

# Status of *Bryum pseudotriquetrum* var. *subrotundum* (Brid.) Gangulee in India

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## ABSTRACT

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The present paper deals with the current taxonomic status of *Bryum pseudotriquetrum* var. *subrotundum* (Brid.) Gangulee and its distribution in India. The occurrence of this taxon in Mount Abu, Rajasthan, reported for the first time, is an addition to bryoflora of western India.

**Key-words:** *Bryum pseudotriquetrum* var. *subrotundum*, Bryophyta, moss, new addition, India.

## INTRODUCTION

*Bryum* Hedw. (Bryaceae), the largest and polymorphic acrocarpous moss, is cosmopolitan in distribution. It shows its occurrence in Asia, Europe, Africa and America. The basionym of *B. pseudotriquetrum* var. *subrotundum* (i.e. *Bryum subrotundum*) was described by Bridel (1817) from the Alps of Switzerland and was generally considered to be an altimontane variety of the variable *Bryum pallescens* Schwägr., following the treatment presented by Bruch and Schimper in *Bryologia Europaea* (1836-1851). Since then, this taxon was always associated with *B. pallescens*, including the treatments of Podpěra (1952, 1954), but Gangulee (1974) considered this taxon well within the range of *B. pseudotriquetrum* and treated it as a basionym of newly constituted variety, i.e. *B. pseudotriquetrum* var. *subrotundum*. This name is also accepted by widely used Plant List (2010). This taxon was not critically investigated before and was

completely neglected, thus the present paper deals with the current taxonomic status based on the plants available in India and elsewhere.

The taxon was earlier reported from Western Himalaya with no specific locality (Gangulee 1974, The Plant List 2010, Dandotiya et al. 2011). Recently, Bansal et al. (2010) reported it from Lal Tibba, Mussoorie, Dehradun District (Garhwal - West Himalaya). Selvan and Kumar (1996) carried out cytological studies on this taxon collected from Nilgiri hills, Tamil Nadu (South India). Bansal and Nath (2013) reported its occurrence in Meghalaya and West Bengal for the first time.

During the revisionary study of the genus *Bryum* of India, some of the specimens which closely resemble with *Bryum pseudotriquetrum* var. *subrotundum* have been encountered from Mount Abu (Rajasthan). The taxon was not reported from any part of western India so far, therefore a new record for this territory.

## MATERIAL

The study is based on the specimens available in the Herbarium at National Botanical Research Institute, Lucknow (LWG) collected from various localities of Meghalaya, Darjeeling (Eastern Himalaya), Uttarakhand (Western Himalaya) and Mt. Abu (western India) as well as literature available. The authors also had privilege to examine authentic specimens of *B. pseudotriquetrum* of Western Himalaya and *B. pallescens* of Japan, borrowed from Farlow Herbarium (FH) and Musci Japonici Exsiccatae.

## TAXONOMIC OBSERVATION

### *Bryum pseudotriquetrum* var. *subrotundum*

(Brid.) Gangulee, Mosses E. India, 4: 994. 1974.

