

## DISCOVERY OF GENUS *BARBILOPHOZIA* IN INDIA WITH EXTENDED DISTRIBUTION OF TWO SPECIES OF THE GENUS FROM HIMALAYAN REGION

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Genus *Barbilophozia* is reported and described as a new generic record for India from union territories of Jammu and Kashmir, Western Himalaya. Two species, namely *Barbilophozia lycopodioides* and *Barbilophozia barbata* are described in the present communication.

Key words: *Barbilophozia*, Himalaya, India, new record

### INTRODUCTION

The genus *Barbilophozia* was first recognised by Loeske (1907) with *Barbilophozia barbata* (Schmidel ex Schreb.) Loeske as its type species. The genus belongs to a newly established family Anastrophyllaceae, which is separated from family Lophoziaceae (Söderström *et al.* 2010). The members of this genus are distributed mainly in Northern hemisphere (Paton 1999). Earlier the genus was placed under family Lophoziaceae and had two subgeneric groups *Orthocaulis* (Buch) Buch and *Barbilophozia* (Schuster 1969, Hong and Matthews 2001). Bonner (1963) enlisted 12 species of *Barbilophozia* in *Index Hepaticarum*. Presently only five species, namely *B. barbata* (Schmidel ex Schreb.) Loeske, *B. hatcheri* (A. Evans) Loeske, *B. lycopodioides* (Wallr.) Loeske, *B. rubescens* (R. M. Schust. et Damsh.) Kartt. et L. Söderstr. and *B. sudetica* (Nees ex Huebener) L. Söderstr., De Roo et Hedd. are accepted in genus *Barbilophozia*, of which former 4 species belong to subgenus *Barbilophozia* and the last one related to subgenus *Sudeticae* (Söderström *et al.* 2016). Among, 5 accepted species, *B. barbata*, *B. hatcheri* and *B. lycopodioides* are widely distributed in Asia, Europe and eastern North America (Hong and Matthews 2001), *B. sudetica* is widely distributed in Europe, North America, Argentina and Asia (Paton 1999), whereas *B. rubescens* is distributed in Europe and North America (Stotler and Crandall-Stotler 2017).

While exploring the bryophytes in general and liverworts in particular, the first author collected the samples of bryophytes from alpine regions of Jammu and Kashmir in the year 2021 during monsoon months that include two interesting populations of *Barbilophozia*. After a careful examination of

morphological and anatomical characters of these specimens, their identities are ascertained as *B. barbata* and *B. lycopodioides*. Neither of these species have been recorded from India (Singh *et al.* 2016) thus they are recorded here for the first time from the country. It is interesting to note that the genus *Barbilophozia* is also reported for the first time from Indian region. The studied specimens are deposited in Cryptogamic Herbarium of Botanical Survey of India, Northern Regional Centre, Dehradun (BSD).

## TAXONOMIC DESCRIPTIONS

### *Barbilophozia barbata* (Schmidel ex Schreb.) Loeske (Fig. 1)

*Barbilophozia barbata* (Schmidel ex Schreb.) Loeske, Verh. Bot. Vereins Prov. Brandenburg 49 (1): 37 (1907). ≡ *Jungermannia barbata* Schmidel ex Schreb., Spic. Fl. Lips.: 107 (1771).

Leafy shoots procumbent, pale or yellowish-dark green, 1.5–4 cm long 3–5 mm wide; stem cross section oval-spherical in outline, 300–500 × 250–420 μm; cortex poorly differentiated from medulla; postical cortical cells yellowish-red-dish brown, subquadrate-rectangular, 11.4–26.6 × 11.4–28.5 μm; medullary cells comparatively larger, subquadrate or pentagonal-hexagonal, 9.5–38 × 7.6–26.6 μm. Leaves obliquely inserted, horizontal, plane or convex, weakly to strongly undulate, slightly to strongly concave, mostly patent, occasionally more or less squarrose, slightly to distinctly wider than long, subquadrate or weakly obtapeziform 0.5–1.2 mm long, 0.7–1.7 mm wide, 1.5 times as wide as long; antical margin longer or less arcuate than postical margin; leaves subequally 2-lobed or unequally 3–4-lobed or rarely 5-lobed; postical base without or rarely with 1–2 cilia, cilia 5–12-celled long; sinuses 1/5–1/4(–1/3) of leaf length, narrowly to broadly rounded, not or weakly gibbous; lobes narrowly rounded to subacute or sometimes broadly rounded or acute, terminating in 1–2 cells long tooth or cilia; marginal leaf cells subquadrate-rectangular, 9.5–22.8 × 7.6–15.2 μm, median cells subquadrate-hexagonal-polygonal, 12.5–34.2 × 9.5–24.7 μm, basal cells more or less median cells, slightly elongated 19–41.8 × 13.3–24.7 μm, trigones small or subnodulose. Underleaves obscure, ciliate or subulate to very rarely bifid with 2–8-celled marginal cilia. Gemmae absent.

