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NOTE

Current Status of Genus *Bryum* Hedw. in Eastern Himalaya, India

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ABSTRACT: A critical study on the genus *Bryum* Hedw., an acrocarpous moss of family Bryaceae, revealed the occurrence of 21 species from seven state of eastern Himalaya: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal. Among these twenty one species, *B. argenteum* var. *griffithii* (Muell. Hal.) Gangulee, *B. billardieri* Schwaegr., *B. pallescens* Schleich. ex Schwaegr., *B. pseudotriquetrum* (Hedw.) P. Gaertn., B. Meyer & Scherb., *B. pseudotriquetrum* var. *subrotundum* (Brid.) Gangulee and *B. reflexifolium* (Ochi) Ochi are new additions to Meghalaya; *B. billardieri* Schwaegr. to Manipur while *B. apiculatum* Schwaegr., *B. caespiticium* Hedw. and *B. pseudotriquetrum* var. *subrotundum* (Brid.) Gangulee are new for West Bengal. Identification key to all the known species of the genus occurring in eastern Himalaya, alongwith the notes on their ecology and distribution have been provided.

KEY WORDS: *Bryum*, moss, eastern Himalaya, India.

INTRODUCTION

The Bryaceae constitutes one of the largest families of mosses after Pottiaceae (Vohra and Aziz, 1997) with 13 genera and approximately 850 species (Shaw, 1985). Lal (2005) reported 11 genera under this family from India and out of which 10 genera: *Anomobryum* Schimp., *Brachymenium* Schwaegr., *Bryum* Hedw., *Epipterygium* Lindb., *Leptobryum* (B.S.G.) Wils., *Mielichhoferia* Nees & Hornsch., *Mniobryum* Limpr., *Plagiobryum* Lindb., *Pohlia* Hedw. and *Rhodobryum* (Schimp.) Hamp. are widely distributed in eastern Himalaya. The family includes those acrocarpous mosses which have erect and usually sparsely branched stems, capsules bearing ± sterile neck region and a diplolepideous peristome.

The genus *Bryum* Hedw. of this family is most important and occurrs in variety of habitats in tropical and subtropical regions of the world, yet it is poorly understood taxonomically due to its great species diversity and morphological plasticity within the species. The genus being polymorphic with about 700 species worldwide (Gangulee, 1974–1977) is placed under subfamily Bryoideae with other genera *Acidodontium, Anomobryum, Brachymenium, Plagiobryum, Roellia* and *Rhodobryum* (Spence, 1987).

Among the bryogeographical regions of India, eastern Himalaya is considered as one of the centre of origin and diversification of the bryophytes (Dixon, 1937). The region has considerably rich bryological diversity, which is due to the variable climatic conditions, habitat, geography and altitudinal variations.

Earlier published records (Mitten, 1859; Renauld and Cardot, 1895, 1896, 1900, 1905; Dixon, 1910, 1911 ab, 1914, 1931, 1937, 1938; Robinson, 1964, 1968; Noguchi, 1964, 1966, 1971; Wadhwa and Vohra, 1965; Noguchi *et al*., 1966; Gangulee, 1969–1980; Noguchi and Iwatsuki, 1975; Chopra, 1975; Vohra, 1978, 1979, 1980, 1983; Iwatsuki, 1979 ab; Aziz and Vohra, 1988; Bansal *et al*., 2010, 2011; Nath *et al*., 2011; Bansal and Nath, 2011) revealed that eastern Himalaya is rich in terms of moss flora, but only few reports are available for species of *Bryum* occurring in different states of this region. Ochi (1957, 1964) reported *Bryum argenteum* var. *lanatum, B. ramosum, B. thomsonii* and *B. truncorum* from Sikkim; *B. capillare*, *B. filiforme* var. *concinnatum, B. pseudoalpinum* from Darjeeling and *B. pseudoalpinum* var. *reflexifolium* from Darjeeling and Sikkim both. Noguchi (1966) published his first list of mosses in *Flora of Eastern Himalaya–I* and reported 17 taxa of this genus from eastern Himalaya. Five years later Noguchi (1971) added 6 more species to his earlier list from the region. Later Noguchi and Iwatsuki (1975) further added 6 taxa to the list of mosses of Eastern Himalaya. Earlier, Noguchi and Iwatsuki (1971) published a compiled list of mosses in eastern Himalaya wherein they reported 16 taxa under this genus.