Text-figures 1-24

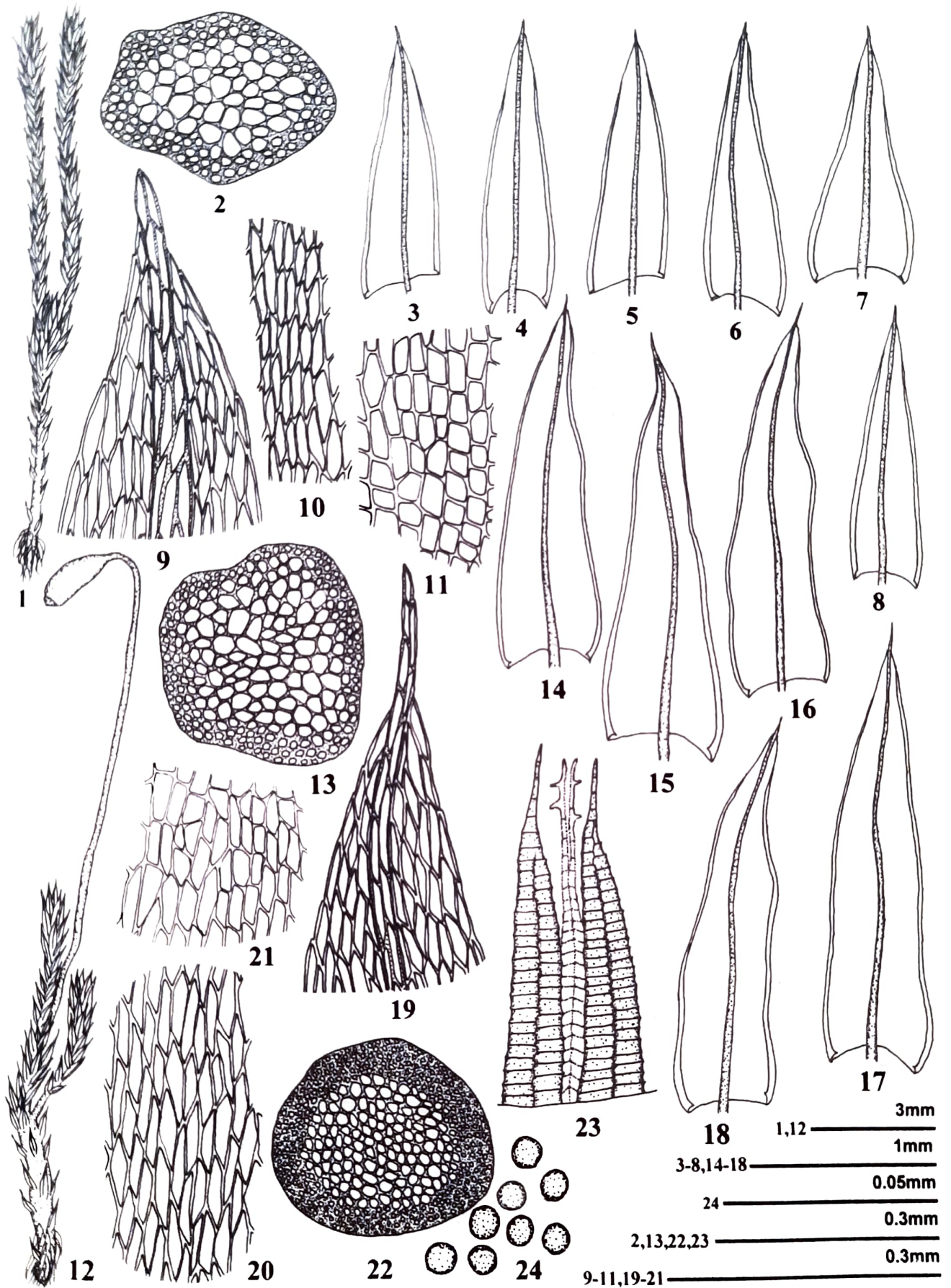
**Description:** Plants robust, in compact to dense turfs, yellowish green above, reddish below, 15-25 mm tall. Stems erect, red, stout with 2 or 3 subapical innovations, 154-160 × 140-145 µm in diameter. Leaves in comal tuft above somewhat distantly arranged below, twisted to contorted when dry, non-comal leaves erect-spreading when moist, oblong-lanceolate, 1.3-1.8 × 0.4-0.8 mm, gradually tapering into an acute apex, reddish-green or yellowish green above with red base; margin entire or serrulate near apex and completely entire below apex, revolute from base to apex; costa stout, excurrent in a 0.06-0.19 mm long arista; apical laminal cells hexagonal-rhomboid, 30-60 × 8.6-12.9 µm, median laminal cells rhombic to hexagonal, 47.3-64.5 × 8.6-12.9 µm, basal cells rectangular, shorter but wider, 25.8-43 × 17.2-25.8 µm, 1-2 rows of marginal cells are narrower, 98.9-116 × 4.3-6.4 µm, forming a distinct border from base to middle part of leaves. Perichaetial leaves narrowly oblong-lanceolate to narrowly triangular, longly acuminate, margin recurved to plane in innermost leaves, border in 1-2 rows, costa excurrent. Seta 18-25 mm long, reddish brown, straight to flexuose, arcuate to abruptly hooked below capsule. Capsule brown, pendulous, barrel-shaped, 2.4-4 × 1-1.5 mm and apophysis distinct; operculum conical, apiculate; peristome double and well developed, exostome teeth yellowish below, hyaline towards apex, 459-642 × 90-

102 µm, outer surface of exostome appears papillose and form reticulate type of ornamentation on the dorsal surface, endostome segments yellow, widely perforate with high basal membrane, not adherent to exostome, basal membrane about ½ the height of exostome, surface smooth, cilia 2-3, finely and moderately densely papillose, longly appendiculate. Spores yellowish green, 11-13 µm in diameter, densely papillate.

