

Article

Polytrichum papillosum (Musci, Polytrichaceae), a new species from the Urals

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Received: 30 July 2013 | Accepted by Robert E. Magill: 28 October 2013 | Published on line: 26 November 2013

Abstract

A study of moss collections from Ilmensky State Reserve (Southern Urals) revealed a new *Polytrichum* species, which is described in this article. *Polytrichum papillosum* differs from all other *Polytrichum* species in the presence of papillae on the abaxial side of the costa, lamina margins with papillose cells, and thin walls in the marginal cells of lamellae. A comparison of *P. papillosum* diagnostic characters with those of *P. piliferum* is provided.

Keywords: Polytrichaceae, *Polytrichum papillosum*, Russia, Urals

Introduction

The bryoflora in the Chelyabinsk region (Urals, Russia) has been studied for at least 130 years. However, our detailed research during 1984-2005 showed that there are 300 moss species growing there that comprise 131 genera, 44 families and 14 orders and 115 of those species were reported for the first time for this region in recent publications (Ignatov *et al.*, 2006; Dyachenko *et al.*, 2008; Dyachenko and Ivchenko, 2009a; 2009b; Isakova, 2009; Dyachenko, 2011).

From a total of 33 *Polytrichum* species known worldwide, 7 are distributed in Russia, namely, *P. commune* Hedw., *P. hyperboreum* R.Br., *P. jensenii* I.Hagen, *P. juniperinum* Hedw., *P. piliferum* Hedw., *P. strictum* Brid. and *P. swartzii* Hartm. An unusual specimen of *Polytrichum* recently collected in Ilmensky State Reserve has attracted our attention. A single existing collection represented by 11 plants is preserved in the Ural State University Herbarium. A search through literature dedicated to the genus *Polytrichum* (Frye, 1910; Smith, 1971, 2007; Scott, Stone, 1976; Catcheside, 1980; Long, 1985; Beever, Allison, Child, 1992; Jarman, Fuhrer, 1995; Ramsay, 1997; Hyvönen, Hedderson, Smith Merrill, Gibbings, Koskinen, 1998; Casas *et al.*, 2006; Atherton *et al.*, 2010; and more) did not reveal any species whose morphological characters would be similar to those of the plant in question.

Taxonomic treatment

Polytrichum papillosum Dyachenko, *spec. nov.* (Fig. 1-10)

Diagnosis: *Polytrichum papillosum* is closely related to *P. piliferum* Hedw. differing from the latter by coarsely papillose costa on the abaxial surface, papillose cells of membranous leaf margin, and thin walls of apical cells of lamellae (Table 1).

Type: Russia. Southern Urals, Chelyabinsk region, Ilmensky State Reserve, Quadrant 82, pine mossy-cereal forest, on the soil, 55° 04' N, 60° 06' E, 340 m alt. 19 July 2005, L.Ivanova, N.Stafeeva SU 1004 (holotype: Herbarium of Ural State Pedagogical University!).

Description: Plants small, 0.6-1.3 cm tall, in loose tufts. Stems crimson red, rather wiry, unbranched, with grayish tomentum near base. Leaves arcuate-incurved when dry, their tips appressed to the stem. Wet leaves are widely separated, 3.0-3.5 (4.0) mm length (excluding the length of apical awn) and 0.4 mm wide. Leaf blade linear-lanceolate, margins greatly involute, with rounded apex. Marginal lamina 8-12 cells wide, 1-stratose, membranous, translucent, entire or with obtuse teeth toward apex, its cells coarsely papillose, 9-15 x 43-47 µm. Sheath 1.5-1.8 x 1 mm, light-crimson. Costa crimson red, coarsely papillose abaxially, excurrent as a coarsely dentate, hyaline awn 1.1-1.6 mm long, crimson red at base. Lamellae, 24-26, irregularly dentate in profile, 4-6 cells high, marginal cells rounded to ovate in section, thin-walled. Sheath cells 42-47 x 31-33 µm, elongate-rectangular (1.5:1). Distal sheath cells within 8-9 rows from margin rectangular, 16-23 x 28-29 µm with thick walls, especially at corners. Cells at base of sheath elongate-rectangular, especially those close to costa. Sporophytes not found.

