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MOSSES OF SALAIR-KUZNETSK REGION (ALTAI-SAYAN MOUNTAIN COUNTRY) AND ADJACENT PLAINS OF WEST SIBERIA

МХИ САЛАИРО-КУЗНЕЦКОГО РЕГИОНА (АЛТАЕ-САЯНСКАЯ ГОРНАЯ ОБЛАСТЬ) И ПРИЛЕГАЮЩИХ ТЕРРИТОРИЙ ЗАПАДНО-СИБИРСКОЙ РАВНИНЫ

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Abstract

The paper summarizes the data of long-term bryological explorations in south-eastern part of West Siberia – in territories at the junction of the West Siberian plain and adjacent north-western part of Altai-Sayan Mountain region. The list includes 425 moss species of 49 families and 160 genera. Taxa are characterized by their occurrence in 9 phytogeographic subdivisions, as well as by the altigudinal range. Annotations and bibliography are included. Moss flora of individual regions and species distribution within the area are discussed.

Резюме

Обобщены данные многолетних бриологических исследований в юго-западной части Сибири – на территориях на стыке Западно-Сибирской равнины и Алтае-Саянской горной страны. Список мхов включает 425 видов из 49 семейств и 160 родов; указаны распределение и встречаемость видов по 9 фитогеографическим регионам территории; по отдельным видам даны комментарии. Обсуждаются особенности бриофлоры рассматриваемых регионов и закономерности распределения видов. Приводится библиография.

KEYWORDS: brophytes, flora, phytogeography, West Siberian Plain, Salair Ridge, Kuznetsky Alatau Range, Kulunda Steppe, Baraba Steppe, Vasyugan Plain

Introduction

The study area lies in the center of Eurasia, where the West Siberian plain transits to the Altai-Sayan mountain region. The West Siberian plane is the largest lowland of the Earth, extending up to 2500 km from north to south and 1900 km from west to east. Its surface is formed by a thick cover of loose Quaternary sediments. Bioclimatic zones from northern tundra through taiga forest to steppe are well-expressed on the plain due to relatively homogeneous areas. The Altay-Sayan mountain region is the main part of the South Siberia mountain belt (Zyat'kova, 1977), being 1500 km long and joining the Baikal Mountains in the east. The boundary between the West Siberian plane and the Altai-Sayan mountain country is rather sharp. Neighboring areas of these two physiographic countries provide a convenient plot to find out specific distribution patterns, correlating the latitudinally arranged physiographic zones and the altitudinal belts in mountains.

The results of the author's long-term bryological investigations in this area are summarized. Nomenclature of vascular plants follows Cherepanov (1995), mosses – Ignatov et al. (2006) with some latest additions.

Study area

The territory under discussion stretches for ober 800 km from west to east and for about 600 km from north to south. Bioclimatic zones from south taiga to steppe follow the latitudee. In mountains, the altitudinal belts are well expressed; vegetation changes from mesophytic *Betula*- and *Pinus*-forests to *Abies*-forests and then to high-mountain tall-herb communities and finally to mountain tundra. According to the administrative subdivision, the study area belongs to Altai Territory (=Krai) and to Novosibirsk, Kemerovo and partly Tomsk Provinces (Figs. 1-2). Physiograpically the area is divided into nine geographic regions (Fig. 3 & Table 1).

My investigations in this territory started in 1992. At that time the major part of the territory remained out of the spotlight of bryologists and the catalogue of bryophytes of West Siberia written by Krylov (1925) was the main source of information. Krylov (l.c.) listed localities of 130 species in the plain part of the former Tomsk Province (at that time broader than our whole study area). Attention of few later researchers was focused on mountain regions (Vasiljev, 1974, 1975, 1978; Gudoshnikov, 1976, 1978, 1986) and on huge mire areas in the

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Table 1. Regions of study area, theirs abbreviations (cf. Fig.2), main sources of regional bryoflora information. (Not all author's material has been published earlier; collecting period for a region is listed in the end of cells). – Табл. 1. Регионы изучаемой территории и используемые в тексте сокращения; основные источники информации по флорам мхов. (Не все материалы автора были ранее опубликованы; годы сборов указаны внизу ячеек).

Abbreviation Аббревиатура	Region Регион	References on bryofloristic publications and the author collections Публикации по бриофлоре и сборы автора
	Salair-Kuznetsk region (north-west part of Altai-Sayan mountain country)	
KA	Kuznetskiy Alatau / Кузнецкий Алатау	Vasiljev, 1973, 1974, 1975, 1976, 1978, 1995; Muldiyarov, Lapshina, 1996; Volkova, Muldiyarov, 2000; Pisarenko, 2004, 2007a, 2009a, 2009b; Pisarenko, Nozinkov, 2007; Ignatova, Pisarenko, 2013a; *author collections 1992, 1994, 1998, 2000-2005*
SM	Shoria Mountains / Горная Шория	Vasiljev, 1973, 1974, 1975, 1976, 1978, 1995; Gudoshnikov, 1976, 1986; Pisarenko, Nozinkov, 2007; Nozinkov, Pisarenko, 2008; Pisarenko, 2007a, 2012b; Ignatova, Pisarenko, 2013a; *author collections 2007, 2010, 2011*
SR	Salair ridge / Салаирский кряж	Gudoshnikov, 1986; Lashchinsky, Pisarenko, 1999; Pisarenko, Lashchinsky, 1999; Pisarenko, 1999, 2007a, 2007b, 2012b; Pisarenko, Nozinkov, 2007; Ignatova, Pisarenko, 2013b; *author collections 1992-1996*
KD	Kuznetskaya depression / Кузнецкая котловина	Pisarenko, Nozinkov, 2007; Pisarenko, 2007a, 2011; *author collections 2007-2011*
	West Siberian plain, south-east coner	
TR	Transitional region / Колывань-Томская дуга и Приаргинская равнина	Logutenko, 1963; Lapshina, Muldiyarov, 1998; Muldiyarov, Chernova, 2002; Pisarenko, 2007a, 2012c, 2013; Pisarenko, Nozinkov, 2007; Lashchinsky, Pisarenko, 2010; Dyachenko, Taran, 2012b; Pisarenko, Valutskiy, 2013; *author collections 2005, 2007-2011*
UO	upper Ob / Верхнее Приобье	Nozinkov, 2006; Pisarenko, Nozinkov, Zolotov, 2007, 2008; Nozinkov, Taran, 2008; Pisarenko, 2012a, 2012c; Dyachenko, Taran, 2012a; *collections 2007-2013*
KS	Kulunda Steppe / Кулунда	Pisarenko, Ignatova, Ignatov, 2001; Nozinkov, 2006; Pisarenko, 2006; Pisarenko, Nozinkov, Zolotov, 2008; *author collections 1995, 2003, 2010-2011*
BS	Baraba Steppe / Бараба	Logutenko, 1963; Valutskiy, 2011; *author collections 2009, 2012*
VP	Vasyugan plain and adjacent areas of Novosibirsk and Tomsk Provinces / Васюганье и прилегающие территории Новосибирской и Томской областей	Lapshina, Muldiyarov, 1998; Pisarenko, Lapshina, Muldiyarov, 2011; Pisarenko, 2012c; *author collections 1998, 2005, 2012, 2013*

northern part of the territory (Logutenko, 1963; L'vov, 1973; Muldiyarov, 1979, 1990; Lapshina & Muldiyarov, 1998). Full bibliography is given in Table 1. Years of the author's collections are shown *ibid*.

The north-western part of the Altai-Sayan mountain region is recognized as Salair-Kuznetsk region (Olyunin, 1975). It is a Late Mesozoic-Coenozoic dome-shaped elevation with a lowering in its central part. It is subdivided into Kuznetskiy Alatau, Mountain (Gornaya) Shoria, low Salair ridge and Kuznetskaya depression (Fig. 3).

Kuznetskiy Alatau is stretched meridionally within 53-56° N and 86-91° E. Macro-slopes of Kuznetskiy Alatau are asymmetric. The western one is faced to the Kuznetskaya depression; it is steep, formed with a system of large ledges. The eastern macro-slope is gently descending to the Minusinskaya depression. Two macro-slopes differ contrastingly in precipitation and consequently in vegetation and relief. In climatology, this ridge is an important climatic frontier, separating continental and sharply continental climatic sectors (Myachkova, 1983). In phytogeography, this watershed is considered as a part of a boundary between the region of dark coniferous forest of East Europe and West-Siberia (to the west from the ridge), and the region of *Larix*-forests of East Siberia (to the east) (Lavrenko, 1978). Also Kuznetskiy Alatau is a phytogeographical boundary for some higher rank units of meadow and steppe vegetation (Lavrenko et al., 1991; Makunina & Maltseva, 2008). The present paper deals only with the western macro-slope of Kuznetsky Alatau.

Detailed characteristics of the region is given by Pisarenko (2004). Most important features for the moss distribution are the following. Altitudes range from 300-500 m in the northern part to 2000 m in the south. Elevation intervals from the valleys level to the highest peaks are about 600-700 m. The relief has a tier structure with 2-3 surfaces of peneplainization (Kashmenskaya et al.,1969). Flat watersheds and slightly inclined surfaces are covered with Quaternary sediments. Transition to the upper surface is characterized by a sharp increasing in slope steepness; talus and rock fields are common there. Most widespread rocks are gabbros, granodiorites, granites, gneisses, serpentinites, clayish and crystalline slates. Limestone outcrops are rare and revealed in valleys of only some rivers.

There are no meteorological stations in the central parts of the mountain formations – neither Kuznetskiy Alatau nor Mountain Shoria or Salair Ridge; for these territories there are only scattered episodic data. Few stations are located on mountain foothills where the climate is warmer and drier than in the inner elevated parts. Standard climate diagrams for the most convenient sta-

tions for every described region are in Fig.4, locations of the stations are in Fig.3.

In Kuznetskiy Alatau and Mountain Shoria mean annual precipitation is several times higher than in neighbor regions and varies from 900-1000 up to 3000-3500 mm according to different data (Pilnikova, 1993; Shpin', 1980) and different parts. An average annual temperature is about 0 °C. Winter snow depth varies from 20-40 cm on flat mountain tops to 170-190 cm in the subalpine belt. When thickness of snow cover exceeds 150 cm, it keeps soil non-freezing during the winter period, temperatures on a soil surface being about 0°C (Latchinsky & Demidenko, 2005). Snow spots may persist for the whole summertime on northern slopes near ridge tops.

In vegetation of the territory, there are 3 mountain belts: a forest-belt, a tall-herbaceous belt, and a tundra-belt. Forests of *Abies sibirica* with a rich herbs layer occupy slopes of all expositions from river valleys up to 1100 m. At 1100-1250 m a.s.l. tall-herbaceous communities prevail. High-mountain tundra is presented as small isolated areas like islands on flat tops of the upper surface of peneplainization. Smooth forms of relief, huge amount of precipitation and cold climate promote mires development. Mires are diverse and represented in all mountain belts.

Vegetation of the area has been described in a number of publications (Kuminova, 1950; Sedelnikov, 1979; Latchinsky, 1996; Lapshina & Muldiyarov, 1995; Muldiyarov & Lapshina, 2000; and others), and briefly overviewed also by Pisarenko (2004).

Mountain (Gornaya) Shoria is situated southward from the Tom River and differs from Kuznetskiy Alatau by smoother relief with elevation intervals between valleys and ridges being 200-300 m. The highest peaks are Patyn Mt. (1628 m) and Pustag Mt. (1570 m), but most peaks are lower than 1200 m and do not exceed the tree line. Mean annual precipitation and temperature vary from 1300-2000 mm and -1,5°C in central highmountain parts to 800 mm and +1,2°C in periphery.

The prevailing type of primeval vegetation here is chernevaia taiga, the most thermophilic and humid type of forest in South Siberia (Polikarpov et al., 1986). It occurs also at the lower elevations in Kuznetskiy Alatau and on the western macroslope of the Salair Ridge. The peculiar composition and structure of chernevaya taiga was discussed by Krylov (1891, 1898), Kuminova (1950), Polozhii & Krapivkina (1985) Ioschenko & Laschinsky (1994), Laschinsky (2009). The canopy of *Populus tremula* and *Abies sibirica* is open and tree groups form a mozaic with tall-herb meadows. Herb layer is closed and tall; the most abundant are *Aconitum septentrionale*, *Crepis sibirica*, *Cirsium helenoides*, *Saussurea latifolia, Euphorbia lutescens.* Average height of herbage is 1-1.5 m, but generative sprouts of some species (*Alfredia cernua, Delphinium elatum, Heracleum dissectum, Anthriscus sylvestris,* and others) often exceed 3 m. Peculiarity of vegetation of Moun-

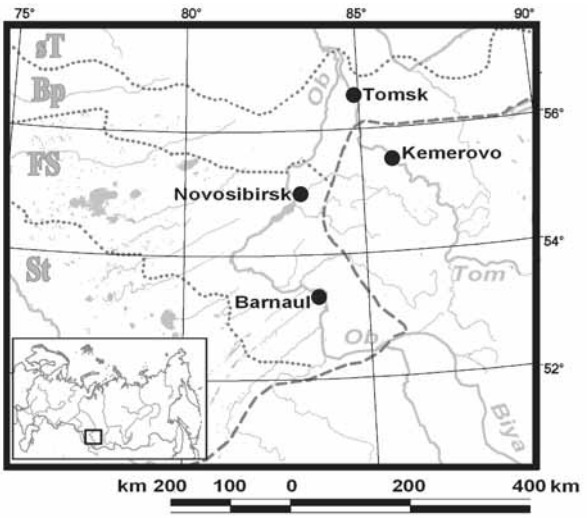


Fig. 1. Study area, showing location of bioclimatic zones. Dotted line marks off West Siberian plane (on the left) and Altay-Sayan mountain country (on the right) by Gorodetskaya & Lazukov, 1975; Olyunin 1975. Bioclimatic zones are abbreviated: **sT** – south taiga; **Bp** – subtaiga (native small-lived deciduous forests with *Betula pendula* dominance); **FS** – forest-steppe; **St** – steppe (boundaries – by Il'ina et al., 1985).

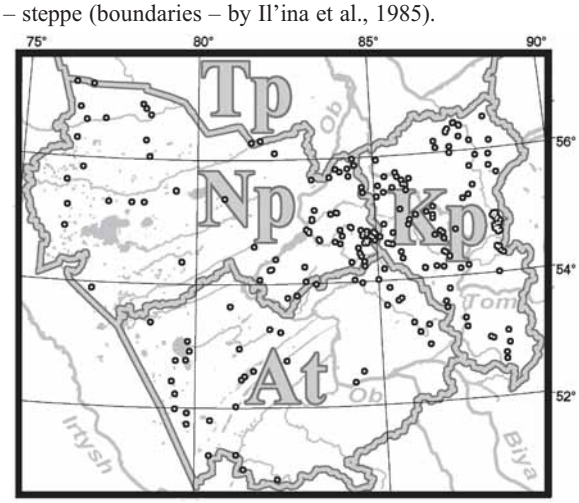


Fig. 2. Studied localities and their distribution in administrative units: **At** – Altai Territory ; **Np** – Novosibirsk Province, **Kp** – Kemerovo Province, **Tp** – Tomsk Province.

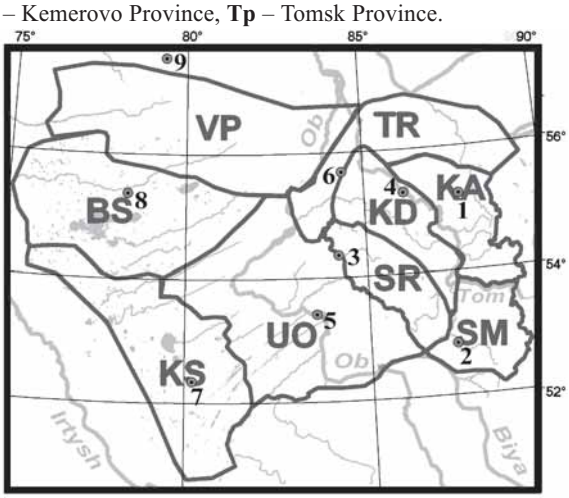


Fig. 3. Geographic regions. Abbreviation are explained in Table 1. Numbers refer to meteorological stations, cf. Fig. 4.

