Arctoa (2025) **34**: *168–187*
doi: 10.15298/arctoa.34.14

MOSS FLORA OF THE TYUMEN PROVINCE (WEST SIBERIA)

ФЛОРА МХОВ ТЮМЕНСКОЙ ОБЛАСТИ (ЗАПАДНАЯ СИБИРЬ)

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Abstract

The data on the moss flora of Tyumen Province (without Khanty-Mansi Autonomous Okrug and Yamal-Nenets Autonomous Okrug) are summarized. The study is based on extensive collections of the authors, revision of herbarium materials and summarizing of literature data. An annotated list includes 207 species and 4 subspecies. For each species literature data, characteristics of occurrence, location in the province, habitat, and sporophyte production are provided.

Резюме

Подведены итоги изучения флоры мхов Тюменской области (без автономных округов ХМАО и ЯНАО). Статья основана на результатах обработки коллекций, учтены гербарные материалы и литературные данные. Аннотированный список включает 207 видов и 4 разновидности мхов. Для каждого вида приводятся литературные источники, характеристика встречаемости, местонахождения в области, экологическая приуроченность, спороношение.

KEYWORDS: mosses, annotated list, Tyumen Province

Introduction

The Tyumen Province (excluding the Khanty-Mansi Autonomous Okrug and Yamal-Nenets Autonomous Okrug) covers an area of 161.8 thousand square kilometers. It extends for 535 km from north to south and 600 km from west to east. It is located in the southern part of the West Siberian Plain, in the center of Eurasia, between 55° and 59° N latitude and 64° and 75° E longitude. It borders Khanty-Mansi Autonomous Okrug to the north, Tomsk and Omsk provinces to the east, the Republic of Kazakhstan to the south, Kurgan Province to the southwest, and Sverdlovsk Province to the west.

The moss flora of Tyumen Province still remains insufficiently known. Here we summarize all available literature data and the results of identification of our extensive collections obtained during field research in 2007–2023. The revision of herbarium collections in Tyumen State University (HTSU) was also carried out. Bryological studies in Tyumen Province covered 13 administrative districts and three cities (see the List of the study localities below).

Study Area

The surface of Tyumen Province consists of a flat, undulating plain that has undergone significant changes due to water, wind, and glacial activity. It features elongated ridges of complex origin and ancient runoff hollows. Elevation above sea level ranges from 60 to 150 meters. The length, width, and height of the ridges vary from 0.9 to 9.0 km, 0.1 to 1.0 km, and 10 to 12 meters, respectively. The terrain is heavily lacustrine and swampy, especially in the northern part of the region. Large peat deposits are confined to the swamps. In the south, lake-basin landforms have developed, where the basins of ancient and modern lakes contrast sharply with the surrounding flat plains. Economic activities have significantly altered the landscape (Starkov & Tyul'kova, 2010).

The soils within the boreal zone include podzolic, sod-podzolic, meadow-chernozem, dark gray, and gray forest soils, often in combination with peat-bog soils. In the forest-steppe zone, sands and podzolic soils are found in watershed areas, while peat-bog soils and chernozems are present in elevated relief features (Bakulin & Kozin, 1996).

Tyumen Province has a continental climate, characterized by long, severe winters with prolonged frosts and stable snow cover, short warm summers, brief frost-free transition periods, strong winds, and excessive summer humidity. Weather variability is influenced by abrupt cyclonic and anticyclonic changes. The region's climate is primarily shaped by its distance from the Atlantic Ocean and the dominance of open plains that facilitate the penetration of cold Arctic air and warm air masses from Central Asia.

Sharp temperature fluctuations occur throughout the year, month, and even within a single day. The winter

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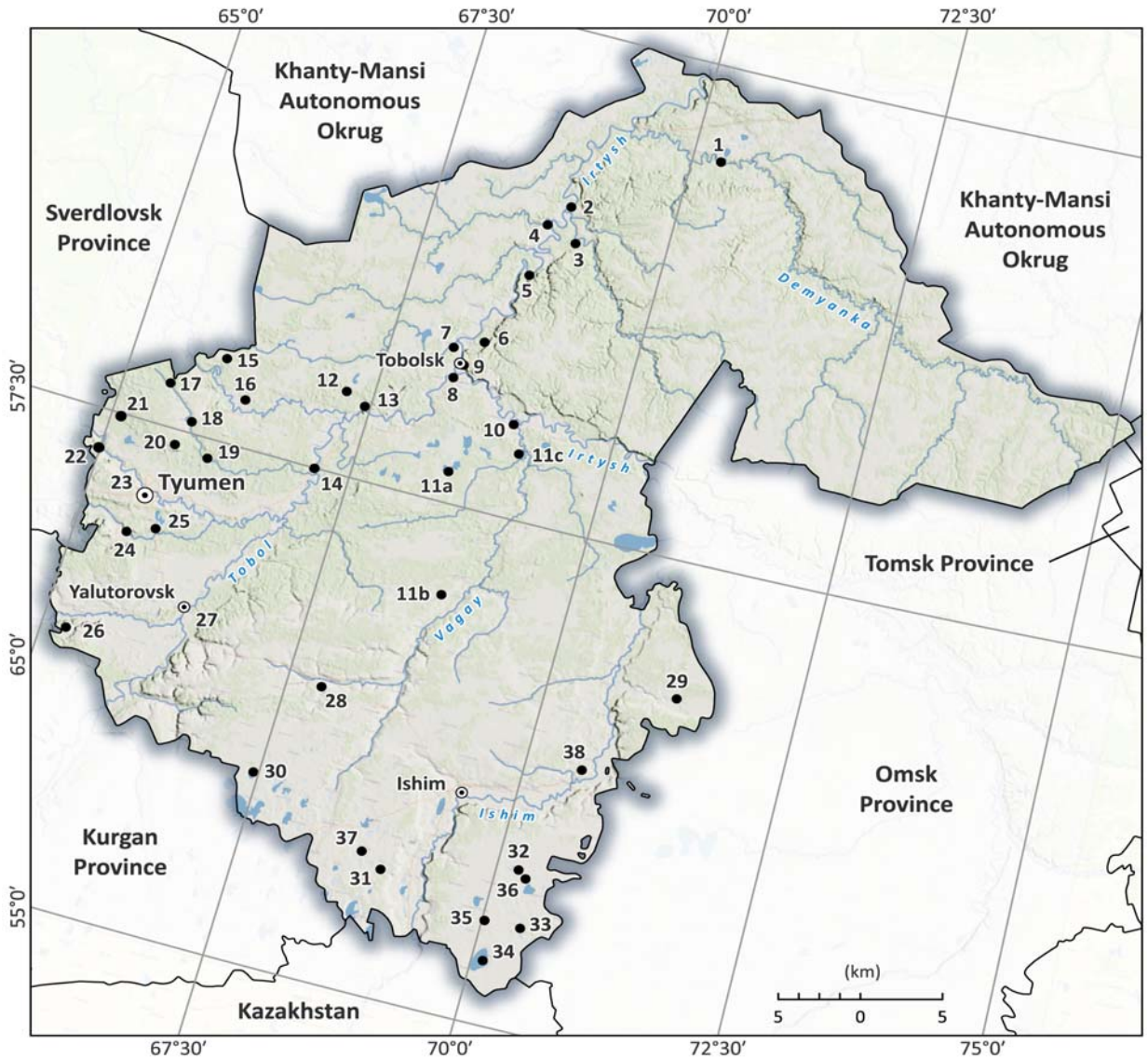

LIST OF COLLECTING LOCALITIES

The numbering corresponds to the numbers of points on the map (Fig. 1). For each locality, the administrative districts and geographical coordinates or their range are provided; literature references are given in italics. For unpublished data of the authors, collector and year of collection are presented (boldfaced).

I. Middle-boreal subzone

1. Uvat District: basin of the Turtas and Demyanka rivers in the lower reaches, 59°14' – 59°48'N, 69°42' – 70°54'E; *Pisarenko*, *2012*.

II. Southern-boreal subzone

2. Uvat District: vicinity of the village of Uvat, 59°06'38"N, 68°54'20"E; *Voronova*, *2008*; *Sofronova et al., 2025*; coll. Taran, **2004**; Voronova, **2007**.

3a. Uvat District: vicinity of the village of Turtas, 58°52'59"N, 69°08'29"E; *Voronova*, *2008*; coll. Voronova, **2007**.

3b. Uvat District: vicinity of the village of Turtas, 58°54'08"N, 69°03'14"E; coll. Khozyainova N.V., **2017**.

4. Uvat District: State complex zoological reserve of regional significance "Povarovsky", 58°59'35"N, 68°43'07"E; *Voronova, 2010*; *Kotkova et al*., *2025*; coll. Voronova, **2008**.

5. Uvat District: vicinity of the "Missiya" station in the Bartrak River valley, 58°43'N, 68°41'E; *Bezgodov, 2014b*; *Ivanov et al., 2017*.

6a. Tobolsk District: vicinity Tobolsk Sity, 58°20'09"N, 68°25'56"E; *Ivanovsky, 1913*; *Sofronova et al*., *2025*.

6b. Tobolsk District: vicinity Tobolsk Sity, the swampy area "Chistoye Boloto", 58°25'N, 68°15'E; *Ganasevich, Lapshina, 2023.*

7. Tobolsk District: natural sanctuary of regional significance "Kartashovsku bor", 58°16'17"N, 68°08'28"E; *Voronova*; *2017b*.

8a. Tobolsk District: natural sanctuary of regional significance "Medyanskaya Grove", 58°07'23"N, 68°13'34"E; *Voronova*, *2017b*;

8b. Tobolsk District: Abalaksky Nature Reserve, 58°08'43"N, 68°28'49"E; *Sofronova et al., 2020; Bezgodov & Selivanov, 2025.*

9a. Tobolsk Sity, 58°11'50"N, 68°17'40"E; *Bezgodov*, *2014a; Ivanov et al., 2017; Sofronova et al., 2020, 2021.*

9b. Tobolsk Sity, natural sanctuary of regional significance "Panin's hill", 58°11'51"N, 68°17'40"E; *Voronova*, *2017b; Bez-*

godov & Selivanov, 2025.

9c. Tobolsk Sity, specially protected natural area "Vicinity of the Tobolsky holiday home", 58°10'39.43"N, 68°20'13.27"E; *Sofronova et al., 2025; Bezgodov & Selivanov, 2025*.

9d. Tobolsk Sity, natural sanctuary of regional significance "Kiselevskaya Mountain with Chuvash Cape", 58°10'26"N, 68°17'0.6"E; *Bezgodov & Selivanov, 2025.*

10. Vagai District: natural sanctuary of regional significance "Vicinities of the vallage of Vagai", 57°58'09"N, 68°57'30"E; *Voronova*, *2017b*.

11a. Tobolsk, Vagaysk, Aromashevsk districts: Aremzyanka and Vagay river basin, 57°10'–58°21'N, 68°24'–69°14'E; *Pisarenko*, *2012*; *Ivanov et al., 2017; Sofronova et al., 2025*.

11b. Aromashevsk districts: State integrated nature reserve of regional significance "Alabuga", 57°03'30"N, 68°44'26"E; *Bezgodov & Selivanov, 2025*.

11c. Vagaysk districts: natural monument of regional significance "Kryukovskoye", 57°49'31"N, 69°06'06"E; *Bezgodov & Selivanov, 2025.*

12a. Yarkovsky District: vicinity of the village Seites, 57°54'57"N, 67°13'09"E; coll. Khozyainova N.V., **2011**.

12b. Yarkovsky District: vicinity of the village Seites, 57°55'42"N, 67°19'09"E; *Sofronova et al., 2024*; coll. Voronova, **2017**.

13a. Yarkovsky District: vicinity of the village Mazurova, 57°52'01"N, 67°26'29"E; *Khozyainova et al*., *2022*;_coll. Kushakov O.K, Terent'ev A.V., **1980**.

13b. Yarkovsky District: vicinity of the village Mazurova, 57°52'02"N, 67°26'03"E; coll. Voronova, **2017**.

14. Yarkovsky District: vicinity of the village Artamonova, 57°29'54"N, 67°07'58"E; *Lindberg, Arnell, 1890*.

15. Nizhnetavdinsky District: State complex zoological reserve of regional significance "Troitsky", 57°54'46"N, 65°56'48"E; *Voronova, 2015*.

16. Nizhnetavdinsky District: 7 km north of the village of Nizhnyaya Tavda, overgrown sand pits, 57°44'15"N, 66°15'17"E*; Baisheva et al., 2018;* coll. Voronova, **2017, 2018**.

III. Hemiboreal subzone

17. Nizhnetavdinsky District: natural sanctuary of regional significance "Zamorozovsky", 57°42'57"N, 65°28'26" E; *Voronova, 2007*.

18. Nizhnetavdinsky District: 47 km of Velizhansky tract, 57°33'28"N, 65°48'11"E; coll. Voronova, **2002**, **2019**.

19. Nizhnetavdinsky District: State complex reserve of regional significance "Guzeneevo", 57°19'37"- 57°24'28"N, 65°50'04"- 66°05'46"E, point of the map 57°24'09"N, 66°04'05"E; *Voronova, 2013b; Sofronova et al., 2024*; coll. Voronova, **2018.**

20. Nizhnetavdinsky District: 31 km of Velizhansky tract, 57°25'27"N, 65°42'39"E; coll. Voronova, **2019**.

21. Nizhnetavdinsky District: State complex biological reserve of regional significance "Tyumensky", 57°28'57"N, 65°06'12"E; *Voronova et al., 2005; Voronova, Ryabikova, 2009*; *Ryabikova et al., 2011, 2012; Voronova, Dyachenko, 2019*; *Sofronova et al., 2025.*

22. Tyumen District: 41 km of the Irbitsky tract, 57°18'08"N, 64°59'42"E; coll. Voronova, **2023**.

23a. Tyumen Sity; *Lindberg*, *Arnell*, *1890*.

23b. Tyumen Sity, hospital squares, 57°09'20"N, 65°33'11" E; coll. Anfilof'eva V.V., **2007**.

23c. Tyumen Sity, natural sanctuary of regional significance "Zatyumensky Forest Park", 57°09'43"N, 65°27'56"E; *Voronova*, *2013a*; coll. Voronova, **2023**.

23d. Tyumen Sity, natural sanctuary of regional significance "Forest Park named after Yu.A. Gagarin", 57°10'43"N, 65°37'05"E; *Voronova*, *2012a*.

