

ON THREE RARE SPECIES OF ORTHOTRICHUM
(ORTHOTRICHACEAE, MUSCI) IN THE CAUCASUS

О ТРЕХ РЕДКИХ ВИДАХ ORTHOTRICHUM
(ORTHOTRICHACEAE, MUSCI) НА КАВКАЗЕ

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Abstract

Three rare *Orthotrichum* species, *O. callistomum* Fischer-Ooster ex Bruch, *O. vladikavkanum* Vent. and *O. sordidum* Sull. et Lesq., are documented with recent collections from the Russian Caucasus Mountains. *Orthotrichum callistomum* is a highly disjunct species, previously known from SE Asia (from Taiwan to Eastern Himalayas) and a single site in Switzerland (from 1849); *O. vladikavkanum* was described from Ossetiya in 1887, but was never recorded in Caucasus during XX century. *Orthotrichum sordidum* also was found 1887, and only recently recorded again.

Резюме

Обсуждаются три редких кавказских вида *Orthotrichum*: *O. callistomum* Fischer-Ooster ex Bruch, *O. vladikavkanum* Vent. и *O. sordidum* Sull. et Lesq. *Orthotrichum callistomum* имеет широко дизъюнктивный ареал, охватывающий, с одной стороны, районы Юго-Восточной Азии (от Тайваня до Юннана и Восточных Гималаев), с другой – Европу, где он известен по единственной находке в Швейцарии в 1849 г.; *O. vladikavkanum* был описан из Северной Осетии в 1887 г., и лишь в последние годы удалось повторить его находки на Кавказе; сходным образом, *O. sordidum* также не приводился в работах по Кавказу более 100 лет, после 1887.

INTRODUCTION

In the course of studies of the moss flora of the Russian Caucasus, we found one *Orthotrichum* species new for the Caucasus (and also for Russia), *O. callistomum*, and two other little known species of the same genus, *O. vladikavkanum* and *O. sordidum*. These records are from the Caucasian Nature Reserve in the West Caucasus and in the Kabardino-Balkarian Republic in the northern part of the Central Caucasus. For the moss floras and environmental characteristics of these areas see Akatova (2002) and Kharsinov & al. (2004), respectively.

Orthotrichum callistomum Fischer-Ooster ex B.S.G., 3: 77, 224. 1850. Figs. 1-3.

Plants deep-green. Stem 10 mm long, densely foliate, repeatedly branched. Leaves straight and appressed when dry, erect-spreading when moist, up to 2.7 mm long, 0.8 mm wide; ovate-lanceolate, gradually tapered to apex, concave in basal part, keeled above, margin recurved to revolute on both sides; costa reaching 0.9-0.95 of leaf length, moderately strong, ca. 70 µm wide near base, in transverse section composed of undifferentiated cells; laminal cells round, 8-11 µm, thick-walled, with 1-2 papillae seen in surface view

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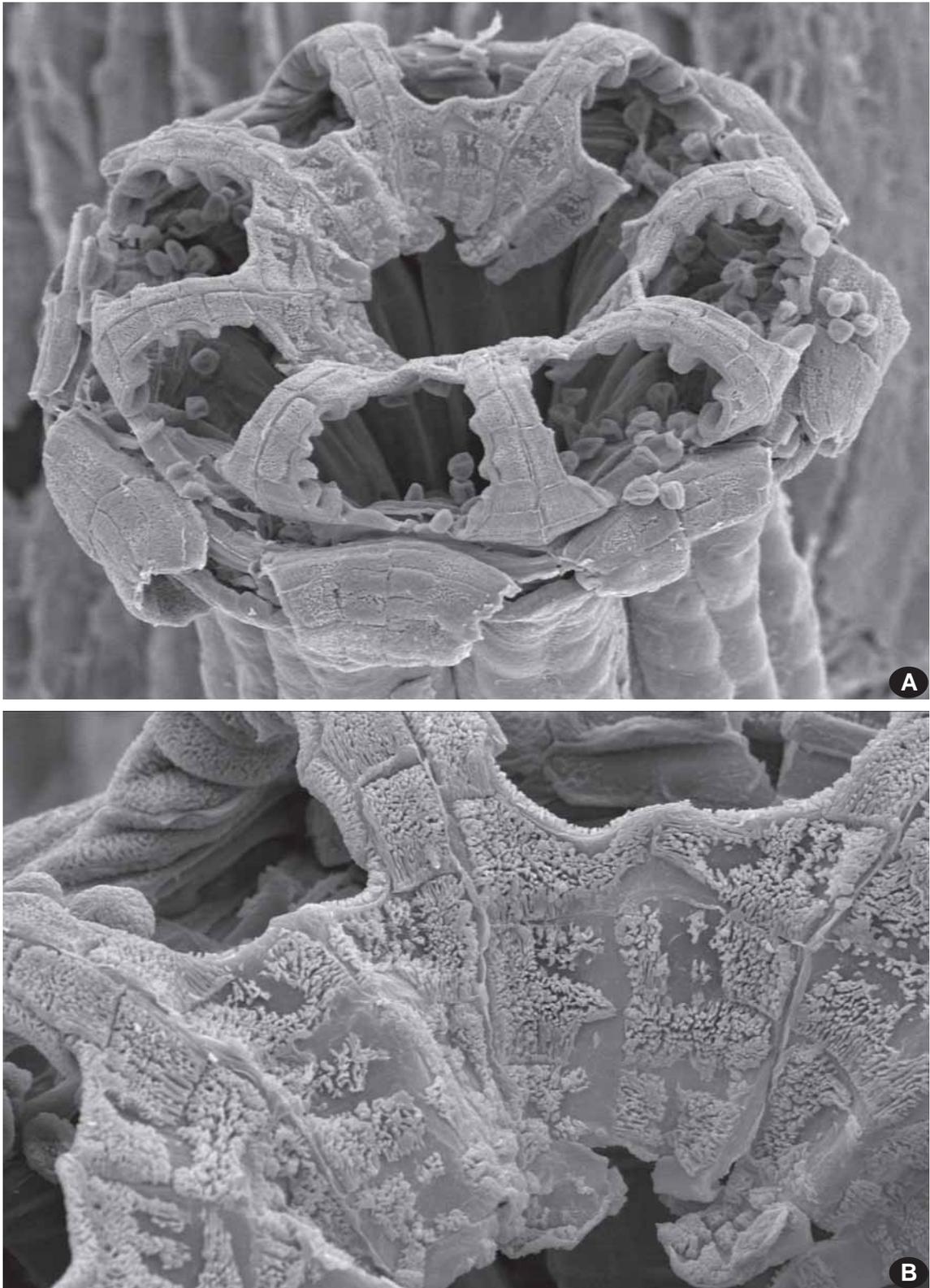


