil in subalpine meadow, in rather dry low-grass meadow in *Betula* forest; at the same time totally absent in northern part of reserve, though appropriate habitats where seems equally common.

RHYTIDIACEAE

Rhytidium rugosum (Hedw.) Kindb. [600-775] – Several times found on extensive rock outcrops in subalpine zone, on relatively exposed surfaces.

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