Arctoa (2009) **18**: *195-200*

ORTHOTRICHUM HOLMENII LEWINSKY-HAAPASAARI (ORTHOTRICHACEAE, MUSCI), A NEW SPECIES FOR RUSSIAN MOSS FLORA

ORTHOTRICHUM HOLMENII LEWINSKY-HAAPASAARI (ORTHOTRICHACEAE, MUSCI) – НОВЫЙ ВИД ДЛЯ БРИОФЛОРЫ РОССИИ

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Abstract

Orthotrichum holmenii Lewinsky-Haapasaari is found in Russia for the first time, in European Arctic (Adzva River, Nenetzky Autonomous District) and Siberian Subarctic (Maimecha River, the southern Taimyr). Previously the species was known only from the type locality in Kazakhstan, vicinity of Alma-Ata, 3400 km and 3000-3400 km from the new localities. The description, illustrations and differentiation from similar species are provided. *Orthotrichum holmenii* differs from other species of the genus by the combination of naked calyptra, exserted, distinctly ribbed capsules with stomata slightly to moderately covered by subsidiary cells, exostome teeth reflexed when dry and not paired when old, and 16 long papillose endostome segments.

Резюме

Orthotrichum holmenii Lewinsky-Haapasaari впервые найден в России в двух местонахождениях: в европейской Арктике (р. Адзьва, Ненецкий автономный округ) и Восточносибирской Субарктике (р. Маймечи, южный Таймыр). Ранее этот вид был известен только из типового местонахождения (Казахстан, окрестности Алма-Аты) в 3000–3400 км от новых местонахождений. Приводятся описание и иллюстрации образцов из России, рассматриваются отличия от близких видов. От прочих видов рода *O. holmenii* отличается следующей комбинацией признаков: колпачок голый, коробочка ребристая, поднятая над перихецием, с устьицами, слабо или умеренно прикрытыми побочными клетками, зубцы экзостома отогнутые в сухом состоянии, не сближенные попарно после рассеивания спор, сегментов эндостома 16, длинных, папиллозных.

KEYWORDS: *Orthotrichum*, Bryophyta, Siberia, Taimyr, European Arctic, disjunction

In 2009 the first author explored the moss flora of Maimecha River area in Taimyrsky District of the Northern Siberia. At the first day of expedition his attention was attracted by an unusual *Orthotrichum* plants growing at base of *Alnus fruticosa* trunk covered by silty alluvium, in a thickets along a gravel river bar. Habitually it resembled *O. pallens* Bruch ex Brid. which is frequent in that area. However, these plants differed in clearly exserted capsules (immersed in *O. pallens*) and epiphytic habitat (*O. pallens* in this area usually grows on rock faces and in crevices at places with extensive snow accumulation in the alpine belt). Few days later one more specimen of this species was collected in a similar habitat, about 10 km from the first place.

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Subsequent study of these collections revealed their identity with *O. holmenii,* a little known Asiatic species described from the foothills of the northern slope of Zailijsky Alatau Ridge, Thian-Schan Mountains, Kazakhstan and up to now known only from the type locality.

After the paper was almost prepared, another collection of this species was found from the southern part of the European Arctic, not far from Ural Mts. Plants were collected in quite similar environment: willow thicket along a river in tundra treeless area. This was the only place where epiphytic mosses were observed, including *Myrinia pulvinata*.

Description based on Russian plants follows.

Orthotrichum holmenii Lewinsky-Haapasaari, Bryologist 99, 1996. 1-5. – Figs. 1-3.

