

## FLORISTIC ACCOUNT OF BOLDHA GARDEN, DHAKA : CLASS-HEPATICOPSIDA AND BRYOPSIDA

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### Abstract

The Boldha garden, Dhaka, is rich in Bryophyte flora because of its special micro-environment. The present paper on Hepaticopsida and Bryopsida includes an account of 32 species under 12 genera, 10 families and 8 orders. A short taxonomic description of each species with locations, date of collection, name of collectors and alphabetic arrangement of taxa are provided.

### Introduction

Khan<sup>(1,2)</sup> for the first time started outstanding work on Bryophytes in Bangladesh. He reported a number of new species of *Riccia* L. from Bangladesh amongst them *Riccia perssonii* Khan, *R. bengalensis* Khan and *R. arnellii* Khan are noteworthy. Tixier<sup>(3)</sup> collected Bryophyte specimens from the south-eastern regions of Bangladesh and published a report on leafy Hepaticopsida. Hadiuzzaman and Chakravarty<sup>(4)</sup> reported six species of the order Marchantiales of Bangladesh. Banu<sup>(5)</sup> worked on Acrocarpous mosses of Bangladesh. She identified 96 taxa of which 77 were new report from Bangladesh. Kamruzzaman<sup>(6)</sup> worked on the genus *Riccia* L. of Bangladesh and reported 45 taxa of which 3 had been reported for the first time from Bangladesh and 36 proposed as new to science. Banu-Fattah<sup>(7)</sup> reported bryophytic flora of Chittagong zone. Khatun<sup>(8)</sup> worked on Pleurocarpous mosses of Bangladesh. She identified 72 taxa of them 62 were reported for the first time from Bangladesh. Banu-Fattah and Sarker<sup>(9)</sup> published a comprehensive list of mosses under the class Bryopsida from greater Mymensingh district. Recently they reported 48 species of Bryophytes of same region under the classes Hepaticopsida and Anthocerotopsida<sup>(10)</sup>.

An attempt has been made for the first time to prepare a comprehensive list with short description of Bryophytes under the class Hepaticopsida and Bryopsida of Boldha garden, Dhaka.

### Materials and Methods

The report was mainly based upon fresh materials collected from different sites of Boldha garden (latitude 23°43'0" and longitude 90°25'9"), Dhaka. The Boldha garden

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consists of approximately 3.38 acre which was divided into two units named as 'Psyche' and 'Cybele'. The soil was sandy loam to clay type with a pH 6.7 and annual average temperature was maximum 34.5°C and minimum 11.5°C. The average rainfall was about 194 cm.

From the Boldha garden 200 leafy and thalloid samples were collected during July, 2006 to December, 2007. The classification of identified species followed in this enumeration was that of the system used by Parihar for the class Hepaticopsida<sup>(11)</sup> and Gangulee for the class Bryopsida<sup>(12)</sup>. All the collected specimens were preserved in the Bryology Herbarium, Department of Botany, University of Dhaka.

### Results and Discussion

The present study comprises an account of 32 species under 12 genera, 10 families, 8 orders and 2 classes. Nine species of the class Hepaticopsida comprises of 2 genera, 2 families and 1 order whereas in the class Bryopsida, 23 species comprises of 10 genera, 11 families and 7 orders.

It has been observed that leafy as well as thalloid Bryophytes grow very well in Boldha garden because of suitable environment. *Riccia billardieri* Mont. et Nees and *Fissidens areolatus* Griff. also grow widely in this garden.

A short taxonomic description of 32 species of the class Hepaticopsida and Bryopsida found in Boldha garden are given in following section.

### Taxonomic enumeration

**Class: Hepaticopsida, Order: Marchantiales, Family: Cyathodiaceae**

**Genus: Cyathodium** Kunze, in Lehm., Pug. VI p. 17 (1854).

1. **Cyathodium tuberosum** Kashyap, New Phyt. Vol. XIII, p. 210 (1914).

*Cyathodium penicillatum* St., Sp. Hep. Vol. VI p. 4 (1916)

Plants dioecious, thalloid, thin, small, greenish or yellow, dichotomously branched for once to thrice, densely overlapping, with thin vertical partitions, lobes linear to oblong; sporangium surrounded by ovoid involucre and spores spiny.