24. Tyumen District: Chervishevsky tract, left bank of the Pyshma River near the village of Onokhino, 56°56'12"N, 65°31'14"E; coll. Glazunov V.A., Nikolaenko S.A., **2017**.

25. Tyumen District: 25 km of the Yalutorovsky tract, 56°59'27"N, 65°47'21"E; coll. Voronova, **2019**.

26. Isetsky District: State complex reserve of regional significance "Rafaylovsky", 56°20'25"N, 65°15'26"E; *Voronova*, *2012b*.

27. Yalutorovsk Sity, natural sanctuary of regional significance "Roshcha Dekabristov", 56°39'05"N, 66°17'24"E; coll. Voronova, **2022**, **2023**.

28. Omutinsky District: vicinity of the village of Pingina, tract "Aganikhina sogra", 56°26'56"N, 67°50'45"E; coll. Elisheva E.V., **2018**.

29a. Vikulovsky District: complex natural reserve of regional significance "Alexandrovsky", 56°49'12"N, 71°17'21"E; *Voronova*, *Dyachenko*, *2019*; *Voronova et al*., *2022*; *Sofronova et al., 2024*; coll. Voronova, **2019**.

29b. Vikulovsky District: complex natural reserve of regional significance "Vikulovsky", 57°02'13"N, 70°15'28"E; *Sofronova et al., 2025; Bezgodov & Selivanov, 2025.*

IV. Northern forest-steppe subzone

30. Armizonsky District: vicinity of the village of Prokhorova, 55°56'53"N, 67°26'49"E; *Voronova*, *2018*.

31. Kazansky District: reserve of regional significance "Dubynsky", 55°38'21"N, 68°54'50"E; *Voronova*, *2018*.

32. Sladkovsky District: natural sanctuary of regional significance "Brusnichnoye", 55°48'09"N, 70°12'58"E; *Voronova*, *2018; Bezgodov & Selivanov, 2025*.

33. Sladkovsky District: vicinity of the village of Sladkovo, 55°31'22"N, 70°22'49"E; *Voronova*, *2018*.

34. Sladkovsky District: natural reserve of regional significance "Tavolzhansky", 55°19'15"N, 70°06'43"E; *Voronova*, *2017a*, *2018*.

35. Sladkovsky District: state complex nature reserve of regional significance "Barsuchye", 55°31'02"N, 70°01'34"E; *Bezgodov & Selivanov, 2025*.

36. Sladkovsky District: state complex nature reserve of regional significance "Kabansky", 55°46'02"N, 70°18'17"E; *Bezgodov & Selivanov, 2025*.

37. Berdyuzhsky District: natural sanctuary of regional significance "Ozero Solenoye", 55°42'15"N, 68°41'17"E; *Bezgodov & Selivanov, 2025*.

38. Abatsky District: state complex nature reserve of regional significance "Ereminsky", 56°21'47"N, 70°33'32"E; *Bezgodov & Selivanov, 2025*.

Fig. 2. Main vegetation types of Tyumen Province. A: birch fern forest, Vikulovsky District; B: linden fern forest, Vikulovsky District; C: herb pine forest, Nizhnetavdinsky District; D: spruce forest, Yarkovsky District; E: peat bog, Nizhnetavdinsky District; F: swampy shore of Lake Mokhovoe, Vikulovsky District; G: meadow with mixed grasses, Isetsky District; H: Barsuk River Valley, Vikulovsky District.

period lasts approximately five months, with occasional thaws (up to +6°C) caused by warm air intrusions from Central Asia and the Mediterranean. The average air temperature ranges from –19°C to –17°C in January and from +14°C to +24°C in July. The average monthly wind speed varies from 4.1 to 6.2 m/s. Annual precipitation ranges from 200 to 600 mm. The southern part of Tyumen Province experiences moisture instability, with alternating wet and dry years (Forest plan..., https://admtyumen.ru/ogv_ru/finance/lk/info_les/more_article.htm?id= 12030359@cmsArticle).

Vegetation

According to the botanical and geographical zoning of Western Siberia, the study area falls within the subzones of the northern forest-steppe, hemiboreal (pine-small-leaved forests), and southern-boreal regions. Additionally, a small portion extends into the middle-boreal subzone near the border with the Khanty-Mansiysk Okrug (Il'ina *et al*., 1985). The location within several natural subzones and the border position between Europe and Asia imparts certain originality to the flora of the region (Glazunov *et al*., 2017).

The middle-boreal subzone, which extends along 59° N, is composed predominantly of moss forests with *Pinus sibirica*, *Abies sibirica,* and *Picea obovata*, often interspersed with *Sphagnum* forests in wetland areas. Lichen and moss pine forests, primarily consisting of *Pinus sylvestris*, are common in sandy habitats. Raised peat moss bogs with pools and ridges are also characteristic of this subzone.

The southern-boreal subzone extends between 59°30' and 57°(56°) N. *Pinus sibirica*-spruce-fir grass forests with a mosaic moss cover predominate, often accompanied by *Larix sibirica*. In the southwest, extensive areas are covered by shrub-moss and lichen pine forests. Both primary and secondary birch (*Betula pendula*, *B. pubescens*) forests with *Populus tremula* are typical of this subzone. Raised peat moss bogs, featuring pools and ridges with *Pinus sibirica* or *P. sylvestris* in some locations, occupy nearly half of the area.

The hemiboreal subzone, a narrow strip between 57° and 56° N, is characterized by a complex mosaic of predominantly forested and marsh plant communities. Grass swamps are the dominant vegetation type. The forest communities primarily consist of native deciduous forb-grass forests with *Betula pendula* and *Populus tremula*, complex pine forests with *Pinus sylvestris* and an admixture of other coniferous species, as well as *Tilia cordata* in certain areas. Dark coniferous forests with *Picea obovata* and *Pinus sibirica* occur along the southern limit of their range. In some locations, particularly in old clearings, forb and grass-forb meadows are present.

The northern forest-steppe zone lies south of 56° N. Vegetation in this subzone includes small insular groves of birch and pine small-leaved forests, dominated by *Pinus sylvestris* and *Betula pendula*, as well as meadow-steppe vegetation with a predominance of forb-grass and grass-forb communities. Some communities are found in saline habitats. Sedge-reed fens and marshy meadows are common on the flat surfaces of low terraces. A notable feature of this subzone is the abundance of grasses and raised *Sphagnum* bogs with *Pinus sylvestris*, *Ledum palustre*. The landscapes of the northern forest-steppe are largely secondary, having undergone significant transformation due to anthropogenic activities. (Il'ina *et al*., 1985; Bakulin & Kozin, 1996; Yurkovskaya & Safronova, 2019).

Bryological exploration

The study of bryoflora in Tyumen Province began in the late 19th century with H.W. Arnell, who participated in the Swedish polar expedition organized by the renowned Arctic explorer A.E. Nordensköld from 1875 to 1876. The expedition was divided into two parts: A.E. Nordensköld, F.R. Chel'man, and A.I. Stuksberg continued sailing through the Arctic Ocean toward the mouth of the Yenisei, while H.W. Arnell, M. Brenner, J. Sahlberg, and other naturalists traveled overland through Nizhny Novgorod, Tyumen, and Tomsk to Krasnoyarsk. The two parties never met at the Yenisei's mouth and returned separately along the same routes. Throughout the journey, H.W. Arnell and M. Brenner actively collected mosses alongside seed plants (Borodin, 1908). The first moss collections, later identified by H.W. Arnell, were included in the general summary *Musci Asiae borealis* (Lindberg & Arnell, 1890).

At the beginning of the 20th century, in the vicinity of Tobolsk, local historian and amateur botanist V.A. Ivanovsky collected mosses, which were later identified by V.F. Brotherus and published in *Proceedings of the Botanical Museum of the Imperial Academy of Sciences* (Ivanovsky, 1913) and partly in *Flora of Asian Russia* (Brotherus, 1914, 1918, 1931). The article "The list of mosses from the vicinity of Tobolsk" does not list the author, and the references in bryological works vary. The article is cited under the name of V.A. Ivanovsky (Lapshina & Muldiyarov, 1998; Pisarenko, 2012; Bezgodov, 2014a, b) or V.G. Tranšel and V.F. Brotherus (Arnell, 1917). We cite it under Ivanovsky's name (Ivanovsky, 1913).

Nearly a century later, the collection of Ivanovsky was included in a comprehensive study of the moss flora of Western Siberia (Lapshina & Muldiyarov, 1998).

Further studies of the moss flora in Tyumen Province resumed in 2000 by botanists from Tyumen State University. They were focused mainly on specially protected natural areas, as reflected in a series of publications (Voronova *et al*., 2005, 2013, 2022; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012). O.Yu. Pisarenko investigated the occurrence and distribution of mosses in forest communities across the flatlands of Western Siberia, presenting data from two localities: the lower reaches of the Turtas and Demyanka

Rivers basins (Uvat District) and the Aremzyanka and Vagai River basins (Tobolsk, Vagaisky, Aromashevsky districts) (Pisarenko, 2012). More than a century after the collections of V.A. Ivanovsky, A.G. Bezgodov expanded the bryophyte records in Tobolsk and its surroundings, publishing a list of mosses found near the Mission Hospital in the Uvat District (Bezgodov, 2014a, b).

The records of new and rare moss species from Tyumen Province have been presented in various publications (Baisheva *et al*., 2018; Voronova & Dyachenko, 2019; Sofronova *et al*., 2020, 2021, 2024, 2025; Khozyainova *et al.,* 2022; Ganasevich & Lapshina, 2023; Kotkova *et al*., 2025).

The results of bryological studies have been analyzed, summarized, and incorporated into the cadastral records of specially protected natural areas[1]. These findings were also used to compile materials for the second edition of the *Red Book of Tyumen Province* (Voronova *et al*., 2013), which lists 10 species of mosses as part of its main inventory and identifies four species as rare or vulnerable (Petrova, 2020).

List of species

The nomenclature generally follows Ignatov *et al.* (2006) with some updates from recent literature (Ignatov *et al*., 2017, 2018, 2020, 2022, 2025; Ivanov *et al*., 2017). Annotation of each species includes some synonyms that are common in Russian publications (in brackets); then literature references are given, followed by frequency of occurrence (Rare – single finds in 1–3 localities; Sporadic – occurs sporadically in 4–15 localities; Frequent – commonly found in more than 15 localities), localities (according to Fig. 1 and the list of localities), habitats, frequently accompanying species, and presence of sporophytes (S+). Numbers of localities for literature records are given in italics. Localities confirmed by herbarium specimens are boldfaced. An asterisk (*) marks species included in the Red Book of the Tyumen Province, ** marks species included in the list of rare and vulnerable species in need of constant monitoring and additional study in the Tyumen Province (Petrova, 2020). Specimens are deposited in HTSU and LE.

Abietinella abietina (Hedw.) M.Fleisch. – Ivanovsky, 1913; Voronova, 2008, 2012b, 2013a, b; Ryabikova *et al*., 2012; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Bezgodov & Selivanov, 2025. Sporadic. II: **2**, *6a*, *8b*, *9b*, *d*, **13b**; III: **19**, **21**, **23c**, **24**, **26**, **29a**. On soil, dead wood, at base of trunks in various types of forests and in forest parks; on roadside slope.

Aloina brevirostris (Hook. et Grev.) Kindb. – Ivanovsky, 1913; Ignatov *et al*., 2025. Rare. II: *6a*. On bricks of old house on the bank of the Irtysh River. S+.

Aquilionium plicatulum (Lindb.) Hedenäs, Schlesak & D. Quandt (= *Stereodon plicatulus* Lindb.) – Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Rare. II: *6b*. Hummocky sedge-moss dark coniferous forests.

Amblystegium serpens (Hedw.) Schimp – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014 b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **4**, ***5***, *6a*, *b*, **9b**, **7**, **8a**, *8b*, *9b*, *c*, *d*, *11a*, *c*, **12a**, **b**, **13a**, **b**, **15**; III: **19**, **17**, **18**, **21**, **20**, **22**, **23c**, d, **26**, **27**, **29a**, *29b*; IV: **31**, **33**, **34**, *35*, *37*, *38*. On soil, dead wood, stumps, hummocks, at base of trunks in various types of forests and in forest parks; on flood plane meadows; on various types of mire; on lake banks. S+.

A. serpens (Hedw.) Schimp.var. *juratzkanum* (Schimp.) Rau & Herv. – Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Voronova, 2013b; Bezgodov, 2014a; Ignatov *et al.*, 2022. Sporadic. II: *9a*, **12b**; III: **19**, **21**, **23c**. On soil, dead wood, hummocks, on the uprooted trees, at base of trunks in various types of forests; on swamps and transitional mires.

Aongstroemia schreberiana (Hedw.) Bonfim Santos & Fedosov (= *Dicranella schreberiana* (Hedw.) Hilf. ex H.A. Crum & Anderson) – Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: *5*, *8b*, *9a*, *11c*, **16**; III: *29b*.On bare soil in various habitats; on roadsides; on steep slope; along the banks of rivers. S+.

Atrichum flavisetum Mitt. – Ivanovsky, 1913; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Voronova, 2008; Voronova *et al*., 2013; Ivanov *et al*., 2017; Ignatov *et al.*, 2017. Sporadic. II: **2**, *5*, *6a, 8b*, *9a, b, c*, *d*; III: **27**. On bare soil on roadsides, with *Ceratodon purpureus*. S+.

A. tenellum (Roehl.) Bruch, Schimp. & Gümbel – Voronova, 2013b, Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Ivanov *et al*., 2017; Ignatov *et al.*, 2017. Sporadic. II: *5*, *9a,* **9b**, **13b**; III: **19**, **21**. On soil in small-leaved and mixed forests; on dry meadow; in disturbed habitats. S+. Erroneously recorded for Uvatsky district (Voronova, 2008; Voronova *et al*., 2013), reidentified as *Atrichum flavisetum*.

A. undulatum (Hedw.) P. Beauv. – Voronova, 2008, 2010, 2013b, 2015, 2017b; Pisarenko, 2012; Ryabikova *et al*., 2012; Voronova *et al*., 2013; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2017. Sporadic. II: **2**, **3a**, **4**, *5*, *6a*, 9*c*, *d*, *11a*, **13b**, **15**; III: **19**, **21**. On soil in various types of forests; on dry meadow; in disturbed habitats. S+.

