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SCAPANIA VERRUCOSA HEEG (SCAPANIACEAE, MARCHANTIOPHYTA) IN RUSSIA

SCAPANIA VERRUCOSA HEEG (SCAPANIACEAE, MARCHANTIOPHYTA) В РОССИИ

YURIY S. MAMONTOV[1,2] & ALEXEY D. POTEMKIN[3]

ЮРИЙ С. МАМОНТОВ[1,2], АЛЕКСЕЙ Д. ПОТЕМКИН[3]

Abstract

Records of *Scapania verrucosa* from the Russian Far East have recently been considered as dubious or erroneous. Revision of all available collections, however, confirms the older records and detects new localities in Primorsky Territory. All specimens from Magadan Province and Khabarovsk Territory were transferred to *S. microdonta*. Thus, it is shown that in Russia *S. verrucosa* sporadically occurs only in the southern Far East and the Caucasus. Description and illustrations of *S. verrucosa* are provided, and examined specimens are listed.

Резюме

Новые находки *S. verrucosa* в Приморском крае и сомнительность ее более ранних идентификаций на Дальнем Востоке потребовали ревизии всех доступных дальневосточных коллекций. Для уточнения распространения вида в России были дополнительно изучены материалы с Кавказа. В результате показано, что *S. verrucosa* спорадически встречается в Приморском крае и на Кавказе. Все образцы в LE из Магаданской области и Хабаровского края, определенные ранее как *S. verrucosa*, относятся к *S. microdonta*. Приводятся описание и иллюстрации *S. verrucosa*, а также отличия от *S. microdonta* и *S. sphaerifera.*

KEYWORDS: *Scapania verrucosa*, *S. microdonta, S. sphaerifera,* taxonomy, new record, Russia, description, illustration.

Scapania verrucosa was first reported for the Russian Far East by Blagodatskikh & Duda (1977) from Magadan Province and Khabarovsk Territory. These records were considered by Schljakov (1981) as dubious. Subsequently Blagodatskikh & Duda (1982, 1988) listed *S. verrucosa* also for the southern part of Magadan Province, the Kolyma Upland. Fifteen years later, *S. verrucosa* was reported by Potemkin (2003) from Primorsky Territory, but Konstantinova, Bakalin *et al*. (2009), Choi *et al*. (2012) doubted all those identifications in the Russian Far East. They believed that *S. verrucosa* is confused with *S. sphaerifera*, a similar and more widespread species in the Russian Far East.

Recently, the first author found *S. verrucosa* in his own collections and collections of T.V. Sviridenko from Primorsky Territory. These findings prompted us to revise all available collections from the Russian Far East. We confirmed that all the specimens collected before in Primorsky Territory (Potemkin, 2003) belong to *S. verrucosa.* At the same time, 6 specimens from Magadan Province and Khabarovsk Territory collected by L.S. Blagodatskikh and identified by J. Duda as *S. verrucosa* in LE, all belong to *S. microdonta.*

Description below is based on materials from the Russian Far East. Data from other studied specimens are provided in square brackets for completeness. It should be noted that the previous records of *S. verrucosa* from the treated area were not supported by any plant illustrations and/or descriptions. Moreover, a drawing of *S. verrucosa* in Schljakov (1981: Fig. 60: *2*) is certainly based on *S. sphaerifera*: *S. verrucosa* never develops so coarsely dentate leaves and sphaerical 4-celled gemmae shown in that figure.

Scapania verrucosa Heeg, Revue Bryologique 20: 81. 1893. Type: [Austria] Steiermark: Felsen am Rissachfall nachst Sihladmig, 20.8.1890 Heeg (topotypus H!). – *S. parva* Steph. 1894. Mém. Soc. Sci. Nat. Cherbourg 29: 226. Type: China, Yunnan, Maculchan, Delavay s.d., s.n. (?holotype G8177!) – *S. verrucifera* C. Massal. 1897. Mem. Accad. Agric. Verona 73 (ser. 3), fasc. 2: 21. – *S. manina* Steph. 1924. Spec. Hep. 6: 503. Type: Hawai (sic!), Maui, 3000 m, 1909 Faurie 454 (holotype G!) (Potemkin, 2002).

