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NOTES ON LOPHOZIA I. WHAT IS LOPHOZIA SILVICOLA BUCH VAR. GRANDIRETIS BUCH ET S. ARNELL (HEPATICAE: LOPHOZIACEAE)?

ЗАПИСКИ ПО РОДУ LOPHOZIA I. ЧТО ТАКОЕ LOPHOZIA SILVICOLA BUCH VAR. GRANDIRETIS BUCH ET S. ARNELL (HEPATICAE: LOPHOZIACEAE)?

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Abstract

Analyses of authentic specimens of *Lophozia silvicola* var. *grandiretis* Buch et S. Arnell, and comparisons with herbarium and living materials of *Lophozia savicziae* Schljak. have shown that these names are synonymous. This morphologically malleable taxon is characterized by biconcentric oil bodies, a feature it shares with few other Lophozias. Among these, it is most similar to *L. ventricosa s.str.*, but the two are differentiated by several morphological and ecological characters. Therefore, it is concluded that *L. savicziae* warrants recognition as a distinct species.

Резюме

На основании исследования типовых образцов *Lophozia silvicola* var. *grandiretis* Buch et S. Arnell и гербарного и живого материала *Lophozia savicziae* Schljak. показано, что эти названия являются синонимами. Приводятся доводы в пользу признания за таксоном видового статуса и закрепления за ним имени *L. savicziae*. Изучена морфологическая вариабельность на гербарном и живом материале, а также в ходе культивации растений в лаборатории в течение полугода. Непостоянство структуры и количества масляных телец, слабая дифференциация тканей стебля, а также дизъюнктивное распространение говорят о примитивности таксона. Вид приводится для северных территорий Старого и Нового (Гренландия) света.

HISTORICAL BACKGROUND

Lophozia silvicola var. *grandiretis* Buch et S. Arnell (=*L. ventricosa* var. *grandiretis* (Buch et S. Arnell) Schust. et Damsh.) was described on the basis of five specimens from Sweden and Norway. According to the original description, it differs from the type variety in larger cells and somewhat larger plants (Arnell, 1950). The structure of oil bodies of the var. *grandiretis* was not included in the original description, perhaps because they did not find them in the dried material. Subsequently, Schuster and Damsholt (1974) recorded additional specimens of this taxon from Greenland, as *L. ventricosa* var. *grandiretis*. They reported the oil bodies to be biconcentric, as in the var. *silvicola*, which they similarly treated as a variety of *L. ventricosa*. Twenty-five years later, the taxonomic position of the variety *grandiretis* is still poorly understood and it has been reported only from Sweden, Norway and Greenland.

Biconcentric oil bodies are unusual in the genus *Lophozia* s. str. Besides *L. silvicola* var. *grandiretis*, they are known for only a few species, including *L. ventricosa* (Dicks.) Dum. s. str. (=*L. silvicola* Buch), *L. silvicoloides* N. Kitag., *L. schusterana* Schljak. (=*L. groenlandica* sensu Schuster) and *L. savicziae* Schljak. Among these taxa, only *L. savicziae* and *L. silvicola* var. *grandiretis* have large cells.

Lophozia savicziae was described by Schljakov (1973) and placed in the Section *Heteromorpha* Schust. of *Lophozia s. str.*, presumably because of the broad ventral segment and relatively broad leaves. From other puzzling taxa of the same genus, Schljakov (1973) distinguished *L. savicziae* on the basis of unique rusty-brownish to orange-brownish pigmenta-

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Table 1. The main differences between *Lophozia savicziae* and *L. ventricosa* s.str.

