

DISCOVERY OF EIGHT ANGIOSPERM NEW RECORDS FOR BANGLADESH FROM RAMPAHAR AND SITAPAHAR RESERVE FORESTS UNDER RANGAMATI DISTRICT

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Abstract

This paper deals with eight new angiosperm species records for Bangladesh from Rampahar and Sitapahar reserve forests under Rangamati district. These species are: *Aspidopterys tomentosa* (Blume) Juss., *Begonia rubella* Buch.-Ham., *Beilschmiedia sikkimensis* King ex Hook.f., *Cryptocarya calderi* M. Gangop., *Maytenus hookeri* Loes., *Mitrephora grandiflora* Beddome, *Phyllanthus columnaris* Müll.-Arg. and *Pollia thyrsoflora* (Blume) Endley ex Hasskarl. Updated nomenclature, important synonyms, description, ecology, geographical distribution and photographs or illustrations are provided for each species.

Introduction

Since the independence of Bangladesh, researchers of Bangladesh National Herbarium (BNH), Bangladesh Forest Research Institute (BFRI) and different universities of Bangladesh (i.e. University of Dhaka, University of Chittagong, and Jahangirnagar University) have involved in a number of floristic inventories throughout the country resulting in the compilation of a number of checklists, floras, revisions etc. (i.e. Khan and Banu, 1969 & 1972; Huq and Begum, 1984; Khan and Hassan, 1984; Alam, 1988; Huq, 1988; Mia and Huq, 1988; Khan *et al.*, 1994; Rahman and Hassan, 1995; Rahman and Uddin, 1997; Uddin *et al.*, 1998; Uddin and Rahman, 1999; Khan and Huq, 2001; Rashid and Mia, 2001; Choudhury *et al.*, 2004; Uddin and Hassan, 2004; Hossain *et al.*, 2005; Alam *et al.*, 2006; Islam *et al.*, 2009; Tutul *et al.*, 2009 & 2010; Arefin *et al.*, 2010; Uddin and Hassan, 2010; and Uddin, 2012). However, many areas of the country remain botanically unexplored or poorly explored till now. Rampahar and Sitapahar reserve forests are two of such poorly explored areas, though they are two rich and interesting botanical areas in the whole CHTs region. Moreover, in the recent past, the forests were cleared extensively either for illicit wood trading or shifting cultivation (*Jhuming*). Those rendered a number of economically important species threatened and perhaps extinct of a few. Therefore, a study program had been taken to prepare an inventory of the forests species aiming for their conservation and sustainable management.

Rampahar and Sitapahar forest areas are situated in Kaptai Upazila under Rangamati district. The areas lie between 22°26' and 22°38' North and 92°08' and 92°17' East and occupy an area of 966 hectares of hilly land (Anonymous, 1960). The areas were declared as the first reserve forest in 1875 through a *vide* Gazette notification no. 6184-S, dated 12/12/1945 by the Government of Bengal. The areas are managed by Kaptai Forest Range under Rangamati South Forest Division. The configuration of the ground is very irregularly rugged and consists of a series of ridges and

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valleys running more or less from the North to the South. The level of valley bottoms ranges from 30 to 90 m above the sea level and maximum elevation is about 500 m. The hill soils are mainly yellowish-brown to reddish-brown loams and soil pH varies from 5.5-6.0. The area enjoys a sub-tropical climate characterized with a long period of dry season from October to May and a short period of high precipitation from June to September. The average annual precipitation is 250 cm and average temperature varies from 24°C in December to 35°C in May.

