

THE STATUS AND TREATMENT OF THE GENUS *HATTORIELLA* (H. INOUE) H. INOUE

СТАТУС И ТРАКТОВКА РОДА *HATTORIELLA* (H. INOUE) H. INOUE

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Abstract

The morphology and taxonomic status of the genus *Hattoriella* (H. Inoue) H. Inoue is discussed. It is concluded that *Hattoriella* is a well defined taxon which merits generic status. Two new combinations – *Hattoriella morrisoncola* (Horikawa) Bakalin comb. nov. and *H. subcrispa* (Herzog) Bakalin comb. nov. are presented. *Hattoriella* includes two species: *H. morrisoncola* and *H. subcrispa*. It is shown that “*Lophozia subcrispa*” Herzog should be placed in the genus *Hattoriella* rather than in *Lophozia* (Dumort.) Dumort. s. str. The distribution of *H. morrisoncola* appears to be temperate East Asiatic with a more or less noticeable pacific tendency. To date this species has been found in Japan, Taiwan, Southwest China, Bhutan and Russia (Baikal Area). *Hattoriella subcrispa* is known from Sumatra only. *Leiocolea (Hattoriella) kateninii* Schljakov is synonymized with *Leiocolea badensis* (Gottsche) Jörg.

Резюме

Обсуждается морфология и таксономический статус рода *Hattoriella* (H. Inoue) H. Inoue. Делается заключение, что *Hattoriella* является хорошо отграниченным таксоном заслуживающим ранга рода. Предлагается две новые комбинации *Hattoriella morrisoncola* (Horikawa) Bakalin comb. nov. и *H. subcrispa* (Herzog) Bakalin comb. nov. Показано, что род *Hattoriella* включает два вида: *H. morrisoncola* и *H. subcrispa*, а также, что “*Lophozia subcrispa*” Herzog должна включаться в род *Hattoriella*, а не в *Lophozia* (Dumort.) Dumort. s. str., куда она помещалась ранее. Показано, что *H. morrisoncola*, по-видимому, имеет неморальное восточно-азиатское распространение и в настоящее время известна из Японии, Тайваня, юго-западного Китая, Бутана и России (район оз. Байкал). *Hattoriella subcrispa* известна только из типового нахождения – о. Суматра. *Leiocolea (Hattoriella) kateninii* Schljakov должна рассматриваться в качестве синонима *Leiocolea badensis* (Gottsche) Jürg.

INTRODUCTION

Plants collected by the author, in 1999, near Lake Baikal (South Siberia, Russia) were placed in the genus *Hattoriella* (H. Inoue) H. Inoue, family Lophoziaaceae due to their characteristic leaf shape and coloration, as well as the structure of their perianth and androecium. Specimens of *Leiocolea (Hattoriella) kateninii* Schljakov were collected in 2000 (also by the author), in the northwestern Amur Province of Russia. The holotype of *Lophozia subcrispa* Herzog (Sumatra) was examined in 2001. This specimen agrees with *Hattoriella* by appearance and some morphological features. The status of *Hattoriella* and related taxa is discussed below.

THE STATUS OF *HATTORIELLA* –
A HISTORICAL PERSPECTIVE

In 1957 H. Inoue proposed a new monotypic subgenus *Hattoriella* H. Inoue in the genus *Lophozia* (Dumort.) Dumort. to include *Lophozia diversiloba* Hatt. Later, in 1960, he elevated this subgenus to a separate genus *Hattoriella* (H. Inoue) H. Inoue to include *H. diversiloba* (Hatt.) H. Inoue and *H. mayebarae* (Hatt.) H. Inoue (Inoue, 1960). However Kitagawa (1966) treated both taxa as species of *Lophozia* subg. *Leiocolea* Müll. Frib. He also proposed that *L. mayebarae* was “most closely related to *L. turbinata* (Raddi) Steph. and *L. badensis*”, and not to *L. diversiloba*. Later, Schljakov treated *Hattoriella* as a separate