Habitat: Growing in dripping water near stream at alpine region along with member of Polytrichales and liverworts.

Distribution: India (Jammu and Kashmir, present record), Europe, North America, Southern Asia (Paton 1999).

Specimen examined: India, Jammu and Kashmir, Gulmarg, 34° 02' 47" N, 74° 22' 13" E, alt. 2,840 m, 12.08.2021, coll. Amarpreet Kour G-3 (BSD).

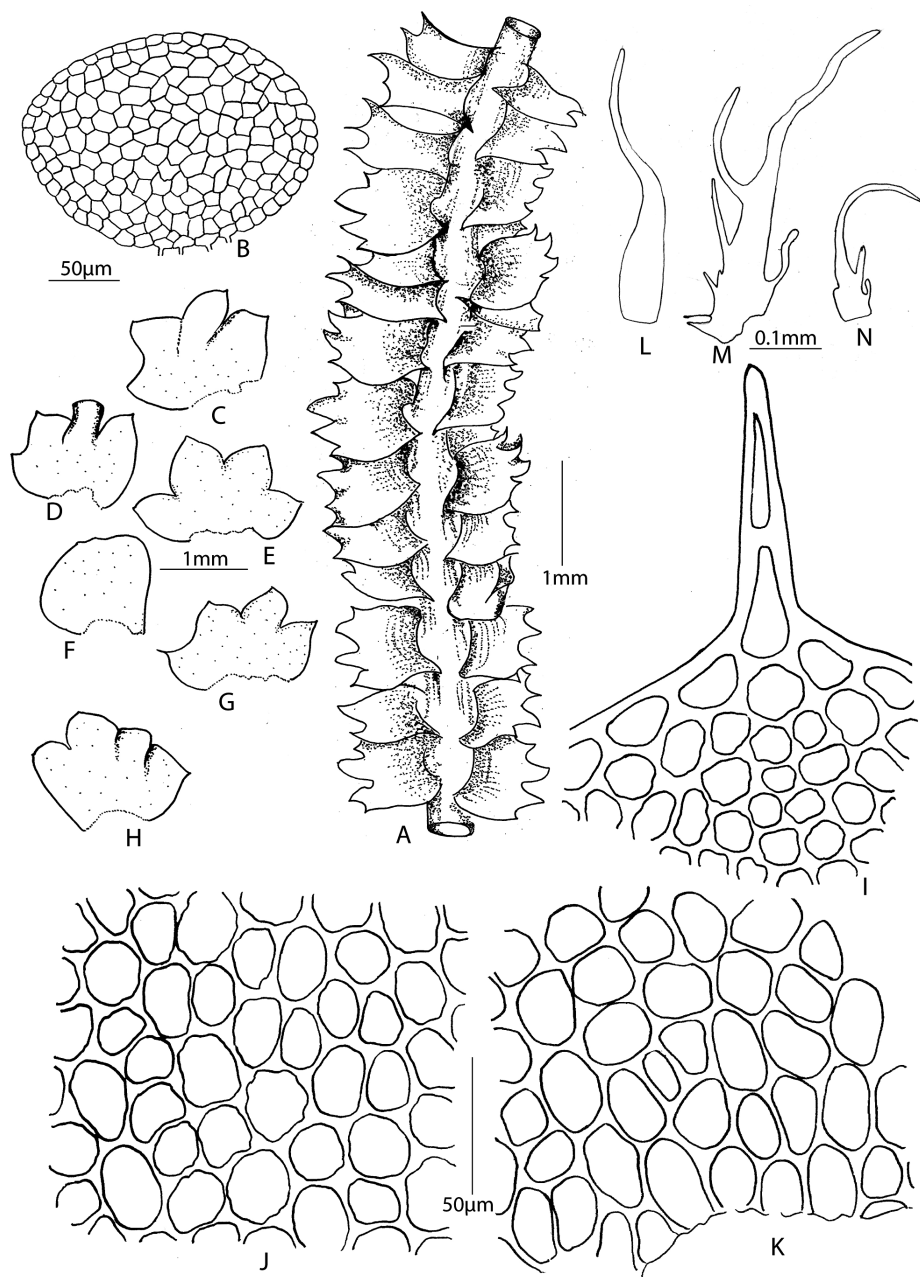


Fig. 1. *Barbilophozia barbata* (Schmidel ex Schreb.) Loeske – A = a portion of plant in dorsal view; B = cross section of stem; C–H = leaves; I = apical leaf cells; J = median leaf cells; K = basal leaf cells; L–N = underleaves