[1] – Polar-Alpine Botanical Garden, Kola Science Centre, Russian Academy of Sciences; Kirovsk-6, Murmansk Province 184256 Russia – Россия 184256, г. Кировск-6 Мурманской области, Полярно-альпийский ботанический сад-институт им. Н.А. Аврорина КНЦ РАН;

[2] – Institute of North Ecological Problems, Kola Science Centre, Russian Academy of Sciences, 18a Fersmana St., Apatity, Murmansk Province, 184209 Russia – Россия 184209, г. Апатиты Мурманской области, ул. Ферсмана, д. 18а, Институт проблем промышленной экологии Севера КНЦ РАН; e-mail: yur-mamontov@yandex.ru

[3] – Komarov Botanical Institute of Russian Academy of Sciences, 2 Prof. Popova St., Saint Petersburg 197376 Russia – Россия 197376, Санкт-Петербург, ул. Профессора Попова, д. 2, Ботанический институт им. В.Л. Комарова РАН; e-mail: potemkin_alexey@mail.ru

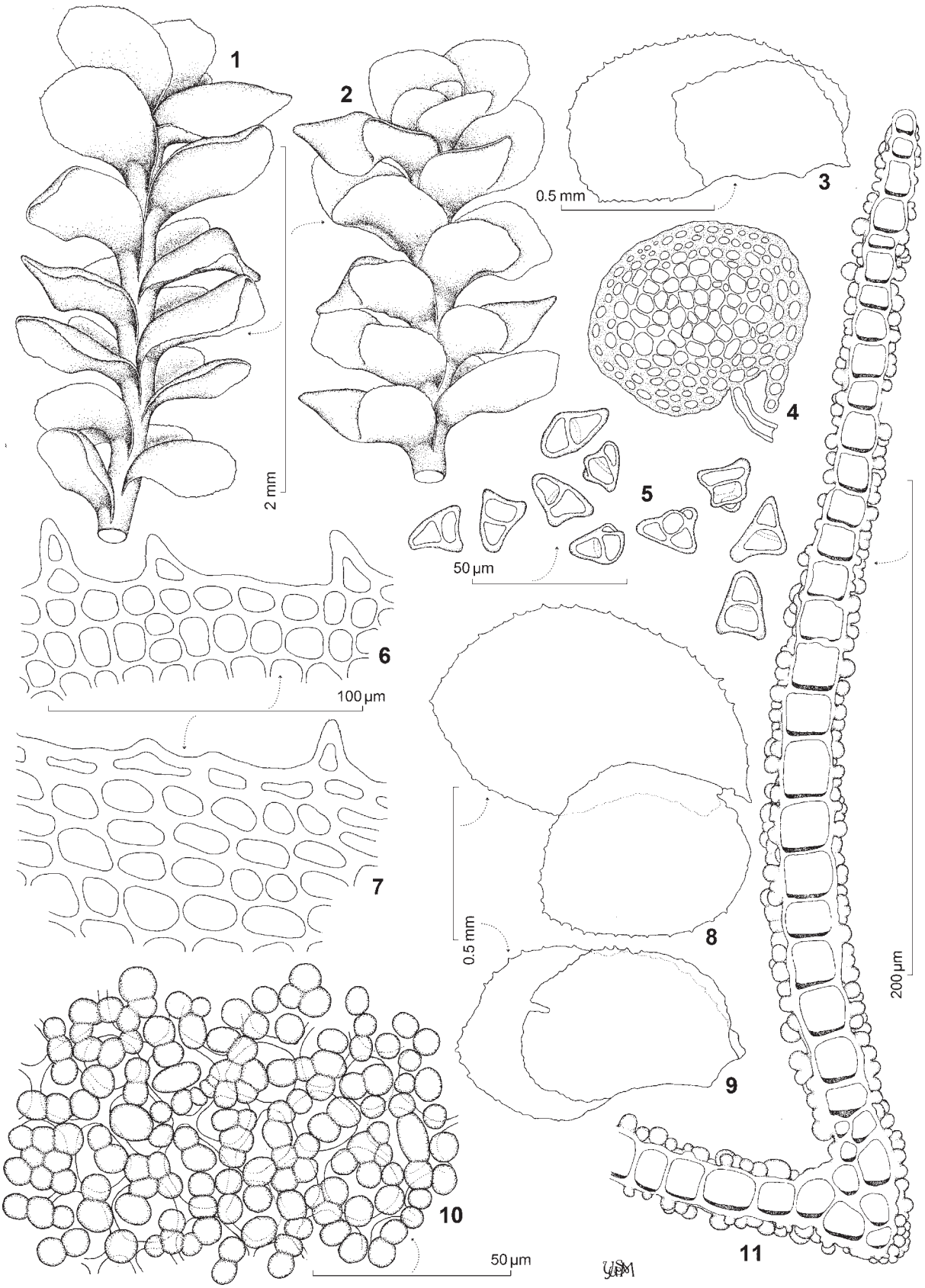

Fig. 1. *Scapania verrucosa*: 1 – habit, postical view; 2 – same, antical view; 3, 8, 9 – leaves; 4 – stem cross section; 5 – gemmae; 6 – cells of leaf border, middle of postical lobe; 7 – same, base of postical lobe; 10 – median cells of postical lobe with coarsely verrucose cuticle indicated; 11 – leaf transverse section, distally. All from Primorsky Territory, 26.VIII.2008 *Sviridenko s.n.* (KPABG).

