LINDBERGIA 28: 75-79, Lund 2003

Notes on *Lophozia* II. On *Lophozia rufescens* Schljakov and *Lophozia sudetica* (Huebener) Grolle van *anomala* (Schljakov) Schljakov with notes on allied taxa

Vadim A. Bakalin

Bakalin, V.A. 2003. Notes on *Lophozia.* II. On *Lophozia rufescens* Schljakov and *Lophozia sudetica* (Huebener) Grolle var. *anomala* (Schljakov) Schljakov with notes on allied taxa. - Lindbergia 28: 75-79.

Analyses of authentic material of *Lophozia rufescens, L. sudetica* var. *anomala* and *L. wenzelii* var. *lapponica* have shown that (1) *L. rufescens* is synonymous with *L. sudetica* var. *anomala,* the correct name for the taxon, (2) *L. wenzelii* var. *lapponica* is a taxon within the variability of *L wenzelii* and is not connected with var. *anomala,* (3) as a result of subsequent misinterpretation some collections belonging to *L. wenzelii* were confused with *"L. rufescens".* Features differentiating *L. sudetica* var. *anomala* from *L. wenzelii* s.l. and other taxa of sect. *Sudeticae* are discussed.

V.A. Bakalin, Polar-Alpine Botanical Garden Institute, Kola Science Center of the Russian Academy of Sciences, Kirovsk-6, Murmansk Province 184256, Russia (v_bak@aprec.ru).

Schljakov (1974) described *Lophozia alpestris* auct. non (Schleich.) A.Evans var. *anomala* Schljakov from the region of Murmansk, NW Russia as a new variety. This variety is distinguished from var. *alpestris* by larger cells reaching 31-38 x 25-36 um (l x w) in the leaf middle and 22-28 um in the leaf margins. The size of the gemmae was reported as (18-)21-34x 15-25 um, i.e. larger than those of var. *alpestris.* Since, Grolle (1971) has shown, that the taxon traditionally named *Lophozia alpestris* (Schleich.) A. Evans must be called *L sudetica* (Huebener) Grolle, because the type of *Jungermannia alpestris* Schleich. ex F. Web. represents another species. Therefore a new combination, *Lophozia sudetica* (Huebener) Grolle var. *anomala* (Schljakov) Schljakov, was required (Schljakov 1976).

Four years later Schljakov (1980a) described *Lophozia rufescens* Schljakov and reported it to be allied to *L. sudetica* (Schljakov 1980b). His description mentioned the following diagnostic features of the new species: "larger cells of leaves, built into longitudinal rows from middle of leaf base to leaf sinus; leaves narrower, usually with acute lobes and deep sinus. Gemmae colourless to yellowish, yellow and rust-brown" (Schljakov 1980b). *Lophozia wenzelii* (Nees) Steph. var. *lapponica* H. Buch et S.W. Arnell was considered synonymous with *L. rufescens.* It was regarded as modification *laxifolia-angustifolia* with colourless gemmae and dentate-crenate gemmiparous leaves. So, the features distinguishing the *Lophozia rufescens* and *L. sudetica* var. *anomala* seem to be the shape of leaves, the direction of their cells rows, and the colourless gemmae, which supposedly occur sometimes in *L rufescens.*

Accepted 11 March 2002

Material and methods

I studied holotypes and isotypes of *Lophozia rufescens* and *L. sudetica* var. *anomala* from LE and KPABG, respectively, and 47 specimens of the two taxa from various origins, all kept in those herbaria. Moreover I studied authentic material of *L wenzelii* var. *lapponica* from UPS.

Results and discussion

The shape of leaves of *L. rufescens* corresponds with shady forms of *L. sudetica* var. *sudetica* - with relatively narrower leaves and acute lobes (Fig. 1:1,2). The shape of leaves of *L sudetica* var. *anomala* corresponds with that of mature, large-leaved forms of *L. sudetica* var. *sudetica* - with relatively wider leaves and obtuse lobes. Both taxa (L. *rufescens* and *L. sudetica* var. *anomala)* have leaves variable within the limits of *L. sudetica* var. *sudetica,* moreover, it was impossible to differentiate any fractions clearly. The sinus descends from 1/10 to 1/3 of leaf length and is U-, V-, or widely-y-shaped. Gemmiparous leaves have sharply-dentate to dentate-crenate margins.

