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ACROCARPOUS MOSSES OF BANGLADESH. XI FAMILY: BARTRAMIACEAE-2[1]

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Abstract

Bartramiaceae, under the Order Eubryales among the Acrocarpous mosses, is represented in Bangladesh by a single genus *Philonotis* Brid. with nine species. The present paper includes four species of *Philonotis* namely, *P. nitida* Mitt., *P. turneriana* (Schwaegr.) Mitt., *P. angusta* Mitt. and *P. mollis* (Doz. & Molk.) Mitt. Illustrated descriptions of these species along with a short note on each species and their distribution in and outside Bangladesh are provided.

Introduction

Tixier in 1965 collected a large number of Bryophytes from Chittagong region of Bangladesh. Out of these collections, he reported two species of *Philonotis* namely, *P. griffithiana* Hook. and *P. pergracilis* Broth., but he did not give any description or illustration of these species. Thus only locations were given for these two species reported by Tixier (1967) which could not be found later. Gangulee (1974) dealt with 12 species of *Philonotis* from the eastern Indian region, but did not give any information about their presence in Bangladesh.

Bartramiaceae, under the Order Eubryales among the Acrocarpous mosses, is represented in Bangladesh by a single genus *Philonotis* Brid. with nine species (Banu 1991). The genus is the third largest in species number among the Acrocarpous mosses in Bangladesh (Banu-Fattah 2001). Out of these nine species, *P. thwaitesii, P. hastata* and *P. falcata* have been published recently (Banu-Fattah and Hadiuzzaman 2006). The present paper is a continuation of the previous paper and includes four species of *Philonotis* namely, *P. nitida* Mitt., *P. turneriana* (Schwaegr.) Mitt., *P. angusta* Mitt. and *P. mollis* (Doz. & Molk.) Mitt. Illustrated descriptions of these species along with a short note on each species and their distribution in and outside Bangladesh are provided.

1. **Philonotis nitida** Mitt., Musc. Ind. Or. 62 (1859) (**Plate 1**)

Plants dioicous; densely tufted; lower portion brown, matted with tomenta, upper part yellowish-green. Shoot robust, erect or flexuose with a whorl of innovations, up to 1 cm high and 1 mm wide with leaves. Leaves erect to erect-spreading, falcate, closely appressed to stem when dry; lanceolate with a broad base and gradually acuminate, c. 1.8 mm long and 0.5 mm wide at base. Margin revolute in most part except at tip and extreme base, denticulate all along. Costa prominent, 33-50 µm broad at base, long-excurrent in a denticulate arista (0.3-0.5 mm long). Laminal cells thin-walled, mamillose on upper ends, rectangular; basal cells c. 64 µm long and 4-12 µm broad, narrower and smaller at margins, broader and longer towards costa; upper cells c. 40 µm long and 4 µm broad. Perichaetial leaves shorter than stem leaves and with longer arista, otherwise similar. Seta apical, bent and flexuose, orange to red, c. 2.4 cm long and 0.17 mm broad. Capsule nodding, ovate to globose with small mouth, c. 2.2 mm long and 1.8 mm in diameter, shrunk and furrowed when dry. Exothecial cells hexagonal, 32-60 µm long and 24-40 µm broad at middle portion, about 5 rows of cells at mouth transversely rectangular, darker in colour.

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Stomata present at base, lighter in colour than surrounding cells. Peristome teeth deeply inserted; exostome brown, c. 228 µm high; endostome lighter in colour, shorter, papillose. Operculum convex, small. Spores brown, bean-shaped to round, 22-26 µm in diameter, finely papillose.

