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THE GENUS *SAUTERIA* NEES (CLEVEACEAE, MARCHANTIOPHYTA) IN RUSSIA

РЕВИЗИЯ РОДА *SAUTERIA* NEES (CLEVEACEAE, MARCHANTIOPHYTA) В РОССИИ

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Abstract

The genus *Sauteria* (Nees) Nees has been revised in Russia. All specimens of *Sauteria* from Russia are referred to *S. alpina*. Morphological description, ecology and a distribution map of the species are provided. Differences from similar species are discussed. Most features considered earlier as important for distinguishing species of *Sauteria* are shown to be highly variable and cannot be used as diagnostics in intrageneric systematics. *Sauteria japonica* (Shimizu & S. Hatt.) S. Hatt. is synonymized with *S. alpina* (Nees) Nees.

Резюме

Проведена ревизия рода *Sauteria* (Nees) Nees в России. Все изученные образцы этого рода с ее территории отнесены к *S. alpina.* Приводится подробное описание вида, отличие его от внешне похожих таксонов, рассматривается распространение и экология. Показано, что большинство признаков, ранее рассматривавшихся как диагностически важные для разграничения видов рода, очень вариабельны и не могут использоваться для внутриродовой систематики. *Sauteria japonica* (Shimizu & S. Hatt.) S. Hatt. синонимизирована с *S. alpina* (Nees) Nees.

KEYWORDS: *Sauteria*, liverworts, phytogeography, taxonomy

INTRODUCTION

The genus *Sauteria* Nees is one of the three long-established genera of the Cleveaceae (Marchantiopsida), together with *Athalamia* Falconer and *Peltolepis* Lindb. Recently the family has been strongly supported as monophyletic by molecular phylogenetic analysis (Rubasinghe, 2011; Rubasinghe *et al.*, 2011), with four main lineages resolved within the family: two corresponding to *Peltolepis* and *Sauteria* and two including polyphyletic *Athalamia*, which was divided by Rubasinghe *et al*. (2011) into *Athalamia* s.str. and *Clevea* Lindb. Since the original description of *Sauteria* in 1838 (Nees, 1838), numerous taxa have been defined. However, in the most recent worldwide revision of the Cleveaceae (Rubasinghe, 2011), only two species of *Sauteria* have been accepted: *S. alpina* (Nees) Nees and *S. spongiosa* (Kashyap) S. Hatt. No specimens from the European part of Russia were revised in that study. A few specimens of *Sauteria* originating from Siberia were referred to *S. spongiosa* (Rubasinghe, 2011). According to the checklist of hepatics of Russia (Konstantinova, Bakalin *et al*., 2009), two species of *Sauteria* were reported for Russia: *S. alpina* and *S. japonica* (Shimizu & S. Hatt.) S. Hatt. *Sauteria alpina* was recorded from many regions, including Siberia and Russian Far East (Konstantinova, Bakalin *et al*., 2009), whereas *S. japonica* was known from Sakhalinskaya Province only (Bakalin *et al*., 2009). In the course of the present study we revised 107 specimens of *Sauteria* from Russia preserved in KPABG (48), LE (23), VLA (10), and SYKO (26).

TAXONOMIC TREATMENT

Sauteria Nees, Naturg. Europ. Leberm. 4: 139. 1838. – *Hampea* Nees, Naturg. Europ. Leberm. 4: 139. 1838. – *Sauchia* Kashyap in Journ. Bambay Nat. Hist. Soc. 24: 347. 1916.

Type: *Lunularia alpina* Nees in Nees & Bisch., Flora (Regensburg) 13(2): 399. 1830.

Sauteria alpina (Nees) Nees, Naturg. Europ. Leberm. 4: 143. 1838. – *Lunularia alpina* Nees in Nees & Bisch. Flora 813(2): 399. 1830. – *Sauteria alpina* (Nees) Nees var. *angustifrons* Kaal. in Jørgensen, Bergens Mus. Skr. 16: 27. 1934. – *Sauchia japonica* Shimizu & S. Hatt., J. Hattori Bot. Lab. 9: 34. 1953. Syn. nov. – *Sauteria japonica* (Shimizu & S. Hatt.) S. Hatt. in Shimizu & Hattori, J. Hattori Bot. Lab. 12: 62. 1954. Syn. nov. – *Sauteria alpina* (Nees) Nees var. *japonica* Shimizu & S. Hatt., J. Hattori Bot. Lab. 12: 64. 1954. Syn. nov. – *Sauteria yatsuensis* S. Hatt. in Hattori & Shimizu, J. Hattori Bot. Lab. 14: 99. 1955. Figs. 1-4.

