

Status of genus *Leiocolea* (K. Müll.) Buch. in India

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ABSTRACT

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Status of genus *Leiocolea* (K. Müll.) Buch. in India is discussed along with its two species, *Leiocolea alpestris* (F. Webb.) Isov. and *L. mayebarae* (Hatt.) Furuki & Mizut., earlier known as *Lophozia alpestris* (Schleich. ex Webber) Evans and *Lophozia mayebarae* (Hatt.) Kitag., respectively.

Key-words: *Leiocolea* (K. Müll.) Buch. Hepaticae, India

INTRODUCTION

Müller (1910), for the first time, proposed *Lophozia* subgen. *Leiocolea* primarily based on *Jungermannia muelleri* Nees on perianth characters. Buch (1933) raised the status of the subgen. *Leiocolea* to genus *Leiocolea*. Since then, the status of *Leiocolea* has been dealt differently by different workers. Kitagawa (1966), Schuster (1969) and Schumacher and Váňa (2000) considered *Leiocolea* as a subgenus of *Lophozia*. According to Schuster (1969), *Leiocolea* is a closely allied group of species and should be retained as a part of *Lophozia* s.l. due to sporadic recurrence of the characters in *Lophozia* taxa used to segregate the genus. Schljakov (1980) and Paton (1999) recommended the generic status of *Leiocolea* on features other than perianth characteristics. Yatsentyuk et al. (2004) segregated species of genus *Leiocolea* from *Lophozia* and gave generic status to the former due to presence of strongly papillose cuticle, amphigastria in major portion of ventral surface of stem of most of the taxa, homogeneous medulla without ventral mycorrhizal band, very obliquely inserted leaves, peculiar perianth shape and lack of gemmae in all species but *Leiocolea heterocolpos* (Thed. ex Hartm.) H. Buch., and proposed their possible inclusion in family

Mesoptychiaceae on the basis of phylogenetic analysis of Lophoziaaceae and related families. De Roo et al. (2007) supported placement of *Leiocolea* under Mesoptychiaceae, a sister group of Jungermanniaceae. Vilnet et al. (2009) also supported placement of genus *Leiocolea* in Mesoptychiaceae by their gene set analysis. However, Crandall-Stotler et al. (2009) treated family Mesoptychiaceae (incl. *Leiocolea*) under family Jungermanniaceae, based on the data provided by Hentschel et al. (2007) and followed by Bakalin (2010).

In the present communication the authors support the generic status of *Leiocolea* with two species *L. mayebarae* (Hatt.) Furuki and Mizut. and *L. alpestris* (F. Webb.) Isov., earlier treated under the genus *Lophozia*.

***Leiocolea mayebarae* (Hatt.) Furuki & Mizut.**, Proc. Bryo. Soc. Jap. 6: 75-83. 1994.

Synonym: *Lophozia mayebarae* (Hatt.) Kitag., J. Hattori Bot. Lab. 29: 106. 1966.

Description: For detailed taxonomic description, see Kitagawa (1966), Asthana and Nath (2007).

Range: Endemic to India.

Distribution in India: Chhindwara District, Madhya Pradesh.

Remarks: The species was described by Asthana and Nath (2007) from Chhindwara, Madhya Pradesh as *Lophozia mayebarae* (Hatt.) Kitag. This is an interesting find, as the members of Lophoziaceae are usually found in high altitude areas and have maximum diversity in Russian region and high altitude areas of Europe. However, the Indian locality is at comparatively low altitude (ca. 1000 m). Inoue (1960) created a new genus *Hattoriella* Inoue under Lophoziaceae, to include *Hattoriella mayebarae* (Hatt.) Inoue and *Hattoriella diversiloba* (Hatt.) Inoue. However, Kitagawa (1966) treated both taxa under *Lophozia* subgen. *Leiocolea* Müll. and also changed the status of *Hattoriella mayebarae* as *Lophozia mayebarae* (Hatt.) Kitag. While discussing this species under *Lophozia* subgen. *Leiocolea*, Kitagawa (1966) remarked "...we can not decide whether these species should be assigned to *Leiocolea* or *Lophozia*, if only the feature of perianth are taken into account...". Furuki and Mizutani (1994), however, finally treated it as *Leiocolea mayebarae*. On the basis of above studies we would prefer to follow the status (Vilnet et al. 2009) of *Lophozia mayebarae* as *Leiocolea mayebarae*.

