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RHIZOMNIUM TUOMIKOSKII (MNIACEAE, MUSCI) ON THE KAMCHATKA PENINSULA, RUSSIAN FAR EAST

RHIZOMNIUM TUOMIKOSKII (MNIACEAE, MUSCI) НА ПОЛУОСТРОВЕ КАМЧАТКА, РОССИЙСКИЙ ДАЛЬНИЙ ВОСТОК

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Abstract

Rhizomnium tuomikoskii T. J. Kop., previously known from Japan and China, is recorded for the first time for Russia from the Kamchatka Peninsula. Illustrations and desricption based on the Kamchatkan specimen, and a key to the Kamchatkan species of *Rhizomnium* are provided. The total known distribution of *R. tuomikoskii* is mapped.

Резюме

Rhizomnium tuomikoskii T. J. Kop., ранее известный из Японии и Китая, найден теперь также на российском Дальнем Востоке, на полуострове Камчатка. Даны описание и иллюстрации камчатских растений, а также дан ключ для определения видов рода *Rhizomnium*, встречающихся на Камчатке. Также приводится карта общего распространения *R. tuomikoskii*.

Rhizomnium tuomikoskii was described by Koponen (1971) from Japan. It is there rather common in warm temperate (= meridional) and temperate zones and grows on rocks and rotten wood preferably in moist forested habitats such as small streams and seepages. Later it was reported from several localities in China; from Taiwan (Koponen & Lai 1977), from Zhejiang and Sichuan Provinces (Koponen & Lou 1982), and collected in Sichuan and Hunan Provinces by the senior author (Koponen 1994, Enroth & Koponen, 2003). We have seen specimens also from Bhutan (T. Koponen, unpublished). According to the field experience of the senior author the habitats and substrates of *R. tuomikoskii* in China are similar to those in Japan.

Recently *Rhizomnium tuomikoskii* was found in a collection from Kamchatka Peninsula, Russian Far East (Fig. 1). It is the northernmost locality for the species (Fig. 2). The habitat ecology in the locality obviously corresponds to its habitats in Japan and China. The description of *R. tuomikoskii* below is based on this Kamchatkan specimen.

Rhizomnium tuomikoskii T. J. Kop., J. Hattori Bot. Lab. 34:375. 1971.

Plants 1-2 cm high, green to dark-green, loosely tufted. Stems erect, brownish to reddish-brown. Micronemata lacking; macronemata numerous till upper part of stem, often covering the upper leaf surface and forming multicellular propagules. Propagules uniseriate, occasionally branched. Leaves obovate, contorted when dry, (3-)4-6(-7) mm long, 2-4 mm wide, apex apiculate to obtuse; margin bi- to multistratose, slightly or rarely strongly coloured; costa strong at base and tapering gradually, narrow in upper part and occasionally forked, rarely reaching the apex; leaf base shortly attenuate, longly and very narrowly decurrent. Laminal cells hexagonal, (40-)55-90(-110) μm long, (20-)35-45(-50) μm wide, with length/width ratio from 2.8:1 to 1.1:1, cells smaller and rectangular towards the border; cell walls similarly thickened throughout or rarely with slight corner thickenings; cells of border prosenchymatous also at apex. Dioicous. Head of male plant disklike, leaves broadly obovate. Inner pericha-

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Table 1. Comparison of Kamchatkan and Japanese plants of *Rhizomnium tuomikoskii*

	Kamchatka specimen	Type description
Plant color	green to dark-green	pale green
Leaf above	apiculate to obtuse	usually apiculate
Leaf border	lightly coloured	usually coloured
Costa	rarely reaching the apex	often reaching the apex
Leaf cells	corner thickenings slightly expressed	always evenly thickened
Leaf cells, μm	55-90 x 35-45	95-135 x 55-90

etial leaves small, triangular. Seta solitary, nearly 5 cm. Capsule slightly curved, 2.5 mm long. Operculum with small rostrum.

Specimen from Kamchatka demonstrated several morphological differences from the type description (Table 1). This may be due to location on the northern border of the area.

The following characters of the specimen from Kamchatka fit to *Rhizomnium tuomikoskii*: (1) the absence of micronemata; (2) dioicous sexuality and (3) macronemata numerous at upper part of the stem, often covering the upper leaf surface and forming multicellular propagules. This character and the regenerating of the plants from the propagules was studied by Koponen and Nehira (1972).

In Kamchatka, 7 species of the genus *Rhizomnium* are known (Czernyadjeva, 2005). Their diagnostic characters are given in the following key.

