

MOSES NEW TO THE BRYOFLOTA OF THE WESTERN GHATS FROM THE AGASTHYAMALAI BIOSPHERE RESERVE

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ABSTRACT

The mosses *Chaetomitrium papillifolium*, *Entodon ovicarpus*, *E. scariosus*, *Glossadelphus bilobatus*, *Pseudobarbella ancistrodes*, *Sematophyllum micans* and *Taxithelium kerianum*, earlier known to be distributed in the Himalaya, Northeast and/or the Andaman & Nicobar Islands, are recorded for the Western Ghats. They are described in detail and illustrated.

Key words: Mosses, Additions, Western Ghats, Agasthyamalai Biosphere Reserve.

There are c. 642 species of mosses in the Western Ghats, 190 of which are endemic (Vohra & Aziz, 1997). Since knowledge on the diversity and ecology of the bryophytes of this region is far from adequate, studies on the bryoflora of the erstwhile Tirunelveli-Travancore Hills now comprising the Agasthyamalai Biosphere Reserve were initiated about a decade ago. As a result novelties, new records and species rediscovered after a long time have been published by Daniels & Daniel (2003a,b,c,d, 2004, 2006, 2007, 2008a,b, 2009a,b), Brijithlal & al. (2008), Daniels & Mabel (2009) and Daniels & al. (2010). These reports add 20 mosses to the bryoflora of the Western Ghats. Dabhade (1998) added 10 species to the Western Ghats from Khandala and Mahabaleshwar in Maharashtra. Manju & al. (2005, 2008, 2009a,b) added another 50 to the list from Kerala of which nine had been added overlooking earlier reports. As a result *Barbula indica* (Hook.) Spreng. (as *Semibarbula orientalis* (F. Weber) Wijk & Margad., vide Gangulee, 1972; Daniels, 2004), *Fissidens virens* Thwaites & Mitt. (vide Gangulee, 1971; Daniels, 2004), *Floribundaria walkeri* (Renauld & Cardot) Broth. (vide Wadhwa, 1969; Vohra & al., 1982), *Gymnostomiella vernicosa* (Hook.) M.Fleisch. var. *tenerum* (Müll.Hal. ex Dusén) Arts (vide Arts, 1998), *Himantocladium cyclophyllum* (Müll.Hal.) M.Fleisch. (vide Enroth, 1992), *Oxystegus cylindricus* (Bruch ex Brid.) Hilp. [vide Daniels, 2004, as *Trichostomum cylindricum* (Bruch ex Brid.) Müll. Hal., vide Foreau, 1961], *Symblepharis vaginata* (Hook. ex Harv.) Wijk & Margad. (vide Lal, 2005), *Syrrhopodon gardneri* (Hook.) Schwägr. (as *S. strictus* Thwaites & Mitt., vide Foreau, 1961, Daniels, 2004) and *Thuidium pristocalyx* (Müll.Hal.) A. Jaeger var. *pristocalyx* (as *Hypnum pristocalyx*) Müll.Hal., Bot. Zeitung (Berlin) 12: 573. 1854. - Type: India, Neilgherries, Schmid s.n. (Holotype: B lost; lectotype: H Touw, 2001) and also (as *Thuidium glaucinum* (Mitt.) Bosch & Sande Lac. vide Foreau, 1931; Gangulee, 1978; Daniels, 2004) are to be dropped. Thus, 41 are added to the list raising the number to 713.

Subramanian (2008) described *Aerobryidium indicum*, *Grimmia neilgiriensis*, *Hedwigium neelgiriensis*, *Homaliopsis kollimalaiensis* and *Meteorium neelgiriensis* as new species. Some of the epithets might indicate that the material is likely to be from the Western Ghats. However, as Subramanian (l.c.) did not designate a type and thereby did not fulfill the requirements of Art. 37.1, 37.2, 37.6 and 37.7 of the Code (McNeil & al., 2006), all these names are not validly published and hence have no standing in nomenclature. As a result, they are not considered here.

In the present paper seven mosses viz., *Chaetomitrium papillifolium*, *Entodon ovicarpus*, *E. scariosus*, *Glossadelphus bilobatus*, *Pseudobarbella ancistrodes*, *Sematophyllum micans* and *Taxithelium kerianum* are recorded for the Western Ghats that raise the number to 720. These recent additions might stress the need for more rigorous systematic studies in this region. Detailed description for all the species is given with illustrations and notes on distribution. The specimens cited are housed at SCCN (Herbarium of Scott Christian College, Nagercoil).

