

LEJEUNEA ALASKANA (R.M. SCHUST. & STEERE) INOUE & STEERE,
A NEW SPECIES FOR THE RUSSIAN LIVERWORT FLORA

LEJEUNEA ALASKANA (R.M. SCHUST. & STEERE) INOUE & STEERE,
НОВЫЙ ВИД ДЛЯ ФЛОРЫ ПЕЧЕНОЧНИКОВ РОССИИ

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Abstract

Lejeunea alaskana (R.M. Schust. & Steere) Inoue & Steere is found for the first time in Russia. The record is quite expectable taking into account the species distribution in Alaska. In Russia the species grows on calcareous substrates in mountain tundra belt. The areas in North-East Asia where the species occurs were probably not totally glaciated in Pleistocene (Magadan Province, Kolyma Uplands). The species description and illustrations are given, along with the key to the *Lejeunea* species in the Russian Far East as well as some phytogeographical speculations are provided.

Резюме

Lejeunea alaskana (R.M. Schust. & Steere) Inoue & Steere приводится впервые для России. Учитывая имеющуюся информацию о его распространении на Аляске, нахождение вида в России было весьма ожидаемо. Вид встречен в горно-тундровом поясе, на богатых кальцием субстратах, в районах, вероятно, не затронутых покровным оледенением в плейстоцене (Магаданская область, Колымское нагорье). Приводятся морфологическое описание и иллюстрации *L. alaskana*, обсуждаются закономерности его распространения, а также дан ключ для определения видов рода *Lejeunea* на российском Дальнем Востоке.

KEYWORDS: Hepaticae, *Lejeunea*, North-East Asia, relict.

The genus *Lejeunea* is most diverse in tropical and subtropical zones, rarely descending to temperate and boreal ones with only a few isolated localities in Arctic and Subarctic. It included in Russia 4 species, if *L. ulicina* (Taylor) Gottsche, Lindenb. & Nees is regarded in a separate genus, *Microlejeunea ulicina* (Taylor) Steph. (cf. Konstantinova *et al.*, 2009). The distribution of *L. patens* Lindb. in Russia is restricted to Caucasus, while *L. otiana* S. Hatt. and *L. japonica* Mitt. occur only in the southern Russian Far East. One species, *L. cavifolia* has wider and more northern distribution; it is known in European Russia, Siberia, Caucasus, the Russian Far East, and extending to the North as far as to Kola Peninsula in Europe and the Arctic Yakutia in Asia (Konstantinova *et al.*, 2009). According to Mizutani (1961), *L. japonica* "may possibly be conspecific" with *L. cavifolia*. Our observations rather confirm this conclusion, since many intermediate plants occur in the southern Russian Far East. However the question is pending until the special study will be undertaken.

In the course of our studies of Kolyma Uplands in Magadan Province we collected one more species of this genus, *L. alaskana*, known up to now from Alaska only (Steere & Inoue, 1978).

The species was described as *Hygrolejeunea alaskana* by Schuster & Steere (1958) from two localities in Arctic Alaska and was placed in *Hygrolejeunea* based mostly on common presence of two innovations below gynoecia, versus commonly one in *Lejeunea*. Later Steere & Inoue (1978) found the species in many additional localities and revealed instability in number of innovations and concluded that the species fits better in *Lejeunea*.

The following description is based on collections from Magadan Province of Russia.

Lejeunea alaskana (R.M. Schust. & Steere) Inoue & Steere, J. Hattori Bot. Lab. 44: 330. 1978. – *Hygrolejeunea alaskana* R.M. Schust. & Steere, Bull. Torrey Bot. Club., 85: 190. 1958.