Plants small, yellowish-green, in compact tufts. Stems 0.6-0.8 cm, poorly branched, strongly tomentose in lower part. Leaves appressed, straight or slightly to moderately curved then dry, erect to spreading when moist, 2.3-3.1×0.6-0.8 mm, ovate-lanceolate, acuminate, rarely acute; costa strong, green in upper leaves, brown to blackish in lower ones, percurrent or ending just below leaf apex, with simple and forked papillae on abaxial surface; lamina unistratose, margins entire to slightly crenulate distally due to protruding papillae, recurved from leaf base to near apex on both sides; upper laminal cells isodiametric, 9-15×9-13 μm, with 2-3 low simple or branched papillae per cell, near apex slightly elongate (to 21 μm), with thicker walls; apical cell not differentiated; basal laminal cells rectangular, 17-45×8-15 μm, with moderately thickened walls, smooth, somewhat broader toward margins. Autoicous. Perichaetial leaves from ovate base gradually tapering to apex, shortly acuminate. Setae 0.8-1 mm, spirally twisted, often bent when old. Capsules exserted, oblong-cylindric 1.8-2.0 mm long, reddish-brown, with 8 deep furrows extending to base of dry capsules, urns more or less gradually tapering to the seta, somewhat constricted below mouth. Stomata in central and lower part of capsules, immersed, almost free or half-covered by subsidiary cells. Peristome double, prostome not observed. Exostome teeth in 8 pairs, splitted to 16 when mature, incurved when wet, reflexed and appressed to capsule wall when dry, brownish; outer surface finely papillose, more densely in distal part; inner surface with distant low papillae, often in oblique rows. Endostome of 16 long filiform segments of about an equal length, uniseriate distally, biseriate proximally, yellowish, composed of short rectangular cells, outer surface smooth, inner surface strongly papillose. Operculum slightly convex, with short beak, below with purple rim below. Calyptra campanulate, opaque, pale yellowish with dark brown apices and 8 sharp plicae, naked, not papillose. Spores papillose-rugose, 13-20 μm.

Specimens examined: EUROPEAN RUSSIA: **Nenets Autanomous District**: 67°06'27"N, 60°40'20"E, Adzva River, 1.VIII.2009, *Ivanov & Donskoff #09-549* (MHA); ASIATIC RUSSIA: **Krasnoyarsk Territory**, Taimyrsky Municipal District, 70.7807°N, 101.043°E, right bank of Maimecha River 200 m downstream Chopko mouth, 20.VI.2009, *Fedosov #09-58* (MW); 70.742°N; 101.235°E, left bank of Maimecha River near Balagannakh Creek mouth (9.1 km upstream Chopko mouth), 23.VI.2009, *Fedosov #09-59* (MW).

Variation. Collections from two Arctic localities are identical, but differ in some respects from the Middle Asiatic ones. Dry leaves in specimens from Kazakhstan are described as somewhat flexuose and twisted, whereas in collections from Arctic Russia they are straight to moderately curved. Lewinsky-Haapasaari (1996) reported the presence of gemmae in this species, whereas they are absent in our specimens. However, the presence of gemmae is not a constant feature in the group of cryptophorous *Orthotrichum* species, and in three Middle Asian specimens only one has gemmae (Lewinsky-Haapasaari, l.c.).

Differentiation. The combination of exserted distinctly furrowed capsules with immersed stomata, exostome teeth reflexed whed dry, 16, not paired, and 16 papillose endostome segments of about an equal length delimit *O. holmenii* from all other *Orthotrichum* species.

The most similar to *O. holmenii* is probably *O. hispanicum* F.Lara, Garilleti & Mazimpaka, described from Iberian Peninsula (Lara et al., 2000), and subsequently found in France, Balearic Islands, Netherlands, Greece, Turkey (close to Caucasus) and Kashmir (Garilleti et al., 2009), the latter record being relatively close to Kazakhstan. It is similar to *O. holmenii* in peristome structure and presence of both simple and forked papillae, but differs in shorter setae, 0.37-0.65