**Range of distribution:** India (Eastern Himalaya: Meghalaya - Shillong; West Bengal - Darjeeling; Western Himalaya: Uttarakhand - Garhwal hills; Mussoorie; Western India: Mount Abu; South India: Tamil Nadu - Nilgiri hills), Nepal, Siberia, Tibet. Europe. North Africa. North America.

**Specimens examined:** Eastern Himalaya: Meghalaya: Shillong, on way to Dawki, alt. ca. 1755 m, grows on wet rock, 24.10.2010, leg. V. Sahu & V. Awasthi 251563 & 251564B (LWG); West Bengal: Darjeeling, alt. ca. 2000 m, epiphytic, 18.04.1965, leg. S. Chandra 202143 (LWG); Sandakphu, alt. ca. 3500 m, epiphytic, 25.04.1965, leg. S. Chandra 202346 (LWG); Western Himalaya: Uttarakhand: Garhwal hills: Dehra Dun, Mussoorie, Lal Tibba route, alt. ca. 2370 m, grows on stone, 08.04.2001, leg. V. Nath & party 208803 & 208807 (LWG); Western India: Rajasthan: Mount Abu, Near Dilwara Temple, alt. ca. 1125 m, grows on rocks, 12.10.2006, and leg. V. Nath & party 229258 (LWG).

**Specimens examined of *B. pseudotriquetrum* (Hedw.) P. Gaertn., B. Mey. & Scherb.:** Eastern Himalaya: Meghalaya: Shillong, on way to Dawki, alt. ca. 1755 m, grows on rock, 24.10.2010, leg. V. Sahu & V. Awasthi 251560 (LWG); on way to Jowai, alt. ca. 1755 m, grows on rock, 26.10.2010, leg. V. Sahu & V. Awasthi 251684, 251686 & 251698 (LWG); on way to Cherrapunji, alt. ca. 1653 m, epiphytic, 25.10.2010, leg. V. Sahu & V. Awasthi 251650B (LWG); Western Himalaya: Himachal Pradesh: Botanical collections in North-western India, under the Auspices of the University of Michigan, Chandratul, Lahul, Kangra, Punjab, 1 September 1933, leg. Walter Koelz 6937, det. E. B. Bartram (FH); Kashmir: Herb. of Edwin B. Bartram, Flora of Kashmir, Sonuamarg, pine forest, c. 8000 ft., 18 Oct. 1952, coll. R. D. Svihla



**Text-figures 1-24.** *Bryum pseudotriquetrum* (Hedw.) Schwaegr. var. *subrotundum* (Brid.) Gangulee, 1-11 (LWG 229258): 1. Plant. 2. Cross-section of stem. 3-8. Leaves. 9. Apical laminal cells. 10. Median laminal cells. 11. Basal laminal cells; 12-24 (LWG 202346): 12. Plant. 13. Cross-section of stem. 14-18. Leaves. 19. Apical laminal cells. 20. Median laminal cells. 21. Basal laminal cells. 22. Cross-section of seta. 23. Peristome teeth. 24. Spores.

## DISCUSSION

3533, det. E. B. Bartram (FH); Gordon College Herb., Plants of Kashmir, Rama above astor, swampy place,  $\pm 10000$  ft., 27.7.1946, coll. R. R. Stewart 22927 & 22932, det. E. B. Bartram (FH); Uttarakhand: Kumaun hills: Nainital, alt. ca. 1368 m, grows on soil and rocks, 17.10.1976, leg. S. Chandra 202963 (LWG); University of Toronto Herbarium, Flora of India - Herb. Walker, 5 mi. south of Mansiari, Kumaon, wet rocks and trees, alt. 8000 ft. July 1899, coll. T. L. Walker 384, det. E. B. Bartram (FH); University of Toronto Herbarium, Flora of India - Herb. Walker, between Milam and Uttadhura Pass, Kumaon, 12000-17000 ft. Aug. 1899, coll. T. L. Walker 425, det. H. N. Dixon (FH); Central India: Madhya Pradesh: Amarkantak, Mai ki Bagia, alt. ca. 973 m, grows on soil, 08.10.2007, leg. R. Kapoor 248639B (LWG).