Table 1. Differences between *Polytrichum piliferum* and *P. papillosum*

Characters	<i>P. piliferum</i>	<i>P. papillosum</i>
Leaf width	0.7-1.1 mm	0.4 mm
Costa in apical part of leaf on abaxial side	smooth	coarsely papillose
Lamina, cells	smooth	papillose
Lamellae, number at mid-blade	30-35	24-26
Number of cell rows in lamellae at mid-blade	6-8	4-6
Apical cells of lamellae in cross-section	bottle-shaped	round to ovate
Outer wall of apical cell	thick	thin

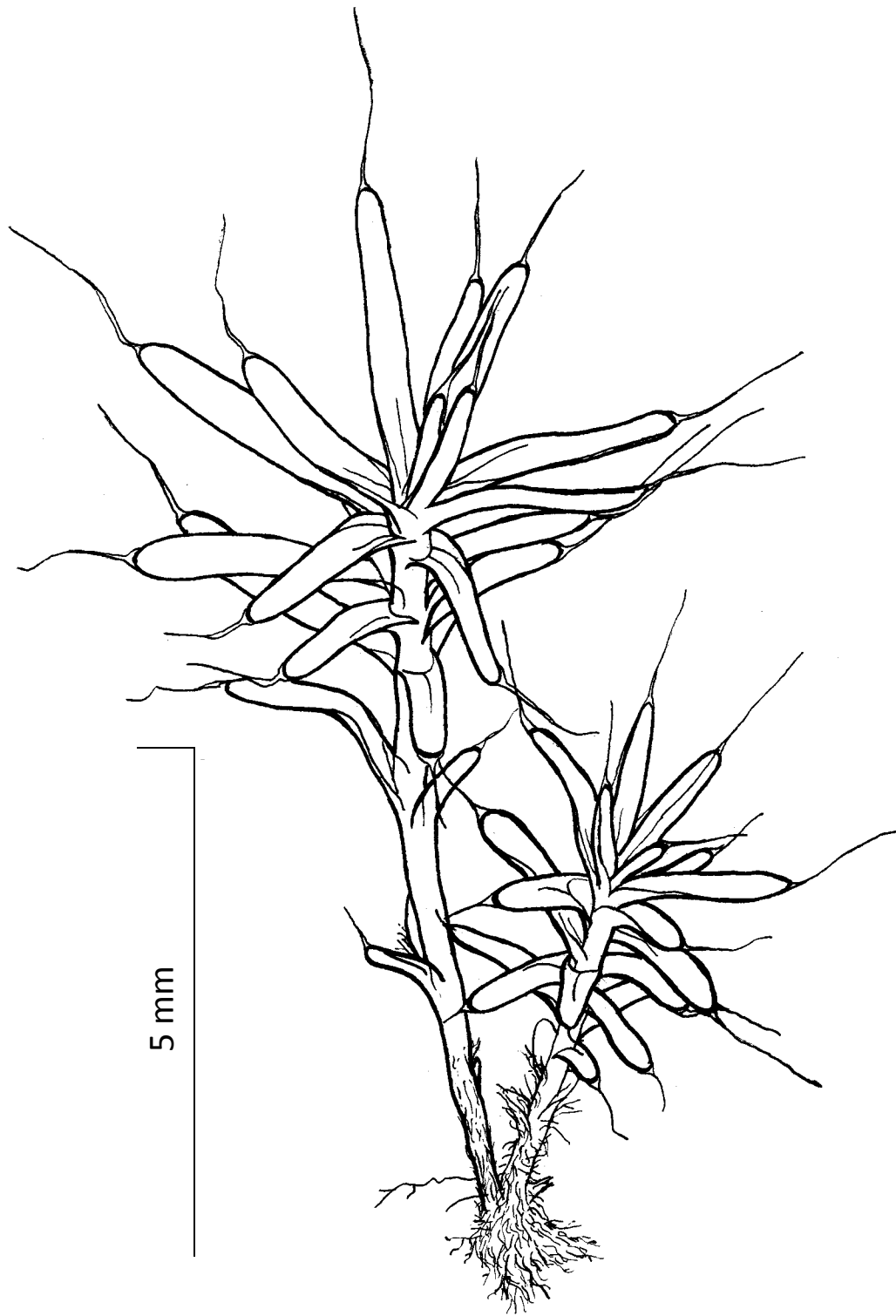
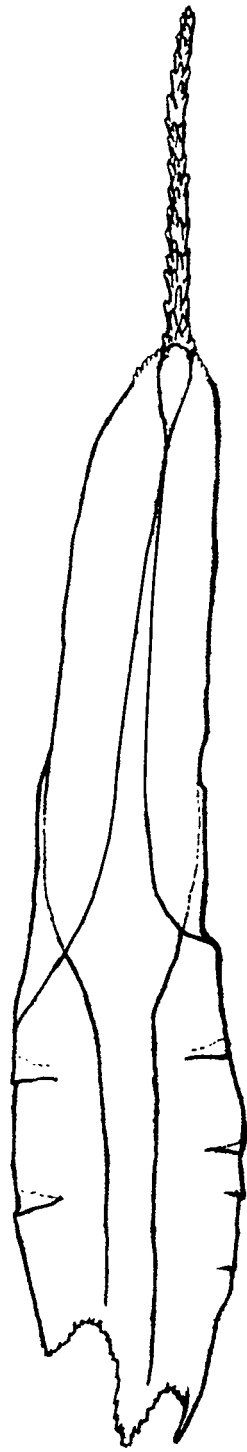


