

ON THE FIRST RECORD OF *DIDYMODON TIBETICUS* J. KOU, X.M. SHAO & C. FENG
(POTTIACEAE, BRYOPHYTA) IN RUSSIA

О ПЕРВОЙ НАХОДКЕ *DIDYMODON TIBETICUS* J. KOU, X.M. SHAO & C. FENG
(POTTIACEAE, BRYOPHYTA) В РОССИИ

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Abstract

Didymodon tibeticus was described in 2018 from Tibet (China) and was hitherto considered a local endemic occurring in high alpine areas of Qinghai-Xizang Plateau, between 3700 and 5200 m a.s.l. It is newly reported from Zabaikalsky Territory in Russia, where it was collected in Sokhondinsky State Reserve (Kyra District). Specimens from Russia fully agree with the description of this species in combination of morphological characters, except slightly smaller leaves. This species appeared to be not rare in Sokhondinsky Reserve, growing in abundance on soil and rock outcrops on slopes. It occurs here at much lower altitudes than in Tibet. Description, illustrations and overview of habitats of *D. tibeticus* based on specimens from Russia are provided.

Резюме

Didymodon tibeticus был описан в 2018 г. из Тибетского автономного района в Китае и до настоящего времени считался локальным эндемиком, встречающимся на Тибетском нагорье на высотах от 3700 до 5200 м над ур. м. Этот вид впервые приводится для Забайкальского края в России, где он был собран в Сохондинском заповеднике (Кыринский район). Образцы из России по совокупности морфологических признаков полностью соответствуют описанию этого вида, за исключением немного более мелких размеров листьев. Этот вид нередок в Сохондинском заповеднике, он образует довольно обширные дерновинки на почве и скальных выходах на склонах; здесь он встречается на значительно более низких высотах (1100 – 1200 м над ур. м.), чем в Тибете. Приводятся описание, иллюстрации и экологические предпочтения *D. tibeticus*, основанные на образцах из России.

KEYWORDS: mosses, new record, moss flora, Transbaikalia

INTRODUCTION

Didymodon Hedw. is a large genus with approximately 130 species throughout the world. Its taxonomic revision for Europe, North Africa, Southwest and Central Asia was published by Jiménez (2006). However, this genus remains insufficiently known in other regions of the world, including Russia. Several species new to Russia were already reported from Asian Russia by Afonina *et al.* (2010), and one species, *D. zanderi* Afonina & Ignatova, was described as new for science from Zabaikalsky Territory (Afonina & Ignatova, 2007). Here we provide one additional species of *Didymodon* from Zabaikalsky Territory which is new to Russia. It was collected by the senior author in 2010–2013 in several localities in Sokhondinsky State Reserve. These specimens were very peculiar due to the small size of plants, strongly concave tiny leaves with wide bases and short acumina, acute

apices, totally flat margins, unistratose leaf lamina, and quadrate cells throughout the lamina which were papillose only on dorsal surface. Such character combination did not fit any known species of *Didymodon* or any other genus of Pottiaceae. So, these specimens remained unidentified. Now, in the course of preparation taxonomic treatment of *Didymodon* for the “Moss flora of Russia”, we returned to various puzzling specimens, including those from Sokhondinsky Reserve. By this time, a number of new *Didymodon* species were described from China. Our search among possible names succeeded in finding a proper one, *Didymodon tibeticus* J. Kou, X.M. Shao & C. Feng (Kou *et al.*, 2018). The identity of specimens from Zabaikalsky Territory was also confirmed by molecular barcoding (see Ignatova *et al.*, 2024). Below we provide the description and illustration based on specimens from Russia and discuss its ecological preferences.

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Fig. 1. Collecting localities in Sokhondinsky State Reserve. A–C: Valley of Enda River, S-faced slopes with steppe vegetation where *Didymodon tibeticus* has been collected. D: Habitats of *D. tibeticus* on rock outcrops.

TAXONOMY

Didymodon tibeticus J. Kou, X.M. Shao & C. Feng, *Nova Hedwigia* 106(1–2): 74. 2018[2017]. Fig. 2.