### Specimens examined of *B. pallescens*

**Schleich. ex Schwaegr.:** Eastern Himalaya: Meghalaya, Shillong, alt. ca. 1500 m, epiphytic, 10.04.1965, leg. S. Chandra 201331 (LWG); Western Himalaya: Uttarakhand, Garhwal hills: Dehradun, Chakrata, Janglat Chowki - Deoban, alt. ca. 2865 m, grows on soil, 10.10.1976, leg. S. Chandra 202852 (LWG); Ryogase, Niigata Prefecture, on soil in rocky place, May 24, 1952, coll. Y. Ikegami, det. H. Ochi (Musci Japonici Exsiccatae 508).

Variability of this moss has been discussed, especially with the material collected from 1755-2370 m altitude, including Mount Abu (1125 m). A total of two duplicate specimens collected from Meghalaya, West Bengal and Uttarakhand each along with one specimen from Mount Abu (Rajasthan) were examined for the present study. Variations in size of gametophyte and sporophyte have also been observed. For confirmation of the status of the present taxon, observations were also made on the specimens of *B. pseudotriquetrum* and *B. pallescens*.

This taxon shows close resemblance with *B. pseudotriquetrum* (Hedw.) P. Gaertn., B. Mey. & Scherb. and *B. pallescens* Schleich. ex Schwaegr. in most of the morphological features, viz. plant habit, leaf colour and leaf shape etc. but the plants are easily recognized by its large ( $2.4-4 \times 1-1.5$  mm), mostly pendulous, barrel shaped capsule with distinct apophysis. However, capsule in *B. pallescens* is shorter ( $2-3 \times 1-1.5$  mm), inclined to pendulous, elongate-clavate-pyriform and capsule of *B. pseudotriquetrum* is relatively larger ( $4.5-5 \times 2$  mm), pendulous and club-shaped. The leaves in the former taxon (*B. pseudotriquetrum* var. *subrotundum*) are larger and apical laminal cells are hexagonal-rhomboid whereas

Table 1. Comparative account of *Bryum pallescens*, *B. pseudotriquetrum* and *B. pseudotriquetrum* var. *subrotundum*.

Species	<i>B. pallescens</i>	<i>B. pseudotriquetrum</i>	<i>B. pseudotriquetrum</i> var. <i>subrotundum</i>
Plant colour	Bright green	Olive to yellow or fuscous green	Yellowish green to fuscous green
Plant size	18-20 (-25) mm	10-35(-40) mm	15-30(-35) mm
Leaves	Ovate or broadly oblong-acuminate	Oblong-ovate or broadly oblong-acuminate	Oblong-lanceolate
	Long acuminate	Short acuminate	Short acuminate
	Non decurrent or scarcely decurrent at base	Narrow and decurrent at base	Narrow and somewhat decurrent at base
	Border indistinct	Border distinct	Border distinct
Costa	Long excurrent (0.17-0.25 mm)	Usually short to rather long-excurrent (0.10-0.20 mm)	Short to long excurrent (0.10-0.18 mm)
Laminal cells	Apical cells short rhombic Basal cells rectangular	Apical cells rhomboidal Basal laminal cells rectangular or elongate-hexagonal	Apical cells hexagonal-rhomboid Basal cells rectangular
Perichaetial leaves	Lanceolate to triangular	Narrowly oblong-lanceolate to narrowly triangular	Narrowly oblong-lanceolate to narrowly triangular
Capsule	Ovate-clavate to elongate-pyriform	Club-shaped, elongate-ovate to oblong-clavate	Barrel shaped
	Horizontal or inclined to pendulous	Pendulous	Pendulous

*B. pallescens* has shorter leaves (1.3-2.1 × 0.6-0.9 mm) with short rhombic apical laminal cells and *B. pseudotriquetrum* has larger leaves (1.7-3.3 × 0.9-1.4 mm) with rhomboidal cells. The presence of oblong-lanceolate to narrowly triangular perichaetial leaves also separates this taxon from *B. pallescens* which have lanceolate to triangular perichaetial leaves (Table 1).

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