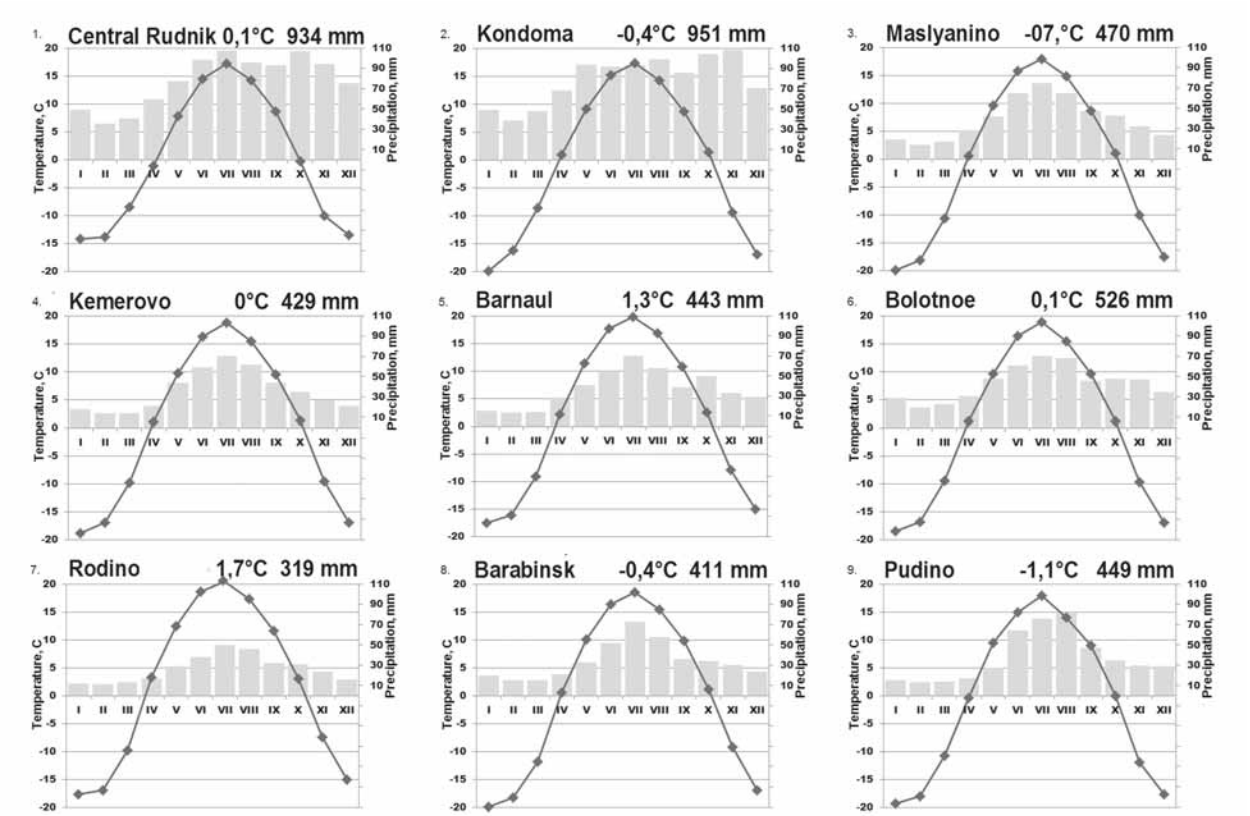


Fig. 4. Climate diagrams for study area according to Pilnikova (1993). The top of each diagram lists the name of the climate station, its average annual temperature (C) and its average annual precipitation (mm). Numbers correspond to those shown in Fig. 3: **1**. Central Rudnik, Kuznetskiy Alatau lowlands (55°13‘N – 87°39‘E), 495 m alt.; **2**. Kondoma, Shoria Mountains (52°49‘N – 87°17‘E), 354 m alt.; **3**. Maslyanino, Salair Ridge foothills (54°20‘N – 84°13‘E), 198 m alt.; **4**. Kemerovo, Kuznetskaya depression (55°17‘N – 86°06‘E), 260 m alt.; **5**. Barnaul, Upper Ob (53°24‘N – 83°34‘E), 157 m alt.; **6**. Bolotnoe, transitional region (55°40‘N – 84°23‘E), 194 m alt.; **7**. Rodino, Kulunda Stepper (52°30‘N – 80°12‘E), 160 m alt.; **8**. Barabinsk, Baraba Stepper (55°21‘N – 78°21‘E), 120 m alt.; **9**. Pudino, northern outskirts of Vasyugan plane (57°32‘N – 79°22‘E), 97 m alt.

tain Shoria is the Kuzedeevo “Linden island” – a forest massive with abundant *Tilia sibirica* in the tree layer. In South Siberia, *Tilia sibirica* is also known from some scattered locations in the Altai, Kuznetskiy Alatau and Salair Ridge; but in Mountain Shoria, the species is rather more common. Kuzedeevo “Linden island” is the biggest from known *Tilia*-forests; its size is about 18×6 km. Besides the abundance of *Tilia sibirica,* the community is characterized by the presence of *Asarum europaeum, Festuca altissima, Galium odoratum, Geranium robertianum, Polystichum braunii*, which have disjunctive distribution in Siberia and are considered here as Tertiary relicts (Polozhii & Krapivkina, 1985). Due to anthropogenic pressure, chernevaia taiga is replaced by secondary birch and aspen forests in many areas.

Salair Ridge is a low, slightly incised peneplain with average altitudes ca. 400 m (Vdovin, 1988). Salair is situated about 100 km west from Kuznetskiy Alatau and almost parallel to the latter. Macroslopes of Salair are also asymmetric, the eastern one being steep, while the western is more gentle. The ridge surface is covered with a thick layer of quaternary sediments, mainly eolian loess, which is especially thick on the western slope. Rocky outcrops occur mainly in river valleys. Annual precipitation is about 800 mm on the western slope, declining to 400 mm in the rain shadow on the eastern one (Lashchinskiy & Sedelnikov, 1991).

The ridge is totally within the forest belt. Chernevaia taiga completely covers the wet gentle and loamy western macro-slope, while more dry and drained eastern macro-slope has *Betula pendula* or *Pinus sylvestris* forests, sometimes with admixture of *Larix sibirica*. The cover of herb layer is about 60-80%; *Carex macroura*, *Brachypodium pinnatum*, *Calamagrostis arundinacea* are abundant. Petrophytic steppe with *Festuca valesiaca, Koeleria cristata, Potentilla acaulis, Artemisia frigida, Carex duriuscula* occurs on steep and sunny faces among forest. Some xerophytic mosses participate in these communities. Mires are rare and small, being mostly of mesotrophic-type. Syntaxonomy of the vegetation is comprehensively described by Lashchinskiy (2009).

Kuznetskaya depression is an elevated hilly plain with altitudes mostly 200-300 m. In the north, the plain has no sharp border; other verges are well-defined in relief. In the south the plain is limited with Mountain Shoria, in the west – with Salair ridge, in the east – with

Kuznetskiy Alatau. In the center of the eastern part of the plain near Kuznetskiy Alatau foothills, there are specific geological structures, a so-called "Melafir horseshoe" – the basalt mold of Permian age. The highest northern parts of the mold rise above the plain at 200-400 m and differ from the last in precipitation and vegetation. So, geomorphologically "Melafir horseshoe" belongs to Kuznetskaya depression (Finer, 1969), but in vegetation its northern part is similar to slopes of Kuznetskiy Alatau (Lashchinsky et al., 2011). Mosses of the northern part of "Melafir horseshoe" are included into Kuznetskiy Alatau bryoflora.

Main part of Kuznetskaya depression is within the forest-steppe zone. Zonal vegetation is a complex of small massifs of *Betula*-forests with steppe meadows and meadow steppes (Kuminova, 1950; Makunina, 1998; Makunina & Maltseva, 2008). Forests in Kuznetskaya depression are presented mainly by *Betula pendula* communities. The herb layer of these forests depends on local humidity. Dry habitats are characterized by the dominance of *Brachypodium pinnatum, Calamagrostis arundinaceae*, *Rubus saxatilis* sometimes *Carex macroura,* meadow-steppe herbs such as *Peucedanum morissonii, Seseli libanotis, Pulsatilla patens* are common. Moist forest types have *Populus tremula* dominant in the tree canopy; in herb layer *Aegopodium podagraria, Aconitum septentrionale, Pteridium aquilinum, Lathyrus gmelinii, Lathyrus vernus, Geranium sylvaticum* are common and abundant. Well-developed canopy of tall herbs and meadow grasses (*Festuca pratensis, Dactylis glomerata, Elytrigia repens, Phleum pratense, Lupinaster pentaphyllus, Phlomoides tuberosa, Sanguisorba officinalis)* is characteristic for the grasslands. The herbadge prevents the development of moss cover. A moss layer takes place only in petrophytic steppes like Salair ones, which occur on most steep and sunny slopes of river valleys or separate hills. Mires here are very rare, they occur only in river valleys, these are swampy tussock-sedge forests with *Betula pubescens*. In some places along depression sides small rock outcrops are revealed in river valleys.

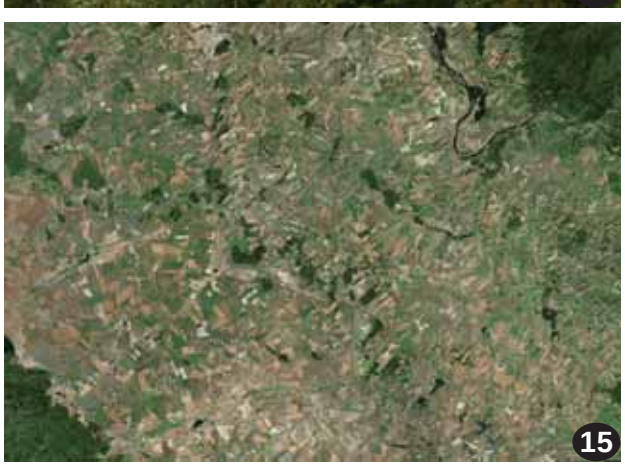
Plant cover of this region is strongly transformed by agriculture and mining activities: now it is very difficult to find fragments of native vegetation. Periodical ground fires occurring in spring or autumn due to stubble burning on adjoining farmlands are an additional disaster for mosses.

West Siberian plane south-east corner includes regions of the **upper Ob, Kulunda, Baraba, Vasyuganie** (Vandakurova, 1957; Kuminova et al., 1963; Zarutskaya, 1978; Gorodetskaya & Lazukov, 1975).

The boundary of the West Siberian plane and Salair-Kuznetsk region is not well-defined in its relief. Territories on the Ob right bank in the length from Kamen'-na-Obi to Tomsk and further to the east along the northern face of Kuznetskiy Alatau are treated by differently in geomorphology (Olyunin, 1975; Gorodetskaya, 1975). Considering the morphology and vegetation features (Kuminova, 1957; Vandakurova, 1957; Makunina & Maltseva, 2008), the area is described here as a **transitional region**. Relief is mild undulated within altitudes 150-300 m. The surface is formed by quaternary sediments, but their layer is not so thick as on most part of West Siberian plane, and small rocky outcrops occur sometimes in river valleys and on hill tops. (In other discussing parts of West Siberia, on the left bank of Ob River, stones are absolutely absent). The region is situated on a boundary of subtaiga and forest-steppe zones. Zonal vegetation is a combination of mesophitic *Betula* forests and meadows, but the plant cover is strongly transformed by agriculture activity. Steppe communities take place on steep sunny slopes of hills. Mires mainly occur in valleys of small rivers and in flat bottoms of gullies; the most common type is represented by mesotrophic communities with *Betula pubescens* or willows of *Salix cinerea* canopy (Kuminova, 1950; Kuminova et al., 1963; Lashchinskiy et al., 2014). On sandy soils along the Ob River *Pinus sylvestris*-forests prevail; between massifs of *Pinus*-forests oligotrophic *Sphagnum*-bogs occur rarely. In the northern part of the region specific mire massifs were found (Lashchinsky, Pisarenko, 2010): the massifs represent a series of parallel ribbons in river valleys; the central parts of mires are formed by complexes of mesotrophic pools with *Carex* species and forested peat beds. The periphery of mire systems is often formed by narrow stripes of swampy *Picea obovata* forests which significantly contribute to biodiversity of the region.

Upper Ob covers plains contouring the north-west face of Altai-Sayan Mountain Country at both sides of the Ob River: Priobskoe plateau and Prisalairskaya plain, Biya-Chumysh upland (Zyat'kova, 1977; Nikolaev, 1988). This region rises above the neighboring western and northern plains by approximately 100 m. The surface is dissected by erosion gullies and ravine systems. Sandy substrates prevail in this area. They form Ob terraces and pave bottoms of ancient ravines of water runoff. On such sort of habitats forests from *Pinus sylvestris* prevail. The biggest *Pinus*-forests on the right Ob River bank are Verhneob (up to 90×50 km) and Suzun (up to 70×50 km) massifs of forests; on the left bank – Barnaul and Kasmala ribbon forests, their length is 250 km, width – to 3-6 km. In depressions surrounded with *Pinus sylvestris*-forests, small bog massifs occurs. Poor in nutrients sandy substrates provoke the oligotrophic species appearance (*Oxycoccus palustris, Scheuchzeria palustris, Rhynchospora alba, Sphagnu*m spp.); here they are found far south from the plain part of their areal. Vicinity to windward macroslopes of Altai-Sayan Country has strong influence on the climate of the territory which is expressed primarily in increasing precipitation. Despite a rather southern position, the region is referred to the forest-steppe zone. In zoning schemes, bioclimatic boundaries here are turned in submeridian direction. Zonal vegeta-

Figs. 5-10. Kuznetskiy Alatau. View on a dominant top; characteristic "goltsy" relief (**Figs. 5-6**): gentle slopes and flat naked tops covered by tundra and stone fields beneath. *Abies sibirica* mountain taiga foreground and snow patches beyond, in June (**Fig. 5**). Beginning of September near timberline (1100 m): sparse growth of *Pinus sibirica* with admixture of undersized forms of *Abies sibirica* and *Betula tortuosa* (**Fig. 6**). Inside of the mountain *Abies*-forest (**Fig. 7**): *Pinus sibirica, Betula alba s.l., Sorbus sibirica* commonly participate in the stand; in herb layer *Calamagrostis obtusata, Athyrium distentifolium, Aconitum septentrionale* prevail, tall-herb species occur together with taiga umbrophytes *Oxalis acetosella, Paris quadrifolia, Gymnocarpium dryopteris etc.; Rhytidiadelphus subpinnatus, Sciuro-hypnum curtum* are abundant on soil and it is possible to find *Hylocomiastrum umbratum, Sciuro-hypnum ornellanum;* from epiphytic species *Ulota rehmannii, Iwatsukiella leucotricha, Anacamptodon latidens* are most interesting; *Pseudoephemerum nitidum* once was collected on bare soil on a pass in similar forest. Tall-herbaceous communities with abandant *Saussurea latifolia, Euphorbia lutescens, Geranium krylovii, Anthriscus sylvestris* (**Fig. 8**); *Trollius asiaticus, Aquilegia glandulosa* (**Fig. 9**) form a belt at 1100-1250 m, where snow is accumulated in winter due to blowing out from tops. On soil and stones under the herb canopy *Brachytheciastrum velutinum, Mnium spinosum, Fissidens bryoides, Serpoleskea confervoides, Lescuraea saxicola, Thamnobryum neckeroides, Anomodon rugelii* occur. High-mountain mire complex (**Fig. 10**): small peat ridges (dominants are *Betula rotundifolia*, *Vaccinium uliginosum, Rubus chamaemotus* & *Sphagnum fuscum, S. capilllifolium*) alternate with watery hollows (dom. *Carex limosa, C. lasiocarpa, Scheuchzeria palustris, Sphagnum jensenii, S. papillosum, Warnstorfia fluitans*).



Figs. 11-12. Mountain Shoria, "Linden island": chernevaia taiga with abundant *Tilia sibirica*; spot with dense tree layer (**Fig. 12**) and a gap with tall-herbs (**Fig. 11**). *Anomodon longifolius, Entodon schleicheri, Leucodon sciuroides* grow here on *Tilia* trunks; *Brachythecium rutabulum, Eurhynchium angustirete, Fissidens taxifolius* on soil. **Figs. 13-14.** Salair Ridge, typical chernevaia taiga outside (**Fig. 13**) and inside (**Fig. 14**): alternation of tall-herb meadows with groups of *Populus tremula* and *Abies sibirica.* **Figs. 15-17.** Kuznetskaya depression. Space photo: agricultural lands and mines with only fragments of parent vegetation (**Fig. 15**, from http://sasgis.ru). Forest-stepper landscape (**Fig. 16**). Petrophytic steppe on steep slopes (**Fig. 17**) provides habitats for *Abietinella abietina, Rhytidium rugosum, Syntrichia ruralis, Tortella tortuosa,* and *Dicranum muehlenbeckii*.