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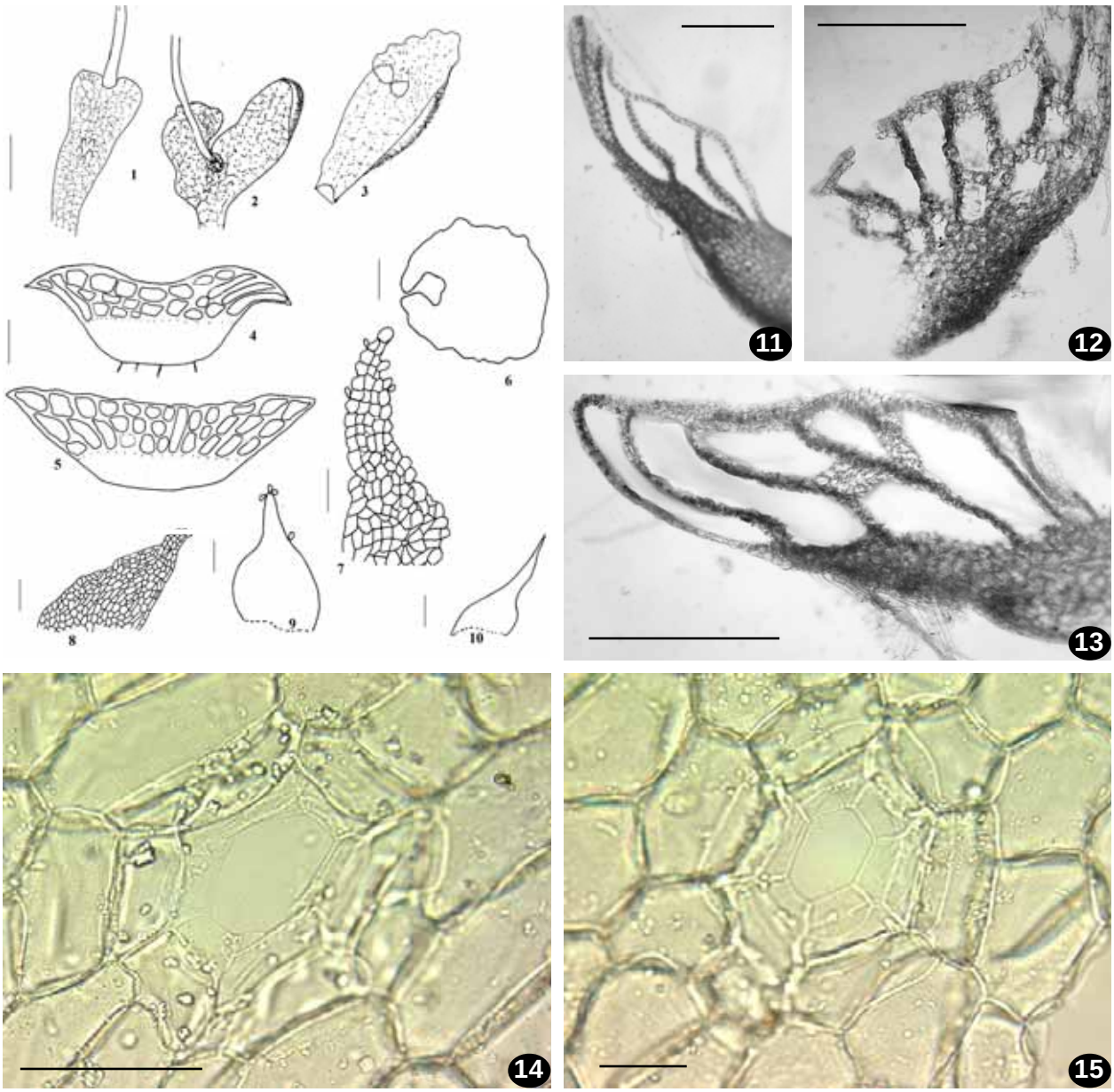

Fig. 1. *Sauteria alpina* (Nees) Nees (1-2, 5, 9 – from North Koryakiya, *Afonina*, KPABG #105883; 3, 7, 11-15 – from Republic of Komi, *Dulin*, SYKO, KPABG #121081; 4, 6 – from Nunligran, Chukotka *Afonina*, KPABG #114676; 8, 10 – from East of Kamchatka, *Bakalin*, KPABG #105195). 1-3 – thallus, dorsal view; 4-5, 11-13 – transverse sections of thallus in its middle part, except 11, which is made near base; 6 – transverse section of female receptacle stalk; 7-10 – ventral scales of thallus; 14-15 – air pores from dorsal epidermis of thallus. Scale bars: 3.5 mm for 1-3; 0.15 mm for 6; 300 μm for 4-5; 250 μm for 8-10; 200 μm for 7; 300 μm for 11-13; 50 μm for 14-15.