Aulacomnium palustre (Hedw.) Schwägr. Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2010, 2012b, 2013b, 2015, 2017b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2018; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **3a**, **b**, **4**, *5*, *6a*, *b*, **7**, *8b*, *11b*, *c*, **13a**, **b**, **15**, **16**; III: **19**, **21**, **17**, **20**, **24**, **26**, **29a**; IV: **31**, **32a**, *32b*, **33**, *38*. On soil, dead wood, stumps, hummocks, at bases of tree trunks in various types of forests; on various types of mires; along the banks of rivers and streams. S+.

***Barbula unguiculata* Hedw. – Ivanovsky, 1913; Ryabikova *et al*., 2012; Voronova, 2012a; Voronova *et al*., 2013; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: *5*, *6*, *8b*, *9a*, *d*, *11c*; III: **21**, **23b**, **d**, **29a**, *29b*, *35*. On soil, stumps, at bases of trunks of *Salix alba* in small-leaved forests, forest parks and public gardens; on dry meadows; in disturbed habitats; along

1 – https://admtyumen.ru/files/upload/OIV/U_zachita-fauna/%D0%A0%D0%B0%D1%84%D0%B0%D0%B9%D0%BB%D0%BE%D0%B2%D1%81%D0%BA%D0%B8%D0%B9.pdf ; https://admtyumen.ru/files/upload/OIV/U_zachita-fauna/%D0%9F%D0%BE%D0%B2%D0%B0%D1%80%D0%BE%D0%B2%D1%81%D0%BA%D0%B8%D0%B9%20%D0%A3%D0%B2%D0%B0%D1%82%D1%81%D0%BA%D0%B8%D0%B9%20%20%D1%80%D0%B0%D0%B9%D0%BE%D0%BD.pdf

the banks of rivers and lakes. S+.

Brachythecium albicans (Hedw.) Schimp. – Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017. Rare. II: *5*, *11c.* On soil on open slopes. Report from the reserve "Zamorozovsky" (Voronova, 2007) was erroneous; the specimen re-identified as *Brachythecium salebrosum*.

B. campestre (Müll. Hall.) Schimp. – Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Rare. II: **5**, *8b*, *9b*, *d*, **13b**; III: **27**, *29b*; IV: *36*. On soil, dead wood in birch and linden forests; on meadows; steep slopes along rivers and roadsides. S+.

B. erythrorrhizon Schimp. – Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Rare. II: *5*, *8b*. On soil in herb mixed forests; along the sides of the fire-prevention furrow. S+.

B. mildeanum (Schimp.) Schimp. – Lindberg & Arnell, 1890; Voronova, 2007, 2012a, b, 2013a, b; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020; Ganasevich & Lapshina, 2023. Frequent. II: **3a**, *5*, *6b*, *8b*, *9a*, *b*, *11b, c*, *14*, **12b**, **13b**; III: **19**, **17**, **23a**, **c**, **d**, **26**, **27**, **28**, **29a**, *29b*; IV: *35*, *36*, *37*. On wet soil, dead wood, stumps, hummocks, at bases of trunks in various types of forests and forest parks; on flood plane meadows; on herb mires; along the banks of rivers and streams. S+.

B. rivulare Schimp. – Voronova, 2012b; Ignatov *et al.*, 2020; Ganasevich & Lapshina, 2023; Bezgodov & Selivanov, 2025. Sporadic. II: *6b*, *8b*, *9c.* III: **26**. On soil of the bank of river Olkhovka, in mixed grass-alder community; hummocky sedge-moss dark coniferous and birch-pine forests.

B. rotaeanum De Not (= *Brachythecium capillaceum* (F. Weber & D. Mohr) Giacom.) – Pisarenko, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Sporadic. II: *8b*, *9a*, *b*, *c*, *11a, c*; III: **19**, **27**, **29a**, *29b*; IV: *36*, *38*. On trunks and trunk bases in small-leaved and mixed forests; on roadside slope; on meadow fallow land. S+.

B. salebrosum (Hoffm. ex F. Weber & D. Mohr) Schimp. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020; Ganasevich & Lapshina, 2023. Freguent. I: *1*; II: **2**, **3a**, **b**, **4**, *5*, *6a*, *b*, **7**, **8a**, *8b*, *9b*, *c*, **10**, *11a*, *b*, *c*, **12a**, **b**, **13a**, **b**, **15**; III: **17**, **18**, **19**, **21**, **23b**, **c**, **d**, **24**, **26**, **27**, **28**, **29a**, *29b*; IV: **30**, **31**, **32a**, **33**, **34**, *35*, *36*, *37*, *38*. On soil, dead wood, stumps, uprooted trees, at bases of trunks in various types of forests, forest parks and public gardens; on flood plane and dry meadows; along the banks of rivers and streams; on hummocks and in hollows of high bogs. S+.

Bryoerythrophyllum recurvirostrum (Hedw.) P.C. Chen – Ivanovsky, 1913; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Rare. II: *5*, *6a*, **12b**. On exposed roots and bases of tree trunks, stumps, dead wood, the uprooted trees in swampy hardwood and dark coniferous forests; along the banks of rivers, on roadsides. S+.

Bryum algovicum Sendtn. ex Müll. Hal. – Ivanovsky, 1913; Ignatov *et al.*, 2018. Rare. II: *6a*. On stumps along the marshy edge of the swamp. S+.

B. alpinum Huds.ex With. – Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Rare. II: *5*. On bare soil along the banks of Irtysh River. S+.

B. argenteum Hedw. – Ivanovsky, 1913; Ryabikova *et al*., 2012; Voronova, 2012a, 2013b; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Sporadic. II: *5*, *6a*, *8b*, *9d*, *11 c*, **16**; III: **19**, **21**, **23b**, **c**, **d**, *29b.* On disturbed soil, sand, stones in small-leaved, light-coniferous and mixed forests, forest parks and public gardens; along river banks; roadsides of railways and highways, quarries. S+.

B. bimum (Schreb.) Turner – Ivanovsky, 1913; Voronova, 2012b, 2013b, 2015; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6a*, *b*, *11b*, *c*, **13a**, **15**; III: **19**, **23b**, **26**. On wet soil and dead wood in mixed forests and forest parks; fire pits; high bogs.

B. caespiticium Hedw. – Lindberg & Arnell, 1890; Voronova, 2008, 2015, 2017 b; Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Frequent. II: 2, *5*, *8b*, *9a*, **10**, *14*, **15**, **16**; III: **17**, **19**, **21**, **23b**, **c**, **d**, **26**, *29b*; IV: *37*.On soil, stumps, dead wood, at the bases of tree trunks, in hollows, on uprooted trees in all types of forests, forest parks and public gardens; on dry meadows; peat, high bogs; roadside slopes. S+.

B. capillare Hedw. – Voronova, 2012b, 2015; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017. Sporadic. II: *5*, *8b*, *9a*, *b*, **15**; III: **26**. On deads wood, on the uprooting trees in small-leaved and coniferous forests; on bare soil along roadsides.

B. creberrimum Taylor – Lindberg & Arnell, 1890; Ivanovsky, 1913; Voronova, 2010, 2012a, b, 2013b, 2015, 2017a, 2018; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Frequent. II: **4**, *5*, *6a*, *9d*, *11b*, *c*, **13a**, *14*, **15**, **16**; III: **18**, **19**, **20**, **23b**, **d**, **26**, **29a**, *29b*; IV: **33**, **34**. On stumps, dead wood, soil, at bases of tree trunks, in hollows in damp small-leaved, light coniferous and mixed forests, forest parks and public gardens; on high and swamp bogs; along roads. S+.

B. elegans Nees in Brid. – Voronova, 2012b. Rare. III: **26**. On soil in pine-lichen moss forest.

B. intermedium (Brid.) Turton – Ivanovsky, 1913. Rare. II: *6a*. We did not see the specimen which is likely in H.

B. lonchocaulon Müll. Hal. – Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Voronova, 2012b, 2015; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Sporadic. II: *5*, *9a*, **15**; III: **21**, **26**; IV: *37*.On soil, stumps, at bases of tree trunks in various types of forests; along roadsides and coastal slopes. S+.

B. moravicum* Podp. – Ryabikova *et al*., 2012; Voronova, 2012b, 2013b, 2017a; Voronova *et al*., 2013; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Sporadic. II: *5*, *8b*, *9a*, **12b; III: **19**, **21**, **26**, **29a**; IV: **34**. On disturbed soil, dead wood, on the uprooted trees in small-leaved and dark coniferous forests; along the banks of a rivers and lakes; at the bottom of a dried-up stream. S+.

B. pallens Sw. – Ivanovsky, 1913; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Rare. II: *5*, *6a.* On clay slopes of quarries, in pits along the banks of rivers and ponds. S+.

B. pseudotriquetrum (Hedw.) G. Gaertn., B. Mey. & Scherb. – Ivanovsky, 1913; Voronova, 2007, 2008, 2012a, b, 2013b, 2015, 2017a, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018; Ganasevich & Lapshina, 2023. Frequent. II: **3a**, *5*, *6a, b*, *8b*, *9c*, **15**, **16**; III: **17**, **18**, **19**, **21**, **23c**, **d**, **26**, **29a**, *29b*; IV: *32b*, **33**, **34**, *36*.

On soil, sand, dead wood, stumps, fire sites, roots and at bases of tree trunks, in hollows in all types of damp forests and forest parks; along the banks of streams and lakes; in lowland swamps. S+.

B. subapiculatum Hampe – Ivanov *et al*., 2017; Sofronova *et al*., 2020; Bezgodov & Selivanov, 2025. Rare. II: *8b*. On uprooted trees in the sedge fir forest.

B. uliginosum* (Brid.) Bruch & Schimp. – Ivanovsky, 1913; Ryabikova *et al*., 2012; Voronova, 2012b; Voronova *et al*., 2013; Ignatov *et al.*, 2018. Rare. II: *6a*; III: **21, **26**. On soil and exposed tree roots in mixed and dark coniferous forests; along the banks of a stream and at the bottom of dried-up stream. S+.

B. violaceum Crundw. & Nyholm – Bezgodov, 2014a; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Rare. II: *9a*. On bare soil along road.

Buxbaumia aphylla Hedw. – Ivanovsky, 1913; Ignatov *et al*., 2017. Rare. II: *6a*. On soil along the bank of pond. S+.

Calcidicranella varia (Hedw.) Bonfim Santos, Fedosov & Jan Kučera (= *Dicranella varia* (Hedw.) Schimp.) – Ivanovsky, 1913; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: *5*, *6a*, *8b*, *9d*. III: **29a**, *29b*. On bare soil of the pits along the steep slopes on banks of Irtysh River; in a reed-cattail community on the shore of a lake. S+.

Callicladium haldaneanum (Grev.) H.A. Crum – Lindberg & Arnell, 1890; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020; Ganasevich & Lapshina, 2023. Frequent . II: **2**, **4**, *5*, *6b*, **8a**, *8b*, *9a*, *b*, *c*, *11a*, *b*, *c*, *14*, **15**, **16**; III: **17**, **18**, **19**, **21**, **22**, **23c**, **d**, **24**, **26**, **27**, **28**, **29a**, *29b*; IV: **33**, **34**, *35*, *36*, *37*, *38*. On soil, dead wood, stumps, at bases of tree trunks and on exposed tree roots, in hollows in all types of forests and forest parks. S+.

Calliergon cordifolium (Hedw.) Kindb. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2008, 2010, 2013a, b, 2015, 2017b; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **3a**, **b**, **4**, *5*, *6a, b*, **7**, *8b*, **9b**, *9c*, *11b*, *c*, **12a**, **b**, **13a**, **b**, **15**, **16**; III: **19**, **21**, **23c**, **29a**; IV: *38*. On damp soil, dead wood, hummocks, in hollows, water in all types of forests; on damp banks of rivers, lakes and streams; in different types of mires. S+.

C. giganteum (Schimp.) Kindb. – Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Voronova, 2013b, 2015; Bezgodov, 2014a, b; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Sporadic. II: **2**, *5*, *6b*, *9a*, **15**; III: **19**, **21**. On damp soil, in hollows in all types of forests; in lowland swamps.

C. richardsonii (Mitt.) Kindb. ex G. Roth – Ivanovsky, 1913; Bezgodov, 2014b; Voronova & Dyachenko, 2019; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6a, b*; III: **20**, **21**. In pits, hollows in swampy mixed and dark coniferous forests; in high bogs. S+.

Calliergonella cuspidata (Hedw.) Loeske – Voronova, 2007, 2018; Voronova & Ryabikova, 2009; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6b, 8b*, *9a*, *c*, *11b*, **12a**, **b**, **13b**; III: **17**, **18**, **21**; IV: **32a**. On damp soil, on hummocks and in hollows in coniferous forests; in lowland swamps.

C. lindbergii (Mitt.) Hedenäs – Lindberg & Arnell, 1890; Ivanovsky, 1913; Voronova, 2007, 2008, 2010, 2012b, 2013b, 2015, 2017b; Ryabikova *et al*., 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **4**, *5*, *6a, b*, *8b*, *9c*, **10**, *11b*, **13a**, b, *14*, **15**; III: **17**, **19**, **21**, **23d**, **24**, **26**, **29a**. On damp soil, hummocks, dead wood, at the base of tree trunks in all types of forests; along the banks of rivers and streams; in mixed-grass meadows; in sedge bogs. S+.

Campylium chrysopyllum (Brid.) Lange (= *Campyliadelphus chrysopyllus* (Brid.) Kanda) – Ryabikova *et al*., 2012; Voronova, 2013a; Ignatov *et al.*, 2022. Rare. III: **21**, **23c**. On the soil near tree trunks in mixed and small-leaved forests.

C. protensum* (Brid.) Kindb. – Ivanovsky, 1913; Voronova *et al*., 2005, 2013; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6a, b*, *9a*; III: **21. On the soil, hummocks and in hollows in mixed and dark coniferous forests; on the bottoms of quarries and pits; in swampy meadows and lowland swamps.

C. stellatum (Hedw.) Lange & C.E.O. Jensen – Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Rare. II: *6b*; III: **21**. On damp soil in *Ledum palustre*–moss spruce forest; in swampy hummocky herb-sedge forests.