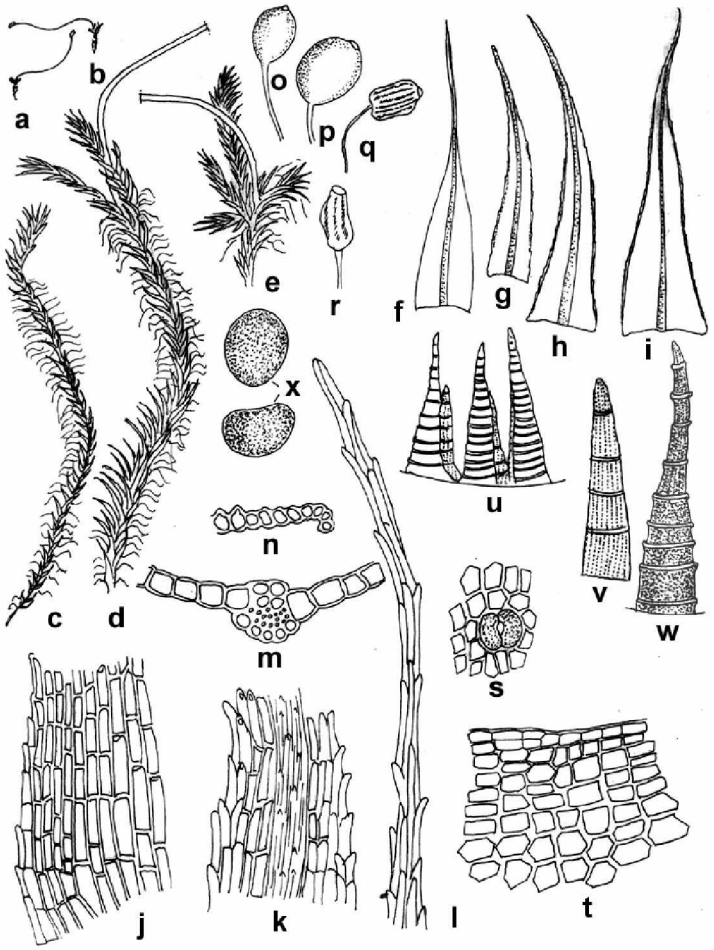

Plate 1 (Figs. a-x): ***Philonotis nitida*** Mitt. a-b. Plant with sporophytes (× 0.5), c. Sterile plant (× 5), d-e. Wet plant with a portion of seta (× 5), f. Perichaetial leaf (× 15), g. Branch leaf (× 15). h & i. Stem leaves (× 15), j. Basal laminal cells (× 112.5), k. Middle laminal cells (× 112.5), l. Arista (× 112.5), m-n. T.S. of leaf (× 112.5), o & p. Wet capsules (× 15). q & r. Dry capsules (× 15), s. Exothecial cells at the base of capsule showing stoma (× 112.5), t. Exothecial cells at the mouth of capsule (× 112.5), u. Peristome teeth (× 50), v. Endostome (× 112.5), w. Exostome (× 112.5) and x. Spores (× 225).

Specimens examined: **Chittagong :** Chittagong University Campus, on slope of hill, Quazi Abdul Fattah, 31.1.1990, **1127**. **Cox's Bazar :** Teknaf, on soil, Md. Kamruzzaman, 11.2.1989, **791**; Himchhari, Barochhara, on soil, Mustafa Kamal Pasha, 27.08.96, **80**.

Distribution: W. Himalaya, N. Vietnam, Sumatra, Java, Borneo, Philippines, Taiwan, China, Korea and Japan.

Note: This species resembles *P. mollis* in having long, robust plant with whorls of innovations, long excurrent costa and strongly mamillose cells, but differs in having broader and larger leaves and strongly recurved margin (except at the tip) instead of flat margin.

2. **Philonotis turneriana** (Schwaegr.) Mitt., Musci Ind. Or. 62 (1859) (**Plate 2**)
Bartramia turneriana Schwaegr. in Sp. Musc. Suppl. **3**(1): 238 (1828)