Illustrations: Shimizu & Hattori, 1953 (fig. 2, as *Sauchia japonica*), 1954 (fig. 13; fig. 14, 16 (A-H) as *Sauteria alpina* var. *japonica*); Hattori & Shimizu, 1955 (fig. 21); Schljakov, 1982 (fig. 37 (2 а-г), fig. 38 (2 а-з); Schuster, 1992 (p. 114, fig. 935); Damsholt, 2002 (p. 740, pl. 227); **Map:** Söderström, 1995 (p. 41 , map 310); Damsholt, 2002 (p. 742, fig. 294).

Exsiccatae: Schiffner, V. 1939. Hepaticae europaeae exsiccatae. Ser. XXIV, #1178-1180; Piippo, S. 1993. Hepaticae Exsiccatae S. O. Lindbergii. Fasc. I. #120.

Thalli prostrate, light to whitish or yellowish-green, without any trace of secondary pigmentation, (1-)3-5(-8) mm wide, (6-)9-14 mm long, rather fleshy to almost spongy or in basal parts almost flat, with air chambers convex and inflated, becoming more visible towards apex; sometimes dorsal epidermis destroyed with age and surface becoming lacunose with visible air-chambers; simple or sparingly dichotomously branched, sporadically with ventral branches, branches lingulate or ovate-lingulate with rounded or notched apex and slightly undulate margins. Rhizoids densely covering ventral surface of midrib of thallus, hyaline, smooth rhizoids 28-45 μm wide, pegged ones 16-30 μm wide. Dorsal epidermis delicate, hyaline, cells (25-)35-50 μm wide, (45-)50-80(-90)

Fig. 2. *Sauteria alpina* (Nees) Nees habit: 1 – plants without receptacles; 2 – plants with female receptacles.

μm long, with thin walls and small to conspicuous trigones; pores simple, slightly elevated above epidermis, stellate, surrounded by single ring of (4-)5-8(-9) cells with thickened radial walls or without thickened radial walls, but then in 1-2(-3) concentric rings of 5-8 cells in each. Midrib relatively ill-defined, thallus over midrib 550-1100 μm thick, aerenchyma well-developed, occupying 1/2-1/3 of the thallus height in the middle, air chambers without photosynthetic filaments, isodiametric ones 50-165 μm long, (50-)65-150 μm wide, elongated ones 70-150(-200) μm long, 50-130 μm wide, or narrow to canal-like, (120-) 150-350 μm long, 45-100 μm wide, in 1-4 layers, often one-layered and canal-like near the apex and 2-3(-4)-layered in the middle; ventral tissue consisting of small, thin walled cells (15-)20-35 μm, with solitary oil-cells, oil-bodies brownish to yellowish, 18×30 μm in diameter. Ventral scales shiny, hyaline to silvery white, usually irregularly scattered on ventral surface, often more conspicuous and large near apex, not projecting laterally or sometimes clearly projecting near thallus apex, asymmetrically ovate to triangular, 0.35-0.65(-0.9) mm long and (0.15-)0.2-0.6 mm wide, usually with an acute to acuminate poorly differentiated appendage and numerous marginal one-celled slime papillae; body cells of ventral scales thin-walled, hyaline, large, 55-95(-110) μm long and 40-60(-75) μm wide; with (0)2-6(-9) more or less isodiametric oil-cells 15-25(-28) μm in diameter, oil-bodies one per cell, yellowish to pale gray.

Sexual condition heteroicous. Androecia borne on both ventral branches and lateral branches or dorsally situated on leading thallus behind the female receptacle, ostioles from conical to finger-like, without scales. Gynoecia arising in apical notch of leading thallus, later becoming lateral; stalk of receptacle hyaline or greenish, smooth, (3-)5-15(-20) mm long, with single rhizoidal furrow. Archegonial scales at base of receptacle stalk absent or rare, at apex numerous, lanceolate to almost linear, hyaline, with many slime papillae; carpocephalum green to yellowish, cruciate to umbrella-shaped, disc convex, flat or concave medially, with (2-3-)4-6 relatively short lobes, each involucre with a single sporophyte. Capsule globose, brown to dull purplish, wall unistratose, cells of wall with annular to semiannular yellow-brown thickenings, foot bulbous, short.