Campylophyllopsis sommerfeltii (Myrin) Ochyra (= *Campylidium sommerfeltii* (Myrin) Ochyra) – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2010, 2012b, 2013b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **4**, *5*, *6a, b*, **7**, *8b*, *9c, 11a*, *b*, *c*, **13b**, **15**; III: **17**, **19**, **21**, **23c**, **24**, **26**, **27**, **29a**, *29b*; IV: **34**, *35*, *36*, *37*, *38*. On soil, sand, dead wood, stumps, roots and at the base of tree trunks in all types of forests, forest parks and public gardens; on bluffs along riverbanks and roadsides. S+.

Ceratodon purpureus (Hedw.) Brid. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2008, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2025; Ganasevich & Lapshina, 2023. Frequent. II: **3a**, **4**, *5*, *6a, b*, **7**, *8b*, *9b*, *c*, *d*, *11b*, *c*, **12b**, **13a**, **b**, **15**, **16**; III: **19**, **20**, **21**, **23b**, **c**, **d**, **24**, **25**, **26**, **27**, **28**, **29a**, *29b*; IV: **30**, **32a**, *32b*, **33**, **34**, *35*, *36*, *37*, *38*. On bare soil, dead wood, stumps, exposed roots and bases of tree trunks, uprooted trees, in hollows and on hummocks in all types of forests; on dry meadows; raised bogs; in disturbed habitats. S+.

Cirriphyllum piliferum (Hedw.) Grout – Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Sporadic. II: **2**, *5*, *8b*, *9a, c*. On the bottoms and northern slopes of deep ravines in dark coniferous forests; on sandy outcrops of disturbed habitats.

Climacium dendroides (Hedw.) F. Weber & D. Mohr – Lindberg & Arnell, 1890; Ivanovsky, 1913; Voronova, 2007, 2008, 2010, 2012b, 2013a, b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2020; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **4**, *5*, *6a, b*, **7**, *8b*, *9c*, *11a*, *b*, *c*, **12a**, **b**, **13a**, b, *14*, **15**; III: **17**, **18**, **19**, **21**, **23c**, **24**, **26**, **28**, **29a**, *29b*; IV: **31**, **33**, **34**.

On soil, dead wood, stumps, hummocks, uprooted trees, exposed roots and bases of tree trunks in all types of forests; in sedge and reed grass bogs. S+.

Cinclidium stygium Sw. – Ganasevich & Lapshina, 2023. Rare. II: *6b.* Swampy hummocky herb-sedge forests.

Dicranella cerviculata (Hedw.) Schimp. – Voronova, 2013b; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Rare. II: *5*; III: **19**. On uprooted trees in sedge pine forest; on bare sandy-clay soil in a birch-aspen-sedge forest. S+.

D. heteromalla (Hedw.) Schimp. – Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Voronova, 2008, 2010, 2012b, 2015; Ryabikova *et al*., 2012; Voronova *et al*., 2013; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: **2**, **4**, *5*, *8b*, *9a*, **15**; III: **21**, **26**. On bare soil, sand, dead wood, stumps, uprooted trees in various types of forests; along roadsides. S+.

Dicranellopsis crispa (Hedw.) Bonfim Santos, Siebel & Fedosov (= *Dicranella crispa* (Hedw.) Schimp.) – Ivanovsky, 1913; Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Voronova, 2015; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: **2**, *5*, *6a*, *9a*, *b*, **15**; III: **21**. On bare soil, sandy outcrops in small-leaved and dark coniferous forests; along roadsides; on the slopes of ravines. S+.

D. subulata (Hedw.) Bonfim Santos, Siebel & Fedosov (= *Dicranella subulata* (Hedw.) Schimp.) – Ivanovsky, 1913; Voronova, 2008; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Rare. II: **2**, *5*, *6a*. On bare soil and sand of overgrown quarries; on roadside bluffs and slopes of ravines; in clay pits along stream banks; in a meadow with mixed grasses. S+.

Dicranum acutifolium (Lindb. et Arnell) C.E.O. Jensen – Voronova, 2013b; Ignatov *et al.*, 2025. Rare. III: **19**. On dead wood in a coniferous-small-leaved forest.

D. bonjeanii De Not. – Voronova, 2008, 2013b, 2018; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014a, b; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023; Ignatov *et al.*, 2025. Sporadic. II: **2**, **3a**, **b**, **4**, *5*, *6b*, *9a*, **13a**; III: **19**, **21**; IV: **31**. On soil, dead wood, hummocks, at base of tree trunks in various types of damp forests; in reed swamps. S+.

D. flagellare Hedw. – Ivanovsky, 1913; Voronova, 2007, 2008, 2010, 2012a, b, 2013b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023; Ignatov *et al.*, 2025. Frequent. II: **2**, **4**, *5*, *6a, b*, **7**, *8b*, *9c*, **12a**, **b**, **13a**, **b**, **15**; III: **17**, **18**, **19**, **21**, **23d**, **25**, **26**, **29a**; IV: **33**, **34**. On dead wood, stumps, soil, uprooted trees, at the base of tree trunks in various types of forests and forest parks. S+.

D. flexicaule Brid. – Ivanovsky, 1913; Voronova, 2010, 2012á, 2013á, 2017a, 2018; Ryabikova *et al*., 2012; Bezgodov, 2014 b; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: **4**, *5*, *6a*, **12b**; III: **19**, **21**, **26**, **28**; IV: **33**, **34**. On dead wood, stumps, roots and at the base of tree trunks in various types of forests. S+.

D. fragilifolium Lindb. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. I: *1*; II: *5*, *6a*, *11a*, **13b**; III: **21**. On stumps, dead wood, at base of tree trunks in swampy mixed and dark coniferous forests; in forested swamps.

D. fuscescens Turner – Voronova, 2007, 2008, 2010, 2012a, b, 2013b, 2015, 2017a, b; Pisarenko, 2012; Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Frequent. I: *1*; II: **2**, **3a**, **4**, *5*, **7**, *8b*, *9a*, *b*, *11a*, *c*, **12a**, **13b**, **15**; III: **17**, **19**, **21**, **23d**, **26**, **29a**, *29b*; IV: **34**, *38*. On soil, dead wood, stumps, occasionally on sedge hummocks, exposed roots and bases of tree trunks in various types of forests and forest parks; in forested swamps. S+.

D. majus Turner – Pisarenko, 2012; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al*., 2025. Sporadic. II: **3b**, *5*, *11a*, **13b**. On wet soil and near tree trunks in dark coniferous forests; on bottom of fire ditch.

D. montanum Hedw. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012b, 2013b, 2017a, b, 2018; Voronova & Ryabikova, 2009; Pisarenko, 2012; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014 b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023; Ignatov *et al.*, 2025. Frequent. I: *1*; II: **2**, **3a**, **4**, *5*, *6a, b*, **7**, *8b*, *9b*, *c*, *11a*, *c*, **12a**, **b**, **13a**, **b**; III: **17**, **18**, **19**, **21**, **23c**, **26**, **27**, **28**, **29a**; IV: **33**, **34**, *35*, *36*. On soil, dead wood, stumps, at bases of tree trunks and on exposed tree roots in all types of forests and forest parks; in peat bogs; in mixed-grass meadows. S+.

D. polysetum Sw. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012b, 2013b, 2015, 2017b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023; Ignatov *et al.*, 2025. Frequent. I: *1*; II: **2**, **3a**, **4**, *5*, *6a, b*, **7**, *8b*, *9b*, *c*, **10**, *11a*, *c*, **12a**, **b**, **13b**, **15**; III: **17**, **18**, **19**, **21**, **23c**, **24**, **25**, **26**, **29a**, *29b*; IV: *32b*, **33**. On soil, hummocks, dead wood, stumps, at bases of tree trunks, on roots of fallen trees in all types of forests and forest parks; along riverbanks. S+.

D. scoparium Hedw. – Voronova, 2008, 2010, 2012a, b, 2013b, 2015, 2017a, b, 2018; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2025. Frequent. II: **2**, **3a**, **b**, **4**, *5*, **7**, *8b*, *9b*, *c*, *11a*, **13b**, **15**; III: **18**, **19**, **21**, **23d**, **26**; IV: **33**, **34**. On soil, dead wood, stumps, at bases of tree trunks, on the roots of fallen trees in all types of forests and forest parks. S+.

D. undulatum Schrad. ex Brid. – Ivanovsky, 1913; Voronova, 2010, 2012b, 2013b, 2017b; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: **4**, *5*, *6a*, **7**, **13b**; III: **19**, **26**. On soil, hummocks, stumps, dead wood, at bases of tree trunks, on roots of fallen trees in mixed and small-leaved forests; in grassy swamps. S+.

D. viride (Sull. & Lesq.) Lindb. – Bezgodov & Selivanov, 2025; Sofronova *et al*., 2025; Ignatov *et al.*, 2025. Rare. II: *9c*. On trunks of *Tilia cordata* and deadwood in linden forests.

Didymodon fallax (Hedw.) R.H. Zander – Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: *5*, *8b*, *9a*, *d*; III: *29b*. On bare soil of bluffs at riverbanks; on steep slopes along roads. S+.

D. rigidulus Hedw. – Voronova, 2013b; Sofronova *et al*., 2020; Ignatov *et al.*, 2025. Rare. II: *9a*; III: **19**. On dry sandy soil on a dry meadow with mixed grasses; on bricks of a water tower.

Discelium nudum (Dicks.) Brid. – Ivanovsky, 1913; Ignatov *et al.*, 2017. Rare. II: *6a*. On bare soil of the hillock. S+.

Distichium capillaceum (Hedw.) Bruch & Schimp. – Ivanovsky, 1913; Ivanov *et al*., 2017; Ignatov *et al.*, 2017; Ganasevich & Lapshina, 2023. Rare. II: *6a, b*. On soil, stumps, dead wood in a swampy birch forest; in ditch along the bank of a stream; in hummocky sedge-moss dark coniferous forests. S+.

Ditrichum macrorhynchum Broth. ex Cardot – Ignatov *et al.*, 2025. Rare. II: **15**, **16**; IV: **33**. On bare soil in sand quarries;

on soil in birch forest with mixed grasses; in reed-green moss association. S+.

Drepanocladus aduncus (Hedw.) Warnst. – Ivanovsky, 1913; Voronova, 2010, 2012b, 2013b, 2015, 2017a, 2018; Ryabikova *et al*., 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **4**, *5*, *6a, b*, *8b*, *9b*, *c*, *11b*, *c*, **12b**, **13b**, **15**; III: **19**, **21**, **23b**, **c**, **24**, **26**, **28**, **29a**, *29b*; IV: *32b*, **33**, **34**, *35*, *36*, *37*, *38*. On soil, dead wood, fallen trees, hummocks, in water in all types of forests, forest parks and public gardens; on the banks of lakes, rivers, streams; in sedge and reed swamps. S+.

D. polygamus (Schimp.) Hedenäs – Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Voronova, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent . II: **3a**, **b**, **4**, *5*, *6b*, **7**, *8b*, *9a*, *11c*, **12a**, **13b**, **15**; III: **19**, **21**, **23c**, **d**, **24**, **25**, **26**, **27**, **29a**, *29b*; IV: **31**, *32b*, **33**, **34**, *37*. On hummocks, dead wood, at tree bases and on tree trunks, in water in various types of forests and forest parks; in reed swamps; in floodplain meadows with mixed grasses; along the banks of rivers and lakes. S+.

D. sendtneri (Schimp. ex H. Müll.) Warnst. – Ivanovsky, 1913; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023; Bezgodov & Selivanov, 2025. Rare. II: *5*, *6a, b, 11b*. In hollows along the edge of the swamp; in pine forest with hummocks of *Carex appropinquata*; in sedge-moss swamps.

D. sordidus (Müll. Hal.) Hedenäs – Ivanov *et al*., 2017; Sofronova *et al*., 2020; Ignatov *et al.*, 2022; Sofronova *et al.,* 2025. Rare. II: *6a*, *8b*. In waterlogged small holes in the floodplain of the stream; in a ditch.

Encalypta vulgaris Hedw. – Ivanovsky, 1913; Bezgodov, 2014a, Ivanov *et al*., 2017; Ignatov *et al.*, 2017. Rare. II: *6a*, *9a*. On soil along stream bank; on bare soil on steep slope. S+.

Eurhynchiastrum pulchellum (Hedw.) Ignatov & Huttunen – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Sporadic. II: **2**, **4**, *5*, *6a*, *8b*, *9b*, *c*, *d*, *11c*, **13b**; III: **17**, **21**, *29b*. On soil, dead wood, stumps, at bases of tree trunks in small-leaved, mixed and dark coniferous forests; along roadside ditches; along the banks of lakes.

Fissidens bryoides Hedw. – Bezgodov & Selivanov, 2025; Rare. II: *9b*.

F. viridulus (Sw.) Walenb. – Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Rare. II: *5*, *8b*, *9a*, *b*, *d*; III: **21**, *29b.* On disturbed soil and at bases of *Salix alba* trunks in mixed and small-leaved forests. S+.

Funaria hygrometrica Hedw. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Voronova, 2013b, 2018; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2017. Sporadic. II: 5, *6a*, *8b*, *9d*, *11a*, **13a**, **b**; III: **19**, **21**, **29a**; IV: **33**. In disturbed habitats; on bare soil; on uprooted trees in small-leaved and dark coniferous forests; along the banks of lakes and rivers. S+.

Hamatocaulis vernicosus (Mitt.) Hedenäs – Ivanovsky, 1913; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Rare. II: *5*, *6a, b*. In hollows in lowland swamps.

Haplocladium microphyllum (Sw. ex Hedw.) Broth. – Lindberg & Arnell, 1890; Ivanovsky, 1913; Voronova, 2008, 2010, 2012a, b, 2013a, b, 2017a, 2018; Ryabikova *et al*., 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022. Frequent. II: **2**, **4**, *5*, *6a*, *8b*, *9c*, *11a*, *b*, **13b**, *14*; III: **19**, **21**, **23a**, **c**, **d**, **26**, *29b*; IV: **30**, **34**, *35*, *37*, *38*. On dead wood, at bases of tree trunks in various types of forests and in forest parks; on a concrete slab. S+.

Helodium blandowii (F. Weber & D. Mohr) Warnst. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Voronova, 2012b, 2013b, 2015, 2017a, 2018; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. II: **3a**, **b**, **4**, *5*, *6a, b*, *8b*, *11b*, *c*, **12a**, **15**; III: **18**, **19**, **21**, **24**, **26**, **29a**; IV: **33**, **34**. On soil, dead wood, stumps, exposed tree roots, uprooted a trees, hummocks in all types of forests; in high bogs. S+.

