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MOSS FLORA OF TOKINSKY STANOVIK RANGE (AMUR PROVINCE AND SOUTHERN YAKUTIA; RUSSIA): AN ANNOTATED CHECKLIST

ФЛОРА МХОВ ТОКИНСКОГО СТАНОВИКА (АМУРСКАЯ ОБЛАСТЬ И ЮЖНАЯ ЯКУТИЯ): АННОТИРОВАННЫЙ СПИСОК

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Abstract

Data on the moss flora of Tokinsky Stanovik are presented. This is a hard-to-reach and little-studied mountainous area, including a territory of the recently organized Tokinsko-Stanovoy National Park. We collected mosses in 2018–2021. Original field materials supplemented by published data resulted in an annotated check-list of 338 species and one variety; collecting localities, altitudinal distribution and ecology are provided for each species. 145 species are newly recorded for Tokinsky Stanovik. Within the boundaries of the Tokinsko-Stanovoy National Park, 267 species of mosses were revealed. Thirteen species from our list are new for the southern part of the Russian Far East, two are new for Yakutia and 33 species are presented for the first time for the Amur Province.

Резюме

Представлены данные о бриофлоре Токинского Становика – труднодоступной и малоизученной горной территории, в том числе – для территории недавно организованного Токинско-Станового национального парка. В результате определения оригинальных коллекций, собранных в 2018–2021 годах, и обобщения литературных данных для данной территории выявлено 338 видов и одна разновидность мхов, из них 145 видов отмечены нами впервые. В границах Токинско-Станового национального парка выявлено 267 видов мхов. Представлен аннотированный список мхов по оригинальным данным, в котором даны заметки по локалитетам сборов, высотному распространению и экологии видов. Выявлены 13 новых видов для юга российского Дальнего Востока, 2 вида новых для Якутии, 33 вида впервые приводятся для Амурской области.

KEYWORDS: mosses, Tokinsky Stanovik Range, altitude zonation, Far East, biodiversity conservation

INTRODUCTION

The severe nature of the eastern part of the Stanovoy Range – Tokinsky Stanovik Range – was described by soviet writer G.A. Fedoseev in the novels “Death Will Wait for Me” and “The Path of Trials” (Fedoseev, 1976). In the 30s – 50s of 20th century, the writer was the head of geodesic expeditions, during which the first topographic map of the area was created. In 21st century, this mountainous region on the Main Siberian watershed remained inaccessible and relatively untouched by human impact as it was described in the books by Fedoseev.

First collections of mosses were made in this area by O.I. Kuzeneva and N.I. Prokhorov in 1911. Their expedition crossed Stanovoy Range along the Okonon River to the Bolshoe Toko Lake (Fig. 2), describing for the first time the nature of the main watershed and differences in vegetation on its macroslopes (Prokhorov, 1912). Moss specimens collected during the expedition were identified by V.F. Brotherus and S.O. Lindberg; they are kept in LE. The published annotated list of mosses collected during Amur expeditions in 1908-1914 (Brotherus *et al.,* 1916) includes 112 species for the Stanovoy Range and its foothills.

In 1986-1992 K.A. Volotovskij collected mosses on Tokinsky Stanovik. Based on his collections, the annotated check-list for this area was published (Stepanova *et al.,* 1995), which, with later refinements (Ivanova & Ignatov, 1999), includes 221 species and 8 varieties of mosses. Collections of K.A. Volotovskij comprised several species, such as *Encalypta alpina, Hamatocaulis*

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Fig. 1. Reindeer caravan in the Anachyan basin. Photo: S.V. Dudov

lapponicus, and *Tetrodontium repandum,* occurring there at the edge of their ranges. Ivanova (2010) mentioned that lower (forest and subalpine) belts were better sampled during these expeditions.

In 2018 SD collected mosses during the biodiversity survey specially organized in the course of a legally protected natural area establishment. A hiking route was passed with a reindeer caravan (Fig. 1) from the Ulak-Elga railway (the watershed of the Anachyan and Algoma rivers) along the Ulyagir and Tok Rivers, through the Okonon volcanic plateau, along the Malye and Bolshie Tuksani, Sivaktylyak 1st Rivers to the upper reaches of the Zeya River, then by rafting down the Zeya River (Fig. 2).

On December 20, 2019, a decree of the Government of the Russian Federation was issued on the creation of the Tokinsko-Stanovoy National Park on the southern slopes of the Stanovoy Range with an area of 2530 sq. km. In 2020, a study of the biodiversity of the National Park was launched during the expeditions of the Zeya Reserve. In August of this year, OR collected mosses at the Zeya-Tuksani pass (points 32–39). In July 2021, SD visited the Tas-Balagan Pass (points 40–47), and OR studied mosses in August 2021 during rafting down the Zeya River from the mouth of the Sivaktylyak 1st River. In total, in 2018–2021 we collected ca. 1100 moss specimens, including about 500 ones collected above the timberline. Localities of herbarium collections are presented in the Table 1.

STUDY AREA

Tokinsky Stanovik is a highly elevated (up to 2100–2400 m a.s.l.), intensively developing neotectonic block of complex geological structure, it forms the highest part of the Stanovoy Range. The axial part of the range is composed mainly of Archean metamorphic rock: gneisses and schists with interbeds of marbles and calciphyres. The southern macroslope of the ridge is composed mainly of Proterozoic metamorphic rocks: crystalline schists and gneisses. Outcrops of anorthosites, basalts, and tuffs associated with Pleistocene volcanism are encountered (Mikailov *et al.,* 1971). Early Cretaceous and Early Proterozoic granite and granodiorite intrusions are widespread. Modern tectonic movements are still going on with an average annual uplift up to 11 mm, and high seismic activity (Lebedeva *et al.,* 2014).

An important feature of Tokinsky Stanovik is the glacial relief originated in the course of the Pleistocene mountain-valley glaciations (Kornilov, 1962). As a result of glacial activity and erosion, against the background of modern tectonic activity, the alpine-type relief of the ridge was developed. Narrow, ridge-like, often rocky watersheds, steep slopes with screes, an abundance of glacial cirques with lakes on the bottoms, “ram’s foreheads”, well-defined trough valleys and moraines are characteristic.

V.I. Gotvanskij (Schlothgauer *et al.,* 1980) suggested distinguishing three landscape subregions on Tokinsky Stanovik according to the features of the topography and

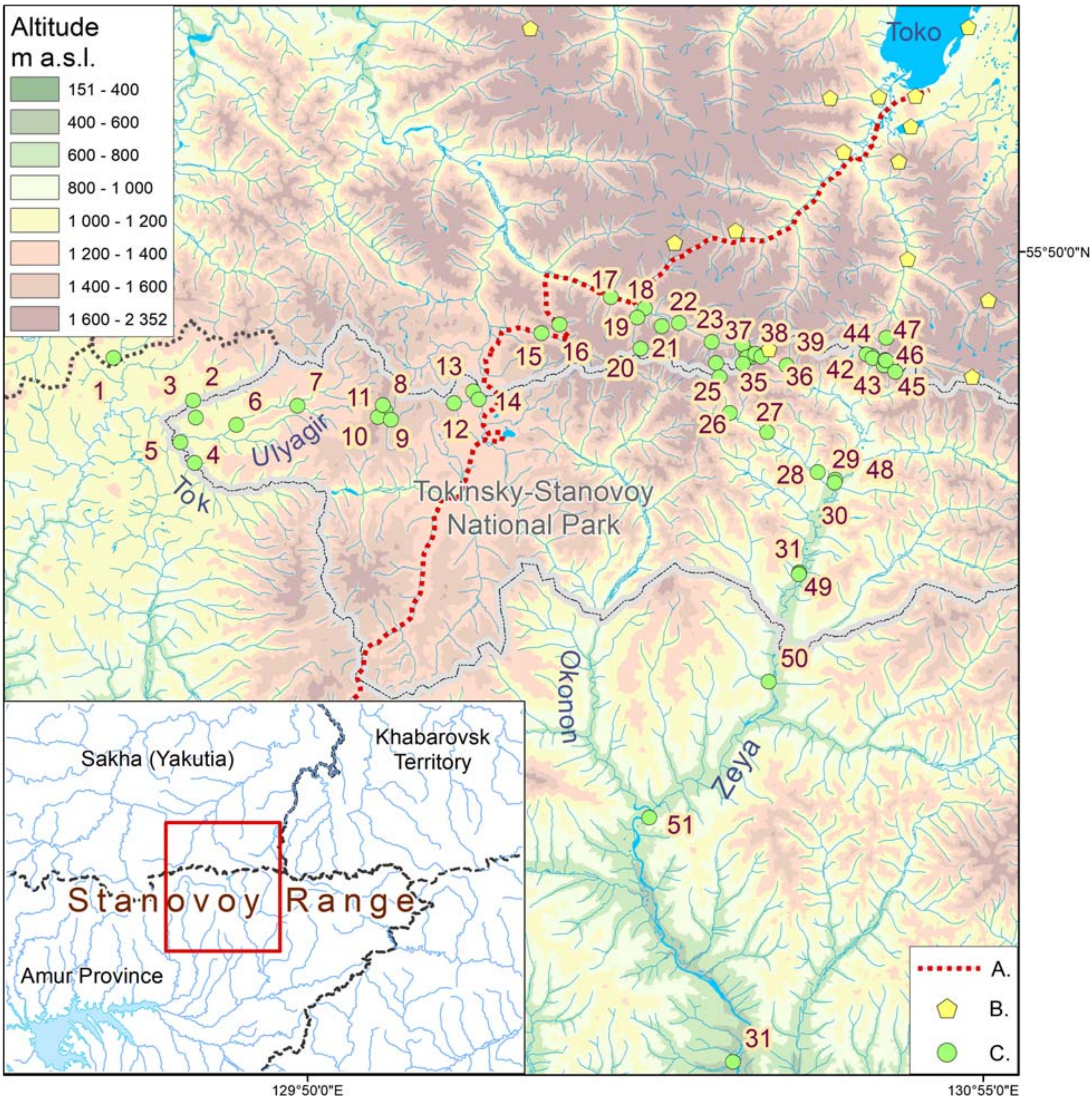

Fig. 2. Study area. A: The route of N.I. Prokhorov and O.I. Kuzeneva expedition in 1911; B: Collecting localities of K.A. Volotovskij 1986-1992; C: Collecting sites of S.V. Dudov and O.I. Ryabenko. The source of map base: SRTM digital elevation model.

landscape patterns. The Utuk region occupies the northern part of the ridge with a high-mountainous alpine-type relief with structures composed of gneisses and intrusions of acidic rocks. The relative height of the ridges reaches 1000 m, the absolute height exceeds 2000 m a.s.l. Steep slopes covered with screes, acute ridges of watersheds and glacial landforms are typical here. The Tok-Zeya region is stretched along the southern border of the ridge. The mid-mountain relief is developed here with heights up to 1700–1800 m a.s.l. The summits are mostly flattened. The slopes of the mountains and ridges are steep, but mostly covered by vegetation. The Tok-Tuksani region is represented by a high volcanic plateau (1100–1400 m). The surface of the plateau is formed of basalts and tuffs, overlained by metamorphic rocks and granitoids. The area is characterized by a flat relief with depressions occupied by lakes.

The climate of the study area is ultracontinental, excessively humid. According to the CHELSA climate model (Karger *et al.,* 2017), the average annual temperature is from –6.5°C in the Zeya River valley at an absolute height of 850 m a.s.l. to –12.0°C at altitudes above 2000 m a.s.l. Average July temperature ranges from +20°C to +14°C. The annual precipitation is 500–750 mm. The area is characterized by the wide distribution of permafrost (Nekrasov & Klimovsky, 1978).

Table 1. Collection sites

N	Locality	Coordinates, WGS84 N	E	Altitude(s)m a.s.l.	Main habitats
	Amur Region, Zeya District; *Dudov, 2018*				
1	Interstream area of the Anachyan and Algoma Rivers, Dzhugdyr lakes, valley of the Anachyan and Makarcha in upper course	55°43'46"–55°45'5"	129°31'50"–129°32'51"	992–1038	larch forest, sphagnum bogs, pebbles
	Amur Region, Zeya District, Tokinsky-Stanovoy National Park; *Dudov, 2018*				
2	Chardat River valley in 3 km upstream its mouth	55°42'34"–55°42'41"'	129°39'17"–129°39'35"	1011–1032	open larch forests, valley forests
3	Interstream area of the Chardat and Ulyagir Rivers	55°40'44"–55°41'43"	129°39'50"–129°40'38"	1055–1136	open larch forests
4	Tok River valley 1.5 km upstream the Ulyagir River mouth	55°39'14"–55°39'41"	129°38'51"–129°39'41"	976–1032	base-rich rock outcrops
5	Tok River valley 4 km upstream the Ulyagir River mouth	55°40'22"	129°38'17"	970	base-rich rock outcrops
6	Ulyagir River valley in the middle course	55°41'18"–55°41'59"	129°43'48"–129°46'12"	1034–1037	acidic rock outcrops
7	Ulyagir River valley in the upper course; the watershed between Neleg and Uliagir Rivers	55°42'20"–55°42'20"	129°49'46"–129°54'41"	1128–1297	larch and spruce forests
8	Watershed between the Ulyagir and Inarogda Rivers	55°42'15"–55°42'27"	129°58'7"–129°58'8"	1460–1496	sparse larch forests
9	Depression with lakes in the Inarogda River upper course	55°41'43"–55°42'0"	129°57'48"–129°58'21"	1420–1486	subalpine meadows, dwarf birch shrubs
10	Mountain with the altitudinal mark 1742 m in the Inarogda River upper course	55°41'7"–55°41'39"	129°57'13"–129°57'38"	1511–1742	siberian dwarf-pine thickets, dwarf-shrub-lichen tundra, screes
11	Volcanic plateau in the Inarogda River headwaters	55°41'17"–55°42'2"	129°58'53"– 130°0'41"	1423–1506	dwarf birch dominated communities, sparse larch woodlands
12	Anonymous tributary of the Malyi Okonon River valley	55°42'21"	130°5'5"	1398	open larch forests, rock outcrops
13	Dugduj (Dzhugdyr) Lake, the Malyj Okonon headwaters	55°43'0"	130°6'59"	1330	subalpine meadows, dwarf birch shrubs, open larch forests
14	Malyj Okonon River valley in upper course	55°42'23"–55°42'32"	130°7'26"–130°7'29"	1320	
	Republic of Sakha (Yakutia), Neryungri district; *Dudov, 2018*				
15	Malye Tuksani River valley in middle course	55°46'8"–55°46'20"	130°9'35"–130°13'45"	1200–1313	open larch forests, rock outcrops, pebbly stream banks
16	Solokit river valley (left tributary of Bolshie Tuksani River), left side of the valley	55°46'36"	130°15'31"	1400	screes
17	Bolshie Tuksani River valley	55°47'53"–55°48'3"	130°20'37"–130°21'26"	1106–1129	open larch forests, siberian dwarf-pine thickets
18	Bolshie Tuksani River valley	55°47'2"–55°47'24"	130°23'46"–130°23'56"	1202–1451	rockfield
19	Oyur River (left tributary of the Bolshie Tuksani River) valley	55°45'18"–55°46'54"	130°22'40"–130°23'17"	1267–1569	rock outcrops, pebbly banks along the stream
20	Oyur River headwaters, the main watershed of the Stanovoi Range	55°44'55"–55°45'13"	130°23'25"–130°24'45"	1584–1900	dwarf-shrub-lichen tundra, snowbeds 21
	Anonymous stream valley (left tributary of Bolshie Tuksani River)	55°46'24"	130°25'33"	1418	screes, siberian dwarf-pine thickets
22	Bolshie Tuksani River valley upstreams	55°45'37"–55°46'33"	130°27'14"–130°29'58"	1303–1381	valley forests, rock outcrops
23	Anonymous stream valley (left tributary of Bolshie Tuksani River upstreams)	55°44'46"–55°45'28"	130°30'5"–130°30'23"	1418–1482	siberian dwarf-pine thickets, rock outcrops
24	Watershed between the Bolshie Tuksani and Sylaktyliak Rivers, lakes in the Bolshie Tuksani upstreams	55°43'44"–55°44'18"	130°30'47"–130°31'22"	1421–1621	siberian dwarf-pine thickets, rock outcrops, screes
	Amur Region, Zeya District, Tokinsky-Stanovoy National Park; *Dudov, 2018*				
25	Watershed between the Bolshie Tuksani and Sylaktyliak-1 Rivers	55°43'0"–55°43'32"	130°31'6"–130°31'15"	1234–1385	dwarf-shrub tundra, snowbeds
26	Syvaktyliak-1 River valley in the upper course	55°41'1"–55°41'31"	130°32'1"–130°32'58"	998–1004	spruce forests, rock outcrops
27	Syvaktyliak-1 River valley in the middle course	55°39'30"–55°40'38"	130°35'11"–130°37'57"	926–967	larch forests, anfeus glades, pebbles
28	Syvaktyliak River valley in the lower course	55°38'8"	130°40'28"	833	larch forests, anfeus glades, pebbles
29	Zeya River valley upstream the Syvaktyliak-1 mouth	55°37'42"–55°38'14"	130°41'56"–130°42'12"	802–884	larch forest, bogs, alluvium, base-rich rock outcrops
30	Zeya River valley 5 km downstream the Syvaktyliak-2 mouth	55°32'38"	130°38'25"	738	base-rich rock outcrops
	Amur Region, Zeya District; *Dudov, 2018*				
31	Zeya River valley near the Taktalgin River mouth	55°5'42"	130°30'56"	532	acidic rock outcrops