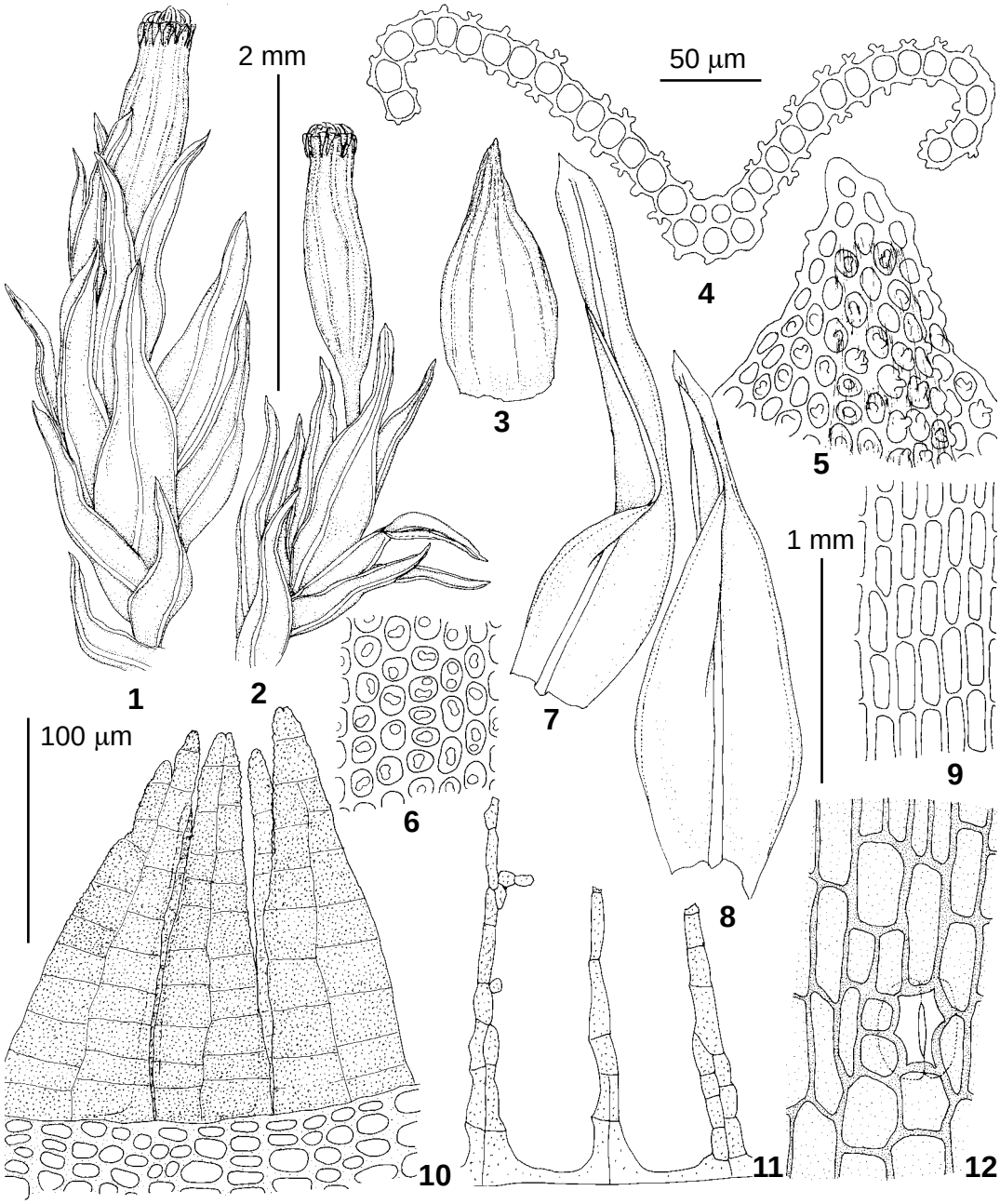

Fig. 2. *Orthotrichum holmenii* Lewinsky-Haapasaari (from Taimyrsky Autonomous District, *Fedosov #09-59*, MW): 1-2 – habit, dry; 3 – calyptra; 4 – leaf transverse section; 5 – upper laminal cells; 6 – median laminal cells; 7-8 – leaves; 9 – basal laminal cells; 10 – part of peristome; 11 – endostome segments; 12 – cells of exothecium & stoma. Scale bars: 2 mm for 1-3; 1 mm for 7-8; 100 μm for 5-6, 9-12; 50 μm for 4.

mm vs. 0.8-1.0 mm in *O. holmenii*, emergent capsules strongly constricted below mouth (exserted and indistinctly to moderately constricted in *O. holmenii*) and smaller spores, 11-15 μm vs. 13-20 μm in *O. holmenii*.