Plants 7-12×0.7-0.9 mm, prostrate to ascending, yellowish green to pale yellowish green. Stems usu-

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ally sparsely monopodially branched; in cross section ca. 0.11-0.12×0.10-0.11 mm; cortex cells in 7 rows, 32.5-50.0×20-25 µm, slightly thick-walled, yellowish green; inner cells smaller than cortical, 20-25×10-20 µm, in (12-)14-16 rows, thin-walled, trigones concave to rarely triangular, pale yellowish green. Rhizoids scarce. **Leaves** closely imbricate, obliquely spreading; keels 0.30-0.42 of lobe length, strongly arched, ca. 50-70° with stem axis at the base and up to 5-30° at the end; **lobes** obliquely ovate-oblong, strongly convex, 0.65-0.80×0.45-0.55 mm, margin entire, apex broadly rounded, deflexed, 40-50° with stem axis, dorsal margin subcordate at base, extending across and shortly beyond the stem, postical margin strongly arched, falcate; **lobules** strongly inflated, ovate-oblong, 0.15-0.18×0.20-0.25 mm, 0.30-0.42 of lobe length, free margin strongly involute, apex constricted, 40-45° with stem axis, first tooth subacute, indistinct, second tooth almost disappearing, as hyaline papilla on the proximal side of first tooth. **Cells** in the lobe middle polygonal, 30.0-37.5×20-25 µm, slightly thick-walled, trigones concave, intermediate thickenings distinct to indistinct; cells near apex subquadrate to rectangulate, thin-walled, 17.5-22.5×12.5-25.0 µm, trigones concave; cells at the base 37.5-47.5×25-30 µm; cuticle smooth. **Underleaves** contiguous to imbricate, broadly ovate to orbicular, cordate at base, 4-5 times as wide as stem, 0.40-0.45×0.45-0.50 mm, 2-lobed for 0.3-0.4 of the underleaf length, lobe triangular, acute, 8-10 cells wide at base, margin entire, sinus acute. [**Oil bodies** several per cells, ca. 8.0 µm long, homogeneous. Sexual condition autoicous. **Androecia** intercalary; bracts in 3-5 pairs, subequally bilobed, strongly concave; bracteoles suborbicular, 2-lobed for ca. 0.25 of the bracteole length. **Gynoecia** terminal on elongate branch, usually with 2 subfloral innovations; bracts lobe oblong-obovate to elliptical, margin entire, apex rounded 0.65-0.68×0.36-0.45 mm; bracts lobule lingulate to narrowly oblong, apex rounded, 0.43-0.46×0.10-0.18 mm; bracteoles oblong-ovate to oblong-obovate, 0.57-0.60×0.46-0.45 mm, 2-lobed for ca. 0.20-0.33 of the bracteole length. **Perianth** clavate-obovate, scarcely compressed, 5-keeled, smooth (Schuster & Steere, 1958).]

Specimens examined: RUSSIAN FAR EAST: **Magadan Province:** Ol'skoye Basalt Plateau westward of Skif Mt. (60°38'58"N 151°21'39"E), 1580 m alt., 8 August 2011, *V.A. Bakalin & S.S. Choi* #R6188, *Mag-52-11-11* (VBGI; JNU); Omsukchan District, Kilganskiye Gory Range, Mt. Evgeniya (61°11'43"N 153°58'53"E), 1400 m alt., 9 August 2012, *V.A. Bakalin & A.V. Ermolenko* #Mag-28-25-12, *Mag-28-28-12* (VBGI).

The species was collected in two quite different habitats. In the Ol'skoye Basalt Plateau it grows as small admixture among and over moss patches in the dwarf shrub-moss tundra with the active solifluction processes.

In Kilganskiye Gory Range it was collected in tundra belt in well insulated moist cliff crevice. In Arctic Alaska the species was reported in "on sedge tussocks, or moist to wet somewhat calcareous soil, more rarely on wet rocks" (Steere & Inoue, 1978: 330).

A remarkable feature of *L. alaskana* ecology is the tendency to occupy calcareous or at least basic substrates. This feature is uncommon for *Lejeunea* species that prefer acidic habitats (Frey & Stech, 2009).