Gangulee (1974–1977) made valuable contributions on the mosses of eastern India and adjacent regions and described twenty two species of *Bryum* from different parts of the country. He mentioned that Sikkim with 12 taxa was high in diversity, after which was Darjeeling with 9 taxa. Only 5 taxa were present in Khasia hills, Meghalaya while both Arunachal Pradesh and Assam were represented by 2 taxa each. Lal (2005) in his *Checklist of Indian Mosses* reported 21 taxa of the

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genus from eastern Himalaya, whereas Dandotiya *et al*. (2011) provided a checklist of the bryophytes of India which included 45 taxa of *Bryum* from India. They listed 26 taxa from eastern Himalaya including 15 taxa in Sikkim, 9 in Darjeeling, 7 in Khasia hills, 16 in Manipur, 4 in Assam, 2 in Arunachal Pradesh. Barukial (2011) reported 4 species of the genus from the Assam state. Bansal and Nath (2011) reported *B. argenteum* for the first time from Nagaland. Later, Govindapyari *et al.* (2012) listed the acrocarpous mosses from Imphal district, Manipur, and reported 13 taxa of *Bryum.* Bansal and Nath (2012 a,b) reported *B. bessonii* for the first time from eastern Himalaya and described *B. coronatum* as an addition to the bryoflora of Meghalaya.

The present work provides the current status of genus *Bryum* in eastern Himalaya which includes 2 taxa from Arunachal Pradesh, 10 from Assam, 11 from Manipur, 14 from Meghalaya, 2 from Nagaland, 14 from Sikkim and 13 from West Bengal, out of which 6 taxa of *Bryum* (*B. argenteum* var. *griffithii, B. billardieri, B. pallescens, B. pseudotriquetrum, B. pseudotriquetrum* var. *subrotundum* and *B. reflexifolium*) are new additions to the bryoflora of Meghalaya, 1 species (*B. billardieri*) to Manipur, 3 taxa (*B. apiculatum, B. caespiticium* and *B. pseudotriquetrum* var. *subrotundum*) to West Bengal bryoflora.

MATERIALS AND METHODS

The study is based on the specimens available at the Bryophyte Herbarium of the National Botanical Research Institute, Lucknow collected earlier from various localities of Meghalaya, West Bengal-Darjeeling, Nagaland and Manipur as well as those loaned from Farlow Herbarium (FH). The data on their distribution is based on the information collected from herbarium specimens as well as literature. The distribution of all the known species of eastern Himalaya is provided in the Map (Fig. 1.) and Table (Table 1), but *B. retusifolium* was not included in the map and table because the local distribution of this species in eastern Himalaya is not precisely known. Similarly *B. alpinum, B. atrovirens, B. billardieri, B. dichotomum* and *B. pallescens* were reported from West Bengal and *B. paradoxum* from Nagaland, are not included in the map because of lack of information on their local distribution. The voucher specimens have been deposited in the Bryophyte Herbarium of the National Botanical Research Institute, Lucknow (LWG).

TAXONOMIC TREATMENT

1. *Bryum alpinum* Huds. ex With., Syst. Arr. Brit. Pl. (ed. 4) 3: 824. 1801.

Ecology: Terricolous and Saxicolous; growing in association with *Hyophila involuta* (Hook.) A. Jaeger and other moss species.

Specimens examined: INDIA, Meghalaya: East Khasi Hills: Mawphlong, alt. *c.* 1500 m, grows on soil, 09.04.1965, Leg.: *S. Chandra, 201259* (LWG); Shillong: Lum Nehru Park, Umiam, alt. *c.* 1014 m., grows on rock, 23.10.2010, Leg.: *V. Sahu* & *V. Awasthi, 251550B* (LWG).

Range of Distribution in Eastern Himalaya: Manipur, Meghalaya, Sikkim, West Bengal.

2. *Bryum apiculatum* Schwaegr., Sp. Musc. Frond., Suppl. 1(2): 102. f. 72. 1816.

Ecology: Saxicolous and Terricolous; growing in association with *Asterella* sp., *Anthoceros bharadwajii* Udar & A.K. Asthana, *Anomobryum auratum* (Mitt.) A. Jaeger, *Funaria hygrometrica* Hedw., *Macrothamnium macrocarpum* (Reinw. & Hornsch.) M. Fleisch. and *Entodon* sp.

Specimens examined: INDIA, Manipur: 3 to 4 km away from Senapati to Khamson village (roadside), Senapati Distt., alt. *c.* 1336 m, grows on stony draine, 25.05.2009, Leg.: *V. Nath* & *A.K. Asthana*, *251362C* (LWG); West Bengal: Darjeeling, Tiger Hill, alt. *c.* 2432 m, grows on rock, 10.11.2003, Leg.: *A.K. Asthana* & *V. Sahu*, *225519B* (LWG); Darjeeling, on way to Senchal Lake, alt. *c.* 2273 m, grows on soil near road, 27.09.2002, Leg.: *A.K. Astahna* & *V. Sahu*, *224205B* (LWG).