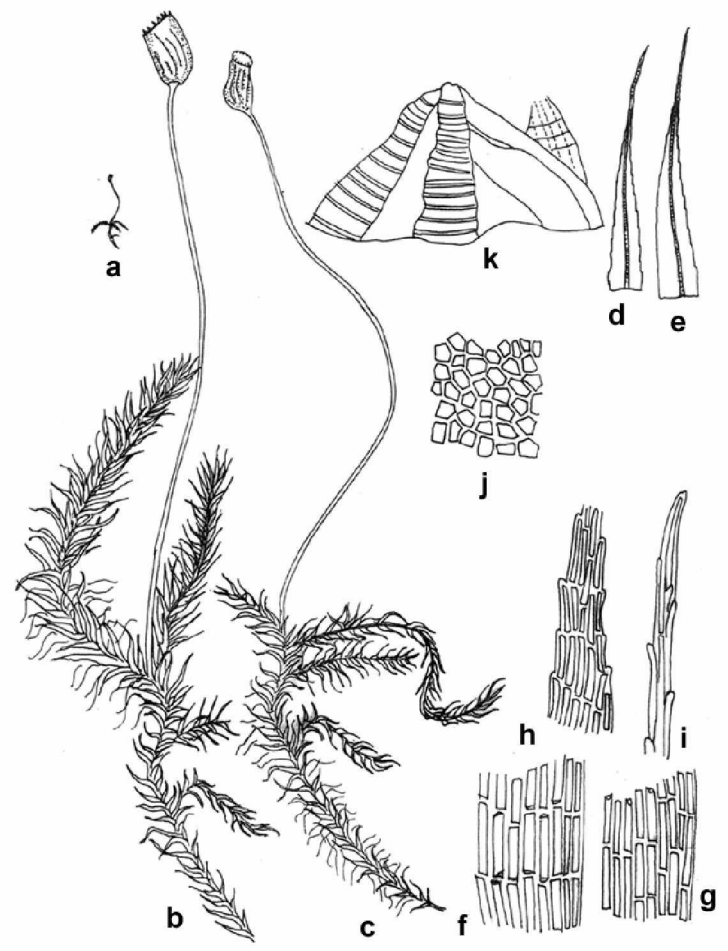

Plate 2 (Figs. a-k): ***Philonotis turneriana*** (Schwaegr.) Mitt., a. Whole plant with sporophyte (× 0.5), b. Wet plant with sporophyte (× 5), c. Dry plant with sporophyte (× 5), d-e. Leaves (× 15), f. Basal laminal

cells (× 112.5), g. Middle laminal cells (× 112.5), h. Laminal cells near apex (× 112.5), i. Arista (× 112.5), j. Exothecial cells (× 50), k. Peristome teeth (× 112.5).

Plants dioicous; more or less rigid, loosely tufted, matted with tomenta below, yellow-green above. Shoot up to 2.6 cm high and c. 1 mm broad with a ring of subfloral innovations. Leaves erectopatent, somewhat appressed to stem when dry, carinate, triangular, narrow-lanceolate with aristate point, 1.2-1.5 mm long and 0.16-0.18 mm broad at base. Margin flat, serrate. Costa long excurrent, c. 33 µm broad at base. Laminal cells narrow-rectangular all along, 60 µm long and 8 µm broad at base, 40-48 µm long and c. 4 µm broad at middle and 40-44 µm long and 4 µm broad at apex, mamillose at one or both sides, not prominent. Perichaetial leaves not much differentiated. Seta apical, slender, sinuose, reddish to yellow-brown, smooth, up to 1.4 cm long and c. 66 µm broad. Capsule usually nodding, yellow-brown, ovoid, asymmetric, c. 1.6 mm long and c. 1 mm in diameter, furrowed when dry. Exothecial cells hexagonal, 30-50 µm diagonally. Exostome dark-brown, papillose, lanceolate, c. 170 µm high and 50 µm broad at base; endostome yellowish-white, papillose, shorter than exostome. Spores not found.

Specimens examined: **Chittagong :** Hazarikhil Forest, on slope of hill, Md. Shahjahan and Monwaruzzaman, 11.3.1976, **210.**

Distribution: Nepal, India, Bhutan, Sri Lanka, Myanmar, Java, Philippines, Hongkong, China, Japan, Taiwan, Hawaii and Sandwich Island.

Note: This species is characterized by being more or less rigid with triangular, narrow-lanceolate leaves with excurrent costa and flat, serrate margin; and it differs from *P. nitida* and *P. mollis* by having smaller leaves and less prominent mamillae.

3. **Philonotis angusta** Mitt., Musc. Ind. Or. 61 (1859) (**Plate 3**)

Plants dioicous; robust, densely tufted, yellow-green above, brown below. Shoot erect, up to 5 cm high with whorl of innovations, stem tomentose all over except innovations. Leaves moderately dense, erect to erectopatent, only shrunk, otherwise not much changed when dry; lanceolate from a broader base with acuminate apex; c. 2 mm long and 0.4 mm wide at base, innovation leaves smaller with shorter acumen. Margin narrowly recurved, serrate all along. Costa prominent, long excurrent, 50-60 µm broad at base. Laminal cells rectangular, 16-100 µm long and c. 4-12 µm broad at base, cells towards costa being longer, at middle 32-72 µm long and c. 4 µm broad and at tip 32 µm long and 4 µm broad. Perichaetial leaves more or less same with longer arista. Seta apical, erect, slender, flexuose, reddish-brown, c. 2.3 cm long and c. 0.13 mm broad. Capsule sub-globose to ovoid, reddish-brown, nodding, slightly asymmetric, mouth small, c. 2.1 mm long and 1.6 mm in diameter, strongly furrowed when dry. Exothecial cells hexagonal, c. 40 µm wide, about 5 rows of cells at mouth transversely arranged. Peristome normal; exostome brown, endostome yellow, c. 360 µm long and 32 µm broad at base, papillose. Spores c. 24 µm in diameter, oval to round, often bean-shaped.