Figs. 18-24. Kuznetskaya depression. Eutrophic mire in a valley of small river (**Fig. 18**): abundance of *Carex cespitosa & C. appropinquata* under *Betula*-stand (**Fig. 19**), in moss layer *Breidleria pratensis, Tomentypnum nitens, Helodium blandowii, Sphagnum* spp. occur apart from *Plagiomnium ellipticum Calliergon cordifolium, Calliergonella cuspidata* etc. **Fig. 20.** Upper Ob, space photo (http://sasgis.ru): green strips between agricultural lands are ancient ravines of water runoff with *Pinus sylvestris* forests and mires, the main reserves of parent flora. **Figs. 21-22.** Kulunda. Solonez steppe in periphery of slightly salty lake (**Fig. 21**): habitats for *Pleuridium subulatum, Tortula acaulon, Pterygoneurum subsessile, P. kozlovii, Jaffueliobryum latifolium, Entostodon hungaricuss*; near strongly salted lakes (**Fig. 22**) no mosses can survive. **Figs. 23-24.** Baraba landscape (**Fig. 23**): alternation of meadows and mires with *Betula*-forests (**Fig. 24**).

Figs. 25-26. SW West Siberian Plain. Eutrophic mire with *Phragmites australis* dominance (**Fig. 25**). Oligotrophic raised peat bogs (riams) (**Fig. 26**) are Pleistocene relicts in the landscape. **Fig. 27-28.** Great Vasyugan Swamp, view from helicopter (**Fig. 27**) and inside (**Fig. 28**): huge mire system from *Carex*-swamps and low *Sphagnum*-ridges with *Pinus sylvestris* and *Betula*. **Fig. 29.** South taiga in West Siberia is polydominant coniferous forest with well-developed and rich grass layer; moss cover is not closed, but rather diverse. By river valleys south taiga communities penetrate subtaiga zone to 54 °N. **Fig. 30-31.** Transitional region, subtaiga zone. Rock outcrops and petrophytic steppe in river valley (**Fig. 30**). Native *Betula*-forest (**Fig.** 31): mosses are abundant on *Betula*-trunks (*Pylaisia polyantha, Stereodon pallescens, Callicladium haldanianum, Platygyrium repens , Haplocladium microphyllum, etc.).*

tion occupies non-sandy sites and is presented by a combination of small massifs of *Betula*-forests and different meadow and steppe communities (Lapshina, 1963; Makunina et al., 2010; Latchinsky & Latchinskaya, 2012).

Kulunda is an accumulative plain within the Ob-Irtysh watershed. It is the lowest part of the study area with the mean altitudes of 100-140 m. Its surface is formed by a thick layer (to 50-60 m) of alluvial sediments. Shallow internal-drainage mineralized lakes are a characteristic feature of the region (Nikolaev, 1972, 1988; Nikolaev et al., 1982). The territory is located within the steppe zone (Ilina et al., 1985; Vandakurova, 1950).

Mosaic vegetation reflects differences in microrelief and soils. Zonal communities are steppe with *Stipa* spp. and *Festuca valesiaca* predominance. Solonez dry steppe are widespread. All watersheds of the territory are plowed; in some administrative districts arable lands take up to 80%. Remaining steppe areas exist under strong pasturing; now they are mainly degraded and present poor communities of *Artemisia austriaca, A. glauca, Festuca valesiaca*. Halophyte communities are very diverse on this territory; they take place in depressions, in salt lake basins and river valleys (Korolyuk, 1999; Korolyuk et al., 2007). The most common species are *Artemisia nitrosa, Puccinellia tenuissima, Limonium gmelinii, Halimione verrucifera, Salicornia perennans, Suaeda prostrate.* In more wet places *Hordeum brevisubulatum*, *Alopecurus arundinaceus*, *Agrostis stolonifera*, *Elytrigia repens*, *Juncus gerardii*, *Scorzonera parviflora*, *Plantago cornuti* prevail. In the margins of overgrowing lake communities, *Phragmites australis, Typha latifolia, Carex riparia, C. pseudocyperus, Thelypteris palustris,* and *Scolochloa festucacea* are common. Forest communities are rather rare in the region. They occur on spots of winter snow accumulation – on concave downwind slopes of slightly elevated places and in small depressions (Korolyuk et al., 2008). The communities are formed by scrubby beech and aspen trees. Characteristic species of herb layer are *Artemisia latifolia*, *Lathyrus pratensis*, *L. pisiformis*, *Achillea asiatica* , *Hieracium virosum, Achillea cartilaginea* , *Veronica longifolia*, *Kadenia dubia*, *Carex disticha, C. melanostachya*). Sandy deposits of ancient ravines of water runoff ensure the existence of dry *Pinus*-forests with psammophyte species in the herb layer. The ancient ravines are covered with mire communities of *Phragmites australis*, swampy birch forests with *Carex riparia, C. pseudocyperus, C. atherodes, Thelypteris palustris, Filipendula ulmaria.*

Baraba is the alluvial drainless plain to the north of Kulunda. There is no distinct boundary between Baraba and Kulunda plains; usually they are delimited by the Bagan and Karasuk River watershed. The northern border of the forest-steppe zone is taken as the Baraba northern border; it matches with the northern limit of salted soils and is about 56°N. Altitudes of the territory are 105-145 m. Baraba has well-expressed mesorelief formed by interspersed elevations and depressions about some hundred meters across, having 5-10 m in relative hight. The form of mesorelief elements varies from narrow and elongated in the western part to more or less roundish in the eastern part. There are a lot of shallow salted and fresh lakes on the territory.

Drained habitats are occupied by *Betula*-forests and grassland (meadow steppe in southern part) (Vagina, 1962; Kuminova et al., 1963; Korolyuk, 1993a,b; Korolyuk & Kiprijanova, 2005). Mires take huge areas. Most common of them are eu- and mesotrophic sedge mires with abundance of *Phragmites australis, Carex disticha, C. atherodes, C. omskiana, C. diandra, C. rostrata, C. riparia, Calamagrostis canescens*. Oligotrophic raised peat bogs (riams) also occur, being considered as Pleistocene relicts. Bog massifs occur in small pan depressions in a forest-steppe landscape and have some hundred meters in diameter. They have a uniform composition and structure. Peat surface is covered by oligotrophic and mesotrophic *Sphagnum* species or by taiga mosses *Pleurozium schreberi, Hylocomium splendens, Dicranum polysetum* in more dry spots. A sparse tree layer is formed by undersized *Pinus sylvestris* of 6-10 m tall. In the herb-shrub layer, *Chamaedaphne calyculata, Ledum palustre, Vaccinium vitis-idaea, Carex globularis, Eriophorum vaginatum, Rubus chamaemorus* are abundant (Valutskij, 2011). In the periphery of lake and mire basins, solonez and solonchak communities are common (Vagina, 1963; Korolyuk, 1999).

Vasyugan plain and adjacent areas. The central part of Ob-Irtysh watershed is a vast denudation-accumulative plain with mean altitudes 100-140 m. Most part of the plain is the Great Vasyugan Swamp – the largest mire system in the world, 1 500×450 km.

Swamp communities are diverse in the system. Eight main types by moisture and nutrient conditions result in corresponding plant communities (Liss & Berezina, 1981; Lapshina et al., 2000; Pisarenko et al., 2011). Oligotrophic *Sphagnum* bogs are most widespread. In the southern part, mesotrophic sedge mires with Bryalean mosses cover take place (commonly called "Hypnum"-type bogs). To the south of the Great Vasyugan Swamp, the watershed habitats are covered by herbaceous *Betula*-forests; these forests are considered here to be primary (not secondary as *Betula* forest in many other areas). The zone formed by them is segregated in Siberia as the subtaiga zone (Gorodkov, 1915; Krylov, 1919; Khramov & Valutsky, 1977; Ilina et al., 1985). Forests of *Abies sibirica* and *Picea obovata* grow here only in the river valleys.

To the north of the Great Vasyugan Swamp, the native vegetation of drained habitats is the south taiga: polydominant coniferous forest with herb cover with *Carex macroura* predominance (Latchinsky & Korolyuk, 2012). Because of the mire landscape, the boundary between subtaiga and south taiga zones in the territory is conventional.

Species List

Occurrence of species is shown by regions (for abbreviations see Table 1 and Fig. 2), according to the following scale: w = widespread (>30 localities); c = common (recorded from 16-30 localities); sp = sporadic (6-15 localities); r = rare (2-5 localities); u = unique (1 locality). For unique species the collecting point or reference [if it was published in Arctoa] is cited in the "Comments" section under the number given under the corresponding species name. Square brackets indicate species reported based on the literature data only, as no species were located, and comments are given also in these cases. The author specimens are in NSK. Column *alt* includes altitude interval within the studied territory. Three right columns specify species presence in administrative units: **No** – Novosibirsk Province, **Ke** – Kemerovo Province, **Al** – Altaisky Territory outside Altai Mountains. At least one label from each region is in database "Herbarium specimens of Russian mosses" (http://arctoa.ru/Flora/basa.php).

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Abietinella Müll.Hal.													
abietina (Hedw.) M.Fleisch. (1)	r	r	c	sp	sp	r	u	.	u	100-1500	+	+	+
Acaulon Müll.Hal.													
triquetrum (Spruce) Müll.Hal. (2)	.	.	.	.	.	u	.	.	.	250	.	.	+
Aloina Kindb.													
brevirostris (Hook. & Grev.) Kindb.(3)	.	.	u	.	[u]	.	.	.	.	400	.	+	.
rigida (Hedw.) Limpr.	.	.	.	.	r	.	.	.	.	100-120	+	.	.
Amblystegium Bruch et al.													
radicale (P.Beauv.) Bruch et al. (4)	[r]	.	.	.	.	.	.	.	r	150-950	+	+	.
serpens (Hedw.) Bruch et al.	sp	c	w	w	w	c	sp	sp	c	100-1200	+	+	+
Amphidium Schimp.													
lapponicum (Hedw.) Schimp.	r	.	.	.	.	.	.	.	.	500-1300	.	+	.
mougeotii (Bruch et al.) Schimp. (5)	u	r	.	.	.	.	.	.	.	500-600	.	+	.
Anacamptodon Brid.													
latidens (Besch.) Broth. (6)	u	.	.	.	.	.	.	.	.	940	.	+	.
Andreaea Hedw.													
rupestris Hedw.	sp	r	.	.	.	.	.	.	.	800-1500	.	+	.
Anomodon Hook. & Taylor													
attenuatus (Hedw.) Huebener (7)		r	r	.	u		.	.	.	200-600	.	+	.
longifolius (Brid.) Hartm. (8)	sp	sp	r	.	u	u	.	.	.	120-1100	+	+	+
rugelii (Müll.Hal.) Keissl.	sp	u		.			.	.	.	900-1200	+	+	.
viticulosus (Hedw.) Hook. & Tayl. (9)	r	sp	r	.	u	u	.	.	.	150-600	.	+	.
Atrichum P.Beauv.													
flavisetum Mitt.	c	sp	c	r	sp	r	.	.	.	100-1000	+	+	.
tenellum (Roehl.) Bruch et al. (10)	.	[u]	.	.	[u]		.	.	.		.	.	.
undulatum (Hedw.) P.Beauv. (11)	r	r	r	.	r	u	.	.	.	200-750	+	+	.
Aulacomnium Schwägr.													
palustre (Hedw.) Schwägr.	sp	sp	c	sp	c	sp	r	sp	c	100-1500	+	+	+
turgidum (Wahlenb.) Schwägr.	sp	.	.	.	.	.	.	.	.	1100-1500	.	+	.
Barbula Hedw.													
convoluta Hedw. (12)	.	.	.	.	[u]	[u]	.	.	.		+	.	.
unguiculata Hedw.	r	sp	sp	sp	sp	sp	r	r	r	100-400	+	+	+
Bartramia Hedw.													
ithyphylla Brid.	sp	r	.	.	.	.	.	.	.	950-1800	.	+	.
pomiformis Hedw. (13)	r	r	u	.	u	.	.	.	.	200-800	+	+	.
Brachytheciastrum Ignatov & Huttunen													
velutinum (Hedw.) Ignatov & Huttunen (14)	sp	r	r	r		[r]	.	.	r	150-1300	+	+	+
Brachythecium Bruch et al. (15)													
albicans (Hedw.) Bruch et al. (16)	.	[r]	[u]	.	.	r	r	.	.	180-250	.	.	+
baicalense Ignatov (17)	.		u	.	.	u		.	.	170, 340	+	+	.
campestre (Müll.Hal.) Bruch et al. (18)	.	[u]	r	r	sp	r	r	.	.	100-350	+	+	.
cirrosum (Schwägr.) Schimp.	r	r	.	.	.	.	.	.	.	300-750	.	+	.
complanatum Broth. (19)		u	.	.	.	.	.	.	.	350	.	+	.
erythrorrhizon Bruch et al. (20)	c	r	.	.	.	.	.	.	[u]	750-1800	.	+	.
mildeanum (Schimp.) Schimp.	r	.	c	c	c	sp	sp	sp	sp	100-400	+	+	+
rivulare Bruch et al.	c	c	c	sp	sp	r	[u]	.	.	110-1200	+	+	+
rotaeanum De Not.	r	sp	r	c	c	sp	sp	sp	sp	100-750	+	+	+
rutabulum (Hedw.) Bruch et al.	r	sp	r	r	r	.	.	.	.	140-600	+	+	
salebrosum (F.Weber & D.Mohr) Bruch et al.	c	c	w	c	w	c	r	sp	sp	100-1200	+	+	+

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Breidleria Loeske													
pratensis (W.D.J.Koch ex Spruce) Loeske (21)	u	.	r	sp	r	r	.	.	sp	120-300	+	+	.
Bryhnia Kaurin													
brachycladula Cardot	.	r	r	r	r	.	.	.	.	150-500	+	+	+
Bryobrittonia R.S.Williams													
longipes (Mitt.) D.G.Horton (22)	[u]	r	.	.	.	.	.	.	.	400-600	.	+	.
Bryoerythrophyllum P.C.Chen													
recurvirostrum (Hedw.) P.C.Chen	sp	sp	sp	r	sp	sp	.	.	r	120-900	+	+	+
Bryum Hedw. (23)													
amblyodon Müll.Hal.	r	.	.	.	r		r	.	.	100-1200	.	+	+
argenteum Hedw.	r	r	c	r	sp	sp	sp	r	r	100-1000	+	+	+
bimum (Schreb.) Turner	r	.	sp	r	r	sp	r	.	sp	100-350	+	+	+
caespiticium Hedw.	.	r	sp	.	r	sp	sp	.	.	100-400	.	+	+
capillare Hedw. (24)	r	.	r	.	[u]	.	.	.	.	250-1200	+	+	+
creberrimum Taylor	r	.	.	r	r	r	sp	.	sp	100-1000	+	+	+
cyclophyllum (Schwägr.) Bruch et al. (25)	.	.	.	.	u	.	.	.	.	150	.	+	.
elegans Nees (26)	sp	r	r	.		[r]	[r]	.	.	250-1100	.	+	+
funkii Schwaegr. (27)	.	.	r	.	u	[r]	.	.	.	200-400	+	+	+
intermedium (Brid.) Blandow (28)	r	.	u	.	.	.	.	.	[r]	300-1100	.	+	.
lonchocaulon Müll.Hal.	.	r	sp	.	r	.	.	.	.	200-500	+	+	+
moravicum Podp. (29)	r	sp	r	.	r	[r]	.	.	.	250-800	+	+	+
neodamense Itzigs. (30)	.	.	u	.	.	.	.	.	r	150-200	+	+	.
pallens Sw. ex anon. (31)	.	.	.	.	[u]	u	.	.	r	140-170	+	.	.
pallescens Schleich. ex Schwägr. (32)	[u]	.	.	.	[u]	.	.	.	[u]		.	+	.
pseudotriquetrum (Hedw.) P.Gaertn., B.Mey. & Scherb.	sp	sp	c	sp	sp	sp	r	sp	c	100-1300	+	+	+
schleicheri DC.	r	r	.	.	.	.	.	.	.	360-800	.	+	.
subapiculatum Hampe. (33)	.	.	.	.	.	[u]	.	.	.		.		
uliginosum (Brid.) Bruch et al.	.	.	.	r	r	.	.	.	.	200-400	+	+	.
weigelii Spreng. (34)	r	.	.	.	.	.	.	.	[u]	100-900	.	+	.
Bucklandiella Roiv.													
microcarpa (Hedw.) Bednarek-Ochyra & Ochyra	sp	sp	.	.	.	.	.	.	.	600-1800	.	+	.
sudetica (Funck) Bednarek-Ochyra & Ochyra	c	sp	.	.	.	.	.	.	.	700-1800	.	+	.
Buxbaumia Hedw.													
aphylla Hedw. (35)	.	.	.	.	[u]	.	.	.	.		.	.	.
Callicladium H.A.Crum													
haldanianum (Grev.) H.A.Crum	sp	sp	w	c	w	sp	sp	sp	c	100-800	+	+	+
Calliergon (Sull.) Kindb.													
cordifolium (Hedw.) Kindb.	sp	r	c	sp	sp	r	.	sp	c	100-1000	+	+	+
giganteum (Schimp.) Kindb. (36)	r	.	sp	u	r	[u]	.	.	sp	130-250	+	+	.
megalophyllum Mikut. (37)	.	.	.	.	.	.	.	.	[?]				
richardsonii (Mitt.) Kindb.	.	.	.	.	.	.	.	.	r	100-150	+	.	.
Calliergonella Loeske													
cuspidata (Hedw.) Loeske	r	r	c	sp	sp	sp	.	.	c	100-600	+	+	+
lindbergii (Mitt.) Hedenäs	sp	sp	c	sp	sp	sp	.	.	sp	100-1000	+	+	+
Campyliadelphus (Kindb.) R.S.Chopra													
chrysophyllus (Brid.) R.S.Chopra (38)	sp	sp	r	.	sp	[r]	.	.	r	120-1000	+	+	+
Campylidium (Kindb.) Ochyra													
calcareum (Crundw. & Nyholm) Ochyra (39)	.	.	u	.	.	.	.	.	.	270	.	.	.
sommerfeltii (Myrin) Ochyra	r	sp	c	sp	sp	sp			sp	100-800	+	+	.
Campylium (Sull.) Mitt.													
protensum (Brid.) Kindb.	r	r	.	.	r	r	.	.	sp	120-900	+	+	+
stellatum (Hedw.) C.E.O.Jensen	r	.	sp	sp	r	r	.	.	c	100-1000	+	+	+
Campylophyllum (Schimp.) M.Fleisch.													
halleri (Hedw.) M.Fleisch. (40)	u	.	.	.	.	.	.	.	.	600	.	+	.
Ceratodon Brid.													
purpureus (Hedw.) Brid.	sp	sp	w	c	c	c	c	c	c	100-1400	+	+	+
Cinclidium Sw.													
stygium Sw. (41)	.	.	u	.	u	.	.	.	r	120-300	+	+	.
Cinclidotus P.Beauv.													
riparius (Host ex Brid.) Arn.	.	r	.	.	.	.	.	.	.	360-600	.	+	.

