**SPHAGNUM BERINGIENSE (SPHAGNACEAE, BRYOPHYTA) IN RUSSIA**

**SPHAGNUM BERINGIENSE (SPHAGNACEAE, BRYOPHYTA) В РОССИИ**

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Abstract

Distribution of *Sphagnum beringiense* in Russia is revealed based on a revision of herbarium collections. The species occurs in Yamal and Tazovsky Peninsulas, in eastern Taimyr, Yakutia, and Russian Far East from Chukotka to Primorsky Territory. Description and illustrations of the species based on Asian specimens are provided, its distribution in Russia is mapped and key to identification of species from subgenus *Subsecunda* with multi-layered epidermis is given.

Резюме

В результате ревизии гербарных коллекций выявлено распространение *Sphagnum beringiense* в России. Вид встречается на восточном Таймыре, в Якутии, в Дальнем Востоке от арктических районов Чукотки до Приморского края, единичные находки известны в Западной Сибири (Ямал, Тазовский полуостров). Приводится описание вида и его иллюстрации, основанные на азиатском материале, карта распространения в России и ключ для определения видов рода *Sphagnum* подрода *Subsecunda* с многослойным гиалодермисом.

KEYWORDS: subgenus *Subsecunda*, Asian Russia.

**INTRODUCTION**

*Sphagnum beringiense* A.J. Shaw, R.E. Andrus & B. Shaw was recently described from Arctic Alaska (Shaw et al., 2008). It belongs to the subgenus *Subsecunda* (Lindb.) A.J. Shaw (Shaw et al., 2010) and resembles *S. platyphyllum* (Lindb. ex Braithw.) Sull. ex Warnst. in appearance, but differs in having fascicles of spreading and pendent branches. Microscopically, it is most similar to *S. contortum* Schultz. *Sphagnum beringiense* was detected in Russia for the first time from recent collections of one of the authors (VEF), made in Taimyr (Fedosov et al., 2011). A revision of herbarium materials from Asian Russia was subsequently undertaken by the senior author (AIM). Specimens identified as *S. platyphyllum* and *S. contortum* from LE, MHA, MW, PTZ, and SASY were mainly studied, ca. 130 specimens in total were checked. Among them, ca. 50 specimens were re-identified as *S. beringiense*. At the same time, in 2015 K. Flatberg revised collections of O.M. Afonina from Chukotka in LE and also identified *S. beringiense* (Flatberg et al., 2016). In addition, the species was identified from Yakutian collections of the senior author (AIM) and third author (EAI) and from some other recent collections of VEF, O.Yu. Pisarenko, A.G. Bezgodov and I.V. Czernyadjeva. In this paper, we summarize the data on distribution of *S. beringiense* in Russia and its ecology. Morphological description is based on specimens from Taimyr Peninsula, Varneg Island, Chukotka, and Yakutia.

**TAXONOMIC TREATMENT**


Plants medium-sized to large, in small patches, yellowish-green, grayish-yellow or, occasionally, yellowish-green with pinkish tint. Terminal bud weakly differentiated. Capitulum well delimited, round. Stems light brownish, rarely yellow or green, hyalodermis well differentiated, 2–3–(4)-layered, efibrillose and non-porose. Sclerodermis well delimited, consisting of small thick-walled cells, light yellow to reddish-brown, occasionally dark brown. Stem leaves short to elongate lingulate-triangular, 0.8–1.1(–1.5) mm long and 0.6–0.9 mm wide, marginal border narrow, usually not widened at leaf base. Hyaline cells in distal 1/3–1/2–2/3 portion of stem leaf fibrillose and usually non-septate, on convex surface with numerous thin-ringed or non-ringed pores 5–8 μm in diam. along commissures, on concave surface with numerous or few weakly ringed or non-ringed pores 4–6 μm in diam. Branch fascicles with 1–2 spreading and 1–2(–3) pendent branches. Branch leaves in the middle part of spreading branches ovate to ovate-lanceolate or almost round, concave, 1.3–2.1 mm long and 0.8–1.3 mm wide,
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weakly secund; hyaline cells on convex surface with rounded ringed or thinly ringed pores in continuous or discontinuous rows along comissures, on concave surface without pores or with few or more numerous rounded pores 4–6 μm in diameter. Chloropyllous cells in branch leaf transverse section lens-shaped or rectangular, equally open on concave and convex surfaces and with equally thickened walls on both ends (Fig. 1: 13). Gametangia and sporophytes not seen in specimens from the territory of Russia.
Differentiation. Sphagnum beringiense is most similar to S. platyphyllum in appearance, and occasionally it looks like S. contortum. It differs from S. platyphyllum by well developed branch fascicles consisting of both spreading and pendent branches (the latter usually absent in S. platyphyllum) and by stem leaves smaller than branch leaves (vs. stem leaves are equal in size or larger than branch leaves). There also is some difference in hyalodermis structure between these species, i.e., in S. beringiense hyalodermis is 2–3–(4)-layered, while in S. platyphyllum it consists of 2–1 layers of hyaline cells. S. beringiense shares with S. contortum 2–3-layered stem hyalodermis, lingulate-triangular shape of stem leaves, which have fibrils and pores in their distal portion; however, stem leaves of S. beringiense are larger, 0.8–1.1(–1.5) vs. 0.7–1.0 mm long, they usually have numerous large pores on both surfaces, while stem leaves of S. contortum have few pores on convex surface and numerous pores on concave surface; furthermore, pores on convex surface of branch leaves are different in these species: they are medium-sized and thin-ringed and form more or less continuous rows along commissures in S. beringiense, and are much smaller, in discontinuous rows in S. contortum.