The under explored forests of Rampahar and Sitapahar areas represents sub-tropical rain forest mainly of semi-evergreen type of vegetation. The areas are rich in angiosperm diversity. Floristic study of Rampahar and Sitapahar has recorded a total of 786 vascular plant species under 485 genera and 121 families (Uddin, 2012). The top canopy of the forests consists of the tree species like: *Artocarpus chama* Buch.-Ham., *Artocarpus lacucha* Buch.-Ham., *Bombax insigne* Wall., *Dipterocarpus turbinatus* Gaertn. f., *Lagerstroemia speciosa* (L.) Pers., *Machilus fruticosa* Kurz, *Swintonia floribunda* Griff., *Tectona grandis* L. f., and *Tetrameles nudiflora* R. Br. The middle canopy consists of the tree species like: *Aglaia chittagonga* Miq., *Albizia chinensis* (Osbeck) Merrill, *Anogeissus acuminata* (Roxb. ex DC.) Guill. & Perr., *Aporosa wallichii* Hook. f., *Bischofia javanica* Blume, *Bursera serrata* Wall. ex Colebr., *Cassia nodosa* Buch.-Ham. ex Roxb., *Castanopsis tribuloides* (Sm.) A. DC., *Chaetocarpus castanocarpus* (Roxb.) Thw., *Cinnamomum iners* Reinw., *Derris robusta* (Roxb.) Benth., *Diospyros pilosula* (A. DC.) Hiern. The lower canopy consists of *Aidia pseudospicata* Ridsdale, *Bridelia retusa* (L.) A. Juss., *Calliandra umbrosa* (Wall.) Benth., *Callicarpa arborea* Roxb., *Diplospora kurzii* Hook. f., *Euonymus glaber* Roxb., *Eurya acuminata* DC., *Macaranga indica* Wight, *Maesa ramentacea* (Roxb.) A. DC. Under the shade of the middle canopy a luxurious growth of herbs, shrubs, epiphytes and climbers are seen.

One of the main goals of this floristic survey was to discover new plant species for the country and floristic novelties within the areas. This report describes the methods and results of floristic surveys conducted on Rampahar and Sitapahar reserve forests by the authors.

Materials and Methods

Floristic survey was conducted by the first author at different seasons between the years 1998 and 2010. The areas were surveyed by walking along the forest trails and springs (*charas*), and by country boat along the river to record all species encountered. At least one set of voucher specimen of each different species encountered in flowering condition was collected and preserved at BNH. Collection of voucher specimens were conducted in a manner that is consistent with conservation ethics. Location, date, habit and any other notable ecological characteristics were recorded at each collection. Both fresh materials and herbarium specimens were studied. All available taxonomic resources *viz.* literatures, herbarium specimens and botanical illustrations were taken under consideration to identify the species. Digital imagery of the species was also used to supplement plant identification and document their habitats. The new records are based on 12 specimens and all of them are deposited at DACB after labeled properly.

Results

About twelve hundred plant specimens were collected from the areas by the first author in the course of the taxonomic study during the period of 1998-2010. In the process, eight angiosperm species were encountered for which no herbarium specimens had ever been collected from the country. Later on, those species have been identified as *Aspidopterys tomentosa* (Blume) Juss., *Begonia rubella* Buch.-Ham., *Beilschmiedia sikkimensis* King ex Hook.f., *Cryptocarya calderi* M. Gangop., *Maytenus hookeri* Loes., *Mitrephora grandiflora* Beddome, *Phyllanthus columnaris*

Müll.-Arg., and *Pollia thyrsiflora* (Blume) Endley ex Hasskarl. Eight specific taxa in the following list belong to 8 genera and 7 families. Those species are being described here to be new report for Bangladesh as they have never been mentioned in any publication on the flora covering the present territory of Bangladesh (*i.e.* Hooker & Thompson, 1872; Hooker, 1874, 1875, 1879, 1886, 1887, 1888, 1890 & 1992; Lawson, 1875; Clarke, 1879; Kurz, 1877; Prain, 1903; Heinig, 1925; Cowan, 1926; Cowan and Cowan, 1929; Kanjilal *et al.*, 1934, 1938 & 1940; Raizada, 1941; Datta and Mitra, 1953; Sinclair, 1956; Mia and Khan, 1995; Das and Alam, 2001; Rahman 2004a & 2004b; Alam, 2007; Khanam and Afroz, 2008; Khanam and Rahman, 2008; Rahman, 2008; Uddin, 2008; Habib, 2009; and Mia and Huq, 2009).

Detailed taxonomic accounts including photographs of all the species is given below and entries are arranged in alphabetical order.

1. ***Aspidopterys tomentosa*** (Blume) Juss., Ann. Sci. Nat. 11, 13: 267. 1840. (Fig. 1)

Malpighiaceae

Hiraea tomentosa Blume, Bijdr. 225. 1825.

Ryssopteris rufescens Turcz, Bull. Soc. Nat. Moscou 36: 583. 1863.

Aspidopterys helferiana Kurz, Jour. As. Soc. Beng. 43 (2): 137. 1874.

Aspidopterys concava var. *sumatrana* Niedenzu, Arb. Bot. Inst. Braunsberg 6: 7. 1915.