Table 1 (cont.) . Collection sites

Republic of Sakha (Yakutia), Neryungri district; *Ryabenko, 2020*				
32 Bolshie Tuksani River valley in the upper course	55°44'52"–55°45'19"	130°33'45"–130°34'5"	1464–1592	low shrub tundra, screes, tundra peat bogs
33 Bolshie Tuksani River valley in the upper course, near the second lake	55°45'18"	130°33'25"	1453	low shrub tundra, screes, tundra peat bogs
Amur Region, Zeya District, Tokinsky-Stanovoy National Park; *Ryabenko, 2020*				
34 Watershed between the Bolshie Tuksani and Zeya Rivers	55°44'34"–55°44'36"	130°34'9"–130°34'25"	1507–1544	dwarf-shrub tundra, screes
35 Watershed between the Bolshie Tuksani and Zeya Rivers	55°44'35"	130°33'50"	1590	dwarf-shrub tundra, screes
36 Watershed between the Bolshie Tuksani and Sylaktyliak-1 Rivers, a seddle between two peaks	55°44'14"–55°44'17"	130°33'24"–130°33'44"	1780–1801	dwarf-shrub tundra, screes
37 the mountain peak between the lake in upstream of the Bolshie Tuksani and the Zeya River heads	55°44'46"–55°44'46"	130°34’39"–130°34’39"	1625–1625	dwarf-shrub tundra
38 Zeya River valley in the upper course	55°44'36"	130°35'14"	1280	rock outcrops
39 Anonymous stream valley (left tributary of Zeya River)	55°44'5"–55°44'5"	130°37'41"–130°37'41"	1148–1148	rock outcrops
Amur Region, Zeya District, Tokinsky-Stanovoy National Park; *Dudov, 2021*				
40 Tas-Balagan mountain pass	55°44'30"–55°44'44"	130°46'1"–130°46'33"	1469–1558	dwarf-shrub tundra, rock outcrops, tundra peat bogs, snowbeds
41 A peak westward from the Tas-Balagan pass	55°44'35"–55°44'37"	130°45'31"–130°45'45"	1707–1866	dwarf-shrub tundra on base-rich soils
42 Tas-Balagan mountain pass, slopes of the Tas-Balagan River valley	55°44'22"–55°44'27"	130°46'7"–130°46'44"	1458–1481	siberian dwarf-pine thickets
43 Northern shoulder of the Niakhigin mountain	55°43'57"–55°44'2"	130°47'12"–130°47'47"	1621–1799	dwarf-shrub tundra
44 Tas-Balagan River valley in the upper course	55°44'15"–55°44'30"	130°47'20"–130°47'26"	1548–1589	tundra peat bogs, snowbeds
45 Mountain ridge over the cirque of the Tas-Balagan River upstreams	55°43'35"–55°43'56"	130°48'18"–130°48'39"	1854–2031	dwarf-shrub tundra, rock outcrops, screes
Republic of Sakha (Yakutia), Neryungri district; *Dudov, 2021*				
46 Mountain ridge over the cirque of the Ivak-Makit River upstream	55°44'13"–55°44'43"	130°47'24"–130°48'27"	1577–1899	dwarf-shrub tundra, snowbeds, screes
47 Mountain ridge under the Ivak-Makit river upstream	55°45'28"–55°45'33"	130°47'30"—130°48'14"	1725—1906	dwarf-shrub tundra, snowbeds, screes
Amur Region, Zeya District, Tokinsky-Stanovoy National Park; *Ryabenko, 2021*				
48 The right side of the Zeya River valley upstream the Syvaktyliak-1 mouth	55°37'33"–55°38'0"	130°42'6"–130°42'25"	790–821	larch forest, base-rich rock outcrops
49 The left side of the Zeya River valley 4 km downstream the Urum River mouth	55°32'34"–55°32'35"	130°38'23"–130°39'30"	756–792	valley forests, pebbles
50 Zeya River valley in vicinity of the Karaurakkan River mouth	55°26'40"–55°27'0"	130°35'13"–130°35'45"	684–740	valley forests, pebbles
Amur Region, Zeya District, *Ryabenko, 2021*				
51 Zeya River valley in vicinity of the Okonon River mouth	55°19'18"	130°23'21"	619	valley forests, pebbles

The first data about the flora and vegetation of the Southwestern Okhotsk region was obtained during the expedition of A. F. Middendorf (Middendorf, 1867). The patterns of vegetation structure of Tokinsky Stanovik were first described by O.I. Kuzeneva and N.I. Prokhorov (Prokhorov, 1914). In the mid-1950s, L.N. Tyulina (1956) published a brief essay of the vegetation, indicated the patterns of altitudinal-belt arrangement, and noted the relationship between vegetation and the geomorphological structure of the territory. A significant contribution to the study of the flora and vegetation of Tokinsky Stanovik was made by S.D. Schlothgauer, who worked there in 1974, 1975, and 1978. Based on collected data, Schlothgauer *et al.* (1980) gave an overview of the vegetation of Tokinsky Stanovik; Schlothgauer also provided an information on the diversity and structure of plant communities of the Western Okhotsk region in general (Schlothgauer, 1990).

Altitudinal gradient is a primary driver of vegetation diversity in the study area (Schlothgauer, 1990; Isaev & Kuznetsova, 2010). The lower altitudinal belt is a mountain taiga, formed mainly by boreal coniferous forests. Above the treeline, two belts are formed: dwarf pine and dwarf alder thickets and mountain tundra. The latter is often called "golets" in the literature on the Siberian mountains. In view of bioclimatic definition of altitudinal belts of vegetation (Körner *et al.*, 2011) hereafter we refer to these as taiga, subalpine and alpine belts.

Taiga belt occurs up to 1200–1300 m a.s.l. Widespread larch forests are formed by *Larix gmelinii*[1] . Significant areas are occupied by open larch forests with dwarf birch (*Betula divaricata*). A dwarf-shrub-herb layer is largely composed by *Ledum palustre, Vaccinium uliginosum,* and *V. vitis-idaea.* Moss cover is often well developed, composed mainly of *Pleurozium schreberii, Hylocomium splendens,* and *Dicranum* spp. Fruticose lichens (*Cladonia spp.*, *Cetraria islandica*) are usually abundant. In the upper part of the mountain taiga belt, mainly in the Tok-Zeya landscape region, spruce forests (*Picea ajanensis*) occur. Herb layer is usually sparse in these forests and consists of *Vaccinium vitis-idea, Carex pallida, Linnaea borealis,* and *Lycopodium annotinum*. At the same time, cover of mosses (mostly *Hylocomium splendens, Pleurozium schreberii* and *Dicranum* spp.) reaches 90%. On rotten logs and trunk bases *Iwatsukiella leucotricha, Dicranum montanum, D. fuscescens*, *Aquilonium plicatulum*, *Plagiothecium svalbardense, Sanionia uncinata* occur. On the ends of spruce branches *Ulota rehmannni* often grows.

River valleys are occupied by complexes of valley vegetation up to absolute heights of about 1000 m. On fresh pebble alluvium, pioneer species (*Artemisia mongolica, A. borealis, Chamaenerion latifolium*, seedlings of poplar and willows) occur. Mosses are represented there by *Niphotrichum panshii, Schistidium platyphyllum*, etc. At the later stage of succession, valley forests composed of *Populus suaveolens* and *Chosenia arbutifolia* form. These communities are the richest in diversity of epiphyte mosses, among which *Pylaisia polyantha, P. condendsata, Zygodon sibiricus*, *Lewinskya elegans,* and *L. sordida* are most common. The final stage of successions is represented by larch forests with spruce and birch (*Betula platyphylla*). Relatively large areas are occupied by aufeus glades. Ice often remains there until mid-August. Two main types of vegetation communities occur in such conditions: sedge (*Carex drymophilla, C. pallida, C. media*) – horsetail (*Equisetum variegatum*) – moss (*Sanionia uncinata*) and low-shrub (*Salix saxatilis, Vaccinium uliginosum*) communities. Open, boggy larch forests are widely distributed on river terraces in conditions of close permafrost.

Subalpine belt occurs at altitudes 1200–1500 m a.s.l. Open larch woodlands and crooked birch forests of *Betula lanata* occur near the timberland. Large areas on slopes are occupied by siberian dwarf pine (*Pinus pumila*) and dwarf alder (*Alnus alnobetula* subsp. *fruticosa*) thickets. These communities do not form a continuous band, and vary in herb and moss layer composition. Shrub willow communities (*Salix krylovii, S. hastata, S. divaricata*) are formed in stream valleys. In the lower parts of the slopes, communities of dwarf birch often occur among dwarf pine thickets. These communities occupy especially large areas in the Tok-Tuksani geomorphological region. A characteristic feature of the belt is the presence of meadows dominated by *Festuca altaica, Helictotrichon dahuricum, Geranium kryloviil, Veratrum lobelianum, Dasiphora fruticosa,* and *Viola kusnezowiana*; such subalpine meadows are widespread in the Tok-Tuksani geomorphological region neighboring with peculiar open larch woodlands with a diverse forb layer (Fig. 3B).

In **alpine belt** (1400–2200 m), mountain tundra communities dominate. Composition of these communities depends on the underlying rocks and the thickness of the snow cover. Dwarf-shrub tundra dominated by *Dryas ajanensis, Rhododendron redowskianum, Salix berberifolia*, *S. phlebophylla,* and *Diapensia obovata* are widespread. Moss layer is represented by *Hylocomium splendens, Abietinella abietina, Rhytidium rugosum, Dicranum bonjeanii, D. elongatum, Hylocomiastrum pyrenaicum, Aulacomnium turgidum,* and *Racomitrium lanuginosum*.

In snowbeds, tundras composed of *Phyllodoce caerulea, Rhododendron aureum, Salix turczaninovii*, as well as nival meadows with *Carex podocarpa, Gentiana algida, Callianthemum isopyroides, etc.* occur. In such conditions, *Dicranum bonjeanii, D. acutifolium, Sanionia uncinata, Flexitrichum flexicaule, Conostomum tetragonum,* and *Oligotrichum falcatum* are often found.

On the summit surfaces, mainly on acidic rocks,

1 Names of vascular plants follow The World Flora online database (http://www.worldfloraonline.org/)

Fig. 3. Main habitats of mosses on the Tokinsky Stanovik Range. A: dwarf-shrub tundra and rock outcrops on the watershed between the Bolshie Tuksani and Sylaktyliak-1 Rivers; B: subalpine meadows on volcanic plateau in upper course of the Malyj Okonon River valley; C: wet outcrops in the Oyur River valley; D: screes in the Solokit River valley; E: spruce forest in the Sylaktyliak-1 River headwaters; F: larch forest with dwarf-shrubs and lichens in the Ulyagir River valley; G: base-rich outcrops in the Tok River valley; H: aufeus glades in Sylaktyliak-1 River floodplain. Photos: S.V. Dudov, 2018.

shrub-lichen tundras with *Rhododendron redowskianum, Salix phlebophylla, S. nasarovii, Alectoria ochroleuca, Cladonia* spp. are formed. On the base-rich soils, communities with *Kobresia filiformis* and *K. simpliciusula* occur. In such communities, calciphilous mosses such as *Distichium capillaceum, Tortella arctica, T. spitzbergensis, Myurella* spp. are frequent. In intermountain saddles and on mountain terraces, tundra swamps of various composition are formed, typically with *Eriophorum humile, Scirpus maximoviczii, Arctagrostis latifolia, Carex* spp. Among mosses *Tomentypnum involutum, Scorpidium cossonii, Campylium stellatum,* and *Aulacomnium palustre* are most common. The most diverse moss communities in the upper mountain belts are confined to rock outcrops, screes, and also individual boulders. *Grimmia jacutica, G. longirostris, Niphotrichum canescens,* and *Hypnum cupressiforme* are most common on rocky substrates. The highest peaks (2200–2400 m a.s.l.) are covered by rockfields, where vegetation is represented only by communities of crustaceous lichens *Lecanora badia, Rhizocarpon geographicum,* and *R. grande* (Schlothgauer, 1990).