Fig. 1. *Orthotrichum callistomum* Fischer-Ooster ex B.S.G. (from Kabardino-Balkaria, Ignatov & Ignatova, 1.VIII.2004). A – peristome, $\times 280$; B – part of exostome, showing joined segments, $\times 800$.

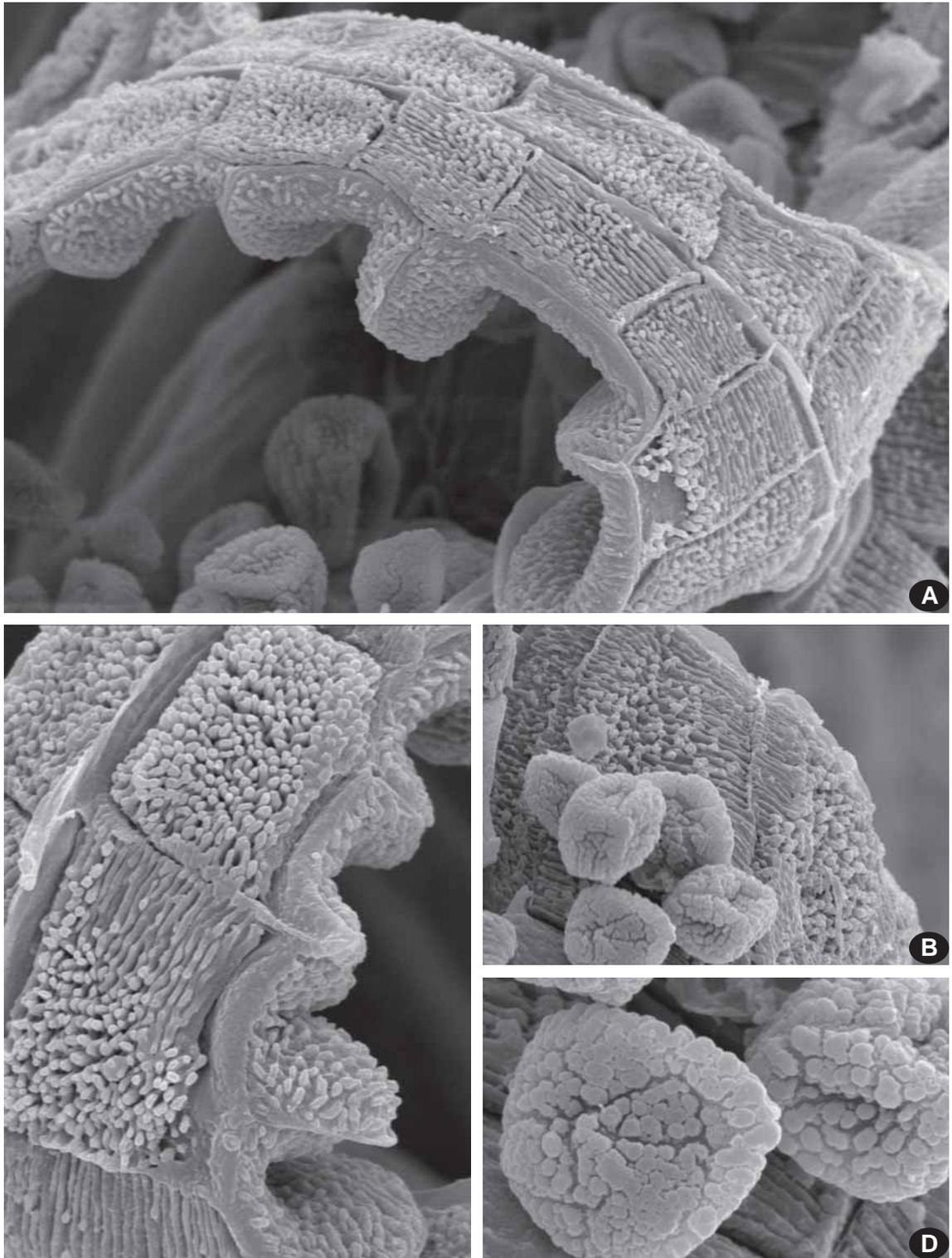


Fig. 2. *Orthotrichum callistomum* Fischer-Ooster ex B.S.G. (from Kabardino-Balkaria, Ignatov & Ignatova, 1.VIII.2004). A, C – endostome (!) segments from outside, showing variation in ornamentation of outer surface and strongly papillose inner trabeculae, $\times 1240$ and $\times 1850$; B – proximal part of exostome tooth from inside, with spores, $\times 1200$; D – spores, $\times 3000$.

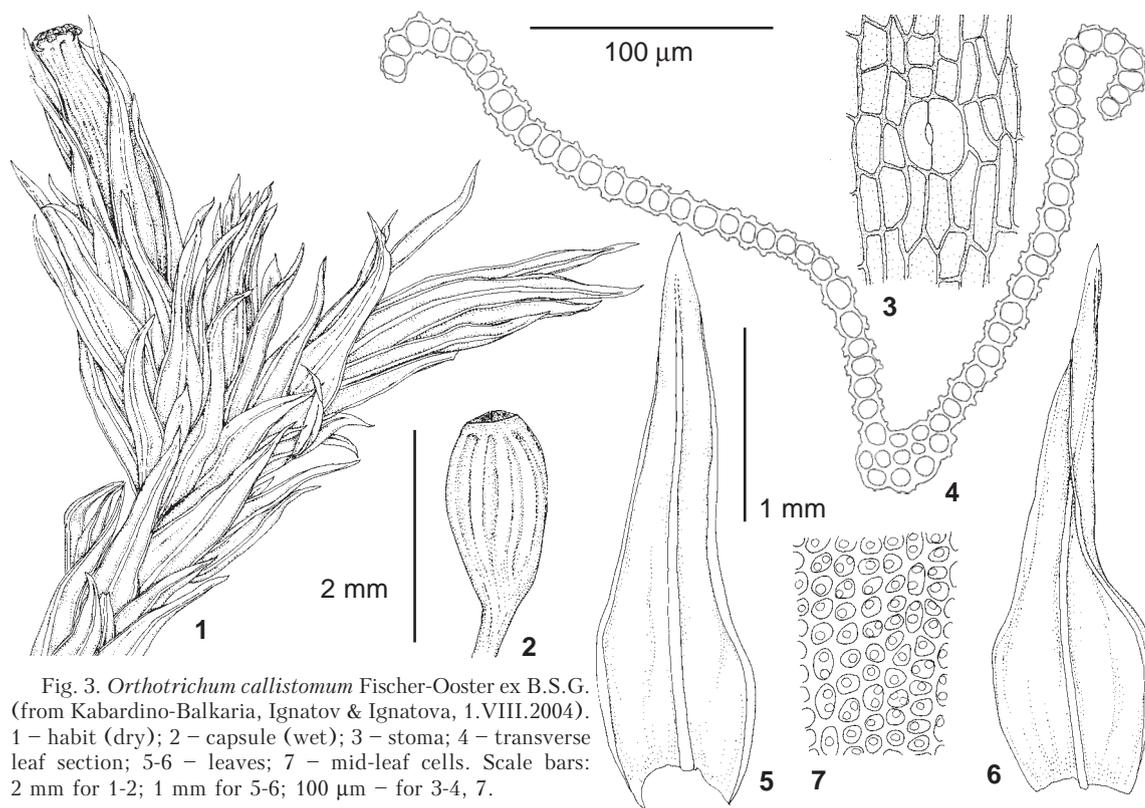


Fig. 3. *Orthotrichum callistomum* Fischer-Ooster ex B.S.G. (from Kabardino-Balkaria, Ignatov & Ignatova, 1.VIII.2004). 1 – habit (dry); 2 – capsule (wet); 3 – stoma; 4 – transverse leaf section; 5-6 – leaves; 7 – mid-leaf cells. Scale bars: 2 mm for 1-2; 1 mm for 5-6; 100 μm – for 3-4, 7.