Leiocolea alpestris (F. Webb.) Isov., Ann. Bot. Fenn. 15(2): 80. 1978.

Text-figure 1

Synonyms: *Lophozia alpestris* (Schleich.) Evans in Kennedy & Collins, Rhodora 3: 181. 1901; *Jungermannia alpestris* Schleich ex F. Webb., Hist. Musc. Hep. Prodr.: 80. 1815, non sensu Nees 1836 et auct. plur. For further synonymy, see Schljakov (1980)

Description: Plants small to medium, up to 18 mm long, 0.60-0.96 mm wide (with leaves), pale green to light brown, scattered, or in thin patches, on soil. Branching sparingly lateral and terminal. Stem pale green, rigid, suberect, prostrate with ascending tips, subrounded to elliptical, 0.31-0.37 mm and 14-16 cells wide laterally, 0.18-0.22 mm and 10-12 cells wide vertically, dorsiventrally differentiated, dorsal cells larger, rounded to subrounded, 22.8-38 x 15.2-30.4 µm, ventral cells smaller, rounded to subrounded, 15.2-26.6 x 11.4-15.2 µm. Rhizoids pale brown and numerous. Leaves contiguous to sub-imbricate, alternate,

succubous, subvertically to horizontally oriented, obliquely inserted, not decurrent, plane to slightly concave, sub-quadrate, broadly ovate to round, 0.54-0.69 mm long, 0.54-0.63 mm wide (as long as wide), widest in middle of leaf, bilobed, lobes unequal to subequal, broadly triangulate, 1/4 - 1/3 of the total leaf length, antical lobe small, 7-12 cells high, 8-15 cells wide, postical lobe 9-14 cells high, 10-20 cells wide, lobe apex subacute to obtuse, sinus wide, shallowly rounded to lunate, 0.15-0.21 mm deep, 0.30-0.33 mm wide; cells medium sized, thin-walled with simple trigones, apical cells rounded, subrounded or quadrate to subquadrate, 15.2-26.6 (34.2) x 15.2-22.8 µm, median cells also rounded or subrounded to polygonal, 15.2-30.4 x 15.2-22.8 µm, basal cells quadrate to subquadrate, or rectangularly elongated, 19.0-38.0 x 19.0-30.4 µm; cuticle smooth; amphigastria not seen; gemmae not seen. Fertile plants not found.

Habitat: Terrestrial, on soil covered rocks.

Type locality: Switzerland.

Range: Asia minor, Austria, Canada, Czech Republic, Denmark, England, France, Germany, Hungary, India, Maderia, Poland, Portugal, Scotland, Siberia, Slovak Republic, Spain, Switzerland.

Distribution in India: Jammu and Kashmir - Gurdhar Pass, Zanskar (Kashyap 1932); Uttarakhand - On way to Valley of Flowers (1.5 km away from Ghangharia).

Characteristics of the species: Plants small to medium, up to 18 mm long, 0.60-0.96 mm wide (with leaves), pale green to light brown. Stem subrounded to elliptical, 14-16 cells wide laterally, 10-12 cells wide vertically, dorsiventrally differentiated with dorsal cells larger and ventral cells smaller. Leaves contiguous to subimbricate, obliquely inserted with no decurrence, plane to slightly concave, subquadrate, broadly ovate to rounded, bilobed, lobes unequal to subequal, 1/4 - 1/3 of the total leaf length, lobe apex subacute to obtuse. Cuticle smooth.

Specimens examined: *Lophozia alpestris* (Schleich.) Steph. (*Jungermannia sicca*) original ex. W/L *ventricosa*, Loc.: ?, Leg.: ?; Det.: ? (FH). *Lophozia alpestris* (Schleich.) Steph., (*Jungermannia curvula*) orig. ex., bet. exine extress bline form Ier.