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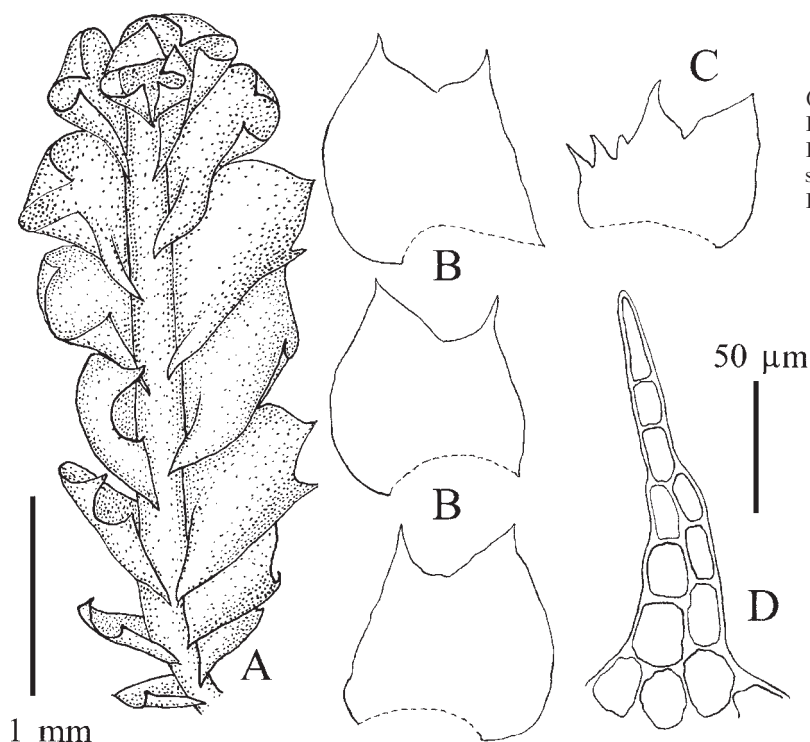


Fig. 1. *Hattoriella morrisoncola* (Horikawa) Bakalin (from Russia, Baikal Area, leg. 9.VIII.1999 Bakalin, KPABG): A – Plant habit; B – sterile leaves; C – antheridial bract; D – ending of lobe of sterile leaf.

subgenus of *Leiocolea* (Müll.Frib.) H. Buch. In 1978 he proposed a new combination *Leiocolea* subg. *Hattoriella* (H. Inoue) Schljakov and included in this taxon *Leiocolea* (*Hattoriella*) *kateninii* Schljakov, described (l.c., p. 244) from Chukotka Peninsula (northeastern Russia). This position was repeated by him in 1980. Kitagawa (1981) synonymised *Lophozia diversiloba* with *L. morrisoncola* Horikawa, with the latter as the priority name. But, Kitagawa's paper remained apparently unknown. Recently this species was reported as *L. diversiloba* from Bhutan (Grolle & Long, 1990), Altai Mts (southern Siberia; Váňa & Ignatov, 1995) and southwestern China (Jun & Tong, 2001).

Lophozia subg. *Hattoriella* (and later *Hattoriella* as the separate genus) was established by Inoue (Inoue, 1957, 1960; Kitagawa, 1966) based on a complex of features, some of which are shared by *Lophozia* s. str., *Orthocaulis* H. Buch, and *Leiocolea*. *Hattoriella diversiloba* shows some affinity (concerning listed authors, l. c.) to *Lophozia* s. str. in the following characters: dorsally secund leaves, slightly obliquely inserted leaves, more or less ascending mode of growth, absence of underleaves and weakly plicate perianth lacking a

beaked mouth. Similarly *Hattoriella diversiloba* shows some affinity to *Orthocaulis* due to its 3-lobed leaves, dentate female bracts, and the presence of paraphyses, and to *Leiocolea* in the brownish color of plants, the few large oil-bodies, the rather uniform cells of the stem tissue and the verrucose cuticle. It can be noticed that the listed features show some affinity not only to *Leiocolea*, *Orthocaulis* and *Lophozia* s. str., but also to *Isopachys* H. Buch (uniform cells of the stem tissue, mode of growth, absence of underleaves, etc.), and *Barbilophozia* Loeske (brownish color of plants, the few large oil-bodies, etc.). Some of these cited traits may be found in all (or almost all) genera of Lophoziaceae (e.g. the rather uniform cells of the stem, the absence of underleaves and the verrucose cuticle), and therefore the genera of *Lophozia* s.l. are best separated on the base of a complex of features. The diagnostic features of *Hattoriella* and some related genera are given in Table 1.