Woody liana, 10 m or longer. Stems teret, with irregular longitudinal ridges and few lenticels, brown, younger parts rusty-tomentose; internodes 10-15 cm long. Leaves opposite, seldom subopposite or in whorls of 3, coriaceous, very variable in shape, suborbicular to ovate, elliptic or obovate, 6-13 × 4-14 cm; base rounded to subcordate; apex obcordate-cuspidate, rounded-cuspidate or acuminate, upper surface glabrous, glaucous when dry, nerves often sulcate, lower



Fig. 1. *Aspidopterys tomentosa* (Blume) Juss.

surface dark ferruginous to fulvous-haired, nerves prominent, mostly darker haired; nerves 4-7 pairs; petiole 1-3 cm long, densely rusty tomentose. Inflorescences axillary or terminal paniculate, many flowered, 10-20 (-30) cm long, yellowish or brownish hairy; pedicels 0.5-2.0 cm long, dark brownish hairy; bracts acute, 2- 3 mm long; bracteoles acute, ca. 1 mm long, inserted below the articulation. Flowers white, cleftic-ovate in bud. Sepals ovate-oblong, apex rounded, 0.5 × 1.0 mm, base truncate, acute, glabrous, sometimes ciliate. Petals white to light yellowish, obovate, 4-5 × 3-6 mm, glabrous, top rounded, base truncate. Filaments 2.0-2.5 mm long, terete, sometimes connate at the base, glabrous; anthers 1.0-1.2 mm long, somewhat narrowed towards the top. Ovary ovoid, ca. 1 mm in diameter, glabrous; styles 3-4 mm long. *Samaras* on a 2-5 (-7) mm long acute carpophore; lateral wings ovate, apex emarginated, pale translucent, 2.5-3.5 × 1.5-3.0 cm, glabrous; dorsal wing 3-4 mm high, broadest at the base. Seed linear, acropically situated in the wing, 15-20 mm long. Flowering and fruiting: throughout the year.

Ecology: Evergreen hilly forests; between 300-800 m altitude.

Distribution: India (Andaman Islands), Myanmar, Thailand, Malaysia, Indonesia and the Philippines.

Specimen examined: **Chittagong Hill Tracts**: 1876, J.L. Lister 107, 173 (CAL). **Rangamati**: Rampahar, Kaptai, 25 iii 2010, S.N. Uddin N4199 (DACB).

Note: *Aspidopterys* A. Jussieu is a genus of about 20 species occurring mainly in tropical Asia (Shukun and Funston, 2008). From Bangladesh, Habib (2009) listed four species (*viz.* *Aspidopterys glabriuscula* (Wall.) A. Juss., *Aspidopterys nutans* A. Juss., *Aspidopterys orbiculata* Niedenzu and *Aspidopterys oxyphylla* A. Juss.) under the genus.

2. *Begonia rubella* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 223. 1825.

(Fig. 2)

Begoniaceae

Syn: *Begonia scutata* Wall. ex A. DC., Prodr. 15 (1): 328. 1864.

Perennial succulent, either acaulescent or shortly stemmed, erect herbs, monoecious or rarely dioecious, nearly glabrous, rhizomatous or tuberous. Stem in fruit often leafless, scapo-like. Leaves simple, rarely palmately compound, alternate or all basal; blades ovate, often oblique and asymmetric, rarely symmetric, 5-15 cm in diameter, cordate-acuminate, margin often irregularly serrate or sinuate-toothed or slightly angular, occasionally entire, venation usually palmate, glabrous or minutely pubescent on the nerves beneath; petiole of the radical leaves often 15 cm long, weak; stipules ovate-lanceolate, membranous, usually deciduous. Inflorescence of dichotomous cymes, sometimes in panicle, (1 or) 2-4 to several, rarely numerous flowered; scape or stem reaching 20-25 cm long; bracts oblong, acute, caducous. Flowers unisexual, pedicelled, medium-sized. Staminate flower: tepals 2 or 4 and decussate, usually outer ones larger, inner ones smaller; stamens usually numerous; filaments free or connate at base; anthers obovoid, 2-celled, apical or lateral; connectives extended at apex, sometimes apiculate. Pistillate flower: tepals 3, larger two round, opposite, the third one smaller, lateral, all deciduous; pistil composed of 2-5 (-7) carpels; ovary inferior, 1-3 (-7)-loculed; placentae axile or parietal; styles 3, free or fused at base, forked once or more; stigma turgid, spirally twisted-tortuous or U-shaped, capitate or reniform, setose-papillose. Capsule dry with persistent styles, 12-15 × 7-9 mm including the wings, unequally or subequally 3-winged, larger one much ascending, upper margin of the wings concave, rarely wingless and 3- or 4-horned, dehiscent by all faces. Seeds very numerous, pale brown, oblong or ellipsoid, minute, testa reticulate. Flowering and fruiting: August-November.