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Cirriphyllum Grout													
piliferum (Hedw.) Grout	sp	sp	sp	sp	r	.	.	.	r	110-1000	+	+	.
Climacium F.Weber & D.Mohr													
dendroides (Hedw.) F.Weber & D.Mohr	r	s	c	sp	c	sp	r	sp	sp	100-560	+	+	+
Cnestrum I.Hagen													
schistii (F.Weber & D.Mohr) I.Hagen	.	.	r	.	.	.	.	.	.	200-300	+	+	.
Conardia H.Rob.													
compacta (Drumm. ex Mull. Hal.) H. Rob. (42)	.	.	.	.	.	[u]	[u]	.	.		.	.	+
Cratoneuron (Sull.) Spruce													
filicinum (Hedw.) Spruce (43)	sp	sp	sp	r	r	r	.	.	[u]	100-1100	+	+	+
Cynodontium Bruch et al.													
polycarpon (Hedw.) Schimp.	r	.	.	.	.	.	.	.	.	900-1100	.	+	.
strumiferum (Hedw.) Lindb.	r	r		.	.	.	.	.	.	200-1400	.	+	.
tenellum (Schimp.) Limpr. (44)	r	.	u	.	.	.	.	.	.	200, 1000	+	+	.
Cyrtomnium Holmen													
hymenophylloides (Huebener) T.J.Kop.	r	r	.	.	.	.	.	.	.	500-940	.	+	.
Dichelyma Myrin													
falcatum (Hedw.) Myrin (45)	u	.	.	.	.	.	.	.	.	940	.	+	.
Dichodontium Schimp.													
pellucidum (Hedw.) Schimp. (46)	sp	sp	u	r	[u]	.	.	.	.	140-1200	.	+	+
Dicranella (Müll.Hal.) Schimp.													
cerviculata (Hedw.) Schimp.	r	.	.	.	r	.	.	.	.	100-900	.	+	.
crispa (Hedw.) Schimp. (47)	.	.	.	.	[u]	.	.	.	.				
heteromalla (Hedw.) Schimp.	sp	sp	sp	.	sp	r	.	.	.	100-900	+	+	.
rufescens (Dicks.) Schimp.	r		r	.	.	.	.	.	.	400-1000	+	+	.
schreberiana (Hedw.) Hilf. ex H.A.Crum & L.E.Anderson (48)	.	r	r	r	r	.	.	.	[u]	100-350	+	+	+
subulata (Hedw.) Schimp. (49)	.	.	.	.	[u]	.	.	.	.				
varia (Hedw.) Schimp. (50)	r	r	r	.	[u]	r	.	.	.	130-400	+	+	.
Dicranodontium Bruch et al.													
denudatum (Brid.) E.Britton	r	r	.	.	.	.	.	.	.	350-700	.	+	.
Dicranum Hedw.													
acutifolium (Lindb. & Arnell) C.E.O.Jensen (51)	r	.	.	.	u	.	[u]	.	.	1000-1200	.	+	+
bonjeanii De Not.	sp	r	sp	sp	sp	sp	u	sp	sp	100-1400	+	+	+
brevifolium (Lindb.) Lindb. (52)	r	.	.	.	.	[u]	.	.	.	600-1400	.	+	+
drummondii C.Muell. (53)	.	.	.	.	.	[u]	.	.	.		.	.	+
elongatum Schleich. ex Schwägr.	r	.	.	.	.	.	.	.	.	1300-1500	.	+	.
flagellare Hedw.	r	sp	sp	r	r	sp	r	sp	sp	120-450	+	+	+
flexicaule Brid.	sp	sp	.	.	r	.	.	.	r	120-1500	+	+	.
fragilifolium Lindb.	r	sp	r	r	r	r	.	.	r	100-950	+	+	+
fuscescens Turner	c	sp	c	sp	sp	sp	r	sp	sp	100-1100	+	+	+
laevidens R.S.Williams	r	.	.	.	.	.	.	.	.	1100-1700	.	+	.
leioneuron Kindb. (54)	.	.	.	.	.	.	.	.	[?]		.	.	.
majus Turner	r	.	.	.	.	.	.	.	.	700-1800	.	+	.
montanum Hedw.	c	c	c	c	c	sp	r	sp	sp	100-1200	+	+	+
muehlenbeckii Bruch et al.	.	.	sp	r	r	.	.	.	r	150-460	+	+	.
polysetum Sw.	sp	sp	w	sp	sp	sp	r	sp	sp	100-1500	+	+	+
scoparium Hedw.	c	c	sp	r	r	r		r	sp	100-1500	+	+	.
spadiceum J.E.Zetterst.	sp	r	.	.	.	.	.	.	.	1000-1800	.	+	.
undulatum Schrad. ex Brid.	r	r	r	.	r	.	.	.	r	100-1300	+	+	.
viride (Sull. et Lesq.) Lindb. (55)	.	.	u	.	.	.	.	.	.	200	.	+	.
Didymodon Hedw.													
fallax (Hedw.) R.H.Zander	.	u	u	u	r	r	.	.	.	100-350	+	+	+
ferrugineus (Schimp. ex Besch.) M.O.Hill (56)	r	r	.	.	[u]	.	.	.	.	200-500	.	+	.
icmadophilus (Schimp. ex Müll.Hal.) R.H.Zander (57)	.	.	.	[u]	.	.	.	.	.		.	.	.
rigidulus Hedw.	r	r	r	.	r	.	.	.	.	100-750	+	+	.
tophaceus (Brid.) Lisa (58)	.	.	.	.	[u]	.	.	.	.		.	.	.
validus Limpr.	.	r	r	r	r	.	.	.	.	100-400	.	+	.
Discelium Brid.													
nudum (Dicks.) Brid.	.	.	.	.	[u]	.	.	.	.		.	.	.

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Distichium Bruch et al.													
capillaceum (Hedw.) Bruch et al.	sp	s	sp	r	r	r	.	.	r	100-1800	+	+	.
inclinatum (Hedw.) Bruch et al. (59)	.	.	.	.	.	.	.	.	[u]		.	.	.
Ditrichum Timm ex Hampe													
cylindricum (Hedw.) Grout (60)	r	.	r	r	[u]	.	.	.	.	200-1000	.	+	.
flexicaule (Schwägr.) Hampe	sp	s	.	.	.	.	.	.	r	100-1300	.	+	.
heteromallum (Hedw.) E.Britton (61)	r	.	.	.	[u]	.	.	.	.	500	.	+	.
pusillum (Hedw.) Hampe (62)	u	.	.	.	u	.	r	.	.	530	.	+	.
Drepanium C.E.O.Jensen													
recurvatum (Lindb. & Arnell) G.Roth	r	r	.	.	.	.	.	.	.	500-800	.	+	.
Drepanocladus (Müll.Hal.) G.Roth													
aduncus (Hedw.) Warnst.	sp	s	c	sp	sp	sp	sp	sp	c	100-800	+	+	+
polygamus (Bruch et al.) Hedenäs	r	.	r	r	sp	sp	r	r	c	100-1100	+	+	+
sendtneri (Schimp. ex H.Muell.) Warnst. (63)	.	.	u	u	u	r	.	.	sp	100-300	+	+	+
Encalypta Hedw. (64)													
ciliata Hedw.	r	r	r	.	r	.	.	.	.	100-600	.	+	.
pilifera Funck	.	r	r	r	r	.	.	.	.	150-400	+	+	+
procera Bruch	r	sp	r	.	r	.	.	.	.	150-800	.	+	.
rhaptocarpa Schwägr. (65)	u	.	.	.	.	.	.	.	.	750	.	+	.
trachymitria Ripart (66)	.	u	.	.	r	.	.	.	.	150-400	+	+	.
vulgaris Hedw. (67)	.	.	r	r	r	.	.	.	u	100-400	+	+	.
Entodon Müll.Hal.													
concinnus (De Not.) Paris (68)	u	r	u	.	.	.	.	.	.	300-600	.	+	.
schleicheri (Schimp.) Demet. (69)	.	sp	.	u	r	.	.	.	.	100-600	+	+	.
Entosthodon Schwägr.													
hungaricus (Boros) Loeske	.	.	.	.	.	.	r	.	.	130	.	.	+
Eurhynchiastrum Ignatov & Huttunen													
pulchellum (Hedw.) Ignatov & Huttunen	r	r	sp	r	sp	r	.	.	sp	100-700	+	+	+
Eurhynchium Bruch et al.													
angustirete (Broth.) T.J.Kop.	r	sp	.	.	.	.	.	.	.	200-800	.	+	.
Fabronia Raddi													
ciliaris (Brid.) Brid. (70)	.	.	u	.	.	.	.	.	.	220	.	+	.
Fissidens Hedw.													
adianthoides Hedw. (71)	sp	.	r	.	r	u	.	.	[u]	100-1100	+	+	+
bryoides Hedw.	sp	sp	sp	r	sp	sp	.	.	r	100-1300	+	+	+
exilis Hedw. (72)	r	r	.	u	.	.	.	.		300-800	.	+	+
osmundoides Hedw. (73)	r	.	u	.	.	.	.	.	r	100-1200	+	+	.
taxifolius Hedw. (74)	r	sp	r	r	.	[r]	.	.		100-800	.	+	+
viridulus (Sw.) Wahlenb. (75)	.	.	.	.	[u]	.	.	.	[u]		.	.	.
Fontinalis Hedw.													
antipyretica Hedw.	sp	sp	c	r	sp	sp	.	.	r	100-900	+	+	.
hypnoides Hartm. (76)	.	r	r	.	.	[r]	.	.		100-600	.	+	+
Funaria Hedw.													
hygrometrica Hedw.	r	r	c	r	sp	sp	sp	sp	sp	100-600	+	+	+
Grimmia Hedw.													
alpestris (F.Weber & D.Mohr) Schleich.	r	.	.	.	.	.	.	.	.	800-1700	.	+	.
anodon Bruch et al. (77)		u		u		.	.	.	.	300-400	.	+	.
anomala Hampe ex Schimp.	r	.	.	.	.	.	.	.	.	900-1100	.	+	.
caespiticia (Brid.) Jur.	r	.	.	.	.	.	.	.	.	1200-1300	.	+	.
elatior Bruch ex Bals.-Criv. & De Not.	r	r	r	.	.	.	.	.	.	250-1000	.	+	.
funalis (Schwägr.) Bruch et al. (78)	.	u	.	.	.	.	.	.	.	1300	.	+	.
incurva Schwägr.	r	.	.	.	.	.	.	.	.	1200-1800	.	+	.
laevigata (Brid.) Brid.	.	.	r	.	r	.	.	.	.	300-400	.	+	+
longirostris Hook.	c	sp	sp	r	r	.	.	.	.	100-1700	.	+	.
muehlenbeckii Schimp.	r	r	.	.	.	.	.	.	.	300-1000	.	+	.
pulvinata (Hedw.) Sm. (79)		[u]	.	.	.	.	.	.	.		.	+	.
reflexidens Müll.Hal.	sp	sp	.	.	.	.	.	.	.	300-1400	.	+	.
teretinervis Limpr.	.	r	.	.	.	.	.	.	.	300-350	.	+	.
tergestina Tomm. ex Bruch et al. (80)	.	.	.	.	u	.	.	.	.	100	.	+	.
unicolor Hook. (81)	u	.	.	.		.	.	.	.	1100	.	+	.

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Gymnostomum Nees & Hornsch.													
aeruginosum Sm. (82)	r	r	r	r	u	.	.	.	.	100-800	+	+	.
Hamatocaulis Hedenäs													
lapponicus (Norrl.) Hedenäs	.	.	.	.	.	.	.	.	r	120	+	.	.
vernicosus (Mitt.) Hedenäs (83)	[u]		r		r	u			c	100-800	+	+	+
Haplocladium (Müll.Hal.) Müll.Hal.													
angustifolium (Hampe & Müll.Hal.) Broth. (84)	u	.	.	.	.	.	.	.	.	900	.	+	.
microphyllum (Hedw.) Broth.	.	r	r	sp	sp	sp	r	sp	sp	100-400	+	+	+
Hedwigia P.Beauv.													
ciliata (Hedw.) P.Beauv.	r	sp	sp	r	r	u	.	.	.	100-1200	+	+	+
Helodium Warnst.													
blandowii (F.Weber & D.Mohr) Warnst. (85)	r	r	sp	sp	sp	r	u	r	sp	100-600	+	+	+
Herzogiella Broth.													
striatella (Brid.) Z.Iwats. (86)	u	.	.	.	.	.	.	.	.	940	.	+	.
turfacea (Lindb.) Z.Iwats. (87)		[u]	u		u	.	.	.	r	100-400	+	+	.
Heterocladium Bruch et al.													
dimorphum (Brid.) Bruch et al. (88)	.	.	.	.	[r]	.	.	.	.		.	.	.
Homalia Brid.													
trichomanoides (Hedw.) Bruch et al. (89)	r	sp	sp	r	r	u	.	.	r	100-800	+	+	+
Homomallium (Schimp.) Loeske													
incurvatum (Schrad. ex Brid.) Loeske	.	r	sp	.	r	.	.	.	.	100-600	+	+	+
Hygroamblystegium Loeske													
humile (P.Beauv.) Vanderp., Goffinet & Hedenäs (90)	[u]	.	r	r	sp	r	sp	r	r	100-600	+	+	+
tenax (Hedw.) Jenn. (91)	.	.	.	.	[u]	.	.	.	.		.	.	.
varium (Hedw.) Moenk.	r	r	sp	r	r	sp	.	.	r	100-800	+	+	+
Hygrohypnella Ignatov & Ignatova													
ochracea (Turner ex Wilson) Ignatov & Ignatova	sp	sp	r	.	.	.	.	.	.	300-1400	+	+	.
Hygrohypnum Lindb.													
luridum (Hedw.) Jenn.	sp	r	sp	.	r	r	.	.	.	100-800	+	+	.
Hylocomiastrum Broth.													
pyrenaicum (Spruce) M.Fleisch.	c	sp	.	.	.	.	.	.	.	650-1500	.	+	.
umbratum (Hedw.) M.Fleisch.	sp	r	.	.	.	.	.	.	.	400-1200	.	+	.
Hylocomium Bruch et al.													
splendens (Hedw.) Bruch et al.	c	c	c	r	sp	sp	r	r	sp	100-1500	+	+	+
Hymenoloma Ochyra													
crispulum (Hedw.) Ochyra	c	sp	.	.	.	.	.	.	.	900-1800	.	+	.
Hypnum Hedw.													
cupressiforme Hedw. (92)	sp	sp	r	.	.	[u]	[u]		[u]	200-1200	.	+	+
Isopterygiopsis Z.Iwats.													
alpicola (Lindb. & Arnell) Hedenaes (93)	u	.	.	.	.	.	.	.	.	1240	.	+	.
muelleriana (Schimp.) Z.Iwats. (94)	u	.	.	.	.	.	.	.	.	1240	.	+	.
pulchella (Hedw.) Iwats. (95)	sp	r	r	.	.	[u]	.	.	r	100-1800	+	+	+
Iwatsukiella W.R.Buck & H.A.Crum													
leucotricha (Mitt.) R.W.Buck & H.A.Crum (96)	r	u	.	.	.	.	.	.	.	500-1100	.	+	.
Jaffueliobryum Thér.													
latifolium (Lindb. & Arnell) Ther. (97)	.	.	r	r	r		u	.	.	100-400	+	+	+
Kiaeria I.Hagen													
blyttii (Bruch et al.) Broth.	r	.	.	.	.	.	.	.	.	1000-1500	.	+	.
falcata (Hedw.) I.Hagen	r	.	.	.	.	.	.	.	.	1100-1250	.	+	.
starkei (F.Weber & D.Mohr) I.Hagen	sp	.	.	.	.	.	.	.	.	1100-1500	.	+	.
Leptobryum (Bruch et al.) Wilson													
pyriforme (Hedw.) Wils.	.	.	sp	r	sp	sp	r	sp	sp	100-400	+	+	+
Leptodictyum (Schimp.) Warnst.													
riparium (Hedw.) Warnst.	r	r	c	sp	sp	sp	r	r	r	100-400	+	+	+
Lescuraea Bruch et al.													
incurvata (Hedw.) E.Lawton (98)	c	r	.	.	.	.	.	.	[u]	480-1400	.	+	.
patens Lindb.	r	r	u	.	.	.	.	.	.	250-1250	.	+	.
saxicola (Bruch et al.) Molendo	c	sp	.	.	.	.	.	.	.	300-1800	.	+	.
secunda Arnell	r	.	.	.	.	.	.	.	.	1000-1100	.	+	.

