

DITRICHUM ZONATUM VAR. *SCABRIFOLIUM* DIXON IN RUSSIA

DITRICHUM ZONATUM VAR. *SCABRIFOLIUM* DIXON В РОССИИ

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Abstract

Ditrichum zonatum var. *scabrifolium* Dixon is reported for the first time for the moss flora of Russia. Its description and illustration based on the material from the Bering Island are provided, its taxonomic status and distribution pattern are discussed.

Резюме

Ditrichum zonatum var. *scabrifolium* Dixon впервые приводится для флоры мхов России. На основании образца с о. Беринга дано его описание и иллюстрации, обсуждаются его таксономический статус и распространение.

KEYWORDS: Aleutians, Bering Island, *Ditrichum*, *Ditrichum zonatum* var. *scabrifolium*, mosses, Russia

Ditrichum zonatum (Brid.) Kindb. is a taxon with unclear status and apparently insufficiently known distribution. In some recent European floras it is treated as a separate species (Smith, 2004; Hallingbäck, 2006), the same does Lawton (1971). Savicz-Lyubitskaya & Smirnova (1970) recognized it as a variety of *D. heteromallum* (Hedw.) E. Britton; at the same time, Seppelt *et al.* (2007) included it into *D. heteromallum* without any taxonomic status considering it only as a small form of the latter. Ignatov, Afonina, Ignatova *et al.* (2006) accepted it as a separate species and cited it only for NW European Russia basing on Schljakov & Konstantinova (1982). Fedosov *et al.* (2011) added a locality of the species in Taimyr Municipal District.

During exploration of the Bering Island moss flora, one specimen with unusual character combination was collected on a steep rocky slope near snow bed. The plant had short, predominantly subquadrate, leaf cells with mamillae at both ends on dorsal leaf surface, and leaf margins with peculiar serrulation with every tooth composed of projected corners of two neighboring cells. It was identified as *Ditrichum zonatum* var. *scabrifolium* Dixon which was previously known only from Western North America and Great Britain. As this taxon is rare worldwide and is only briefly discussed in Floras (Smith, 2004; Lawton, 1971), we provide its description and illustration based on the specimen from the Bering Island.

Ditrichum zonatum* var. *scabrifolium Dixon, J. Bot. 40: 378. 1902. Figs. 1-2.

Plants green to yellowish green in lower part, in loose to compact tufts. Stems erect or ascending, 0.7-

1.5 cm, not or weakly branching, \pm fragile, without hyalodermis and central strand, cortical cells in 1-2 layers thick-walled, brown, medullar cells thin-walled. Leaves loosely appressed and slightly incurved or somewhat flexuose when dry, occasionally homomalous, erect-spreading when wet, (0.7-)0.8-1.0(-1.2) \times 0.28-0.35 mm, concave, from ovate base \pm abruptly narrowed into triangular-lanceolate acumen, broadest at 1/4–1/3 of leaf length, acute to subobtuse at apex, occasionally cucullate; costa reddish-brown proximally, green distally, 55-75 μ m wide at base, of equal width throughout leaf or slightly narrowed towards apex and ending a few cells below it, sometimes unclearly delimited from lamina distally, in transverse section weakly differentiated, mostly with larger ventral cells, or with small dorsal stereid band in middle part of leaf, mammilose dorsally in distal 3/4; lamina unistratose with few 2-stratose strips proximally, mostly 2-stratose distally; margins plane, serrulate proximally, with teeth composed of protruding distal corner of lower cell and proximal corner of upper cell, crenulate distally; basal cells rectangular, 10-22(-28) \times 5-10 μ m, shorter towards margin, in distal lamina short rectangular, 10-15 \times 7-11 μ m, both distal and proximal ends of cells protruding on dorsal side almost throughout the leaf. Specialized asexual reproduction not seen. Sporophytes unknown.