*Specimen examined:* On the wall of semi-elliptical Cacti house in the Psyche part, Md. Saidur Rahman, 12. 10. 2006, 01.

**Family: Ricciaceae, Genus: Riccia** L., Sp. P1. p.1138 (1753).

2. **Riccia bengalensis** Khan, The Bryologist **60**: 29-31 (1957).

Plants thalloid, monoecious, greenish, overlapping in dense, sometimes twice or thrice dichotomously branched; epidermal cells dome shaped; sporangia dorsal or slightly projecting ventrally, spores papillate and papillae usually arise from the angle of areole.

*Specimen examined:* In the pot near the circular structure of the Psyche part, on moist soil, Md. Saidur Rahman, 12. 11. 2006, **09, 13**.

3. **Riccia billardieri** Mont. *et* Nees Sp. Hep. 602 (1846)

*R. bulbifera* St. Sp. Hep. **1: 24**(1898)

Plants thalloid, greenish, crowded, overlapping, rarely incomplete rosette, dichotomously branched for twice or thrice, or sometimes unbranched, thin, margin wavy; scales semi-lunar, sporangia grow ventrally or slight dorsally, spores winged and wing cart wheel like.

*Specimen examined:* In the greenhouse of the Cybele part, on moist soil, Md. Saidur Rahman, 12. 11. 2006, **02, 38, 45, 67, 09**. 12. 2006, 26. 04. 2007, **53, 29, 56, 28**.

4. **Riccia bogransis** Zaman *et* Syed, in Kamruzzaman, Ph.D. thesis, Univ. Dhaka, p. 77-80 (1995).

Plants thalloid, monoecious, light green, irregularly in dense, overlapping and rarely forming rosette; scale absent; sporangia arise ventrally, spores winged and areole wall thicken.

*Specimen examined:* In the pot, near the circular structure of the Psyche part, on moist soil, Md. Saidur Rahman, 12. 11. 2006, **43**.

5. **Riccia discolor** L. *et* L. Pugil. **4 : 1** (1832).

Plants thalloid, dioecious, forming rosette, sometimes overlapping, dichotomously branched for twice or thrice; scales semi-lunar, sporangium dorsal, spores wingless and no tri-radiating mark.

*Specimen examined:* In the pot, near the circular structure of the Psyche part, on moist soil, Md. Saidur Rahman, 12. 11. 2006, **11**.

6. **Riccia gangetica** Ahmad, Curr. Sci. **11:** 433 (1942).

Plants thalloid, monoecious, dark green normally in dense, overlapping and rarely forming rosette, unbranched or dichotomously branched; scales hyaline, multi-cellular; sporangia ventral, spores wall reticulated and spores wingless.

*Specimen examined:* In the big greenhouse of the Cybele part, on moist soil, Md. Saidur Rahman, 10. 09. 2006, **38a**.

7. **Riccia lithophilii** Zaman *et* Syed, in Kamruzzaman, Ph.D. thesis, Univ. Dhaka, p. 136-139 (1995).

Plants thalloid, monoecious, greenish, forming mat, irregularly overlapping and sometimes forming rosette; sporangia ventral, spores winged, wing crenate, wall reticulate, dorsal reticulation complete and ventral reticulation incomplete.

*Specimen examined:* In the miniature artificial hillocks of the Psyche part, on stone, Md. Saidur Rahman, 12.11.2006, **19a**.

8. **Riccia mogransis** Zaman *et* Syed, in Kamruzzaman, Ph.D. thesis, Univ. Dhaka, p. 148-151 (1995).

Plants thalloid, monoecious, greenish, forming rosette, sometimes crowded and overlapping; sporangia dorsal, spores winged and wall reticulated.

*Specimen examined:* In the pot, near the circular structure of the Psyche part, on moist soil, Md. Saidur Rahman, 12. 04. 2007, **03**.

9. **Riccia sullivantii** Aust., *The Bryologist* **73**: 47 (1970).