Feature	*L. savicziae*	*L. ventricosa*
Plant pigmentation	reddish-yellow to rust and rust-brown, rarely green	dark-green to light-green and green-yellowish, rarely purplish to purple-brown
Width of ventral segment of stem	3-6 cells, rarely 2-4 cells in shaded place or in erect shoots	1-3 cells
Leaf shape	cupped, rounded to explanate rectangular (rarely)	rectangular and lingulate, explanate with lobes decurved away shoots
Width of midleaf cells	28-45 (48) μm, rarely 22-30 μm in plants from periodically moistened, well exposed places (then leaves always cupped)	18-28 (30) μm
Oil body structure[1]	(15)20-50 per cell, rounded, biconcentric to homogenous, 2-5 μm in diameter or shortly oblong	5-20 per cell, 3-6 μm in diameter or oblong 3-5x3, 5-6,5 μm, always biconcentric
Gemmae	mainly pentangular to polygonal, with protruding angles, sometimes stellate, 15-25x20-30(33) μm	mainly triangular and tetrangular, 15-27x13-22 μm, angles not or scarcely protruding, never stellate
Habitat	Mainly in montane tundra and forest-tundra, rarely in the forest zone, then on places with disturbed cover ground, as a rule	mainly in forests, on decaying woods, very rarely in tundra zone

tion; mainly pentagonal to polygonal, colourless to greenish gemmae; and the quantity and structure of oil bodies. The latter were reported to be small, 2-5 μm diameter, homogeneous to biconcentric and 15-30 or more per cell, or granulate, larger and less numerous (Schljakov 1973). However, the latter type of oil body appears to be erroneous for this species, because the specimen in KPABG (RS-60-75) annotated by Schljakov as having granulate oil bodies actually represents a mesotrophic phase of *L. wenzelii* (Nees) Steph.

The differences between *L. savicziae* and *L. silvicola* var. *grandiretis* can be derived from the original descriptions (Schljakov,1973; Arnell, 1950) as follows: the former has a broad ventral stem segment and cupped, broad leaves, whereas the latter has narrower, explanate leaves and narrow lateral segments. However, these features appear to be variable, possibly reflecting the ecological conditions of microhabitats and the distribution of shoots in tufts. The situation is further complicated by the fact that Schuster and Damsholt's (1974) interpretation of *L. ventricosa* var. *grandiretis* appears to match *L. savicziae*. They drew attention to cupped leaves as characteristic of *L. ventricosa* var. *grandiretis*.

The present study was undertaken to determine whether the differences between *L. savicziae* and *L. silvicola* var. *grandiretis* are environmentally induced or have a genetic basis, and ultimately, whether the variety *grandiretis* warrants taxonomic recognition.

MATERIAL AND METHODS

Type and other specimens of *L. silvicola* var. *grandiretis* were compared with specimens representative of the morphological variation of *L. savicziae*. Specimens of the former were borrowed from UPS, and of the latter from LE and KPABG. In addition, the morphological variability, including oil body structure, was studied in material cultivated in the laboratory for several species of *Lophozia*, including *L. savicziae, L. ventricosa, L. longiflora* (Nees) Schiffn., *L. wenzelii, L. sudetica* (Hueb.) Grolle and *L. rufescens* Schljak. Two populations of about 50 shoots each of all the above species were removed from their substrate and placed upon a damp sheet of paper in glass tubes. Every week a few drops of river water were added to each test-tube to keep the specimens moist. The specimens were cultivated over a six month period.

RESULTS AND DISCUSSION

The analyses of herbarium specimens and fresh material of *L. savicziae* reveals its extraordinary polymorphism.There are modifications with explanate and narrow leaves in shady places. The forms with cupped, wide leaves and rusty-brown to orange-brown pigmentation,

[1] – the data on the oil body structure and quantity are based on my studies of living material and also specimens in KRABG annotated as studied in fresh state with data on oil bodies (they are all cited).