Differentiation. *Ditrichum zonatum* var. *scabrifolium* readily differs from var. *zonatum* as well as from any other species of the genus by protruding upper and lower cell

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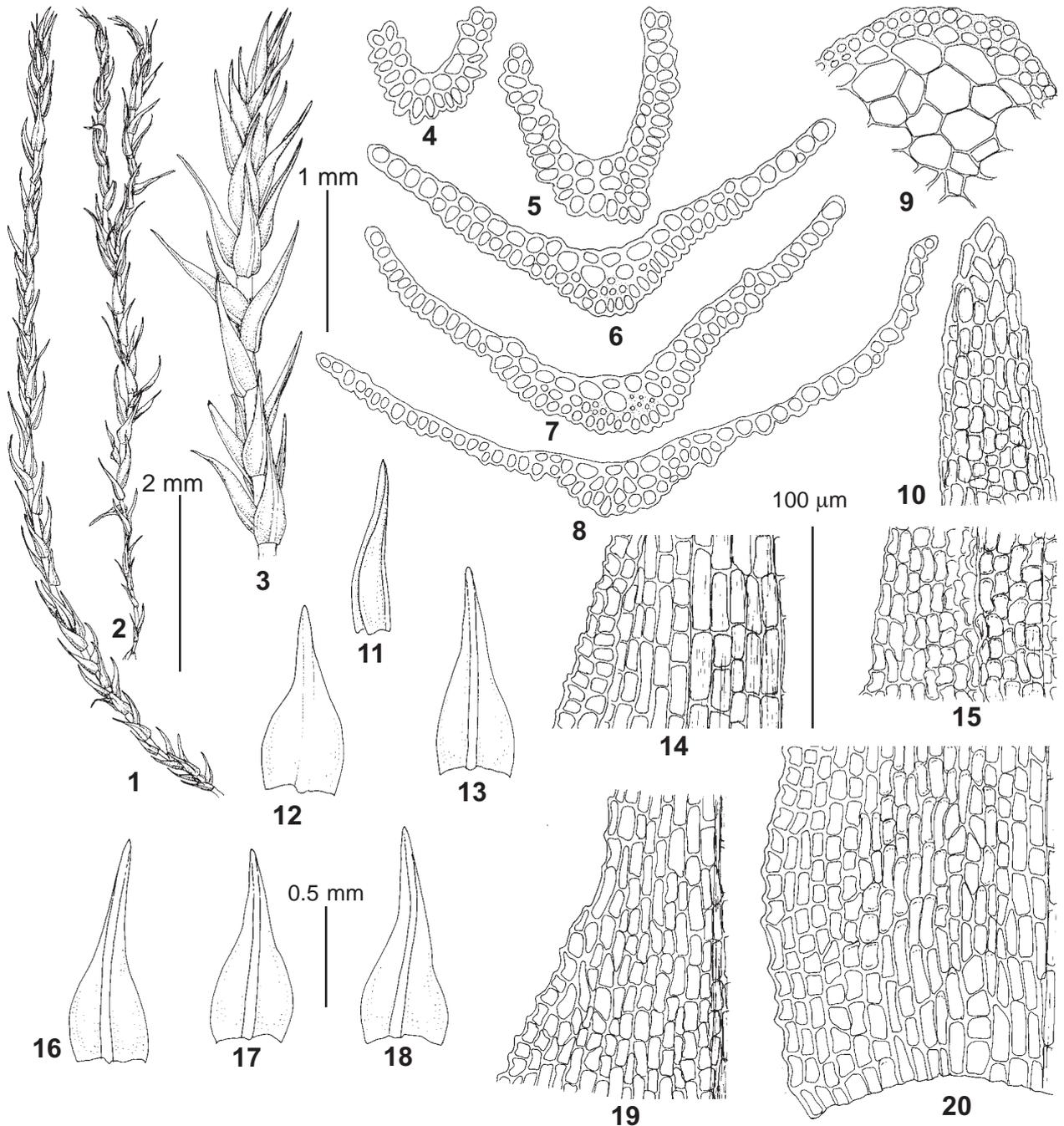


Fig. 1. *Ditrichum zonatum* var. *scabrifolium* Dixon (from: Russia, Commander Islands, Bering Island, Fedosov #10-3-1052, MW): 1-2 – habit, dry; 3 – habit, wet; 4-8 – leaf transverse sections; 9 – stem transverse section; 10 – cells of leaf apical part; 11-13, 16-18 – leaves; 14 – distal laminal cells and surface cells of costa, ventral side; 15 – distal laminal cells and surface cells of costa, dorsal side; 19 – median laminal cells; 20 – basal laminal cells. Scale bars: Scale bars: 2 mm for 1-2; 1 mm for 3; 0.5 mm for 11-13, 16-18; 100 µm for 4-10, 14-15, 19-20.

ends making dorsal side of leaf lamina and costa scabrose, and peculiar ‘two-celled’ marginal serration in proximal part of leaf, the latter character being somewhat similar to that of *Philonotis* sect. *Philonotis*.