Plants thalloid, dark green, forming rosette; ventral scales inconspicuous, sporangia pendulous, spores spiny and reticulate without tri-radiating mark.

*Specimen examined:* Near the base of the observatory tower in the Psyche part, on moist soil, Md. Saidur Rahman, 12. 11. 2006, **14a**.

**Class: Bryopsida, Order: Fissidentales, Family: Fissidentaceae**

**Genus : Fissidens** Hedw., *Sp. Musc.* 152 (1801)

10. **Fissidens areolatus** Griff., *Call. J. Nat. Hist.* **2** : 506 (1842).

*F. polyodioides* Hedw. var. *areolatus* (Griff.) Wils., *Kew J. Bot.* **9** : 294 (1857)

Plants green in color, unbranched, shoot with 18 - 22 pairs of leaves; leaves oblong-lingulate, some slightly acute; sheathing laminae closed; costa brown, usually percurrent; laminal cells smooth and pentagonal-hexagonal. Female plant not found.

*Specimen examined:* In the large greenhouse of the Cybele part, on damp soil and damp bricks, Md. Saidur Rahman, 10.12.2006, **11, 12, 5, 10, 17, 26, 29, 30**.

11. **Fissidens ganguleei** Nork. in Gang., *Mosses of East. Ind. and Adj. Reg. Fasc.* **2**: 527-528(1971).

*F. lancifolius* Hamp. *ex* Gang., *Bull. Bot. Soc. Bengal* **11** : 75 (1967).

Plants yellowish-green, unbranched; shoot with 15 - 17 pairs of leaves; leaves ovate-lanceolate to oblong-lanceolate; sheathing laminae are unequal, slightly larger than 1/2 of the whole leaf; margin crenulate all along except base to sheathing laminae; costa slightly excurrent or percurrent and laminal cells smooth.

*Specimen examined:* Southern side of the circular structure in the Psyche part, on moist soil, Md. Saidur Rahman, 10. 12. 2006, **15**.

12. **Fissidens garberi**. Lesq. *et.* James, *Proc. Amer. Acad. Arts. Sci.* **14** : 139 (1879)

Plants yellow-green, usually unbranched, shoot with 12 - 15 pairs of leaves; leaves oblong-lingulate, apex obtuse to round; sheathing laminae open, margin serrulate, costa subpercurrent; laminal cells finely papillate; spores spherical and finely papillose.

*Specimen examined:* In the large greenhouse of Cybele part, on the bark of trees, Md. Saidur Rahman, 10. 09. 2006, **6**.

13. **Fissidens involutus** Wils. *ex* Mitt., in *Musc. Ind. Or.*: 138 (1859)

*F. involutus* Wils. in *Kew J. Bot.*, **9** : 294 (1857)

Plants yellow-green with 6 - 8 pairs of leaves; leaves ovate-lanceolate, tip acuminate; sheathing lamina open; costa ending a few cells below the apex and leaf margin slightly dentate by development of cells.

*Specimen examined:* South side of the lion gate in the Cybele part, on the bricks, Md. Saidur Rahman, 10. 12. 2006, **4b**.

14. **Fissidens leptopelma** Dix., *J. Bomb. Nat. Hist. Soc.* **39**: 733(1937)

Plants yellow to green, unbranched; shoot with 4 - 5 pairs of leaves; leaves linear lanceolate, narrowly acuminate; dorsal lamina narrowing and meeting of stem at point of attachment sometimes rounded at base; sheathing lamina open, acute at tip; margin minutely crenate; costa ending just below the tip; laminal cells irregularly hexagonal and unipapillate.

*Specimen examined:* In the large greenhouse of the Cybele part, on damp soil and cemented structure, Md. Saidur Rahman, 10. 12. 2006, **20**.

15. **Fissidens orishae** Gang., *Nova Hedwigia* **8**: 140 (1964)

Plants yellow green, unbranched; shoot with 8-12 pairs of leaves; sheathing lamina open, semilimbium incomplete, consists of two rows of elongated pellucid cells at sheathing lamina base, dorsal lamina quickly narrowing down at the base and vanishing just before the costa and meet the stem; costa excurrent; laminal cells rounded-quadrate to hexagonal with mamillate papilla.