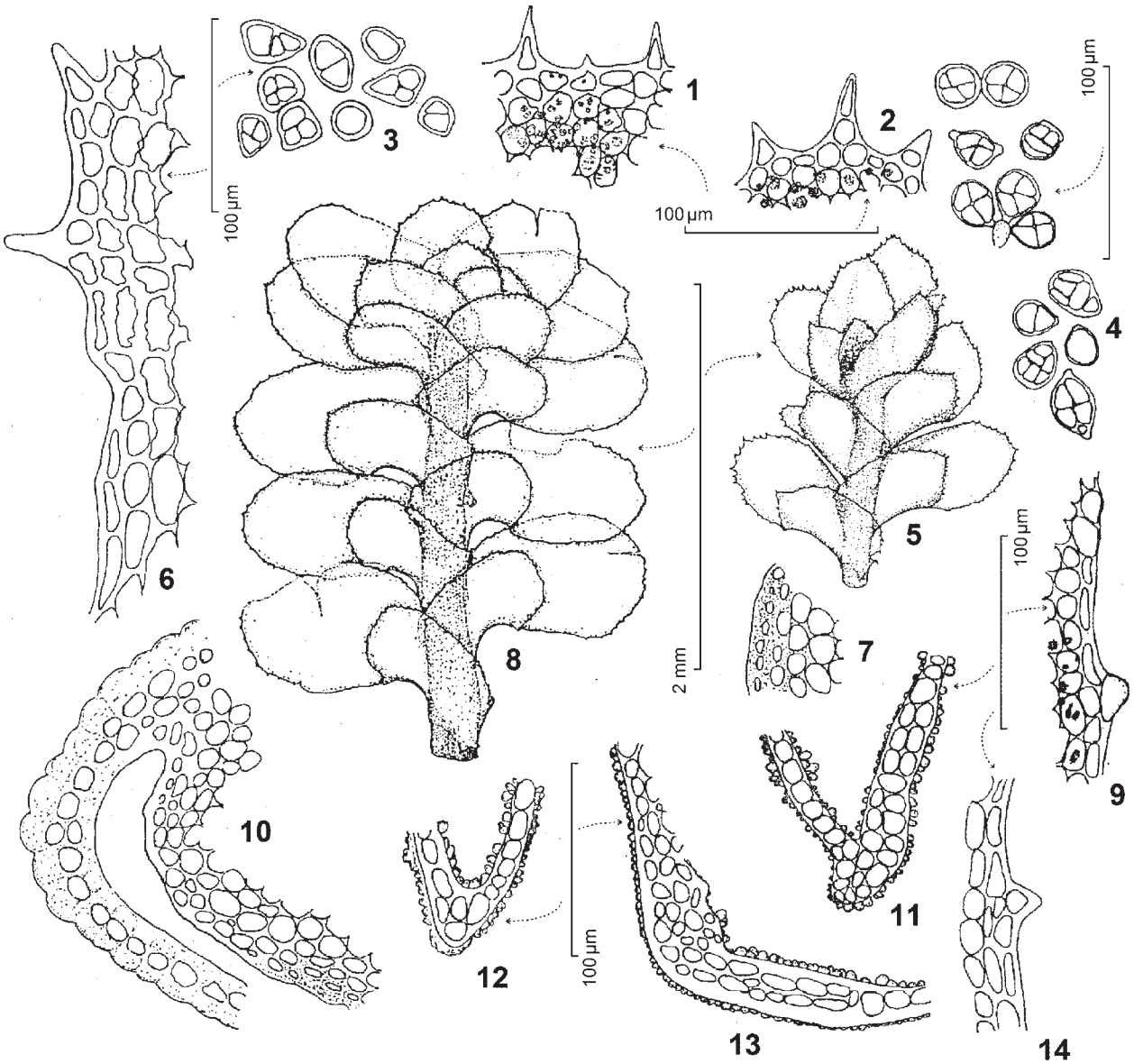

Fig. 2. *Scapania microdonta* (1, 3, 6, 8, 10, 12) and *S. sphaerifera* (2, 4, 5, 7, 9, 11, 13, 14): 1, 2 – apex of antical lobe with marked papillae; 3, 4 – gemmae; 5, 8 – habit, antical view; 6, 14 – basal sector of postical lobe margin; 7, 10 – stem cross section (10 – with sheathing leaf base); 9 – gemmiparous area along inner margin of ventral lobe; 11, 12 – leaf keel section, distally; 10, 13 – leaf base transverse section (10 – with sector of stem cross section). All modifed from Potemkin (1999).

Illustrations: Amakawa, 1964: Fig. 4: g-l; Buch, 1928: Fig. XXVI; Choi et al., 2012: Fig. 47; Müller, 1905: Taf. 32, 33; 1956: Fig. 350: c-e, 354; Potemkin, 2001: Fig. 6. Fig. 1.

Plants yellowish-green, with no trace of red or purple pigmentation of leaves. Shoots 2.5-10(-60) mm long, 1.4-1.6(-3) mm wide, prostrate to ascending [often with intercalary branches]. Stem 0.17-0.24 mm in diameter, brown below, reddish towards the apex, in cross section with 1-4(-5)-layered cortex of thick-walled cells gradually transformed into medullary cells [the surface of cortex ±papillose]. Leaves denticulate with remote 1-2-celled teeth spread to leaf bases [occasionally with a rather large antical tooth up to 7 cells long, 3 cells at base with uniseriate end 1-3 cells long]; apical cells of teeth up to 2.5× as long as wide, (10-)15-22(-25) µm long, 6-11(-13) µm wide. The leaf keel acute, 2-3-stratose, straight to weakly arched, ca. (0.3-)0.4-0.5 of postical lobe length. Antical lobe 0.4-0.7 mm long, 0.4-0.5 mm wide, 0.5-0.7(-0.8) of postical lobe size, obliquely to rounded rectangular, not decurrent or barely so. Postical lobe 0.6-1.0 mm long, 0.5-0.7 mm wide, 