Arctoa (2018) **27**: *87–90*
doi: 10.15298/arctoa.27.08

ON THE IDENTITY OF *ENTODON RUFESCENS* LAZ.

ЧТО ТАКОЕ *ENTODON RUFESCENS* LAZ.?

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Abstract

Entodon rufescens Laz. described from the Russian Far East is synonymized with *E. sullivantii* (Müll. Hal.) Lindb. Illustrations and description from Russian collections and data on its distribution in Russia are provided.

Резюме

Entodon rufescens Laz., описанный с территории Российского Дальнего Востока, синонимизирован с *E. sullivantii* (Müll. Hal.) Lindb. Приводятся иллюстрации и описание российских образцов, а также данные о распространении вида в России.

KEYWORDS: mosses, new synonym, Russian Far East

INTRODUCTION

The genus *Entodon* Müll. Hal. includes approximately 117 species in the world, with 33 species occurring in East Asia (Zhu *et al*., 2010) and 27 in China (Hu & Wang, 2008). Most of species grow in tropical and temperate regions, and only few penetrate northward. Eleven species of *Entodon* were recorded from Russia in the "Checklist of mosses of East Europe and North Asia" (Ignatov *et al.*, 2006). One of them, *E. transbaikalensis* Bard., described from Zabaikalsky Territory, was recently synonymized with *E. giraldii* Müll. Hal. (Afonina *et al.*, 2017). All others are known from the Russian Far East. Three species, *E. concinnus* (De Not.) Paris, *E. schleicheri* (Schimp.) Demet. and *E. challengeri* (Paris) Cardot, are rather widespread in Russia, occurring also in southern Siberia and European Russia, one species, *E. giraldii*, was recently reported from Zabaikalsky Territory (Afonina *et al.*, 2017), while five species (*E. diversinervis* Cardot, *E. flavescens* (Hook.) A. Jaeger. *E. luridus* (Griff.) A. Jaeger, *E. scabridens* Lindb., and *E. sullivantii* (Müll. Hal.) Lindb.) are known in Russia only in the Far Eastern region, mainly in its southern part, along with many other East Asian species confined in Russia only to this region. The last species, *E. rufescens* Laz., was described from Primorsky Territory and remained known only by type specimens.

First comprehensive study of mosses of the Russian Far East was conducted by A.S. Lazarenko (see Cherdantseva *et al.*, 2018 for overview). In his check-list of mosses of the Soviet Far East Lazarenko (1945) listed ten species of *Entodon*, two of them being described as new for science. This list includes *E. orthocarpus* (Brid.) Lindb. (= *E. concinnus*), *E. ramulosus* Mitt. (= *E. flavescens*), *E. compressus* (Hedw.) Müll. Hal. (= *E. challengeri*), *E. sinense* (Dixon) Laz. (= *E. giraldii*), *E. diversinervis*, *E. scabridens*, *E. schleicheri*, *E. cladorrhizans* (Hedw.) Müll. Hal., *E. polycarpus* Laz. (nom. illeg., later homonym, =*E. luridus*), and *E. rufescens* Laz. Lazarenko recorded both *E. schleicheri* and *E. cladorrhizans* in the region and discussed the differences between them. These two species were often confused in Europe (see discussion in Ignatov *et al.*, 1996). *Entodon cladorrhizans* was excluded from the moss flora of Russia by Ignatov *et al.* (1996, 2006). However, it is considered as widespread species in China (Hu & Wang, 2008; Zhu *et al.*, 2010), and its finding in the Russian Far East is possible. Presence of most species was confirmed by numerous subsequent collections, except *E. diversinervis*, which was referred to doubtful by Cherdantseva *et al*. (2018).

Summing up, most species currently known in the Russian Far East were already reported from this region by Lazarenko (1945), except *E. sullivantii*. At the same time, Lazarenko described *E. rufescens* which identity remained unclear.