*Specimen examined:* Beside the base of the cactii in the Psyche part, on soil, brick etc., Md. Saidur Rahman, 10.12.2006, **32a**.

16. **Fissidens splachnobryoides** Broth. in *Schum. et Lauterb., Fl. Deutsch. Schutz. Suedsee* 81 (1900).

Plants light-green, shoot with almost 10 pairs of leaves; leaves oblong-lanceolate, widely acuminate; sheathing lamina closed, limbium of 1 - 4 rows of elongated yellowish cartilaginous cells all round leaf; costa ending far below tip; laminal cells smooth, transparent, with wavy thin walled and greenish to brownish multicellular gemmae arise from axis of leaves.

*Specimen examined:* Near the famous asoke tree in the Psyche part, on sandy soil, Md. Saidur Rahman, 10.12.2006, **28**.

17. **Fissidens sylvaticus** Griff., Cal. J. Nat. His. **2** : 507 (1842)

*F. zippelianus* Doz. et Molk., in Zoll., Syst. Verzeich. **129** (1854).

Plants light greenish, unbranched or rarely branched; shoot with 20-24 pairs of leaves. At the axis of sheathing laminae, glandular protuberance cells (5-8 cells) are distinct along the stem; leaves oblong-lanceolate, acuminate, slightly apiculate; sheathing lamina usually equal (closed); costa ending three or four cells below the apex and laminal cells unipapillate.

*Specimen examined:* In front of the Camellia grove in the Cybele part, on soil, brick etc., Md. Saidur Rahman, 10.12.2006, **19, 23 24a**.

18. **Fissidens taxifolius**. Hed., in Sp. Musc. 155 (1801)

*Dicranum taxifolium* (Hedw.) Web. et Mohr., in Ind. Mus. P1. Crypt. : **2** (1803)

Plants yellow green to green; stem contains 20- 22 pairs of leaves; leaves oblong-ligulate, broadly acuminate; sheathing lamina unequal; costa short excurrent, the tip ending in short apiculus; border cells dentate; sporophyte not found.

*Specimen examined:* Southern side of the circular structure in the Psyche part, on brick, Md. Saidur Rahman, 10.12. 2006, **33, 4a**.

**Order: Syrrhopodontales, Family: Calymperaceae**

**Genus: Calymperes** Schwaegr in Web.Tab. Exh. Calypt. Operc. Gen. **2** (1813)

19. **Calymperes tenerum** C. Muell. var. **teniolata** Gan. , Mosses of East. Ind. and Adj. Reg. Fasc. **3** : 600-603 (1972)

Plants greenish, small; leaves lingulate, arranged closely, more crowded at apex with rosette, upper gemmiferous leaves longer and narrower at top and broad at base; margin entire, costa strong, percurrent in normal leaves, excurrent into a club-like structure in gemmiferous leaves, strongly papillose, specially at apex; laminal cells quadrate, unipapillate or multipapillate, unistratose except at margin and gemmae arise from the gemmiferous leaf.

*Specimen examined:* In the rose garden of the Cybele part, on the bark of mango tree, Md. Saidur Rahman, 28.03.2007, **78**.

**Order: Pottiales, Family: Pottiaceae**

**Genus: Hyophila** Brid., Bryol. Univ. 1: 760 (1827)

20. **Hyophila comosa** Dix. et Varde, Arch. Bot. **1** : 166 (1927)

Plants greenish, densely tufted, unbranched; leaves erectopate, inrolled and curled when dry, oblong-ligulate to spatulate, apex obtuse to rounded; costa strong, excurrent; upper laminal cells multipapillose; abounded multicellular gemma whose arise from the axis of leaves.

*Specimen examined:* West side of the circular structure in the Psyche part, on the cemented structure, Md. Saidur Rahman, 26. 10. 2006, **2**.

21. **Hyophila involuta** (Hook.) Jaeg., Ber. S. Gall. Naturw. Ges. 1871-72: 356(1873)

*Gymnostomum involutum* Hook., Musc. Exot. **2** : 154 (1819)

Plants dioecious, tufted, sometime branched; leaves oblong-lingulate, denticulate at apex, costa percurrent; peristome absent; operculum conic-rotate; calyptra cucullate, smooth; spores round and smooth.