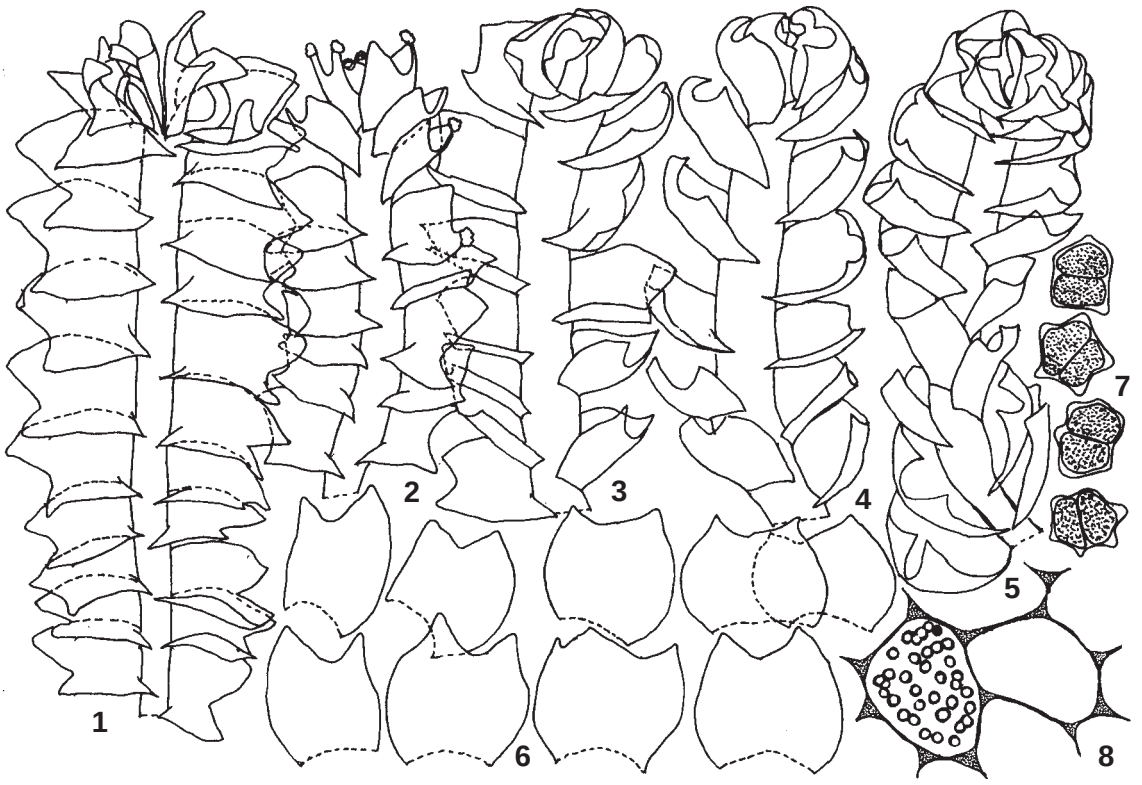

Рис. 1. *L. savicziae* Schljak. (1 – Швеция, лестотип *Lophozia ventricosa* var. *grandiretis,* Mårtensson 19.VII.1949 (UPS); 2-4, 6-8 – Мурманская обл., Бакалин (KPABG): 2 – VB-40-2-99, 3 – VB-40-3-99, 4 – VB-40-5-99, 6-8 – VB-40-4-99; 5 – Швеция, Arnell 5.VIII.1947 (UPS)): 1-5 – крайние побеги, x12; 6 – листья, x12; 7 – выводковые почки, x341; 8 – клетки, x341.

Fig. 1. *L. savicziae* Schljak. (1 – Sweden, lectotype of *Lophozia ventricosa* var. *grandiretis,* Mårtensson 19.VII.1949 (UPS); 2-4, 6-8 – Murmansk Prov., Bakalin (KPABG): 2 – VB-40-2-99, 3 – VB-40-3-99, 4 – VB-40-5-99, 6-8 – VB-40-4-99; 5 – Sweden, Arnell 5.VIII.1947 (UPS)): 1-5 – extreme shoots, x12; 6 – leaves, x12; 7 – gemmae, x341; 8 – cells, x341.

described and illustrated by Schljakov (1973, 1980), occur in permanently moist, well exposed places. In addition, bright coloured, microcellous, cupped leaf modifications occur in periodically moist, well exposed sites, as a rule with disturbed ground cover (Fig. 1) (= *L. savicziae* var. *pseudomurmanica* Schljak., see Schlajakov, 1976). Two authentic specimens of *L. silvicola* var. *grandiretis* represent two extreme forms of the variability that characterizes *L. savicziae*. The lectotype of var. *grandiretis* represents a modification with explanate and narrow leaves (Fig. 1, 1).