Lejeunea alaskana distribution notoriously differs from the general pattern of the genus, which is the most diverse in tropic and subtropic zones, rarely descending to temperate and boreal ones with only a few isolated localities of *L. cavifolia* and *L. alaskana* in Arctic and Hemi-arctic (Frey & Stech, 2009). Both Schuster & Steere (1958) and Steere & Inoue (1978) stressed that this species has the relict distribution restricted to areas unglaciated during the Pleistocene. Both authors also listed the species, which commonly grow together with *L. alaskana* and may tentatively be regarded as preglacial relics. From this list, *F. nisquallensis* Sull., *Scapania simmonsii* Bryhn et Kaal. and *Radula proliferata* Arnell were collected near localities of *L. alaskana* in Magadan Province. Seems in Russia these species can be considered as occurring in regions that presumably escaped Pleistocene glaciation.

The question of presence of glaciers in the Ol'skoye Basalt Plateau remains disputable (Chanyshva & Bredikhin, 1981). However in Kilganskiye Gory Range, the second area where *L. alaskana* has been found, the glaciation was most probably of the mountain-valley or netted type, admitting the presence of ice-free habitats (Chanyshva & Bredikhin, 1981). Pleistocene stage of the geological history in both areas is characterized by a rather high tectonic activity, blocks risings and heavy denudation processes (Rauzer *et al.*, 1978-1983). This instability of habitats is rather in favor the explanation the present distribution of *L. alaskana* as well as associated species of *Frullania*, *Radula*, *etc.*, by similarity in ecology, not an evidence of survival in highly isolated nunataks. In any case, we expect that some additional localities will be found for this species in the course of the future liverwort studies in North-East Asia.

Lejeunea alaskana can be easily identified in the field by strongly convex lobe with broadly deflexed apex and very large underleaves (ca. 0.5-0.7 of the lobe area, though "appearing greater due to deflexed-involute apices of the [lobe]" (Schuster & Steere, 1958: 192).

Below we provide an identification key to the *Lejeunea* in the Russian Far East based mostly on vegetative characters.