Lewinsky-Haapasaari (1996) compared *O. holmenii* with *O. pulchellum* Brunton in Smith, *O. consimile* Mitt., and *O. scanicum* Gronvall. Among them only *O. scanicum* is known in Russia. It differs from *O. holmenii* by denticulate leaf

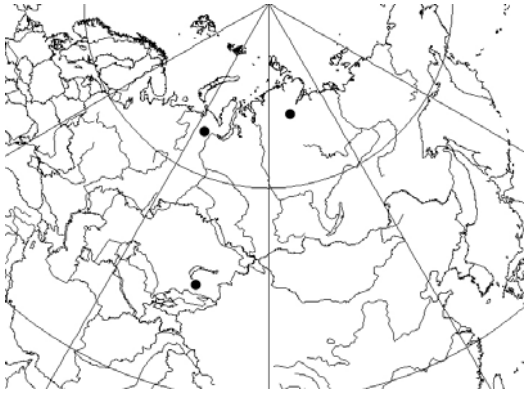

Fig. 1. Distribution of *Orthotrichum holmenii* Lewinsky-Haapasaari.

apex with teeth formed by emergent cell angles (entire or weakly crenulate due to protruding papillae in *O. holmenii*), simple papillae of laminal cells vs. partly forked in *O. holmenii,* and shorter setae, ca. 0.3 mm vs. 0.8-1.0 mm in *O. holmenii*. *Orthotrichum pulchellum* also has short setae and immersed capsules, and only *O. consimile* sometimes has relatively long setae, up to 0.6 mm, but it differs from *O. holmenii* in leaf laminal cells smooth to bluntly papillose vs. distinctly papillose, and endostome segments almost smooth vs. distinctly papillose.

Orthotrichum alpestre Hornsch. ex Bruch et al., a cryptophorous species widespread in Russia, is somewhat similar to *O. holmenii.* It has emergent capsules, forked papillae, ribbed urns and similar narrow and rigid exostome segments. However, *O. alpestre* has hairy calyptras vs. naked ones in *O. holmenii*, eight smooth endostome segments vs. sixteen papillose ones in *O. holmenii,* and grows mostly on rocks, whereas all collections of *O. holmenii* are from trees.

Orthotrichum sordidum Sull & Lesq. can be confused with *O. holmenii* due to exserted ribbed capsules with reflexed exostome teeth and presence of forked papillae, but differs from the latter by superficial stomata vs. immersed ones, endostome segments 8 vs. 16, spores 22-25 μm vs. 13-20 μm, and hairy calyptra vs. naked ones.

Ecology. All collections of *O. holmenii* are from tree and shrub trunk bases at river banks. In Taimyr area it grows on *Alnus fruticosa* and *Salix alaxensis* trunks, in pure tufts or with insufficient admixture of *Sanionia uncinata* and *Myrinia pulvinata*. In Adzva River *O. holmenii* was collected from *Salix* cf. *dasyclados* trunks with Myrinia pulvinata as well. Possibly, a regular flooding and alluvium layer depositing on trunks are important for the species, like for some other epiphytic mosses (*Leskea polycarpa, Myrinia pulvinata*). In Adzva River *O. holmenii* was collected from *S.* cf. *dasyclados* trunks.

Distribution. In Maimecha River valley the collections of *O. holmenii* were done in both of two relatively well studied localities. However, in Kotuy River valley, ca. 70 km to NE, this species was not found despite a much better level of exploration and subidentical conditions. One more species, *Leskea polycarpa* Hedw. has similar distribution and habitat preferences in the southern Taimyr (Fedosov, 2009). Apparently Maimecha River valley is a northern distribution limit for these two species, as well as for some other species with a principally southern distribution in the southern Taimyr region: *Ortotrichum alpestre, O. speciosum, Homomalium incurvatum, Dicranodontium denudatum, Brachythecium rivulare, Sciuro-hypnum reflexum.*

ACKNOWLEDGMENTS

The work was partly supported by the 'Biodiversity' Program of Russian Academy of Sciences and by Scientific School Program НШ-4243-2008.4.