Ecology: Hilly forests; between 300-500 m altitude.

Distribution: Nepal, India and Myanmar.

Specimens examined: **Rangamati:** Sitapahar, Kaptai, 01 vi 2003, S.N. Uddin N1995 (DACB); 20 xii 2004, S.N. Uddin N2650 (DACB).

Note: *Begonia* L. is a genus of more than 1400 species widely distributed in the tropical and subtropical regions of the world (Cuizhi *et al.*, 2008). From Bangladesh, Khatun and Afroz (2008) listed eight species under the genus.



Fig. 2. *Begonia rubella* Buch.-Ham. ex D. Don

3. *Beilschmiedia sikkimensis* King ex Hook.f., Fl. Brit. India 5: 122. 1886.

(Fig. 3)

Lauraceae

Large, evergreen tree; branchlets blackish brown, compressed, conspicuously angled, sparsely pubescent or subglabrous; wood brownish-white, soft; terminal buds pale tomentose. Leaves opposite, elongate-elliptic or elliptic-oblong, 7-10 × 3-5 cm, apex obtuse or subacute, base obtuse or rounded, membranous, minutely glandular-punctate on both surfaces, midrib abaxially elevated,



Fig. 3. *Beilschmiedia sikkimensis* King ex Hook.f.

adaxially slightly elevated, lateral veins 10-15 pairs, slender, interconnected on leaf margin, abaxially elevated and reddish, reticulate veins slender, always inconspicuous; petiole 5-6 mm long. Inflorescence of cymose panicles or racemes, fasciculate at the ends of branchlets from the uppermost leaf-axils, short, 7-10 cm long, wholly densely gray-yellow pubescent. Flowers mostly solitary, pedicels as long as or a little shorter than flower. Perianth divided to the base, segments ovate, ca. 1.5 mm long, hairy on both sides. Fertile stamens 9. Ovary glabrous. Fruit ellipsoid, 2.5-3.5 × 1.2-1.7 cm, smooth, subrounded at both ends, apex mucronate; fruiting pedicels robust, 5-20 mm long, up to 7 mm in diameter, always brown maculate. Flowering and fruiting: June-October.

Ecology: Evergreen broad-leaved forests on hill slopes; upto 1200 m elevation.

Distribution: India (Sikkim), Nepal.

Specimen examined: **Rangamati:** Rampahar, Kaptai; 28 v 2003, S.N. Uddin N1884 (DACB).

Note: *Beilschmiedia* Nees is a genus of about 300 species occurring mainly in tropical Africa, Asia, Australasia and America (Xiwen *et al.*, 2008). From Bangladesh, Mia (2009) listed four species (*viz.* *Beilschmiedia assamica* Meiss., *Beilschmiedia fagifolia* Nees, *Beilschmiedia gammieana* King *ex* Hook.f. and *Beilschmiedia roxburghiana* Nees) under the genus.

4. *Cryptocarya calderi* M. Gangopadhyay,

Bangladesh J. Plant Taxon., 15 (2): 101-103. 2008.

(Fig. 4)

