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Brachythecium garovaglioides Müll.Hal., an addition to West Himalayan Bryoflora

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Abstract – *Brachythecium garovaglioides* Müll.Hal. is newly reported from Western Himalaya, India.

Musci / Bryopsida / Brachytheciaceae / *Brachythecium* / Western Himalaya / India

INTRODUCTION

The Genus *Brachythecium* Bruch, Schimp. & W.Gümbel has 257 species distributed all over the world (Gangulee, 1979). Thirteen species of this genus have been described for India by Chopra (1975) and Gangulee (1979).

Hypnum wichurae Broth. was first described by Brotherus (1899) and later it was transferred under genus *Brachythecium* by Paris (1900). Gangulee (1979) in his monograph mentioned it as an East Asiatic species which has a wide distribution in East Asian countries, viz., E Nepal, Japan, China and India (Salmon, 1900; Takaki, 1955; Noguchi, 1966; Iwatsuki, 1979). Ignatov and Koponen (1996) synonymized *B. wichurae* (Broth.) Paris under *Brachythecium garovaglioides* Müll. Hal. on the basis of some common features and reported it from Eastern Himalayas, India, Burma, Nepal and Indonesia. Wang *et al.* (2000) also reported *B. garovaglioides* Müll. Hal. from China.

During the investigation of the moss species of Garhwal Hills of India, plants of *B. garovaglioides* have been encountered from Camel's back road, Mussoorie (altitude *ca* 7000 ft), Western Himalaya, India, which were found growing on soil as dense cushion in association with *Tortella* sp., *Desmatodon* sp. and *Bryum* sp. Thus *B. garovaglioides* is reported from this territory for the first time, which is a new record and an addition to the West Himalayan bryoflora.

DESCRIPTION

Brachythecium garovaglioides Müll.Hal., *Ann. Bot. Fennici* 33: 285-301(1996).

Syn.: *Brachythecium wichurae* (Broth.) Paris, *Index Bryol. Suppl.* 52: 136-164 (1900); *Hypnum wichurae* Broth., *Hedwigia* 38: 239 (1899).

Plants yellowish-green to brown forming dense tufts. Main stem creeping, irregularly to pinnately branched. Stem with scaly leaves have thick-walled cells extending towards the middle half portion of the stem epidermal cells irregular in

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shape, thick walled. Cells of cortex thin walled and irregular in shape, ranging from hexagon, square to pentagon. Stems 0.25 -0.75 mm in diameter, in transverse section 16-18 cells, thick-walled at margin and thin walled in the cortex. Leaves ovate-lanceolate with long narrow tip, broad base, ± 2 mm long and 0.75-1 mm wide, concave, serrulate at tips or sometimes to about 1/3 portion of the leaf. Costa single, little more than half of leaf in length. Cells at tip of leaves are long and narrow, shorter and broader at middle and basal region. Basal leaf cells 25-37.5 × 12.5-20 µm; median leaf cells 55-90 × 7.5-10 µm; apical leaf cells 45-87.5 × 7.5-12.5 µm, and marginal leaf cells 60-80 × 7.5-12.5 µm. Perichaetial leaves erect, spreading with pointed tips. Sporophytes present on main stem. Capsules inclined or horizontal, arcuate, dark brown to reddish in colour, oblong to cylindrical, 2.5 × 1 mm; operculum conical in shape. Seta about 20 mm long, smooth. Peristome teeth hypnoid, vary in size, about 450-550 µm in length and 110-114 µm in width at base. Spores spherical or round in shape, 10-15 µm in diameter, sporoderm minutely papillose with occasional lamellae.