K. Müller (1910) suggested that the most important feature of *Leiocolea* was the beaked perianth mouth, but Kitagawa (1966) showed that some Japanese species of *Leiocolea* (*Lophozia* subg. *Leiocolea* by Kitagawa) such as *L. chichibuensis* H. Inoue lack the "beak" on

perianth mouth. Therefore the “perianth by itself is not always reliable for discriminating *Leiocolea* from *Lophozia*” (l. c., p. 101). On this basis Kitagawa suggested that *Leiocolea* represented only a subgenus rather than a genus. However, on the basis of other features Buch (1933), Schljakov (1980), J. Paton (1999) confirmed the generic status of *Leiocolea*.

Indeed, the perianth structure of some species of *Hattoriella* closely resembles that of some species of *Leiocolea* (*L. badensis*, *L. chichi-buensis*, *L. mayebarae*), but there are other striking traits differentiating *Hattoriella* from *Leiocolea*. These features are as follows: (1) 3-5-lobate, frequently dentate male bracts versus bilobate (with the exception of *L. fitzgeraldiae* Paton et A. R. Perry, having intermediate position); (2) presence of paraphyses (with the exception *L. rutheana* and *L. collaris*); (3) numerous tawny rhizoids in tufts under stem; (4) almost constant absence of underleaves (if present then solitary and lanceolate, versus more or less regular in most species); (5) moderately obliquely inserted leaves versus almost horizontally inserted; (6) scarcely papillose to smooth leaf cuticle versus striate-verrucose in most species. Therefore it is proposed that *Hattoriella* merits generic status (Fig. 1). (Note that although morphologically *Leiocolea badensis* appears similar to *Hattoriella*, the affinity is superficial. The problem of defining *L. badensis* is discussed below.)

A new combination for *Lophozia morrisoncola* is therefore needed.

Hattoriella morrisoncola (Horikawa) Bakalin, comb. nov. – Basionym: *Lophozia morrisoncola* Horikawa 1934. J. Sci. Hiroshima Univ. Ser. B. Div. 2, Bot. 2:150. Type from Taiwan: «Formosa: Mt. Morrison (Tataka-Niitakashita), prov. Tainan (Y. Horikawa, n. 11305, Aug. 1932)» (not seen).

The variable number of leaf lobes, the dioicous condition, the presence of paraphyses and the disjunctive distribution suggest that *Hattoriella* is an ancient, more or less primitive member of *Lophozia* s.l. complex.

THE DISTRIBUTION OF *HATTORIELLA MORRISONCOLA*

For fifteen years it was believed that this species was restricted to Taiwan (*Lophozia morrisoncola* as endemic to Taiwan) and Japan (*Hattoriella diversiloba* as endemic to Japan,