Lauraceae

Evergreen tree, upto 30 m high; branchlets terete, densely brown tomentose. Leaves alternate; blades oblong to orbicular-oblong, 12-20 × 5-8 cm, unequally obtuse or cuneate at base, retuse at apex, strongly incurved along margins, coriaceous, green and glossy above, brown and subglaucous beneath, midvein and lateral nerves above densely rufus-villous, sparsely so elsewhere beneath; lateral nerves 5-8 pairs, ascending; petioles to 15 mm long, rufus-tomentose. Inflorescences axillary and pseudo-terminal panicles, 6-12 cm long; peduncles 10-35 mm long, ferrugineous villous; branches spreading, villous. Flowers tubular-campanulate, 4-5 × 2.8 mm, subsessile, finely appressed tomentose; pedicels ca. 0.2 mm long; bracteoles narrowly oblong, densely tomentose; tube narrow oblong-obovoid, ca. 1.5 × 1.0 mm. Perianth lobes 3 + 3, oblong-ovate or elliptic-ovate, 2.0-2.2 × 1.0-1.2 mm, acute at apex, minutely puberulous. Stamens 9 (3 staminodes), 3 in each whorle, anthers 2-locular, ovate-oblong or oblong-ellipsoid, obtuse or subretuse at apex, filaments and anthers sparsely puberulous, filament 0.7-1.0 mm long, gland ca. 1 mm long, attached at base of filament. Pistil glabrescent, ca. 2.5 mm long; ovary ovoid, gradually tapering into broad style, ca. 1 × 0.5 mm; style flat, shallow channeled; stigma minute, thin, peltate. Fruit an ellipsoid drupe, 1.0-1.4 × 0.5-0.8 cm, smooth, green turns to violet when ripe, one seeded. Flowering and fruiting: April-November.

Ecology: Primary and secondary broad leaved forests.

Distribution: Myanmar.

Specimens examined: **Cox's Bazar:** Dulahazra Safari Park, 17 ii 2004, S.N. Uddin N2210 (DACB); 16 iv 2004, S.N. Uddin N2278 (DACB). **Rangamati:** Sitapahar, Kaptai, 20 xii 2004, S.N. Uddin N2650 (DACB).

Note: *Cryptocarya* R. Brown is a genus of about 200-250 species occurring mainly in tropical and subtropical regions of the world (Xiwen *et al.*, 2008). From Bangladesh, Mia and Huq (2009) listed two species (*viz.* *Cryptocarya amygdalina* Nees and *Cryptocarya andamanica* Hook. f.) under the genus.



Fig. 4. *Cryptocarya calderi* M. Gangopadhyay

5. *Maytenus hookeri* Loes., Engler & Prantl, Nat. Pflanzenfam. Aufl., 20b: 140. 1942. (Fig. 5)

Celastraceae

Gymnosporia acuminata Lawson in Hooker's Fl. Brit. India 1: 619. 1875, not *Maytenus acuminata* (Linnaeus) Loesener (1942).

Shrubs or small trees, 1-8 m tall; twigs slender, sometimes trailing, unarmed, older branches typically thorny. Leaves elliptic or oblong-ovate or oblanceolate, 8-20 × 3.5-8.0 cm, thinly papery, glabrous, base cuneate or acute, margin crenate or serrate, apex acuminate, lateral nerves tenuous, 7-9 pairs; petiole 5-12 mm long. Inflorescence axillary, dichotomously cymes, 1-6 fascicled; peduncle slender, 15-25 mm long, sometimes absent; pedicel slender, 3-5 mm long, 1.0-1.2 cm long when fruiting. Flowers small, bisexual, 5-merous, white-green or reddish-brown, 3-5 mm in diameter. Sepals 5, ca. 1 mm long, ovate. Petals 5, 2-3 mm long. Disk fleshy, annular, undulate or 5-lobed, intrastaminal. Filament ca. 2 mm long, anthers longitudinally dehiscent, introrse. Ovary usually 2-locular, rarely 3- or 4-locular, base confluent with disk, stigma 2-lobed, ovules erect,

often 1 per locule. Capsule obovoid, obcordate or subglobose, compressed, 0.6-1.2 cm across, leathery, loculicidally dehiscent, usually 2-valved. Seeds 1-4, oblong-ovate or ellipsoid, black, ca. 2 mm diameter; aril basal to enveloping seed, white, yellowish when dry. Flowering and fruiting: April-November.

Ecology: Primary and secondary forests, hill slopes and valleys; 100-700 m altitude.

Distribution: Bhutan, India and China.

Specimen examined: **Rangamati:** Rampahar, Kaptai; 30 ix 2002; S.N. Uddin N1616 (DACB).