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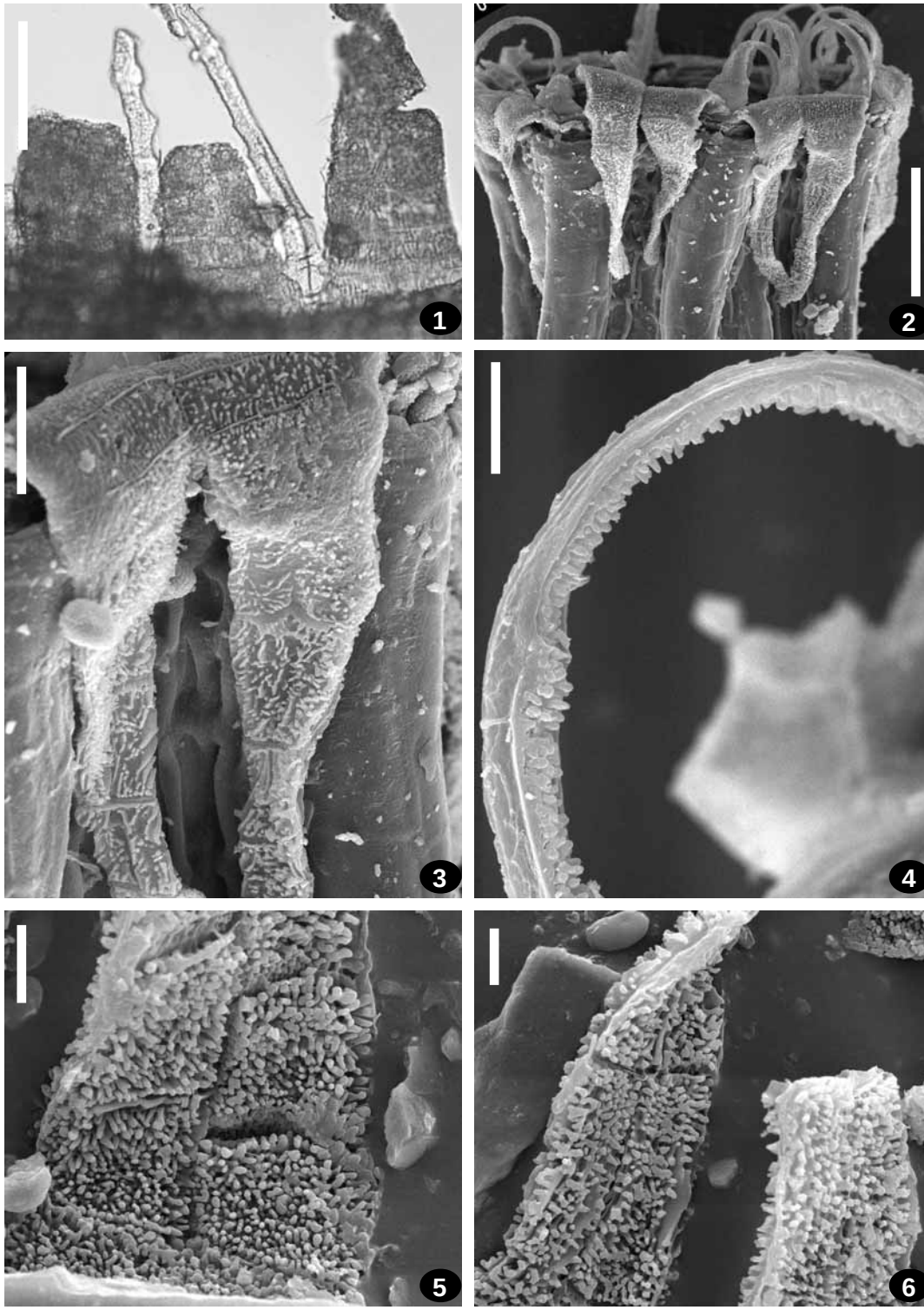

Fig. 3. *Orthotrichum holmenii:* (1 – light microscope, from *Ivanov & Donskoff, #09-549* and 2-6 – SEM, from *Fedosov 09-59*): 1-2 – peristome; 3 – inner surface of exostome teeth; 4 – endostome segment, side view; 5-6 – ornamentation of lower and middle part of teeth from outside. Scale bars: 100 μm for 1-2; 30 μm for 3; 10 μm for 4-6.