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Leskea Hedw.													
polycarpa Hedw.	r	r	sp	sp	c	c	r		sp	100-500	+	+	+
Leucodon Schwägr.													
sciuroides (Hedw.) Schwägr. (99)	r	sp		u	u	.	.	.	.	100-600	+	+	.
Meesia Hedw.													
longiseta Hedw.	.	.	.	.	.	.	.	.	r	150	+	.	.
triquetra (Jolycl.) Angstr. (100)	[u]	.	r	.	u	u	.	.	sp	150-900	+	+	+
uliginosa Hedw. (101)	u	.	.	.	.	.	.	.	r	150-1100	+	+	.
Microbryum Schimp.													
curvicollum (Hedw.) R.H.Zander (102)	.	.	.	.	.	u	.	.	.	250	.	.	+
Mnium Hedw.													
lycopodioides Schwägr.	sp	sp	r	.	.	.	.	.	.	250-1500	+	+	.
marginatum (Dicks.) P.Beauv.	r	r	r	r	r	.	.	.		100-600	+	+	+
spinosum (Voit) Schwägr.	c	r	r	r	r	.	.	.	r	150-1200	+	+	.
spinulosum Bruch et al. (103)	r	[u]	.	.	u	.	.	.		150-1800	+	+	.
stellare Hedw.	sp	c	c	sp	sp	sp		r	sp	100-1300	+	+	+
thomsonii Schimp.	r	.	.	.	.	.	.	.	.	500-800	.	+	.
Myrinia Schimp.													
pulvinata (Wahlenb.) Schimp.	r	.	.	r	r	.	.	.	r	100-600	+	+	.
Myurella Bruch et al.													
julacea (Schwägr.) Bruch et al. (104)	u	r	.	.	r	.	.	.	r	120-750	+	+	+
sibirica (Müll.Hal.) Reimers	r	sp	r	r	r	.	.	.	.	100-800	+	+	
tenerrima (Brid.) Lindb. (105)	u	.	.	.	u	.	.	.	.	200, 750	.	+	.
Myuroclada Besch.													
maximowiczii (G.G.Borshch.) Steere & W.B.Schofield	r	sp	r	r	r	.	.	.	.	100-600	+	+	+
Neckera Hedw.													
pennata Hedw.	r	r	r	.	r	.	.	.	r	100-600	+	+	+
Niphotrichum (Bednarek-Ochyra) Bednarek-Ochyra & Ochyra													
canescens (Hedw.) Bednarek-Ochyra & Ochyra (106)	c	sp	.	.	[u]	.	.	.	.	100-1550	.	+	.
Ochyraea Váňa													
duriuscula (De Not.) Ignatov & Ignatova	sp	sp	r	.	.	.	.	.	.	300-1100	.	+	.
Oligotrichum DC.													
hercynicum (Hedw.) Lam. & DC.	r	.	.	.	.	.	.	.	.	1100-1700	.	+	.
Oncophorus (Brid.) Brid.													
virens (Hedw.) Brid. (107)	r	r	.	.	.	.	.	.	[u]	600-1300	.	+	.
wahlenbergii Brid.	sp	sp	sp	sp	sp	sp	r	sp	sp	100-1300	+	+	+
Orthothecium Bruch et al.													
intricatum (Hartm.) Bruch et al. (108)	u	.	.	.	.	.	.	.	.	750	.	+	.
Orthotrichum Hedw.													
alpestre Hornsch. ex Bruch et al. (109)	.	.	u	.	.	.	.	.	.	270	+	.	.
anomalum Hedw.	r	sp	sp	r	r	.	.	.	.	100-1100	+	+	+
cupulatum Brid.	r		r			.	.	.	.	200-750	+	+	.
obtusifolium Brid.	r	sp	c	c	sp	c	r	sp	sp	100-950	+	+	+
pallens Bruch ex Brid. (110)	.	.	u	.	.	.	.	.	.	200	.	.	+
pellucidum Lindb. (111)	.	.	u	.	.	.	.	.	.	200	+	.	.
rupestre Schleich. ex Schwägr. (112)	.	[u]	u	.	.	.	.	.	.	300	+	+	.
speciosum Nees	sp	sp	c	c	c	sp	r		sp	100-900	+	+	+
Oxyrrhynchium (Schimp.) Warnst.													
hians (Hedw.) Loeske (113)	sp	sp	sp	sp	sp	[r]	.	.	.	150 1100	+	+	+
Oxystegus (Lindb. ex Limpr.) Hilp.													
tenuirostris (Hook. & Tayl.) A.J.E.Sm.	sp	r	r	.	.	.	.	.	.	200-1400	+	+	.
Paludella Brid.													
squarrosa (Hedw.) Brid. (114)	r	.	r	.	u	u	.	.	.	150-900	+	+	+
Palustriella Ochyra													
commutata (Hedw.) Ochyra (115)	r	.	.	.	[u]	.	.	.	.	150-1000	.	+	.
decipiens (De Not.) Ochyra	sp	.	.	.	.	.	.	.	.	560-1100		+	
falcata (Brid.) Hedenäs (116)	.	.	u	.	.	.	.	.	.	200	.	+	.
Paraleucobryum (Limpr.) Loeske													
enerve (Thed.) Loeske (117)	u	.	.	.	.	.	.	.	.	1600	.	+	.
longifolium (Hedw.) Loeske (118)	c	sp	r		u	.	.	.	.	200-1800	+	+	.

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Philonotis Brid. (119)													
caespitosa Jur.	r	.	.	.	.	.	.	.	.	700-900	.	+	.
fontana (Hedw.) Brid. (120)	sp		u	.	.	[u]	.	.	.	200-1250	+	+	+
seriata Mitt.	r	.	.	.	.	.	.	.	.	900-1200	.	+	.
Physcomitrella Bruch et al.													
patens (Hedw.) Bruch et al. (121)	.	.	.	.	u	[r]	.	u		100-500	+	.	+
Physcomitrium (Brid.) Brid.													
eurystomum Sendtn. (122)	.	.	.	.	.	[u]	.	.	.		.	.	+
pyriforme (Hedw.) Hampe (123)	.	.	r	r	u	[u]	.	.	.	250-400	+	+	+
Plagiomnium T.J.Kop.													
affine (Bland.) T.J.Kop. (124)		u	.	.	.	.	.	.	.	600	.	+	.
confertidens (Lindb. & Arnell) T.J.Kop. (125)	r	sp	r	r	r	[u]	.	.	r	100-800	+	+	+
cuspidatum (Hedw.) T.J.Kop.	c	c	w	w	w	c	r	c	c	100-1000	+	+	+
drummondii (Bruch & Schimp.) T.J.Kop. (126)	r	r	sp	r	[u]	[r]	.	.	r	100-1000	+	+	+
ellipticum (Brid.) T.J.Kop.	c	c	w	c	w	sp	r	r	c	100-1000	+	+	+
medium (Bruch et al.) T.J.Kop.	sp	r	c	sp	r	r	.	.	r	100-1200	+	+	+
rostratum (Schrad.) T.J.Kop. (127)	r	r	2	r	r	r	r		[r]	100-750	+	+	+
Plagiopus Brid.													
oederianus (Sw.) H.A.Crum & L.E.Anderson (128)	r	r	r	.	u	.	.	.	.	100-750	+	+	+
Plagiothecium Bruch et al.													
cavifolium (Brid.) Z.Iwats. (129)	sp	sp	r	.	u	.	.	.	.	200-1000	.	+	+
denticulatum (Hedw.) Bruch et al.	c	c	w	c	sp	sp	r	sp	sp	100-1800	+	+	+
laetum Bruch et al. (130)	sp	sp	sp	r	sp	[u]	r	r	r	100-1200	+	+	+
latebricola Bruch et al. (131)	.	.	r	.	u	.	.	.	r	100-250	+	+	+
Platydictya Berk.													
jungermannioides (Brid.) H.A.Crum (132)	u	[u]	.	.	.	.	.	.	[r]	100, 750	+	+	
Platygyrium Bruch et al.													
repens (Brid.) Bruch et al.	r	sp	c	c	c	sp	sp	sp	c	100-650	+	+	+
Pleuridium Rabenh.													
subulatum (Hedw.) Rabenh. (133)	.	.	.	.	u	.	u	.	.	100-300	+		+
Pleurozium Mitt.													
schreberi (Brid.) Mitt.	c	c	w	c	c	sp	r	sp	c	100-1550	+	+	+
Podperaea Z.Iwats. & Glime													
krylovii (Podp.) Z.Iwats. & Glime (134)	.	.	u	.	.	.	.	.	.	270	+	.	.
Pogonatum P.Beauv.													
dentatum (Brid.) Brid.	c	.	.	.	.	.	.	.	.	500-1800	.	+	
urnigerum (Hedw.) P.Beauv. (135)	sp	sp	r	.	[u]	.	.	.	u	100-1800	+	+	+
Pohlia Hedw.													
annotina (Hedw.) Lindb. (136)	.	[u]	.	.	.	[u]	.	.	.		.	+	+
cruda (Hedw.) Lindb.	cm	sp	sp	r	sp	r	.	.	.	100-1700	+	+	+
drummondii (Müll.Hal.) A.L.Andrews	sp	r	.	.		.	.	.	.	900-1700		+	
elongata Hedw. (137)	.	.	.	.	u	.	.	.	.	200	.	+	.
longicollis (Hedw.) Lindb. (138)	u	u	.	.		.	.	.	.	550-600	.	+	.
melanodon (Brid.) A.J.Shaw (139)	.	r	.	r	[u]	[u]	r	.	.	100-200	.	+	+
nutans (Hedw.) Lindb.	c	c	w	c	c	c	sp	c	c	100-1500	+	+	+
obtusifolia (Vill. ex Brid.) L.F.Koch (140)	u	.	.	.	.	.	.	.	.	1100	.	+	.
proligera (Kindb.) Lindb. ex Broth.	r	.	r	.	r	.	.	.	.	100-350	+	+	
sphagnicola (Bruch et al.) Broth. (141)	[u]	.	.	.	[u]	.	.	.	[r]	[100-900]	+	+	
wahlenbergii (F.Weber & D.Mohr) A.L.Andrews	sp	sp	sp	sp	sp	sp	.	.	.	100-1300	+	+	+
Polytrichastrum G.L.Sm.													
alpinum (Hedw.) G.L.Sm. (142)	sp	r	u	.	.	.	.	.	.	250-1800	.	+	+
formosum (Hedw.) G.L.Sm. (143)	sp	sp	.	.	.	[r]	[u]	.		400-1200	.	+	+
longisetum (Sw. ex Brid.) G.L.Sm. (144)	c	sp	u	u	.	r	.	.		120-1500	+	+	+
pallidisetum (Funck) G.L.Sm. (145)	u	.	.	.	.	.	.	.	.	550	.	+	.
sexangulare (Florke ex Brid.) G.L.Sm.	sp	.	.	.	.	.	.	.	.	1100-1700	.	+	.
Polytrichum Hedw.													
commune Hedw. (146)	c	sp	sp	r	r	sp	r	[u]	r	180-1800	+	+	+
juniperinum Hedw.	c	sp	c	r	sp	sp	r	sp	sp	100-1500	+	+	+
piliferum Hedw.	c	sp	c	r	sp	sp	sp		sp	100-1800	+	+	+
strictum Brid. (147)	sp	r	sp		r	r	[u]	sp	c	100-1400	+	+	+