TAXONOMY

Entodon rufescens was described from Primorskaya oblast [Province], Pos'etsky Distr., Sidimi Bay, mentioning two specimens: (1) on rock in park and (2) Brinner Cape, N-faced slope, on rock. Ochyra (1988) failed to find any specimen in KW, where Lazarenko' collections are kept, however the syntype with the label "2" exists in KRAM-B and is cited by Ochyra (1988); note, however, that his English translation (slope S-faced) is opposite as

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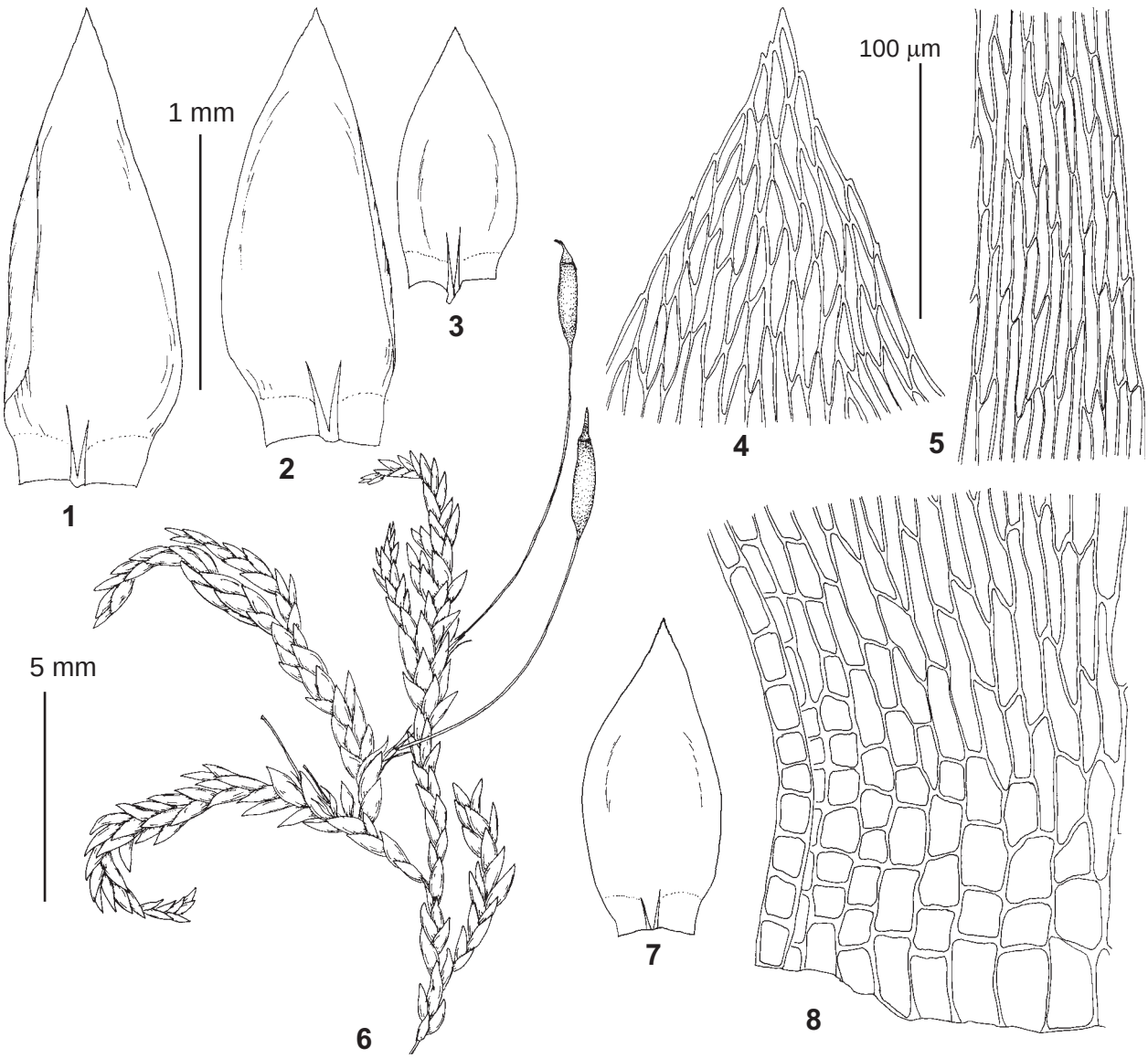

Fig. 1. Lectotype of *Entodon rufescens* Laz. (Primorsky Territory, Pos'etsky Distr., Sidimi Bay, Brinner Cape, 29.X.1933, *A.S. Lazarenko*, IRK): 1–2 – stem leaves; 3, 7 – branch leaves; 4 – upper laminal cells; 5 – mid-leaf cells; 6 – habit, dry; 8 – basal laminal cells. Scale bars: 5 mm for 6; 1 mm for 1–3; 7; 100 μm for 4–5, 8.

according to protologue and other specimens slope in N-faced. No original material occur in LWS (Lobacheska, 2008) and LE, where a number of isotypes of Lazaranko are kept.