The cultivation experiment is continuing, but already preliminary data demonstrate that the structure of oil bodies is a constant feature for all species of *Lophozia* examined, except *L. savicziae*. In the latter, the ratio of biconcentric and homogeneous oil bodies was variable, although the proportion of biconcentric oil bodies never was less than 40% (VB-2-98; VB-5-98).

Thus, among the characters used to separate *L. savicziae* and *L. ventricosa* var. *grandiretis,* none are constant, so I consider the latter to be synonymous with *L. savicziae.*

Lophozia savicziae Schljak., Novosti Sist. Nizsh. Rast. 10: 299. 1973. (holotype: Murmansk Reg., Khibiny Mts., Vudyavrchorr Mt., 25.VII.1971 leg. R.N. Schljakov, LE) – *L. murmanica* sensu Schljak., Novosti Sist. Nizsh. Rast. 6: 244. 1969, non Kaal. 1906. *Lophozia silvicola* var. *grandiretis* Buch et S. Arnell, Sv. Bot. Tidskr. 44(1): 82. 1950, *syn. nov.* (Lectotype (selected here): Torne Lappmark, Pältsa-Området 19/7 1949 leg. Olle Mårtensson, UPS). – *L. ventricosa* var. *grandiretis* (Buch et S. Arnell) Schust. et Damsh., Meddel. om Grønl. 199: 118. 1974.

Note on the lectotypification: In the original description five specimens are listed, but none of these is cited as the holotype. At present, only two authentic specimens are found in UPS, and only one is annotated as "var. nov.". It

agrees well with the description in Swedish (the Latin diagnosis is very short), and is selected here as the lectotype.

Lophozia savicziae and *L. ventricosa s.str.* (=*L. silvicola* var. *silvicola* and *L. ventricosa* var. *silvicola*) can be separated consistently by a number of diagnostic features, as enumerated in Table 1. In addition, *L. savicziae* has a disjunct distribution in oroboreal and arctic areas of western Greenland, northern parts of Sweden and Norway, and northern regions of Russia, including Murmansk Province, the northern Ural Mountains, Yamal Peninsula, Severnaya Zemlya, Chukotka Peninsula and Koryakiya, while *L. ventricosa s.str.* is distributed in taiga and hemiboreal zones of the North Hemisphere.

The inconstancy of oil body structure and quantity, faint differentiation of tissue in stem cross sections, and the disjunct distribution suggest that *L. savicziae* is an ancient, primitive member of the genus that merits specific recognition.

SPECIMENS EXAMINED:

Most specimens were collected by N.A. Konstantinova, R.N. Schljakov, or the author, and these names are abbreviated as NK-, RS-, or VB- respectively. Their collections are in KPABG.

SWEDEN: **Torne Lappmark** Atjektjåkko, ca. 1200 m.s.m. leg S. Arnell 5.VIII.1947 (UPS); Karesuanda soken, Pältsa-området leg. O. Mårtensson 19.VII.1949 (UPS).

RUSSIA: **Murmansk Province** Khibiny Mts. NK-1-16.9.89, RS-60-75, RS-60-75, VB-1-98, VB-2-98, VB-3-98, VB-4-98, VB-5-98, VB-6-98, VB-7-98, VB-40-1-99, VB-40-2-99, VB-40-3-99, VB-40-4-99, VB-40-5-99, VB-40-6-99, VB-40-7-99, VB-40-8-99; Sal'nye Tundry NK-37/1-93, NK-38-93; Keyvy NK-65-2-97; Kovdor RS-74-77. **Yamal Peninsula** Kamennyy Cape leg. A.D. Potemkin 31.VII.88 (LE). **Chukotka Peninsula** Anadyr' Distr. leg. O.M. Afonina 7.VI.81. (LE).

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