Specimens examined: **Cox's Bazar :** Ramu, on soil, Samar Ranjan Mitra, 12.6.1988, **512. Sherpur :** Gajni, Zhinaigati, on soil, Md. Almas Uddin Hawlader, 16.2.1990, **1139.**

Distribution: India, Myanmar, Thailand.

Note: *P. angusta* is characterized by being very tall and highly tomentose and having lanceolate leaves with broader base, long acuminate apex and serrate margin.

4. **Philonotis mollis** (Doz. & Molk.) Mitt., Musci Ind. Or. 60 (1859) (**Plate 4**)

Bartramia mollis Doz. & Molk. Ann. Sc. Nat. Bot. Ser. 3, **2**: 300 (1844)

Plants dioicous; tufted; yellowish-green; lax, soft, slender. Shoot up to 4.7 cm long with a ring of subfloral innovations, not branched in sterile plant. Stem sparsely radiculose. Leaves erect or erectopatent, shrunk and more erect when dry, narrowly lanceolate, gradually narrowed from base to a long filiform acuminate apex, 1.4-1.6 mm long and 0.2 mm wide at base. Margin flat, sharply serrulate in most part. Costa dark-brown, 33-50 µm broad at base, long excurrent. Laminal cells lax, rectangular all along ; basal cells 60-100 µm long and 8-16 µm broad; middle cells 28-52 µm long and 4-6 µm broad and upper cells below arista 20-28 µm long and 4 µm broad; cells mamillose at upper ends, mamillae very prominent in upper portion. Perichaetial leaves with ovate sheathing portion and much longer arista. Bunch of archegonia with paraphyses present at the apex of shoot. No sporophyte formed.

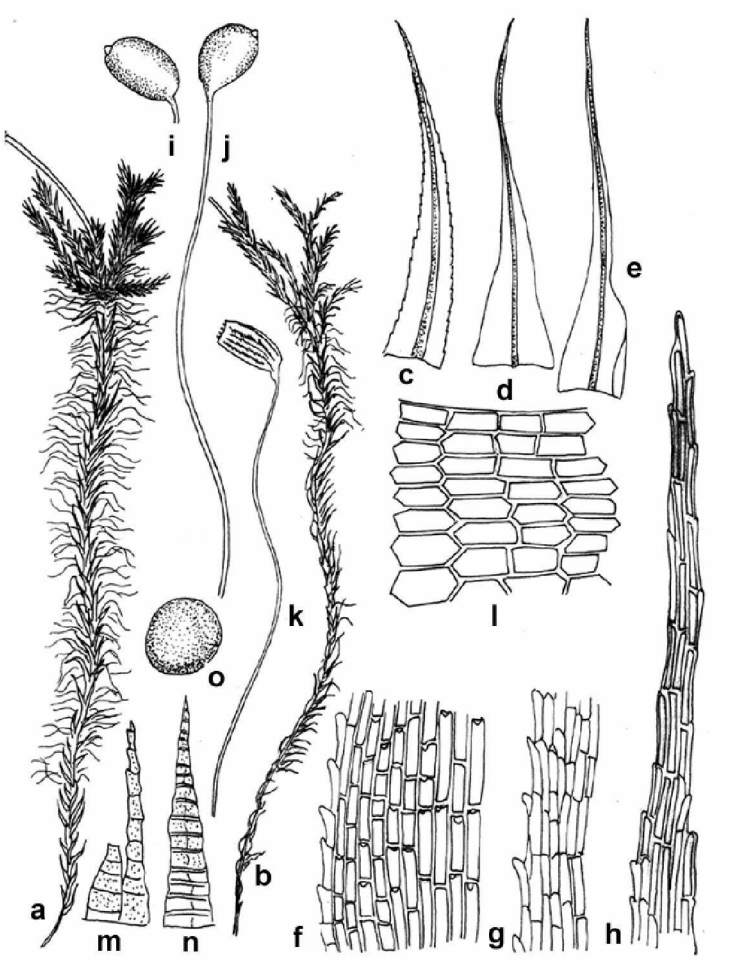

Plate 3 (Figs. a-o): ***Philonotis angusta*** Mitt., a. Wet plant with a portion of seta (× 5), b. Dry plant with a portion of seta (× 5), c. Leaf (× 15), d & e. Perichaetial leaves (× 15), f. Basal laminal cells (× 112.5), g. Middle laminal cells (× 112.5), h. Arista (× 112.5), i & j. Wet capsules with setae (× 15), k. Dry

capsule with seta (× 15), l. Exothecial cells at mouth of capsule (× 112.5), m. Endostome (× 50), n. Exostome (× 50), o. Spore (× 225).