However in IRK, where the bryophyte herbarium has been organized by L.V. Bardunov, who worked in close contact with Lazarenko in 1950–1960s, there is a specimen, with the label "2". It fully agrees with the description in protologue of *E. rufescens*, in both gametophytic and sporophytic characters, and in view of no better choice for the lectotypification, is selected here as the lectotype.

As expected, the lectotype appeared to be identical with *E. sullivantii* in essential characters: monoicous sexual condition; leaves narrowed at the base; well-developed annulus; red seta; and striolate ornamentation of exostome teeth in proximal part. Leaf margins of *E. rufescens* are described as entire; however, plants of the lectotype specimen have leaves with serrulate uppermost margins. Leaves are described in protologue of *E. rufescens* as slightly smaller than in *E. sullivantii*, but in the lectotype specimen they are larger and well fit the range of *E. sullivantii* leaf size (Zhu *et al.*, 2010; Hu & Wang, 2008; Buck, 2014). Leaves gradually narrowed to the apex and large alar groups of quadrate cells that reach the costa are also observed in the lectotype specimen (Fig. 1). Thus, we consider the name *E. rufescens* Laz. to be a synonym of *E. sullivantii*.

Entodon sullivantii (Müll. Hal.) Lindb., Contr. Fl. Crypt. As. 233. 1872[1873]. — *Neckera sullivantii* Müll. Hal., Syn. Musc. Frond. 2(6): 65. 1851[1850]. Type: Musci Alleghanienses, #64, ad saxa in sylvaticis secus flumen French Broad, Carolinae Superioris, 1845, *Sullivant* (isotype in LE!).