1.2-1.4× as long as wide, elliptical to obovate, at apex ± rounded to obtuse, often with apiculis, mostly long-decurrent, weakly to strongly convex. Marginal leaf cells rounded, 9-11(-14)×7-9(-11) µm (Fig. 1: 6), or tangentially elongated, 13-25×4-6 µm (Fig. 1: 7), evenly thick-walled and forming a border of 1-3(-4) cell rows. Median cells of postical lobes (14-)19-21×13-19 µm, with somewhat thickened walls and concave-sided [sometimes nodulose] trigones; cell surface with ir-

regular coarse papillae. The papillae hemispherical in transverse section, 4-8 μm high (Fig. 1: 11), and rounded (4-10 μm across) to elliptical (9-13×5-9 μm) in view from above (Fig. 1: 10). [Oil-bodies 3-6 per cell in postical lobe middle, 7-12 per cell in lobe base, spherical and 3-7 μm in diam., or elongated, 5-8×3-5 μm]. Gemmae green to brown, angular, 2-4-celled, 17-22(-25)×(10-)13-17 μm; gemma formation limited to the apices of uppermost [almost all] leaves. [Dioicous. Androecia composed of 1-2 pairs of bracts; each bract similar to leaves, with larger convex antical lobes, subtending numerous antheridia and narrow lanceolate paraphyses. Female bracts somewhat larger than leaves. Perianth strongly compressed, truncate at the mouth, not plicate or with a few weak plicae in the distal part; the perianth mouth weakly to strongly lobulate with dentate-ciliate margin; the cilia up to 5 cells long, with colorless elongated apical cells up to 2.7× as long as wide (to 30 μm and 11 μm wide). Cells of perianth mouth evenly thick-walled and weakly papillose. Sporophytes rare, known from Sichuan, China only (*Wu* # 97-06-3, LE). Spores 8.5-11 μm in diam., smooth. Elaters 2-spiral, 110-165 μm long, 7-8.5 μm in diam.]