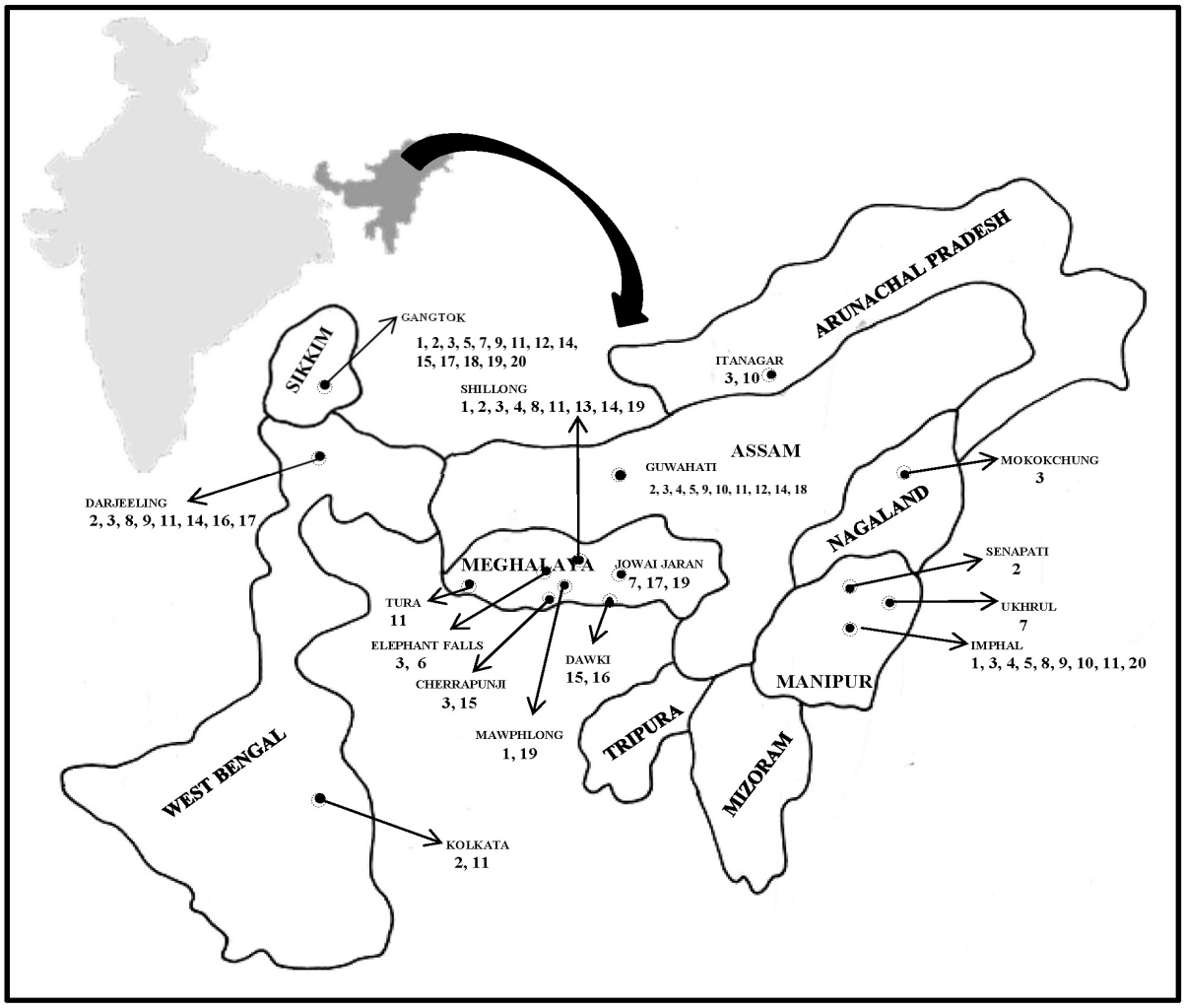
Range of Distribution in Eastern Himalaya: Assam, Manipur, Meghalaya, Sikkim, West Bengal.

3. *Bryum argenteum* Hedw., Sp. Musc. Frond. 181. 1801.

Ecology: Corticolous, Saxicolous and Terricolous; growing in association with *Hyophila involuta*, *Bryhnia decurvans* (Mitt.) Dixon, *Hyophila nymaniana* (M. Fleisch.) M. Menzel, *Brachymenium bryoides* Hook. ex Schwaegr., *Campylopus subgracilis* Renauld & Cardot ex Gangulee, *Funaria hygrometrica*, *Bryum parodoxum* Schwaegr., *Leucobryum nilghiriense* Muell. Hal., *Campylodontium flavescens* (Hook.) Bosch & Sande Lac., *Pohlia rigescens* (Mitt.) Broth. and other moss species and leafy liverworts.

Specimens examined: INDIA, Meghalaya: East Khasi Hills: Shillong Peak, alt. *c.* 1500 m, grows on soil, 20.04.1964, Leg.: *S. Chandra*, *201088(A4)* (LWG); Shillong, Cherrapunjee, alt. *c.* 912 m, grows on soil, 07.04.1965, Leg.: *S. Chandra*, *201139, 201140* (LWG); Elephant Falls, alt. *c.* 1500 m, grows on soil, 08.04.1965, Leg.: *S. Chandra*, *201227* (LWG); Umiam, Lum Nehru Park, alt. *c.* 1014 m, grows on bark of trees, 23.10.2010, Leg.: *V. Sahu* & *V. Awasthi*, *251546B* (LWG); on way to Shillong Peak road, alt. *c.* 1702 m, grows on bark of trees, 11.11.1998, Leg.: *V. Nath, A.K. Asthana, A.P. Singh* & *Mukesh*, *207967B* (LWG); *B. argenteum* var. *lanatum* (P. Beauv.) Hampe, Exsiccati Gangulee Collection, Shillong Peak, 2000 m, 20.X.58, Coll.: *H.C. Gangulee, 3465b*, Det.: *E.B. Bartram* (FH); Nagaland: Mokokchung, University Guest House, grows on the