At the same time, *D. zonatum* var. *scabrifolium* is similar to var. *zonatum* as follow: both are always sterile, forming compact, dense tufts, leaves are loosely appressed and slightly incurved.

Ecology. *D. zonatum* var. *scabrifolium* grows in the Bering Island on fine soil near snow bed; for environment and moss flora of the area see Fedosov *et al.* (2012). Lawton (1971) describes its habitats “in rock crevices, usually in the mountains”, the same as for var. *zonatum*. Smith (2004) reported a certain difference in their ecology in Britain and Ireland: var. *zonatum* grows “in rock crevices, in areas of late snow-lie and in scree, calci-

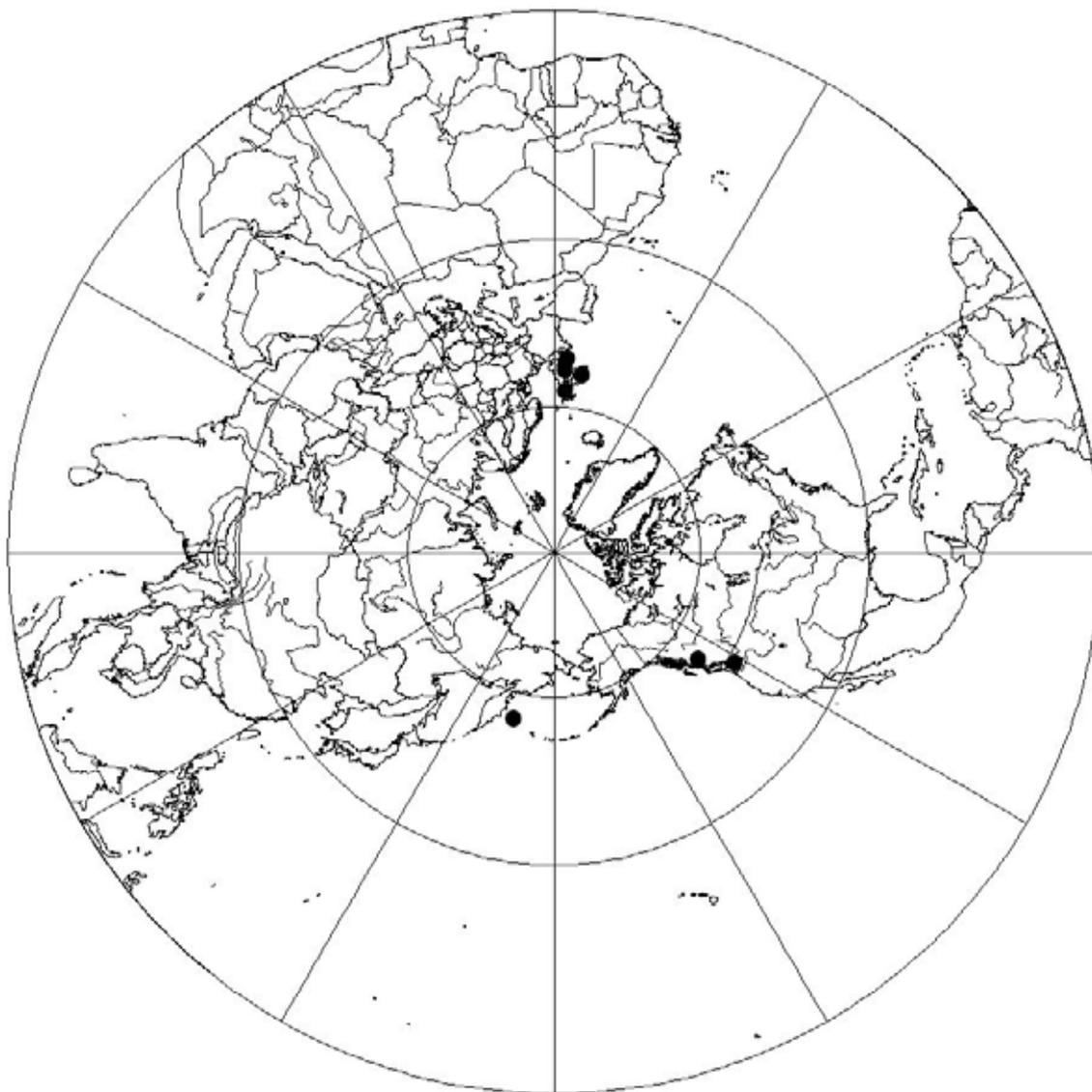


Fig. 2. Distribution of *Ditrichum zonatum* var. *scabrifolium* Dixon.

fuge”, while var. *scabrifolium* prefers “damp rock crevices, especially slightly basic.” In Russia, var. *zonatum* occurs on more or less acidic rocks, e.g. granitic, gneiss and quartzite sandstone rock outcrops, mostly on cliff ledges (Murmansk Province and Anabar Plateau), while var. *scabrifolium* in the Bering Island was collected in a place with somewhat calcareous sedimentary bedrocks, being thus coincidental with Smith’s (l.c.) observations.

Distribution. *Ditrichum zonatum* var. *scabrifolium* is a taxon that has west-western disjunction (Schofield, 1988), being known in Europe from Great Britain (Wales, northern England, Scotland, and North Ireland) and in Western North America from Canada (British Columbia) and U.S.A. (Washington). Its finding in the Commander Islands stretches a Pacific part of its area considerably (Fig. 2).

Specimen examined: RUSSIA: **Kamchatsky Territory**, Aleutsky Distr., Bering Island, western slope of Steller Mt. (54°53’43.8”N, 166°19’43.2”E), 490 m. alt., 11.VIII.2010, Fedosov #10-3-1052 (MW).