Fig. 1. *Polytrichum papillosum* sp. nova: habit



1 mm

Fig. 2. *Polytrichum papillosum* sp. nova: leaf

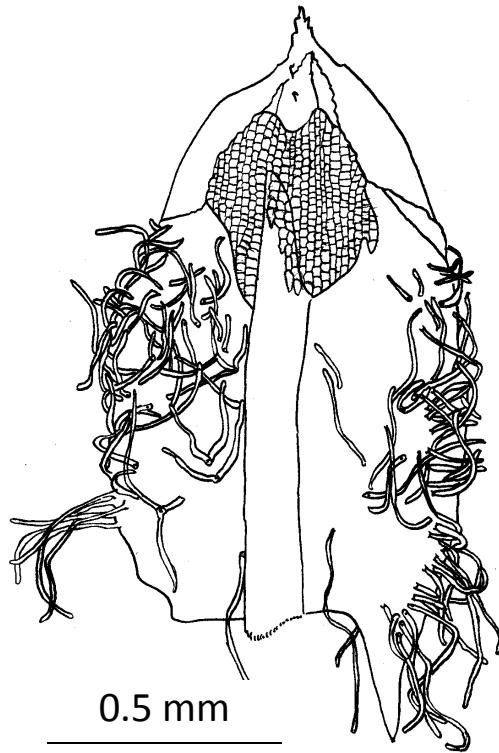


Fig. 3. *Polytrichum papillosum* sp. nova: basal leaf, abaxial side

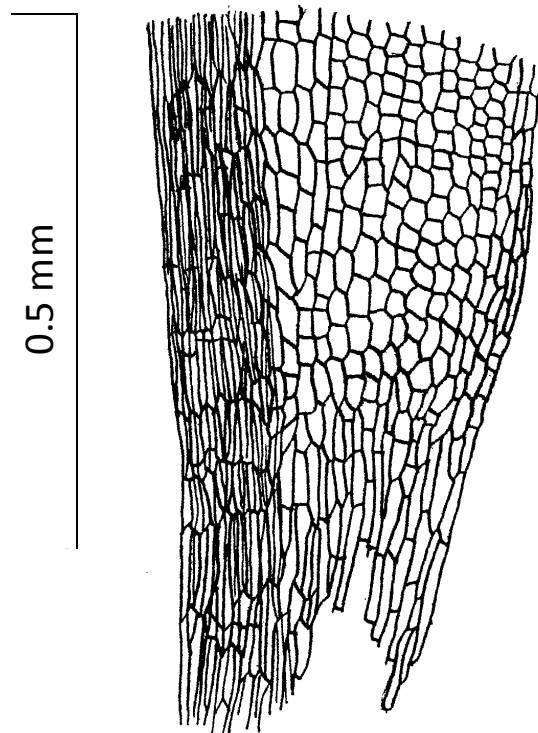