Direction of the longitudinal rows of leaf cells was used as an important character in identification key of *Lophozia* species by Schljakov (1980b, p. 72). However, even he himself admitted a certain degree of instability of this feature (I.e.). Longitudinal rows directed to the sinus and those directed to the lobes can be found in leaves of a single shoot. Sometimes the cells are not arranged in any orderly way. In my opinion, these features are unstable and their usage in the systematic of *Lophozia* appears to be impossible.

The gemmae of the authentic specimens of *L. rufescens* are rusty brown, as in those of *L sudetica* var. *anomala,* and have similar size. As regard to the colourless or greenish gemmae which supposedly occur in *L. rufescens,* I discovered that all plants with such gemmae belong to other species (see below).

No morphological characters were found that can be used to separate *L. rufescens* from *L sudetica* var. *anomala,* and hence they are regarded as synonymous.

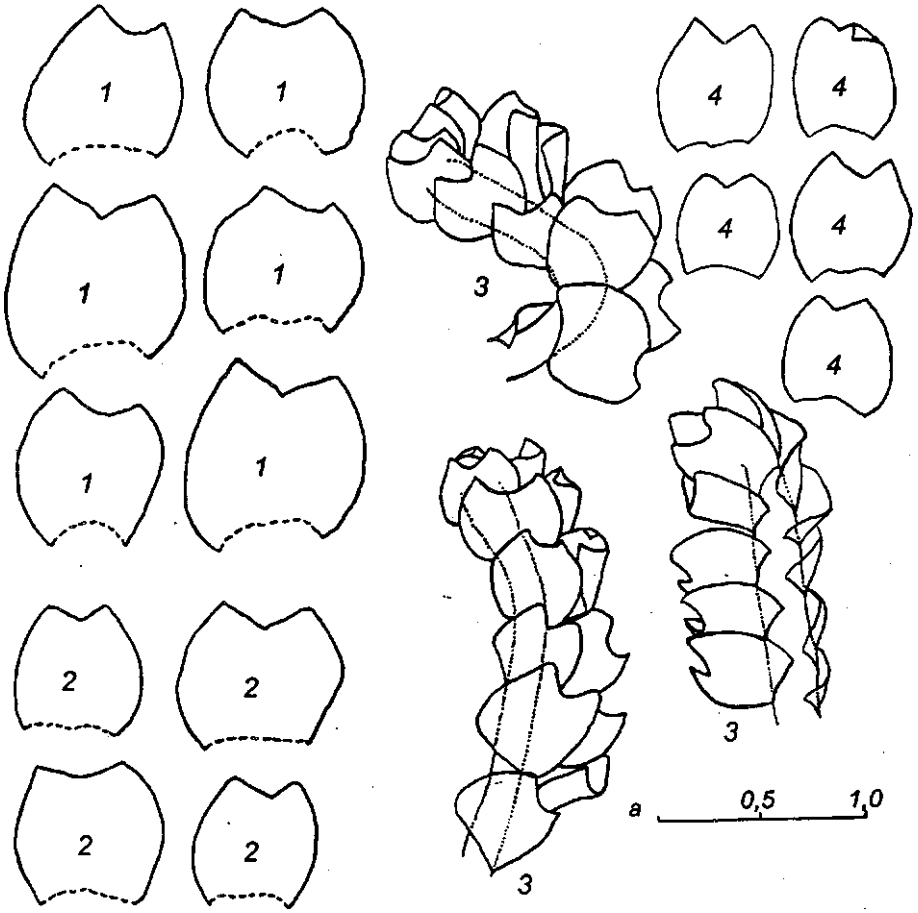

Fig. **1. 1** *Lophozia rufescens,* leaves (from Holotype - LE), 2 *Lophozia sudetica,* leaves from shady forms, 3**,4** *Lophozia wenzelii* var. *lapponica,* leaves and shoots (from lectotype - UPS).