Chaetomitrium papillifolium Bosch & Sande Lac., Bryol. Jav. 2: 50. 1862; Bruehl, Rec. Bot. Surv. India 13(1): 82. 1931; R.S.Chopra, Tax. Indian Moss: 391. 1975; Gangulee, Moss. E. India 2(6): 1499, f. 750.

1977; J. Lal, Checklist Indian Moss.: 40. 2005. Type: Indonesia, Java, *Teysmann* s.n. ex Herb. Sande Lac. (FH). *Gyrosine andamaniae* Müll.Hall. in M. Fleisch., Musc. Buitenzorg 3: 1052. 1908. Type: India, Andamans Isl., *Man* s.n. (H-BR). (Fig. 1)

Plants forming mats, pale green. Stems creeping, 4 - 7 cm long; branches pinnate, erect, 0.5 - 1.5 cm. Leaves many-rowed, spreading, $0.8 - 1.3 \times 0.25 - 0.3$ mm, oblong-lanceolate, concave, entire at margin below, faintly toothed at apex; cells rhomboid to elongate-rhomboid, thick-walled, with raised papillate tips; apical cells $20 - 36 \times 4 - 6$ μ m; median ones $40 - 70 \times 4 - 8$ μ m; basal ones $16 - 52 \times 4 - 8$ μ m; those at extreme base quadrate, $28 - 32 \times 10 - 14$ μ m; costa faint, 1 or 2, or absent. Sporophyte not seen.

Habitat: Rupicolous in evergreen forests, c. 1110 m.

Distribution: India: Andaman Isl., Northeast India (Assam) and W. Ghats of Tamil Nadu (Kanyakumari); Southeast Asia.