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1. ***B. alpinum***
2. ***B. apiculatum***
3. ***B. argenteum***
4. ***B. argenteum* var. *griffithii***
5. ***B. atrovirens***
6. ***B. bessonii***
7. ***B. billardieri***
8. ***B. caespiticium***
9. ***B. capillare***
10. ***B. cellulare***
11. ***B. coronatum***
12. ***B. dichotomum***
13. ***B. pallescens***
14. ***B. paradoxum***
15. ***B. pseudotriquetrum***
16. ***B. pseudotriquetrum* var. *subrotundum***
17. ***B. reflexifolium***
18. ***B. rubens***
19. ***B. thomsonii***
20. ***B. uliginosum***

Fig. 1. Map showing distribution of genus *Bryum* Hedw. in Eastern Himalaya

bark of *Thuja* tree, 04.08.2008, Leg.: *V. Nath, 248818B* (LWG); grows on rocky walls, 04.08.2008, Leg.: *V. Nath, 248824C* (LWG); grows on moist stony walls, 04.08.2008, Leg.: *V. Nath, 248825C* (LWG); grows on side of pots, 04.08.2008, Leg.: *V. Nath, 248831B* (LWG); Sikkim: Himalayan Mosses, Gangtok–Chengu road, 6000–(?) ft., 10.X.58, Coll.: *H. Gangulee,* 3425, Det.: *E.B. Bartram* (FH); Chengu–Nathala road, 12,000 ft., 11.X.58, Coll.: *H.C. Gangulee, 3436b*, Det.: *E.B. Bartram* (FH); Sheralothang, 13600 ft., 12.X.58, Coll.: *H. Gangulee, 3452* (FH); Gangtok, 5000 ft., terrestrial, mixed with *Pogonatum*, 10.8.58, Coll.: *H.C. Gangulee, 3424,* Det.: *E.B. Bartram* (FH); West Bengal: Darjeeling, Sandakphu, alt. *c.* 3500 m, grows on soil, 25.04.1965, Leg.: *S. Chandra*, *202347B* (LWG); on way to Teesta, alt. *c.* 1697 m, grows on stony wall, 26.09.2002, Leg.: *A.K. Asthana & V. Sahu, 224186B* (LWG); Manebhanjan, alt. *c.* 1879

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m, grows on stony wall, 1.11.2003, Leg.: *A.K. Asthana* & *V. Sahu*, *224313* (LWG); Darjeeling, 9.X.56, Coll.: *H.C. Gangulee, 3019* (FH); *B. argenteum* var. *lanatum* (P. Beauv.) Hampe, Himalayan Mosses, Darjeeling roadside, 7000 ft., 6.X.57, Coll.: *H.C. Gangulee, 4902*, Det.: *E.B. Bartram* (FH); Mosses of India, Darjeeling, 7000 ft, on road parapet, 10 Oct. 1957, Coll.: *H.C. Gangulee, 4988*, Det.: *E.B. Bartram* (FH).

Range of Distribution in Eastern Himalaya: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal.

4. *Bryum argenteum* var. ***griffithii*** (Muell. Hal.) Gangulee, Moss. East Ind. and Adj. Regions, Fasc. 4: 973. 1974–1977.

Ecology: Saxicolous; growing in association with *Hyophila nymaniana*.

Specimen Examined: INDIA, Meghalaya: Shillong: Lum Nehru Park, Umiam, alt. *c.* 1014 m., grows on stony wall, 23.10.2010, Leg.: *V. Sahu* & *V. Awasthi, 251557* (LWG).

Range of Distribution in Eastern Himalaya: Assam, Manipur, Meghalaya.

5. *Bryum atrovirens* Brid., Muscol. Recent. 2(3): 48 1803.

Range of Distribution in Eastern Himalaya: Assam, Manipur, Sikkim, West Bengal.

6. *Bryum bessonii* Ren. & Card. *in* Podr., Fl. Bryol. Madag. Suppl. 59. 1909.

Ecology: Corticolous; growing in association with other moss species.

Specimen Examined: INDIA, Meghalaya: East Khasi Hills: Shillong, Elephant Fall, alt. *c.* 1500 m, grows on bark of trees, 08.04.1965 Leg.: *S. Chandra*, *201229* (LWG).

Range of Distribution in Eastern Himalaya: Meghalaya.

7. *Bryum billardieri* Schwaegr., Sp. Musc. Frond., Suppl. 1: 115. 1816.