Plants tiny, in loose, easily separated tufts, yellowish-green above, light brownish below, slightly glossy. *Stems* 2–7 mm long, erect, simple or repeatedly branched, dark brown, hyalodermis absent, sclerodermis usually 1-layered, central strand large. *Leaves* imbricate when dry, erect when wet, $(0.38)0.40\text{--}0.45(0.55)\times 0.22\text{--}0.30(0.35)$ mm, ovate to ovate-triangular, with wide bases and short acumina, acute at apex, not or shortly decurrent at base, concave; margins plane throughout, unistratose, entire; *costa* 30–40(–60) μm wide at leaf base, slightly narrowed upwards, percurrent or ending few cells below apex, with quadrate, papillose cells on ventral and dorsal surfaces, in transverse section semicircular or round, with 1 layer of guide cells, dorsal and ventral epidermis, ventral epidermal cells bulging, 0–1 layer of ventral stereids, 1–2 layers of dorsal stereids; lamina unistratose; upper and median *laminal cells* quadrate, $7\text{--}10\times 8\text{--}10$ μm , thin-walled, with straight, eporose walls, smooth on ventral surface and with 1–2 simple or bifid papillae per cell on dorsal surface; basal juxtacostal and central cells not differentiated, basal marginal cells in 3–4 rows transverse

rectangular and quadrate. KOH reaction red or reddish-orange. *Specialized asexual reproduction* unknown. *Apparently dioicous*. Gametangia not seen. *Sporophytes* unknown.

Variation. Plants of *Didymodon tibeticus* from Zabaikalsky Territory differ from those from Tibet in having even smaller leaves, $(0.38)0.40\text{--}0.45(0.55)\times 0.22\text{--}0.30(0.35)$ mm vs. $0.45\text{--}0.85\times 0.2\text{--}0.45$ mm, otherwise having the same combination of morphological characters.

Distribution and ecology. In Zabaikalsky Territory *Didymodon tibeticus* was collected in Sokhondivsky State Reserve, at the border with Mongolia, in the highest central part of Khentei-Daur Highlands, with prevailing elevations 1500–2200 m a.s.l. Climate of this territory is continental extreme, with amplitude of daily temperatures to 30°, which affects vegetation (Zhukov, 1965; Russkikh, 1983). Here, along with larch forests, steppe communities occur on S-faced, exposed, well-heated mountain slopes and high floodplane terraces. In such habitats in valleys of rivers Agutsa, Enda and Sokhondinka *Didymodon tibeticus* was collected (Fig. 1). This species is locally not rare; it forms small, usually pure patches on rocky soil on steep, S-faced slopes with steppe vege-