(in transverse section showing one low forked papilla). Autoicous. Perichaetial leaves similar to stem leaves. Seta ca. 0.3 mm long, capsule immersed, ovate, distinctly ribbed. Stomata superficial. Perisome double. Exostome teeth 16, tightly joined in 8 pairs, when dry reflexed and appressed to capsule wall, when wet covering capsule mouth; outer surface papillose, inner surface papillose above, longitudinally striate below. Endostome segments 8, joined above, forming ring ca. 70 μm in diameter, ca. 80 μm wide; free part of segments linear in most of their length, 12-14 μm wide, composed of two rows of cells, separated by straight “median line”, rather abruptly widened at base; outer surface strongly papillose above, longitudinally striolate at places below (partly intermixed with papillose areas); inner surface papillose, with distinct and heavily papillose trabeculae (remains of transverse walls of IPL). Spores ca. 15 μm , ripening in first half of summer.

Kabardino-Balkarian Republic, Cherek Bezengijskij River Valley 1 km upstream from Dumala Creek, 43° 10' N – 43° 14' E, 1650 m alt., in *Salix* thicket, on trunk of *Salix caprea*,

1.5 m above the ground. 1.VIII.2004 M. Ignatov & E. Ignatova (MHA). Associated species included *O. pallens* (immediately intermixed with *O. callistomum*), and nearby were also *O. vladikavkanum*, *O. striatum*, *O. speciosum*, and *O. sordidum*. We found just one plant of *O. callistomum* with three capsules with well-preserved peristomes. As we were able to recognize this species in the field, an expanded search for more plants was undertaken. However, despite two hours of assiduous efforts to examine almost every twig and trunk in the area, we failed to locate additional plants.

Previously this species was known in East Asia, from Taiwan to South-West China (Sichuan, Yunnan, and Xizang) and the Eastern Himalayas in Nepal (Lewinsky, 1992), with a single, highly disjunct locality was in Switzerland, from a collection made in 1849 (Bruch & al., 1850). This geographic distribution pattern is unusual in mosses, although, for example, *Mnium heterophyllum* (Hook.) Schwaegr. approaches this as it is more or less common in East Asia and the Himalayas, with solitary records from the in Caucasus and Europe.

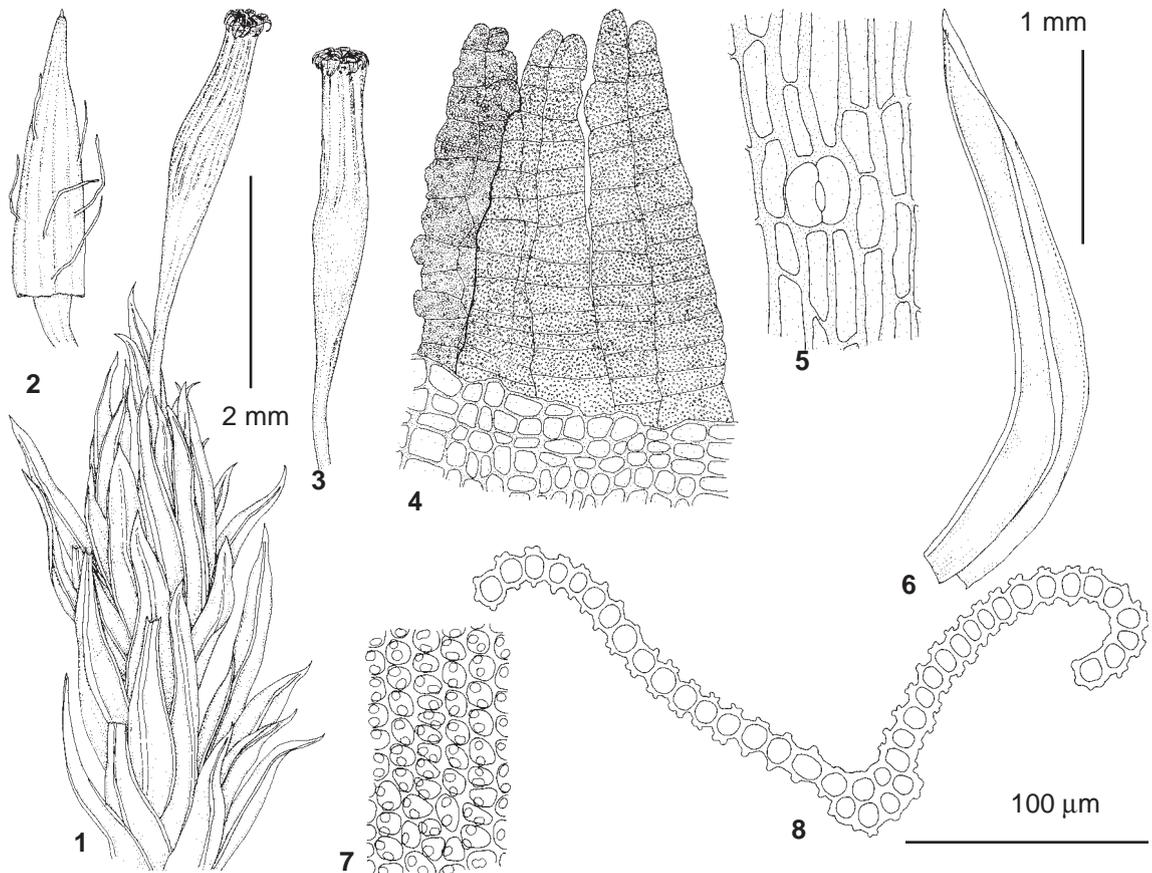


Fig. 4. *Orthotrichum vladikavkanum* Vent. (from Kabardino-Balkaria, Ignatov & Ignatova, 1.VIII.2004). 1 – habit (dry); 2 – capsule (wet); 3 – stoma; 4 – transverse leaf section; 5-6 – leaves; 7 – mid-leaf cells. Scale bars: 2 mm for 1-2; 1 mm for 5-6; 100 μm – for 3-4, 7.