LIST OF SPECIES

In the annotated list of species nomenclature of mosses largely follows Cherdantseva *et al.* (2018) with some improvements. Annotations include absolute altitudinal range (in brackets), numbers of our collecting localities according to Table 1, and brief description of ecology. These localities do not reflect actual distribution of species and their frequency. For widespread species, we additionally describe their role in communities and distribution throughout the study area. For the species previously reported from the area literature references are provided. At the same time, for the species collected by K.A. Volotovskij and not found by us, we cite their distribution through the altitudinal belts, since species altitudinal distribution was not provided by Stepanova *et al.* (1995). Species new for the Amur Region are marked with asterisk (*), new for the southern part of the Russian Far East with **, and new for Yakutia with ***.

Abietinella abietina (Hedw.) M. Fleisch. – Stepanova *et al.,* 1995; [1400–1800 m] 23, 24, 27: rock outcrops, soil in dwarf-shrub and forb tundras, at tree bases in forests; widely distributed in the study area.

Amblystegium serpens (Hedw.) Bruch, Schimp. & W. Gümbel – Stepanova *et al.,* 1995: taiga, subalpine and alpine belts: rock outcrops, dwarf-schrub tundra. For our territory, *Amblystegium serpens* var. *juratzkanum* (Schimp.) Rau & Herv is also listed.

Amphidium asiaticum Sim-Sim, Afonina & M. Stech – [1143] 39: on rock outcrops.

A. lapponicum (Hedw.) Schimp. – Stepanova *et al.,* 1995; [830–1800 m] 5, 14, 21, 31, 36: in crevices of rock outcrops and cliffs.

A. mougeotii (Bruch & Schimp.) Schimp. – [800-1030 m] 1, 29: on wet base-rich rock outcrops.

Andreaea rupestris Hedw. – Stepanova *et al.,* 1995; [1055–2014 m] 3, 8, 10, 11, 16, 19, 21, 27, 45: on acidic boulders near streams, on rock outcrops and rock-fields. We also collected *A. rupestris* var. *sparsifolia* (Zetterst.) Sharp [1585 m] 27: on the moist shaded rock wall.

A. obovata Thed. – Brotherus *et al.,* 1916: [1800 m] mountain pass from Bolshie Tuksani to Mulam.

Anoectangium thomsonii Mitt. – [800–1230 m] 25, 26, 28, 29: on walls and in crevices of rock outcrops (mainly base-rich), on soil in community with *Salix saxatilis* and *Equizetum variegatum* in the aufeis glade.

Anomobryum concinnatum (Spruce) Lindb. – Stepanova *et al.,* 1995; [740–980 (?1700) m] 5, 29, 30: in crevices of base-rich rock outcrops; on wet rock block in dwarf-shrub lichen tundra.

Anomodon thraustus Müll. Hal. – [800 m] 29: on base-rich rock outcrops.

Aquilonium plicatulum (Lindb.) Hedenäs, Schlesak & D. Quandt – Stepanova *et al.,* 1995; [680–1600 m] 12, 28, 49, 50: on fallen logs, trunks of spruce, larch, siberian dwarf pine and stone birch.

Arctoa blyttii (Bruch, Schimp. & W. Gümbel) Loeske – [1400–1650 m] 11, 21, 22, 26, 27: on boulder in stream bed and in forb snowbed tundra.

A. glacialis (Berggr.) Fedosov, Jan Kučera & M. Stech – Stepanova *et al.,* 1995: taiga belt: on wet rock outrops in river canyon.

A. fulvella (Dicks.) Bruch, Schimp. & W. Gümbel – [1600 m] 27: on boulders of rock field with dwarf shrub tundra, on shaded rocks.

A. starkei (F. Weber & D. Mohr) Loeske – Stepanova *et al.,* 1995; [1400 m] 17: among rocks in rock field.

***Aulacomnium acuminatum* (Lindb. & Arnell) Kindb. – [801–1469 m] 40, 48: in open larch forest and minerotrophic tundra bog.

A. palustre (Hedw.) Schwägr. – Stepanova *et al.,* 1995; [1400–1500 m] 10, 26, 32: on soil in bogs, dwarf birch communities and subalpine meadows.

A. turgidum (Wahlenb.) Schwägr. – Stepanova *et al.,* 1995; [756-1390 m] 48, 49: in moss- and dwarf shrub-moss dominated tundras, in dwarf pine thickets, in open larch forests and in *Sphagnum* bogs, widely distributed.

**Bartramia deciduaefolia* Broth. & Yasuda – [532–1034 m] 7, 27, 34: on wet rock outcrops near streams and lakes.

B. ithyphylla Brid. – Stepanova *et al.,* 1995; [970–1966 m] 5, 14, 20, 21, 22, 23, 31, 45: on wet rock outcrops, shaded cliff walls near watercourses.

B. pomiformis Hedw. – Stepanova *et al.,* 1995; [1000–1260 m] 2, 20: in permafrost crevices on steep boggy slopes, on shaded rocks.

Blindia acuta (Hedw.) Bruch, Schimp. & W. Gümbel – Stepanova *et al.,* 1995; [980–1270 m] 5, 6, 7, 21, 28: on rock outcrops near the watercourses, and on boulders in streambeds.

Blindiadelphus diversifolius (Lindb.) Fedosov & Ignatov – [800 m] 29: on wet vertical walls of base-rich rock.

Brachythecium albicans (Hedw.) Schimp. – Stepanova *et al.,* 1995: taiga belt: on spruce trunk in spruce forest.

B. baicalense Ignatov – [802–1420 m] 27, 48: on fine soil in birch crooked birch forests and on dead wood in floodplain poplar forest.

B. cirrosum (Schwägr.) Schimp. – [800–1800 m] 23, 31, 32, 40, 42: on base-rich cliffs and outcrops, on fine soil in dwarf-shrub tundra.

B. erythrorrhizon Schimp. – Stepanova *et al.,* 1995; [1300–1471 m] 16, 25, 34, 42: among the rocks in rockfields; on poplar trunks on floodplain forest.

B. mildeanum (Schimp.) Schimp. ex Milde – Stepanova *et al.,* 1995: taiga belt: on soil in birch (*Betula lanata*) forest.
B. rotaeanum De Not. – [619 m] 51: on trunk bases in spruce forest.
****B. turgidum** (Hartm.) Kindb. – Stepanova *et al.,* 1995; [1621 m] 43: dwarf-shrub moss tundra on base-rich soils; base-rich outcrops.
B. udum I. Hagen – Stepanova *et al.,* 1995: taiga belt: birch (*Betula lanata*) forest.
***Brideliella demetri* (Renauld & Cardot) Fedosov, M.Stech & Ignatov – [1000–1783 m] 5, 21, 29, 41-43: on rock outcrops, on soil in aufeus glade communities and in dwarf-shrub moss tundra on base-rich soil.
Bryobrittonia longipes (Mitt.) Horton – Stepanova *et al.,* 1995: taiga belt: on rock outcrops on the lake bank.
Bryoerythrophyllum recurvirostrum (Hedw.) P.C. Chen – Stepanova *et al.,* 1995; [1000–1763 m] 5, 43: in cliff crevices, on base-rich soil.
Bryum argenteum Hedw. – Stepanova *et al.,* 1995; [532–1700? m] 34: on rock outcrops near the watercourses, in snowbeds.
B. cyclophyllum (Schwägr.) Bruch & Schimp. – Stepanova *et al.,* 1995: subalpine belt: under rock outcrops in glacial cirque, in dwarf-shrub tundra.
B. pseudotriquetrum (Hedw.) P. Gaertn., B. Mey. & Scherb. – Stepanova *et al.,* 1995; [970–1800 m] 23, 27, 29, 30, 40, 42: in various wet habitats mainly in valleys: wet rock niches and depressions, on fine soil on stream banks, on rock outcrops near watercourses.
B. teres Lindb. – Stepanova *et al.,* 1995: taiga belt: base-rich outcrops.
Buckia vaucheri (Lesq.) D. Rios, M.T. Gallego & J. Guerra – [1539] 40: on limestone eluvium.
Bucklandiella microcarpa (Hedw.) Bednarek-Ochyra & Ochyra – Stepanova *et al.,* 1995; [1530–1800 m] 21, 23, 27, 37, 43: on rock outcrops in tundra belt, on boulders near streams.
B. sudetica (Funck) Bednarek-Ochyra & Ochyra – Stepanova *et al.,* 1995; [1300–1380 m] 27: on boulders and rock outcrops in tundra belt.
Calliergon cordifolium (Hedw.) Kindb. – Brotherus *et al.,* 1916: taiga belt: on bank of the Toko Lake.
C. giganteum (Schimp.) Kindb. – Stepanova *et al.,* 1995: taiga belt: moss community on anfeus glade.
C. richardsonii (Mitt.) Kindb. – Stepanova *et al.,* 1995; [800 m] 29: in small pool near base-rich rock outcrops; on wet outcrops.
Calliergonella lindbergii (Mitt.) Hedenäs – Stepanova *et al.,* 1995; [1800 m] 23: on rock outcrops in dwarf-shrub tundra.
**Campylium bambergeri* (Schimp.) Hedenäs, Schlesak & D. Quandt – Stepanova *et al.,* 1995; [1504 m] 40: on boulder; on wet outcrops.
C. chrysophyllum (Brid.) Lange – [740–1000 m] 29, 33: on fine soils in the aufeis glade community, on pebble alluvium.
C. protensum (Brid.) Kindb. – Stepanova *et al.,* 1995; alpine belt: on soil in dwarf-shrub-forb-sedge community.
C. stellatum (Hedw.) C.E.O. Jensen – Stepanova *et al.,* 1995; [(1000?) 1475–1899 m] 40–42, 46: in wet tundra and mineratrophic tundra peatbogs, on soils in the aufeis glade moss-horsetail community.
**Campylopus schimperi* Milde – [1000 m] 5: in cliff crevices.
**Catoscopium nigritum* (Hedw.) Brid. – [1469–1525 m] 40: on minerotrophic tundra peatbogs.
Ceratodon purpureus (Hedw.) Brid. – Stepanova *et al.,* 1995; [1330 m] 15: on soil, fallen logs, rocks, burnt wood, and cliffs of various composition.
Chionoloma cf. *tenuirostre* (Hook. & Taylor) M. Alonso, M.J. Cano & J.A. Jiménez – Stepanova *et al.,* 1995; [750–1400 m] 5, 25, 33: on rock outcrops in crevices, on poplar.
***Cinclidium arcticum* (Bruch, Schimp. & W. Gümbel) Schimp. – (SASY) [1469 m] 40: in moist sedge-willow tundra.
***C. stygium* Sw. – Stepanova *et al.,* 1995; [970–1707 m] 30, 41: in stream bed in the Syvaktyliak River valley, on moist soil near ground water discharge in tundra belt, on rock outcrops and mossy larch forests.
***C. subrotundum* Lindb. – [1330 m] 40: in moist sedge-willow tundra.
Climacium dendroides (Hedw.) F. Weber & D. Mohr – [960–1300 m] 30: on soil in floodplain forest and crooked birch forests.
Cnestrum schisti (F. Weber & D. Mohr) I. Hagen – Stepanova *et al.,* 1995; taiga belt: on terraces of rock outcrops in stream canyon.
**Conostomum tetragonum* (Hedw.) Lindb. – Stepanova *et al.,* 1995; [1300–1600 m] 17, 20, 22, 27, 40: on fine soil, wet rocks and boulders near watercourses and in snowbeds in taiga, subalpine and alpine belts.
**Coscinodon hartzii* C.E.O. Jensen – [970–1453 m] 5, 33: in cliff crevices.
****C. yukonensis* Hastings – [1100 m] 19: on vertical wall of rock pillar in the Bolshie Tuksani River valley.
C. cf. *cribrosus* (Hedw.) Spruce – [1300–1600 m] 16, 26, 27: on cliffs and rock outcrops in the Bolshie Tuksani River upstreams.
Cratoneuron filicinum (Hedw.) Spruce – Stepanova *et al.,* 1995; taiga belt: on base-rich outcrops.
Cynodontium asperifolium (Lindb. & Arnell) Paris – [740–1500 m] 4, 7, 12, 19, 27, 28, 32, 49, 50: on boulders, rocks, and fallen logs in all altitude belts.
C. strumiferum (Hedw.) Lindb. – Stepanova *et al.,* 1995; [800–1600 m] 1, 6, 8, 11, 20, 27, 48: on soil banks near watercourses, on boulders and rocks in all altitude belts.
C. tenellum (Schimp.) Limpr. – Stepanova *et al.,* 1995; [1000–1300 m] 7, 20: on boulder, in crevices of acidic rock outcrops in all altitude belts.
Cyrtomnium hymenophylloides (Huebener) T.J. Kop. – Stepanova *et al.,* 1995; [800–1707 m] 32, 41: on base-rich rock outcrops, on moist soil near ground water discharge in tundra belt.
C. hymenophyllum (Bruch & Schimp.) Holmen – Stepanova *et al.,* 1995; alpine belt: tundra in snowbed.
Dichodontium pellucidum (Hedw.) Schimp – Stepanova *et al.,* 1995; [900–1000 m] 4, 29: on rock outcrops and boulders in rock fields, on lake shore in Zeya River valley.
Dicranella cerviculata (Hedw.) Schimp. – [1020 m] 1: on fine soil on steep bank of the Anachan River.
D. heteromalla (Hedw.) Schimp. – [1480–1790 m] 27, 32: on fine soil in tundra, on sandy alluvium.
D. subulata (Hedw.) Schimp. – Stepanova *et al.,* 1995; [1030–1500 m] 2, 12: on fine soil on stream bank, on mossy cliffs and rotten logs in valleys.
Dicranodontium denudatum (Brid.) E. Britton – Stepanova *et al.,* 1995; [1230 m] 28: on rock outcrops in spruce forest.
Dicranum acutifolium (Lindb. & Arnell) C.E.O. Jensen – Stepanova *et al.,* 1995; [750–1470 m] 1, 40, 42, 49: on soil and at tree base in larch forests, on soil in wet sedge–willow tundra and forb meadow in the snowbeds.

D. angustum Lindb. – Stepanova *et al.,* 1995; [1400 m] 10: on soil in the dwarf birch community in the Inarogda River upstreams, in low shrub tundra.

D. bardunovii Tubanova & Ignatova – [800–1500 m] 11, 30, 40, 48: among boulders in rock fields, on soil and on trunk bases in open larch forests, on soil in forb meadow in subalpine belt.

D. bonjeanii De Not. – [1450–2030 m] 10, 22, 27, 32, 40, 45, 46, 47: on soil in various tundra communities, in forb communities in snowbeds and rock fields in alpine belt, on trunk bases of larches in subalpine belt.

D. elongatum Schleich. ex Schwägr. – Stepanova *et al.,* 1995; [1000–1600 m] 1, 2, 3, 8, 9, 11, 12, 20, 21, 27, 31, 40, 43: on soil, on rotten wood and trunk bases of larches in larch woodlands, on soil in tundra and dwarf pine thickets, among boulders of rock fields, in crevices of rock outcrops.