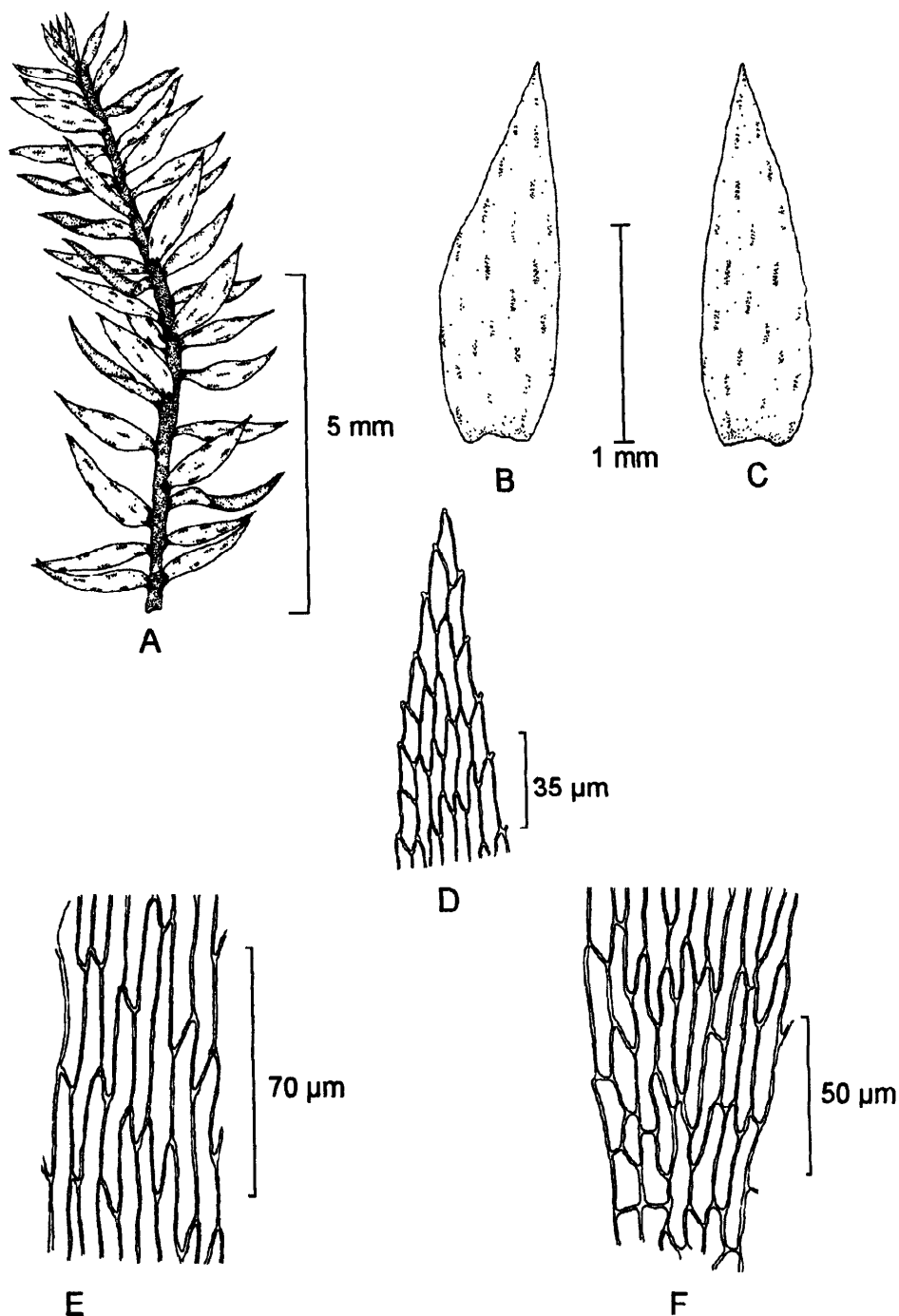


Fig. 1. *Chaetomitrium papillifolium* Bosch & Sande Lac.: A. Plant; B & C. Leaves; D. Leaf apical cells; E. Leaf median cells; F. Leaf basal cells (Drawn from Daniels & Mabel 285).

Specimens examined: Tamil Nadu, Kanyakumari Dist., W. Ghats, Agasthyamalai Biosphere Reserve, Muthukuzhivayal, c. 1110 m, 31.03.2009, *Daniels & Mabel* 285.

Entodon ovicarpus Dixon, J. Bombay Nat. Hist. Soc. 39: 789. 1937; Gangulee, Moss. E. India 3(8): 1769, f. 891. 1980; J.Lal, Checklist Indian Moss.: 56. 2005. Types: India (Arunachal Pradesh), Abor Hills, 2900 m, 1934, *N.L. Bor* 132 (BM); Assam, Pankim La, 300 m, 1934, *N.L. Bor* s.n. (BM). (Fig. 2)

Plants in dense mats, 1 - 4 cm high, glossy, yellow-green. Stems creeping, 2 - 10 mm long, irregularly pinnately branched. Leaves erectopatent, 1.8 - 2 × 0.6 - 0.8 mm, ovate-lanceolate, concave, faintly denticulate at apex; costa 2, short, faint; leaf apical cells elongate-elliptic, 20 - 80 × 3 - 6 µm; median ones 80 - 110 × 3 - 8 µm; basal ones 60 - 82 × 4 - 7 µm; alar cells irregularly quadrate to rectangular, 20 - 50 × 10 - 16 µm. Sporophyte not seen.

Habitat: Corticolous in evergreen forests, c.1110 m.

Distribution: India: Eastern Himalaya (Arunachal Pradesh), Northeast India (Assam) and W. Ghats of Tamil Nadu (Kanyakumari).

Specimen examined: Tamil Nadu, Kanyakumari Dist., W. Ghats, Agasthyamalai Biosphere Reserve, Muthukuzhivayal, c. 1110 m, 08.12.2009, *Daniels & Mabel* 546.