Herzogiella turfacea (Lindb.) Iwats. – Voronova *et al*., 2005; Voronova, 2008; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Sporadic. II: **2**, **4**, *5*, *8b*, *9a*, **12b**, **13b**; III: **17**, **18**, **19**, **21**. On deadwood in mixed, small-leaved and dark coniferous forests. S+.

Homalia trichomanoides (Hedw.) Brid. – Bezgodov, 2014a; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Rare. II: *9a*, *b*. On trunk of *Alnus incana* in the city of Tobolsk.

Hygroamblystegium humile (P. Beauv.) Vanderp., Hedenäs & Goffinet – Voronova, 2013b; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6b*, *8b*, *11c*, *9a, c*; III: **18**, **19**, **29a**; IV: *35*, *36*, *38*. On damp soil, including disturbed soil, dead wood, small hummocks in different types of forests; along the banks of lakes, streams, rivers. S+.

H. varium (Hedw.) Mönk. – Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Voronova, 2013b; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022. Sporadic. II: *5*, *8b*; III: **18**, **19**, **21**, **24**. On deadwood and on damp disturbed soil in mixed and dark coniferous forests.

Hylocomiadelphus triquetrus (Hedw.) Ochyra & Stebel (= *Rhytidiadelphus triquetrus* (Hedw.) Warnst.) – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2010, 2012b, 2013b, 2015, 2017b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2020; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **4**, *5*, *6a*, *b*, **7**, *8b*, **9b**, *9b*, *c*, *d*, **10**, *11a*, *c*,**12a**, **13a**, **b**, **15**; III: **17**, **18**, **19**, **21**, **24**, **26**; IV: **33**. On soil, dead wood in all types of forests; on the edges of various types of mires.

Hylocomium splendens (Hedw.) Schimp. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012b, 2013b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2020; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **3a**, **b**, **4**, *5*, *6a, b*, **7**, *8b*, *9b*, *c*, *d*, **10**, *11a*, **12a**, **b**, **13b**, **15**; III: **17**, **18**, 19, **21**, **24**, **25**, 26, **29a**; IV: **33**, **34**. On soil, dead wood, stumps, at bases of tree trunks in all types of forests; along the banks of streams. S+.

Hypnum cupressiforme Hedw. – Voronova, 2010; Ignatov *et al.*, 2020. Sporadic. II: **4**, **12b**; III: **27**, **29a**. On damp soil, at bases of

tree trunks in light coniferous and small-leaved forests.

****Isopterygiella pulchella*** (Hedw.) Ignatov & Ignatova (= *Isopterygiopsis pulchella* (Hedw.) Z. Iwats.) – Ivanovsky, 1913; Ryabikova *et al*., 2011, 2012; Voronova *et al*., 2013; Ignatov *et al.*, 2020. Rare. II: *6a*; III: **21**. On stump in a swamp; on dead wood in pine-birch and linden-spruce forests. S+.

Jochenia pallescens (Hedw.) Hedenäs, Schlesak & D. Quandt (= *Stereodon pallescens* (Hedw.) Mitt.) – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017a, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **4**, *5*, *6a*, *b*, *8b*, *9b*, *c*, *d*, *11a*, *c*, **12a**, **b**, **13b**, **15**; III: **18**, **19**, **21**, **23c**, **d**, **24**, **25**, **26**, **27**, **28**, **29a**, *29b*; IV: **30**, **31**, **33**, **34**, *35*, *36*, *37*, *38*. On soil, dead wood, stumps, on uprooted trees, roots, at bases of trunks in all types of forests and in forest parks. S+.

Leptobryum pyriforme (Hedw.) Wilson – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2010, 2012b, 2013b, 2015, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018; Ganasevich & Lapshina, 2023. Frequent. II: **3a**, **4**, *5*, *6a, b*, *8b*, *9b*, *11b*, **12b**, **13a**, **b**, **15**, **16**; III: **17**, **18**, **19**, **21**, **23b**, **c**, **26**, **27**, **29a**, *29b*; IV: *32b*, **33**, *36*, *37*, *38*. On bare soil, sand, stumps, dead wood, on uprooted trees, fire sites, hummocks and hollows in all types of forests and in forest parks; in high bogs; along banks of rivers and streams; in floodplain meadows with mixed grasses; in disturbed habitats. S+.

Leptodictyum riparium (Hedw.) Warnst. – Lindberg & Arnell, 1890; Ivanovsky, 1913; Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Voronova, 2010; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. II: **4**, *5*, *6a, b*, *8b*, *9b*, *d*, **13a**, **b**, *14*; III: **18**, **19**, **20**, **21**, **24**, **29a**, *29b*; IV: *35*, *36*, *38*. On damp soil, dead wood, stumps, sedge hummocks, at bases of tree trunks in dark coniferous forests; in water along the banks of rivers, streams, and lakes. S+.

Leskea polycarpa Hedw. – Voronova, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022. Frequent. II: **4**, *5*, **8a**, *8b*, *9a*, *b*, *c*, *11b*, *c*, **13b**, **15**; III: **19**, **23b**, **c**, **d**, **24**, **25**, **26**, **27**, *29b*; IV: **33**, **34**, *38*. On fallen trees, tree trunks in mixed and small-leaved grass forests, forest parks and public gardens; in floodplain meadows; in disturbed habitats. S+.

Leucodon sciuroides (Hedw.) Schwägr. – Voronova, 2018. Rare. IV: **30**. On trunk of an old *Populus tremula* in a birch-reed-forb forest.

Lewinskya elegans (Schwägr. ex Hook. & Grev.) F. Lara, Garilleti & Goffinet – Ignatov *et al.*, 2018; Bezgodov & Selivanov, 2025. Sporadic. II: **2**, **4**, **8a**, *8b*, *9b*, *c*, *11c*, **13b**; III: **19**, **21**, **23c**, **26**, **29a**, *29b*; IV: *36*. On trunks of *Populus balsamifera* s.l., *P. tremula*, *Betula pendula*, and *Salix caprea* in small-leaved and light coniferous forests and in forest parks. S+.

Meesia triquetra (Jolycl.) Ångstr. – Ivanovsky, 1913; Ryabikova *et al*., 2012; Voronova *et al*., 2013; Ignatov *et al.*, 2018; Ganasevich & Lapshina, 2023. Rare. II: *6a, b*; III: **21**. In pits with water, swampy places, on hummocks in a swamp; on damp soil in willow thickets with mixed grasses; in hummocky sedge-moss dark coniferous and swampy hummocky herb-sedge birch-pine forests. S+.

M. uliginosa Hedw. – Ivanovsky, 1913; Ignatov *et al.*, 2018. Rare. II: *6a*. On stumps and dead wood along the edge of a forested mire. S+.

Mnium lycopodioides Schwägr. – Bezgodov, 2014a; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Rare. II: *9a*. On soil of a shady bluff at the foot of a slope.

M. marginatum (Dicks.) P. Beauv. – Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Rare. II: *5*, *8b*. On bare soil in a mixed forest.

M. spinulosum Bruch & Schimp. – Ivanovsky, 1913; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Rare. II: *5*, *6a*. On dead wood, at tree base and on tree trunks in dark coniferous and mixed forests; in the floodplain of a stream; along the edge of a mire. S+.

M. stellare Hedw. – Ivanovsky, 1913; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018; Ganasevich & Lapshina, 2023. Sporadic. II: **2**, *5*, *6a, b*, *8b*, **12a**, **b**; III: **21**. On soil, peat, uprooted trees, at bases of tree trunks and on tree roots in dark coniferous and mixed forests; along the banks of rivers and streams; in lowland swamps. S+.

Myuroclada longiramea (Müll. Hal.) Min Li, Y.F. Wang, Ignatov & Huttunen (= *Bryhnia brachycladula* Cardot) – Bezgodov, 2014a; Bezgodov & Selivanov, 2025; Sofronova *et al*., 2020; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Rare. II: *8b*, *9b*, *c*. On soil, rotten wood, roots of fallen trees, in riverbed and along the banks of the stream in the Abalaksky nature reserve in the Tobolsk region; on steep forested slopes; in the floodplain of a stream near trunks of *Alnus incana* and *Populus tremula* in the city of Tobolsk.

Neckera pennata Hedw. – Ivanovsky, 1913; Pisarenko, 2012; Ryabikova *et al*., 2012; Voronova *et al*., 2013; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Sporadic. I: *1*; II: **4**, *5*, *6a*, *8b*, *9c*; III: **21**, **29a**. On fallen trees and trunks of old *Picea obovata*, *Populus tremula*, *Tilia cordata* in broad-leaved, small-leaved and dark coniferous forests.

Nicholmiella obtusifolia (Brid.) Holmen & E. Warncke (= *Orthotrichum obtusifolium* Brid.) – Ivanovsky, 1913; Voronova & Ryabikova, 2009; Voronova, 2010, 2012b, 2013b, 2015, 2018; Pisarenko, 2012; Ryabikova *et al*., 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Frequent. I: *1*; II: **2**, **4**, *5*, *6a*, *8b*, *9b*, *d*, *11a*, *b*, *c*, **13b**, **15**; III: **19**, **21**, **23c**, **25**, **26**, **27**, **29a**, *29b*; IV: **30**, **33**, *35*, *36*, *38*. On dead wood, stumps, trunks of small-leaved trees in all types of forests and in forest parks; on humus-covered concrete slabs. S+.

Orthotrichum pallens Bruch ex Brid. – Sofronova *et al*., 2020. Rare. II: *9a*. On trunk of an old *Tilia cordata* on the street of Tobolsk. S+.

Oxyrrhynchium hians (Hedw.) Loeske – Lindberg & Arnell, 1890. Rare. III: *23a*. We did not see the specimen which is likely in H.

Paludella squarossa (Hedw.) Brid. – Ivanovsky, 1913; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2018; Ganasevich & Lapshina, 2023. Rare. II: *5*, *6a, b*. In the water of lowland swamps.

Physcomitrella patens (Hedw.) Bruch & Schimp. – Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2017. Rare. II: *5*, *11a*. On silt in the thickets of *Salix alba*; in silty shallows in the floodplain of the Irtysh River. S+.

Physcomitrium pyriforme (Hedw.) Hampe – Khozyainova *et al*., 2022. Rare. II: **13b**. On silt along the bank of the Tobol River. S+.

P. sphaericum (Ludw.) Tuernr. – Ivanov *et al*., 2017; Ignatov *et al*., 2017. Rare. II: **2**. On muddy shoal of the Irtysh River.

Plagiomnium confertidens (Lindb. & Arnell) T.J. Kop. – Ignatov *et al*., 2018; Sofronova *et al*., 2020; Bezgodov & Selivanov, 2025. Rare. II: *8b*. At the bottom of a ravine, on soil near the trunk of *Alnus incana* in the village Sibiryak.

P. cuspidatum (Hedw.) T.J. Kop. – Lindberg & Arnell, 1890; Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al*., 2018; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **3a**, **b**, **4**, *5*, *6a*, *b*, **7**, *8b*, **9b**, *9b*, *c*, *d*, **10**, *11a*, *b*, *c*, **12a**, **b**, **13a**, **b**, *14*, **15**; III: **17**, **18**, **19**, **20**, **21**, **22**, **23b**, **c**, **d**, **24**, **26**, **27**, **29a**, *29b*; IV: **31**, **33**, **34**, *35*, *36*, *37*, *38*. On soil, dead wood, stumps, hummocks, at bases of tree trunks and on tree roots, on uprooted trees in all types of forests, forest parks and public gardens; in floodplain meadows; transitional mires; along the banks of rivers and streams; on roadsides. S+.

P. drummondii (Bruch & Schimp.) T.J. Kop. – Ivanovsky, 1913; Voronova, 2008, 2012b; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018; Ganasevich & Lapshina, 2023. Sporadic. II: **2**, **4**, *5*, *6a, b*, *8b*, *11a,* **13b**; III: **18**, **26**, **29a**. On soil and humus in dark coniferous, mixed and small-leaved forests; on slopes of deep ravines. S+.

P. ellipticum (Brid.) T.J. Kop. – Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017b; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **3a**, **b**, **4**, *5*, *6b,* **7**, *8b*, *9a*, *b*, *c*, *11b*, *c*, **12a**, **b**, **13a**, **b**, **15**; III: **17**, **18**, **19**, **20**, **21**, **23b**, **c**, **d**, **24**, **26**, **27**, **29a**; IV: *38*.On soil, dead wood, stumps, hummocks, at bases of tree trunks in all types of forests, forest parks and public gardens; in transitional bogs and lowland swamps; on slopes of quarries; on banks of rivers and streams.

P. medium (Bruch & Schimp.) T.J. Kop. – Pisarenko, 2012; Voronova, 2012a, 2013a, 2017b; Bezgodov, 2014 a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Sporadic. I: *1*; II: **2**, **4**, *5*, *8b*, *9a*, **10**, *11*, **13a**; III: **18**, **23c**, **d**, **27**. On soil and pit walls in various types of forests and in forest parks.

P. rostratum (Schrad.) T.J. Kop. – Bezgodov & Selivanov, 2025. Rare. II: *8b*.

Plagiothecium cavifolium (Brid.) Z. Iwats. – Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2020. Sporadic. II: *5, 8b*, *9a*; III: **21**. On soil, dead wood, hummocks, at bases of tree trunks in damp forests and willows; on bluff in a deep ravine.

P. denticulatum (Hedw.) Schimp. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2020; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, *5*, *6a*, *b*, *8b*, *9b*, *11c*, **12b**, **15**; III: **17**, **18**, **19**, **21**, **23c**, **d**, **26**, **27**; IV: **33**. On dead wood, stumps, uprooted trees, at bases of trunks and on roots of old trees in all types of forests and forest parks; in fire ditches. S+.

P. latebricola Bruch & Schimp. – Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2020. Rare. II: *5, 8b*, *9a*. On rotten wood along the bluff and at the foot of the slope in the floodplain of a stream; at base of *Betula pendula* trunk in aspen sedge forest.

P. rossicum Ignatov & Ignatova – Bezgodov & Selivanov, 2025; Kotkova *et al*., 2025. Rare. II: **4**, *8b*, *9b*. On birch trunk in aspen-birch-herb and birch-herb forests.