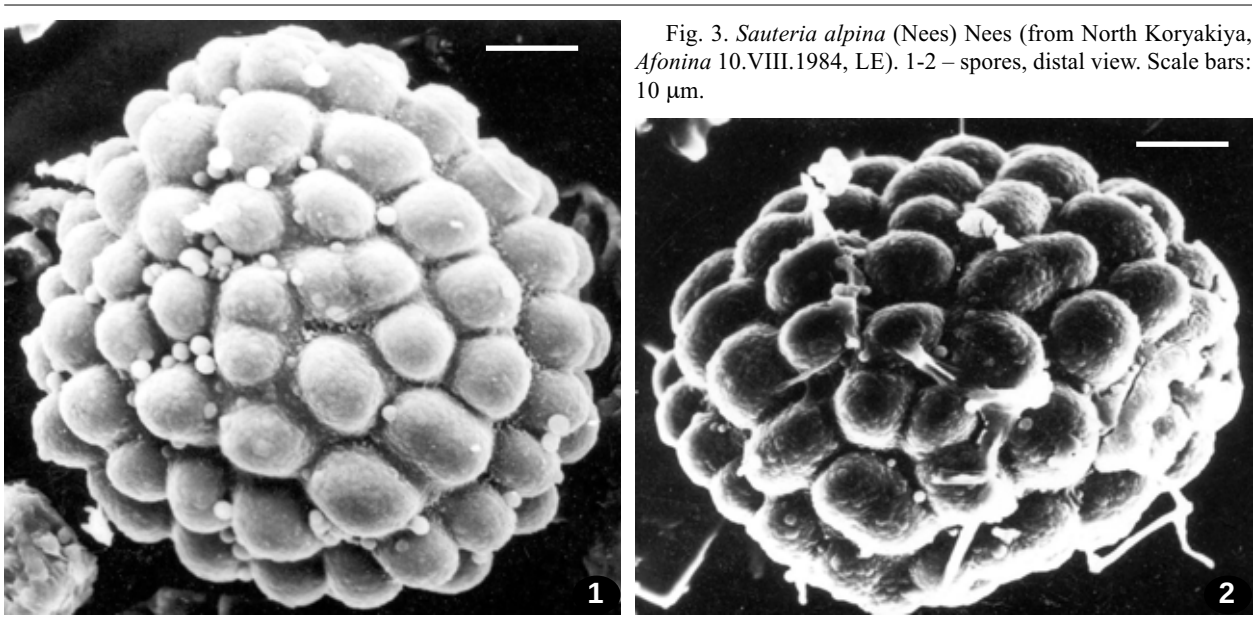

Fig. 3. *Sauteria alpina* (Nees) Nees (from North Koryakiya, *Afonina* 10.VIII.1984, LE). 1-2 – spores, distal view. Scale bars: 10 μm.

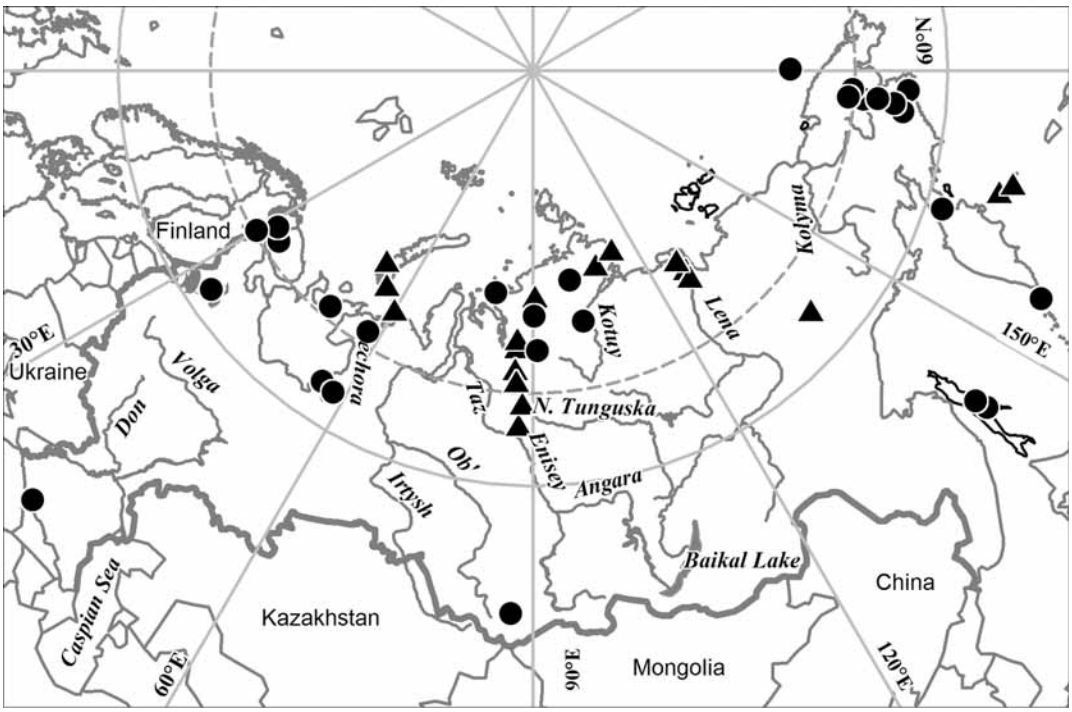

Fig. 4. Distribution of *Sauteria alpina* in Russia: circles – herbarium checked by authors; triangles – literature data.