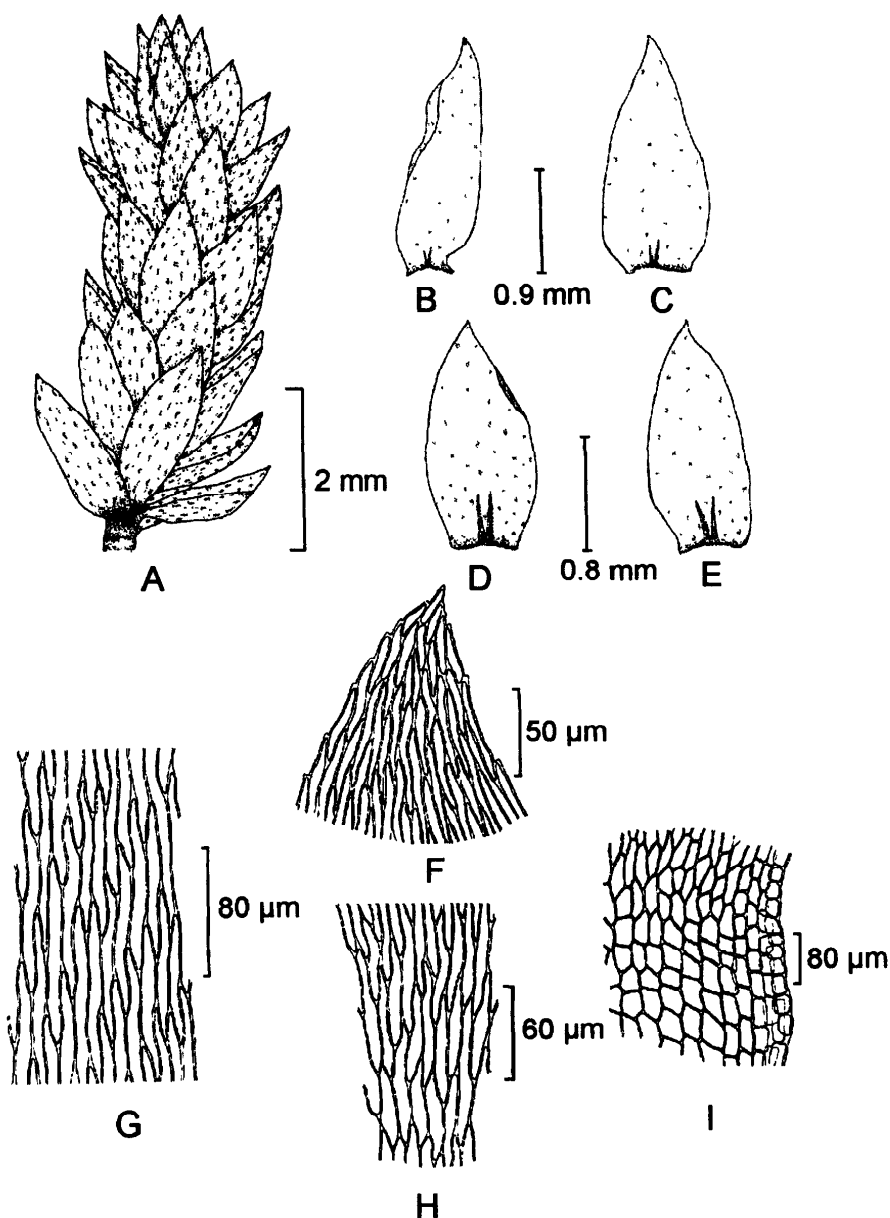


Fig. 2. *Entodon ovicarpus* Dixon : A. Plant; B & C. Stem leaves; D & E. Branch leaves; F. Leaf apical cells; G. Leaf median cells; H. Leaf basal cells; I. Leaf alar cells (Drawn from *Daniels & Mabel* 546).

Entodon scariosus Renaud & Cardot, Bull. Soc. Roy. Bot. Belgique 34(2): 75. 1896; Bruehl, Rec. Bot. Surv. India 13(1): 99. 1931; Gangulee, Moss. E. India 3(8): 1789, f. 906. 1980; J. Lal, Checklist Indian Moss.: 57. 2005. Type: India, (Eastern Himalaya), W. Bengal, Darjeeling, *Stevens* s.n. (PC). (Fig. 3)

Plants, in dense mats, 1–1.5 cm high, glossy, yellow-green. Stems branched, creeping. Leaves erectopatent, 2–3.5 × 0.8–1.1 mm, ovate-lanceolate, plicate, concave, crenulate at margin, acute at apex; costa 2, short, very faint; leaf apical cells elongate-linear, 28–60 × 4–8 µm; median ones 100–120 × 4–6 µm; basal ones 104–128 × 4–6 µm; alar cells irregularly quadrate to rectangular, 20–50 × 16–24 µm. Sporophyte not seen.

Habitat: Lignicolous in evergreen forests, c. 820 m.

Distribution : India: Eastern Himalaya, W. Bengal (Darjeeling), Sikkim and W. Ghats of Tamil Nadu (Kanyakumari and Tirunelveli); China.

Specimens examined: Tamil Nadu, Kanyakumari Dist., W. Ghats, Agasthyamalai Biosphere Reserve, Seafeld, c. 820 m, 21.9.2009, *Daniels & Mabel* 357; Tirunelveli Dist., W. Ghats, Narakkad, 500 m, 13.08.2009, *Daniels* 3506.