P. svalbardense Frisvoll – Ignatov *et al*., 2020; Ganasevich & Lapshina, 2023; Bezgodov & Selivanov, 2025. Sporadic. III: **2**, *6b*, **7**, *9c*, **12b**, **29a**; IV: **31**, **33**. On dead wood, at bases of tree trunks in various types of forests.

Platygyrium repens (Brid.) Bruch & Schimp. – Voronova, 2007, 2008, 2012b, 2013a, b, 2015, 2017a, 2018; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2022. Frequent. II: **2**, **4**, *5*, *8b*, *9a*, *b*, *c*, *11a*, *b*, *c*, **12b**, **13b**, **15**; III: **17**, **18**, **19**, **21**, **23c**, **26**, **27**, **29a**, *29b*; IV: **30**, **33**, **34**, *35*, *36*, *38*. On dead wood, on uprooted trees, on trunks of deciduous trees in all types of forests and in forest parks. S+.

Pleurozium schreberi (Brid.) Mitt. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014 b; Bezgodov & Selivanov, 2025; Ignatov *et al*., 2020; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **3a**, **b**, **4**, *5*, *6a, b*, **7**, *8b*, *9b*, *c*, *d*, 10, *11a*, *c*, **12a**, **b**, **13a**, **b**, **15**, **16**; III: **17**, **18**, **19**, **21**, **22**, **23c**, **d**, **24**, **26**, **27**, **28**, **29a**, *29b*; IV: **30**, **32a**, *32b*, **33**, **34**, *36*, *37*, *38*. On soil, dead wood, stumps, sandy outcrops, in hollows, on hummocks, uprooted trees, at bases of tree trunks in all types of forests and in forest parks; on floodplain and dry meadows; in high bogs. S+.

Pogonatum urnigerum (Hedw.) P. Beauv. – Ivanovsky, 1913; Voronova, 2008; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2017. Sporadic. II: **2**, *5*, *6a*, *8b*, *9b*. On disturbed soil and sand along bank and roadside bluffs, in ditches; in a mixed-grass meadow; in a tree nursery with *Pinus sylvestris*. S+.

Pohlia andalusica (Höhn.) Broth. – Bezgodov, 2014 b; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Rare. II: *5*, **13b**, **16**. In disturbed habitats: roadside bluffs, sandy ravines, fire ditches.

P. atropurpurea (Wahlenb.) H. Lindb. – Rare. II: *6a*. The specimen was collected by Ivanovsky in 1905 in the vicinity of Tobolsk (LE). S+.

P. bulbifera (Warnst.) Warnst. – Voronova, 2008; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Rare. II: **2**, *5*. On disturbed soil along roadside; on uprooted trees in dark coniferous forests.

P. cruda (Hedw.) Lindb. – Ivanovsky, 1913; Bezgodov, 2014 b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Sporadic. II: *5*, *6*, *8b*, *9b*, *d*, **13b**, **16**; III: *29b*. In disturbed habitats: along bluffs on banks of streams, in sandy ravine. S+.

P. drummondii (Müll. Hall.) A.L. Andrews – Voronova, 2008; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Rare. II: **2**, *5*. In disturbed habitats: in ravines, along roadsides, on uprooted trees in dark coniferous forests. S+.

P. filum (Schimp.) Märtensson – Baisheva *et al*., 2018. Rare. II: **16**. On disturbed soil in sandy ravines.

P. lescuriana (Sull.) Ochi – Bezgodov, 2014 a, b; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Rare. II: *5*, *9a*. On disturbed soil around a pond, along roadside, on slope of ravine. S+.

***P. melanodon* (Brid.) A.J. Shaw – Ivanovsky, 1913; Voronova, 2013; Voronova *et al*., 2013; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*.,

2018. Sporadic. II: *5*, *6a*, *8b*, *9a*; III: **19**, *29b.* On disturbed soil on shores of a ponds; on roadsides in mixed and small-leaved forests; on bluff in thickets of *Salix alba*. S+.

P. nutans (Hedw.) Lindb. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017 a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al*., 2018; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **3a**, **b**, **4**, *5*, *6a*, *b*, **7**, *8b*, **9b**, *11a*, *b*, *c*, **12a**, **b**, **13a**, **b**, **15**, **16**; III: **17**, **18**, **19**, **21**, **23b**, **c**, **d**, **24**, **25**, **26**, **27**, **28**, **29a**; IV: **31**, **32a**, *32b*, **33**, **34**, *35*, *36*, *37*, *38*. On stumps, dead wood, soil, sandy outcrops, uprooted trees, roots and bases of tree trunks, hummocks, in hollows in all types of forests, in forest parks; on dry meadows; in all types of mires; in disturbed habitats: along roadsides, ravine slopes, river and stream banks. S+.

P. proligera (Kindb. ex Breidl.) Lindb. ex Arnell – Bezgodov, 2014 a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Rare. II: *5*, *8b*, *9a*, *11c*, **13b**; III: *29b.* In disturbed habitats: along bank and roadside bluffs, on steep slopes.

P. wahlenbergii (F. Weber & D. Mohr) A.L. Andrews – Voronova, 2008, 2013b; Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Sporadic. II: **2**, *5, 8b*, *9a, b*, *11c*, **13b**; III: **19**, **21**, *29b.* On disturbed soil, sand, uprooted trees in mixed forests; along roadside slopes, banks of rivers and streams, cliffs.

Polytrichum commune Hedw. – Voronova, 2008, 2010, 2012b, 2013b, 2017b; Ryabikova *et al*., 2012; Pisarenko, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ignatov *et al*., 2017. Frequent. I: *1*; II: 2, **3a**, **4**, *5*, **7**, *8b*, *9a*, *11a*, **13a**, **b**, **16**; III: **18**, **19**, **21**, **25**, **26**, **29a**. On soil, hummocks, stumps, dead wood, sand, uprooted trees in all types of forests; on all types of mires; in disturbed habitats. S+.

P. juniperinum Hedw. – Voronova, 2008, 2010, 2012b, 2013b, 2015, 2017b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Pisarenko, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ignatov *et al*., 2017; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **3a**, **4**, *5*, *6b*, **7**, *8b*, *9a, b*, *c*, *d*, *11a*, *b*, *c*, **12b**, **13a**, **b**, **15**; III: **18**, **19**, **21**, **23c**, **25**, **26**, **27**, **29a**, *29b*; IV: **30**, **33**, *36*. On soil, stumps, dead wood, uprooted trees, on hummocks, in hollows, at bases of tree trunks in all types of forests and forest parks; on raised bogs; on disturbed habitats. S+.

P. longisetum Sw. ex Brid. (= *Polytrichastrum longisetum* (Sw. ex Brid.) G.L. Sm.) – Voronova, 2010, 2013b, 2017b; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2017. Sporadic. II: **2**, **4**, *5,* **7**, *8b*, *11b*, *9a*, **12b**; III: **19**. On soil, uprooted trees, dead wood, hummocks in all types of swampy forests; in lowland swamps and raised bogs.

P. longisetum Sw. ex Brid. var. *anomalum* (Milde) G.L. Sm. (= *Polytrichastrum longisetum* var. *anomalum* (Milde) Hag.) – Bezgodov, 2014a; Ignatov *et al*., 2017. Rare. II: *9a*. In a hole in a swampy pine forest; on a hummock in a damp willow.

P. pallidisetum Funck (= *Polytrichastrum pallidisetum* (Funck) G.L. Sm.) – Voronova, 2010; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al*., 2017. Rare. II: **4**, *5*. On tree roots, stumps, dead wood, sandy outcrops, uprooted trees in coniferous forests; in a sedge-reed bog. S+.

P. piliferum Hedw. – Voronova, 2008, 2012b, 2013b, 2015, 2018; Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2017. Sporadic. II: **2**, **3a**, *5*, *8b*, *9a*, **13b**, **15**, **16**; III: **19**, **21**, **25**, **26**; IV: **33**. On bare soil, sandy outcrops, dead wood, stumps, uprooted trees, hummocks, at bases of tree trunks in mixed, small-leaved and light-coniferous forests; on dry meadows; in disturbed habitats. S+.

P. strictum Brid. – Ivanovsky, 1913; Voronova, 2010, 2013b, 2015, 2017b, 2018; Ryabikova *et al*., 2012; Bezgodov, 2014 b; Ignatov *et al*., 2017; Ganasevich & Lapshina, 2023. Sporadic. II: **4**, *5*, *6a*, *b*, **7**, **13a**, **15**, **16**; III: **19**, **21**, **29a**; IV: **32a**, *32b*. On damp soil, sand, uprooted trees, dead wood, hummocks (often among sphagnum mosses), in hollows in all types of forests, mostly swampy; on all types of mires. S+.

P. swartzii Hartm. – Pisarenko, 2012; Ivanov *et al*., 2017; Ignatov *et al*., 2017. Rare. I: *1*; III: *23*.

Pseudoamblystegium subtile (Hedw.) Vanderp. & Hedenäs (= *Serpoleskea subtilis* (Hedw.) Loeske) – Bezgodov, 2014a; Ganasevich & Lapshina, 2023. Rare. II: *6b*, *9a*. At the base of an old *Populus tremula* in a sedge aspen forest; in hummocky sedge-moss dark coniferous forests. S+.

Pseudobryum cinclidioides (Huebener) T.J. Kop. – Pisarenko, 2012; Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018. Sporadic. II: **4**, *5, 8b*, *9a*, *11a*; III: **21**. On soil in dark coniferous and brook forests; on raised bogs among sphagnum mosses.

Pseudocampylium radicale (P. Beauv.) Vanderp. & Hedenäs (=*Campilium radicale* (P. Beauv.) Grout) – Ivanovsky, 1913; Ignatov *et al*., 2022. Rare. II: *6a*. In herb swamps, on stems of dead sedges and between them.

Pseudoleskeella nervosa (Brid.) Nyholm – Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Ignatov *et al*., 2022. Rare. II: *11*; III: **21**. On trunk of *Picea obovata* in the grass linden forest.

P. tectorum (Funck ex Brid.) Kindb. ex Broth. – Voronova, 2012b; Ignatov *et al*., 2022. Rare. III: **26**. On dead wood in a reed-sedge floodplain meadow.

Ptilium crista-castrensis (Hedw.) De Not. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012b, 2013b, 2015, 2017b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al*., 2022; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **4**, *5*, *6a*, *b*, **7**, *8b*, *11a*, **13a**, **b**, **15**; III: **17**, **18**, **19**, **21**, **23c**, **24**, **25**, **26**, **27**, **28**; IV: **33**. On soil, dead wood, stumps, uprooted trees, at bases of tree trunks in all types of forests and forest parks.

Pylaisia condensata (Mitt.) A. Jaeger – Ignatov *et al*., 2022; Bezgodov & Selivanov, 2025. Frequent. II: **2**, **4**, *8b*, *9b*, *d*, *11b*, *c*, **13b**; III: **19**, **21**, **23c**, **26**, **27**, **29a**, *29b*; IV: *38*. On trunks of *Populus tremula*, *Betula pendula*, *Picea obovata*, on dead wood in broad-leaved, mixed, light-coniferous and small-leaved forests and forest parks. S+.

P. polyantha (Hedw.) Schimp. – Lindberg & Arnell, 1890; Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014 b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2022. Frequent. I: *1*; II: **2**, **4**, *5*, *6a*, **7**, **8a**, *8b*, *9b*, *c*, *d*, *11a*, *b*, *c*, **12a**, **b**, **13a**, **b**, *14*, **15**; III: **17**, **18**, **19**, **21**, **22**, **23b**, **c**, **d**, **24**, **25**, **26**, **27**, **29a**, *29b*; IV: **30**, **31**, **33**, **34**, *35*, *36*, *37*, *38*. On tree trunks, dead wood, stumps, uprooted trees, sedge hummocks, on bare soil in all types of forest, forest parks and squares. S+.

Rhizomnium pseudopunctatum (Bruch & Schimp.) T.J. Kop. –

Voronova, 2007; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2018; Ganasevich & Lapshina, 2023. Sporadic. II: **3b**, *5*, *6b*, *8b*; III: **17**, **29a**. On damp soil, uprooted trees, dead wood in coniferous and small-leaved forests; in lowland swamps; along the banks of streams and lakes.

R. punctatum (Hedw.) T.J. Kop. – Ivanovsky, 1913; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al*., 2018; Ganasevich & Lapshina, 2023. Sporadic. II: **3b**, *5*, *6a*, *b*, *8b*, *9a*, **12b**. On soil, dead wood, uprooted trees, at bases of tree trunks in dark coniferous forests; along bluffs at river banks. S+.

Rhodobryum roseum (Hedw.) Limpr. – Ivanovsky, 1913; Voronova, 2008; Pisarenko, 2012; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2018. Sporadic. I: *1*; II: **2**, **4**, *5*, *6a*, *11a*; III: **18**, **24**. On soil, dead wood, hummocks in dark coniferous and light coniferous forests. S+.

Rhytidiadelphus subpinnatus (Lindb.) T.J. Kop. – Voronova, 2008, 2010; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Sporadic. II: **2**, **4**, *5*, *8b*. On sandy outcrops, dead wood in dark coniferous forests; along slopes and bottoms of deep ravines.

Saelania glaucescens (Hedw.) Broth. – Ivanovsky, 1913; Bezgodov, 2014a; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017. Rare. II: *6a*, *8b*, *9a*. On bare soil on the shore of a pond and on steep slope. S+.

Sanionia uncinata (Hedw.) Loeske – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012a, b, 2013a, b, 2015, 2017a, b, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **3a**, **4**, *5*, *6a, b*, **7**, *8b*, *9b*, *c*, *d*, *11a*, *b*, *c*, **12a**, **b**, **13b**, **15**; III: **17**, **18**, **19**, **21**, **23c**, **d**, **24**, **25**, **26**, **27**, **29a**, *29b*; IV: **30**, **33**, **34**, *35*, *36*, *37*, *38*. On soil, stumps, dead wood, on roots and tree trunks, hummocks, in hollows in all types of forest and in forest parks; in all types of mires. S+.

Sarmentypnum exannulatum (Schimp.) Hedenäs (= *Warnstorfia exannulata* (Schimp.) Loeske – Voronova, 2007, 2010, 2013b, 2017b, 2018; Ryabikova *et al*., 2012; Ignatov *et al.*, 2022. Sporadic. II: **2**, **3a**, **4**, **9b**, **13b**; III: **17**, **19**, **20**, **21**; IV: **30**, **31**, **33**. On damp soil, dead wood, stumps, at bases of tree trunks, in hollows in all types of forest; in roadside ditches; in the water of lakes and streams.