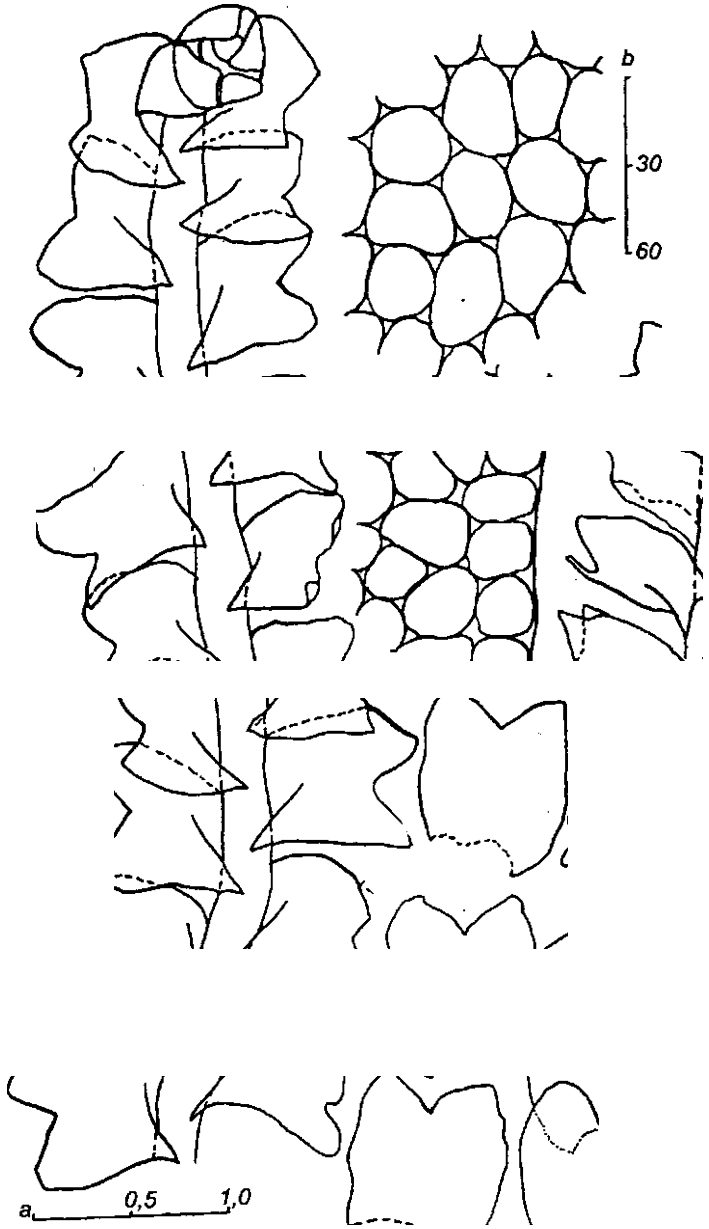

Fig. 2. *Lophozia sudetica* mod. *hoinalophylla.* Scales: a- for shoots and leaves; b- for cells.

Lophozia rufescens thus proves to be a later synonym of *L. sudetica* var. *anomala.* It seems to be unnecessary to distinguish this taxon at the species level from *L. sudetica* only on the basis of larger cells and gemmae, and the varietal rank is more suitable.

Lophozia sudetica (Huebener) Grolle var. *anomala* (Schljakov) Schljakov, Novosti Sist. Nizsh. Rast. 13:228.1976. -*Lophozia alpestris* auct. non (Schleich.) A. Evans var. *anomala* Schljakov, Novosti Sist. Nizsh. Rast. 11:352. 1974. - *Lophozia rufescens* Schljakov, Novosti Sist. Nizsh. Rast. 17:235. 1980. syn. nov.

Lophozia sudetica is an extremely polymorphous taxon and sometimes, I could distinguish var. *sudetica* from var. *anomala* only conditionally. Intermediate forms are common. In Karelia I collected plants with intermediate cell size that also have some unique features and look like *Obtusifolium obtusum* (Lindb.) S.W. Arnell. I regard these plants as mod. *homalophylla* only, because transitions to typical *"sudetica"*

were found in Lovosero Mts. A description of these plants follows:

Plants dark green independently of lighting conditions. Shoots 1-2 cm in length and 1,5 mm wide. Ventral part of stem dark brown to brown-purple. Leaves explanate, forming a "funnel" with stem in the base. Lobes obtuse. Sinus descending to 2/5 of leaf length, V- or (more frequently) y-shaped, margin of sinus deflexed away the stem. Cells 19-24um wide and 20-3Oцт long in the middle of the leaf. Oil-bodies 6-8 per cell, 4-6x5 -8 pm. Gemmae brown, small, sometimes absent, 1-2 celled, triangular to pentagonal, rarely polygonal, not stellate (Fig. 2). The plants look like *Obtusifolium obtusum* (Lindb.) S.W. Arnell because of the obliquely inserted leaves and the shape of their lobes.

Since the publication of *Lophozia rufescens* the taxonomic status of this taxon was unclear to many authors (e.g. Konstantinova and Potemkin, 1996, footnote 35, p. 140). Often some phases of *L wenzelii* were referred to this name. Consequently, the distribution of *Lophozia sudetica* var. *anomala* was indistinct and a study of all specimens cited in literature (determined as L. sudetica var. anomala and L. rufescens) is necessary for clarification.