*Barbilophozia lycopodioides* (Wallr.) Loeske  
(Fig. 2)

*Barbilophozia lycopodioides* (Wallr.) Loeske, Verh. Bot. Vereins Prov. Brandenburg 49 (1): 37 (1907). ≡ *Jungermannia lycopodioides* Wallr., Comp. fl. Germ. 2 (III): 76 (1831).

Leafy shoots procumbent, pale green-dark green, 2.6–4.5 cm long, 3–5 mm broad; stem simple, in cross section suborbicular-oval in outline, 300–600 × 200–600 μm; postical cortical cells often becoming red or brown, subquadrate, 7.6–24.7 × 5.7–15.2 μm, medullary cells subquadrate-pentagonal or hexagonal 19–32.3 × 23–38 μm. Leaves strongly imbricate, concave to convex, strongly undulate, patent, antical margin normally extending across middle portion of stem, 2.0–3.4 mm long 1.4–1.7 mm wide, twice as wide as long, obtapeziform, with postical margin longer and often less arcuate than antical margin, leaves unequally 4–5-lobed or rarely 3-lobed, postical base with 3–8 cilia, cilia 5–17-celled long; sinuses 1/4–1/2 (–2/5) of leaf length to obsolete, narrowly rounded to very broad, weakly recurved to strongly gibbous; lobes often very broadly ovate-triangular, apex generally abruptly apiculate or cuspidate, terminating in to 1–2 strongly thick-walled elongate cells; apical cell 80–114 μm long; or lobe apex sometimes acute or rarely broadly rounded, or occasional lobes terminating in a cilium 4–8 cells long; marginal leaf cells towards apex subquadrate-rectangular, 19–27.5 × 7.6–19 μm; middle leaf cells subquadrate-pentagonal-hexagonal, 15.2–34.2 × 13.3–24.7 μm, basal cells slightly elongated, subquadrate-pentagonal or hexagonal, 19.0–28.5 × 7.6–19.0 μm, trigones small, subnodulose, cells thickened. Underleaves usually bifid, margins with many long cilia. Gemmae absent.

Habitat: Growing in alpine region, near stream in cushion like mats, mixed with mosses, on soil covered rocks.

Distribution: India (Jammu and Kashmir, present record), China, Central and Eastern Asia, Europe, North America (Keceli *et al.* 2011, Paton 1999, Söderström *et al.* 2002).

Specimen examined: India, Jammu and Kashmir, Gulmarg, 34° 02' 48" N, 74° 22' 18" E, alt. 2,800 m, 18.07.2021, coll. Amarpreet Kour S-13 (BSD).

Notes and differentiation: *Barbilophozia barbata*, *B. lycopodioides* and *B. hatcheri* belonging to subgenus *Barbilophozia* of the genus *Barbilophozia*, show close affinity with each other. However, *B. barbata* and *B. lycopodioides* distinctly differ from *B. hatcheri* in lacking gemmae (present in *B. hatcheri*). *B. barbata* further differs from *B. hatcheri* in having much wider leafy shoots, subquadrate or weakly obtapeziform leaf shape, less incised leaves which are 3–5-lobed, having smaller spines and have subulate, unlobed underleaves and larger medullary cells. Further, *B. lycopodioides* differs from *B. hatcheri* in