D. flagellare Hedw. – [1100 m] 8: on boulder in rock field.

D. flexicaule Brid. – Stepanova *et al.,* 1995; [800–2010 m] 1, 11, 32, 40, 41, 45–47, 49: on trunk bases of larches, among boulders in rock fields, on soil in tundra and tundra bogs.

D. fragilifolium Lindb. – Stepanova *et al.,* 1995; [700–1400 m] 9, 10, 30, 49, 50: on rotten wood and on trunk bases of conifers.

D. fuscescens Turner – Stepanova *et al.,* 1995; [680–1500 m] 1, 9, 10, 12, 26, 30, 32, 40, 49, 50: on soil, fallen logs, tree trunk bases in forests of different types, in rock fields and outcrops, in sedge-willow tundra.

D. groenlandicum Brid. – Stepanova *et al.,* 1995; [790–1800 m] 46, 48, 49: on soil in open larch forests and dwarf-shrub tundra.

D. laevidens R.S. Williams – [1590–1760 m] 43, 44: in dwarf-shrub tundra and tundra bog.

D. leioneuron Kindb. – Stepanova *et al.,* 1995; [1470–1550 m] 40, 44: in moist sedge-willow tundra on base-rich soil.

D. majus Turner – Stepanova *et al.,* 1995; [800–1800 m] 12, 16, 22, 26, 27, 34, 40, 43, 48: on soil in larch and spruce forests, peat bods, subalpine meadows and dwarf-shrub tundra, among boulder in rock fields.

D. majus var. *orthophyllum* A. Braun ex Milde – [1600 m] 22: subalpine meadow with shrubs on cirque floor, on soil.

D. montanum Hedw. – [680–1500 m] 12, 48, 50: on trunk bases of conifers, on rotten log.

D. pacificum Ignatova & Fedosov – [1500 m] 10, 12: on trunk bases of conifers and rotten logs in open larch and larch-spruce forests in the Inarogra River upstreams.

D. polysetum Sw. – [620–1500 m] 12, 50, 51: on soil in larch and spruce forests, in siberian dwarf pine thickets.

D. schljakovii Ignatova & Tubanova – [1000–1600 m] 1, 4, 11, 19, 27: on trunk bases of conifers, on boulders in rock fields, on fine soil in tundra, on rock outcrops and pillars throughout the altitudinal range.

D. scoparium Hedw. – Stepanova *et al.,* 1995; [1400 m] 27: on birch trunk bases in crooked *Betula lanata* forest.

D. spadiceum J.E. Zetterst. – Stepanova *et al.,* 1995; [800–1500 m] 11, 16, 16, 20, 27, 28, 32, 40, 47: among boulders in rock fields, on rock outcrops, on soil in tundra and on trunk bases in spruce forests.

D. undulatum Schrad. ex Brid. – Stepanova *et al.,* 1995; [700–1300 m] 1, 3, 9, 48, 49, 50: on soil, trunk bases and rotten wood in larch forests.

Didymodon asperifolius (Mitt.) H.A. Crum, Steere & L.E. Anderson – Stepanova *et al.,* 1995; [1470 m] 40: on boulder in sedge-willow tundra.

D. icmadophilus (Schimp. ex Müll. Hal.) R.H. Zander – [800 m] 29: on base-rich rock outcrops in Zeya River valley.

***D. subandreaeoides* (Kindb.) R.H. Zander – [1550 m] 40: on base-rich soil in forb and dwarf-shrub tundra.

D. cf. *validus* Limpr. – [800 m] 29: on base-rich cliff in Zeya River valley.

D. zanderi Afonina & Ignatova – [830–1300 m] 25, 31: on cliffs and rock outcrops.

Dilutineuron brevisetum (Lindb.) Bedn.-Ochyra, Sawicki, Ochyra, Szczecińska & Plášek – [1100 m] 19: on boulder in stream water.

D. corrugatum (Bedn.-Ochyra) Bednarek.-Ochyra, Sawicki, Ochyra, Szczecińska & Plášek – [1469–1763 m] 40, 43: on boulders and rock fragments.

****D. fasciculare* (Hedw.) Bedn.-Ochyra, Sawicki, Ochyra, Szczecińska & Plášek – [1300–1900 m] 23–25: on rock outcrops in subalpine and alpine belts.

Distichium capillaceum (Hedw.) Bruch, Schimp. & W. Gümbel – Stepanova *et al.,* 1995; [800–1520 m] 5, 20, 31, 40, 42: in cliff crevices and on boulders, on calcicolous soil in alpine belt.

D. inclinatum (Hedw.) Bruch & Schimp. – Stepanova *et al.,* 1995; taiga belt: wet rock crevices, wet marble rock outcrops.

Ditrichum cf. *heteromallum* (Hedw.) E. Britton – [1400 m] 17: among boulders in rock fields.

D. cf. *lineare* – [1450 m] 33: in rock crevices.

D. cf. *pusillum* (Hedw.) Hampe – Stepanova *et al.,* 1995; [1000 m] 1: on fine soil on steep bank of the Anachan River.

Drepanium fastigiatum (Hampe) Lange & C.E.O. Jensen – Stepanova *et al.,* 1995; [1460 m] 1: on base-rich outcrops and boulders.

Drepanocladus aduncus (Hedw.) Warnst. – Stepanova *et al.,* 1995; [1500 m] 13: on the bottom of stream in the Inarogda River upstreams; on rotten log in spruce forest.

***Encalypta alpina* Sm. – Stepanova *et al.,* 1995; [1854–2020 m] 45: on calcareous rock outcrops, on soil moist due to base-rich seepage water in alpine belt.

E. brevipes Schljak. – Stepanova *et al.,* 1995; alpine belt: on rock outcrops on stream bank.

**E. brevicollis* Ångstr. – [1600 m] 27: on fine soil among boulders in rock field.

E. ciliata Hedw. – Stepanova *et al.,* 1995; [800–1400 m] 14, 29: on rock outcrops and on sandy alluvium.

**E. rhaptocarpa* Schwägr. – [800 m] 29: in crevices of base-rich cliffs.

E. procera Bruch – [1458–1707 m] 41, 42: on wet soil in tundra and forb communities in subalpine and alpine belts.

Entodon concinnus (De Not.) Paris – [1458–1707 m] 40: on soil in forb meadow in snowbed.

Eurhynchiastrum pulchellum (Hedw.) Ignatov & Huttunen – Stepanova *et al.,* 1995; taiga belt: on rock outcrops.

Flexitrichum flexicaule (Schwägr.) Ignatov & Fedosov – [800–1552 m] 40, 42, 48: tundra on base-rich soil, forb meadow in snowbed.

F. gracile (Mitt.) Ignatov & Fedosov – [800–1800 m] 27, 32, 33: in shaded niche of base-rich cliff.

Fissidens osmundoides Hedw. – [1000 m] 29: on soil on aufeis glade.

Fontinalis perfida Cardot. – [1000 m] 1, 7: in shallow water of the Anachan and Uliagir Rivers, locally abundant. Stepanova *et al.* (1995) also listed *Fontinalis antipyretica* Hedw. (taiga belt, on soil in the aufeis glade). In connection with the revision of the genus, additional herbarium material are required to confirm the presence on this species

Funaria hygrometrica Hedw. – Stepanova *et al.,* 1995; [1000–1800 m] 1, 36: on fine soil near small pond near the "Ulak–Elga" railroad and on natural salt lick in tundra belt.

Gollania turgens (Müll. Hal.) Ando – [1490 m] 40: in minerotrophic tundra bog.

**Grimmia donniana* Sm. – [1470–1700 m] 11, 40: on boulders in tundra.

**G. funalis* (Schwägr.) Bruch, Schimp. & W. Gümbel – [800–1900 m] 29, 47: on base-rich rock outcrops in Zeya River valley, on stones in alpine belt.

**G. incurva* Schwägr. – [1600 m] 27: on rock outcrops in watershed between Bolshie Tuksani and Sylaktyliak river basins.

G. jacutica Ignatova, Bedn.-Ochyra, Afonina & Muñoz – [740–1820 m] 4, 6, 8, 11, 15, 16, 17, 20, 21, 27, 32, 40, 43, 46, 47, 48, 50: on boulders in rock fields, on rock outcrops. The most frequent species of the genus in our territory.

G. longirostris Hook. – [1000–1600 m] 4, 7, 14, 16, 19, 25, 27, 40, 45, 49: on boulders and rock outcrops. Widely distributed in the study area.

G. mollis Bruch & Schimp. – Stepanova *et al.,* 1995; alpine belt: on boulder in dwarf shrub–sedge–moss tundra.

G. reflexidens Müll. Hal. – [1800 m] 23, 42: on boulders in dwarf shrub tundra.

**G. torquata* Drumm. – [1600 m] 27: on rock outcrops in the watershed area among the Bolshie Tuksani and Sylaktyliak river basins.

G. unicolor Hook. – [1850 m] 45: on rock outcrops in alpine belt.

Gymnostomum aeruginosum Sm. – [800–1000 m] 5, 29: in crevices of base-rich rock outcrops in Tok and Zeya river valleys.

Hamatocaulis lapponicus (Norrl.) Hedenäs – Stepanova *et al.,* 1995; taiga and subalpine belts: wet shaded outcrops, dwarf-shrub moss tundra.

H. vernicosus (Mitt.) Hedenäs – Stepanova *et al.,* 1995; [1000? – 1470 m] 40: in minerotrophic tundra bog; on soil in larch forest and on base-rich outcrops.

Haplohymenium triste (Ces.) Kindb. – [800 m] 29: on base-rich boulder in Zeya River valley.

Hedwigia czernyadjevae Ignatova, Ignatov & Fedosov – [800–1100 m] 4, 8, 19, 20, 29: on boulders and insolated rock outcrops.

H. kuzenevae Ignatova & Ignatov – [740–1320 m] 16, 32, 48–50: on boulders and rock outcrops.

Helodium blandowii (F. Weber & D. Mohr) Warnst. – Stepanova *et al.,* 1995; [1000 m] 1: among *Sphagnum* in willow and dwarf shrub community in Anachan River floodplain, also collected on rotten log in spruce forest by T.A. Volotovskij.

Homalia trichomanoides (Hedw.) Brid. – Stepanova *et al.,* 1995; [800–1000 m] 4, 29: in shaded niches of cliffs and rock outcrops.

Homomallium connexum (Cardot) Broth. – [1000 m] 4: in crevices of rock outcrops in Tok River valley.

H. incurvatum (Schrad. ex Brid.) Loeske – Stepanova *et al.,* 1995; [800 m] 31: on base–rcih cliffs in Zeya River valley.

Hygrohypnella ochracea (Turner ex Wilson) Ignatov & Ignatova – Stepanova *et al.,* 1995; [950–1700? m] 28: on temporary stream alluvium in the Syvaktyliak–1 River valley; on wet outcrops, on boulders in water.

H. polaris (Lindb.) Ignatov & Ignatova – Stepanova *et al.,* 1995; [750–1500 m] 7, 12, 13, 14, 21, 31, 32, 38: on rocks along river banks and in river and brook beds.

Hygrohypnum luridum (Hedw.) Jenn. – Stepanova *et al.,* 1995; [750–1700? m] 33: on pebbly alluvium of Zeya River; also on wet calcareous outcrops, on boulders in stream.

Hylocomiadelphus triquetrus (Hedw.) Ochyra & Stebel – Stepanova *et al.,* 1995; [800–1660 m] 28, 43, 48: on rotten log in poplar-birch-larch forest, om soil in forb dwarf-shrub tundra.

Hylocomiastrum pyrenaicum (Spruce) M. Fleisch. – Stepanova *et al.,* 1995; [1500–1800 m] 22, 23, 43, 48: on outcrops in subalpine meadow with shrubs on cirque floor, in dwarf-shrub tundra.

Hylocomium splendens (Hedw.) Schimp. – Stepanova *et al.,* 1995; [1420 m] 10: on soil, tree trunks and fallen logs in forests, dwarf pine thickets and ernik communities, on soil in tundra. Forms extensive moss cover in taiga forests.

Hymenoloma crispulum (Hedw.) Ochyra – Stepanova *et al.,* 1995; [1150–1900 m] 22, 23, 27, 39: on soil and boulders in tundra communities and rock fields in alpine belt, on wet rock outcrops in forest belt.

Hymenostylium recurvirostrum (Hedw.) Dixon – [980–1515 m] 5, 48: on base-rich rock outcrops.

Hypnum cupressiforme Hedw. – Stepanova *et al.,* 1995; [500–1800 m] 4, 5, 12, 20, 27, 29, 30, 40, 41, 43, 48: on rock pillars, rock outcrops, on trunk bases of larches, on soil in dwarf-shrub tundra. Three specimens we determined as *Hypnum cupressiforme* var. *subjulaceum* Molendo (27, 29, 30).

H. leptothallum (Müll. Hal.) Paris – [1558 m] 40, on soil in dwarf-shrub lichen tundra.

H. saitoi Ando – Ivanova & Ignatov, 1999; [1400–1720 m] 11, 17, 27, 40: on boulders in tundra and in siberian dwarf pine thickets.

Isopterygiella alpicola (Lindb. & Arnell) Ignatov & Ignatova – Stepanova *et al.,* 1995; [1400 m] 14: in cliff crevices in the valley of tributary of Malyi Okonon River.

I. pulchella (Hedw.) Ignatov & Ignatova – Stepanova *et al.,* 1995; [1700–1800 m] 11, 23: in crevices of rock outcrops in tundra belt.

Isopterygiopsis catagonioides (Broth.) Ignatov & Ignatova – Ivanova & Ignatov, 1999 (as *I. muelleriana*); [1000–1800 m] 4, 7, 16, 20, 21, 27, 28, 31, 32, 36: on soil in dwarf-shrub tundra, on boulders, rock outcrops and cliffs throughout altitudinal range.

Iwatsukiella leucotricha (Mitt.) W.R. Buck & H.A. Crum – Ivanova & Ignatov, 1999; [800–1300 m] 20, 25, 27, 28, 32, 48: on tree branches and trunks, more frequently on spruce, on rock walls and boulders.

Jochenia pallescens (Hedw.) Hedenäs, Schlesak & D. Quandt – Stepanova *et al.,* 1995; [800 m] 48: on boulder in larch forest; on tree bases.

Leptobryum pyriforme (Hedw.) Wilson – Stepanova *et al.,* 1995; [800 m] 48: on trunk base of larch, also is specified to base-rich rock outcrops and burnout.

Leptodictyum riparium (Hedw.) Warnst. – Stepanova *et al.,* 1995; taiga belt: birch (*Betula lanata*) forest, willow thickets.

Leskea polycarpa Hedw. – Stepanova *et al.,* 1995; taiga belt: on trunk base of spruce.

Lewinskya elegans (Schwägr. ex Hook. & Grev.) F. Lara, Garilleti & Goffinet – [1400 m] 28: on spruce branches.