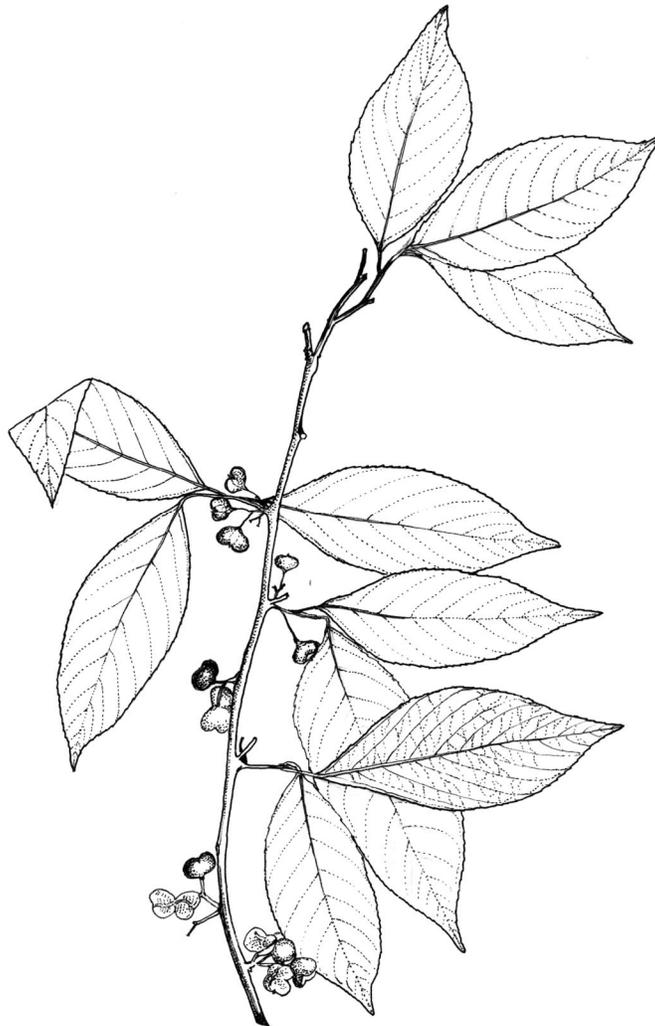


Fig. 4. *Maytenus hookeri* Loes.

Note: *Maytenus* Molina is a genus of about 220 species occurring mainly in tropics and subtropics of America and temperate Australasia (Liu & Funston, 2008). From Bangladesh, Uddin (2008) listed only *Maytenus wallichii* (G. Don) Bennet & Sahni under the genus *Maytenus* Molina.

6. *Mitrephora grandiflora* Beddome, Fl. Sylv. 1: t. 75. 1869.

(Fig. 6)

Annonaceae

A large, handsome tree, 12-25 m tall; young parts golden pubescent. Leaves elliptic or ovate-lanceolate, 6-20 × 5-8 cm, base rounded, apex acute or slightly acuminate, margins entire, thinly coriaceous, glabrous and shining above, glabrescent beneath, with hairy glands in the axils of the nerves; nerves 10-16 pairs, pubescent beneath; petioles ca. 1 cm long, pubescent when young. Flowers solitary or 2-3 in leaf-opposed cymes, peduncle ca. 1 cm long, brown pubescent; bud globose, densely aureo-pubescent, bracts single, basal, ferruginous. Sepals 3, connate at base,



Fig. 6. *Mitrephora grandiflora* Beddome

broadly ovate or orbicular, 4-5 mm across, yellowish brown pubescent. Petals 6 (3 + 3); outer petals broadly elliptic, acute, 2.5-3.5 × 1.2-1.8 cm, pure white turning to yellow, densely appressed pubescent outside, almost glabrous and veined inside; inner ones triangular at the apex, with a long broad clawed, 1.2- 1.5 × 0.3-0.5 cm, very hairy at the apex, glabrous below, white-streaked with carmine; limb triangular, forming a mitriform cap over the genitalia, early caducous. Torus convex. Stamens many, oblong, ca. 1 mm long; connectives flat at top. Carpels many, oblong-ovate, ca. 2 mm long, young carpels densely velvety, club-shaped, ovules 4-6 in 2 series. Ripe carpels many, globose, 1 seeded or oblong and 2 seeded, fuscous with dense short tomentose, and furnished with a raised furrow down the whole length. Flowering and fruiting: January-April.

Ecology: Evergreen forests, up to 600 m altitude.

Distribution: India.

Specimen examined: **Rangamati:** Sitapahar, Kaptai; 18 xii 2004; S.N. Uddin N2608 (DACB).

Note: *Mitrephora* Hooker & Thomson is a genus of about 47 species occurring mainly in tropical and subtropical Asia (Bingtao and Gilbert, 2011). From Bangladesh, Khanam and Rahman (2008) listed two species (*viz. Mitrephora maingayi* Hook. f. & Thom. and *Mitrephora tomentosa* Hook. f. & Thom.) under the genus.