Mature spores reddish-brown to deep brown, 54-78 µm, weakly tetrahedral; under SEM, distal side strongly convex, proximal side weakly convex; equatorial ridge and three-radiate scar well-expressed only for immature spores, with large hemispherical papillae 6-10 across each side; papillae often spirally arranged, having lumpy surface; distance between papillae decreasing along the spore maturation. Elaters brown, 2-4 spiral, (80-)120-280(-320) µm long, (8-)10-15(-18) µm wide.

Differentiation. Specimens of *Sauteria* without carpocephalum are most likely to be mistaken with species of other Cleveaceae genera and *Mannia triandra* (Scop.) Grolle. *Sauteria* differs from other members of Cleveaceae in: 1) lacking secondary pigmentation even in exposed sites, whereas even in green forms of *Clevea* and *Peltolepis* from shaded sites at least the bases of ventral scales are always colored light rose or red-purplish; 2) having fleshy or spongy texture of thallus at least near the apex contrary to the relatively thin, non-fleshy thalli of *Clevea* and *Peltolepis*; 3) having pulvinate dorsal surface with inflated air chambers versus a flat dorsal surface in *Clevea* and *Peltolepis.* In addition, *Sauteria* differs from *Clevea* by the terminal position of gynoecia and a single rhizoidal furrow of female receptacle, whereas *Clevea* has no rhizoidal furrow and its gynoecia are always dorsal. *Sauteria* differs from *Peltolepis* in the shape of androecia which in *Sauteria* are scattered along the thallus whereas in *Peltolepis* they form a compact disc surrounded by small red scales, and by single rhizoidal furrow of the female receptacle vs. two rhizoidal furrows in *Peltolepis*. Specimens of *Sauteria* with a lacunose dorsal surface may be confused with *Mannia triandra.* The latter differs from *Sauteria* in color of ventral scales, which are purplish, and in the discoid shape of androecia.

Variation of pore shape. Pores vary from stellate with strongly thickened walls of the surrounding pore cells and then consisting of a single row of cells, to rounded, without thickened walls of surrounding pore cells and then composed of 1-3 rows of cells. Earlier the pore complexity was considered as an important feature for intrageneric classification of *Sauteria* (Kashyap, 1929; Shimizu & Hattori, 1954; Hattori & Shimizu, 1955; Schuster, 1985, 1992). In most specimens studied by us both stellate and rounded pores are present even in one thallus. So this character cannot be used for distinguishing species of *Sauteria*, which has also been shown by Rubasinghe (2011).

Variation in layer number of air chambers. For a long time, the number of layers of air chambers has been regarded as a quite important feature for distinguishing not only species (Kashyap, 1929), but also the sections of *Sauteria* (Schuster, 1985). According to our data, the number of layers of air chambers in transverse section varies even within one thallus changing from 1-2 near the thallus apex to (1-)2-3(-4) in the middle and 1-2 again in the basal part. No differences were found in air chamber architecture between European and Asiatic specimens as well as between specimens collected in the Far North or in high mountains.

Variation in sexuality. Most authors state that *Sauteria alpina* is mostly paroicous and only rarely autoicous, whereas *S. spongiosa* and *S. japonica* are autoicous (Shimizu & Hattori, 1954; Hattori & Shimizu, 1955; Schuster, 1992; Damsholt, 2002). It is necessary to em-

phasize that in many cases only very limited material is available for study where either autoicous or paroicous thalli can be present. Studying the abundant material from Komi Republic and Svalbard we found that in most specimens both paroicous and autoicous plants were present. Moreover, paroicous thalli occur much more seldom than autoicous ones. In some cases several male branches were found near the female thalli. Careful observation shows that male and female branches are normally basally connected in rosettes and the pseudodioicous condition occurs only as a result of destruction of rosettes' basal parts. Similar pseudodioicous plants of *Sauteria alpina* were described by Schuster (1992) from Greenland.

