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FIRST CERTAIN RECORD OF HYGROHYPNUM BESTII (REN. & BRYHN) HOLZ. EX BROTH. FOR EURASIA (RUSSIAN FAR EAST, KAMTCHATKA PENINSULA)

ПЕРВАЯ ДОСТОВЕРНАЯ НАХОДКА HYGROHYPNUM BESTII (REN. & BRYHN) HOLZ. EX BROTH. ДЛЯ ЕВРАЗИИ (РОССИЙСКИЙ ДАЛЬНИЙ ВОСТОК, ПОЛУОСТРОВ КАМЧАТКА)

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Abstract

Hygrohypnum bestii, previously known only from the North America, was found in the Russian Far East in the Kamtchatka Peninsula. Description, illustrations and ecological characteristics are provided. The diagnostic characters and differences between *H. bestii, H. molle*, *H. duriusculum* and *H. ochraceum* are discussed.

Резюме

Hygrohypnum bestii, ранее известный только из Северной Америки, найден на Дальнем Востоке, на полуострове Камчатка. Приводятся описание, рисунки, экологическая характеристика вида. Обсуждаются различия между *Hygrohypnum bestii, H. molle, H. duriusculum* и *H. ochraceum*.

Renauld and Bryhn (Renault, 1901) originally described *Limnobium molle* Dicks. ssp. *bestii* Ren. et Bryhn from Avalanche Basin, Montana, USA by a sterile collection of Holzinger. Williams (1901) considered it as a separated species and published records of a number of sterile collections from the United States and Canada. Holzinger (1901) placed this species in the genus *Hygrohypnum*, but he provided an invalid combination. Brotherus (1909) validated the combination of *Hygrohypnum bestii* in this genus. Grout (1931) and Wijk & al. (1962) considered *H. bestii* as a subspecies of *H. molle*. Lawton (1966) discovered sporophyte of *H. bestii*. On the basis of dioicous condition and structure of the inner perichaetial bracts of this species, she showed its species independence. Jamieson (1976) provided the detailed description of this species, list of localities and its distributional map. According to him, *H. bestii* occurs only in North America, chiefly in its Western part, with few localities in the East. Crum & Anderson (1981) however have seen no reason to include *H. bestii* in the eastern flora because dioicous condition has not been certainly shown for the plants from the eastern North America. Wijk & al. (1969) in the "Index Muscorum" reported *H. bestii* from the Europe. But neither Jamieson (1976) nor me could find any literature records or specimens of the species from there.

During my revision of the Russian collections of the genus *Hygrohypnum,* 6 specimens of *H. bestii* from the Kamtchatka Peninsula (Russian Far East) have been found (Fig. 1). They were deposited in herbarium as *H. molle* (Hedw.) Loeske and *H. duriusculum* (De Not.) Jamieson. All specimens are sterile. So, the following description of the gametophyte is based on the Russian materials, but the description of sporophyte is taken from the literature (Jamieson, 1976; Lawton, 1971).

Hygrohypnum bestii (Ren. et Bryhn) Holz. ex Broth. in Engl. & Prantl, Nat. Pfl. **1**(3): 1040. 1909. – *Limnobium molle* ssp. *bestii* Ren. et Bryhn, Bull. L'Acad. Int. Geogr. Bot. 10: 7. 1901. Fig. 2.

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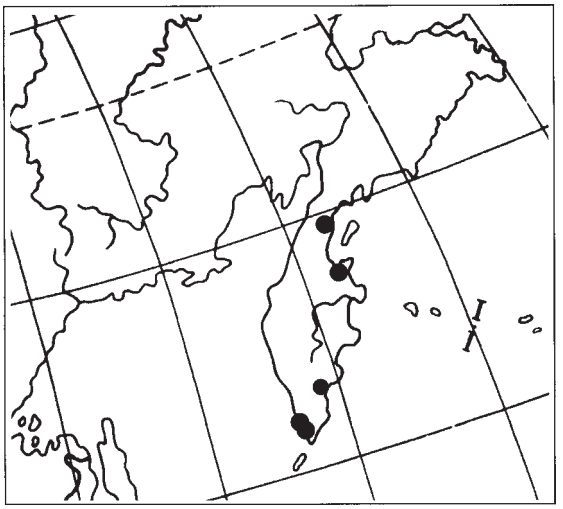

Fig. 1. Distribution of *Hygrohypnum bestii* (Ren. & Bryhn) Holz. ex Broth. in Kamtchatka Peninsula.