Ecology. S. beringiense predominantly grows in various types of moist and wet tundra with intermediate conditions in terms of inorganic nutrition. These are communities with dominance of sedges, cotton grasses, dwarf willows, dwarf arctic birch, blueberry, and hygrophilous plants.

Distribution. Among eight species of the subgenus Subsecunda known from Asian Russia, S. beringiense turned out to be one of the most widespread. It is rather common in Taimyr, Yakutia and Chukotka and is known from few localities in West Siberia and southern part of Russian Far East (two localities in Amurskaya Province and one in Primorsky Territory, Fig. 2). In North America its distribution area is restricted to the western coastal area (Alaska, Washington and British Columbia) (Shaw et al., 2008). So, generally the distribution is to be attributed to Beringian pattern. Most old collections from Asian Russia identified as S. contortum actually belong to other species. Specimens from northern areas of Siberia and Russian Far East were re-identified mainly as S. beringiense, whereas collections from southern territories with oceanic climate turned out to be S. inexpectatum. Sphagnum contortum is apparently absent in East Siberia and Russian Far East, while its presence in West Siberia needs in confirmation. Sphagnum platyphyllum was also reported from many regions of Asian Russia (Ignatov, Afonina, Ignatova et al., 2006). We can confirm its presence in Kamchatka Peninsula, Iturup Island, Sakhalin Island, Buryatia, and Yakutia, but its distribution area should be studied in more detail.