Ecology: Corticolous and Saxicolous; growing in association with *Neckera setschwanica* Broth., *Pseudotrachypus ancistrodes* (Renauld & Cardot) V. Nath & Bansal and *Hymenostylium recurvirostrum* (Hedw.) Dixon.

Specimens examined: INDIA, Manipur: Ukhrul Distt., Duncan Park, (Orchid Park), alt. *c.* 1614 m, grows on bark of *Pinus* tree, 23.05.2009, Leg.: *V. Nath* & *A.K. Asthana*, *249276* (LWG); grows on bark of trees, 23.05.2009, Leg.: *V. Nath* & *A.K. Asthana*, *249290* (LWG); Foot hills of Shirui Peak, alt. *c.* 1818 m, on rock, 24.05.2009, Leg.: *V. Nath* & *A.K. Asthana*, *251323* (LWG); MEGHALAYA: Jowai Jarain, alt. *c.* 1500 m, grows on bark of trees, 06.04.1965, Leg.: *S. Chandra*, *201088(A27)-B* (LWG).

Range of Distribution in Eastern Himalaya: Manipur, Meghalaya, Sikkim, West Bengal.

8. *Bryum caespiticium* Hedw., Sp. Musc. Frond. 180. 1801.

Ecology: Terricolous; growing in association with *Anomobryum filiforme* var. *concinnatum* (Spruce) Loeske.

Specimen Examined: INDIA, West Bengal: Darjeeling, on way to Sandakphu, alt. *c.* 3091 m, 5.11.2003, grows on soil, Leg.: *A.K. Asthana* & *V. Sahu*, *225371* (LWG).

Range of Distribution in Eastern Himalaya: Manipur, Meghalaya, West Bengal.

9. *Bryum capillare* Hedw., Sp. Musc. Frond., 182. 1801

Ecology: Saxicolous, Corticolous and Terricolous; growing in association with *Hyophila involuta*, *Barbula* sp., *Oligotrichum semi-lamellatum* var. *darjeelingense* Gangulee, *Entodon luteonitens* Renauld & Cardot, *Campylopus schimperi* Milde *Clapodium prinophyllum* (Muell. Hal.) Broth., *Solenostoma* sp. and *Scapania* sp.

Specimens Examined: INDIA, West Bengal: Darjeeling, Lebong road, alt. *c.* 1818 m, grows on stone wall, 24.09.2002, Leg.: *A.K. Asthana* & *V. Sahu*, *224040C* (LWG); on way to Tonglu from Manebhanjan, alt. *c.* 2091m, grows on bark of trees, 02.11.2003, Leg.: *A.K. Asthana* & *V. Sahu*, *224329E* (LWG); Himalayan Mosses, Darjeeling, ±10,000 ft, 11.VI.59, Coll.: *H. Gangulee, 3518*, Det.: *E.B. Bartram* (FH); Mosses of India, Darjeeling, 7500 ft, water edge, terrestrial, 13 Oct. 1957, Coll.: *H. Gangulee, 5006 (a)*, Det.: *E.B. Bartram* (FH).

Range of Distribution in Eastern Himalaya: Assam, Manipur, Sikkim, West Bengal.

10. *Bryum cellulare* Hook., Sp. Musc. Frond., Suppl. 3(1): 214. 1827.

Range of Distribution in Eastern Himalaya: Arunachal Pradesh, Assam, Manipur.

11. *Bryum coronatum* Schwaegr., Sp. Musc. Frond., Suppl. 1(2): 103. pl. 71. 1816.

Ecology: Corticolous and Saxicolous; growing in association with *Fossombronia himalayensis* Kashyap, *Entodon scariosus* Renauld & Cardot, *Hyophila involuta* and other moss species.

Specimens examined: INDIA, Meghalaya: West Garo Hills, Forest Teele Tura Hills, alt. *c.* 410 m, grows on rocky soil near road, 19.09.1999, Leg.: *A.P. Singh* & *M. Lal*, *208101* (LWG); Shillong, Umiam, Lum Nehru Park, alt. *c.* 1014 m, grows on bark of trees, 23.10.2010, Leg.: *V. Sahu* & *V. Awasthi*, *251533* (LWG); West Bengal: Exsiccati Gangulee collection, Darjeeling, 5000 ft., on rock, Det.: *E.B. Bartram* (FH *4945*); Baruipur (near Calcutta), on brick wall, Sept. 7, 1958, Coll.: *H.C. Gangulee, 793* (FH).

Range of Distribution in Eastern Himalaya: Assam, Manipur, Meghalaya, Sikkim, West Bengal.

12. *Bryum dichotomum* Hedw., Sp. Musc. Frond. 183. 1801.

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Range of Distribution in Eastern Himalaya: Assam, Sikkim, West Bengal.

13. *Bryum pallescens* Schleich. ex Schwaegr., Sp. Musc. Frond., Suppl. 1(2): 107. pl. 75. 1816.

Ecology: Corticolous; growing in association with other moss species.

Specimen Examined: INDIA, Meghalaya: Shillong, alt. *c.* 1500 m, grows on the bark of trees, 10.04.1965, Leg.: *S. Chandra*, *201331* (LWG).