Fig. 4. *Polytrichum papillosum* sp. nova: sheath

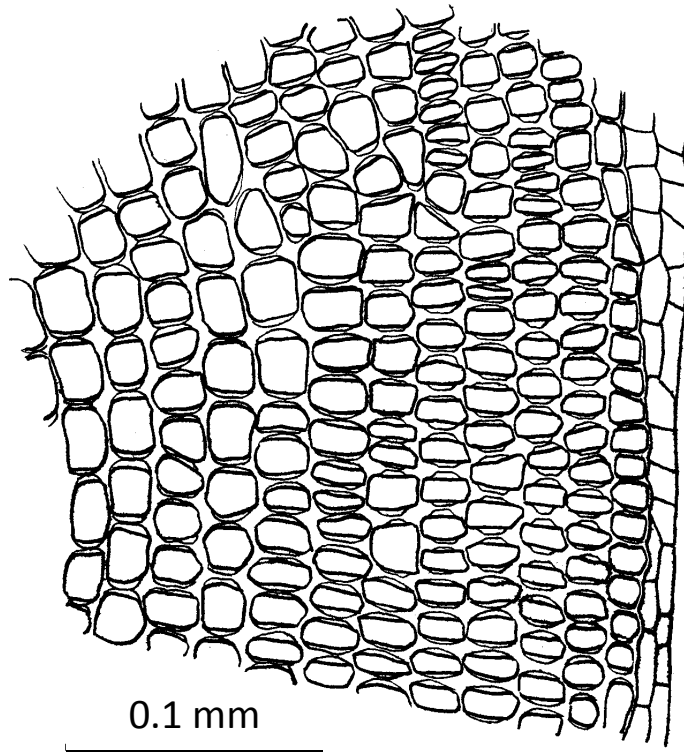


Fig. 5. *Polytrichum papillosum* sp. nova: upper part of sheath

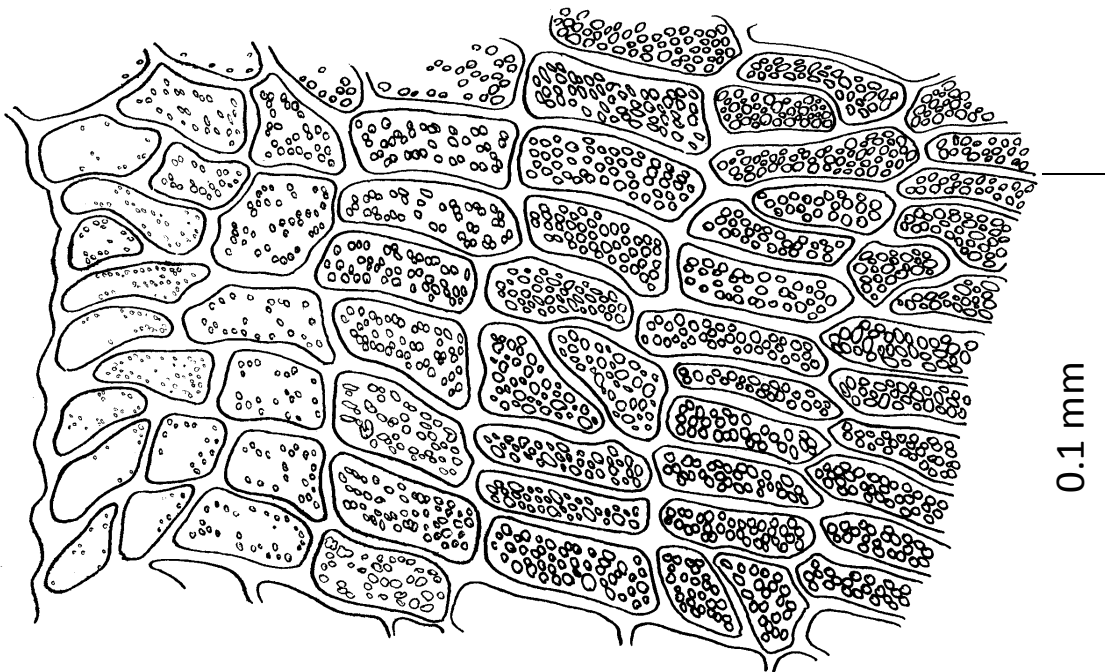


Fig. 6. *Polytrichum papillosum* sp. nova: part of lamellae