KEY TO THE SPECIES OF *RHIZOMNIUM* IN KAMCHATKA

1. Micronemata or micronematous initials present on the stem; dioicous or synoicous . . 2
1. Micronemata or micronematous initials absent on the stem; dioicous 4
2. Large species; leaves up to 1 cm long, elliptic to obovate; costa percurrent or ending shortly below apex; capsule ovate, outer peristome teeth bright yellow, rarely brownish; lamellae more than 20; dioicous . . . . . *R. magnifolium* (Horik.) T. J. Kop.
2. Smaller species; leaves up to 7 mm long, broadly elliptic – obovate; costa rarely percurrent, mostly vanishing below apex; capsule globose, outer peristome teeth brown; lamellae less than 20; dioicous or synoicous 3
3. Leaves up to 7 mm long and 6 mm wide, border bistratose at base; synoicous . . . . . *R. pseudopunctatum* (Bruch & Schimp.) T. J. Kop.
3. Leaves up to 4 mm long and 3 mm wide, border unistratose; dioicous . . *R. gracile* T. J. Kop.
4. Leaf border conspicuous throughout, usually bi- or multistratose; apex often apiculate; costa often percurrent 5
4. Leaf border inconspicuous especially near apex, usually uni-, rarely bistratose, apex rarely apiculate; costa not reaching apex . . 7
5. Leaves narrowly elliptic – narrowly obovate; cells with strong corner thickenings; costa often percurrent, macronemata not forming propagules . . *R. striatulum* (Mitt.) T. J. Kop.
5. Leaves elliptic – obovate; cell walls equally thickened or with slight corner thickenings . . 6
6. Macronemata often covering upper stem parts and leaves, forming upstanding propagules; costa often not reaching apex . . . . . *R. tuomikoskii* T. J. Kop.
6. Macronemata not forming propagules on leaves; costa percurrent in most leaves . . . . . *R. punctatum* (Hedw.) T. J. Kop.
7. Large plants, leaves up to 8 mm long; stems straight . . . . . *R. nudum* (E. Britton & R. S. Williams) T. J. Kop.
7. Small plants, leaves up to 3.5 mm long; stems characteristically winding . . . . . *R. andrewsianum* (Steere) T. J. Kop.

This key is useful for the northern part of Asia. In southern and southwestern Asia three more species of *Rhizomnium* occur: (1) *R. parvulum* (Mitt.) T. J. Kop. ranges from Japan to the Himalayas and (2) *R. horikawae* from Taiwan to the Himalayas (Koponen 1981); (3) *R. hattorii* T. J. Kop., previously known from Japan and Korea, was recently recorded from the mainland of China (Koponen & Ji, 2006).

The Kamchatkan locality of *Rhizomnium tuomikoskii* is widely disjunct from its main range. The nearest locality is on northern Honshu in Japan, ca 2000 km south of the Kamchatkan locali-