Plants large, in mats or loose tufts, stiff or harsh, dull yellow-green, dark olive-green or brownish. Stems (3)5-7(10) cm long, irregularly branching, central strand absent or rarely very weak, cortical cells small, thick-walled, reddish-brown, with 2-4 rows, medullary cells larger and thinner-walled, older extremities of stems and branches often become denudated. Leaves (1.5)1.7-3(3.3) mm long, (1)1.3-1.6(1.9) mm wide, erect-spreading to wide-spreading, sometimes slightly asymmetrical, often removed with difficulty from stem, plane to shallowly concave, broadly ovate to ovate-lanceolate, gradually acute, blunt at apex; margins plane, entire below, minutely serrulate in apecal part; not to slightly decurrent. Costa variable, strong at base, usually double, rarely single or forked with 2 or 3 lateral branches, often reaching midleaf, yellow, becoming brownish with age. Median leaf cells linear-flexuose to flexuose, (55)80-100(135) μm long, 7-10 μm wide; marginal cells very long and narrow, (100)150-240(300) μm long, 5.5-8(9) μm wide. Upper cells shorter, rhomboid to rounded-quadrangular; basal cells rectangular, incrassate and yellowish or brownish, often opaque; alar cells sometimes similar to the basal or differentiated in small area quadrate or rectangular cells.

Dioicous. Perichaetial bracts squarrose, ecostate; inner perichaetial bracts lanceolate, their costa single or double, in cross section of 5-9 layers of thick-walled cells, with broad regions of lamina bistratose near costa. Seta 1.5-2 cm long. Capsule arcuate, 2.5 mm long; annulus of 2-3 rows of decidous cells; peristome double, the 16 teeth, endostome with 1-3 finely papillose, weakly appendiculate cilia. Spores pale yellow, finely papillose, 15-19 μm.

Hygrohypnum bestii is best recognized by the dioicous condition and the very long marginal leaf cells (Table 1). Jamieson (1976) noted, that *H. bestii* is unique in leaves detauched from the stem with a difficulty. In studied specimens from Russia this character seems to be not constant. *H. bestii* is closely related to *H. molle*. They may be confused because of similar habit, broadly ovate leaves and hardly differentiated alar cells. On the other hand small plants of *H. bestii* with tiny leaves are similar to *H. duriusculum*. From both *H. molle* and *H. duriusculum, H. bestii* differs in dioicous sexual condition and the very long marginal leaf cells. The central strand is an additional character: *H. bestii* has very weak or no central strand whereas *H. molle* and *H. duriusculum* develop strong to weak central strand. *H. bestii* differs from *H. duriusculum* also in alar cells, which are hardly differentiated in *H. bestii* whereas *H. duriusculum* has the well-defined group of thick-walled alar cells. *H. ochraceum* (Turn. ex Wils.) Loesk. is a dioicous species most close to *H. bestii*. This species is distinguished from *H. bestii* by inflated hyaline cortical cells of stems (vs. small thick-walled in *H. bestii*) and lanceolate leaves (vs. broadly ovate in *H. bestii*). It is noteworthy that among the mentioned species *H. bestii* has a considerably longer leaves.

Habitat. On stones in water of swiftly running mountain cold and hot streams and on bank of river among willow stand.

Specimens studied (all in LE): **Kamtchatka Peninsula**: *Ossora Settlement*, foot of Kaspa Mt., forest belt. Coll. Czernyadjeva #51, 27.VIII.1990; slope of Kaspa Mt., subalpine belt. Coll. Czernyadjeva #53, 28.VIII.1990; peak of Kaspa Mt., alpine belt. Coll. Czernyadjeva #54, 28.VIII.1990. *South-Kamtchatka Reserve* (51°20'N, 156°45'E): slope of Koschelevsky Volcano, alpine belt. Coll. Czernyadjeva #7, 22.07.1990; Chetvyortaya River, subalpine belt. Coll. Czernyadjeva #22, 24.07.1990. *Nachik River Valley.* Coll. V.P. Savicz #5974, VIII.1908.