Text-figure 1. *Leiocolea alpestris* (F. Webb.) Isov., 1. Plant, dorsal view. 2. Plant portion, showing terminal branching. 3. Stem, cross section. 4. Same, portion enlarged (dorsal cells). 5. Same, (ventral cells). 6-12. Leaves. 13-15. Apical cells of leaf. 16. Median cells of leaf, 17. Basal cells of leaf. (All figures drawn from LWU 12051/99)

Lophozia alpestris: Fichtelgebirge Leg.: ?; Det.: ?; 2685 (FH).

DISCUSSION ON INDIAN RECORDS

Uttarakhand: Chamoli District - Hemkund; alt. ca. 3400 m, May 23, 1980; S. C. Srivastava, D. Kumar and D. K. Singh; 4249/80, 4279/80 (LWU). Uttarakhand: On way to Valley of Flowers (1.5 km away from Ghangharia); ca. 3200 m; Sept. 27, 1999; S. C. Srivastava, D. Kumar and D. K. Singh; 12051/99 (LWU).

Leiocolea alpestris (F. Webb.) Isov. was reported from India as *Lophozia alpestris* (Schleich.) Evans by Kashyap (1932) from Kashmir (Gurdhar Pass) and subsequently listed by Chopra (1943), Parihar (1962) and Parihar et al. (1994). Macvicar (1912) and Müller (1954) considered this species under subgenus *Dilophozia* as *Lophozia* subgenus *Dilophozia alpestris*, which was later on synonymized under subgenus *Lophozia* (Kitagawa 1966). Subsequently, Schuster (1969) treated this species under *Lophozia* subgen. *Lophozia* sect. *Lophozia* as *Lophozia alpestris*. However, this species now belongs to genus *Leiocolea* (Schljakov 1980, Grolle & Long 2000) and treated here accordingly.

This species (*Leiocolea alpestris*) approaches *Lophozia ventricosa* (Dicks.) Dum. and *Lophozia wenzellii* (Nees) Steph. in overall appearance of the plant and subovate, quadrate to rounded leaves. However, *L. collaris* can be differentiated on the basis of plane, flat, shortly bilobed leaves, lobes 1/10 - 1/8 of the leaf length, the variable sinus, smaller leaf cells, reddish or vinous red gemmae and bilobed bracts which are more rotund as compared to *Lophozia ventricosa* which has erectopate, concave, longly bilobed leaves, lobes 1/4 - 1/3 of the leaf length, wide and shallowly rounded sinus, large sized polygonal leaf cells, yellowish green gemmae, erecto-patent, 3 lobed, irregularly divided bracts (Macvicar 1912).

It resembles to *Lophozia wenzellii* in the form of the leaf and the mouth of the perianth. However, widely spreading leaves (usually nearly horizontal) and weakly concave, flat, (only the apex of the leaf lobe is curved) and reddish gemmae in *Leiocolea alpestris*, distinctly

differentiate it from *L. wenzellii* which has strongly concave and not so widely spreading leaves and pale green gemmae (see also Kitagawa 1965).

Kitagawa (1965) observed that the brownish and hyaline cell wall in leaf cells of a single leaf were overemphasized by Schuster (1951, 1953) and Müller (1954) and are taxonomically unreliable, as both hyaline and pigmented brown cells occur in the leaves of *Lophozia alpestris* (= *Leiocolea alpestris*). He (Kitagawa 1965) further described the perianth of Japanese *Lophozia alpestris* which is slightly different from the typical form of the species in the ciliate - denticulate (2-3 celled) mouth. However, typical *L. alpestris* has a denticulate perianth mouth or with projecting cells (with 1-2 celled short teeth).

Schuster (1969) remarked that *Lophozia alpestris* is highly variable and the variations are environmentally induced. The plants growing on dry, sunny rock walls and dry soil, or boulders in alpine tundra are very small, 4-10 mm long and are bronze coloured in shaded sites and become blackish-brown in sun. Such variations have been often described as different species or varieties of the same species. He further remarked that such phases are often freely gemmiparous with slightly dentate and narrower leaves with deep sinus, descending to 1/4 - 1/3 of the leaf length. He further described that plants become larger, green and more pellucid on wet sites, much similar to *Lophozia wenzellii* and on wet cliffs in the mountains the plants are highly pigmented, difficult to be identified, ventral portion of stem and ventral leaf base have intensely violet-purple to vinaceous pigmentation which is merely absent on the distal portion of the leaves.

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