7. *Phyllanthus columnaris* Müll.-Arg., Linnaea 32: 15. 1863.

(Fig. 7)

Euphorbiaceae

Deciduous trees, up to 12 m high; branchlets 15-60 cm long, branchlets and petiole leafless towards tips, sparsely puberulous. *Leaves* oblong or oblong-ovate, rarely elliptic, 3-6 × 1.0-2.5 cm, base cuneate, rounded or truncate or unequal, apex broadly acute, apiculate or rounded to obtuse, margins entire, membranous to thinly coriaceous, sparsely puberulous on midrib above, glaucous beneath, pilose on nerves, lateral nerves 5-14 pairs; reticulation inconspicuous on both sides; petiole 1-3 mm long; *stipules* linear-subulate, ca. 2 mm long. Inflorescence axillary at the upper axils and on terminal leafless branchlets, pseudo-racemes, 10-20 cm long; cymules 15-50-flowered with usually one female and the remainder male flowers, female flowers also solitary at the upper leaf axils; bracts triangular, ca. 2.0 × 1.2 mm, entire. Male flowers: pedicel 2-4 mm long, filiform; sepals 3 + 3, obovate to spatulate-flabellate or oblong-elliptic, 0.5-2.5 × 0.3-2.0 mm; disc gland 6, obovate, minute; stamens 3, staminal column 1-3 mm long, exerted, anthers ellipsoid-oblong, 0.3-0.4 mm long, vertically dehiscent, connective with a minute appendage. Female flowers: pedicel 4-6 mm long, papillose; sepals 3 + 3, ovate, ovate-elliptic to orbicular, 1.3-3.0 × 0.7-2.0 mm, papillose; disc annular, ca. 1 mm across, shallowly lobed or crenate; ovary subglobose, 1.0 × 1.3 mm, glabrous, styles 0.7-0.8 mm long, stigmas 3, 0.5-0.6 mm long. Fruiting pedicel 4-10 mm long; fruit capsular, depressed globose, 4-5 × 8-10 mm, deeply 3-lobed, glabrous to slightly rugulose. *Seeds* trigonous, 3.5-4.0 × 3.0 mm. Flowering and fruiting: April-December.

Ecology: In deciduous or evergreen forests; between 200-500 m altitude.

Distribution: Thailand, India, Myanmar, Malaysia.

Specimen examined: **Rangamati:** Rampahar, Kaptai; 19 x 2003; S.N. Uddin N2125 (DACB).

Note: *Phyllanthus* Linnaeus is a genus of about 750-800 species occurring primarily in the tropics and subtropics, poorly represented in temperate regions of the world (Bingtao and Gilbert, 2011). From Bangladesh, Rahman (2008) listed eleven species under the genus.