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Pseudephemerum (Lindb.) I.Hagen													
nitidum (Hedw.) Loeske (148)	u	.	.	.	.	.	.	.	.	950	.	+	.
Pseudobryum (Kindb.) T.J.Kop.													
cinclidioides (Huebener) T.J.Kop.	sp	.	sp	r	r	.	.	.	r	140-1100	+	+	+
Pseudocalliergon (Limpr.) Loeske													
lycopodioides (Brid.) Hedenäs	.	.	.	.	.	r	.	.	r	100-200	+	.	+
trifarium (F.Weber & D.Mohr) Loeske (149)	[u]	.	u	.	.	.	.	.	r	150-1200	+	+	.
Pseudoleskeella Kindb.													
catenulata (Brid. ex Schrad.) Kindb.	r	r	r	.	.	.	.	.	.	300-1100	+	+	+
nervosa (Brid.) Nyholm (150)	sp	sp	c	r	u	[u]	.	.	.	100-12500	+	+	+
papillosa (Lindb.) Kindb. (151)	r	.	u	.	.	.	.	.	.	900-1150	+	+	.
rupestris (Berggr.) Hedenäs & L.Söderstr. (152)	r	.	u	.	.	.	.	.	.	250-1100	+	+	.
tectorum (Funck ex Brid.) Kindb. ex Broth.	r	r	sp	r	r	.	.	.	.	100-1100	+	+	+
Pterigynandrum Hedw.													
filiforme Hedw. (153)	sp	r	u	.	.	.	.	.	.	300-1200	.	+	+
Pterygoneurum Jur.													
kozlovii Laz.	.	.	.	.	.	r	sp	.	.	100-250	.	.	+
ovatum (Hedw.) Dixon	.	.	.	r	r	r	r	.	.	100-400	.	+	+
subsessile (Brid.) Jur. (154)	.	.	u	u	r	r	sp	.	.	100-400	+	+	+
Ptilium De Not.													
crista-castrensis (Hedw.) De Not.	sp	sp	w	sp	sp	sp	r	r	sp	100-1550	+	+	+
Pylaisia Bruch et al.													
polyantha (Hedw.) Bruch et al.	sp	c	w	w	w	c	sp	sp	c	100-1000	+	+	+
selwynii Kindb.	r	sp	sp	sp	sp	r		r	sp	100-650	+	+	+
Rhabdoweisia Bruch et al.													
crispata (Dicks. ex With.) Lindb.	r	.	.	.	.	.	.	.	.	570-940	.	+	.
Rhizomnium (Broth.) T.J.Kop.													
andrewsianum (Steere) T.J.Kop. (155)	.	u	.	.	.	.	.	.	.	410	.	+	.
magnifolium (Horik.) T.J.Kop.	sp	sp	.	.	.	.	.	.	.	400-1200	.	+	.
pseudopunctatum (Bruch & Schimp.) T.J.Kop.	r	r	sp	r	sp	.	.	.	sp	100-1400	+	+	+
punctatum (Hedw.) T.J.Kop. (156)	sp	sp	r	r	[u]	u	.	.	r	100-1200	+	+	.
Rhodobryum (Schimp.) Limpr.													
ontariense (Kindb.) Kindb. (157)	.	r	.	u	u	.	.	.		200-600	.	+	.
roseum (Hedw.) Limpr.	c	c	c	sp	r	r	.	.	r	100-1100	+	+	
Rhynchostegium Bruch et al.													
arcticum (I.Hagen) Ignatov & Huttunen	r	r	.	.	.	.	.	.	.	360-1300	.	+	.
rotundifolium (Scop. ex Brid.) Bruch et al. (158)	u	u	.	.	.	.	.	.	.	500-750	.	+	.
Rhytidiadelphus (Limpr.) Warnst.													
subpinnatus (Lindb.) T.J.Kop. (159)	c	c	r	r	[u]	u	.	.	.	140-1200	+	+	+
triquetrus (Hedw.) Warnst.	sp	c	c	sp	sp	sp	r	.	sp	100-1100	+	+	+
Rhytidium (Sull.) Kindb.													
rugosum (Hedw.) Kindb. (160)	sp	sp	c	sp	r	[u]	.	.	u	150-1500	+	+	+
Saelania Lindb.													
glaucescens (Hedw.) Broth.	sp	r	sp	.	r	r	.	.	r	100-800	+	+	+
Sanionia Loeske													
uncinata (Hedw.) Loeske	w	c	w	w	w	sp	r	sp	w	100-1800	+	+	+
Schistidium Bruch et al. (161)													
apocarpum (Hedw.) Bruch et al. (162)	.	.	.	.	.	[u]	.	.	.				+
boreale Poelt	.	.	r	.	.	.	.	.	.		.	+	.
crenatum H.H.Blom	.	.	u	.	.	.	.	.	.		+	.	.
dupretii (Ther.) W.A.Weber	r	.	u	.	u	.	.	.	.		+	+	.
lancifolium (Kindb.) H.H.Blom	.	.	r	.	r	r	.	.	.		+	.	.
obscurum H.H.Blom, Koeckinger & Ignatova (163)	.	u	.	.	.	.	.	.	.	315	.	+	.
papillosum Culm.	r	r	.	.	.	.	.	.	.	300-1000	.	+	.
platyphyllum (Mitt.) Perss. (164)	.	.	.	.	u		.	.	.	110	.	+	.
pulchrum H.H.Blom	r	r	r	r	r	r	.	.	.		+	+	.
rivulare (Brid.) Podp. (165)	r	.	sp	.	[u]	.	.	.	.		.	+	.
sibiricum Ignatova & H.H.Blom (166)	.	.	u	.	.	.	.	.	.	270	+	.	.
sinensiapocarpum (Müll.Hal.) Ochyra (167)	.	.	u	.	.	.	.	.	.	270	+	.	.
submuticum Broth. ex H.H.Blom (168)	r	.	r	.	u	.	.	.	.	150-400	+	+	.
tenuinerve Ignatova & H.H.Blom (169)	.	.	.	u	.	.	.	.	.	100	.	+	.

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Schistostega D.Mohr													
pennata (Hedw.) F.Weber & D.Mohr (170)	r	r	u	u	.	.	.	.	.	300-1000	+	+	.
Sciuro-hypnum (Hampe) Hampe													
altaicum (Ignatov) Ignatov	sp	.	r	r	.	r	.	.	.	200-700	+	+	+
curtum (Lindb.) Ignatov	sp	sp	sp	sp	c	sp	r	r	r	100-1000	+	+	+
ornellanum (Molendo) Ignatov & Huttunen	sp	.	.	.	.	.	.	.	.	350-1100	.	+	.
plumosum (Hedw.) Ignatov & Huttunen (171)	r	.	.	.	.	.	[u]	.	.	1050-1200	.	+	+
populeum (Hedw.) Ignatov & Huttunen	sp	sp	r	r	.	r	.	.	.	200-1200	+	+	
reflexum (Starke) Ignatov & Huttunen	c	c	w	c	c	sp	.	r	sp	100-1250	+	+	+
starkei (Brid.) Ignatov & Huttunen	r	r	r	r	r	r	.	.	r	100-1300	+	+	+
Scorpidium (Schimp.) Limpr.													
cossonii (Schimp.) Hedenäs (172)	[u]	.	u	.	.	.	.	.	.	200, 900	.	+	.
revolvens (Sw. ex anon.) Rubers (173)	[r]	.	.	.	.	.	.	.	.	900	.	+	.
scorpioides (Hedw.) Limpr.	.	.	r	.	.	.	.	.	sp	150-200	+	+	.
Seligeria Bruch et al.													
brevifolia (Lindb.) Lindb. (174)	u	.	.	.	.	.	.	.	.	750	.	+	.
campylopoda Kindb. (175)	.	.	.	.	[u]	.	.	.	.		.	.	.
donniana (Sm.) Müll.Hal. (176)	.	[u]	r	.	.	.	.	.	.		.	+	.
pusilla (Hedw.) Bruch et al. (177)	u	[u]	.	.	.	.	.	.	.	750	.	+	.
tristichoides Kindb. (178)	u	[u]	.	.	.	.	.	.	.	750	.	+	.
Serpoleskea (Limpr.) Loeske													
confervoides (Brid.) Loeske	sp	sp	r	.	.	.	.	.	.	300-1200	+	+	+
subtilis (Hedw.) Loeske (179)	.	r	sp	r	r	r	[u]	.	r	100-650	+	+	+
Sphagnum L.													
angustifolium (C.E.O.Jensen ex Russow) C.E.O.Jensen	sp	r	.	.	r	r	.	r	c	100-1200	+	+	.
aongstroemii Hartm. (180)	[r]	.	.	.	.	.	.	.	.	[900]	.	+	.
balticum (Russow) C.E.O.Jensen (181)	[r]	.	.	.	[u]	u	.	.	c	100-900	+	+	.
capillifolium (Ehrh.) Hedw.	sp	r	r	r	r	r	.	r	sp	100-1400	+	+	.
centrale C.E.O.Jensen (182)	[r]	r	r	r	r	r	[u]	r	c	100-1200	+	+	+
compactum Lam. & DC. (183)	sp	.	.	.	[u]	.	.	.	r	150-900	+	+	.
contortum Schultz (184)	[u]	.	r	.	.	u	.	.	sp	150-900	+	+	+
cuspidatum Ehrh. ex Hoffm. (185)	.	.	.	.	.	.	.	.	u	130	+	.	.
fallax (H.Klinggr.) H.Klinggr. (186)	sp	.	.	.	r	r	[u]	r	r	100-900	+	+	+
fimbriatum Wilson (187)	.	.	.	u	r	r	.	r	r	100-250	+	+	.
flexuosum Dozy & Molk. (188)	sp	.	r	.	[u]	r	.	.	sp	150-1400	+	+	.
fuscum (Schimp.) H.Klinggr.	c	.	sp	.	r	r	.	r	c	100-1400	+	+	+
girgensohnii Russow (189)	r	r	.	r	r	[u]	[u]	r	r	100-1200	+	+	+
inundatum Russow (190)	.	.	u	.	.	.	.	.	.		+	.	.
jensenii H. Lindb. (191)	sp	r	u	.	.	.	.	.	sp	100-1200	+	+	.
lindbergii Schimp. ex Lindb.	.	.	.	.	.	.	.	.	sp	150	+	.	.
magellanicum Brid.	c	.	r	.	r	r	.	r	c	100-900	+	+	+
majus (Russow) C.E.O.Jensen (192)	[r]	.	u	.	[u]	.	.	.	sp	150, 900	+	+	.
obtusum Warnst. (193)	[u]	.	.	.		.	.	.	sp	150-900	+	+	.
palustre L. (194)	[u]	.	u	.	[u]	.	.	.	r	150-900	+	+	.
papillosum Lindb.	sp	.	.	.	.	.	.	.	sp	150-900	+	+	.
platyphyllum (Lindb. ex Braithw.) Warnst. (195)	.	.	.	.	.	r	.	.	.	150	.	.	+
pulchrum (Lindb. ex Braithw.) Warnst. (196)	[u]	.	.	.	.		.	.	u	150, 800	+	+	.
riparium Angstr. (197)	r	.	.	.	[u]	u	.	.	r	150-250	+	+	+
rubellum Wilson (198)	r	.	.	.	.	.	.	[u]	sp	100-1400	+	+	.
russowii Warnst.	sp	r	r	r	r	r	.	r	sp	100-1400	+	+	+
squarrosum Crome (199)	sp	r	sp	r	r	r	u	r	sp	150-750	+	+	+
subfulvum Sjoers (200)	.	.	.	.	.	.	.	.	[u]	130	+	.	.
subnitens Russow & Warnst. (201)	[u]	.	.	.	.	.	.	.	.	900	.	+	.
subsecundum Nees	sp	.	.	.	.	r	.	.	sp	150-1200	+	+	.
tenellum (Brid.) Pers. ex Brid. (202)	[u]	.	.	.	.	.	.	.	.	900	.	+	.
teres (Schimp.) Angstr. (203)	[r]	.	.	u	.	r	u	r	sp	100-1100	+	+	+
warnstorfii Russow	sp	sp	sp	r	sp	r	.	r	c	100-1200	+	+	+
wulfianum Girg. (204)	u	.	.	.	[u]	.	.	.	r	150-250	+	+	.
Splachnum Hedw.													
ampullaceum Hedw. (205)	.	.	.	.	.	.	.	.	u	150	+	.	.

Species	KA	SM	SR	KD	TR	UO	KS	BS	VP	*alt*	*No*	*Ke*	*Al*
Stereodon (Brid.) Mitt.													
pallescens (Hedw.) Mitt.	r	r	c	c	c	sp	sp	sp	sp	100-1100	+	+	+
plicatulus Lindb.	sp	r	.	.	.	.	.	.	.	550-1700	.	+	.
vaucheri (Lesq.) Lindb. ex Broth.	.	r	r	r	r	.	.	.	.	130-600	+	+	+
Straminergon Hedenäs													
stramineum (Dicks. ex Brid.) Hedenäs (206)	c	sp	.	.	[u]	.	.	.	sp	100-1700	+	+	.
Syntrichia Brid.													
norvegica F.Weber	sp	.	.	.	.	.	.	.	.	750-1200	.	+	
ruralis (Hedw.) F.Weber & D.Mohr (207)	r	r	sp	sp	r	r	sp	.	u	100-1300	+	+	+
Taxiphyllum M.Fleisch.													
wissgrillii (Garov.) Wijk & Margad.	r	r	r	.	.	.	.	.	.	250-450	+	+	.
Tayloria Hook.													
lingulata (Dicks.) Lindb. (208)	u	.	.	.	.	.	.	.	.	800	.	+	.
Tetraphis Hedw.													
pellucida Hedw. (209)	sp	sp	c	r	sp	r	[u]	sp	sp	100-1000	+	+	+
Tetraplodon Bruch et al.													
mnioides (Hedw.) Bruch et al.	r	.	.	.	.	.	.	.	.	1200-1400	.	+	.
Thamnobryum Nieuwl.													
neckeroides (Hook.) E.Lawton (210)	c	sp	r	.	u	.	.	.	.	200-1250	+	+	.
Thuidium Bruch et al.													
assimile (Mitt.) A.Jaeger	r	sp	r	r	r	r	.	.	r	100-600	+	+	+
recognitum (Hedw.) Lindb.	.	.	sp	r	sp	r	.	.	sp	100-350	+	+	+
Timmia Hedw.													
bavarica Hessl. (211)	.	.	r	.	.	[u]	.	.	.	200	+	.	+
comata Lindb. et H.Arnell (212)	u	r	u	.	[u]	.	.	.	.	250-750	.	+	.
megapolitana Hedw.	.	r	sp	sp	sp	sp	.	r	sp	150-400	+	+	+
Tomentypnum Loeske													
nitens (Hedw.) Loeske (213)	[u]	.	sp	r	r	r	.	.	sp	100-750	+	+	+
Tortella (Müll.Hal.) Limpr.													
alpicola Dixon (214)	.	r	u	.	.	.	.	.		300-550	.	+	.
fragilis (Hook. & Wils.) Limpr. (215)	.	r	r	r	.	.	.	.	[u]	200-450	.	+	+
inclinata (R.Hedw.) Limpr. (216)	.	.	.	u	.	.	.	.	.	370	.	+	.
tortuosa (Hedw.) Limpr.	sp	sp	sp	r	.	.	.	.	.	250-1400	+	+	+
Tortula Hedw.													
acaulon (With.) R.H.Zander (217)	.	.	r	.	u	[u]	r	.	.	100-300	+	+	+
hoppeana (Schultz) Ochyra	r	.	.	.		.	.	.	.	1000-1400	.	+	.
modica R.H.Zander	.	.	.	.	r	.	.	.	.	100-200	+	.	.
mucronifolia Schwägr.	.	.	r	.	r	r	.	.	.	100-250	+	+	+
muralis Hedw. (218)	.	u	u	.	.	.	u	.	.	100-600	+	+	+
obtusifolia (Schwägr.) Mathieu (219)	.	[u]	.	.	.	.	.	.	.	300	.	+	.
truncata (Hedw.) Mitt.	.	.	.	.	r	.	.	.	.	100-200	+	.	.
Trachycystis T.J.Kop.													
ussuriensis (Maack & Regel) T.J.Kop. (220)	.	u	.	.	.	.	.	.	.	400	.	+	.
Trichostomum Bruch													
crispulum Bruch (221)	.	u	.	.	.	.	.	.	.	300	.	+	.
Ulota D.Mohr													
rehmannii Jur. (222)	r	u	.	.	.	.	.	.	.	500-950	.	+	.
Warnstorfia Loeske													
exannulata (Bruch et al.) Loeske (223)	sp	r	sp		[u]	[u]	.	.	sp	100-1400	+	+	+
fluitans (Hedw.) Loeske (224)	sp	.	.	.	r	[u]	r		sp	150-800	+	+	+
pseudostraminea (Müll.Hal.) Tuom. & T.J.Kop.	.	.	.	.	.	.	.	r	r		+		
Weissia Hedw.													
brachycarpa (Nees & Hornsch.) Jur. (225)	r	.	.	.	r	[u]	u	.	.	100-1150	+	+	+
controversa Hedw. (226)	r	[u]		r	[u]	r	.	.	.	350-1100		+	
longifolia Mitt. (227)	.	.	.	.	u	.	.	.	.	300	+	.	.
Zygodon Hook. & Taylor													
sibiricus Ignatov, Ignatova, Z.Iwats. & B.C.Tan (228)	.	r	.	.	.	.	.	.	u	100-400	+	+	.
Total number of species in regions	**302**	**232**	**235**	**148**	**233**	**170**	**82**	**65**	**169**				

COMMENTS

For species with a single record within relevant geographic regions, locations and dates of collection by the author are given. In case the location was published in Arctoa, only bibliography is cited.