Selected specimens examined: ASIAN RUSSIA: Yamalo-Nenetsky Autonomous District: Yamal Peninsula: Vicinity of Ngaranato Lake (70°17’N; 68°57’E), 4.VIII.1981, Rebristaya (LE); vicinity of Syunyaj-Sale Settlement, terrace of Lower Khorutta River (66°55’N; 71°00’E), 8.VIII.1996, Rebristaya (LE); Tazovskyj Peninsula: without exact locality, 1986, Rebristaya (LE). Krasnoyarsk Territory, Taimyrsky Autonomous District: Taimyrsky State Reserve: Bikada River lower course near Bikada field station (74°50’N; 106°10’E), 15.VIII.1988, Pospelova (MW); northern shore of Taimyr Lake, Ledyanaja Bay, Karovyyj Cape (74°24’35”N; 99°29’11”E), 28.VI.2004, Fedosov Sph28 (MW); same locality, Primetnyj Creek basin (74°29’43”N; 99°42’01”), 8.VII.2004, Fedosov Sph10 (MW); same locality, Ledyanaja Bay NE shore (74°26’N; 99°43’40”E), 13.VII.2004, Fedosov Sph51 (MW); same locality, Perevalnyj Creek canyon (74°27’41”N; 99°42’32”E), 23.VII.2004, Fedosov Sph39 (MW); vicinity of Malaja Logata River mouth (73°25’N; 98°24’E), 8.VII.1988, Pospelova s.n. (MW); vicinity of Any-Mas field station; Novaja River valley (72°27’N; 101°30’E), 1.IX.2007, Fedosov 07A-1-4, 07A-1-8, 07A-1-9 (MW); Kotuykan River valley near Merkyu River mouth (70°19’53.22”N; 106°50’12.3”E), boggy duck bank, 15.VII.2011, Chinenko s.n. (MW); Khatanga Settlement vicinity, watershed eastward Kotuy River lower course (71°40’N; 102°34’E), 18.VIII.2004, Fedosov s.n. (PTZ, MW); vicinity of the Fomich River mouth, Anabarka River valley (72°09’60”N; 110°45’70”E), 15.VII.2008, Fedosov 08-52 (MW); vicinity of Medvezhya River mouth (71°09’47”N; 102°42’18”E), boggy terrace of Kotuy River, 16.VII.2005, Fedosov 05-567 (MW); the same place (71°09’15”N; 102°40’16”E), 21.VI.2005, Fedosov 05-29 (MW); Khatanga settlement outskirts, Ericheka river upper course, Nyamakt-Daldyn mouth, Ericheka River valley opposite Sare-Mas Creek mouth, 9.VIII.2013, Fedosov 13-3-0891 (MW); Khatanga settlement outskirts, Kotuy River lower course, Kotuy River valley slope opposite Ericheka River mouth, 21.VIII.2013, Fedosov 13-3-1171 (MW). Republican Sakha/Yakutia: Lena River estuary vicinity, Lyalkina Mt. (Kharaulach Ridge spur) near Tiksi Settlement, 28.VIII.1998, Filin s.n. (MW); Anabarsky Dist., 90 km northward Saksylakh Settlement, Anabar River right bank near Srednyaja River mouth, 11.VIII.1979, Egorova (IRK); Kytałyk resource reserve (70°49’52”N; 147°30’25”E), Berelekh Creek right bank, 26.VII.2005, Maksimov PTZ 12764, 12765, 12766 (PTZ); Kytałyk resource reserve (70°49’52”N; 147°30’25”E), Berelekh Creek left bank, 27.VII.2005, Maksimov PTZ, 12767 (PTZ); Indigirka River lower course, Malaya Ercha River basin, Bolshoy Tugutchan Creek, 2.VIII.1974, Afonina (LE); Oymyakon...
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Kon District, 10 km westward Ust'-Nera Settlement (64°32'57"N; 143°00'25"E), Betula exilis dominated larch forest near Yt'-Yuryakh Creek, 4.VIII.2015, Ignatov & Ignatova 15-1456 (MHA); the same area, Betula exilis & sedge dominated bog in flood plain of Indigirka River, 6.VIII.2015, Ignatov & Ignatova 15-1423 (MHA). Chukotsky Autonomous District: Vrangel Island: Lednikovaja River basin (71°12'N; 179°00'E), 23.VII.1985, Afonina 2 (LE); Somnitel'naja River valley, 13.VIII.1985, Afonina 60 (LE); Drem-Hed Mt. (71°25'N; 179°47'W), 29.VII.1985, Afonina 59 (LE); vicinity of Somnitel'naja Bay, Bazovyj Creek upper course (70°56'N; 179°37'W), 16.VIII.1985, Afonina 24 (LE); Neozhydannaja River middle course (70°54'N; 178°50'E), 12.VII.1985, Guljaev s.n. (LE); hot springs in Gil'mimliveem Creek basin 15 km eastward Ioni Lake (65°48'N; 173°15'W), 26.VII.1977, Afonina (LE); vicinity of Ioni Lake, Ioniveem Creek middle course, Ioni Mt. (65°53'N; 173°44'W), 5.VII.1977, Afonina 60 (LE); vicinity of Anadyr’ River basin; vicinity of Baran’e Lake (66°54’N; 174°31’E), 10.VIII.1979, Afonina s.n. (LE); Vostochno-Tundrovskyj District, Bol'shoj Anuyj River right bank watershed between Khetachan and Krichal’skaja Rivers, 24.VII.1972, Kildyushevskij 72/7 (LE); Kamchatka Peninsula, Ust’-Bol’sheretskij Distr., middle course of Bannaya River (65°54’N; 175°15’E, 600 m alt.), 6.VIII.2015, Bezhodach 232 (PTZ).

Key to identification of Sphagnum species from subgenus Subsecunda with multi-layered stem hyalodermis in Russia

1. Stem leaves are equal in size or larger than branch leaves and similar to branch leaves in shape; stem hyalodermis 2–1-layered .................. Sphagnum platyphyllum
   — Stem leaves considerably smaller than branch leaves, lingulate-triangular; stem hyalodermis 2–3(–4)-layered ................................................................. 2

2. Stem leaves 0.8–1.1 mm long, with numerous large pores on both surfaces in distal leaf portion; in branch leaves hyaline cells on convex surface with medium-sized, rounded, ringed or thinly ringed pores in continuous rows along commissures, on concave surface without pores or with few pores, rarely with more or less numerous pores ...................... S. beringiense
   — Stem leaves 0.7–1.0 mm long, on convex surface with small pores in cell angles and on concave surface with larger and more numerous ringed pores; in branch leaves hyaline cells on convex surface with very small ringed pores in discontinuous rows along commissures and on concave surface without pores or with singular pores .................................. S. contortum

Fig. 2. Distribution of Sphagnum beringiense in Russia.
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LITERATURE CITED