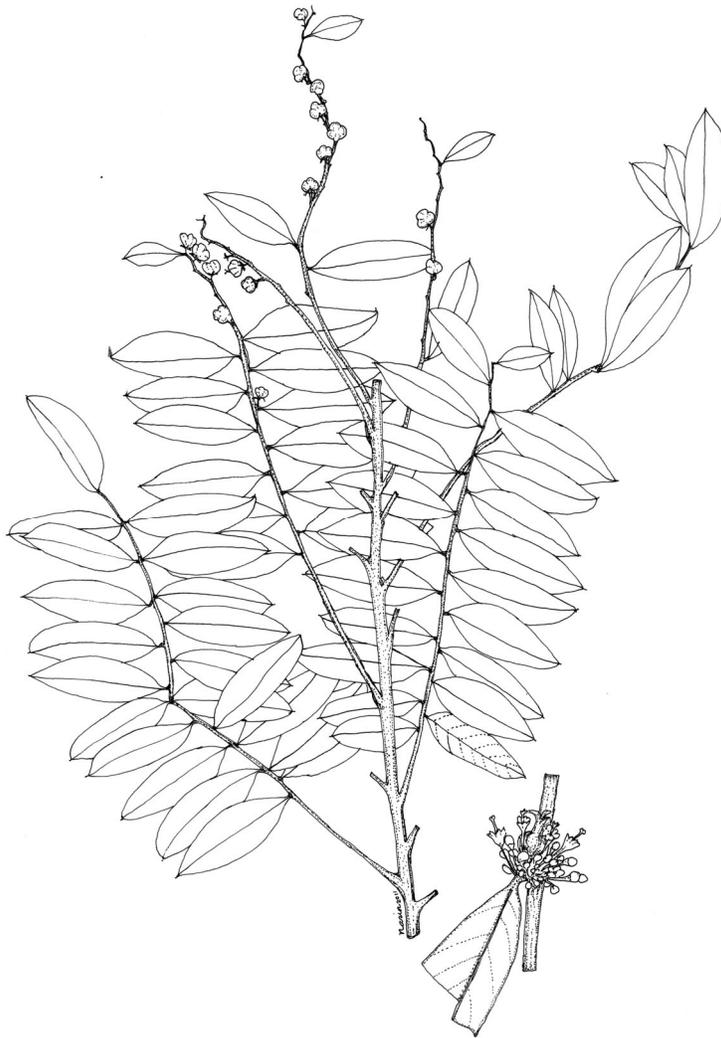


Fig. 7. *Phyllanthus columnaris* Müll.Arg.

8. ***Pollia thysiflora*** (Blume) Endley *ex* Hasskarl in Miquel, Pl. Jungh. 2: 150. 1852. (Fig. 8)
Tradescantia thysiflora Blume, Enum. Pl. Javae 1: 6. 1827. **Commelinaceae**

Herbs perennial. Rhizomes horizontal, long. Stems ascending, usually simple, 12-25 × 0.5-1.0 cm, sparsely hispidulous. Leaves alternate or spirally arranged, sessile or with winged petiole to 3 cm; leaf sheath ca. 2 cm, rather densely hispidulous; leaf blade oblanceolate or narrowly elliptic, 15-25 × 3-5 cm, glabrous adaxially, hispidulous abaxially. Inflorescence terminal shorter than distal leaves, less than 6 cm, densely flowered; peduncle extremely short, less than 2 cm, glabrous or hispidulous; cincinni numerous, ca. 2 cm, not in whorls, glabrous or hispidulous; involucre bracts deltoid-orbicular, basal one ca. 1.5 × 1.5 cm, glabrous or hispidulous; bracts membranous, very short at anthesis, to 4 mm in fruit, persistent. Flowers actinomorphic. Sepals free, ovate-

elliptic, shallowly boat-shaped, ca. 5 mm, persistent, abaxially pubescent. Petals free, white, ovate-orbicular, ca. 6 mm. Stamens 6, all fertile, equal; filaments glabrous; anther locules oblong, longitudinally dehiscent; antherodes deltoid-lanceolate or sagittate. Ovary 3-loculed; ovules (1-)5-10 per locule. Fruit baccate, globose, 3-valved, indehiscent.. Fruit ovoid-globose, 4-5 mm in diam. Seeds (1-)5-8 per valve, purplish gray, polygonal, slightly flattened; hilum orbicular. Flowering and fruiting: March-April.

Ecology: Humid soils in ravine forests.

Distribution: India, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam and China.

Specimen examined: **Rangamati:** Jamaichara, Sitapahar, Kaptai, 14 v 2010, S.N. Uddin N4319 (DACB).



Fig. 8. *Pollia thyrsiflora* (Blume) Endley ex Hasskarl.

Note: *Pollia* Thunberg is a genus of about 17 species occurring mainly in tropical, subtropical, and warm-temperate regions of the E hemisphere (Meyer, 2000). From Bangladesh, Alam (2007) listed two species (*viz.* *Pollia secundiflora* (Blume) Bakh.f. and *Pollia subumbellata* C.B. Clarke) under the genus.

Discussion

This study added eight new and rare plants (*viz.* *Aspidopterys tomentosa* (Blume) Juss., *Begonia rubella* Buch.-Ham., *Beilschmiedia sikkimensis* King ex Hook.f., *Cryptocarya calderi* M. Gangop., *Maytenus hookeri* Loes., *Mitrephora grandiflora* Beddome, *Phyllanthus columnaris* Müll.-Arg. and *Pollia thyrsiflora* (Blume) Endley ex Hasskarl) to the flora of Bangladesh. The

significance of such field research is the detection of novel additions to a floristic region, which subsequently improve our understanding on plant biogeography as well as species diversity of the country. Floristic studies and diversity assessments at local and regional levels are essential to understand the present diversity status and conservation of forest biodiversity. The purpose of the survey was to gather data on the floristic and ecological diversity of the reserve forests, which can be used by the Forests Department for the management of the biodiversity of the areas.

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