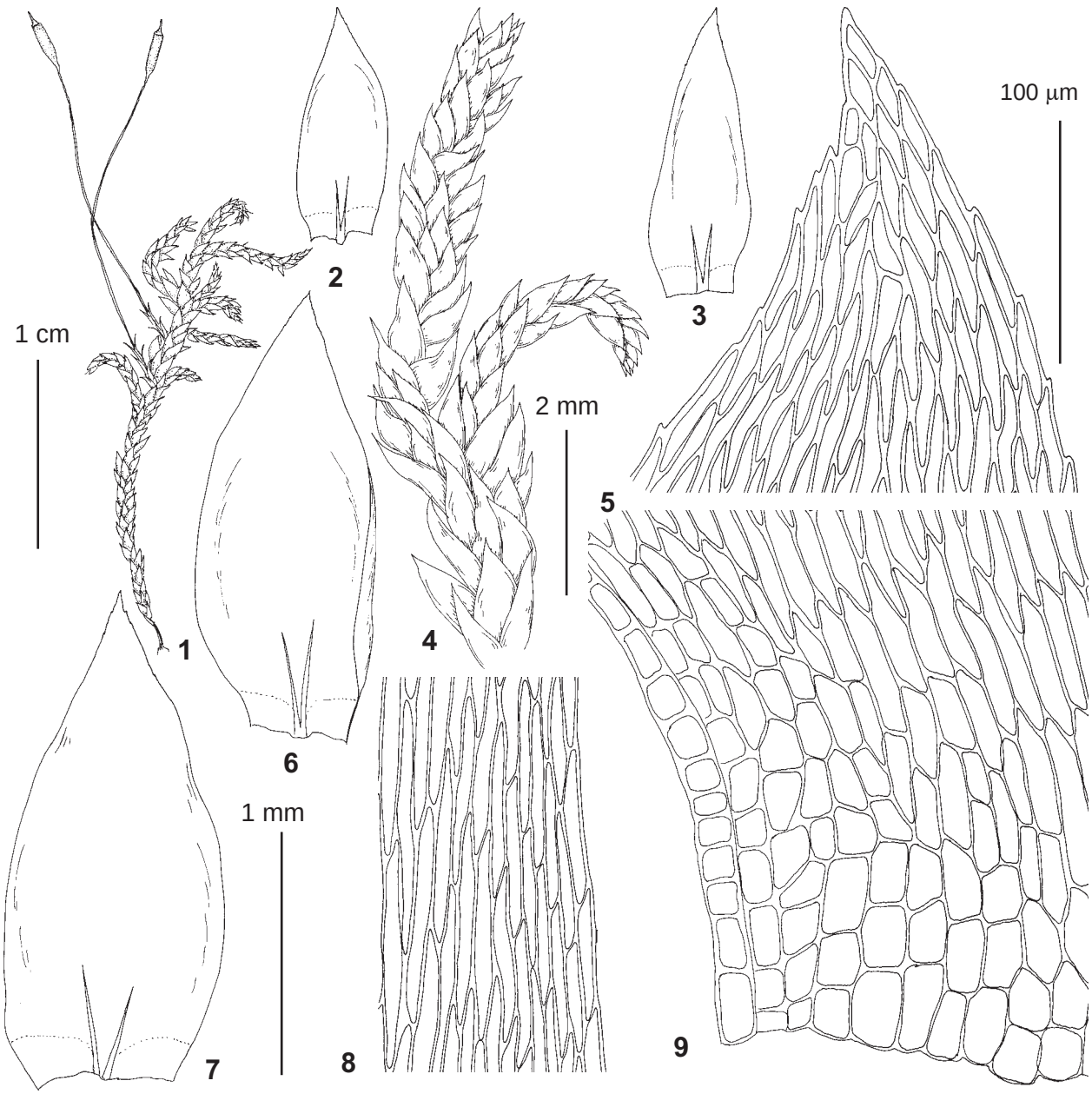

Fig. 2. *Entodon sullivantii* (from: Primorsky Territory, Khanka Distr., *Borovichev & Bakalin BB-1/4-14*. MW): 1, 4 – habit, dry; 2–3 – branch leaves; 5 – upper laminal cells; 6–7 – stem leaves; 8 – mid-leaf cells; 9 – basal laminal cells. Scale bars: 1 cm for 1; 2 mm for 4; 1 mm for 2–3, 6–7; 100 µm for 5, 8–9.

Entodon rufescens Laz., Bot. Zhurn. (Kiev) 2: 188. 1945, syn. nov. – Lectotype (selected here): "*Entodon rufescens* Lazar. sp. nova, ДВК, Приморская обл., Посьетский р-н, Бухта Сидими, мыс Бриннера, N склон. На камнях. 29.10.1933. Leg. Determ. A. Lazarenko (IRK). [Translation of part in Russian: Far Eastern Region. Primorskaya Province, Posiet Distr., Sidimi Bay, Brinner Cape, N-facing slope. On rocks.]

Description. Plants medium-sized, in dense mats, yellowish-green, glossy. Stems to 4(–5) cm long, prostrate, subpinnately to sparsely branched, complanate-foliate; branches to 1.5 cm long, complanate-foliate, attenuate at apex. Stem leaves ovate-lanceolate, 1.8–2.0×0.7–0.9 (–1.0) mm, acute, constricted at the base, concave; margins narrowly recurved at base, plane in middle and distal portion, serrate at apex; costa double, reaching to 1/5(–1/4) of leaf length; laminal cells linear, 55–80(–100)×4–6 µm; alar group large, consisting of quadrate cells, reaching to the costa. Branch leaves similar in shape to stem leaves, but smaller, to 1.3×0.4 mm. Autoicous, sporophytes frequent, perichaetia mainly on stem. Setae reddish-brown, to 2.5 cm long. Capsules narrowly cylindrical, 2–3×0.5–0.7 mm long, brown; annulus composed of 2–3 rows of large cells, persistent. Operculum long-rostrate, with straight or curved beak. Peristome teeth narrow, ca. 400 µm long, reddish-brown and densely striolate at base, pellucid and papillose distally. Endostome segments yellowish, smooth. Spores 8–14 µm.

Distribution. *Entodon sullivantii* was described from U.S.A., North Carolina; however, it is considered as one of the most rare species of the genus in North America, occurring in the south and south-east of U.S.A. (Buck, 2014). Contrary to that, it is fairly common in Japan and is considered to be very polymorphous by Noguchi *et al*. (1994). The latter is confirmed by the list of synonyms of *E. sullivantii* provided by Zhu *et al.* (2010), where ten names described from Japan are given. This species is also reported from most southern and eastern provinces of China (Hu & Wang, 2008) and Korea (Zhu *et al.*, 2010). In Russia it is known only from southern part of Primorsky Territory, where it grows at altitudes 100–800 m, mainly on rocks in oak forests and on rock-fields and cliffs along streams, but occasionally also on tree bases and inclined tree trunks. It agrees with the data on species ecology in North America, where it is characterized as primarily saxicolous (Buck, 2014), as well as with the description of its ecological preferences in East Asia, where it grows on tree bases, rotten logs and rocks (Zhu *et al.*, 2010).