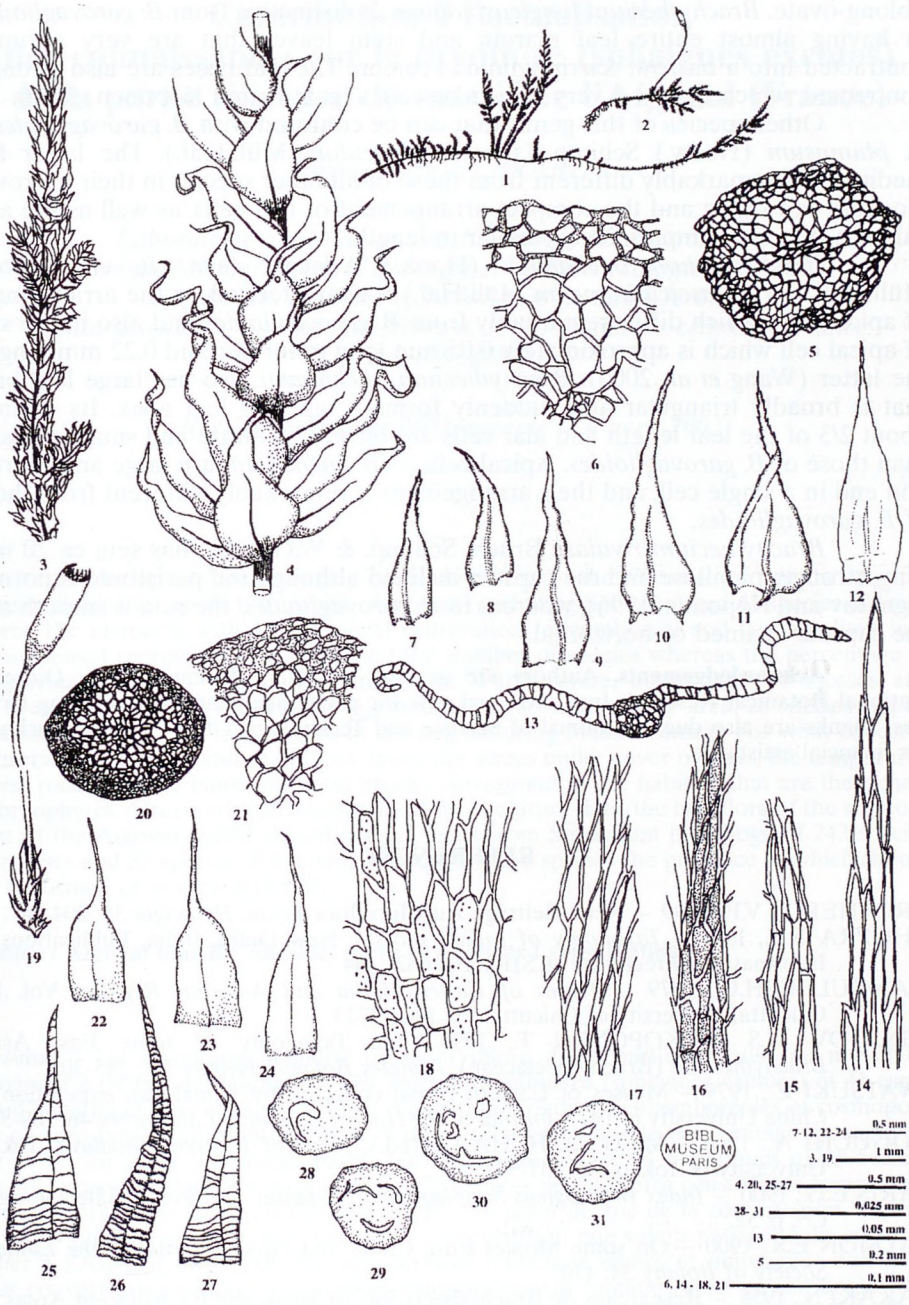
Specimens examined: India. Garhwal region: Mussoorie, Camel's back road, altitude ca 7000 ft., growing on soil as compact mass intermixed with *Tortella* sp., *Desmatodon* sp. and *Bryum* sp., 7 May 1965, leg. *S. Chandra 202627* (LWG), det. V. Nath, A.K. Asthana and S. Sharma. — **India**. Garhwal region: Mussoorie, Camel's back road altitude ca 7000 ft., growing on soil along with *Tortella* sp., 9 April 2001, leg. *V. Nath, A.K. Asthana and S. Sharma 208876, 208883* (LWG), det. V. Nath, A.K. Asthana and S. Sharma.