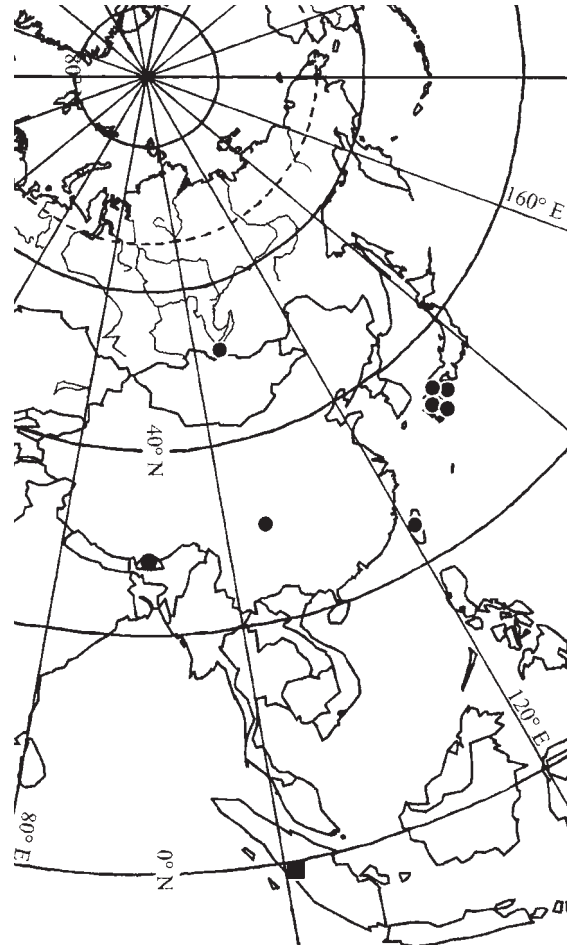


Fig. 2. The distribution for *Hattoriella morrisoncola* (Horikawa) Bakalin (circles) and *H. subcrispa* (Herzog) Bakalin (square).

see Kitagawa, 1966). However, in 1990 it was found in Bhutan (Long & Grolle, 1990), in 1995 in Altai Mts. (Vána & Ignatov, 1995, as *Lophozia* cf. *diversiloba*). In 1999 this species was collected by the author from the Lake Baikal area, South Siberia (Khamar-Daban Range, Sludyanyaya River, 15 km up stream from its mouth, limestone cliffs shaded by *Abies*. 600 m alt. leg. 9 August 1999; plants with perianths and antheridia). In 2001 it was reported for Southwest China (Jun & Tong, 2001).

In 2001 specimens from Altai Mountains were examined by the author (N. 15/50; 15/96; “Kairu Creek, 8 km upstream 1000 m” leg. M.S. Ignatov, loaned by Prof. J. Vána) and reidentified as *Leiocolea gillmannii* (Austin) Evans, a species not closely related to *Hattoriella morrisoncola*. The plants in the specimen are monoicous

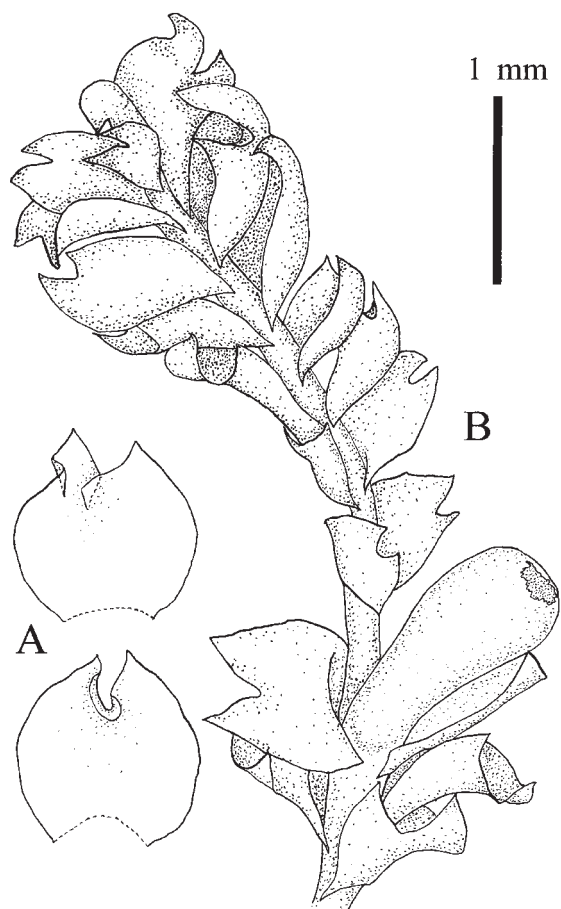


Fig. 3. *Hattoriella subcrispa* (Horikawa) Bakalin (from the holotype, JE): A – sterile leaves; B – plant habit.

(parocious), with beaked perianths and obtuse, bilobate male bracts. The single feature of plants from this Altaian «*Lophozia cf. diversiloba*» specimen which is not characteristic for *Leiocolea gillmanii* is the almost constant lack of underleaves.

Currently the known distribution of *Hattoriella morrisoncola* includes Japan, Taiwan, Southwest China, Bhutan and Baikal Area. On the whole its distribution can be described as temperate East Asiatic with a more or less noticeable pacific tendency (Fig. 2). It may be that this species is sporadically distributed on shaded moist limestone rocks southward of South Siberia in East Asia.