S. tundrae (Arnell) Hedenäs (= *Warnstorfia tundrae* (Arnell) Loeske – Sofronova *et al*., 2021, 2024; Ignatov *et al.*, 2022. Rare. II: *9a*; III: **29a**. In the water of the reservoir near the dam; on damp soil of the sedge-reed community.

Schistostega pennata (Hedw.) F. Weber & D. Mohr – Pisarenko, 2012; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al*., 2025. Rare. II: *5*, *11a*. On bare soil on uprooted trees in damp forests; on edges of swamps. S+.

Sciuro-hypnum curtum (Lindb.) Ignatov – Pisarenko, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020. Frequent. I: *1*; II: **2**, **4**, *5*, *8b*, *9a*, *b*, *c*, *11a*, *c*, **12a**, **b**, **13b**, **15**; III: **18**, **23b**, **c**, **d**, **24**; IV: **33**, *37*. On soil, dead wood, stumps, on roots and at bases of tree trunks in all types of forests, forest parks; along stream beds. S+.

S. reflexum (Starke) Ignatov & Huttunen – Voronova, 2007, 2010, 2012a, b, 2013a, b, 2015, 2017a; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2022; Ignatov *et al.*, 2020. Frequent. II: **2**, **4**, *5*, *8b*, *9a*, *b*, *c*, *11b*, **12b**, **13b**, **15**; III: **17**, **18**, **19**, **21**, **23c**, **d**, **26**, **27**; IV: **34**. On soil, dead wood, roots and at bases of tree trunks in all types of forests and forest parks.

S. starkei (Brid.) Ignatov & Huttunen – Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Voronova, 2012b, 2013b; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2020; Ganasevich & Lapshina, 2023. Sporadic. II: **4**, *5*, *6b*, *8b*, *9a*, *11a*, **13b**, **15**; III: **19**, **21**, **23c**, **24**, **26**, **27**. On soil, dead wood, roots and bases of tree trunks in all types of forests and forest parks; along the banks of streams.

Scorpidium cossonii (Schimp.) Hedenäs – Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Rare. II: *6b*. Swampy hummocky herb-sedge birch-pine forests; in birch forests.

S. scorpioides* (Hedw.) Limp. – Voronova & Dyachenko, 2019; Voronova *et al*., 2022; Ignatov *et al.*, 2020; Sofronova *et al.,* 2025. Rare. II: *11a*; III: **29a. In the water and in the swampy zone along lake shores; in a hollow of a minerotrophic bog.

Sphagnum angustifolium (C.E.O. Jensen ex Russow) C.E.O. Jensen – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2008, 2010, 2012b, 2013b; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Ivanov *et al*., 2017. Sporadic. II: **2**, **3a**, **b**, **4**, *5*, *9a*, **13a**; III: **19**, **20**, **21**, **26**, **29a**; IV: *32b*, *38*. In raised bogs; on damp soil, in hollows in dark coniferous, swampy pine and small-leaved forests.

S. balticum (Russow) C.E.O. Jensen – Voronova, 2008, 2010, 2012b, 2013b, 2018; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Ivanov *et al*., 2017. Sporadic. II: **2**, **3a**, **4**, *5*, **12a**; III: **19**, **21**, **26**; IV: **32a**. In raised bogs; on damp soil, in hollows in dark coniferous, swampy pine and mixed forests.

S. capillifolium (Ehrh.) Hedw. – Ivanovsky, 1913; Voronova, 2007, 2008, 2010, 2013b, 2018; Ryabikova *et al*., 2012; Bezgodov, 2014b; Ivanov *et al*., 2017. Sporadic. II: **2**, **3a**, **4**, *5*, *6a*, **12b**; **13a**, **b**; III: **17**, **19**, **21**; IV: **32a**, *32b*. In raised bogs and lowland swamps; in hollows, at the bases of tree trunks in all types of swampy forests. S+.

S. centrale C.E.O. Jensen – Ryabikova *et al*., 2012; Voronova, 2013 b; Bezgodov, 2014a, b; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6a*, *9a*, **13a**; III: **19**, **21**. On hummocks in swampy pine and birch forests; in all types of mires.

S. compactum Lam. & DC. – Voronova, 2013b. Rare. III: **19**. On hummocks in swampy pine forest.

S. cuspidatum Ehrh. ex Hoffm. – Voronova, 2008. Rare. II: **2**, **3a**. In hollows in swampy pine forests.

S. divinum Flatberg & Hassel – II: Sporadic. **2**, **4**, **13a**; III: **19**, **21**, **29**; IV: **32a**, *32b*, *38*. In raised bogs; on damp soil, in hollows in swampy pine and birch forests.

S. fallax (H. Klinggr.) H. Klinggr. – Voronova, 2008, 2010, 2013b; Bezgodov, 2014b; Ivanov *et al*., 2017. Sporadic. II: **3a**, **4**, *5*, **13a**; III: **19**, **29a**. In all types of mires; in hollows in swampy pine forests, birch forests and mixed forests.

S. fimbriatum Wilson – Ryabikova *et al*., 2012; Voronova, 2013b, 2015; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023. Sporadic. II: **4**, *5*, *6b*, *11c*, **13a**, **15**; III: **19**, **20**, **21**, **29a**; IV: *38*. In raised bogs and transitional mires; in hollows in swampy small-leaved and light-coniferous forests.

S. flexuosum Dozy & Molk. – Voronova, 2008, 2013b; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Bezgodov, 2014b; Ivanov *et al*., 2017. Sporadic. II: **3a**, *5*, **13a**; **19**, **20**, **21**. In raised bogs; on damp soil, in hollows in swampy small-leaved and dark-coniferous forests.

S. fuscum (Schimp.) H. Klinggr. – Ivanovsky, 1913; Voronova, 2010, 2013b, 2015; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023. Sporadic. II: **4**, *5*, *6a*, *b*, **13a**, **15**; III: **19**, **21**, **29a**; IV: *32b*. In raised bogs and transitional mires; on damp soil, in hollows in swampy light-coniferous, small-leaved and mixed forests. S+.

S. girgensohnii Russow – Ivanovsky, 1913; Voronova, 2008, 2012b, 2013b; Pisarenko, 2012; Ryabikova *et al*., 2012; Bezgodov, 2014b; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023. Sporadic. I: *1*; II: **2**, **3a**, **4**, *5*, *6a*, *b*, **13a**; III: **19**, **21**, **26**, **29a**. In raised bogs and transitional mires; on damp soil, in hollows, at bases of tree trunks in all types of swampy forests.

S. jensenii H. Lindb. – Bezgodov, 2014b; Ivanov *et al*., 2017. Rare. II: *5*. In water, swamps, on hummocks of *Carex juncella* in a hummocky bogs.

S. majus (Russow) C.E.O. Jensen – Voronova, 2013b. Rare. III: **19**. In hollows of a raised bog.

S. obtusum Warnst. – Voronova, 2013b. Sporadic. II: **2**, **3a**, **13a**; III: **20**. In raised bogs and transitional mires; on damp soil, in hollows in swampy light-coniferous forests.

S. palustre L. – Voronova, 2013b. Rare. II: **12b**; III: **19**. In hollows of a transitional mire; on damp soil in herb-moss spruce forest.

S. papillosum Lindb. – Voronova, 2013b. Rare. III: **19**. On hummocks in raised bog.

S. riparium Ĺngstr. – Ivanovsky, 1913; Voronova, 2008, 2010, 2013b; Ryabikova *et al*., 2011, 2012. Sporadic. II: **3a**, **4**, *6a*; III: **19**, **21**. In raised bogs and transitional mires; in hollows, water in swampy light-coniferous forests; along the shores of lakes.

S. rubellum Willson – Voronova, 2013b. Rare. III: 19. On hummocks in a swampy pine forest.

S. russowii Warnst. – Ryabikova *et al*., 2012. Voronova, 2012b, 2013b; Bezgodov, 2014a, b; Ivanov *et al*., 2017. Sporadic. II: **4**, *5*, *9a*, **12b**, **13a**, **b**; III: **19**, **21**, **26**. In all types of mires; on damp soil, hummocks, in hollows, the bases of tree trunks in all types of swampy forests.

S. squarrosum Crome – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2013b, 2015; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023. Frequent. II: **2**, **3a**, **4**, *5*, *6a*, *b*, *8b*, *11c*, **12b**, **13a**, **b**, **15**; III: **17**, **19**, **21**, **29a**; IV: *38*. In all types of mires; on damp soil, hummocks, in hollows, at bases of tree trunks in all types of swampy forests. S+.

S. subsecundum Nees – Ivanovsky, 1913; Bezgodov, 2014b; Ivanov *et al*., 2017. Rare. II: *5*, *6a*. In hollows of raised bog and in swampy pine forest. S+.

S. teres (Schimp.) Ångstr. – Voronova, 2008, 2013b; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014a, b; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023. Sporadic. II: **2**, *5*, *6b*, *9a*, **13a**; III: **19**, **21**. In transitional mire and lowland swamps; on damp soil, in hollows in dark coniferous forests; along shores of lakes.

S. warnstorfii Russow – Voronova *et al*., 2005; Voronova, 2013b, 2015, 2018; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ganasevich & Lapshina, 2023. Sporadic. II: **3b**, **4**, *5*, *6b*, *8b*, *9a*, **12a**, **b**, **13a**, **b**, **15**; III: **19**, **21**; IV: **32a**. In raised bogs and lowland swamps; on damp soil in swampy dark-coniferous, light-coniferous and small-leaved forests.

S. wulfianum Girg. – Ivanovsky, 1913; Pisarenko, 2012; Bezgodov, 2014b; Ivanov *et al*., 2017. Sporadic. I: *1*; II: **2**, **3a**, **4**, *5*, *6*, *11a*, **13a**. On damp soil in all types of swampy forests.

Splachnum ampullaceum Hedw. – Ivanovsky, 1913; Ignatov *et al.*, 2018. Rare. II: *6a*. On damp soil between hummocks along the edge of a swamp; on manure in a cattle pasture. S+.

Stereodon pratensis* (W.D.J. Koch ex Spruce) Warnst. (= *Breidleria pratensis* (W.D.J. Koch ex Spruce) Loeske) – Ryabikova *et al*., 2012; Voronova, 2013b, 2015; Voronova *et al*., 2013; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023; Bezgodov & Selivanov, 2025. Sporadic. II: **4, *6b*, *11b*, *c*, **13b**, **15**; III: **21**, **24**, **29a**; IV: *36*. On soil, dead wood, stumps, uprooted trees, at bases of tree trunks in small-leaved, mixed and light-coniferous forests; on raised bogs.

Straminergon stramineum (Dicks. ex Brid.) Hedenäs – Voronova, 2010; Ryabikova *et al*., 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2022. Sporadic. II: **2**, **4**, *5*; III: **18**, **21**; IV: *38*. In water, hollows in raised bogs and transitional mires; on damp soil in dark coniferous forests.

Streblotrichum convolutum (Hedw.) P. Beauv. (= *Barbula convoluta* Hedw.) – Bezgodov, 2014a; Ivanov *et al*., 2017; Sofronova *et al*., 2024; Ignatov *et al.*, 2025. Rare. II: *9a*, **12b**; III: **19**. On dead wood in dark coniferous and mixed forests; in the yard of a house between paving stones in the city of Tobolsk.

Symblepharis sinensis Müll. Hal. – Bezgodov & Selivanov, 2025; Sofronova *et al*., 2025; Ignatov *et al.*, 2025. Sporadic. II: **2**, *8b, 9b*; III: **21**. On dead wood in dark coniferous and mixed forests.

Syntrichia ruralis (Hedw.) F. Weber & D. Mohr – Voronova, 2012b; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2025. Rare. III: **26**, **27**; IV: *37*. On soil in a mixed forest; on a dry mixed-grass meadow; on a path in a forest park.

Tetraphis pellucida Hedw. – Ivanovsky, 1913; Voronova *et al*., 2005; Voronova, 2007, 2008, 2010, 2012b, 2013b, 2017b; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Pisarenko, 2012; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ignatov *et cal.*, 2017; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **2**, **3a**, **4**, *5*, *6a*, *b*, **7**, *8b*, **12b**, **13a**; III: **17**, **19**, **21**, **26**, **29a**. On dead wood, stumps, roots and at bases of tree trunks: in all types of forests, on lowland swamps and transitional mires, along roadside bluffs. S+.

Thuidium assimile (Mitt.) A. Jaeger (= *Thuidium philibertii* Limpr.) – Voronova *et al*., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6b*, *8b*, *9a*, **13b**; III: **21**, **26**. On damp soil, dead wood, at bases of tree trunks and on exposed roots, in mixed and dark coniferous forests; on roots of a tree in a swamp.

T. recognitum (Hedw.) Lindb. – Ivanovsky, 1913; Voronova, 2007, 2012b, 2018; Voronova & Ryabikova, 2009; Pisarenko, 2012; Ryabikova *et al*., 2012; Bezgodov, 2014 b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Frequent. I: *1*; II: **4**, *5*, *6a*, *b*, *8b*, *9d*, **12a**, **b**, **13b**; III: **17**, **18**, **19**, **21**, **26**; IV: **33**, *35*, *37*. On soil, dead wood, tree roots, uprooted trees, in hollows in mixed, light-coniferous and dark-coniferous forests; along the banks of streams. S+.

Timmia megapolitana Hedw. – Ivanovsky, 1913; Voronova *et*

al., 2005; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2011, 2012; Voronova, 2012b; Bezgodov, 2014b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2017; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6a*, *b*, *8b*, *9c*, **12a**, **13b**; III: **18**, **21**, **26**, *29b*. On soil, peat, sand, dead wood, stumps, at bases of tree trunks in dark coniferous and mixed forests; along stream banks; in lowland swamps. S+.

Tomentypnum nitens* (Hedw.) Loeske – Ivanovsky, 1913; Voronova & Ryabikova, 2009; Ryabikova *et al*., 2012; Voronova *et al*., 2013; Bezgodov, 2014a, b; Ignatov *et al.*, 2022; Ganasevich & Lapshina, 2023. Sporadic. II: *5*, *6a*, *b*, *9a*; III: **21. On damp soil, in water in swampy light-coniferous and dark-coniferous forests; in mixed-grass meadows, lowland swamps. S+.