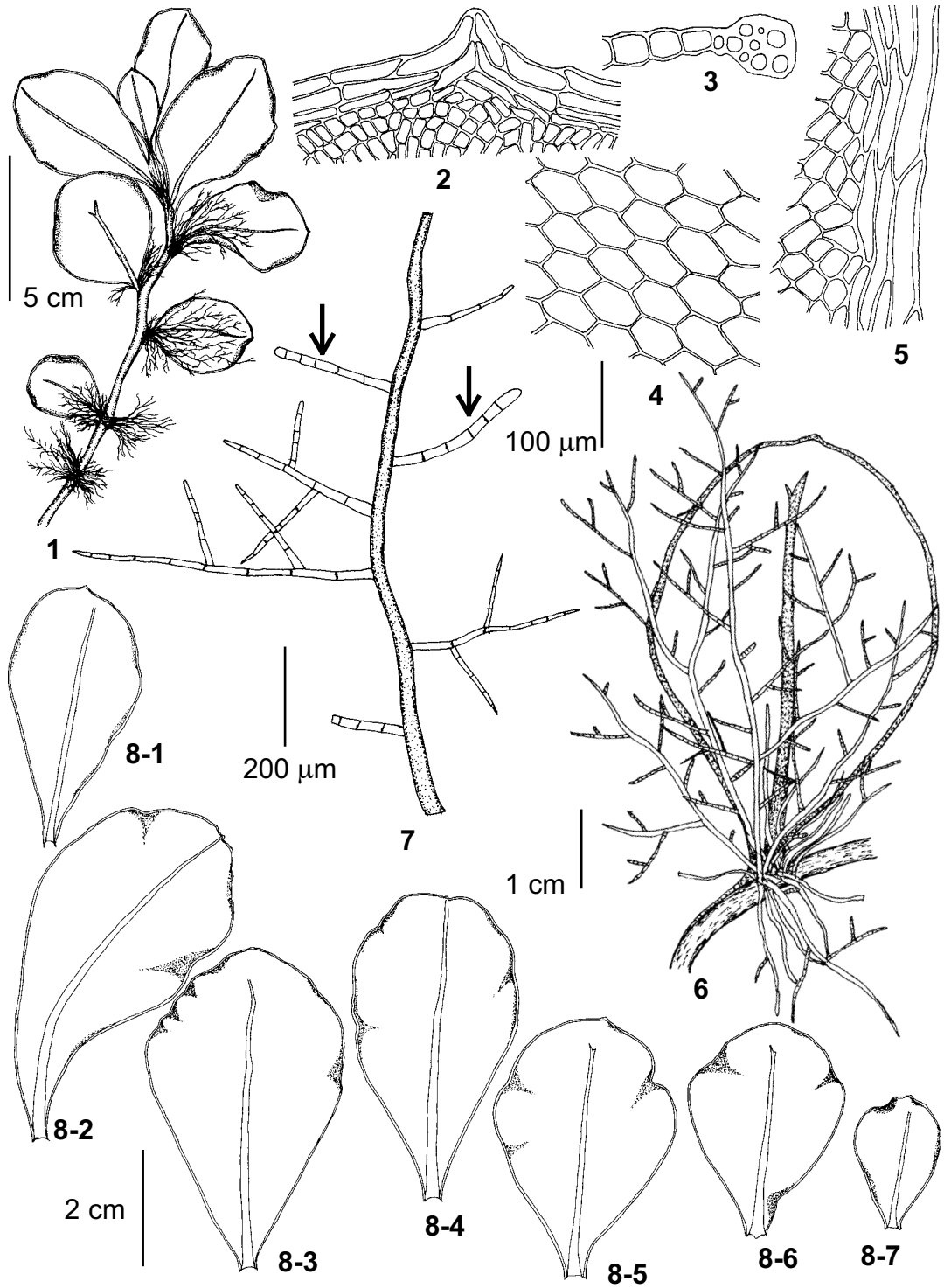

Fig. 1. *Rhizomnium tuomikoskii* T. J. Kop. (from Kamchatkan plants): 1 – habit; 2 – upper laminal cells; 3 – cross section of leaf border; 4 – laminal cells between costa and margin; 5 – border and submarginal laminal cells; 6 – leaf with macronemata in axil; 7 – macronema with upstanding uniseriate propagules (arrowed); 8 – leaves (1-7 - corresponding their sequence on stem from top). Scale bars: 5 cm for 1; 2 cm for 8; 1 cm for 6; 200 μm – 7; 100 μm – 2-5.

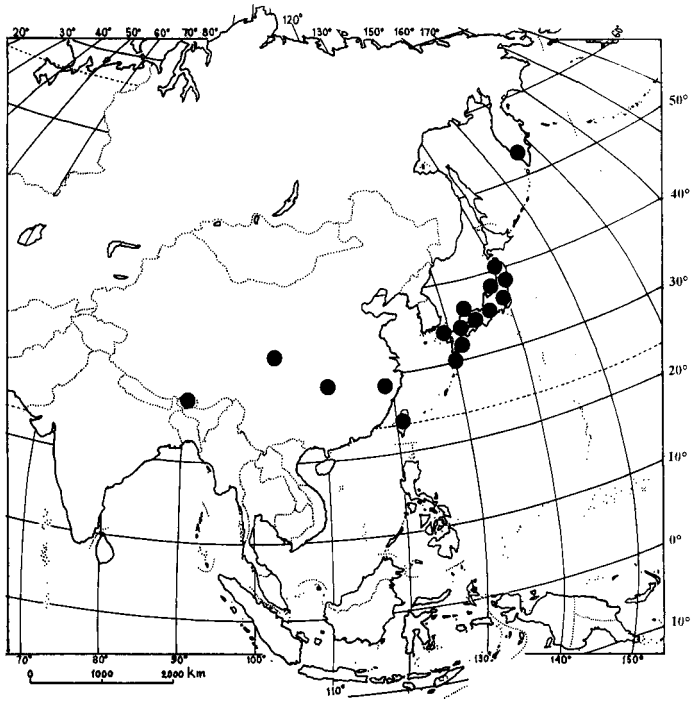

Fig. 2. The total distribution of *Rhizomnium tuomikoskii* T. J. Kop. on the basis of the specimens studied.

ty. All Japanese localities are in the warm temperate or temperate zone, as are the Chinese localities visited by the senior author. In the bioclimatic vegetation zone system (Hämet-Ahti et al., 1974) the Kamchatkan locality is within the middle boreal zone. Other southern taxa known from Kamchatka are species such as *Entodon rubicundus* (Mitt.) A. Jaeger & Sauerb., *Eurhynchiadelphus eustegius* (Besch.) Ignatov & Huttunen, *Oligotrichum aligerum* Mitt., *Oncophorus crispifolius* (Mitt.) Lindb., *Pogonatum japonicum* Sull. & Lesq., *P. contortum* (Brid.) Lesq., *Rauiella fujisana* (Paris) Reimann, and *Rigodiadelphus robustus* (Lindb.) Nog..

Specimen examined: Russia, Far East, South Kamchatka Peninsula, 52°54'N, 157°30'E, alt 200 m, middle course of Bannaja River, flood plain grass willow thicket with *Filipendula camtschatica* (Pall.) Maxim., on decayed trunk, 6.VIII.2002, *Czernyadjeva, #45* (LE).

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