L. sordida (Sull. & Lesq.) F. Lara, Garilleti & Goffinet – [800–1420 m] 18, 20, 24, 25, 32, 50: on willow, alder and poplar tree bases.

Loeskypnum badium (Hartm.) H.K.G. Paul – [800–1550 m] 10, 17, 44, 48: on tussok near lake shore, in mossy open larch woodlands, among boulders on rock field, in tundra peat bogs.

Lyellia aspera (I. Hagen & C.E.O. Jensen) Frye – Stepanova *et al.,* 1995; [1000 m] 7: on wet rock outcrops.

**Meesia minor* Brid. – [1621 m] 43: in dwarf-shrub tundra on base-rich soils.

M. triquetra (Jolycl.) Ångstr. – [1300 m] 15: in brook bed.

M. uliginosa Hedw. – Stepanova *et al.,* 1995; [1500–2020 m] 40, 41, 45: in tundra peat bogs, in wet tundra on base-rich soil, on base-rich outcrops.

**Mielichoferia asiatica* Tubanova & Ignatova – [1000 m] 5: in cliff crevices in the valley of Tok River.

Mnium lycopodioides Schwägr. – Stepanova *et al.,* 1995; [(1000?) 1400–1866 m] 17, 22, 41, 43, 45: on boulder in rock field, on fine soil in forb community in a snowbed and in dwarf-shrub tundra, in spruce forest and crooked birch forests.

M. blyttii Bruch & Schimp. – Stepanova *et al.,* 1995; taiga belt: on rotten log in spruce forest, on base-rich outcrops.

M. marginatum (Dicks.) P. Beauv. – Stepanova *et al.,* 1995; [1400 (1000–1700?) m] 25: on the poplar trunk base, on rotten logs and tree bases in spruce forests, in dwarf-shrub tundra, on base-rich outcrops.

M. spinosum (Voit) Schwägr. – Stepanova *et al.,* 1995; taiga belt: spruce forest.

M. spinulosum Bruch & Schimp. – [1500 m] 12: on rocks in a stream bed.

M. thomsonii Schimp. – [800–850 m] 28, 29: on base-rich rock outcrops in the Zeya River valley.

Molendoa sendtneriana (Bruch. & Schimp) Limpr. – [530–980 m] 5, 39, 34: on base-rich rock outcrops in the Zeya River valley.

Myurella julacea (Schwägr.) Schimp. – Stepanova *et al.,* 1995; [830–1700 m] 5, 28, 40, 41, 45: on rock outcrops, on rotten log, in dwarf-shrub tundra on base-rich soil.

M. sibirica (Müll. Hal.) Reimers – Stepanova *et al.,* 1995; [800–1700 m] 31, 32, 41: on base-rich rock outcrops, in dwarf-shrub tundra on base-rich soils.

M. tenerrima (Brid.) Lindb. – [1000?–1700 m] 41: in dwarf-shrub tundra on base-rich soil, on trunk bases in spruce forest.

Neckera oligocarpa Bruch – [800–1600 m] 20, 27, 32: in shaded niches among boulders, on shaded cliffs.

N. cf. *pennata* Hedw. – Stepanova *et al.,* 1995; [600–1600 m] 25, 28, 51: on poplars and on rotten logs in river floodplains.

Nyholmiella obtusifolia (Brid.) Holmen & Warncke – Stepanova *et al.,* 1995; taiga belt: on poplars in valley forest.

Niphotrichum canescens (Hedw.) Bednarek-Ochyra & Ochyra – Stepanova *et al.,* 1995; [700–1925 m] 22, 27, 32, 50: on boulders and gravel soils in tundra and subalpine meadow communities.

N. ericoides (Brid.) Bednarek-Ochyra & Ochyra – Stepanova *et al.,* 1995; [1500 m] 26: on rock outcrops among subalpine meadow.

N. panschii (Müll. Hal.) Bednarek-Ochyra & Ochyra – Stepanova *et al.,* 1995; [1000–1925 m] 1, 2, 17, 21, 27, 29, 40, 43, 45: on rocks in rock fields, on gravel and sandy alluvium in river valleys, on soil in tundra.

**Oligotrichum falcatum* Steere – Stepanova *et al.,* 1995; [1000–1650 m] 2, 19, 22, 27: on sandy alluvium and wet boulders in valleys, on fine soil in snowbeds, among rocks in rock fields in tundra belt. Probably, record of *O. hercinicum* (Hedw.) DC in Stepanova *et al.,* 1995 should be referred to this species.

Oncophorus virens (Hedw.) Brid. – Stepanova *et al.,* 1995; [1469 m] 40: in sedge–willow tundra.

***Orthothecium retroflexum* Ignatova & Ignatov – Stepanova *et al.,* 1995; [1469–1900 m] 40, 41, 43, 46: in dwarf-shrub tundra on base-rich soil, on wet rock outcrops.

O. strictum Lorentz – Stepanova *et al.,* 1995; taiga and alpine belts: base-rich outcrops, willow–moss community in snowbed.

Paludella squarrosa (Hedw.) Brid. – Stepanova *et al.,* 1995; [970–1530 m] 30, 40: in temporary stream in boggy larch forest, in tundra peat bog.

P. fontana (Hedw.) Brid. – Stepanova *et al.,* 1995; [1050–1700? m] 1: on shore of the pool near “Ulak–Elga” railroad, also collected by K.A. Volotovskij on shaded wet outcrops, on wet sandy alluvium and in dwarf-shrub tundra.

P. tomentella Molendo – Brotherus *et al.,* 1916; [1000–1700 m] 29, 41: on soil in community with *Salix saxatilis* and *Equizetum variegatum* on the aufeis glade, on soil kept moist by base-rich seepage water in alpine belt.

Plagiomnium acutum (Lindb.) T.J. Kop. – [1400 m] 25: at the base of poplar in the Bolshie Tuksani River floodplain.

P. confertidens (Lindb. & Arnell) T.J. Kop. – [1050–1400 m] 24, 27: at base of alder, on rotten stubs and logs in river floodplains.

P. curvatulum (Lindb.) Schljakov – [800 m] 48: on soil in floodplain forest.

P. cuspidatum (Hedw.) T.J. Kop. – [800 m] 29: on rock near river bank.

P. ellipticum (Brid.) T.J. Kop. – Stepanova *et al.,* 1995; [600–740 (1700) m] 50, 51: on soil in larch and spruce floodplain forests, crooked birch forests, dwarf-shrub moss tundra.

P. medium (Bruch & Schimp.) T.J. Kop. – Stepanova *et al.,* 1995; taiga belt: birch (*Betula lanata*) forests, base-rich rock outcrops.

Plagiopus oederianus (Sw.) H.A. Crum & L.E. Anderson – [800–1700 m] 6, 29, 40, 41: in crevices of base-rich rock outcrops, on soil keep moist by base-rich seepage water in tundra.

Plagiothecium cavifolium (Brid.) Z. Iwats. – Stepanova *et al.,* 1995; [1000–1300 m] 4, 16: in shaded niche of rock outcrops, among boulders on rock field.

P. denticulatum (Hedw.) Schimp. – Stepanova *et al.,* 1995; [1200–1500 m] 12, 16, 20, 39: on wet dead wood in stream, on fine soil among boulders on rock field, in shaded cliff niche.

P. svalbardense Frisvoll – Stepanova *et al.,* 1995 (as *P. laetum*); [680–1500 m] 4, 8, 12, 20, 28, 32, 48–50: on shaded niches on outcrops, among boulders, on rotten log, on fallen roots.

Platydictya jungermannioides (Brid.) H.A. Crum – Stepanova *et al.,* 1995; taiga belt: on rotten logs in spruce forest, on base-rich outcrops, on wet rocks in canyon.

Platygyrium repens (Brid.) Schimp. – [740–1000 m] 4, 32, 50: on rock outcrops, boulders, rarer on fallen logs and trunk bases.

**Platyhypnum norvegicum* (Schimp.) Ochyra – [530 m] 34: on rocky bank of Zeya River.

Pleurozium schreberi (Brid.) Mitt. – Stepanova *et al.,* 1995; [1500 m] 12: on soil in dwarf shrub tundra, in low shrub tundra, in siberian dwarf pine thikets and crooked birch forests, in coniferous and small-leaved forests.

Pogonatum dentatum (Brid.) Brid. – Stepanova *et al.,* 1995; [1000–1500 m] 1, 2, 11, 12, 17: on barren soil, cliffs covered by soil in river floodplains, among boulders on rock fields.

P. urnigerum (Hedw.) P. Beauv. – Stepanova *et al.,* 1995; [1050–1750 m] 6, 22, 27, 40, 43: on sandy alluvium in river floodplains, on sandy and gravel soil in tundra communities.

Pohlia andrewsii A.J. Shaw – [1030–1970 m] 2, 45: on sandy alluvium, on bare soil in alpine belt.

P. atropurpurea (Wahlenb. ex Fuernr.) Lindb. – Stepanova *et al.,* 1995; alpine meadow in snowbed.

P. bulbifera (Warnst.) Warnst. – [1040 m] 1: on silt deposits of a temporary pool near the "Ulak–Elga" railroad.

P. camptotrachela (Renauld & Cardot) Broth. – [1300 m] 16: among boulders in rock field.

P. cruda (Hedw.) Lindb. – Stepanova *et al.,* 1995; [800–1850 m] 4, 25, 26, 31, 41, 48: in shaded wet niches of rock outcrops, on cliffs, in cryogenic crevices in tundra.

P. crudoides (Sull. & Lesq.) Broth. – Stepanova *et al.,* 1995; [740–1600 m] 27, 33, 35: on shaded acidic rock outcrops, on pebble alluvium.

P. drummondii (Müll. Hal.) Andrews – Ivanova & Ignatov, 1999; [1750] on wet soil in snowbed.

P. elongata Hedw. – [530–1000 m] 7, 34: in crevices of shaded rock outcrops.

P. filum (Schimp.) Mårtensson – [740–1600 m] 1, 21, 33: on fine soil on river and stream banks, cliffs covered by fine soil.

P. longicollis (Hedw.) Lindb. – – Stepanova *et al.,* 1995; [850–1400 m] 5, 7, 21, 28, 31: on shaded rock outcrops.

P. ludwigii (Spreng. ex Schwägr.) Broth. – [1590 m] 32: on fine soil in dry stream bed.

P. nutans (Hedw.) Lindb. – Stepanova *et al.,* 1995; [750–1600 m] 1, 12, 22, 35, 48, 49: on fallen logs, trunk bases, soil, and rocks in forests.

P. tundrae A.J. Shaw – [1000 m] 1: on fine soil on stream bank.

Polytrichastrum alpinum (Hedw.) G.L. Sm. – Stepanova *et al.,* 1995; [1050–1600 m] 7, 11, 27, 32, 41: on wet shaded cliffs, among blocks on rock fields, on soil in tundra communities.

Polytrichum commune Hedw. – Stepanova *et al.,* 1995; [1000–1500 m] 1, 10, 26: on soil in subalpine meadows, ernik communities, bogs and forests, rarely on fallen logs and trunk bases of trees.

P. hyperboreum R. Br. – [1475–1925 m] 40, 43, 45: in tundra communities.

P. jensenii I. Hagen – Stepanova *et al.,* 1995; [1000 m] 1: on soil in open larch forest in the Anachan River valley.

P. juniperinum Hedw. Stepanova *et al.,* 1995; subalpine and alpine belts: snowbeds, subalpine meadows, dwarf-shrub and sedge–cottongrass tundras.

P. piliferum Hedw. – Stepanova *et al.,* 1995; [1600–1700 m] 27, 32: on soil in dwarf schrub tundra and snowbed communities.

P. strictum Brid. – Stepanova *et al.,* 1995; [800–1650 m] 1, 11, 48: on soil in mountain tundras, in dwarf pine thickets and ernik communities, open larch forests, among blocks in rock fields.

P. swartzii Hartm. – [1000–1350 m] 1, 13: on silt deposits of a temporary pool near the "Ulak–Elga" railroad and the Dugdui Lake, on soil in floodplain willow communities.

Pseudobryum cinclidioides (Huebener) T.J. Kop. – Brotherus *et al.,* 1916; [1350 m] 13: on mossy shore of creek.

Pseudohygrohypnum fauriei (Cardot) Kučera & Ignatov – [1020–1320 m] 1, 16: on the ernik base in larch forest, on rock outcrops.

P. subarcticum Fedosov & Ignatova × *neglectum* Fedosov & Ignatova (see Fedosov *et al.,* 2022) – [1150 m] 39: on rock outcrops.

Pseudoleskeella papillosa (Lindb.) Kindb. – [1526] 34: on boulder in subalpine meadow.

**Pseudostereodon procerrimus* (Molendo) M. Fleisch – [1500 m] 40:on boulder in dwarf-shrub tundra.

Psilopilum cavifolium (Wilson) I. Hagen – Stepanova *et al.,* 1995; subalpine belt: snowbed community near stream.

P. laevigatum (Wahlenb.) Lindb. – Stepanova *et al.,* 1995; subalpine and alpine belts: on wet fine soil on stream banks and on rock terraces, on snowbeds.

Ptilium crista-castrensis (Hedw.) De Not. – Stepanova *et al.,* 1995; [900 m] 32: on soil under tree trunks and between rocks, in dwarf pine thickets and erniks, in cooked birch forests, in larch and spruce forests and in bogs.

Pylaisia condensata (Mitt.) A. Jaeger – Ivanova & Ignatov, 1999 (as *Pylaisiella selwynii*); [600–1300] 18, 30, 48, 51: on poplars.

P. polyantha (Hedw.) Bruch, Schimp. & W. Gümbel – Stepanova *et al.,* 1995; [800–1400 m] 18, 25, 30, 32, 50: on trunks of birch, alder, and poplar in valley forests.

Pylaisiadelpha tenuirostris (Bruch & Schimp. ex Sull.) W.R. Buck – [900 m] 30: on trunks of birch, aspen, and larch, on fallen logs.

Racomitrium lanuginosum (Hedw.) Brid. – Stepanova *et al.,* 1995; [1100–2012 m] 10, 11, 16, 17, 19, 22, 27, 32, 40, 41, 45, 47: on sandy alluvium, on boulders in rock fields, on rock pillars, in dwarf shrub tundra and forb communities in snowbeds.

Rhabdoweisia crispata (Dicks. ex With.) Lindb. – [530–1600 m] 2, 4, 20, 26, 27, 32, 33: in cliff niches and crevices, on rocks.

Rhizomnium pseudopunctatum (Bruch & Schimp.) T.J. Kop. – Stepanova *et al.,* 1995; [1400–1800 m] 17, 27, 43: on rock fields in forest and alpine belts, on gravel soil in dwarf-shrub tundra.

Rhodobryum ontariense (Kindb.) Kindb. – [1400 m] 28: on rotten stub in spruce forest in the Syvaktyliak river upstreams.