The peristome structure of *O. callistomum* (Figs. 1-2) is very peculiar. Thus Lewinsky (1993a) accepted it as a single representative of one of seven subgenera of *Orthotrichum*. However, Duell (1992) thought that this species perhaps is conspecific with *O. stramineum*.

The most curious feature of *O. callistomum* is the structure of the endostome. Besides the joining above, segments are also heavily papillose and bear trabeculae on their inner surface. Looking at Figs. 2A and 2C one might suspect that these are incorrectly labelled exostome teeth, rather than endostome segments, and comparison with Fig. 1A is essential to be sure that these are segments.

Orthotrichum vladikavkanum Vent. in Husn., Muscol. Gallica 167 1887. Figs. 4-5.

Plants green. Stem to 15 mm long, densely foliate, repeatedly branched. Leaves straight

and erect-appressed when dry, erect-spreading when moist, up to (3-)3.5-4 mm long, 0.8-0.9 mm wide; ovate-lanceolate, gradually tapered to apex, concave in basal part, keeled above, margin recurved, on one or more rarely both sides; costa reaching 0.9-0.95 of leaf length, moderately strong, ca. 45-60 μm wide near base, in transverse section composed of undifferentiated cells; laminal cells round, 10-14 μm , thick-walled, with 1-2 papillae in surface view (in transverse section showing one low forked papilla). Gonioautoicous. Perichaetial leaves similar to stem leaves. Seta 2-3 mm long, capsule narrowly cylindrical, smooth, gradually tapered to seta. Stomata superficial. Peristome double. Exostome teeth 16, tightly joined in 8 pairs, when dry reflexed and appressed to capsule wall, when wet covering capsule mouth; outer surface papillose, inner surface papillose throughout. Endostome segments orange, 8,