Specimens examined: **Chittagong**: Betbunia, near Satellite Centre, on soil, Khurshida Banu, Quazi Abdul Fattah and Azizur Rahman, 8.9.1987, **568**; Hinguli, Mirersarai, 22.12.96. **122**. **Comilla**: Gorai, on sandy soil, Khurshida Rahman, 1.2.1976, **72. Cox's Bazar**: Waykong, Shaplapur, on sandy hill slope, Mustafa Kamal Pasha, 18.07.96, **29**, **30**; Himchhari, Barachhara, Mustafa Kamal Pasha, 27.08.96; on hill slope, Mustafa Kamal Pasha, **55**, **91**; St. Martin's Island, Mustafa Kamal Pasha, 28.10.96. **108, 111**.

Distribution: Sikkim, Bhutan, Andaman Islands, South India, Myanmar, Tonkin, Sumatra, Java, Borneo, Celebes, Philippines, Taiwan, Japan and Madagascar.

Note: This species differs from *P. nitida* by having less radiculose stem, narrower leaves and flat margins.

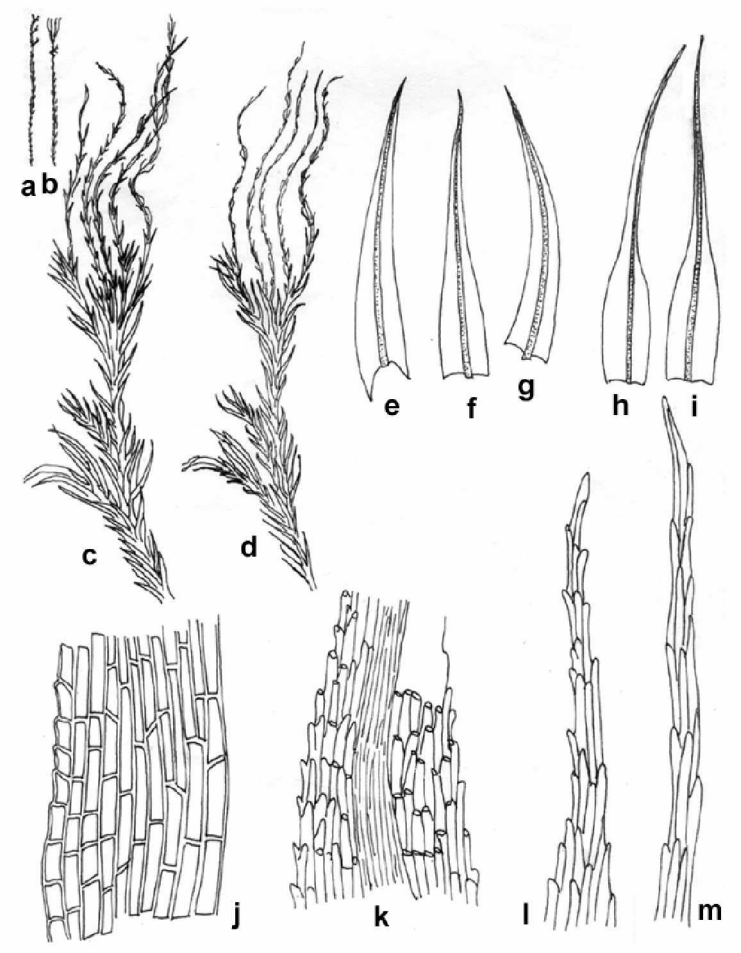

Plate 4 (Figs. a-m): ***Philonotis mollis*** (Doz. & Molk. **)** Mitt. a-b. Whole plants (× 0.5), c. Upper portion of wet plant with perichaetial bract (× 5), d. Upper portion of dry plant (× 5), e-g. Leaves (× 15), h & i. Perichaetial leaves (× 15), j. Basal laminal cells (× 112.5), k. Middle laminal cells (× 112.5), l & m. Apex of lamina (× 112.5).

Specimens examined by P. Tixier

P. griffithiana Hook.

Cox's Bazar: Foot of the cliff, P. Tixier 10.03.1965. **Rangamati**, Kaptai, on ground, 2.03.1965, **144**.

Distribution: Sikkim, Himalaya, North Vietnam and Kumaon.

Philonotis pergracilis Broth.

Rangamati: On barks, P. Tixier 16.03.1965, **231**; Kaptai, on ground, 27.2.1965.

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