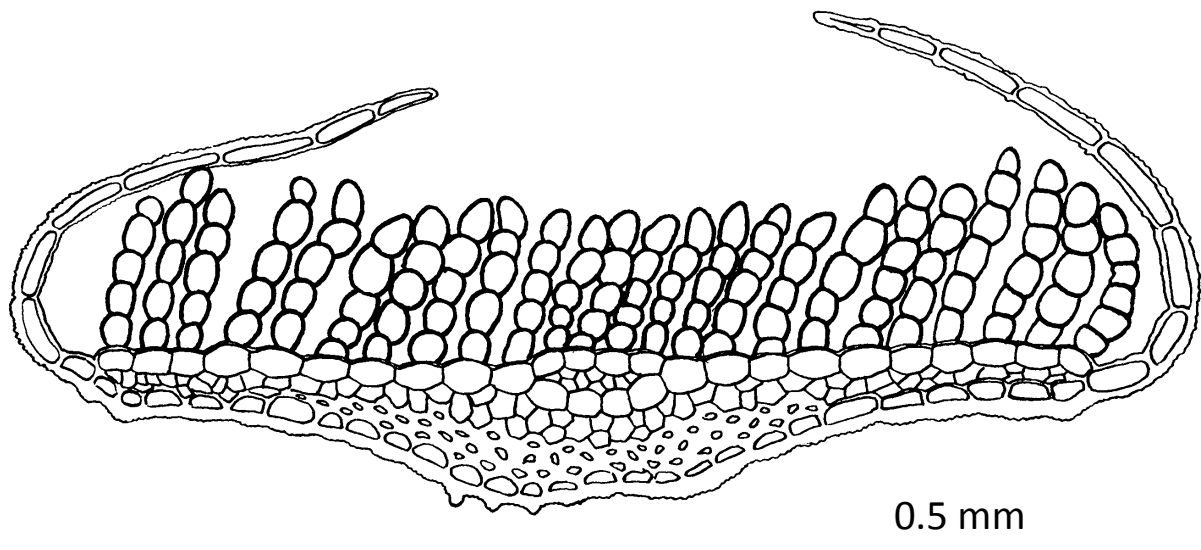


Fig. 7. *Polytrichum papillosum* sp. nova: middle part of leaf, cross-section

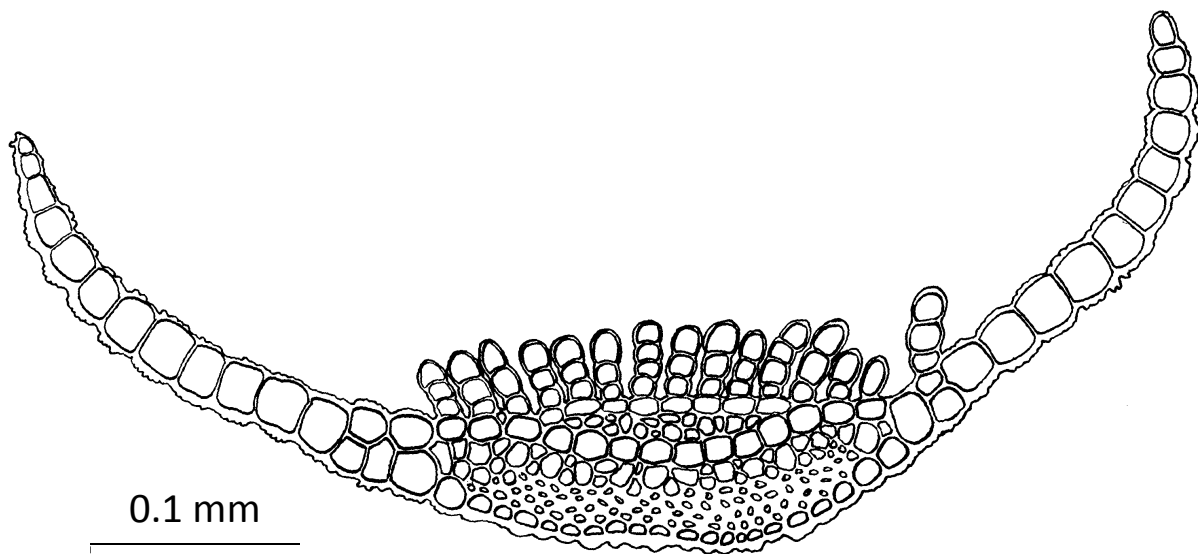
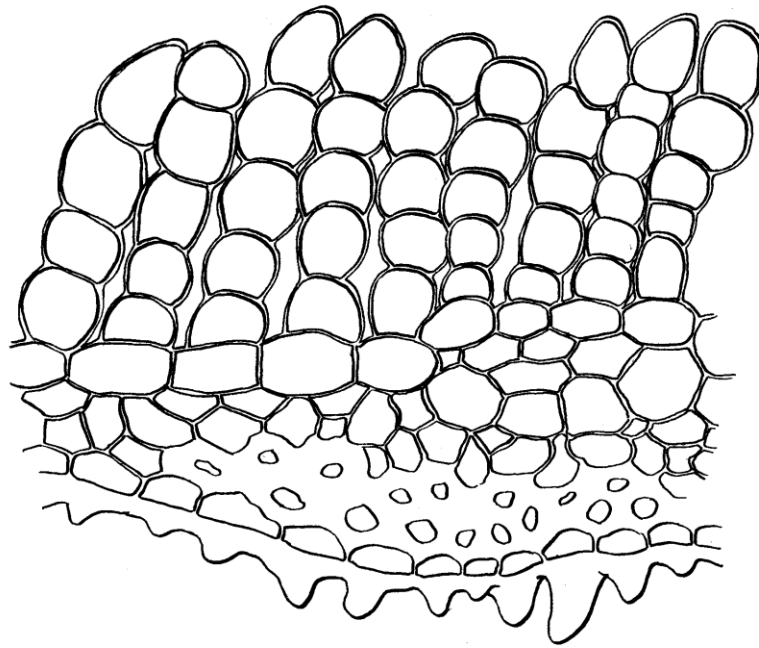
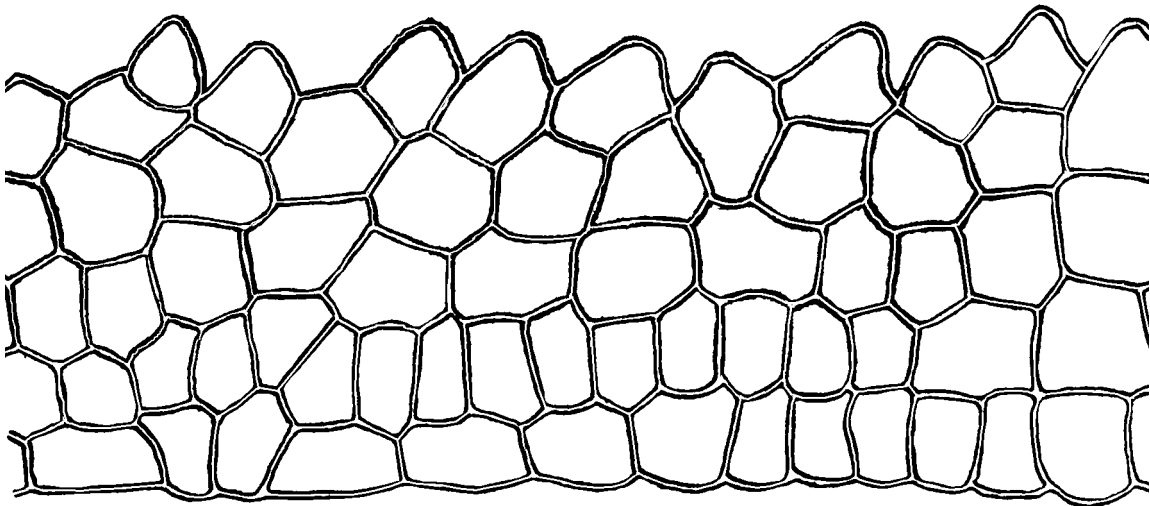