Position of ostioles on the greatly reduced stalked ventral innovations is a feature considered by most authors (Shimizu & Hattori, 1954; Hattori & Shimizu, 1955; Schuster, 1992) as specific for *Sauteria spongiosa* and *S. japonica*. However, in the material from Svalbard and the Republic of Komi studied by us, slightly reduced male ventral branches were not rare in specimens identified as *S. alpina*. Female receptacles were always terminal. Sometimes the position of female receptacles appears to be dorsal just as in *Athalamia* s.l. But careful investigation shows that receptacles are dislocated laterally due to elongation of one of the "forked" branches.

Variation in structure of carpocephala. The structure of carpocephala was considered as an important feature for distinguishing between *Sauteria* species (Shimizu & Hattori, 1954; Hattori & Shimizu, 1955; Schuster, 1992). In particular, the degree of reduction of receptacle tissue and the disc shape were regarded as diagnostic features (Shimizu & Hattori, 1953, 1954; Schuster, 1992): *Sauteria alpina* has carpocephala with well-developed receptacular tissue with pores and air chambers, disc is convex. Both *Sauteria spongiosa* and *S. japonica* have carpocephala without receptacular tissue, but the latter differs from *S. spongiosa* in presence of some pores and chambers, disc is not convex, whereas *S. spongiosa* has carpocephala without pores and chambers, disc is flat. Recently it was shown that the shape of carpocephala is similar in two recognized species of *Sautera*, *S. alpina* and *S. spongiosa* (Rubasinghe, 2011). We found that presence of air chambers and pores in receptacular tissue, as well as the degree of reduction of receptacle tissue are highly variable characters even within one specimen. Thus, the structure of carpocephala cannot be used for distinguishing the species of *Sauteria*.

Ecology. The species grows obligatory on calcareous substrates. More often they occur along river banks where they grow on soil among rocks, on cliff ledges and rocks covered by soil, on bare loamy soil and on fine earth between boulders in rock fields, as well as in floodplain willow stands in areas with calcareous bedrock, in snow bed communities, on spots of bare loamy soil in "spotty" tundras, often hidden between mosses. In forest-tundra and taiga, the species occurs on loamy soil on calcareous, shaded and wet, mostly north-facing rock outcrops, and on bare loamy soil in stream valleys. Also it grows on north-facing slopes along the streams and around springs in limestone areas. Only once the species was collected in an anthropogenic site: on the soil covering industrial limestone at the edge of Petrozavodsk, where it was evidently introduced.

In mountains, *Sauteria alpina* is restricted to calcareous sites in subalpine and alpine zones where it occurs on fine earth, humus, loamy soil and among mosses on wet rock ledges, in rock cracks, and under rock on rock outcrops, on wet bare soil, on slopes adjacent to streams, on fine earth on the floor of large crevices, on moist sandy soil, and in deep cracks, and on ledges on moist rocks.

The species often grow as solitary thalli among bryophytes or forms more or less pure mats, often with an admixture of other hepatics. Totally 27 species were registered as associated with *Sauteria alpina* in studied specimens, the commonest are *Blepharostoma trichophyllum* (41), *Preissia quadrata* (21), *Aneura pinguis* (16), *Leiocolea gillmanii* (15), *Tritomaria quinquedentata* (14), *Peltolepis quadrata* (15), *Jungermannia polaris* (12), *J. borealis* (9), *Tritomaria scitula* (8), and *Odontoschisma macounii* (9).

Distribution. *Sauteria alpina* is an arctomontane circumpolar species, distributed mainly from tundra to north taiga zone and subalpine and alpine belts in the mountains of Eurasia and America. In Europe, the species occurs in Scandinavian countries (Norway, Sweden and Finland), in the mountains of Southern, Central and Eastern Europe: France, Austria, South Germany, Switzerland, Italy, Slovenia, Poland, Yugoslavia, Romania and Ukraine (Söderström *et al*., 2002), as well as in northern islands and archipelagos: Iceland (Söderström *et al*., 2002), Spitsbergen (Frisvoll & Elvebakk, 1996). In Asia outside of Russia, the species occurs in the Himalayas: India (Kashyap, 1929; Singh & Singh, 2009), Nepal (Grolle, 1966; Hattori, 1975), Pakistan (Furuki *et al*., 1993), China (Long, 2006; Wu & Wang, 2000), and the mountains of Japan (Shimizu & Hattori, 1954; Hattori & Shimizu, 1955). Recently *Sauteria alpina* was found in the mountains of Kazakhstan (Andrejeva & Borovichev, 2011b) and Mongolia (Andrejeva & Borovichev, 2011a). In North America, the species was reported from Alaska and British Columbia in the west and from Ellesmere Island to Quebeck in the east, as well as in the Greenland (Schuster, 1992).