Specimens examined

Generally, the specimens were collected by O.A. Belkina (abbreviated by OB-...), N.A. Konstantinova (abbreviated by NK-...), A.L. Likhachev (abbreviated by AL-...) and R.N. Schljakov (abbreviated by RS-...). Names of other collectors and collecting data are listed in full. All specimens from Murmansk Province are deposited in KPABG and their herbarium numbers are cited here and below.

SILESIA Monies Beskydy leg J. Duda 22.V.1956 (LE).

RUSSIA Karelia. Regio Kuusamoensis leg. V.A. Bakalin 06.VIII.1998. Murmansk Province. Kil'din Isl. RS-24-7-77; Ponoy RS-30-7-72; Teriberka riv. NK-433-77; Lavna-tundry NK-182-1-87; Lovosero Mts. AL-25-08-82, AL-73-31-82, OB-23-7-1982, OB-67-21-82. OB-73-39-82; Khibiny Mts. NK-1003-74, NK-1050-2-74, NK-1261-1-75, NK-27-3-89, NK-3-15-91, RS-137-74, RS-143A-66, RS-14-67, RS-148-74, RS-17-73, RS-19-6-74, RS-20-73, RS-25-8-64, RS-263A-66, RS-9-66, leg. M.L. Ramenskaya 30.VIII.69; Kutza Nat. Park RS-98-72. Komi Republic. Middle Timan leg. G V. Zheleznova 10. VII. 1974 (LE, as holotype of L. rufescens). Yakutia. Suntar-Khay ta. riv. Vostochny Khandysh leg. E. Safronova 14.VII.1998 (KPABG). Chukotka Peninsula. Penkeneyskaya bay leg. A.E. Katenin 10.VIII.1978 (KPABG)

In addition to the localities listed above, *Lophozia sudetica* var. *anomala* was reported from the lower flow of Lena river (Konstantinova and Filin 1998, as *"Lophozia rufescens")*. *"Lophozia rufescens"* was also reported from the Far East (Gambaryan 1993), but the specimen cannot be located now (Gambaryan 1998, pers. comm.).

Consequently, *L. sudetica* var. *anomala* seems to be a subarctic-montane eurasian taxon, but I believe, that this variety has a circumpolar distribution.

Relationships ofL. sudetica var. anomala

In 1980 Schljakov described as new *Lophozia* sect. *Sudeticae* Schljakov including *L sudetica, L wenzelii* (Nees) Steph., *L. schusteriana* Schljakov and *L rufescens.* It is an open question whether this group of species deserves recognition as a separate section, but it seems evident to me that the *sudetica-wenzelii* complex is an isolated group in the genus *Lophozia.* The main uniting features appear to be (Schljakov 1980a): "plants rigid, stems rigid, leaves commonly almost symmetrical, with shallow sinus".

As a result of morphological similarity *L sudetica* var. *anomala* was often confused with other taxa of section *Sudeticae.* The following specimens were incorrectly identified as *"L. rufescens"* in KPABG.

Lophozia sudetica var. *sudetica*

Leaves relatively narrow, lobes acute and longitudinal cell rows directed to sinus. The inconstant features discussed above seem to be the reason for misidentifications, but the small cells (18-21 urn wide in the middle of the leaf) refer the plants to *L. sudetica* var. *sudetica.*

Specimens examined. Russia, Murmansk Province, Khibiny Mts. AL-115-8-83, Lovosero Mts. OB-73-39-82, Teriberka river RS-506A-08-77.

Lophozia wenzelii

Lophozia wenzelii (Nees) Steph. As a result of Schljakov's (1980b) treatment of *L wenzelii* var. *lapponica* as a synonym of *L. rufescens,* some unusual forms of *L. wenzelii* were referred to *"L. rufescens".* I regard colourless to greenish gemmae as one of the main characteristic features of *L wenzelii* (versus *L sudetica s.l.).* I discovered plants with scarcely brownish gemmae in one gathering from Murmansk Province. The clusters of these gemmae were not decomposed by soaking. Subsequently I found that those masses were fastened together by hyphasma. It is possible that fun-

gal hyphae provoked development of unusual pigmentation. Besides, in *L wenzelii* from insolated places, a salmon-pink pigmentation of gemmae may sometimes occur (see also Schuster 1969, p. 613, footnote). In the absence of gemmae *L wenzelii* var. *wenzelii* may be distinguished by (1) almost subhorizontally inserted leaves, (2) absence of rusty pigmentation in shoots, (3) as a rule, by the presence of a well-differentiated, more intensely brown-coloured border on the margin of the leaf, and (4) by the leaves being widest above the middle.