Range of Distribution in Eastern Himalaya: Meghalaya, West Bengal.

14. *Bryum paradoxum* Schwaegr., Sp. Musc. Frond., Suppl. 3(1): pl. 244a. 1827.

Ecology: Saxicolous; growing in association with *Mnium cuspidatum* Hedw., *Semibarbula orientalis* (F. Weber) Wijk & Margad., *Anomobryum filiforme* var. *concinnatum* (Spurce) Loeske, *Campylopus* sp., *Funaria hygrometrica*, *Bryum argenteum*, *Hyophila involuta*, *Anthoceros bharadwajii*, *Phaeoceros carolinianus* (Michx.) Prosk. and *Asterella khasiana* (Griff.) Grolle.

Specimens examined: INDIA, West Bengal: Darjeeling, HMI road, alt. *c.* 1970 m, grows on soil covered rocky wall, 23.09.2002, Leg.: *A.K. Asthana* & *V. Sahu*, *223999D* (LWG); Tiger hill, alt. *c.* 2545 m, grows on soil covered rock, 25.09.2002, Leg.: *A.K. Asthana* & *V. Sahu*, *224076D* (LWG); on way to Teesta, alt. *c.* 1697 m, grows on stony wall, 26.09.2002, Leg.: *A.K. Asthana* & *V. Sahu*, *224186C* (LWG); at Senchal Lake, alt. *c.* 2273 m, grows on soil covered rock, 26.09.2002, Leg.: *A.K. Asthana* & *V. Sahu*, *224209C* (LWG).

Range of Distribution in Eastern Himalaya: Assam, Meghalaya, Nagaland, Sikkim, West Bengal.

15. *Bryum pseudotriquetrum* (Hedw.) P. Gaertn., B. Mey. & Scherb., Oek. Techn. Fl. Wetterau 3(2): 102. 1802.

Ecology: Saxicolous and Corticolous; growing in association with *Homaliodendron microdendron* (Mont.) M. Fleisch.

Specimens examined: INDIA, Meghalaya: Shillong: on way to Dawki, alt. *c.* 1755 m, grows on rock, 24.10.2010, Leg.: *V. Sahu* & *V. Awasthi*, *251560* (LWG); on way to Cherrapunji, alt. *c.* 1653 m, grows on bark of trees, 25.10.2010, Leg.: *V. Sahu* & *V. Awasthi*, *251650B* (LWG).

Range of Distribution in Eastern Himalaya: Meghalaya, Sikkim.

16. *Bryum pseudotriquetrum* var. ***subrotundum*** (Brid.) Gangulee, Moss. East. Ind. and Adj. Regions, Fasc. 4: 994. 1974–1977.

Ecology: Corticolous and Saxicolous; growing in association with *Campylopus atrovirens* De Not. and other *Campylopus* sp.

Specimens examined: INDIA, Meghalaya: Shillong: on way to Dawki, alt. *c.* 1755 m, grows on wet rock, 24.10.2010, Leg.: *V. Sahu* & *V. Awasthi*, *251563, 251564B* (LWG); West Bengal: Darjeeling, alt. *c.* 2000 m, grows on bark of trees, 18.04.1965 Leg.: *S. Chandra*, *202143* (LWG); Sandakphu, alt. *c.* 3500 m, grows on bark of trees, 25.04.1965 Leg.: *S. Chandra*, *202346* (LWG).

Range of Distribution in Eastern Himalaya: Meghalaya, West Bengal.

17. *Bryum reflexifolium* (Ochi) Ochi *in* Ohashi, Bull. Univ. Museum, Univ. Tokyo N. 8: 261. 1975.

Ecology: Saxicolous; growing in association with *Papillaria fuscescens* (Hook.) A. Jaeger, *Campylopus* sp., *Plagiochila* sp., *Herbertus* sp., *Scapania* sp., *Racomitrium subsecundum* (Hook. & Grev. ex Harv.) Mitt., *Plagiochila semidecurrens* (Lehm. & Lindenb.) Lehm. & Lindenb., *Orontobryum recurvulum* Gangulee and other species of mosses of family Bartramiaceae and Dicranaceae and liverwort.

Specimens examined: INDIA, Meghalaya: East Khasi Hills: Shillong, on way to Jowai, alt. *c.* 1287 m, grows on rock, 26.10.2010, Leg.: *V. Sahu* & *V. Awasthi*, *251689B* (LWG); West Bengal: Darjeeling, Tiger hill, alt. *c.* 2545 m, grows on soil covered rock, 25.09.2002, Leg.: *A.K. Asthana* & *V. Sahu*, *224073E* (LWG); on way to Tonglu, alt. *c.* 2576 m, grows on rock, 2.11.2003, Leg.: *A.K. Asthana* & *V. Sahu*, *224354* (LWG).

Range of Distribution in Eastern Himalaya: Meghalaya, Sikkim, West Bengal.