THE SYSTEMATIC POSITION OF *LOPHOZIA SUBCRISPA* HERZOG

During the completion of the monographic study of *Lophozia* s. str. the type specimen of *Lophozia subcrispa* was examined. The holotype

contains only some sterile and female plants with features similar to *Hattoriella* (Fig. 3): perianths lacking beaks; moderately obliquely inserted leaves; solitary lanceolate underleaves; numerous rhizoids, in tufts on ventral side of stem; and smooth to scarcely papillose leaf cuticle. It is proposed that these plants should be referred to *Hattoriella* rather than *Lophozia* s. str.

***Hattoriella subcrispa* (Herzog) Bakalin comb. nov.** – Basionym: *Lophozia subcrispa* Herzog, 1943. Ann. Naturhist. Mus. Wien 53(1): 362. Holotype from Sumatra: “Padang, leg. Schild”, JE!

The species seems to be close to *Hattoriella morrisoncola*, but differs in the more obtuse leaf lobes and obpearate versus almost cylindrical perianths. However, the systematic position of this taxon needs further studies. The locus classicus of *H. subcrispa* is indicated Fig. 2.

A RECLASSIFICATION OF LEOCOLEA (*HATTORIELLA*) *KATENINII* SCHLJAKOV

During field trips in the summer of 2000 to Stanovoye Nagorye Uplands (Northwest of Amur Province, Russia) plants resembling a diminutive *Leiocolea* were collected by the author (Fig. 4, published as exsiccata by Bakalin & Konstantinova, 2003). These plants have the following characters: (1) moderately obliquely inserted, trapezoid imbricate leaves, (2) vestigial to filiform underleaves, (3) bulging trigones in the leaf cells, (4) scarcely papillose to smooth leaf cuticle, and (5) perianth without a beaked mouth. A detailed study of the material indicates its similarity with (1) *Leiocolea (Hattoriella) kateninii* due to the moderately obliquely inserted leaves, and the lack of a beak on the perianth mouth, as well as with (2) *Leiocolea badensis* due to the scarcely papillose leaf cuticle and vestigial to filiform underleaves. It is suggested that the collected plants represent a variant intermediate between *L. badensis* and *L. kateninii* in their traditional treatment (cf. Müller, 1954; Schljakov, 1980).

These two taxa were separated by Schljakov, (1980) by the following characters: (1) strongly oblique to almost horizontally inserted leaves in *L. badensis* versus moderate oblique and concave to cupped imbricate leaves in *L. kateninii*, (2) absent or vestigial to filiform and lanceolate underleaves, versus filiform to lanceolate, (3) concave to moderate, rarely