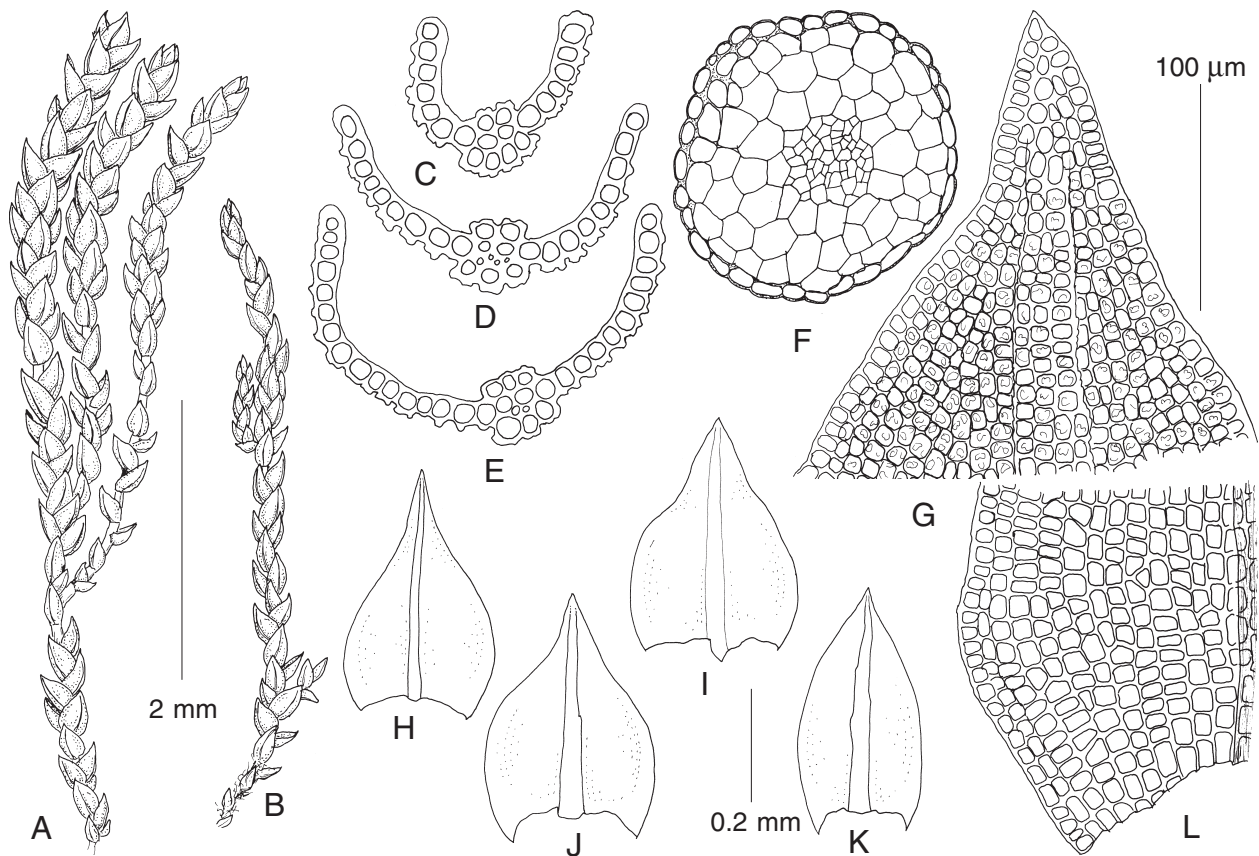


Fig. 2. *Didymodon tibeticus* (from: Russia, Zabaikalsky Territory, Sokhondinsky Reserve, Agutsa River, Afonina 5213, LE). A: habit, wet; B: habit, dry; C–E: leaf transverse sections; F: stem transverse section; G: upper and median leaf cells; H–K: leaves; L: basal leaf cells. Scale bars: 2 mm for A–B; 0.2 mm for H–K; 100 µm for C–G, L.

tation and on rock outcrops at 1100–1200 m a.s.l., *i.e.* at much lower elevations than in Tibet, China.

Specimens examined (all collected by O.M. Afonina): ASIAN RUSSIA: Zabaikalsky Territory, Kyra District, Sokhondinsky State Reserve: Enda River, 49°27'N, 110°50'E, 1219 m a.s.l., dry creek bed, 08.VII.2010 Afonina (LE B-0046589); the same area, 49°26'N, 110°50'E, 1162 m a.s.l., rocks on S-facing slope, 24.VIII.2011 (LE B-0046590); the same area, 49°28'N, 110°51'E, 1214 m a.s.l., outcrops on S-facing slope, 27.VIII.2011 (LE B-0046594); Agutsa River, 49°39'N, 111°24'E, 1178 m a.s.l., outcrops on S-facing slope, 21.VII.2013 (LE B-0046591); Sokhondinka River, 49°30'N, 111°04'E, 1205 m a.s.l., moss community along river, 23.VIII.2011 [LE B-0046586].

Differentiation. Only two species of *Didymodon* known in Russia have leaves of similar or slightly larger size than *D. tibeticus*, but both differ from it in other features. *Didymodon subandreaeoides* (Kindb.) R.H. Zander has leaves 0.35–0.55×0.25–0.40 mm, but its leaf apices are obtuse, and leaf lamina is papillose on both surfaces. *Didymodon maschalogenae* (Renauld & Cardot) Broth. is also a small plant with leaves 0.6–0.8×0.3 mm, but its leaf apices are acuminate, leaf margins are recurved, ventral cells of costa are elongate-rectangular, smooth, and it has numerous brood bodies in leaf axils. Among species described from China, the most similar are *D. jimenezii* J.Kou, X.-M. Shao & C. Feng (also de-

scribed from Tibet) and *D. changbaiensis* J.Kou, C. Feng, H.-X. Xiao & T.-T. Wu (described from NE China, Jilin Province), both not found in Russia yet. *Didymodon jimenezii* has slightly larger leaves, 0.98–1.08×0.4–0.58 mm with subquadrate cells throughout leaf lamina, and it differs from *D. tibeticus* in having always ovate-triangular leaves gradually tapered into acumina, with slightly recurved leaf margins, spurred costae, ventral stereids absent, and laminal cells papillose on both surfaces. Leaves of *D. changbaiensis* are concave, with plane margins, laminal cells are quadrate, with papillae only on dorsal surface, which makes it similar to *D. tibeticus*, but its leaves are also slightly larger, 0.85–1.3×0.43–0.65 mm, they have ovate-triangular bases and very short acumina (in *D. tibeticus* leaf base and acumen are equal in length, usually with shoulders).

It is worth to note that the genus *Didymodon* is represented by more than 20 species in the moss flora of Zabaikalsky Territory (Afonina *et al.*, 2017). It can be explained by its mountainous relief, continental climate and its geographical location close to Mongolia and China, countries with flora especially rich in species of Pottiaceae. Naturally, moss flora of Zabaikalsky Territory has much in common with the moss flora of Mongolia, where more than 20 species of *Didymodon* are also known

(Tsegmed, 2010). Our record of the species described from China provides an additional evidence of close relationships between these floras.

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