Rhytidium rugosum (Hedw.) Kindb. – Stepanova *et al.,* 1995; [1600 m] 27: on rocks, on soil in dwarf shrub tundra and communities of subalpine belt, often abundant, on tree trunk bases, rocky deposits, and cliffs.

Roaldia revoluta (Mitt.) P.E.A.S. Câmara & Carv.-Silva – Stepanova *et al.,* 1995; in all belts: on trunk bases, on fallen logs in spruce, larch and stone birch forests, in dwarf-shrub–moss–lichen tundra.

Saelania glaucescens (Hedw.) Broth. – Stepanova *et al.,* 1995; [1250–1600 m] 16, 20, 21, 27, 33: on side of hillock in dwarf shrub tundra, on bare soil among boulders on rock fields, in shaded cliff niches.

Sanionia uncinata (Hedw.) Loeske – Stepanova *et al.,* 1995; [1330–1600 m] 12, 15, 27, 32, 34, 48: on soil in mountain tundra, forb communities in snowbeds, subalpine meadows, dwarf pine thickets; on fallen logs, trunk bases of trees, and rocks in forests of various types. Most frequent in floodplains.

Sarmentypnum exannulatum (Schimp.) Hedenäs – Stepanova *et al.,* 1995; [1000–1500 m] 1, 2, 10, 13, 15: in temporary watercourses and hollows on bogs and boggy forests, on soil in shrub communities in floodplains.

S. pseudosarmentosum (Cardot & Thériot) Hedenäs – [800–1600 m] 27, 44: on ground water discharge place among rock outcrops, on wet depression in tundra peat-bod.

S. sarmentosum (Wahlenb.) Tuom. & T.J. Kop. – Stepanova *et al.,* 1995; [1000–1780 m] 1, 7, 17, 29, 32, 34, 36: on gravel and rocks in rivers and brooks beds; wet boulders and in tundra sedge-moss bog.

S. trichophyllum (Warnst.) Hedenäs – [1590 m] 32: on rock on stream bed.

Schistidium agassizii Sull. & Lesq. – Stepanova *et al.,* 1995; [1420–1590 m] 26, 32: on rock in the Bolshie Tuksani River and its tributaries upstreams.

S. austrosibiricum Ignatova & H.H. Blom – [800–1030 m] 5, 7, 29: on base-rich rock outcrops.

S. liliputanum (Müll. Hal.) Deguchi – [1030 m] 4: on rock field.

S. papillosum Culm. – [1100–1470 m] 14, 19, 40: in crevices of wet rock outcrops, on boulders in water of streams and wet tundra.

S. platyphyllum (Mitt.) Perss. – [730–976 m] 4, 30, 31: on rock outcrops near streams, on pebble alluvium.

S. pulchrum H.H. Blom – [800 m] 29: on base-rich cliffs.

S. rivulare (Brid.) Podp. – Stepanova *et al.,* 1995; taiga belt: on wet boulders on a stream bed.

S. subjulaceum H.H. Blom – [1540–1780 m] 40, 41: on soil and rocks in dwarf-shrub tundra and snowbed communities.

S. tenuinerve Ignatova & H.H. Blom – [1000 m] 7: on cliffs in the Tok River valley.

Sciuro-hypnum curtum (Lindb.) Ignatov – [680 m] 50: on birch in floodplain forest.

S. latifolium (Kindb.) Ignatov & Huttunen – Stepanova *et al.,* 1995; taiga belt: spruce forest.

S. plumosum (Hedw.) Ignatov & Huttunen – [1150–1320 m] 16, 20, 29, 50: on soil and rocks in rock fields, on rock outcrops, on pebble alluvium.

S. reflexum (Starke) Ignatov & Huttunen – Stepanova *et al.,* 1995; subalpine belt: subalpine forb meadow.

Scorpidium cossonii (Schimp.) Hedenäs – [1470 m] 40: in mire in mountain tundra.

S. revolvens (Sw. ex anon.) Rubers – Stepanova *et al.,* 1995; [850–1500 m] 29, 40: in shallow water of lake with sedge–*Sphagnum* floating mat, in mire in mountain tundra, in forb community an anfeus glade.

S. scorpidioides (Hedw.) Limpr. – Stepanova *et al.,* 1995; [850–1470 m] 29, 40: in shallow water of lake with sedge–*Sphagnum* floating mat, in mire in mountain tundra; in hollows in bog.

Scouleria pulcherrima Broth. – [1050 m] 6: on boulder in the Tok River bed.

Seligeria polaris Berggr. Stepanova *et al.,* 1995; taiga belt: shaded wet rock outcrops.

S. tristichoides Kindb. – [800 m] 29: on base-rich cliff.

Sphagnum alaskense R.E. Andrus & Janssens – [1020–1580 m] 1, 44: in hollows in sedge–sphagnum bog.

S. andersonianum R. E. Andrus – [1040–1600 m] 1, 27: on open boggy larch woodland, on ground water discharge place in mountain tundra.

S. angustifolium (C.E.O. Jensen ex Russow) C.E.O. Jensen – Stepanova *et al.,* 1995; [750–1500 m] 1, 10, 12, 26, 48, 49: in boggy larch forests, subalpine meadows and ernik communities.

S. annulatum Warnst. – [1400 m] 9: on floating *Sphagnum* mat on a lake shore in the Inarogda River upstreams, with *S. perfoliatum*.

S. aongstroemii Hartm. – Stepanova *et al.,* 1995; [800–1720 m] 11, 17, 44, 48: on shore of pool in mountain tundra, on soil among boulders in rock field.

S. balticum (Russow) C.E.O. Jensen – [820–1600 m] Stepanova *et al.,* 1995; 1, 20, 27, 40, 44, 48: in wet mossy tundras and dwarf pine thickets, *Sphagnum* bogs, boggy larch forests.

S. beringiense A.J. Shaw, R.E. Andrus & B. Shaw – [1000–1500 m] 1, 10, 26: near lakes at water edge, in ernik and subalpine meadow communities.

S. capillifolium (Ehrh.) Hedw. – Brotherus *et al.,* 1916; [1400–1530 m] 10, 12, 23, 40: in mossy tundra, ernik community, open larch forest.

S. compactum Lam. & DC. – Stepanova *et al.,* 1995; [1400–1600 m] 10, 27, 44: in dwarf shrub tundra and ernik community.

S. divinum Flatberg & Hassel – Stepanova *et al.,* 1995 (as *S. magellanicum*); [750–1000 m] 1, 32, 48: in peat bogs, in boggy larch forest.

S. fallax (Klinggr.) Klinggr. – Stepanova *et al.,* 1995; [740 m] 50: in mossy larch forest.

S. fimbriatum Wilson – Stepanova *et al.,* 1995; [800–1300 m] 1, 15, 48: on banks and in shallow waters of creeks, in wet-dwarf pine thickets.

S. flexousum Dozy & Molk. – Stepanova *et al.,* 1995; taiga belt, in spruce forest.

S. fuscum (Schimp.) H. Klinggr. – Stepanova *et al.,* 1995; [800–1500 m] 1, 12, 32, 48: in bogs and boggy larch forests.

S. girgensohnii Russow – Stepanova *et al.,* 1995; [800–1650 m] 1, 12, 16, 20, 22, 43, 48–51: in dwarf pine thickets and ernik communities, in bogs, spruce and larch forests.

S. imbricatum Hornsch. ex Russow – [1000–1320 m] 1, 18: in willow and dwarf shrub community in anfeus glades in valleys.

S. lenense H. Lindb. ex Pohle Stepanova *et al.,* 1995; [821–1583 m] 40, 44, 48: peat bogs, wet sedge–willow tundra.

S. lindbergii Schimp. – Stepanova *et al.,* 1995; [800–1420 m] 1, 10, 48: on inundated lake shores, in waterlogged depression.

S. obtusum Warnst. – Stepanova *et al.,* 1995; [1300 m] 15: in lake as floating mats.

S. orientale L.I. Savicz – [1400–1460 m] 14, 42: in ernik community in the stream valley.

S. platyphyllum (Lindb. ex Braithw.) Sull. ex Warnst. Stepanova *et al.,* 1995; all belts: in rock crevises with seeping water.

S. perfoliatum L.I. Savicz – [1580–1900 m] 44, 46: on tundra peat bog, on ground water discharge place in dwarf-shrub tundra.

S. riparium Ångstr. – Stepanova *et al.,* 1995; [1000–1100 m] 1: in waterlogged depressions in bogs and boggy larch forests.

S. rubellum Wilson [800–1600] 44, 48: on peat bogs.

S. russovii Warnst. – Stepanova *et al.,* 1995; [1500 m] 12: on a stream bank in open spruce–larch forest.

S. squarrosum Crome – Stepanova *et al.,* 1995; [1000–1300 m] 1, 15: on wet banks of brooks, in lake floating mats.

S. subfulvum Sjörs – [1460–1600 m] 22, 40, 42, 44: in forb communities in a snowbed.

S. subnitens Russow & Warnst. – (Brotherus *et al.,* 1916) [1500 m] 43: on tundra peat bog.

S. teres (Schimp.) Ångstr. – Stepanova *et al.,* 1995; [1000–1800 m] 1, 15, 22, 27, 40, 43, 44: in waterlogged depression in mountain tundra, on wet banks of brooks.

**S. tescorum* Flatberg – [1760–1800 m] 43: in dwarf-shrub tundra.

S. tundrae Flatberg – [1000–1600 m] 1, 2, 27, 30: in ground water discharge places under rock outcrops in alpine belt, on alluvium along brooks, on soil in poplar forest.

S. warnstorffii Russow – Stepanova *et al.,* 1995; [1300–1550 m] 16, 26, 40, 44: on subalpine meadow and in open larch forest in the Okonon vulcanic plateau.
Splachnum ampullaceum Hedw. – [800 m] 48: on boggy open larch woodland.
S. luteum Hedw. – Stepanova *et al.,* 1995; [1500 m] 13: on soil in open larch forests, more often on raindeer trails.
S. rubrum Hedw. – [1200 m] 18: on a trailway in a larch forest.
Stereodon holmenii (Ando) Ignatov & Ignatova – [730 m] 50: on rotten log in larch forest.
Straminergon stramineum (Dicks. ex Brid.) Hedenäs – Stepanova *et al.,* 1995; [1000–1500 m] 1, 2, 10, 12: on fine soil on river and brook banks, in *Sphagnum* bogs.
Struckia enervis (Broth.) Ignatov – [1260 m] 20: on shaded cliff.
Symblepharis elongata (I. Hagen) Fedosov, M. Stech & Ignatov – [1050–1500 m] 6, 12: on rock outcrops and rotten log in stream.
Syntrichia cf. *norvegica* F. Weber – [1460 m] 42: on soil in forb meadow in the snowbed.
S. ruralis (Hedw.) F. Weber & D. Mohr – [1200–1470 m] 20, 32, 40: on bare soil on a huge boulder, on cliff.
Tetraphis pellucida Hedw. – Stepanova *et al.,* 1995; [690 m] 50: on rotten log in larch forest.
Tetraplodon angustatus (Hedw.) Bruch, Schimp. & W. Gümbel – Stepanova *et al.,* 1995; taiga belt: in spruce forest.
T. mnioides (Hedw.) Bruch, Schimp. & W. Gümbel – Stepanova *et al.,* 1995; [1000–2030 m] 2, 13, 45: on reindeer trails.
***T. pallidus* I. Hagen – [690 m] 40: on the carcass of a small mammal on tundra peat bog.
Tetrodontium repandum (Funck) Schwägr. – Stepanova *et al.,* 1995; taiga belt: in spruce forest.
Thuidium assimile (Mitt.) A. Jaeger – Stepanova *et al.,* 1995; [1380–1800 m] 23, 25: trunk bases of deciduous trees in forests in valleys.
T. recognitum (Hedw.) Lindb. – Stepanova *et al.,* 1995; taiga belt: on base-rich rock outcrops.
Timmia austriaca Hedw. – Stepanova *et al.,* 1995; taiga belt: on boulder in larch forest.
T. bavarica Hessl. – Stepanova *et al.,* 1995; taiga belt: in floodplain willow thińkets.
T. megapolitana Hedw. – Stepanova *et al.,* 1995; taiga belt: on tree bases in floodplain larch forest.
T. comata Lindb. & Arnell – [800–1050 m] 2, 29: on base-rich cliffs.
***T. sibirica* Lindb. & Arnell – [1700 m] 41: on base-rich soil in dwarf-shrub tundra.
***Tomentypnum involutum* (Limpr.) Hedenäs & Ignatov – [1470 m] 40: in mire in mountain tundra.
T. nitens (Hedw.) Loeske – Stepanova *et al.,* 1995; [950–1420 m] 13, 30, 48: on soil in open larch forests.
***Tortella arctica* (Arnell) Crundw. & Nyholm – [1462 m] 40: on base-rich soil in sedge–willow tundra.
T. fragilis (Hook. & Wilson) Limpr. – Stepanova *et al.,* 1995; [800–980 m] 5, 29, 30, 40, 45: on cliffs.
**T. spitzbergensis* (Bizot & Thér.) O. Werner, Köckinger & Ros (=*Trichostomum arcticum* Kaal.) – [1000–1470 m] 27, 40: on soil in community with *Salix saxatilis* and *Equisetum variegatum* on aufeis glade (in this place, on bare soil and on rocks, we observed plants covered with films of carbonates effervescent from HCl); on base-rich soil in dwarf-shrub tundra.
T. tortuosa (Hedw.) Limpr. – Stepanova *et al.,* 1995; [800–1300 m] 20, 29, 31, 40, 43, 45: on cliffs, rocks in rock fields, on soil in shrub community on aufeis glade.
Tortula mucronifolia Schwägr – Ivanova & Ignatov, 1999; [1000 m] on metamorphic rocks near anfeus glade.
Trichostomum crispulum Bruch – [800 m] 29: on base-rich cliff.
Trachycystis ussuriensis (Maack & Regel) T.J. Kop. – [1490 m] 40: on soil in forb meadow on snowbed.
Trichodon cylindricus (Hedw.) Schimp. – Stepanova *et al.,* 1995; [1490 m] 45: on soil in forb meadow in snowbed.
Ulota curvifolia (Wahlenb.) Sw. – Stepanova *et al.,* 1995; [800–1420 m] 4, 8, 20, 26, 28, 32: on cliffs and rock outcrops.
U. rehmannii Jur. – [900–1400 m] 28, 32, 51: on spruce, willow and alder trunks and branches, more often in spruce forests.
U. reptans Mitt. – [900–1400 m] 28, 32: on spruce and birch trunks and branches.
Warnstorfia fluitans (Hedw.) Loeske – Stepanova *et al.,* 1995; [1490 m] 41: dwarf-shrub shagnum peat bog, sedge–moss tundra bog.
Zygodon sibiricus Ignatov, Ignatova, Z. Iwats. & B.C. Tan – Ivanova & Ignatov, 1999; [1400 m] 25: on poplar in floodplain forest.