In Russia, the species is known in the north of the European part, in Murmansk Province: the Khibiny Mts., Kutsa Area (Schljakov & Konstantinova, 1982) and the Salnye Mts. (Borovichev & Andrejeva, 2009); Republic of Karelia: only on anthropogenic site in Petrozavodsk (Borovichev, 2008), Nenetsky Autonomous District: North Timan (M.V. Dulin, SYKO); Arkhangelsk Province: Novaya Zemlya and Waigach Island (Arnell, 1947), Republic of Komi: Vorkuta (our data), valley of Upper Pechora River (Bezgodov *et al*., 2003; Dulin, 2007). In Asiatic Russia, the species occurs in Krasnoyarsk Terri-

tory: Taimyr Peninsula (Zhukova & Matveyeva, 2000; Andrejeva, 2009), valley of the Yenisei River (Lindberg & Arnell, 1889); Republic of Sakha (Yakutia): valley of the Lower Lena River (Konstantinova & Filin, 1998) and Suntar-Khayta (Sofronova, 2005); Chukotsky Autonomous District: Wrangel' Island (Afonina, 2000), valley of the Anadyr River (Afonina & Duda, 1993); Kamchatsky Territory: Northern Koryakiya (Konstantinova & Kuzmina, 2001), Northern and Easthern Kamchatka and Commander Islands (Bakalin, 2009); Sakhalinskaya Province: the Paramushir Island (Bakalin *et al*., 2005) and Sakhalin (Bakalin *et al*., 2009, as *Sauteria japonica*). Apart from northern areas, *Sauteria alpina* was found in several localities in the high mountains of the south: in one locality in Republic of Altai: the Altai Mts. (Andrejeva & Borovichev, 2011c) and in several localities in Republic of Adygeya on the Snegovalka Ridge (Konstatinova *et al*., 2009).

Selected specimens examined: ***Sauteria alpina*: AUSTRIA:** Tirol, VIII.1902, *Wettstein & Patzelt,* Schiffner, Hepaticae europaeae exsiccatae #1178 (TUR 035342); Nord Tirol IX.1902 *Freih & Handel-Mazzetti #1179,* V. Schiffner, Hepaticae europaeae exsiccatae (TUR 035340); **SWITZERLAND:** Kanton Bern, VIII.1904, 1906, 1908 *Culmann #1180,* V. Schiffner, Hepaticae europaeae exsiccatae (TUR 035341); **FINLAND:** Lapponia Enontekiensis, 22.VII.2006, *Syrjanen* (TUR 035341); **NORWAY:** Tromsø, VIII.1885, *Brotherus* (TUR 035339); Sør-Trøndelag, 20.VII.1882, *Lindberg & Rettig* (KPABG); Finnmark, 10.VIII.2011, *Borovichev* (KPABG #*114679*); **SVALBARD:** Is-fjord, 06.VIII.2009, *Davydov* (KPABG #*113225*); **MONGOLIA:** Khubusul'skij Disrict, 20.VIII.1902, *Elenkin* (KPABG #*114681*); **KAZAKHSTAN:** Kyzylordinsk Province, 22.V.1940, *Vel'tischev* (KPABG #*114677*); **NEPAL:** Penndang Karpo, 1.X.1986, *Miche* (JE); Mahalanguo Zwischen Thangpoch, 1962, *Poelt* (JE); **CHINA:** Tibet, 27.IX.1982, *Wang* (JE); ***Sauchia japonica*: JAPAN:** Honshu, Nagano-ken, Mts. Yatsu, 13.VIII.1952, *D. Shimizu #52794* (Holotype NICH); ***Sauteria alpina* Nees var. *japonica* Shimizu & S.Hatt.** [*Sauteria yatsuensis* S. Hatt.]**: JAPAN:** Honshu, Nagano-ken, Toyohiramura, Mt. Yatsu, 22.VIII.1953, *D. Shimizu #52828* (Holotype NICH).