Specimen examined. Russia, Murmansk Province, Lovosero Mts. OB-68-3-83.

Lophozia wenzelii var. *lapponica*

Schljakov (1980a) stated that *Lophozia wenzelii* var. *lapponica* should be referred to *L. rufescens* (see above). However, all the 13 type specimens cited in the protologue of the variety have colourless gemmae (Arnell 1950). Schljakov also found only colourless gemmae in those type specimens. I studied four authentic specimens of *L. wenzelii* var. *lapponica* gathered in Torne Lappmark, Sweden. Their shoots are green-yellowish, greenish-yellowish-brown to blackish-brown without rusty-brown pigmentation; the leaves are broad without reddish or purplish pigmentation in bases, the lobes obtuse to acute, gemmiparous leaves have partly denticulate to crenate margins; gemmae are always colourless. The plants look somewhat like *Lophozia savicziae* Schljakov by soft-structure and occasionally large cells, but the latter species has numerous biconcentric to homogeneous oil-bodies, reddish or purplish pigmentation in the base of leaves commonly, and larger shoots (0,6-2.0 mm vs 0,5-1.0 mm of var. *lapponica).*

I studied all samples of *L. sudetica* s.l. in LE and KPABG and did not discover a single plant with only colourless gemmae. So, var. *lapponica* is a taxon within the variability of *L. wenzelii* s.l., and it is not connected with *L sudetica* var. *anomala.*

Note on the lectotypification. In the protologue 13 specimens are listed, but none of these is cited as the holotype. At present, only four authentic specimens are found in UPS, and one agrees well with the description in Swedish (the latin diagnosis is very short), and is selected here as the lectotype.

Lectotypus (nov.) *Lophozia wenzelii* (Nees) Steph. var. *lapponica* H. Buch et S.W. Arnell TORNE LAPPMARK. Jukkasjarvi sn. Pa platan vid jokeln mellan Mesaktjakko och Noukustak 5.VIII. 1945 leg. O. Martensson. (transl: On the plateau at the glacier between Mesaktjaakko and Nuokustak.)

Acknowledgements -1 thank Prof. N. A. Konstantinova for some valuable comments. I am grateful to the curator of bryophyte herbarium of Uppsala University (UPS) for loan of authentic material of *L wenzelii* var. *lapponica.* This work was partly supported by the Russian Foundation for Basic Researches, grants 00-04-48874 and 01-04-06395.

References

Arnell, S. 1950. Tre nya storcelliga levermossvarieteter. - Svensk Bot. Tidskr. 44: 81-85 (in Swedish).

Bakalin, V.A. 1999. Liverworts of Karelia.-Arctoa 8: 17-26 (in russian).

Gambaryan, S.K. 1993. Hornworts and Liverworts of South Primorye (Russian Far East). - Vladivostok (in russian).

Grolle, R. 1971. Miscellanea hepaticologica. -Trans Brit. Bryol. Soc. 5: 111-120.

Konstantinova, N.A. and A.D. Potemkin 1996. Liverworts of the Russian Arctic: an annotated checklist and bibliography. - Arctoa 6: 125-150.

Schljakov, R.N. 1974. New taxa of genus *Lophozia* Dum. emend. Schljak. - Novosti Sist. Nizsh. Rast. 11: 350-354 (in russian).

Schljakov, R.N. 1976. New combinations and taxa of Anthocerotae and Hepaticae. - Novosti Sist. Nizsh. Rast. 13: 225-229 (in russian).

Schljakov, R.N. 1980a. Liverworts and Hornworts of the North of the USSR. Vol.3. - Leningrad, "Nauka" (in russian).

Schljakov, R.N. 1980b. New and interesting records of Hepatics from the northern regions of the USSR. - Novosti Sist. Nizsh. Rast. 17: 235-241 (in russian).

Schuster, R.M. and K. Damsholt 1974. The Hepaticae of West Greenland. - Meddel. om Gr0nl. 199: 1-374.

Schuster, R.M. 1969. The Hepaticae and Anthocerotae of North America east of the hundredth meridian. Vol. 2. - Columbia Univ. Press.