Selected specimens examined: RUSSIA: [Primorsky Territory]: Amursky Gulf, Sedem River, VI.1882, *Yankovsky s.n.* (LE); Vladivostok area, Okeanskaya Railway Station, 28.IX.1950, *Woroshilov 5304* (MHA9003628); Vityaz' Bay, 4.X.1978. *Bardunov s.n.* (MHA 9003627); Ol'khovaya Mt., Alekseevka Creek near Kamenisty Brook mouth, 1.IX.2006, *Ignatov et al. 06-2540* (MW9038539); Kavalerovo Distr., Vysokaya Mt., Kolobenkov Brook, 29.VIII.2013, *Ignatov et al. 13-1648* (MHA9003629); Okeansky Ridge, Shamarsky Pass between Bogataya Creek and Ussurijsky Gulf, 23.IX.2006, *Ignatov et al. 06-2025* (MHA9003633); Sikhote-Alin Mountains, Lazovky Pass, 5.X.2006, *Ignatov et al. 06-2516* (MHA9003631); Sikhote-Alin Mountains, Chandolaz Mt., 7.X.2006, *Ignatov et al. 06-2813* (MHA9003630).

JAPAN: Honshu, Shizuoka-ken, Tagata-gun, Iwabi-gawa River, 5.X.1980, *Mizutani 6067* (LE). Sikoku, Echime Prefecture, Mt. Ishizuchi, 24.X.1969, *Iwatzuki*, Musci Japonici Ser. 18 (1962) #866 (LE); Honshu, Yamanashi-ken, Higashi-yamanashi-gun, Hajikano, 20.IV.1978, *Osada*, Musci Japonici Exs. ser. 31 (1980) # 1518 (LE); Kyushu, Miyazaki Pref., Nichinan, 3.XII.1972, *Schofield 52604* (LE); Honshu, Ibaraki Pref., Kita-ibaraki-shi, Hanazono-keikoku Gorge, 6.II.2000, *Higuchi*, Bryophyta selecta Exs., fasc. 31 #1253 (LE).

U.S.A.: Tennessee, between Wartburg and Harrison, 28.I.1934, *Sharp*, North American Musci Perfecti issued by A.J. Grout, #271 (LE); Virginia, Patrick Co., pinnacles of Dan, west of Stuart, 18.X.1852, *Anderson 11377 & Patterson* (LE).

Interestingly, there is a specimen in LE collected in 1882 by M.A. Yankovsky from the same place where from later *E. rufescens* was described: Amursky Gulf, Sedem [Sidimi] River [modern toponymy: Khasansky Distr., Bezverkhovo Settl., which is situated on the Yankovsky (former Sidimi) Peninsula, near the mouth of Narva (former Sidimi) River]. This specimen was identified as *E. compressus* by V.F. Brotherus, and in 1965 reidentified as *E. sullivantii* by A.L. Abramova. There is also a specimen in MHA collected in 1950 by V.N. Woroshilov in Vladivostok area and labelled as *E. sullivantii* by A.S. Lazarenko (handwritten by Woroshilov). However, the first published record of *E. sullivantii* for Russia belongs to Bardunov & Cherdantseva (1982), who cited only one locality (Khasansky District, Vityaz' Bay). These authors recognized *E. rufescens* as a separate species, but did not provide any records in addition to the type specimens of Lazarenko.

Differentiation. Among Far Eastern species, *Entodon sullivantii* is most similar to *E. flavescens*; both species share medium-sized plants and acute leaves. However, they differ in autoicous sexual condition in *E. sullivantii* vs. dioicous in *E. flavescens*; leaf margins serrate at apex vs. almost throughout in *E. flavescens*; stems and branches complanate-foilate vs. terete-foliate in the latter species; alar groups large, extending to the costa in *E. sullivantii* vs. smaller, not reaching the costa in *E. flavescens*; and exostome teeth striolate proximally and papillose distally vs. papillose throughout.

ACKNOWLEDGEMENTS

We cordially thank the curators of IRK and LE for the assistance with our work in herbaria. The work of Ignatov was carried out in accordance to Institutional research project №118021490111-5 and of Ignatova by project AAAA-A16-116021660039-1.

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