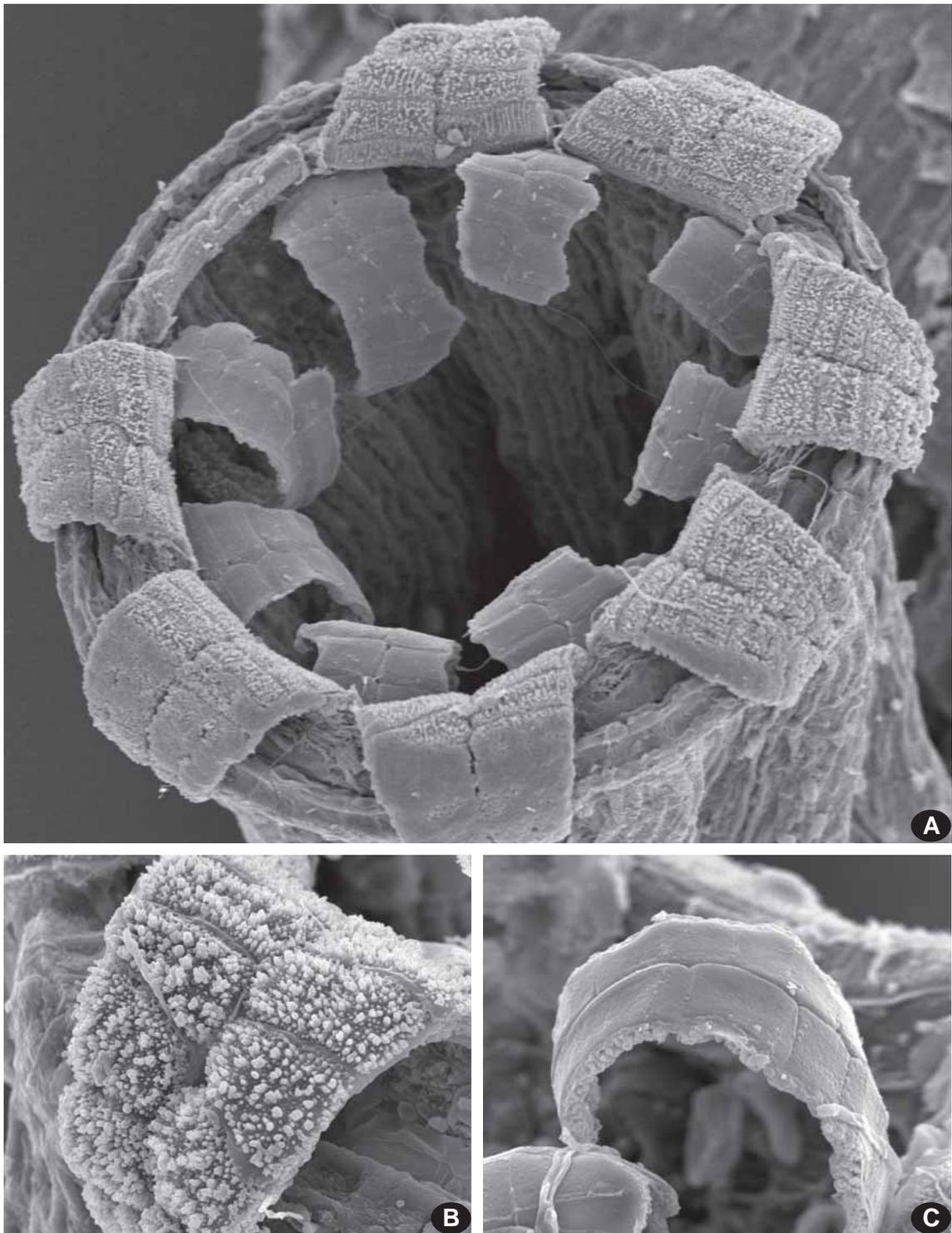


Fig. 2. *Orthotrichum vladikavkanum* Vent. (A – from Kabardino-Balkaria, Ignatov & Ignatova, 1.VIII.2004, B-C – from Krasnodar Territory, 1550 m, Akatova, 19.VI.2000). A – peristome, $\times 310$; B – exostome tooth from inside, $\times 770$; C – endostome segment from lateral view, showing smooth outer surface and strongly papillose inner surface, $\times 770$.