KEY TO THE *LEJEUNEA* SPECIES IN RUSSIAN FAR EAST

1. The first tooth of the leaf lobule ca. 3-4 cells long and 2 cells wide [South Kurils] *L. otiana*

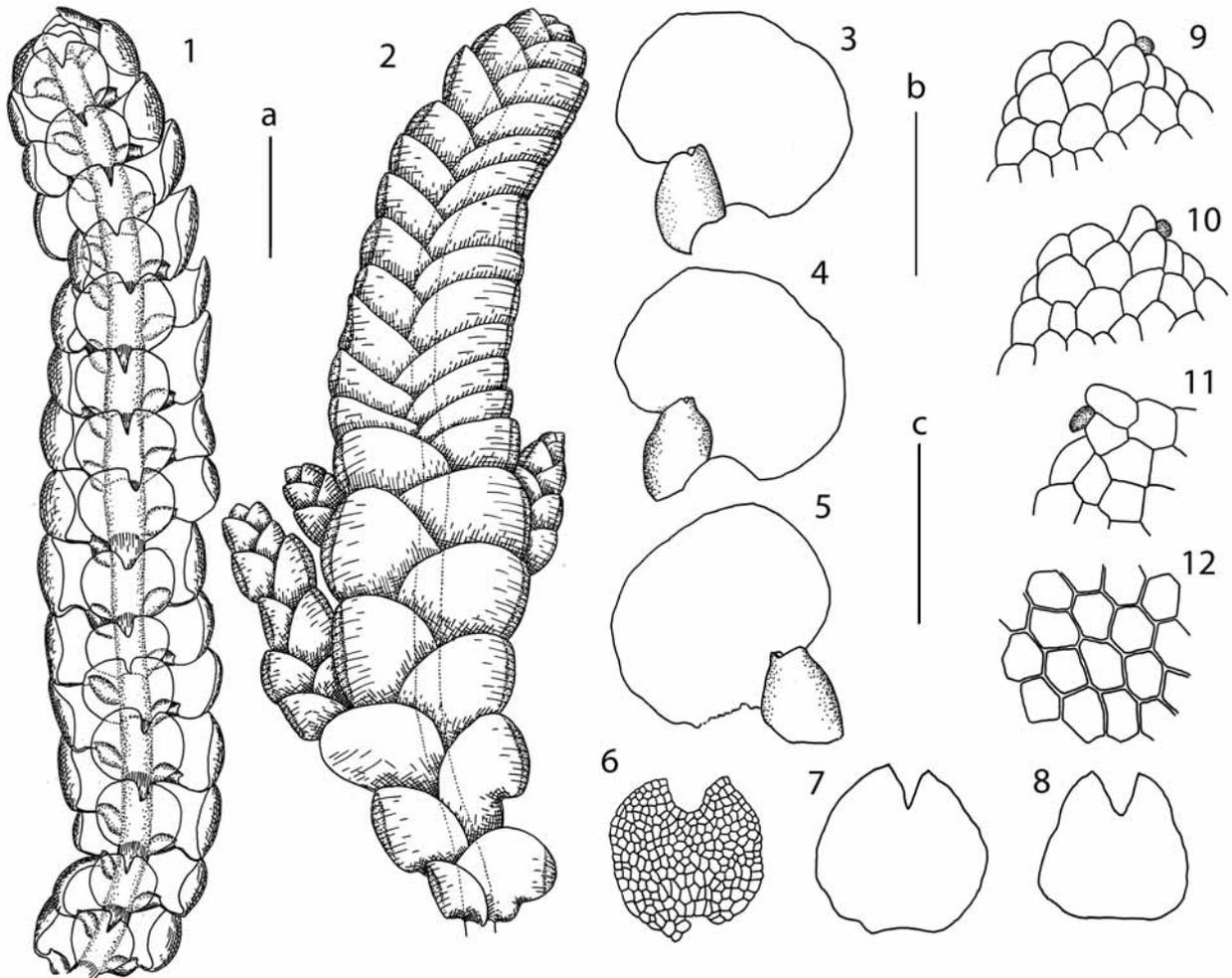


Fig. 1. *Lejeunea alaskana* (R.M. Schust. & Steere) Inoue & Steere (from: Russia, Magadan Province, Omsukchan District, Kilganskiye Gory Range, Bakalin & Ermolenko #Mag-28-25-12, VBG1). 1 – habit, ventral view; 2 – habit, dorsal view; 3-5 – leaves, ventral view; 6-9 – underleaves; 9-11 – apical part of leaf lobule; 12 – midleaf cells. Scale bars: a – 500 µm, for 1, 2; b – 500 µm, for 3-8; c – 100 µm, for 9-12.

- The first tooth of the lobule reduced, with only one projecting cell, sometimes as a slime papilla only . 2
- 2. Plants less than 1.0 mm wide; leaf lobes strongly convex, with broadly deflexed apex; underleaves 0.5-0.7 of leaf lobe size [Magadan Province] *L. alaskana*
- Plants wider than 1.0 mm; leaf lobes not strongly convex, apex laterally spreading, not deflexed; underleaves less than 0.4 of leaf lobe size [southward of 55°N in the Russian Far East] 3
- 3. Underleaves wider than long *L. japonica*
- Underleaves longer than wide *L. cavifolia*

ACKNOWLEDGEMENTS

We are cordially grateful to Mr. M.A. Bakalin for preparation of line drawings for the present account as well as to Mr. V.A. Ermolenko for the help with literature on geology of the area. The present study was partially supported by the Russian Foundation for Basic Researches (10-04-00050, 12-04-91150-ГФЕН).

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