We do not include some species previously reported by Brotherus *et al.* (1916), Stepanova *et al.* (1995) and Ivanova & Ignatov (1999) in the present check-list due to some moss genera were revised, resulting in considerably narrower species concepts, which made it impossible to interpret unconfirmed literature data. The list of erroneous or doubtful records thereby includes *Brachythecium salebrosum* (F. Weber & D. Mohr) Schimp., *Campylium hispidulum* (Brid.) Mitt, *Codriophorus acicularis* (Hedw.) P. Beauv., *Cynodontium polycarpon* (Hedw.) Schimp., *Dicranum brevifolium* (Lindb.) Lindb., *D. drummondii* Müll. Hal., *D. muehlenbeckii* Bruch, Schimp. & W. Gümbel, *D. spurium* Hedw., *Didymodon rigidulus* Hedw., *D. vinealis* var. *flaccidus* (Bruch, Schimp. & W. Gümbel) R.H. Zander, *Drepanocladus trifarius* (F. Weber & D. Mohr) Broth. ex Paris, *Grimmia ovalis* (Hedw.) Lindb., *Lewinskya speciosa* Nees, *Philonotis caespitosa* Jur., *Pohlia obtusifolia* (Brid.) L. Koch., *Schistidium apocarpum* (Hedw.) Bruch, Schimp. & W. Gümbel, *S. strictum* (Turn.) Loeske ex Mårt., *Stereodon callichrous* (Brid.) Lindb., *Hedwigia ciliata* (Hedw.) P. Beauv., *Drepanocladus sendtneri* (Schimp. ex Müll. Hal.) Warnst. We also do not include in the list our specimens of *Bryum* which were identified only at the genus level (mainly without sporophytes). They were collected at altitudes from 800 to 1800 m in many localities (1, 2, 5, 11, 15, 17, 20, 23, 27, 29, 32, 39, 46), in various ecotopes: on fine soil, pebbly alluvium, boulders and rock outcrops.

NEW AND REMARKABLE MOSS RECORDS

The check-list includes 338 species and one variety of mosses. 197 species from it were previously listed for Tokinsky Stanovik, and 145 species are recorded for the first time for the moss flora of Stanovoy Range. Within the boundaries of the Tokinsko-Stanovoy National Park, we noted 267 species of mosses.

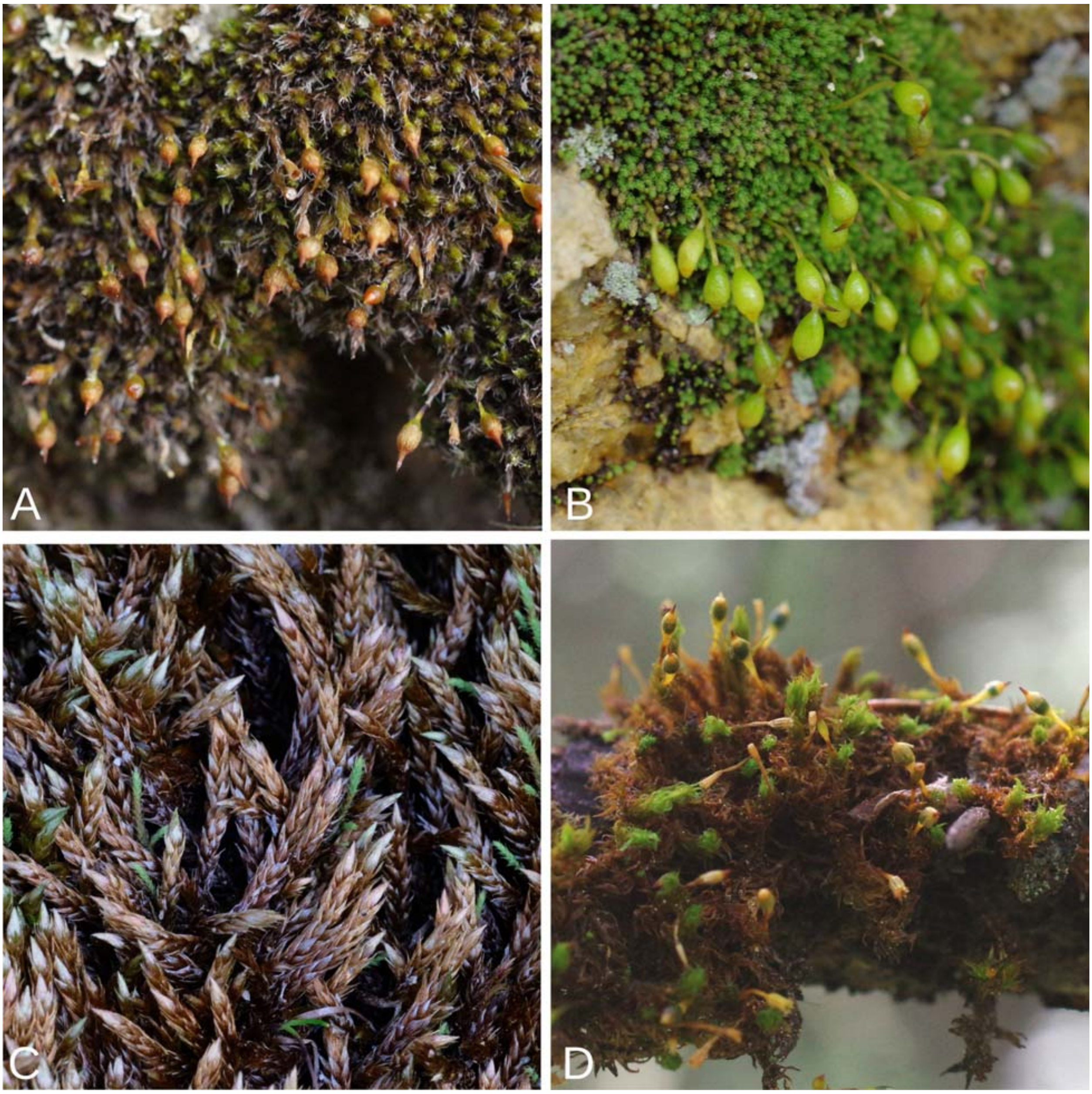

Fig. 4. A: *Coscinodon hartzii*; B: *Mielichoferia asiatica*; C: *Orthothecium retroflexum*; D: *Ulota rehmannii.* Photos: S.V. Dudov, 2018-2021.

Thirteen species in the check-list above are new for the southern part of Russian Far East as a whole; two species were first found in the Yakutia; 33 species are newly reported here for the Amur Province.

A remarkable contribution to the moss flora of the Amur Province and the southern part of Russian Far East represent arctic-alpine or northern, predominantly calci-/basiphylous species which are found here on the southern extremity of their distribution; all species newly recorded for the southern part of Russian Far East belong to this group. Typically, these species are widely distributed northward of the studied area in the mountain ranges of Yakutia where calcareous rock outcrops occur, and also have scattered localities in the mountains of South Siberia. The area harbors an exceptional number of species from the genus *Cinclidium*, which usually grow in Arctic or montane rich fens. *Cinclidium stygium* is widely distributed in the Arctic and northern part of boreal zone, rapidly declining southwards (Fig. 5); this species is new for the southern part of Russian Far East and Amur Province. The closest localities are in the Udokan Range (Afonina *et al.,* 2017) and in the Aldanskoe Upland (Gynym River valley, SASY cf. Ivanov *et al.,* 2017). Likewise, *Cinclidium arcticum* is newly recorded for the southern part of Russian Far East and Amur Province. Beyond Arctic, it has scattered localities in the mountains of southern Siberia and Yakutia from Tyva Republic to Aldanskoe Upland (Fig. 5), this species was also collected by K.A. Volotovskij in the Ivak River upstreams in the Yakutian part of Tokinsky Stanovik Range (SASY cf. Ivanov *et al.,* 2017).

Tortella spitzbergensis is rather widely, although spotty distributed in Arctic and permafrost regions of Siberia, mostly in the areas where calcareous rocks outcrop, reaching Ikatsky Range in the north Buryatia southwards (Werner *et al.,* 2014); this species is also found in the vicinity of Ayan settlement in Khabarovsk Province. Thus, our record is the second one in the southern Russian Far East (Fig. 6). *Aulacomnium acuminatum* has similar distribution in North Asia being widespread in cryolithozone and having few distant localities in high mountains of South Siberia (Tyva Republic, East Sayan, Kodar Range). Closest previously known locality of this species originates from Khetomy River basin, vicinity of Neryungri settl. in Yakutia (Fig. 6). *Brachythecium turgidum, Encalypta alpina* and *Timmia sibirica* (Fig. 6) also have an arctoalpine distribution; these three species also were newly found in Stanovoy Range in the southern extent of their ranges.

Distribution of *Didymodon subandreaeoides* in Russia was revisited by Afonina *et al*. (2022); this species is known from southern Sibiria (Altai, Buryaia, Zabaikalsky Territory, Yakutia, and Chukotka. Our finding in Tokinsky-Stanovoy National Park is the first not only for Amur Province but for the southern part of Russian Far East.

Tetraplodon pallidus is a predominantly arctic species with sporadic localities in permafrost area (Fig. 7), which thus was found remarkably southwards from their previously known distribution ranges. Throughout its range this species is associated with calcareous rocks. Likewise, the southernmost of the previously known localities of *Tetraplodon pallidus* is situated in southern spurs of Verkhoyanskaya Mountain System. The newly revealed locality of this species might be caused by high altitudes and also by rather high abundance of wild reindeer in the area. Asian distribution of *Tortella arctica* largely resembles those of *Tetraplodon pallidus*; this Arctic species also has isolated occurrences on the Kodar Range (Afonina *et al.,* 2017).

Encalypta rhaptocarpa, which was collected in calcareous rock outcrops in Zeya River valley, is first recorded for the continental part of the Russian Far East. The closest localities are in the Aldanskoe Upland and Kodar Range (Ivanov *et al.,* 2017), while the only known record from southern part of the Russian Far East originates from Vaida Mountain in Sakhalin Island (Fedosov, 2012). Similar distribution in the southern part of Russian Far East (Sakhalin and Stanovoy Range) have *Catoscopium nigritum* (Fig. 7), *Meesia minor* and *Pseudostereodon procerrimus*. *Encalypta brevicolla* was previously known in the southern part of Russian Far East from a single locality on the Dusse-Alin' Range; it also occurs on the Udokan Range (Filin *et al.,* 2015), Dzugdzhur Range (Ignatova *et al.,* 2021) and Kolyma Upland (cf. Ivanov *et al.,* 2017). *Campylium bambergeri* also represents this "northern calciphilous group"; it was not previously reported for the Amur Province (Cherdantseva *et al.,* 2018). The closest known localities of *C. bambergeri* are from the middle course of the Aldan River in Yakutia (MHA cf. Ivanov *et al.,* 2017) and on Kodar Range (Afonina *et al.,* 2017). In the southern part of Russian Far East this species was previously known from Sakhalin and lower Amur River area (Cherdantseva *et al.,* 2018).

In addition, among species first revealed in the southern part of Russian Far East, three newly described or recently resurrected species, *Brideliella demetri, Orthothecium retroflexum* and *Tomentypnum involutum* apparently represent the "northern calciphilous group", although their distributions remain underexplored. These species are largely associated with moist tundra communities and rich fens.

Sphagnum tescorum was revealed in Russia rather recently and its distribution remains insufficiently known since its differentiation from *S. girgensohnii* remains largely misunderstood. The newly revealed locality is the second known in the southern part of Russian Far East, where it was also found on Badzhal Range (Pisarenko *et al.,* 2022).

Mielichoferia asiatica is an endemic of Russia, which occurs in southern part of the Russian Far East on the Sakhalin Island (Ignatov *et al.,* 2018); our record is the first for the continental part of the Russian Far East. We collected this moss on the ferriferous rocks in the Tok River valley, along with another metallophilous species, *Coscinodon hartzii*. The latter occurs in the northern part of North America including Greenland (Hastings, 2007). In Russia it has wide distribution in Eastern Siberia (Ignatov *et al.,* 2017), and our record is the first for Amur Province and second for the southern part of Russian Far East, where it was also found in Badzhal Range (Pisarenko *et al.,* 2021); other closest localities of this species are known from SE Yakutia, Irkutsk Province and the northern part of Transbaikalia.

One more representative of the genus, *Coscinodon yukonensis* was collected in the Bol'shie Tuksani valley of the Lena River basin. This species is rather widespread in the humid areas of the Russian Far East from Kamchatka Peninsula to Primorsky Territory and south Kuril Islands and apparently also occurs in Japan (Ignatov *et al.,* 2017); the closest localities are known in the upper Bureya River basin, Badzhal Range (Khabarovsk Territory) and Vitimsky State Reserve, Stanovoe Upland (Irkutsk Province) (Ivanov *et al.,* 2017), so our record is the first for Yakutia.

Dilutineuron fasciculare is here newly recorded for the moss flora of Yakutia. This species was collected in Stanovoy Range by Prokhorov and Kuzeneva in 1911. Its closest known localities are on the Dusse-Alyn' Range, Badzhal Range and on North Sikhote-Alin' (Ignatov *et al.,* 2017; Pisarenko *et al.,* 2022).

Four of seven *Grimmia* species revealed in the studied area (*Grimmia donniana, G. incurva, G. funalis, G. torquata*) are newly reported for the Amur Province (Cherdantseva *et al.,* 2018). Their closest localities are known on Kodar and Udokan Ranges of Stanovoe Upland and on

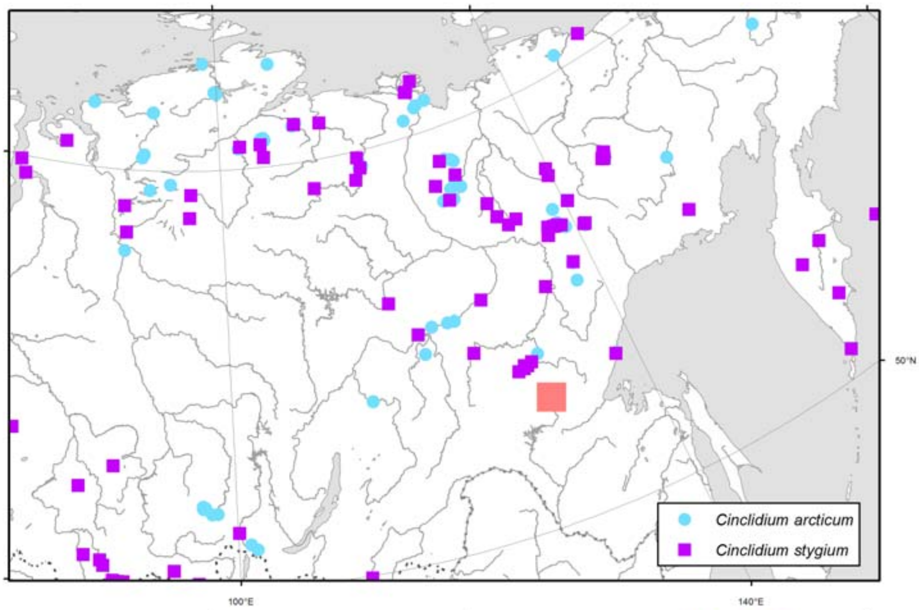

Fig. 5. Distribution of *Cinclidium arcticum* and *C. stygium* in Asian Russia based on herbarium specimens in the database of the moss flora of Russia (Ivanov *et al.*, 2017). Red square: our records.