Fig. 8. *Polytrichum papillosum* sp. nova: lower part of leaf, cross-section



0.1 mm

Fig. 9. *Polytrichum papillosum* sp. nova: lamellae, cross-section



0.1 mm

Fig. 10. *Polytrichum papillosum* sp. nova: profile of lamella

Etymology. The most significant feature of the described new species is papillose marginal lamina from which the Latin species epithet *papillosum* is derived.

Distribution and habitat: found only in Ilmensky State Reserve (Southern Urals), in pine mossy-cereal forest, on soil, at 340m alt. Endemic.

Discussion

Approximately 2.5 million years ago, the southern extremity of the glacier reached the Perm-Nizhniy Tagil-Serov-Ivdel line in the Urals (Boch and Krasnov, 1946). Affected by that Quaternary glaciation, plant species presumably migrated in three directions: east, southwest, and south, the latter group finding a refugium in the Southern Urals.

After the glacier receded from the Urals, plants from adjacent territories re-populated the land previously covered with ice, so that the flora of the Urals now is predominantly allochthonous.

This speculation is well supported by the comparative analysis of species distribution and infraspecific diversity, as well as by the notable lack of endemic species in the Urals (Dyachenko, 1999). However, the finding of *P. papillosum* makes it possible for us to infer that endemic species could originate within the Southern Urals Refugium.

Aknowledgements

The author is very grateful to the collectors L.Ivanova and N.Stafeeva for giving me this rare specimen and to E.A.Dyachenko for the drawings in this paper. The author also thanks the reviewers for very helpful comments.

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