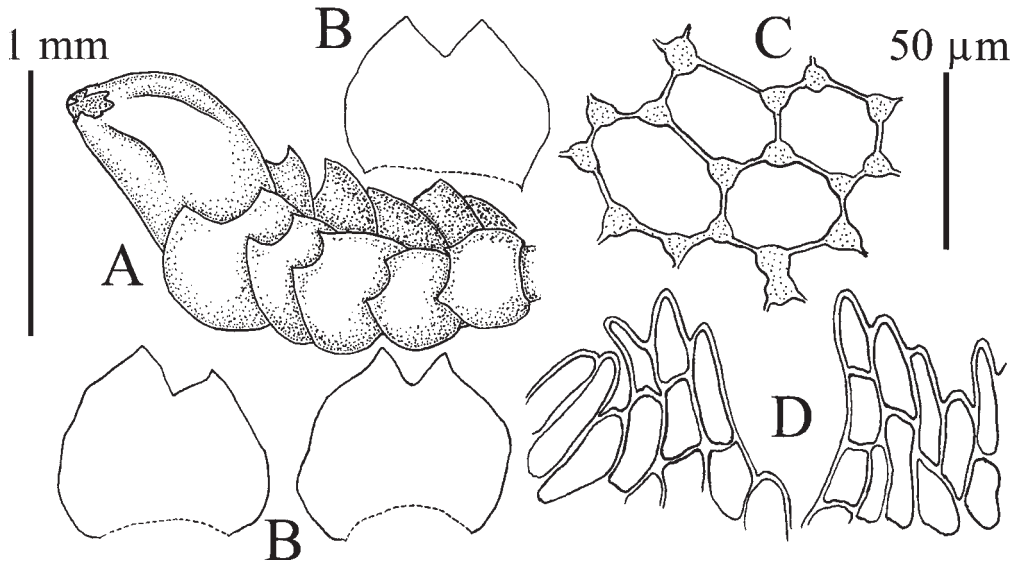


Fig. 4. *Leiocolea badensis* (Gott.) Jörg. (from Russia, Amur Province, Stanovoye Uplands, Udokan Range, Vil'betkan, leg. 9.VIII.2000 Bakalin, KPABG): A – plant habit; B – sterile leaves; C – cells in the leaf middle; D – mouth of the perianth.

convex trigones, versus bulging trigones, (4) smooth to scarcely papillose cuticle, versus scarcely striolate to verrucose cuticle, (5) perianth with a beaked mouth, versus unbeaked, (6) crenulate mouth of perianth, versus dentate (with 1-2 celled teeth).

With the study of type specimens of *Leiocolea* (*Hattoriella*) *kateninii* ("Pars orientalis peninsulae Tschukotka, sinus Laurentii", leg. A.E. Katenin 9 July 1974, KPABG), cited specimen from Amur Province and material of *Leiocolea badensis* from KPABG it is apparent that there is an overlap between the two taxa. Some observations confirm this opinion: 1) The angle of leaf insertion (oblique) in this species depends on the substrate moisture, with the angle of insertion varying between plants in a single specimen; 2) underleaves structure varies from almost lanceolate and regular to none; 3) the density of papillae on the leaf cuticle appears to depend on growth conditions; 4) the mouth of the perianth varies from crenulate to dentate (even in one population); 5) perianth varies from beaked and plicate to not beaked. Some similar observations were reported by J. Paton (1999).

Therefore the characters used to separate *L. badensis* from *L. kateninii* are not reliable, and it is proposed that the latter is synonymous with *L. badensis*.

Leiocolea badensis (Gottsche) Jörg., Bergens Mus. Skr. 16: 166. 1934. – *Jungermannia badensis* Gottsche in Gottsche et Rabenh. Hep. Eur. Exs. № 95. 1859. Germany. «bei Ueberlingen (Oberbaden)», leg. Jack. – *Lophozia badensis* (Gottsche) Schiffn., Lotos 51: 221. 1903. – *Leiocolea kateninii* Schljakov, Novosti Sist. Nizsh. Rast. ("Pars orientalis peninsulae Tschukotka, sinus Laurentii", leg. A.E. Katenin 9 July 1974 15: 244. 1978 **syn. nov.**

Leiocolea badensis differs from species of *Hattoriella* in (1) absence of paraphyses, (2) almost constant presence of regular underleaves, and (3) bilobate male bracts. Some affinity is suggested by the unbeaked perianth and bistratose capsule wall, but it is proposed that these features do not indicate an evolutionary affinity but rather an accidental convergence of *L. badensis* due to growth conditions (for example, moisture).

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Table 1. The comparison *Hattoriella* with related genera.

	<i>Hattoriella</i>	<i>Leiocolea</i>	<i>Lophozia</i>	<i>Barbilophozia</i>	<i>Orthocaulis</i>	<i>Isopachys</i>
Gemmae production	-	-/+	+/-	+	+	+
Paraphyses presence	+	-/+ (rare in <i>L. rutheana</i> and <i>L. collaris</i>)	-	-	+	-
Oil-bodies	scanty, grayish	scanty, brownish	scanty to numerous, colorless to bluish and turquoises	scanty, colorless to grayish	scanty, colorless to grayish	scanty, colorless
Mouth of the perianth	plicate, dentate to lobulate	beaked to plicate, crenulate to shortly lobulate, rare ciliate	plicate, crenulate to dentate, ciliate and lobulate	plicate, crenulate to dentate	plicate, crenulate to dentate	plicate, dentate to lobulate
Female bracts	bi-trilobate	bi-tetralobate	bi-tetralobate	tetra-5-lobate	bi-5-lobate	bi-trilobate
Male bracts	tri-5-lobate	bilobate (rare 2-4-lobate in <i>L. fitzgeraldiae</i>)	bilobate	tetralobate	bi-tetralobate	bilobate
Number of layers in capsule wall	2	2-4	3-5	3-4	3-4	2(3)
Presence of small-celled layer in the stem	-	-	+/-	-	-	-
Leaf papillae	+/-	+/-	-/+	+/-	+/-	-/+
Presence of underleaves	-/+	+/-	-/+	+/-	+/-	-
Shape and regularity of the underleaves	lanceolate, irregular if present	more or less regular, 1-3- lobate, subulate to lanceolate, frequently terminating in a slime papilla, rare vestigial or absent (in <i>L. badensis</i>)	lanceolate, irregular if present	distinct, bilobed with often ciliate lobes, sometimes reduced to two basally connated cilia	distinct, usually bifid (often with 1-several basal cilia, terminated in slime papillae or vestigial to absent)	-
Reddish or purplish pigmen- tation of sterile shoots	-	-	+/-	-/+	+/-	+