Tortula mucronifolia Schwägr. – Ivanovsky, 1913; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: *5*, *6a*, *8b*, *9a*, **13b**. In disturbed habitats: on bare soil, sand, along the banks of streams and Tobol River. S+.

T. muralis var. *aestiva* Hedw. – Sofronova *et al*., 2020; Ignatov *et al*., 2025. Rare. II: *9a*. On fine earth on the wall of a brick water tower.

T. obtusifolia (Schwägr.) Mathien. – Ivanovsky, 1913; Ignatov *et al.*, 2025. Rare. II: *6a*. On the bricks on the temple wall. S+.

T. truncata* (Hedw.) Mitt. – Ivanovsky, 1913; Ryabikova *et al*., 2012; Voronova, 2012b; Voronova *et al*., 2013; Ivanov *et al*., 2017; Ignatov *et al.*, 2025; Bezgodov & Selivanov, 2025. Sporadic. II: *6a*, *11c*; III: **21, **26**. In disturbed habitats: on the bank of the Irtysh River, in overgrown quarries; on bare soil in a mixed-grass meadow and in a mixed-grass birch forest. S+.

Trichodon cylindricus (Hedw.) Schimp. (= *Ditrichum cylindricum* (Hedw.) Grout) – Voronova, 2013b; Bezgodov, 2014a, b; Bezgodov & Selivanov, 2025; Ivanov *et al*., 2017; Ignatov *et al.*, 2025. Sporadic. II: *5*, *9a*, *11c*; III: **19**, *29b.* On bare soil along bluffs on river banks; along roadsides; on uprooted trees in forest clearings; in dry meadows with mixed grasses.

Warnstorfia fluitans (Hedw.) Loeske – Ivanovsky, 1913; Ryabikova *et al*., 2012; Voronova, 2012b, 2013b, 2015, 2018; Bezgodov, 2014b; Ivanov *et al*., 2017; Ignatov *et al.*, 2022. Sporadic. II: **4**, *5*, *6a*, **13a**, **15**; III: **19**, **21**, **26**, **28**; IV: **33**. On damp soil, on uprooted trees in mixed and small-leaved forests; on hummocks, in hollows, in water in raised bogs and transitional mires; along banks river. S+.

Weissia controversa Hedw. – Ivanovsky, 1913; Bezgodov & Selivanov, 2025; Ignatov *et al.*, 2025; Sofronova *et al.,* 2025. Rare. II: *6a*; III: *29b*. On soil near the pond; along bluff at river bank. S+.

Excluded Taxa

The list of mosses of Tyumen Province does not include species that are listed in this section, in three subsections, as they are excluded by different reasons.

1. ***Species erroneously identified***

Brachytheciastrum velutinum (Hedw.) Ignatov & Huttunen – Erroneously recorded for the reserve "Tyumensky" (Ryabikova *et al*., 2012), specimen reidentified by M.S. Ignatov as *Brachythecium mildeanum.*

Brachythecium turgidum (Hartm.) Kindb. – Erroneously recorded for the reserve "Tyumensky" (Ryabikova *et al*., 2012), specimen reidentified by M. S. Ignatov as *Brachythecium mildeanum.*

Orthotrichum pumilum Sw. – Indication for the Tyumen Province is incorrect (Ignatov *et al.*, 2018); reidentified as *Orthotrichum pallens* (Sofronova *et al*., 2020).

Pogonatum dentatum (Brid.) Brid. – Erroneously recorded for Uvatsky District (Voronova, 2008); reidentified as *Pogonatum urnigerum*.

Ruficaulis rufescens (With.) Bonfim Santos & Fedosov (= *Dicranella rufescens* (Dicks.) Schimp.) – Specimens from the reserve "Tyumensky" (Ryabikova *et al*., 2012) were reidentified.

Sciuro-hypnum populeum (Hedw.) Ignatov & Huttunen – Erroneously recorded for the protected area of regional significance "Povarovsky" (Voronova, 2010), reidentified as *Sciuro-hypnum starkei*.

2. ***Species which taxonomy was reconsidered*** (see Table 2).

The names of these species were changed as a result of worldwide taxonomic revisions. For example, the revision of Hassel *et al*. (2018) excluded *Sphagnum magellanicum* from all localities in the Northern Hemisphere, substituting it for all Asian Russia by *Sphagnum divinum*. However, some changes are not that straightforward. For example, *Oncophorus wahlenbergii* appeared to represent several species, now classified in three genera. All checked collections appeared to belong to *Symblepharis sinensis*; however. we cannot be sure that some previous records are not *Brideliella wahlenbergii* or *B. elongata.* Nevertheless, in this and similar cases we report only the species which we were able to confirm by herbarium specimens.

3. ***Species reported in the Moss flora of Russia*** (Ignatov et al., 2017, 2018, 2020, 2022, 2025), but the sources of these records are dubious. Some of them were reported apparently based on specimens from Tyumenskaya Prov-

Table 2. Species which taxonomy was reconsidered, with relevant names of current use (based on cited literature, and partly on available specimens checked by us)

Reported as	Currently accepted as	Literature
Campylidium hispidulum (Brid.) Ochyra	*Campylophyllopsis sommerfeltii*	Ignatov *et al.*, 2022
Ditrichum pusillum (Hedw.) Hampe	*Ditrichum macrorhynchium*	Ignatov *et al.*, 2025
Oncophorus wahlenbergii Brid.	*Symblepharis sinensis*	Ignatov *et al.*, 2025
Orthotrichum speciosum Nees	*Lewinskya elegans*	Ignatov *et al.*, 2018
Plagiothecium laetum Schimp.	*P. rosicum, P. svalbardense*	Ignatov *et al.*, 2020
Plagiomnium elatum (Bruch & Schimp.) T.J. Kop.	*P. ellipticum*	Ignatov *et al.*, 2018
Pylaisia selwynii Kindb.	*Pylaisia condensata*	Ignatov *et al.*, 2022
Sciuro-hypnum oedipodium (Mitt.) Ignatov & Huttunen	*Sciuro-hypnum curtum*	Ignatov *et al.*, 2020
Sphagnum magellanicum Brid.	*Sphagnum divinum*	Hassel et al. 2016

ince as in was defined in the USSR time, i.e. including Khanty-Mansi Autonomous Okrug and Yamalo-Nenets Autonomous Okrug, and were erroneously attributed to the territory of Tyumen Province (Fig. 1) in its present administrative subdivison of the Russian Federation.

Amblyodon dealbatus (Hedw.) P. Beauv.
Bryum kunzei Hornsch.
Calliergon megalophyllum Mikut.
Cratoneuron filicinum (Hedw.) Spruce
Dicranum elongatum Schleich. ex Schwägr.
D. groenlandicum Brid.
Encalypta ciliata Hedw.
E. procera Bruch
Mnium spinosum (Voit) Schwägr.
Philonotis fontana (Hedw.) Brid.
Plagiopus oederianus (Sw.) H. A. Crum & L.E. Anderson
Polytrichum jensenii J. Hagen
Pohlia sphagnicola (Bruch & Schimp.) Broth.
Polytrichum hyperboreum R. Brown
Rhytidium rugosum (Hedw.) Kindb.
Tetraplodon angustatus (Hedw.) Bruch & Schimp.
Zygodon sibiricus Ignatov, Ignatova, Z. Iwats. & B.C. Tan

DISCUSSION

A total of 207 moss species and 4 varieties have been identified in the Tyumen Province. The relatively low moss diversity is due to the region's geographical location in the flat part of the West Siberian Lowland, resulting in the absence of mountain habitats (rocks, boulders, rock outcrops), as well as the poor mineral nutrition of soils and groundwater. By comparison, 236 species have been revaled in the flat part of the Khanty-Mansi Autonomous Okrug (Lapshina & Pisarenko, 2013).

A total of 160 species have been recorded for forests and forest parks, accounting for 77% of the region's total species diversity. Fifty-five species are common in all types of forest communities. In mossy forests, the dominant and co-dominant species are *Aulacomnium palustre, Brachythecium salebrosum, Climacium dendroides, Dicranum polysetum, Hylocomiadelphus triquetrus, Hylocomium splendens, Pleurozium schreberi, Plagiomnium cuspidatum, P. ellipticum, Polytrichum commune, P. juniperinum, Ptilium crista-castrensis,* and *Sanionia uncinata*. In swampy forests are abundant *Sphagnum angustifolium, S. balticum, S. warnstorfii*, *Brachythecium rivulare*, *Calliergonella cuspidata, Leptodictyum riparium, Straminergon stramineum*. Mosses on rotten wood and tree trunk bases in forests are also diverse: *Amblystegium serpens, Callicladium haldaneanum, Dicranum flagellare, D. montanum, Drepanocladus polygamus, Jochenia pallescens, Tetraphis pellucida*. Widespread epiphytes are *Nyholmiella obtusifolia, Pylaisia polyantha, Platygyrium repens*.

The species richness of individual types of forest communities is as follows: 104 species of mosses were found in dark coniferous forests, 99 – in small-leaved forests, 94 – in mixed forests, 90 – in pine forests, and 60 species in broad-leaved forests (represented by linden forests).

Mosses dominate in boggy vegetation, and they are fairly diverse; 78 species were recorded, including *Sphagnum angustifolium, S. fuscum, S. papillosum, S. russowii, S. girgensohnii, S. warnstorfii, S. riparium, S. obtusum, S. squarrosum, S. fallax, S. flexuosum, S. divinum, Aulacomnium palustre, Polytrichum commune, P. juniperinum, P. longisetum*, *P. strictum,* and *Straminergon stramineum*.

Meadow communities include 27 moss species. Typical representatives of the ground cover are *Brachythecium salebrosum, Calliergonella lindbergii,* and *Pleurozium schreberi*; in dry meadows, *Brachythecium campestre, Bryum caespiticium, Ceratodon purpureus,* and *Pohlia nutans* are quite common on soil; in floodplain meadows, *Amblystegium serpens, Brachythecium mildeanum, Drepanocladus polygamus,* and *Plagiomnium cuspidatum* occur.

Fifty-one moss species were found along the banks of reservoirs (rivers, streams, lakes), the most common being *Aulacomnium palustre, Mnium stellare, Plagiomnium ellipticum, Pohlia wahlenbergii, Rhizomnium pseudopunctatum, R. punctatum*, etc. *Calliergon cordifolium, C. richardsonii, Leptodictyum riparium, Sarmentypnum exannulatum, Sphagnum riparium,* and *Warnstorfia fluitans* is common in the water along river banks and lake shores.

Seventy-four species have been recorded in disturbed habitats across various community types, as well as along water bodies, roadsides, ditches, soil, sand, rubble, and construction debris. Commonly found species include *Bryoerythrophyllum recurvirostrum, Bryum argenteum, Dicranellopsis subulata, Eurhynchiastrum pulchellum, Funaria hygrometrica, Leptobryum pyriforme, Pohlia cruda, Pohlia nutans, Polytrichum piliferum,* etc.

The moss flora of the Tyumen Province is composed primarily of widespread, multiregional species with wide circumpolar ranges. However, despite the monotony of natural conditions, the moss flora includes a number of rare and interesting species. Among the rare mosses, the following species are noteworthy.

Dicranum viride is found primarily in the broadleaf forest zone of the European part of Russia and the Caucasus; in Asian Russia, the only record is in the Tyumen Province. It is listed in the Red Data Book of the Russian Federation (Geltman, 2024). This rare species is protected in 20 European countries, and its population is declining (Hodgetts & Lockart, 2020).

Leucodon sciuroides. This is a rare species in lowland regions of Western Siberia (Ignatov *et al*., 2020). A single locality in Tyumen Province was revealed in the northern forest-steppe subzone (Voronova, 2018).

Orthotrichum pallens is not uncommon in the steppe and southern forest zones of the European part of Russia and the Caucasus, but in the Asian part it is known only from isolated localities in Tyumen Province and Altai Republic (Ignatov *et al*., 2018).

Physcomitrium pyriforme is common in the European part of Russia; it was sporadically found in the moun-

tainous regions of Siberia; in the Tyumen and Novosibirsk Provinces (Ignatov *et al*., 2017).

Physcomitrium sphaericum is common in Primorsky Territory, found in Buryatia and Kuril Islands. In European Russia and in the lowland Siberia (Khanty-Mansi Autonomous Okrug, Novosibirsk and Tyumen Regions) it known from isolated finds (Ignatov *et al*., 2017).

Plagiothecium rossicum is common in European Russia, and isolated finds are known from the south of the Far East: Khabarovsk and Primorsky Territories, Sakhalin, and Kuril Islands (Ignatov *et al*., 2020), whereas throughout Siberia it is substituted by another species of the *P. laetum*-complex, *Plagiothecium svalbardense* Frisvoll. Jan Kučera also found it in South Bohemia, Jihočeský Region, district České Budějovice (Ellis *et al*., 2024). The records of *Plagiothecium rossicum* from the Tyumen Province are the first for Siberia.

Sarmentypnum tundrae is arctic-alpine species, common in the Arctic and subarctic, found in the mountains of Siberia and the Far East. In lowland areas, isolated finds have been reported in the Leningrad and Vologda Provinces (Ignatov *et al*., 2022); in the Tyumen Province, it was found near the city of Tobolsk, at the southern limit of its range.

Streblotrichum convolutum is quite common in European Russia, mountains of Siberia, and the Far East (Ignatov *et al*., 2025), but in the flat part of Western Siberia it has only been found once in the vicinity of the city of Tobolsk.

As a result of the present study, we updated the current knowledge of the moss diversity in the Tyumen Province, adding new species and excluding erroneous literature records. The data on the rare species, their localities and habitat preferencies provides a solid ground for the nature conservational purposes. This is especially important for the updating and correction of the list of mosses included in the Red Book of the Tyumen Province (Petrova, 2020), which requires a revision.

Aknowlegements

We are very grateful to E.A. Ignatova, M.S. Ignatov, O.M. Afonina, and E.Yu. Kuzmina forthe help with identification of the some specimens. The research of Voronova was conducted within the framework of the scientific topic of the Department of Botany, Biotechnology and Landscape Architecture of Tyumen State University "Transformation of the vegetation cover of the Tyumen Provinceand adjacent territories under the influence of environmental conditions" № 2022/10. The work of Czernyadjeva was carried out within the framework of the institutional research project (№ 124020100148-3) of the Komarov Botanical Institute of the Russian Academy of Sciences.

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Received 15 October 2025 *Accepted 15 December 2025*