18. *Bryum retusifolium* Card. & P. Varde, Rev. Bryol. 50: 20. 7. 1923.

Range of Distribution: Eastern Himalaya.

19. *Bryum rubens* Mitt., Hooker's J. Bot. Kew Gard. Misc. 8: 232. 1856.

Range of Distribution in Eastern Himalaya: Assam, Sikkim.

20. *Bryum thomsonii* Mitt., Jour. Linn. Soc. Bot. Suppl. 1: 73. 1859.

Ecology: Terricolous; growing in association with *Hymenostylium recurvirostrum* (Hedw.) Dix.

Specimens examined: INDIA, Meghalaya: East Khasi Hills: Mawphlong, alt. *c.* 1500 m, grows on soil, 09.04.1965 Leg.: *S. Chandra*, *201268* (LWG); Shillong, alt. *c.* 1500 m, grows on soil, 11.04.1965 Leg.: *S. Chandra*, *201402* (LWG); Jaintia Hills: Jowai Jarain, alt. *c.* 1500 m, grows on soil, 06.04.1965 Leg.: *S. Chandra*, *201088(A8)-B* (LWG).

Range of Distribution in Eastern Himalaya: Meghalaya, Sikkim.

21. *Bryum uliginosum* (Brid.) Bruch, Schimper & W. Gümbel in Bryol. Eur. 4: 88. 1839.

Range of Distribution in Eastern Himalaya:

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Manipur, Sikkim.

Key to the species of *Bryum* of Eastern Himalaya

1a. Plant silvery green; leaves with hyaline leaf apices…….. 2
1b. Plant green to brownish red; leaves with chlorophyllous leaf apices…….. 3
2a. Leaves broadly ovate or rounded-ovate, ovate to ovate-lanceolate, cucullate; margins plane distally or slightly reflexed; costa percurrent or excurrent in slender, hyaline, 0.14–0.34 mm long arista …… ***B. argenteum***
2b. Leaves broadly ovate, concave; margin flat; costa may end much below tip or may extend to the acumen as a thin, very transparent, 0.06–0.13 mm long arista …….. ***B. argenteum* var. *griffithii***
3a. Rhizoidal gemmae present ……. 4
3b. Rhizoidal gemmae absent ……. 5
4a. Rhizoidal gemmae 150–200 µm in diameter, ±spherical cell …….. ***B. rubens***
4b. Rhizoidal gemmae ±500 µm in diameter, spherical... ***B. atrovirens***
5a. Axillary gemmae present; capsule spherical …..... ***B. dichotomum***
5b. Axillary gemmae absent; capsule not spherical …… 6
6a. Plant deep red to reddish brown or with red tint …… 7
6b. Plant dark green to pale green …… 8
7a. Plant reddish brown; leaf margin entire, strongly revolute from base to apex …… ***B. bessonii***
7b. Plant deep red or with reddish tint; leaf margin slightly denticulate at apex, irregularly reflexed …….. ***B. alpinum***
8a. Leaves spirally twisted around stem when dry…… ***B. capillare***
8b. Leaves not spirally twisted around stem when dry …… 9
9a. Leaves strongly concave with percurrent costa …… 10
9b. Leaves less or non concave with excurrent costa …… 11
10a. Leaves broadly elliptical or spathulate, cucullate at apex; apex acute …… ***B. cellulare***
10b. Leaves ovate-oblong, concave, often crenulate at apex; apex retuse …..... ***B. retusifolium***
11a. Leaves ovate-oblong-spathulate or lingulate with upper 1/3 margin strongly dentate-serrulate …….. ***B. billardieri***
11b. Leaves lanceolate or ovate-lanceolate or oblong–lanceolate with entire or slightly denticulate margin …… 12
12a. Capsule shape like a cup on another cup with thick and spongy apophysis …… ***B. coronatum***
12b. Capsule elongate-ovate to oblong-pyriform to clavate-pyriform with a short or long tapering and distinct apophysis …… 13
13a. Leaves with distinct border …… 14
13b. Leaves without or with indistinct border …… 16
14a. Capsule elongate-ovate to oblong-clavate with a short to fairly long, slender neck …… ***B. pseudotriquetrum***
14b. Capsule ovate-clavate to clavate-pyriform …….. 15
15a. Capsule pendulous, barrel-shaped with more distinct apophysis …… ***B. pseudotriquetrum* var. *subrotundum***
15b. Capsule horizontal or inclined to pendulous, ovate-clavate to elongate-clavate-pyriform with less distinct apophysis…… ***B. pallescens***
16a. Leaves margin strongly revolute …… 17
16b. Leaves margin flat or irregularly reflexed-revolute …… 19
17a. Leaves plicate with decurrent and tinted base, shortly acuminate …….. ***B. reflexifolium***
17b. Leaves non plicate, without tint, longly acuminate …… 18
18a. Leaves bright green; margins often narrowly recurved all along the length; costa excurrent, ending in a 0.11–0.21 mm long arista…… ***B. paradoxum***
18b. Leaves light–silky green; margins broadly reflexed to strongly revolute all along the length; costa long–excurrent, ending in a 0.30–0.48 mm long arista …… ***B. caespiticium***
19a. Inner peristome incomplete …… ***B. uliginosum***
19b. Inner peristome complete …… 20
20a. Margins narrowly recurved almost throughout leaf; costa excurrent in a short to long arista …… ***B. apiculatum***
20b. Margins usually plane, sometimes irregularly revolute; costa excurrent in a long arista …… ***B. thomsonii***