Differentiation. *Scapania verrucosa* is a polymorphous species easily distinguished by the presence of remarkable angulate green to brownish gemmae and coarsely papillose surface of leaf cells. It is noteworthy that *S. sphaerifera* is widely distributed in Asiatic Russia and may be confused with *S. verrucosa.* However, *S. sphaerifera* is separated from *S. verrucosa* on the basis of the presence of spherical 4-8-celled yellowish-brown gemmae. These gemmae are almost always developed on margins of the upper leaves and generally well-marked (Fig. 2). These two species differ also in their distribution. *Scapania verrucosa* has a more southern range. It is rare in South Europe, the Russian Far East, the Hymalaya, Japan, the Hawaii and Mexico, but not so rare in the Russian Caucasus. *Scapania sphaerifera* is more northern and still known from Russia only. It was described from the Kola Peninsula but not found there later. It has a wide range in high mountains of South and East Siberia and the Russian Far East.

Taking into account a broad southern Eurasian distribution of *S. verrucosa*, its findings in the Russian Far East are quite expected. Possible confusion between *S. verrucosa*, *S. sphaerifea,* and *S. microdonta* which have coarsely papillose cuticle and ± dentate leaves persuaded us to provide a key and illustrations (Fig. 1, 2) for their differentiation.

1. Leaf base has sheathing with comissura parallel to stem basally and strongly curved from base to sinus; antical lobe decurrent ..... *S. microdonta*
– Leaf base not sheathed, comissura ± spread from stem basally, nearly straight to moderately curved; antical lobe not decurrent 2
2. Gemmae angulate, 2(-3)-celled; postical lobes mostly ± rounded at apex, often with apiculus; marginal teeth mostly minute, 1-2(-3)-celled ..... *S. verrucosa*
– Gemmae sphaerical, 4-8-celled; postical lobes mostly ± sharply pointed at apex; marginal teeth from vestigial to coarse, 1-4(-6) cells long and broad at the base ..... *S. sphaerifera*

Ecology. In the Russian Far East, *S. verrucosa* occurs on dry rocks in deciduous forests, among *Peltigera* sp. and *Trachycystis* sp. or with *Asterella leptophylla*, *Herbertus dicranus, Cheilolejeunea obtusifolia* and *Lejeunea japonica*, once collected on dry bark, with *Chiloscyphus minor*. In the Caucasus, *S. verrucosa* grows in similar habitats, *e.g.* on silicate rocks and sandstones in deciduous forests together with *Plagiochila porelloides, Leiocolea heterocolpos, Tritomaria quinquedentata, T.* cf. *exsectiformis*, on rocks among *Bartramia halleriana*. According to Konstantinova *et al.* (2009), it also occurs in crevices on moist cliffs on banks of streams mixed with *Scapania cuspiduligera, Pedinophyllum interruptum, Jungermannia atrovirens, Plagiochila porelloides, Conocephalum* spp., and recorded on soil and limestone in the mountain forest belt (collections of I.D. Bogdanovskaya in 1925 from Dagestan). *Scapania verrusosa* is usually associated with species of broad ecological amplitude. Rarely it was collected on bark and rotten wood (Piippo *et al*., 1997; Potemkin, 2003), and on decaying logs in running water where it was associated with *Bazzania tricrenata* and *Tritomaria exsecta* (Konstantinova *et al*., 2009). This species was found only at low elevations in Primorye but reaches up to 2090 m alt. in the Caucasus. In the Himalayas (Sikkim, Bhutan) it was found up to 3555 m alt.