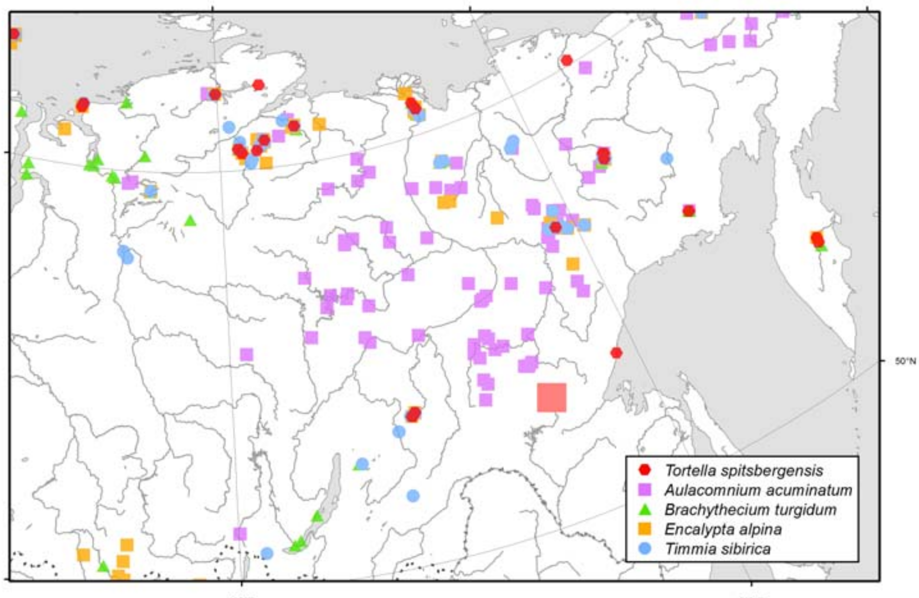

Fig. 6. Distribution of *Tortella spitsbergensis, Aulacomnium acuminatum, Brachythecium turgidum, Encalypta alpina* and *Timmia sibirica* in Asian Russia based on herbarium specimens in the database of the moss flora of Russia (Ivanov *et al.*, 2017). Red square: our records.

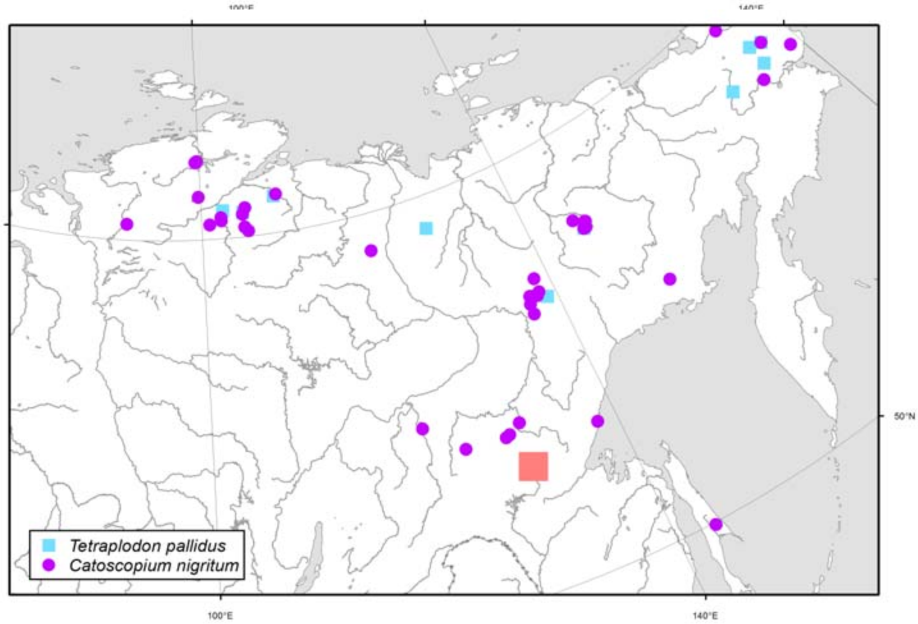

Fig. 7. Distribution of *Tetraplodon pallidus* and *Catoscopium nigritum* in Asian Russia based on herbarium specimens in the database of the moss flora of Russia (Ivanov *et al.*, 2017). Red square: our records.

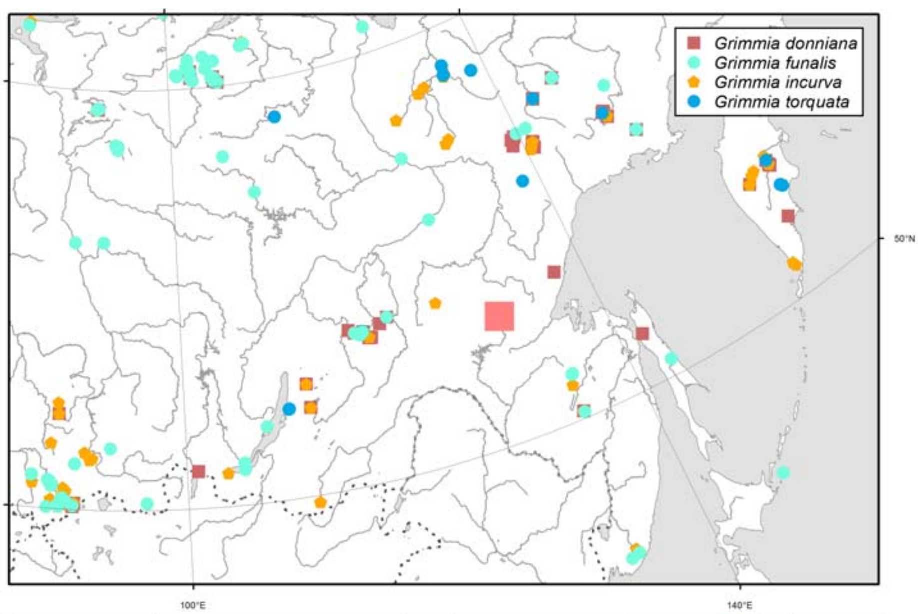

Fig. 8. Distribution of *Grimmia donniana*, *G. funalis, G. incurva, G. torquata* in Asian Russia based on herbarium specimens in the database of the moss flora of Russia (Ivanov *et al.*, 2017). Red suqare: our records.

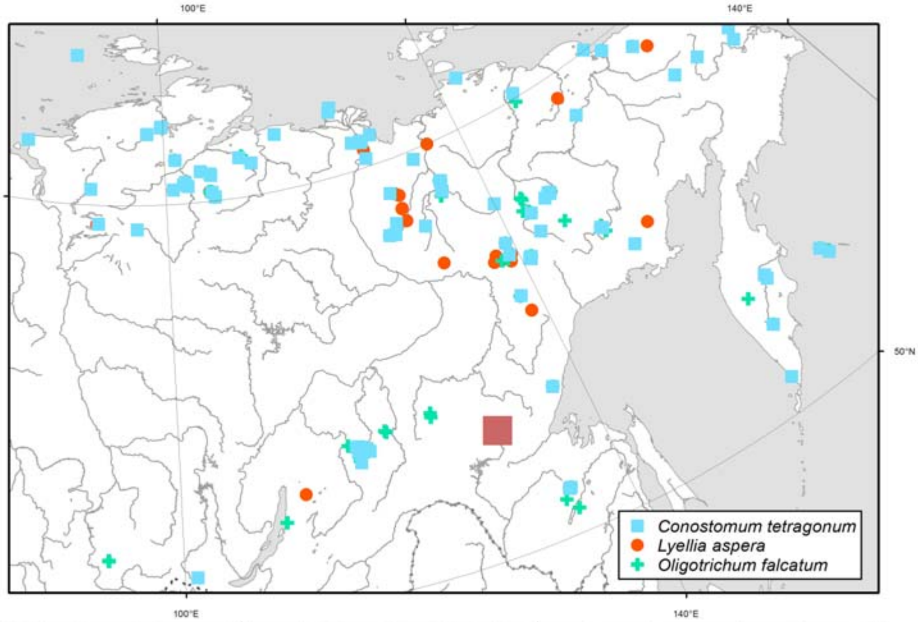

Fig. 9. Distribution of *Conostomum tetragonum, Lyellia aspera* and *Oligotrichum falcatum* in Asian Russia based on herbarium specimens in the database of the moss flora of Russia (Ivanov *et al.*, 2017). Red square: our records.

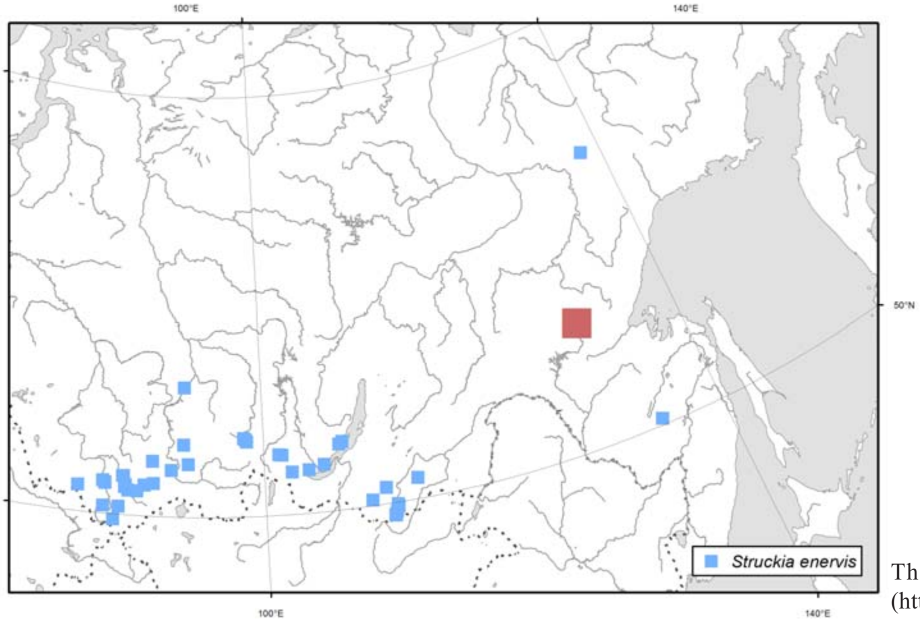

Fig. 10. Distribution of *Strukia enervis* in Asian Russia based on herbarium specimens in the database of the moss flora of Russia (Ivanov *et al.*, 2017). Red square: our records.

1 Names of vascular plants follow The World Flora online database (http://www.worldfloraonline.org/)

Dusse-Alin' and Badzhal Ranges of Bureinskoe Upland (Fig. 8). Similar distribution has one more montane species, newly found in Amur Province, *Campylopus schimperi*. Likewise, several species with arctic-montane or hypoarctic-montane distribution such as *Lyellia aspera, Oligotrichum falcatum* and *Conostomum tetragonum* are first reported for the Amur Province (Fig. 9); these species were collected from Stanovoy Range by K.A. Volotovskij (Stepanova *et al.,* 1995, Ivanov *et al.,* 2017).

Another species, which appeared rather common in the areas where acidic rocks outcrop is *Bartramia deciduaefolia*; it is remarkably different from the widespread *B. ithyphylla* even in the field due to leaving broken fragments of leaves in hands after collecting. This species is first reported here for the Amur Province; it occurs in the mountains of South Siberia and Yakutia with isolated localities in Khabarovsk (Dusse-Alin' Range) and Primorsky Territories (Ignatov *et al.,* 2018).

Among the other remarkable records, *Struckia enervis* was collected in Bol'shie Tuksani River basin (Yakutia). This species has largely Central Asian distribution with few Russian localities outside South Siberia (Fig. 10), on Sette Daban Range in Yakutia (Ignatova *et al.,* 2018) and Badzhal Range in Khabarovsk Territory (Ellis *et al.,* 2017; Pisarenko *et al.,* 2022). *Platyhypnum norvegicum* also occurs in Zeya State Reserve (the specimen collected on wet cliffs in Zeya valley by D.A. Petelin and identified by I.V. Czernyadjeva in MW).

Ulota rehmannii, U. reptans, Didymodon zanderi, Timmia comata, Myurella sibirica, Dicranum pacificum, Pohlia tundrae and *Schistidium subjulaceum* were earlier recorded in Amur Province only from Zeysky Reserve (Dudov *et al.,* 2018). *Meesia triquetra* was previously reported from Norsky State Reserve (Bezgodov *et al.,* 2013), where the southernmost locality of the species in the Russian Far East is situated. Newly revealed record of *Anomodon thraustus* in the Zeya River upper course apparently represents the northernmost locality of this predominantly East Asian species.

High mountains with diverse ecotopes in alpine belts are considered as refugia of arctic-alpine Bryophyte flora (Bakalin, 2015). In the southern part of Russian Far East quite a few of such refugia are known and among them Stanovoy Range may be considered as an exceptional case that captures the richest representation of mosses with predominantly Arctic distribution, comparing with Tardoki-Yani Mountain in North Sikhote-Alin (Fedosov *et al.,* 2016), and Byreinskoe Upland (Ignatov *et al.,* 2000, Pisarenko *et al.,* 2022) where mosses with Arctic-alpine rather than Arctic distribution occur. This might be caused by contact with continental mountain systems of Yakutia. However, several species are found here well distant from the previously known ranges, so their localities here might be considered as remnants of wider distributions in colder and drier environments of Pleistocene. Local populations of Arctic species in Stanovoy Range are likely supported by calcareous bedrocks (likely, the same is true for isolated localities of Arctic species in Kodar, Udokan, Eastern Sayan, *etc.*). Neutral to acidic rocks, which compose other high mountains in the southern part of Russian Far East, although provide suitable conditions for several widespread arctic-alpine bryophyte species, do not house rich refugia of Arctic/Arctic-alpine species. At the same time, despite of a rather low altitude, limestone Vaida Mountain in Sakhalin is known as an area where many arctic-alpine and even predominantly arctic mosses grow, that underlines an importance of calcareous rocks for distribution and preservation of numerous northern bryophytes.

High moss species diversity on Tokinsky Stanovik corresponds to the presence of an apparent altitudinal zonation and numerous bedrock types. The peculiarity of the flora is determined both by the presence of the "northern calciphilous group" of species discussed above, and also East Asian elements. It highlights the conservation value of the area as a hotspot of the bryophyte diversity. This diversity is now protected within the new Tokinsko-Stanovoy national park in the Amur Province and a specially protected natural area of the regional level in Yakutian part of the study area.

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