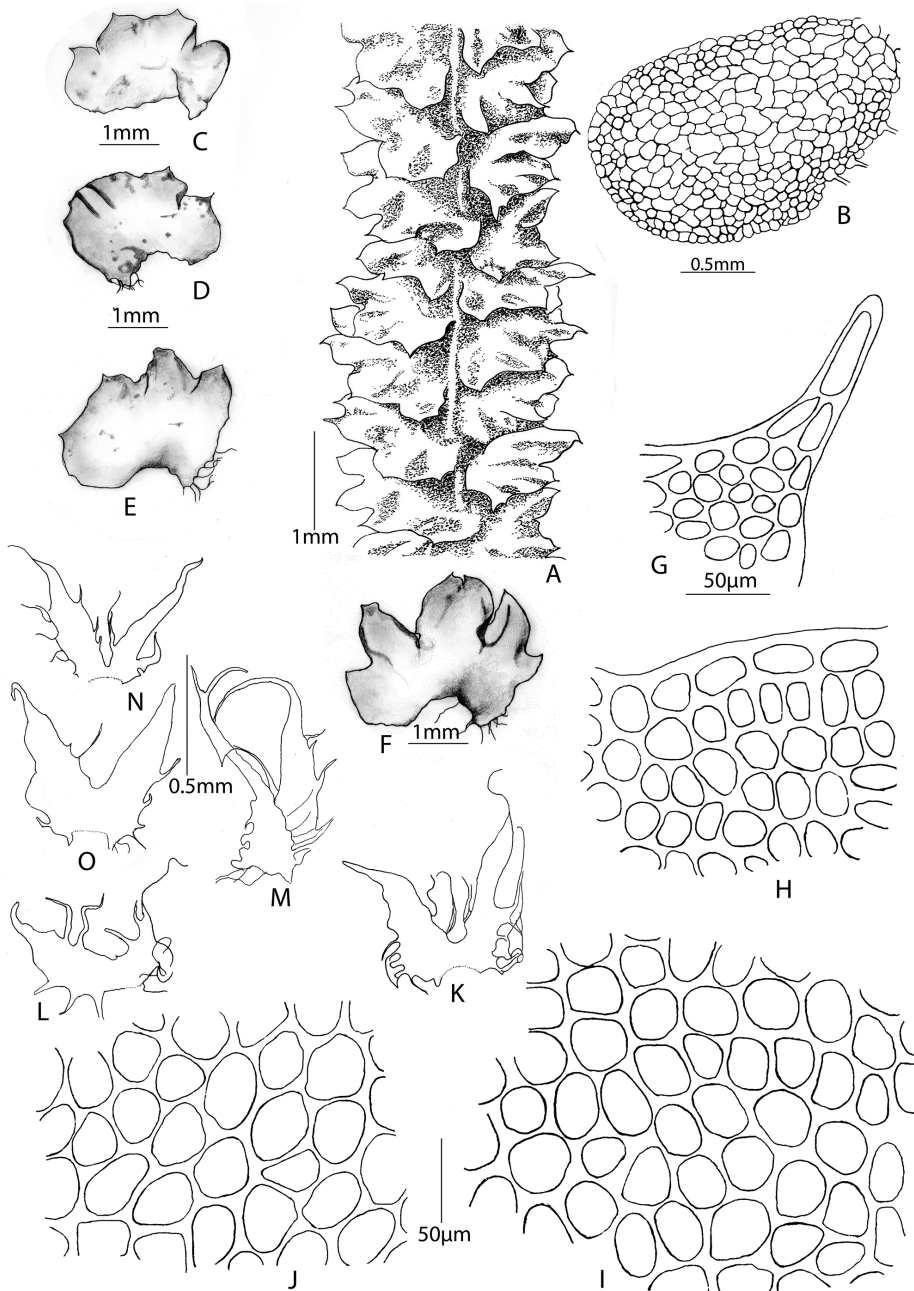


Fig. 2. *Barbilophozia lycopodioides* (Wallr.) Loeske – A = a portion of plant in dorsal view; B = cross section of stem; C–F = leaves; G = apical leaf cells; H = marginal leaf cells; I = basal leaf cells; J = median leaf cells; K–P = underleaves

having robust stem, much wider leafy shoots, larger leaf lobes, much longer cilia at base. Furthermore, *B. barbata* distinctly differs from *B. lycopodioides* in having leaves nearly subquadrate, apex of lobes round to obtuse, spine smaller, 31.6–55.3  $\mu\text{m}$  long and unlobed underleaves, whereas in *B. lycopodioides* the leaves are narrower toward base, apex of lobes acute to mucronate, spines longer 60–114  $\mu\text{m}$  and underleaves bilobed.

#### Key to species of *Barbilophozia* subgenus *Barbilophozia*

- 1a Leaf shoots with reddish pigmentation; marginal leaf lobe cells comparatively larger (28–36  $\mu\text{m}$ ); Arctic-alpine *B. rubescens*
- 1b Leaf shoots without reddish pigmentation; marginal leaf lobe cells comparatively smaller (up to 28  $\mu\text{m}$ ); Holarctic 2
- 2a Gemmae lacking *B. hatcheri*
- 2b Gemmae present 3
- 3a Leaves nearly subquadrate, apex of lobes round to obtuse; underleaves unlobed *B. barbata*
- 3b Leaves narrower toward the base, apex of lobes acute to mucronate; underleaves bilobed *B. lycopodioides*

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