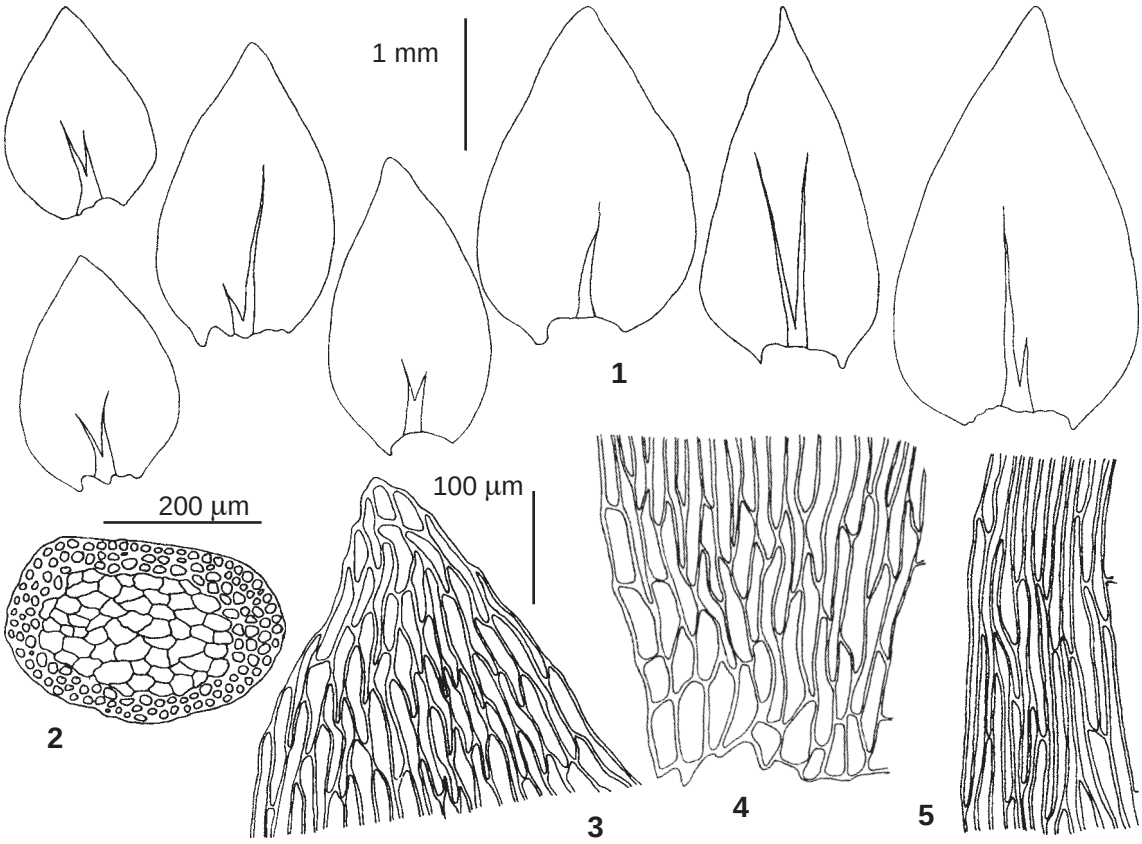

Fig. 2. *Hygrohypnum bestii* (Ren. & Bryhn) Holz. ex Broth.: 1 – leaves; 2 – cross section of stem; 3 – upper laminal cells of leaf; 4 – alar cells of leaf; 5 – marginal cells of middle leaf. Scale bars: 1 mm for 1; 200 µm for 2; 100 µm for 3-5.

Table 1. Characters separating *Hygrohypnum bestii* from the similar species.

Characters \ species	*H. bestii*	*H. molle*	*H. duriusculum*	*H. ochraceum*
Sexuality	dioicous	autoicous	autoicous	dioicous
Outer cortical cells	small thick-walled			inflated hyaline
Leaf shape	broadly ovate	broadly ovate	oblong-elliptic	lanceolate
Average leaf length, mm	2.6-3.0	1.4-2.0	1.1-1.7	1.3-2.4
Alar cells	hardly differentiated	undifferentiated	well developed groups of incrassate cells	variously developed groups of large hyaline cells
Length of marginal cells in the middle part of leaf, µm	120-250	35-65	30-55	70-160

The finding of *H. bestii* in Kamtchatka extends its range considerably. Another example of a North American found recently in Kamtchatka is *Pohlia cardotii* (Ren.) Broth. (Czernyadjeva, 1995). They provide an evidence of the previous connection of the Asian and American continents through Beringia. Insufficient bryological exploration of the Russian Far East allow to expect here more findings of *H. bestii*, as well as the other North American species.

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After the paper was prepared, one more specimen was found: Kamchatka, Elizovo Distr., first leaf tributary of Shumnaya River. 26.IX.1961 (MW).