1. *Abietinella abietina* – **KS:** Ust'-Kormikha, 28.VI.2010. **VP:** Kishtovka, 10.VII.2009.
2. *Acaulon triquetrum* – **UO:** (Pisarenko, 2012a).
3. *Aloina brevirostris* – **SR:** Aprel'ka (Pisarenko, 2007a). **TR:** Tomsk (Muldiyarov et al., 2013).
4. *Amblystegium radicale* – **KA:** Akchelbak creek (Muldiyarov & Lapshina, 1996).
5. *Amphidium mougeotii* – **KA:** Rastai River, 30.VI.2005.
6. *Anacamptodon latidens* – **KA:** (Pisarenko, 2004).
7. *Anomodon attenuatus* – **TR:** (Pisarenko, 2007a).
8. *A. longifolius* – **TR:** Izdrevaja River, 30.V.2008. **UO:** Chaschino, 11.VI.2011.
9. *A. viticulosus* – **TR:** Bugotak River, 26.IV.2009. **UO:** Chaschino, 11.VI.2011.
10. *Atrichum tenellum* – from literature data only. **SM:** Kuzedeevo (Gudoshnikov, 1986). **TR:** (Lapshina & Muldiyarov, 1998).
11. *A. undulatum* – **UO:** Acutikha, 14.VII.2007. Well developed plants with sporophytes often occur as admixture to *A. flavisetum*.
12. *Barbula convoluta* – from literature data only. **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Kolyvan' (Dyachenko, Taran, 2012).
13. *Bartramia pomiformis* – **SR:** Egorievsk, 13.VIII.1990. **TR:** Mariinsk, 8.VI.2007.
14. *Brachytheciastrum velutinum* – **UO:** Ovechkino, Kontoshino, Rasskaziha, Sosnovka, Barnaul (Nozhinkov, 2004, 2006), and Bistry Istok (Nozhinkov & Taran, 2008).
15. *Brachythecium* is treated according to Ignatov & Milyutina (2010), Ignatov (2012).
16. *Brachythecium albicans* – **SM: SM:** Kuzedeevo (Gudoshnikov, 1986). **SR:** Kotorovo (Gudoshnikov, 1986).
17. *B. baicalense* – **SR:** Apanas, 8.VI.2008. **UO:** Erestnaja, 9.IX.2011. Identified by M.S. Ignatov.
18. *B. campestre* – **SM: SM:** Kuzedeevo (Gudoshnikov, 1986).
19. *B. complanatum* – **SM: SM:** (Pisarenko, 2013).
20. *B. erythrorrhizon* – **VP:** vicinity of Igol (Lapshina & Muldiyarov, 1998).
21. *Breidleria pratensis* – **KA:** Azhendarovsky ridge, Inyushka, 10.VI.2010.
22. *Bryobrittonia longipes* – **KA:** Makarakskiy Creek (Vasiliev, 1974).
23. *Bryum* treated according to Zolotov (2011).
24. *Bryum capillare* – **TR:** (Lapshina & Muldiyarov, 1998).
25. *B. cyclophyllum* – **TR:** (Ignatova & Pisarenko, 2013a).
26. *B. elegans* – **KS:** Malinovoe Lake and Volchikha (Nozhinkov, 2006). **UO:** Barnaul (Nozhinkov, 2004), Sosnovy island (Nozhinkov & Taran, 2008).
27. *B. funkii* – **TR:** Serta River bank, 7.06.2007. **UO:** Beloglazovo (Nozhinkov, 2006).
28. *B. intermedium* – **SR:** Suenga River in Kemenka Creek mouth (Pisarenko, 2007b). **VP:** (Lapshina & Muldiyarov, 1998).
29. *B. moravicum* – **UO:** some points in Ob islands and floodplain Bistry Istok (Nozhinkov & Taran, 2008).
30. *B. neodamense* – **SR:** Krasnoye, 22.VI.1994. (Pisarenko, 2007b).
31. *B. pallens* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Niznekamenka, 10.IX.2012.
32. *B. pallescens* – **KA:** Stanovoj ridge (Volkova & Muldiyarov, 2000). Vp&, **TR:** (Lapshina & Muldiyarov, 1998). The records are doubtfull and possibly reffer to *B. lonchocaulon* (Zolotov, 2000, 2011).
33. *B. subapiculatum* – **UO:** Kontoshino (Nozinkov, 2006).
34. *B. weigelii* – **VP:** Melnikovo (Muldiyarov et al., 2013)
35. *Buxbaumia aphylla* – **TR:** Tomsk (Krylov, 1924). The only record in study area; never collected later.
36. *Calliergon giganteum* – **UO:** Sosnovka (Nozhinkov, 2006).
37. *C. megalophyllum* – was mentioned for Igol surroundings (Lapshina & Muldiyarov, 1998), but late was not listed (Lapshina, 2003).
38. *Campyliadelphus chrysophyllus* – **UO:** some points in Ob islands and floodplain Bistry Istok (Nozhinkov & Taran, 2008).
39. *Campylidium calcareum* – **SR:** Suenga River (Pisarenko, 2007b).
40. *Campylophyllum halleri* – **KA:** (Pisarenko, 2004).
41. *Cinclidium stygium* – **SR:** Krasnoye (Pisarenko, 2007b). **TR:** (Pisarenko, 2007k).
42. *Conardia compacta* – **KS:** Volchiha (Nozhinkov, 2004). **UO:** Sosnovy island on Ob River (Nozhinkov & Taran, 2008).
43. *Cratoneuron filicinum* – **VP:** (Lapshina & Muldiyarov, 1998).
44. *Cynodontium tenellum* – **SR:** Novososedovo (Pisarenko, 2007b)
45. *Dichelyma falcatum* – **KA:** (Pisarenko, 2004).
46. *Dichodontium pellucidum* – **SR:** Udinsk (Pisarenko, 2007b). **TR:** (Muldiyarov & Chernova, 2002).
47. *Dicranella crispa* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Beloglazovo (Nozhinkov, 2006).
48. *D. schreberiana* – **VP:** (Lapshina & Muldiyarov, 1998).
49. *D. subulata* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Beloglazovo (Nozhinkov, 2006).
50. *D. varia* – **TR:** (Muldiyarov & Chernova, 2002).
51. *Dicranum acutifolium* – **TR:** Tambar, 6.VI.2007. **KS:** Volchiha (Nozhinkov, 2004).
52. *D. brevifolium* – **UO:** Klochki (Nozhinkov, 2004).
53. *D. drummondii* – **UO:** Pankrushiha (Nozhinkov, 2004).
54. *D. leioneuron* – was mentioned for Ob' floodplain (Lapshina & Muldiyarov, 1998), but later not listed (Lapshina, 2003).
55. *D. viride* – **SR:** (Ignatova, Fedosov, 2008).
56. *Didymodon ferrugineus* – **TR:** (Muldiyarov & Chernova, 2002).
57. *D. icmadophilus* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Beloglazovo (Nozhinkov, 2006).
58. *D. tophaceus* – **TR:** (Muldiyarov & Chernova, 2002).
59. *Distichium inclinatum* – **VP:** Desjatovo (Lapshina & Muldiyarov, 1998).
60. *Ditrichum cylindricum* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Beloglazovo (Nozhinkov, 2006).
61. *D. heteromallum* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Beloglazovo (Nozhinkov, 2006).
62. *D. pusillum* – **KA:** Kija River valley near Bezimianka Creek, 4.VII.2005.
63. *Drepanocladus sendtneri* – **SR:** Krasnoye (Pisarenko, 2007b). **TR:** Tenguli, 13.VI.2008. **KD:** Pushkino, 31.V.2011.
64. *Encalypta* treated according to Fedosov (2012, 2013).
65. *Encalypta rhaptocarpa* – **KA:** N.Tres' River valley, 30.VIII.2003.
66. *E. trachymitria* – **SM:** Ust-Kobirza, 28.VIII.2011.
67. *E. vulgaris* – **VP:** vicinity of Kishtovka, 10.VII.2009.

68. *Entodon concinnus* – **KA:** (Pisarenko, 2004). **SR:** Kostenkovo (Pisarenko, 2007b).
69. *E. schleicheri* – **KD:** Kalachevo, 16.VI.2007.
70. *Fabronia ciliaris Brid.* – **SR:** Pecherkino (Pisarenko, 2007b).
71. *Fissidens adianthoides* – **UO:** Novokamenka, 10.IX.2011. **VP:** (Lapshina & Muldiyarov, 1998).
72. *Fissidens exilis* – **KD:** Kljuchi, 10.VI.2010.
73. *Fissidens osmundoides* – **SR:** M.Chumish River (Pisarenko, 2007b).
74. *F. taxifolius* – **UO:** some points in Ob islands and floodplain Bistry Istok (Nozhinkov & Taran, 2008).
75. *F. viridulus* – mentioned in literature – **TR, VP:** (Lapshina & Muldiyarov, 1998). I didn‘t try to distinguish it from *F. bryoides* according to Ignatov & Ignatova (2003).
76. *Fontinalis hypnoides* – **UO:** Rasskazikha (Nozhinkov, 2006); between settlements Ust‘-Anuj and Bistry Istok (Nozhinkov & Taran, 2008).
77. *Grimmia anodon* – **SM:** Ust-Anzas, 3.VIII.2010. **KD:** (Pisarenko, 2007).
78. *G. funalis* – **SM:** Pustag Mt., 1.VIII.2010.
79. *Grimmia pulvinata* – **SM:** Podkatun (Nozhinkov & Pisarenko, 2008; by Nozhinkov data only).
80. *G. tergestina* – **TR:** Krylovo, 13.VI.2007.
81. *G. unicolor* – **KA:** Barkhatnij ridge, 16.VI.2000.
82. *Gymnostomum aeruginosum* – **TR:** (Pisarenko 2012c).
83. *Hamatocaulis vernicosus* – **KA:** Poludnevaja creek (Volkova & Muldiyarov, 2000). **UO:** (Pisarenko et al., 2007).
84. *Haplocladium angustifolium* – **KA:** (Pisarenko, 2004).
85. *Helodium blandowii* – **KS:** Vavilon Lake (Pisarenko et al., 2008).
86. *Herzogiella striatella* – **KA:** (Pisarenko, 2004).
87. *H. turfacea* – **SM:** Ust‘ Anzas (Nozhinkov & Pisarenko, 2008).
88. *Heterocladium dimorphum* – **TR:** Bogashevo and Tugoiakovka River (Muldiyarov & Lapshina,1998).
89. *Homalia trichomanoides* – **UO:** Chatchino, 11.VI.2011.
90. *Hygroamblystegium humile* – **KA:** Kija River valley (Volkova & Muldiyarov, 2000).
91. *Hygroamblystegium tenax* – **TR:** Tomsk (Lapshina & Muldiyarov, 1998). The record is doubtful.
92. *Hypnum cupressiforme* – **VP:** (Lapshina & Muldiyarov, 1998). **KS:** Volchicha (Nozhinkov, 2004). **UO:** Sosnovka (Nozhinkov, 2006).
93. *Isopterygiopsis alpicola* – **KA:** Chemodan Mt., 11.IX.2004.
94. *I. muelleriana* – **KA:** Chemodan Mt., 11.IX.2004.
95. *I. pulchella* – **UO:** Bistry Istok (Nozhinkov & Taran, 2008).
96. *Iwatsukiella leucotricha* – **SM:** Pustag Mt., 27.IV.2010.
97. *Jaffueliobryum latifolium* – **KS:** (Pisarenko, Ignatova, Ignatov, 2001).
98. *Lescuraea incurvata* – **VP:** Barkovsky i. (Muldiyarov et al., 1998).
99. *Leucodon sciuroides Schwagr.* – **TR:** (Pisarenko, 2012c). **KD:** Krylovo, 13.VI.2007.
100. *Meesia triquetra* – **KA:** Krestovka River (Volkova & Muldiyarov, 2000). **TR:** Tambar, 6.VI.2007. **UO:** (Pisarenko et al., 2007).
101. *Meesia uliginosa* – **KA:** Chemodan Mt., VII.1993, coll. N.Lashchinsky (Pisarenko, 2009)
102. *Microbryum curvicollum* – **UO:** (Pisarenko, 2012a)
103. *Mnium spinulosum* – **SM:** Ust‘-Anzas (Nozinkov & Pisarenko, 2008). **TR:** (Pisarenko, 2012c).
104. *Myurella julacea* – **KA:** (Pisarenko, 2004).
105. *M. tenerrima* – **KA:** (Pisarenko, 2004). **TR:** Ust‘-Kolba, 7.VI.2007.
106. *Niphotrichum canescens* – **TR:** (Muldiyarov & Chernova, 2002).
107. *Oncophorus virens* – **VP:** (Lapshina & Muldiyarov, 1998).
108. *Orthothecium intricatum* – **KA:** (Pisarenko, 2004).
109. *Orthotrichum alpestre* – **SR:** Suenga River near Kamenka mouth (Pisarenko, 2007b).
110. *O. pallens* – **SR:** Sungai (Pisarenko, 2007b).
111. *O. pellucidum* – **SR:** Novososedovo (Pisarenko, 2007b).
112. *O. rupestre* – **SM:** Podkatun (Nozhinkov & Pisarenko, 2008). **SR:** Suenga River near Kamenka mouth (Pisarenko, 2007b).
113. *Oxyrrhynchium hians* – **UO:** Barnaul and Kontoshino (Nozhinkov, 2006); some points in Ob islands and floodplain Bistry Istok (Nozhinkov & Taran, 2008).
114. *Paludella squarrosa* – **TR:** Tambar, 6.VI.2007. **UO:** (Pisarenko et al., 2007).
115. *Palustriella commutata* – **TR:** (Lapshina & Muldiyarov, 1998).
116. *P. falcata* – **SR:** Krasnoje, 9.VI.2008.
117. *Paraleucobryum enerve* – **KA:** (Pisarenko, 2004).
118. *Paraleucobryum longifolium* – **TR:** Mariinsk, 8.VI.2007.
119. *Philonotis* is treated according to Koponen & al (2012).
120. *Philonotis fontana* – **SR:** Novososedovo (Pisarenko, 2007b). **UO:** Velizhanovka (Nozhinkov, 2004).
121. *Physcomitrella patens* – **TR:** Inja River Novosibirsk, coll. Taran, 2001. **BS:** Kreschenskoje, 18.VII.2012. **UO:** some points in Ob islands and floodplain Bistry Istok (Nozhinkov & Taran, 2008).
122. *Physcomitrium eurystomum* – **UO:** between s Ust‘-Anuj and Bistry Istok (Nozhinkov & Taran, 2008).
123. *P. pyriforme* – **TR:** Tambar, 6.VI.2007. **UO:** Barnaul (Nozhinkov, 2006).
124. *Plagiomnium affine* – **SM:** Pyzas River Shanyshtag Mt., 19.VII.2007.
125. *P. confertidens* – **UO:** Roznev Log (Nozhinkov, 2004).
126. *P. drummondii* – **UO:** Krasilovo Lake; Bobrovka and Firsovo s (Nozhinkov, 2006).
127. *P. rostratum* – **VP:** (Lapshina & Muldiyarov, 1998).
128. *Plagiopus oederianus* – **TR:** Izdrevaja River, 18.XI.2004.
129. *Plagiothecium cavifolium* – **TR:** Mariinsk, 8.VI.2007.
130. *P. laetum* – **UO:** Bistry Istok (Nozhinkov & Taran, 2008).
131. *P. latebricola* – **TR:** Troitskoje, 15.VI.2010.
132. *Platydictya jungermannioides* – **KA:** (Pisarenko, 2004). **SM:** Kuzedeevo (Gudoshnikov, 1986).**VP:** Ponkino (Pisarenko et al., 2011).
133. *Pleuridium subulatum* – **TR:** Gorniy, 17.VI.2010. **KS:** (Pisarenko et al., 2001).
134. *Podperaea krylovii* – **SR:** Suenga River near Kamenka mouth (Pisarenko, 2007b).
135. *Pogonatum urnigerum* – **TR:** (Lapshina & Muldiyarov, 1998). **VP:** Kyshtovka, 10.VII.2009.
136. *Pohlia annotina* – **SM:** Ust‘ Kobyrza (Nozhinkov, Pisarenko, 2008). **UO:** Bistry Istok (Nozhinkov & Taran, 2008).
137. *P. elongata* – **TR:** Mariinsk, 8.VI.2007.
138. *P. longicollis* – **KA:** Rastai River (Pisarenko, 2009). **SM:** Pyzas River, 19.VII.2007.
139. *P. melanodon* – **TR:** (Lapshina & Muldiyarov, 1998). **KD:** Morkovkino, 10.VI.2009. **UO:** Barnaul (Nozhinkov, 2006).
140. *P. obtusifolia* – **KA:** (Pisarenko, 2004).