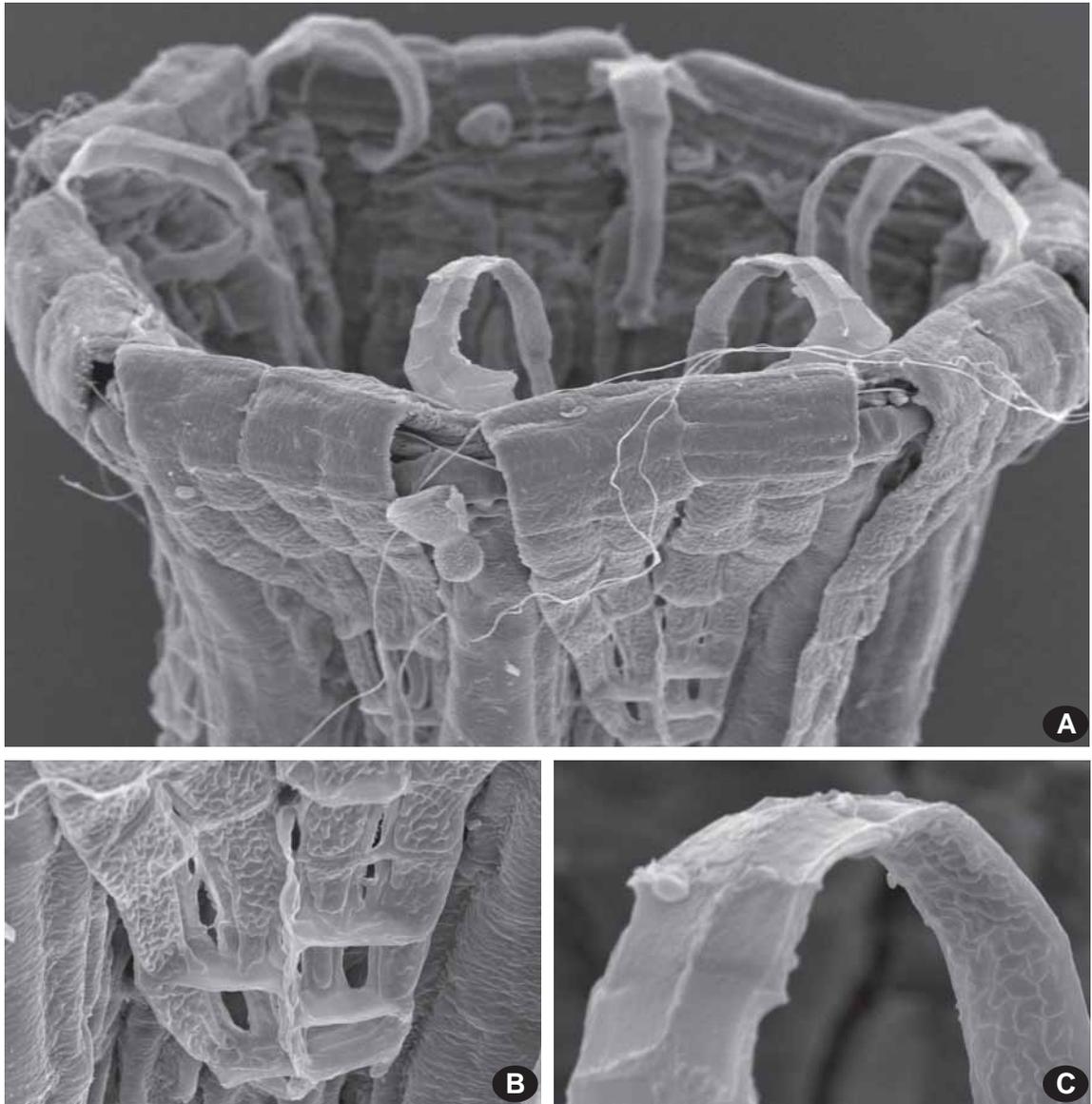


Fig.7. *Orthotrichum soridum* Sull. et Lesq. (from Kabardino-Balkaria, Ignatov & Ignatova, 1.VIII.2004, MHA): A – peristome, $\times 300$; B – upper part of two paired exostome teeth from outside, showing perforations along median lines of teeth, $\times 600$; C – endostome segment, showing smooth outer and somewhat rough inner surface, $\times 1200$.

about as long as teeth; broad, ca. 60-70 μm wide in most of their length; outer surface perfectly smooth; inner surface strongly papillose. Spores ca. 23-27 μm , ripening in first half of summer. Calyptra hairy.

This species was described from Ossetiya in XIX century and not recorded subsequently for many years, until Ignatov & Lewinsky-Haapasaari (1994) found it in the Altai Mountains in South Siberia, where it is a moderately rare species. Recently, we redisco-