General distribution. C and SE Europe! (Austria, Bulgaria, France, Switzerland, Spain, Italy, Jugoslavia in its former extent, Romania, Ukraine), Turkey (Zerov, 1964; Duell, 1983; Schumacker & Váňa, 2005), Russian Caucasus! (Abramov et al., 1964; Abramov & Abaczev, 1968; Ignatova et al., 2008; Konstantinova et al., 2009), Russian Far East! (Potemkin, 2003), Japan (Honshu: Inoue, 1985; Yamada & Iwatzuki, 2006), China! (Schensi, Sichuan, Yunnan: Piippo, 1990; Piippo et al., 1997 as *S. parva*), Pakistan (Mizutani et. al., 1994), W Himalayas (Kashyap & Chopra, 1932; Chopra, 1943 as *S. parva* and *S. verrucosa*), Sikkim, Bhutan (Long & Grolle, 1990), Hawaii! (as *S. manina*), Mexico! (Gradstein & Vana, 1987). The report of this species from the Verkhoyanskiye Mts., East Siberia (Schljakov, 1981) belongs to *S. sphaerifera.* The specimens of *S. verrucosa* from the West Sayan Mts., South Siberia (Vasiljev, 1992) were redefined by N.A. Konstantinova (Konstantinova & Vasiljev, 1994).

Specimens examined: RUSSIAN FAR EAST: **Primorsky Territory**: Partizansky District, 15 km to SE of Frolovka Settlement, 26.VIII.2008, *Sviridenko s.n.* (KPABG). Lazovsky District, Sikhote-Alin' Range, 6.IX.2010, *Mamontov # Prim-108-1* (LE). Lazovsky District, Lazovsky State Reserve, near Perekatnaya River, 30.IX.-2.X.2002 *Potemkin, Kotkova #*

210201Д (LE); idem, 30.IX.-2.X.2002 *Potemkin, Kotkova # 210401A* (LE). CAUCASUS: **Republic of Dagestan**: Karak, on soil, 29.VI.1925 *Bogdanovskaya-Gienef s.n.* (LE); Karak, on rocks, 29.VI.1925 *Bogdanovskaya-Gienef s.n.* (LE); Mt. Gunib, Karakskaya dacha in forest, on limestone, 27.VI.1925 *Bogdanovskaya s.n.* (LE); idem, on sandstone in forest, 28.VI.1925 *Bogdanovskaya s.n.* (LE). **Karachay-Circassian Republic**: Tebedinsky Reserve, Khutyy Canyon near mouth, north-faced rocks of forest belt near waterfall, 1600 m alt., 9.IX.1998 *Onipchenko s.n.* (LE ex MW); idem, Teberda River Valley, 21.IX.2005 *Konstantinova # K544-5-05* (KPABG). **Krasnodar Territory**: Caucasus Reserve, Mt. Agishko, near river Beshenka, on rocks, VI.1951 *Ariskina s.n.* (LE); idem, Shakhe River Basin, 2.X.2008 Konstantinova # K429-4a-08 (KPABG). Republic of Adygeya, Caucasus Reserve, vicinity of Guseripl Town, 19.X.2007 *Konstantinova # K480-1-07* (KPABG).

Specimens of ***S. microdonta*** *from Magadan Region and Khabarovsk Territory identified and reported as S. verrucosa*: RUSSIAN FAR EAST: **Khabarovsk Territory**: Okhotsk District, 3 km N of Okhotsk Settl., southern slope of hill near sea, among rocks, 28.VIII.1972 *Blagodatskikh s.n.* (LE, 2 specimens). **Magadan Region**: Ol'sk District, Middle Chelomdzha River, 14.VII.1982 *Blagodatskikh s.n.* (LE); Ol'sk District, "Chelomdzha" Station, right bank of the river, spur of Khalkindzha Mt., eastern rocky slope of hill, in depressions between rocks. 14VII.1982 *Blagodatskikh s.n.* (LE); Ol'sk District, southern shore of Tjagin Peninsula, rocky slope of hill in upper part, in depression between rocks, 15.VIII.1978 *Blagodatskikh s.n.* (LE); Ten'kinsky District, Sabit-Taellakh Settl., vicinity of "Aborigen" Station, mountain of crushed rock in tundra on plateau, abundant among rocks, 14.VII.1976 *Blagodatskikh s.n.* (LE, 2 specimens); Ten'kinsky District, vicinity of Stokoviy Settl., rocky slope of hill, 1.VII.1973 *Blagodatskikh s.n.* (LE); same place, rocky northern slope of hill, among rocks, 22.VIII.1973 *Blagodatskikh s.n.* (LE).

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