Statics of the Distributional Range and Ecology

The present account deals with the current status of *Bryum* species in eastern Himalaya. The study reavealed that Meghalaya is represented by maximum number of 14 species followed by Sikkim and West Bengal with 13 species respectively, Manipur with 11 species and Assam by 9 species only, whereas, Arunachal Pradesh and Nagaland have minimum number of 2 species each.

An analysis of altitudinal distribution reveals that majority of the *Bryum* species (*B. alpinum, B. bessonii, B. billardieri, B. pallescens, B. pseudotriquetrum* var. *subrotundum* and *B. thomsonii*) are distributed between the altitude of 1000–2000 m, however, *B. apiculatum, B. capillare, B. paradoxum* and *B. pseudotriquetrum* are reported between the altitude 1000–3000 m whereas *B. capillare, B. caespiticium* and *B. pseudotriquetrum* are found at above 3000 m also. On the other hand, *B. reflexifoilum* is repoted at the altitudinal range between 2000–3000 m whereas *B. coronatum* is reported between the altitude 1000–2000 m as well as below 1000 m (410 m). Maximum altitudinal variation can be attributed by *B. argenteum*, grows between the altitude 1000–4000 m as well as below 1000 m and above 4000 m.

It has been found that the species of *Bryum* in eastern Himalaya occur as corticolous, saxicolous and terricolous. Saxicolous species are more dominant with 11 taxa, followed by 8 epiphytic species and 6 terricolous species respectively. *B. bessonii* and *B. pallescens* grow in pure population on the bark of trees; *B. argenteum* var. *griffithii*, *B. paradoxum, B. reflexifolium* grow on rocks; *B. caespiticium* and *B. thomsonii* on soil, whereas *B. argenteum* and *B. capillare* were found in all the three habitats.

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Table 1: Distribution of genus *Bryum* in various states of Eastern Himalayan regions of India

S.No.	*Bryum* taxa	Arunachal Pradesh	Assam	Manipur	Meghalaya	Nagaland	Sikkim	West Bengal
1.	***B. alpinum***	-	-	+	+	-	+	+
2.	***B. apiculatum***	-	+	+	+	-	+	+
3.	***B. argenteum***	+	+	+	+	+	+	+
4.	***B. argenteum* var. *griffithii***	-	+	+	+	-	-	-
5.	***B. atrovirens***	-	+	+	-	-	+	+
6.	***B. bessonii***	-	-	-	+	-	-	-
7.	***B. billardieri***	-	-	+	+	-	+	+
8.	***B. caespiticium***	-	-	+	+	-	-	+
9.	***B. capillare***	-	+	+	-	-	+	+
10.	***B. cellulare***	+	+	+	-	-	-	-
11.	***B. coronatum***	-	+	+	+	-	+	+
12.	***B. dichotomum***	-	+	-	-	-	+	+
13.	***B. pallescens***	-	-	-	+	-	-	+
14.	***B. paradoxum***	-	+	-	+	+	+	+
15.	***B. pseudotriquetrum***	-	-	-	+	-	+	-
16.	***B. pseudotriquetrum var. subrotundum***	-	-	-	+	-	-	+
17.	***B. reflexifolium***	-	-	-	+	-	+	+
18.	***B. rubens***	-	+	-	-	-	+	-
19.	***B. thomsonii***	-	-	-	+	-	+	-
20.	***B. uliginosum***	-	-	+	-	-	+	-
	Total	2	10	11	14	2	14	13

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印度東喜瑪拉雅山地區真蘚屬之現況

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摘要：真蘚屬是真蘚科下具頂生蒴的分類群，本研究針對東喜瑪拉雅山之真蘚屬作調查，共有二十一個物種分布在七個邦：阿魯納恰爾邦、阿薩姆邦、曼尼普爾邦、梅加拉亞邦、那加蘭邦、錫金邦和西孟加拉邦。在這二十一個物種中，*Bryum argenteum* var. *griffithii*、大真蘚、黃色真蘚、*B. pseudotriquetrum* var. *subrotundum*、擬三列真蘚、*B. reflexifolium*在梅加拉亞邦為新分布；大真蘚的新分布則在曼尼普爾邦；叢生真蘚和*B. pseudotriquetrum* var. *subrotundum*在西孟加拉邦為新分布。本文除提供目前在東喜瑪拉雅分布的真蘚屬檢索表外，也提供各物種之分布範圍和生態資訊。

關鍵詞：真蘚屬、東喜馬拉雅山、印度、苔蘚。

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