Considering morphological, ecological and geographical specificity of *Ditrichum zonatum* var. *scabrifolium*, its status may need elevation up to the species level, although genetic identity of Atlantic and Pacific populations must be proved for the well-founded conclusion, moreover, that status of *D. zonatum* also has to be confirmed.

***Ditrichum zonatum* and *D. heteromallum* – differentiating problem.**

Ditrichum zonatum has been characterized by variegated color of tufts, which have alternating dark and light growth zones (Savicz-Lyubitskaya & Smirnova, 1971; Hallingbäck, 2006). However, this character is not always observed in specimens and probably is better seen in the field. Smith (2004) mentions one more character which is helpful for recognizing of *D. zonatum*: its brittle stems, which break easily and make it difficult to remove leaves when preparing slides; it is also the case for plants from the Bering Island. At the same time, Hal-

lingbäck (2006) reported caducous leaves at stem apices, which were not mentioned by Smith and were not seen in specimens from Russia.

Savicz-Lyubitskaya & Smirnova (1970) stated that only *Ditrichum zonatum* (as *D. heteromallum* var. *zonatum*) has bistratose lamina near costa in distal part of leaf, while it is unistratose in *Ditrichum heteromallum* var. *heteromallum*. This disagrees with Seppelt et al. (2007), as well as with our observation in Russian collections of both *D. zonatum* and *D. heteromallum*, where leaf lamina is mostly bistratose distally and bistratose near costa and unistratose at margins in the middle part of the leaf (cf. Figs. 1: 4-8). Unistratose strips more often occur in upper part of larger leaves of *D. heteromallum*, but can not separate it from *D. zonatum*.

At the same time, *D. heteromallum* differs from *D. zonatum* in costa structure: its costa is thicker and better differentiated, having ventral and dorsal epidermis, guide cells and thin ventral and dorsal stereid bands even in its distalmost part, which contrasts with a weakly differentiated costa of *D. zonatum*.

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