vered this species also in the Caucasus, where it seems more rare than in the Altai – it was found by us so far in 4 localities: 1) Krasnodar Territory, Caucasian State Reserve, Malaya Laba River Basin, Armovka Mt., 43° 53' N – 40° 40' E, 1550 m alt., deciduous forest, on recently fallen *Salix* trunk, ca. 10 m from trunk base, with *O. striatum*, coll. Akatova, 19.VI.2000 (CSR, MHA) (Akatova, 2002); 2) same, 1750 m alt., at about timber-line, on trunk of *Alnus glutinosa*, with *O. striatum*, coll. Akatova, 19.VI.2000

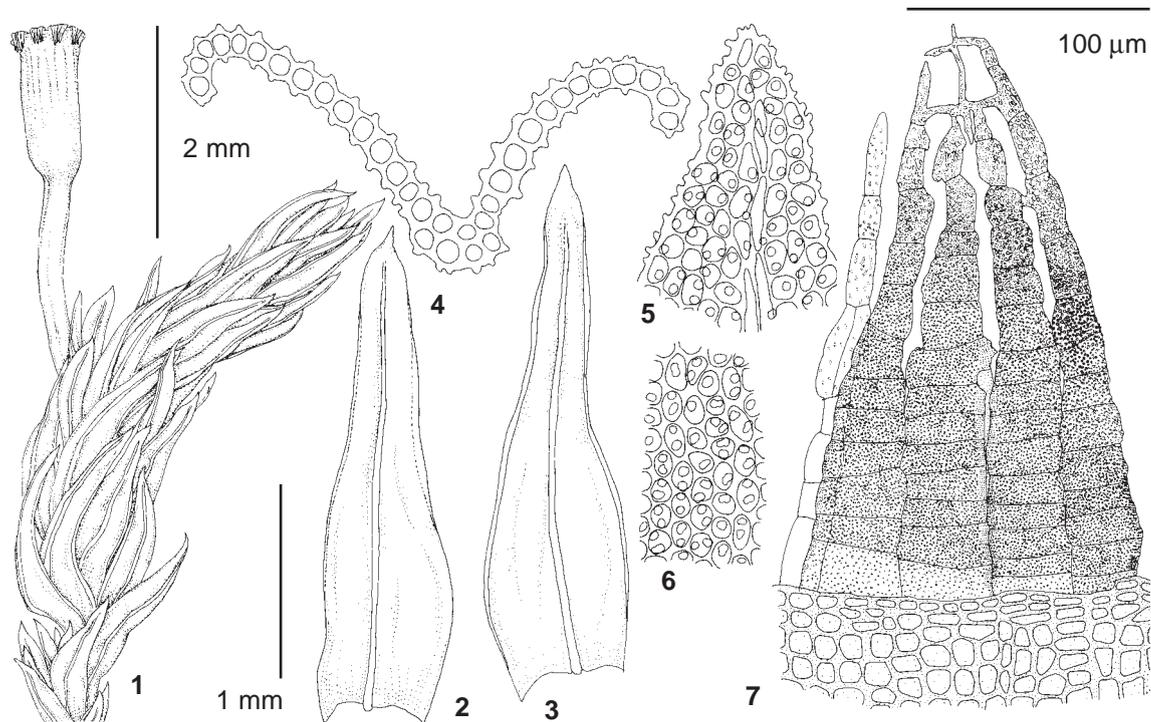


Fig. 8. *Orthotrichum sordidum* Sull. et Lesq. (from Kabardino-Balkaria, Ignatov & Ignatova, 1.VIII.2004): 1 – habit (dry); 2-3 – leaves; 2 – capsule (wet); 4 – transverse leaf section; 5 – stoma; 7 – part of peristome. Scale bars: 2 mm for 1-2; 1 mm for 5-6; 100 µm – for 3-4, 7.