RUSSIA: EUROPEAN ARCTIC**: Nenetsky Autonomous District:** North Timan, 23.VIII.2006, *Dulin* (SYKO); EAST SIBERIAN ARCTIC**: Krasnoyarsk Territory**, Byrranga Range 28.VII.2004, *Fedosov* (KPABG #*107962*); Dikson Isl., 25.VII.1996, *Gorcalova* (KPABG #*114665*); Putorana Plateau, 23.VII.1980, *Andrejeva* (KPABG #*114678*); Hatangskij District, 22.VII.1983, *Andrejeva* (KPABG #*114670*); BERINGIAN ARCTIC**: Chukotsky Autonomous District**, Wrangel' Isl., 10.VIII.1985, *Afonina* (KPABG; LE); **EUROPEAN RUSSIA: Murmansk Province:** valley of Kutsa River, 13.VII.1934, *Vaarama* (TUR 035337); Sal'nye Mts., 25.VII.2006, *Melekhin* (KPABG # *18368*); Khibiny Mts., 16.VIII.1973, *Konstantinova* (KPABG #*5626*); **Republic of Karelia:** Petrozavodsk, 15.VIII.2007, *Voronin* (KPABG #*112189*); **Republic of Komi:** Troitsko-Pecherskij District, 5.VII.1989, *Zheleznova* (SYKO); 23.VI.2001, *Dulin* (KPABG #*121081*; SYKO); Vorkuta, 28.VI.1978, *Andrejeva* (KPABG); CAUCASUS: **Republic of Adygeya:** Belaya River Basin, Snegovalka Ridge, 11.X.2009, *Konstantinova &, Savchenko* (KPABG #*113319, 113324*); SIBERIA**: Republic of Altai:** Altai Mts., Teletzkoe Lake, 7.IX.1931, *Schischkin* (KPABG #*114674, 114675*); FAR EAST**: Chukotka: Chukotsky Autonomous District**, Nunligran 1.VII.1970, *Afonina* (KPABG #*114676*); valley of Anadyr River, 10.VIII.1979, *Afonina* (LE), 24.VII.1980, *Afonina* (LE); Cape of Krause, 1.IX.1975, *Afonina* (LE); **Kamchatsky Territory:** Northern Koryakiya, 7.VIII.1984, *Afonina* (KPABG #*105883*; LE); 8.VII.1988, *Kuz'mina* (KPABG #*100069, 100245*); Northern Kamchatka, 11.VII.2003, *Bakalin* (KPABG #*105025*); Eastern Kamchatka, 24.VII.2003, *Bakalin* (KPABG #*105195*); **Sakhalinskaya Province:** Chamga Mt., 11.IX.2009, *Bakalin* (VLA; KPABG #*114672*); Vostochno-Sakhalinskiye Mts., 20.VI.2006, *Bakalin* (VLA; KPABG #*114671*).

DISCUSSION

In the recent worldwide revision of the Cleveaceae (Rubasinghe, 2011) two species of *Sauteria* were recognized: *S. alpina* and *S. spongiosa*. She emphasized (l.c., 151) "...after careful examination of other Japanese species [*Sauteria japonica*, *Sauteria yatsuensis*] they were identified as synonyms of *S. spongiosa*". For separating *Sauteria* species, the author (l.c.) proposed to use the position of androecia and texture of thallus: *S. alpina* is characterized by: (1) dorsal surface smooth, only older parts areolate, yellowish green, rarely whitish green, delicate and fine; (2) androecia behind archegonia or on a separate terminal branch, rarely on a ventral branch whereas *S. spongiosa* has (1) dorsal surface conspicuously areolate, areoles wide, whitish green rarely yellowish green, delicate and spongy; (2) androecia on reduced ventral branches, rarely behind archegoniophore.

According to Shimizu & Hattori (1953, 1954) and Schuster (1992), *Sauteria japonica* differs from *S. alpina* in (1) thallus with air chambers in two layers; (2) air pores with radial walls not thickened; (3) androecia with few antheridia, on greatly reduced stalked ventral innovations and (4) carpocephala without receptacular tissue, disc is not convex. Holotype of the *Sauteria japonica* (*Sauchia japonica*) (Shimizu, #52794 NICH) has almost flat thallus; (1-)2-3 air chambers in the middle part of thallus; air pores with slightly thickened radial walls; autoicous with ventral male branches but slightly reduced. In general it falls well into revealed infraspecific variability of *S. alpina.*

Sauteria japonica was recorded in Russia from Sakhalinskaya Province (Bakalin *et al.*, 2009). Plants from these specimens (Bakalin, ##114672, 114671,VLA, KPABG) have spongy texture, pores both with thickened radial walls and without thickened radial walls; 2-3 layers of air chambers in the middle part of thallus, male receptacle on ventral but not reduced branches, and carpocephala with discs both flat and convex medially. As it follows from our study, all above mentioned features are very variable and can be revealed in different combinations. Thus, we believe that the studied specimens of *Sauteria japonica* should be referred to *S. alpina*.

Rubasinghe (2011) studied six old Russian samples of *Sauteria* from the Yenisei and Lena Rivers and re-

ferred them to *S. spongiosa*. All studied by us specimens from Asian Russia, including those from the Yenisei River basin, are similar morphologically to the European specimens of *S. alpina*. Thus we see no evidence to segregate two taxa of *Sauteria* in Russia, and accept only one species, *S. alpina*.

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