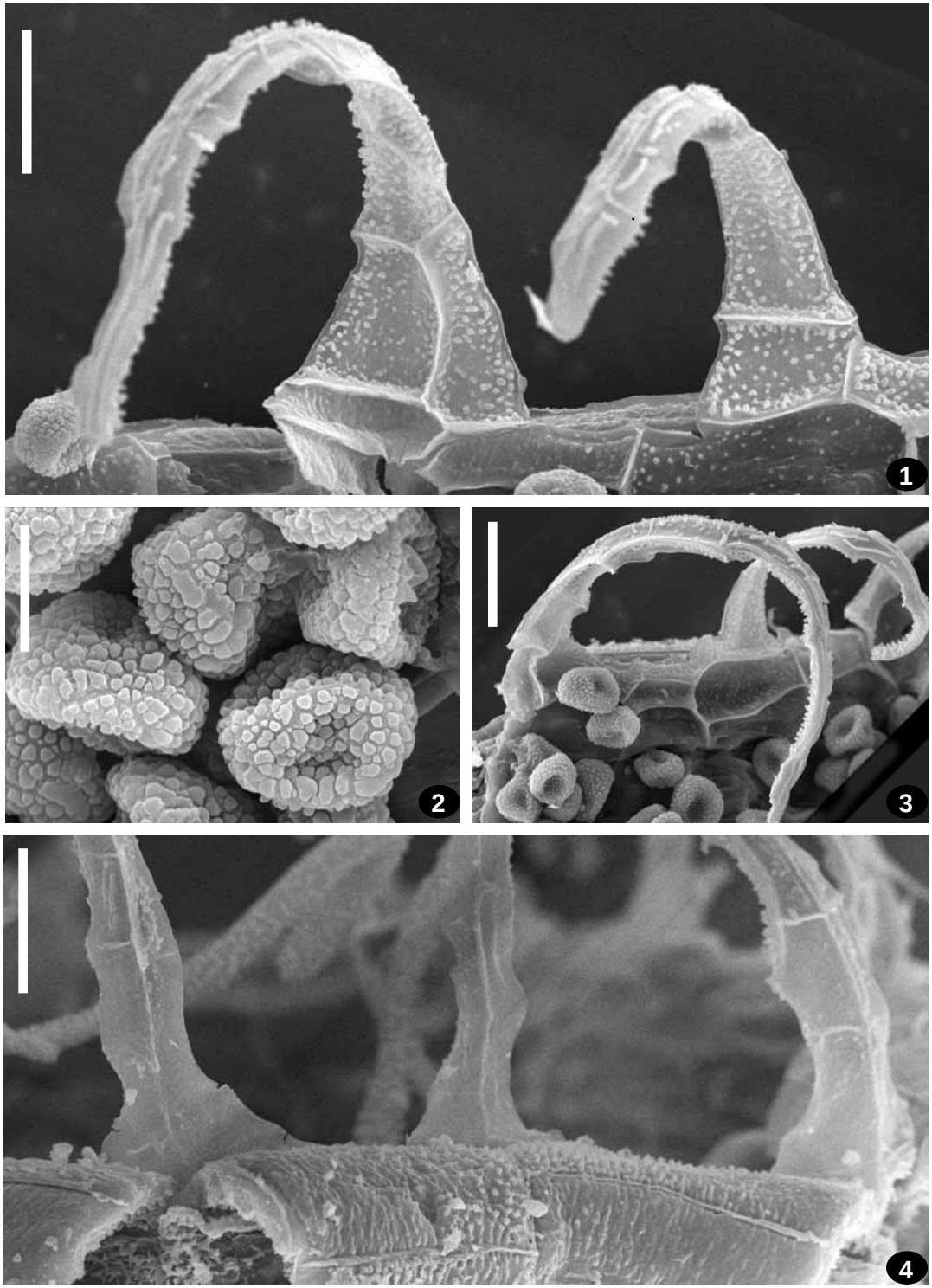

Fig. 4. *Orthotrichum holmenii:* (1-4 – SEM, from *Fedosov 09-59*): 1 – endostome segments from inside; 2 – spores; 3 – part of endostome, side view; 4 – inner surface of exostome teeth at base and endostome segments from outside. Scale bars: 30 μm for 1, 3, 4; 10 μm for 2.