LITERATURE CITED

- BAKALIN, V. A., N. A. KONSTANTINOVA 2003. Hepaticae Rossicae Exsiccata. Fasc. I. (N 1-25). – *Kirovsk, Polygraf*, 17.
- BUCH, H. 1933. Vorarbeiten zu einer Lebermoosflora Fennoskandias. I. Ein verzuch zur Aufteilung Gattungen Lophozia Dum. und Sphenolobus Steph. – *Memoranda Societatis pro Fauna et Flora Fennica* 8: 282-297.
- INOUE, H. 1957. Notes on the Taxonomical status of *Lophozia diversiloba*. – *Botanical Magazine [Tokyo]* 70: 357-362.
- INOUE, H. 1960. A new genus *Hattoriella* of the Lophoziaceae. – *J. Hattori Bot. Lab.* 23: 37-40.
- JUN, S & C. TONG 2001. *Lophozia diversiloba* Hatt. (Hepaticae; Lophoziaceae) discovered in China. *Arctoa* 10: 43-44.
- KITAGAWA, N. 1965. A revision of the family Lophoziaceae of Japan and Adjacent Regions. I. – *J. Hattori Bot. Lab.* 28: 239-291.
- KITAGAWA, N. 1966. A revision of the family Lophoziaceae of Japan and Adjacent Regions. II. – *J. Hattori Bot. Lab.* 29: 101-149.
- KITAGAWA, N. 1981. Miscellaneous notes on little-known species of Hepaticae, 51-70. – *Hikobia Suppl.* 1: 67-72.
- LONG, D. L. & R. GROLLE 1990. Hepaticae of Buthan II. – *J. Hattori Bot. Lab.* 68: 381-440.
- MÜLLER, K. 1910. Die Lebermoose Deutschland, Oesterreich u. d. Schweiz. – In: *Rabenhorst L., ed. Kryptogamen-Flora von Deutschland, Österreich und der Schweiz, Leipzig, Verlag von Eduard Kummer* 6(1): 1-871.
- MÜLLER, K. 1954. Die Lebermoose Europas (Musci Hepaticae). – In: *Rabenhorst L., ed. Kryptogamen-Flora von Deutschland, Österreich und der Schweiz, Leipzig, Akademische Verlagsgesellschaft Geest & Portig K.-G.* 3(5): 641-756.
- PATON, J.A. 1999. The Liverworts flora of the British Isles. – *Colchester: Harley Book*, 626.
- [SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1978. Новые виды печеночников из Сибири и Российского Дальнего Востока. – [A new species of hepatics from Siberia and Russian Far East.] *Новостям сис. низш. раст. [Novosti Sist. Nizsh. Rast]* 15: 242-247.
- [SCHLJAKOV, R. N.] ШЛЯКОВ, Р. Н. 1980. Печеночные мхи Севера СССР Том. 3. – [Hepatics of the North of USSR. Vol. 3.] *Л., Наука [Leningrad, Nauka]*, 188.
- VÁŇA, J. & M. S. IGNATOV 1995. Bryophytes of Altai Mountains. V. Preliminary list of the Altaian hepatics. – *Arctoa* 5: 1-13.