141. *P. sphagnicola* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996). **TR:** Tomsk (Lapshina & Muldiyarov, 1998). **VP:** (Pisarenko et al., 2011; by Muldiyarov data only).
142. *Polytrichastrum alpinum* – **SR:** Eltsovka (Pisarenko, 2007b).
143. *P. formosum* – **KS:** Volchiha (Nozhinkov, 2004). **UO:** Barnaul, Podbornoje (Nozhinkov, 2004).
144. *P. longisetum* – **SR:** Bol'shie Taily River (Pisarenko, 2007b). **KD:** Bannovo, 15.VI.2009.
145. *P. pallidisetum* – **KA:** (Pisarenko, 2004).
146. *Polytrichum commune* – **BS:** Orlovskiy (Valutskiy, 2011)
147. *P. strictum* – **KS:** Volchiha (Nozhinkov, 2004). **UO:** Barnaul (Nozhinkov, 2004).
148. *Pseudephemerum nitidum* – **KA:** (Pisarenko, 2004).
149. *Pseudocalliergon trifarium* – **KA:** Chemodan Mt. (Volkova & Muldiyarov, 2000). **SR:** Krasnoye (Pisarenko, 2007b).
150. *Pseudoleskeella nervosa* – **UO:** Beloyarsk (Nozhinkov, 2006).
151. *P. papillosa* – **SR:** M.Ik River (Pisarenko, 2007b).
152. *P. rupestris* – **SR:** Koltyrak, 4.VI.1992.
153. *Pterigynandrum filiforme* – **SR:** Kivda Mt. (Pisarenko, 2007b).
154. *Pterygoneurum subsessile* – **SR:** Suenga (Pisarenko, 2007b). **KD:** Artyshna, 17.VI.2007.
155. *Rhizomnium andrewsianum* – **SM:** Ust'-Kobirza, 29.VIII.2011.
156. *R. punctatum* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Semenovskij, 10.VI.2011.
157. *Rhodobryum ontariense* – **TR, KD:** (Pisarenko, 2007a).
158. *Rhynchostegium rotundifolium* – **KA:** Saltimakov ridge (Pisarenko, 2009). **SM:** watershed Taenza and Mrassu Rivers, 4.VIII.2010.
159. *Rhytidiadelphus subpinnatus* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Yasnaja Poliana, 30.VI.2010.
160. *Rhytidium rugosum* – **UO:** Verkh-Ozeronje (Nozhinkov & Taran, 2008). **VP:** Kyshtovka, 10.VII.2009.
161. *Schistidium* is treated according to Ignatova (2012).
162. *Schistidium apocarpum* – **UO:** Sosnovy island (Nozhinkov & Taran, 2008).
163. *S. obscurum* – **SM:** (Ignatova & Pisarenko, 2013b).
164. *S. platyphyllum* – **TR:** (Ignatova & Pisarenko, 2013a).
165. *S. rivulare* – **TR:** (Muldiyarov & Chernova, 2002).
166. *S. sibiricum* – **TR:** (Ignatova & Pisarenko, 2013b).
167. *S. sinensiapocarpum* – **TR:** (Ignatova & Pisarenko, 2013b).
168. *S. submuticum* – **TR:** (Ignatova & Pisarenko, 2013b).
169. *S. tenuinerve* – **KD:** (Ignatova & Pisarenko, 2013a).
170. *Schistostega pennata* – **SR:** Kotorovo (Pisarenko, 2007b). **KD:** Luchshevo, 11.VI.2010.
171. *Sciuro-hypnum plumosum* – **KS:** Volchiha (Nozhinkov, 2004).
172. *Scorpidium cossonii* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996). **SR:** Krasnoye (Pisarenko, 2007b).
173. *S. revolvens* – **KA:** Chemodan Mt. (Volkova & Muldiyarov, 2000).
174. *Seligeria brevifolia* – **KA:** Ters' River, 30.VIII.2003.
175. *Seligeria campylopoda* – **TR:** (Muldiyarov & Chernova, 2002).
176. *S. donniana* – **SM:** Ust' Kobyrza (Nozhinkov&Pisarenko, 2008).
177. *S. pusilla* – **KA:** (Pisarenko, 2004). **SM:** Ust' Kobyrza (Nozhinkov & Pisarenko, 2008).
178. *S. tristichoides* – **KA:** (Pisarenko, 2004). **SM:** Ust' Kobyrza (Nozhinkov & Pisarenko, 2008).
179. *Serpoleskea subtilis* – **KS:** Volchiha (Nozhinkov, 2004).
180. *Sphagnum aongstroemii* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996).
181. *S. balticum* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996). **TR:** Tomsk (Lapshina & Muldiyarov, 1998). **UO:** Verhnij Suzun River, Osinovoe Lake, 1997.
182. *S. centrale* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996). **KS:** Volchiha (Nozhinkov, 2004).
183. *S. compactum* – **TR:** (Lapshina & Muldiyarov, 1998).
184. *S. contortum* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996). **UO:** Larichikha, 18.VIII.2013.
185. *S. cuspidatum* – **VP:** Uzas, by Muldiyarov data (Pisarenko et al., 2011).
186. *S. fallax* – **KS:** Volchiha (Nozhinkov, 2004).
187. *S. fimbriatum*– **KD:** Novobarachaty, 3.VI.2011.
188. *S. flexuosum* – **TR:** (Lapshina & Muldiyarov, 1998).
189. *S. girgensohnii* – **KS:** Volchiha (Nozhinkov, 2004). **UO:** Barnaul (Nozhinkov, 2004).
190. *S. inundatum* – **SR:** Mirny (Pisarenko, 2007b).
191. *S. jensenii* – **SR:** Mirny (Pisarenko, 2007b).
192. *S. majus* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996). **SR:** Mirny (Pisarenko, 2007b). **TR:** (Lapshina & Muldiyarov, 1998).
193. *S. obtusum* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996)
194. *S. palustre* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996). **SR:** Mokrushino (Pisarenko, 2007b). **TR:** (Lapshina & Muldiyarov, 1998).
195. *S. platyphyllum* – **UO:** Ryamy, coll. S.Vasivl'ev, 1997; Pisarenko 18.VIII.2013.
196. *S. pulchrum* – **KA:** Poludnevaja creek (Muldiyarov & Lapshina, 1996).**VP:** Targach Lake (Pisarenko et al., 2011).
197. *S. riparium* – **TR:** (Lapshina & Muldiyarov, 1998). **VP:** (Pisarenko et al., 2007).
198. *S. rubellum* – **BS:** between Sherstobitovo and Filimonovo settlements (Valutskiy, 2011).
199. *S. squarrosum* – **KS:** Vavilon Lake, (Pisarenko et al., 2008).
200. *S. subfulvum* – **VP:** Uzas, by Muldiyarov data (Pisarenko et al., 2011).
201. *S. subnitens* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996).
202. *S. tenellum* – **KA:** Chemodan Mt. (Muldiyarov & Lapshina, 1996).
203. *S. teres* – **KA:** Poludnevaja creek; Chemodan Mt. (Muldiyarov & Lapshina, 1996). **KD:** between Berezovka and Bannovo s, 16.VI.2009. **KS:** Vavilon Lake (Pisarenko et al., 2007).
204. *S. wulfianum* – **KA:** Azhendarovsky ridge, Klyuchi, 8.VI.2010. **TR:** (Lapshina & Muldiyarov, 1998).
205. *Splachnum ampullaceum* – **VP:** Targach Lake (Pisarenko et al., 2011).
206. *Straminergon stramineum* – **TR:** (Lapshina & Muldiyarov, 1998).
207. *Syntrichia ruralis* – **VP:** Kyshtovka, 10.VII.2009.
208. *Tayloria lingulata* – **KA:** (Pisarenko, 2004).
209. *Tetraphis pellucida* – **KS:** Volchiha (Nozhinkov, 2004).
210. *Thamnobryum neckeroides* – **TR:** Mariinsk, 8.VI.2007.
211. *Timmia bavarica* – **UO:** Sosnovka (Nozhinkov, 2006).
212. *T. comata* – **KA:** (Pisarenko, 2004). **SR:** Kostenkovo (Pisarenko, 2007b). **TR:** (Muldiyarov & Chernova, 2002).

213. *Tomentypnum nitens* – **KA:** Kija River valley (Volkova & Muldiyarov, 2000).
214. *Tortella alpicola* – **SR:** Kostenkovo, 24.VI.1994.
215. *T. fragilis* – **VP:** Desjatovo (Lapshina & Muldiyarov, 1998).
216. *T. inclinata* – **KD:** (Pisarenko, 2007a).
217. *Tortula acaulon* – **TR:** Gorny, 17.VI.2010. **UO:** Verkh-Ozeronje (Nozhinkov & Taran, 2008).
218. *T. muralis* – **SM:** vicinity of Kuzedeevo, data of A.N. Vasiljev, 14.IX.1970. **SR:** Novososedovo (Pisarenko, 2007b). **KS:** Blagoveschenka, 26.VI.2010.
219. *Tortula obtusifolia* – **SM:** Podkatun, data of Nozhinkov (Nozhinkov & Pisarenko, 2008).
220. *Trachycystis ussuriensis* – **SM:** (Pisarenko, 2012a).
221. *Trichostomum crispulum* – **SM:** Ust'-Anzas Settelment, 3.VIII.2010.
222. *Ulota rehmannii Jur.* – **SM:** Sheregesh, 27.IV.2010.
223. *Warnstorfia exannulata* – **TR:** (Lapshina & Muldiyarov, 1998). **UO:** Barnaul (Nozhinkov, 2006).
224. *Warnstorfia fluitans* – **UO:** Barnaul (Nozhinkov, 2006).
225. *Weissia brachycarpa* – **UO:** Verkh-Ozeronje (Nozhinkov & Taran, 2008).
226. *W. controversa* – **SM:** Ust' Kobyrza, according to Nozhinkov (Nozhinkov&Pisarenko, 2008). **TR:** (Lapshina & Muldiyarov, 1998).
227. *W. longifolia* – **TR:** (Pisarenko 2012c).
228. *Zygodon sibiricus* –**VP:** (Pisarenko, 2012c).

DISCUSSION

By now, 425 species of mosses are known from the study territory.

The maximum species diversity is associated with mountains of Kuznetskiy Alatau and Mountain Shoria. Overall 342 species are recorded for these two regions, and 85 of them were not found in other regions of the investigated territory. Currently less species are recorded for Mountain Shoria than for Kuznetskiy Alatau (232 vs.302), which can be explained partly by a better exploration of the latter.

Bryoflora of Salair Ridge is significantly poorer than of Kuznetsk Alatau: 235 vs. 302. Of course, Salair is a low mountain formation and has no alpine or mountain tundra belts. However, the absence of a number species in the forest belt is notable. A lower diversity of the Salair bryoflora is likely related to low air humidity, which reduces the number of species almost down to the number of that in transitional region (233 species).

Kulunda is poorer in species number (82), because of xeric and windy climate, flat area and strong antropogenic disturbance. The least species are recorded for Baraba (65); but in this case the low number is likely explained by insufficient investigations.

Kuznetskaya depression, upper Ob and Vasyugan plain with adjacent areas are almost identical in mosses number (148, 170, and 169 species), but not in composition.

Vasyugan region stands out by a group of species concentrated in its northern part. These are mainly mire species which are common in Vasyugan plain and northwards; only few of them penetrate to the forest-steppe and steppe zones of West Siberia. Thus, only half of *Sphagnum* species from the list participate in mire communities of plains southwards of Vasyugan: *Sphagnum angustifolium, S. capillifolium, S. centrale, S. fimbriatum, S. fuscum, S. magellanicum, S. russowii, S. squarrosum, S. teres, S. warnstorfii.* At the same time, Vasyugan plain represents the southern boundary (within the West Siberian longitudinal sector) for *Sphagnum lindbergii, S. obtusum, S. papillosum, S. palustre, S. riparium, S. rubellum*, as well as for *Bryum neodamense, Calliergon richardsonii, Cinclidium stygium, Drepanocladus sendtneri, Hamatocaulis lapponicus, H. vernicosus, Meesia longiseta, M. triquetra, M. uliginosa, Pseudocalliergon lycopodioides, Pseudocalliergon trifarium, Scorpidium scorpioides.* Some of these species have scattered records in forest-steppe and steppe zones, in mires with a number of relicts of the last glacial period.

Xeric species in the study area are centered in southern depressions and plains (Kulunda, upper Ob, transitional region, Kuznetskaya depression); most common are *Encalypta vulgaris, Jaffueliobryum latifolium, Pterygoneurum ovatum, P. subsessile, Tortula acaulon, T. mucronifolia.* All of them, with the exception only for *P. ovatum,* were also recorded in the petrophyte steppe of Salair, where additionally the following species occur: *Aloina brevirostris, Fabronia ciliaris, Grimmia laevigata, Homomallium incurvatum*. This group becomes poorly represented in Mountain Shoria region, where only *Homomallium incurvatum* and *Grimmia anodon* were recorded. No one of the above mentioned species has been recorded in Kuznetskiy Alatau, where such widespread species as *Syntrichia ruralis* and *Hedwigia ciliata* are very rare. Some more xeric species, which are rare in the study area include: *Aloina rigida, Grimmia tergestina, Tortula modica, Weissia longifolia* (transitional region); *Acaulon triquetrum, Microbryum curvicollum* (upper Ob); *Entosthodon hungaricus* (Kulunda); *Conardia compacta, Pterygoneurum kozlovii* (Kulunda & upper Ob).

Diversity and specificity of combined bryoflora of Kuznetskiy Alatau and Mountain Shoria depends to a great extent on the presence of mountain and alpine species, *e.g., Andreaea rupestris, Aulacomnium turgidum, Bartramia ithyphylla, Brachythecium erythrorrhizon, Dicranodontium denudatum, Dicranum elongatum, D. spadiceum, Drepanium recurvatum, Kiaeria starkei, Oligotrichum hercynicum, Polytrichastrum alpinum, Polytrichastrum sexangulare*.

Petrophytic species are also almost exclusively concentrated in Kuznetsk Alatau and Mountain Shoria (*Hymenoloma crispulum, Lescuraea saxicola*, *L. incurvata, Bucklandiella microcarpa, B. sudetica, Grimmia spp., Schistidium spp.,* and other). In the investigated area, thick Quaternary sediments are expressed almost throughout. Outside the mountains of Kuznetsk Alatau, Mountain Shoria and Salair, rock outcrops are extremely rare

and are confined to river valleys or steep slopes of the hills. Low humidity in the plains within subtaiga-steppe zones is a limiting factor for most petrophytes, along with the rarity of suitable habitats. Most common petrophytes are *Didymodon validus s.l., Distichium capillaceum, Encalypta pilifera, E. vulgaris, Grimmia longirostris, Hedwigia ciliata, Myurella sibirica, Orthotrichum anomalum, Pseudoleskeella tectorum, Saelania glaucescens, Schistidium lancifolium, S. pulchrum, Sciuro-hypnum populeum, Tortella tortuosa, Syntrichia ruralis.* Many species commonly growing as epilithic in mountains occur in other habitats in lowlands: (1) *Distichium capillaceum, D. inclinatum, Saelania glaucescens* in Tomsk and northern part of Novosibirsk Province grow on degradated peat in mire massifs; (2) *Abietinella abietina, Encalypta vulgaris, Rhytidium rugosum, Syntrichia ruralis* were collected on edge of a steep bank of the Tara River (in vicinity of Kishtovka Settlement); (3) *Anomodon longifolius* was collected on *Picea*-trunks in Inia River valley (vicinity of Chaschino Settlement), *Leucodon sciuroides* and *Rhytidium rugosum* – on *Betula*-trunks in mesophytic forests near Novosibirsk.

Mosses of the forest belt contribute to specificity of bryoflora of Kuznetsk highland besides the alpine (arcto-alpine) and petrophytic species. Thus, *Eurhynchium angustirete, Hylocomiastrum umbratum, Sciuro-hypnum ornellanum* are rather common and abundant in the ground cover of *Abies*-forests in Kuznetskiy Alatau and Mountain Shoria, being absent not only in lowland bryoflora, but also in rather similar *Abies*-forests of Salair. The same distributional pattern occurs for epiphytic and epixylic *Ulota rehmannii, Zygodon sibiricus, Iwatsukiella leucotricha Anacamptodon latidens*. Moreover, some hydrophytes *Cinclidotus riparius, Fontinalis hypnoides, Dichelyma falcatum, Palustriella decipiens, Bryum schleicheri* occur in and near streams in the forest belt of Kuznetsk Alatau and/or Mountain Shoria; but were never found outside the region within the study area. The same is true for calciphilous epilitic mosses including *Brachythecium cirrosum, Bryobrittonia longipes, Campylophyllum halleri, Cyrtomnium hymenophylloides, Mnium thomsonii, Orthothecium intricatum.*

Most species are widespread in Holarctic. Only some species have mainly western distribution (*Acaulon triquetrum, Dicranum viride, Entosthodon hungaricus, Herzogiella striatella, Heterocladium dimorphum, Pleuridium subulatum, Taxiphyllum wissgrillii*); some – mainly eastern distribution (*Anacamptodon latidens, Iwatsukiella leucotricha, Jaffueliobryum latifolium, Myuroclada maximowiczii, Podperaea krylovii, Zygodon sibiricus*), while some are common in the eastern part of Russia, penetrating to European Russia only in the Caucasus and Urals: *Fabronia ciliaris, Rhodobryum ontariense, Trachycystis ussuriensis*.

Most interesting rare species for the territory are: *Acaulon triquetrum, Cnestrum schistii, Conardia compacta, Dicranum viride, Entosthodon hungaricus, Grimmia anomala, Herzogiella striatella, Isopterygiopsis alpicola, Microbryum curvicollum, Oligotrichum hercynicum, Pleuridium subulatum, Podperaea krylovii, Pohlia obtusifolia, Polytrichastrum pallidisetum, Pseudephemerum nitidum, Pseudocalliergon lycopodioides, Rhynchostegium arcticum, Rhynchostegium rotundifolium, Taxiphyllum wissgrillii, Tortella alpicola,* and *Tayloria lingulata*. All of them are known in Siberia from scattered localities.

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