*Specimen examined:* Behind the large greenhouse of the Cybele part, on the brick, Md. Saidur Rahman, 28. 5. 2007, **13, 76**.

22. **Hyophila perannulata** Ren. et Card., in Bull. Soc. R. Bot. Belg., **34** (2): 60 (1896)

*Hyophila decolyii* Broth. in Par. in Index Bryol. Suppl. :190 (1900).

Plants dioecious, unbranched, showing rosette appearance; leaves broadly lingulate, erectopatent to spreading, apex broadly acuminate in mucro; costa excurrent; capsule erect, cylindrical and spores finely papillose.

*Specimen examined:* Behind the large greenhouse and touching the eastern wall of the Cybele part, on the cemented structure, Md. Saidur Rahman, 28. 09. 2006, **14**.

23. **Hyophila rosea** Williams, in Bull. Bot. Gard., **8** : 341 (1914)

Plants dioecious, sometimes branched; leaves usually forming rosette tufts at apex, erectopatent to erect-spreading, apex broadly acuminate; costa papillose, percurrent; upper laminal cells highly multipapillose and gemmae arise from the leaf axis.

*Specimen examined:* West side of the circular structure in the Psyche part, on the cemented structure, Md. Saidur Rahman, 14. 09. 2006, **03**.

**Genus: Semibabula** Herz. ex Hilp., Beih. Bot. Centralbl. **50** (2) : 266 (1933).

24. **Semibarbula orientalis** (Web.) Wijk. et Marg. Taxon, **8** : 75 (1959)

*Trichostomum orientalis* Web. Arch. Syst. Nat. **1** : 129 (1804)

Plants dioecious, yellowish green, tufted; leaves lax, borne spirally, oblong to ovate-lanceolate, margin papillose; upper laminal cells highly multipapillose, obscure; costa strong, percurrent or short excurrent into a minute; gemmae usually multicellular, growing in apical as well as axillary cluster.

*Specimen examined:* Near the water lily pools in the Psyche part, on damp soils and bricks, Md. Saidur Rahman, 14.10.2006, **1**, 26. 04. 2007, **73**.

**Order: Funariales, Family: Splachnaceae**

**Genus: Gymnostomiella** Fleisch. Musci Fl. Buitenzorg **1**: 309 (1904).

25. **Gymnostomiella vernicosa** (Hook.) Fleisch., Musci Fl. Buitenzorg **1**: 310 (1904).

*Gymnostomum vernicosum* Hook., Icon. Pl. Rar. **1**: 17 (1836)

Plants scattered, thin, with filiform stem; leaves are small, erectopate to erect-spreading, shrunk, and not much changed when dry, broad-obovate, with rounded apex; upper half of the leaf rough because of papillae; costa weak, extends up to than 1/2 to 3/5 of the leaf; upper laminal cells warty multipapillose and gemmae usually arise at the axil of the leaves.

*Specimen examined:* Beside the beautiful foliated climbing cactus in the Psyche part, on moist soil, Md. Saidur Rahman, 28. 09. 2006, **16**.

**Genus: Splachnobryum** C. Muell Verh. Zool. Bot. Ges. Wien. **19**: 503 (1869)

26. **Splachnobryum indicum** Hamp. et C. Muell., Linnaea **37**: 174 (1872)

Plants dioecious, tufted, filiform; leaves broadly oblong-lingulate, concave, apex broadly obtuse to rounded; costa always excurrent; laminal cells lax, thin walled and basal cells long, rectangular-pentagonal.

*Specimen examined:* Beside the greenhouse-1 in the Psyche part, on the cemented walls, Md. Saidur Rahman, 28. 1. 2007, **22**.

27. **Splachnobryum schofieldii** Banu-Fattah et Syed, Bangladesh J. Bot. **26(1)**: 61-64 (1997).

Plants dioecious, yellowish green, soft, tufted; stem, thin, light-brown, larger leaves crowded at apex and smaller leaves towards the base; leaves broad, obovate to sub-orbicular with obtuse to rounded apex; margin flat, entire; laminal cells very thin walled, apical cells more or less hexagonal and basal cells elongated-hexagonal.