Other specimen examined: Japan. Kiushiu, Miyazaki, Minaminaka, Obi, in terra humosa umbrosa ca 100 m., leg. *S. Hattori et T. Kurata*, 1947, det. A. Noguchi, Musci Japonici Exsicatti, ser. 2, no. (92).

DISCUSSION

B. garovaglioides M¸ll.Hal. has been found at Camel's back road, Mussoorie, Western Himalaya, India, for the first time. It has been compared with the authentic specimens of *B. wichurae* of Musci Japonici, Exsiccati, ser. 2, no. 92, which is now synonymized with *B. garovaglioides* (Ignatov and Koponen, 1996). A comparative study has shown minor differences in colour and appearance. Both plants resemble significantly to each other in the stem and leaves, their leaf areolation and arrangement, as well as the sporophytes, etc. However, plants collected from Japan are light green in colour with leaves spreading outwards from main stem whereas *B. garovaglioides* from India has slender stem as mentioned by Zhu & So (1996). The Japanese specimen also has leaf arrangement somewhat compact to the stem and the leaves somewhat darker in colour. These minor variations observed in the two specimens can be due to varying local climatic conditions and the individual adaptation to the local ecological conditions.

Among other related species of the genus, *Brachythecium garovaglioides* Müll. Hal. closely approaches *B. salebrosum* (Weber & D.Mohr) Bruch, Schimp. & W. Gümbel and *B. longicuspidatum* (Mitt.) A.Jaeger in having smooth seta, inclined or horizontal capsule. However, *B. salebrosum* can be clearly differentiated from *B. garovaglioides* by its leaves densely imbricate (slightly spread when dry), leaf cells elongate-rhomboid, seta slightly shorter and the capsule arcuate,



Figs 1-31. *Brachythecium garovaglioides* C.Müll. — **1-2**: plant habit (diagrammatic). **3**: a portion of plant. **4**: a part of stem. **5**: transverse section of stem. **6**: a part of transverse section of stem. **7-12**: leaves. **13**: transverse section of leaf. **14**: apical cells of leaf. **15**: marginal cells of leaf. **16**: cells of costa. **17**: median cells of leaf. **18**: basal cells of leaf. **19**: sporophyte with perichaetial leaves. **20**: transverse section of seta. **21**: transverse section of seta. **22-24**: perichaetial leaves. **25-27**: outer peristome teeth. **28-31**: spores.

oblong-ovate. *Brachythecium longicuspidatum* is distinctive from *B. garovaglioides* in having almost entire leaf margin and stem leaves that are very abruptly contracted into a narrow, "cirriphylloid" acumen. The leaf bases are also strongly contracted, which have 3-4 very large alar cells (Ignatov and Koponen, 1996).

Other species of this genus that can be confused with *B. garovaglioides* is *B. plumosum* (Hedw.) Schimp. (syn. *B. glauculum* Müll.Hal.). The latter has median cells remarkably different from those of all other species in their narrowly elongate cell shape and the compact arrangement of leaf cells, as well as the apical cells that are comparatively smaller in length.

Brachythecium buchananii (Hook.) A.Jaeger (syn. *B. viridefactum* Müll.Hal. and *B. fasciculirameum* Müll.Hal.) is characterized by the arrangement of apical cells which differ remarkably from *B. garovaglioides* and also in the size of apical cell which is approximately 0.05 mm long in former and 0.22 mm long in the latter (Wang *et al.* 2000). *Brachythecium buchananii* also has large leaf base that is broadly triangular and suddenly forms a tapering leaf apex. Its costa is about 2/3 of the leaf length and alar cells are mostly quadrate and smaller in size than those of *B. garovaglioides*. Apical cells of *B. buchananii* are large and narrow and end in a single cell, and their arrangement is remarkably different from those of *B. garovaglioides*.

Brachythecium rivulare Bruch, Schimp. & W.Gümbel has seta ca 20 mm long, strongly papillose and the capsule inclined although the peristome is normal (Ignatov and Koponen, 1996), whereas in *B. garovaglioides*, the seta is smooth and the capsule inclined or horizontal.

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