(CSR); 3) Kabardino-Balkaria, Baksan Distr., Altud, 380 m alt., on trees along Hwy, coll. Kharzinov, 7.VI.2002 (KBNG); 4) Kabardino-Balkaria, Cherek Distr., Cherek-Bezengiysky River 2 km above near Dumala Creek mouth, 1600 m alt., on *Salix* trunk, coll. Ignatov & Ignatova, 1.VIII.2004 (MHA, KBNG).

Recently *O. vladikavkanum* was found also by Otte (2004) in the interfluvium of the Belaya and Laba Rivers (#1 & 2) and in the Laba River Basin (#3): 1) Bolshoi Tkhach Mt. (44° 4' N – 40° 25' E, 1600 m, *Carpinus-Ostrya-Betula-Pinus* forest, on *Carpinus*; 2) Tkhach Mt., slope to Bolshoi Sakhrai Creek, 44° 3' 30" N – 40° 24' E, 1650-1950 m, on *Acer*; 3) Malyy Bambak Mt., 43° 57' N – 40° 38' E, 1600 m, on *Salix*.

Orthotrichum vladikavkanum is somewhat similar to *O. speciosum* and *O. sordidum* (which grow together, at least in the locality #4), but differs in the field by a narrower capsule raised on a comparatively longer seta (well seen in mixture with *O. speciosum*), and broad orange endostome segments, much wider than in the other two species.

***Orthotrichum sordidum* Sull. et Lesq. in Austin, Musci Appal 30 n. 168 1870.**

Plants green. Stem to 15 mm long, densely foliate, repeatedly branched. Leaves straight and appressed when dry, erect-spreading when moist, up to 2.6 mm long, 0.6 mm wide; ovate-lanceolate, tapered to apex gradually and near apex more abruptly, concave in basal part, keeled above, margin recurved on one or more rarely both sides; costa reaching 0.9-0.95 of leaf length, moderately strong, ca. 60 µm wide near base, on the transverse section composed of undifferentiated cells; laminal cells round, 10-14 µm, thick-walled, with 1-2 papillae in surface view (in transverse section showing one low solid or slightly forked papilla per cell). Gonioautoicous. Perichaetial leaves similar to stem leaves. Seta 1-2 mm long, capsule ovate-cylindric, smooth below, ribbed above, rather abruptly tapered to seta. Stomata superficial. Peristome double. Exostome teeth 16, tightly joined in 8 pairs, when dry reflexed and appressed to capsule wall, when wet covering capsule mouth; outer surface papillose, inner surface papillose throughout. Endostome segments orange, 8, about

as long as teeth; broad, ca. 40 μm wide in most of their length; outer surface perfectly smooth; inner surface strongly papillose. Spores ca. 21-27 μm , ripening in first half of summer. Calyptra hairy.

Orthotrichum sordidum was first recorded from the Caucasus in the course of revisionary work by Lewinsky (1993b), who treated *O. caucasicum* Vent., known from the lectotype only (from Vladikavkaz), as synonymous. Later it was reported from Karabakh region in Transcaucasia (Manakyan, 1995).

Both new collections of *O. sordidum* were in places where *O. vladikavkanum* was found: 1) Krasnodar Territory, Caucasian State Reserve, Malaya Laba River Basin, Armovka Mt., 1550 m alt., deciduous forest, on recently fallen *Salix* trunk, ca. 10 m from trunk base, with *O. striatum*, coll. Akatova, 19.VI.2000 (MHA, CSR); 2) same, 1700 m alt., at about timber-line, on trunk of *Salix caprea*, with *O. striatum*, coll. Akatova, 19.VI.2000; 3) Karachaevo-Circassian Republic, Bolshaya Laba River Basin, Zakan Mt., 43° 42' N – 40° 47' E, 1500 m alt., *Pinus* forest, on *Populus tremula* trunk, ca. 3 m above the ground, with *O. striatum*, coll. Akatova, 22. VI.2003; 4) Kabardino-Balkaria, Cherek Distr., Cherek-Bezengiyskiy River 2 km above near Dumala

Creek mouth, 1650 m alt., on *Salix* trunk, coll. Ignatov & Ignatova, 1.VIII.2004 (MHA, KBNG).

Orthotrichum sordidum is likely be confused with *O. speciosum*, another species with exserted capsules and superficial stomata. Though capsules of *O. speciosum* are more commonly smooth, there are some populations that have distinctly ribbed capsules. However, the latter are tapered downwards quite gradually (vs. abruptly in *O. sordidum*, cf. Fig. 7). Also, the exostome teeth are never perforate distally in *O. speciosum* and the endostome segments are rather strongly papillose on the inner surface in *O. speciosum*, looking papillose under the light microscope, whereas they are much less so in *O. sordidum* (Fig. 8), and under the light microscope, the segments look smooth to finely granulose.

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