*Specimen examined:* Beside the greenhouse in Psyche part, on moist soil, Md. Saidur Rahman, 28. 09. 2006, **24**.

**Order: Eubrales, Family: Bryaceae**

**Genus: Bryum** Hedw., Sp. Musc., 178 (1801) Emend. Schimp., Syn. ed. 1 (1860).

28. **Bryum apiculatum** Doz. et Molk. in M. Fronc. Ined. Archip.: 24 (1845)

Plants tufted, greenish, lustrous; leaves lax below, crowded at apex, ovate-lanceolate, concave, carinate; margin entire; costa percurrent; basal laminal cells rectangular to rhomboidal; middle and apical laminal cells rhomboidal; irregular rhizoids and gemma normally arise from lower portion of the stem.

*Specimen examined:* In the large greenhouse of the Cybele part, on bricks, Md. Saidur Rahman and Monowar Hossain, 23. 07. 2007, **71**.



29. *Bryum cellulare* Hook., Schwaegr., Sp. Musc. Suppl. 3 (1): 214a (1827)

*Pohlia turbinata* Schwaegr., Sp. Musc. Suppl. 2 (2): 150 (1827)

Plants dioecious, loosely tufted, filiform, greenish; rhizoids finely papillose; leaves imbricate, appressed to stem, thin, carinate, ovate to elliptic with obtusely apiculate apex; costa percurrent or subpercurrent; apical laminal cells pentagonal-rhomboidal and basal cells rectangular-rhomboidal.

*Specimen examined:* In the large greenhouse of the Cybele part, on moist soil, Hamida Khatun and Md. Saidur Rahman, 26. 04. 2007, 70.

**Family: Batramiaceae, Genus: *Philonotis*** Brid. Bryol. Univ., 2 : 15 (1827)

30. *Plilonotis hastata* (Dub.) Wijk. et Marg., Taxon 8 : 74 (1859)

*Hypnum hastatum* Dub. in Moritzi, Syst. Verz. Zoll. Pfl. 132 (1846)

Plants forming mats, filiform, soft, greenish, loosely attached to the surface; leaves acuminate, short-lanceolate with broad base; margin crenulate to denticulate with mammillae of the cells, but mammillae not distinct and costa ending far below apex.

*Specimen examined:* Beside the climbing cactus in the Psyche part, on moist soil and bricks, Md. Saidur Rahman, 12. 10. 2007, 7, 26. 04. 2007, 66.

**Order: Isobryales, Family: Erpodiaceae**

**Genus: *Erpodium*** (Brid.) Brid., in Rechenb., Consp. 32 (1828).

31. *Erpodium mangiferae* C. Muell. in Linnaea, 37 : 178 (1872).

*Erpodium bellii*, in J. Linn. Soc., 13 : 307 (1873)

Plants yellow-green, creeping, freely and irregularly branched, radiculose, monomorphic; leaves in several rows, more flattened on the main stem, ovate, sometimes concave, short acuminate; costa absent; laminal cells oval-hexagonal and alar cells rhomboidal.

*Specimen examined:* Beside the Aloe house in the Psyche part, on bark of trees, Hamida Khatun and Md. Saidur Rahman, 27. 03.2007, 62, 75.

**Order: Hypnobryales, Family: Hypnaceae**

**Genus: *Vesicularia*** (C.Muell.) C. Muell., Bot. Jahrb. 23: 330(1896)

32. *Vesicularia dubyana* (C.Muell.) Broth., E & P. Pflanzenfam. Ed. 1 Musci (1909).

*Hypnum dubyanum* C. Muell., Syn. 2, 241 (1851)

Plants autoicous and forming mat; freely pinnate branched, sparsely radiculose; leaves broadly ovate, short acuminate, asymmetric; margin entire but very faintly serrulate near apex; costa short, single or double and alar not differentiated.

*Specimen examined:* In the greenhouse of the Cybele part, on damp bricks, Md. Saidur Rahman, 26. 10. 2006, **21, 27**.

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