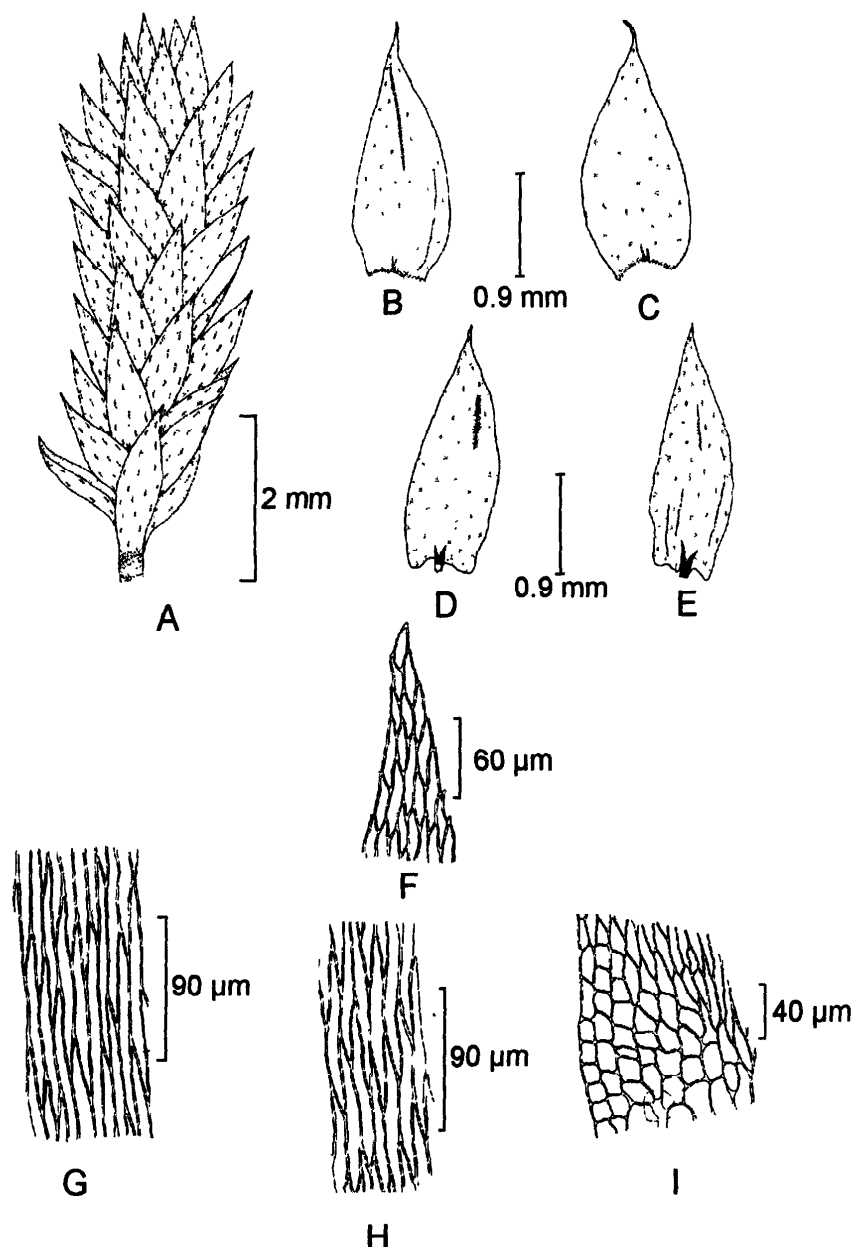


Fig. 3. *Entodon scariosus* Renaud & Cardot.: A. Plant; B & C. Stem leaves; D & E. Branch leaves; F. Leaf apical cells; G. Leaf median cells; H. Leaf basal cells; I. Leaf alar cells (Drawn from *Daniels & Mabel* 357).

Glossadelphus bilobatus (Dixon) Broth. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 11: 535. 1925; Bruehl, Rec. Bot. Surv. India 13(1): 108. 1931; Gangulee, Moss. E. India 3(8): 1928, f. 988. 1980; J. Lal, Checklist Indian Moss.: 66. 2005. *Taxithelium bilobatum* Dixon, Bull. Torrey Bot. Club 51: 244. 1924. Type: Malaysia, Perak, *Ridley* 739, ex Herb. Mitt. (NY). (Fig. 4)

Plants caespitose. Stems prostrate, 2 - 4 cm long, irregularly pinnately branched, covered with scale leaves. Rhizoids at stem attachments. Leaves dense, erectopatent, slightly asymmetric, $1.5 - 2 \times 0.6 - 0.8$ mm, rectangular, irregularly toothed from ventral margin to apex, truncate at apex; cells irregularly elongate-rhomboid, papillate at apex; apical cells $16 - 32 \times 6 - 12$ μ m; median ones $100 - 120 \times 6 - 8$ μ m; basal ones $12 - 40 \times 12 - 16$ μ m; extreme basal ones quadrate; alar region not differentiated; costa 2, one more than half as long as leaf, the other half as long as the longer. Sporophyte not seen.

Habitat: Rupicolous in evergreen forests, c. 1050 m.

Distribution: India: Northeast India (Nagaland) and W. Ghats of Tamil Nadu (Kanyakumari); Indonesia, Malaya, Sri Lanka.

Specimens examined: Tamil Nadu, Kanyakumari Dist., W. Ghats, Agasthyamalai Biosphere Reserve, Balamore, c. 1050 m, 11.5.2007, *Daniels & J.L. Carmel* 43.

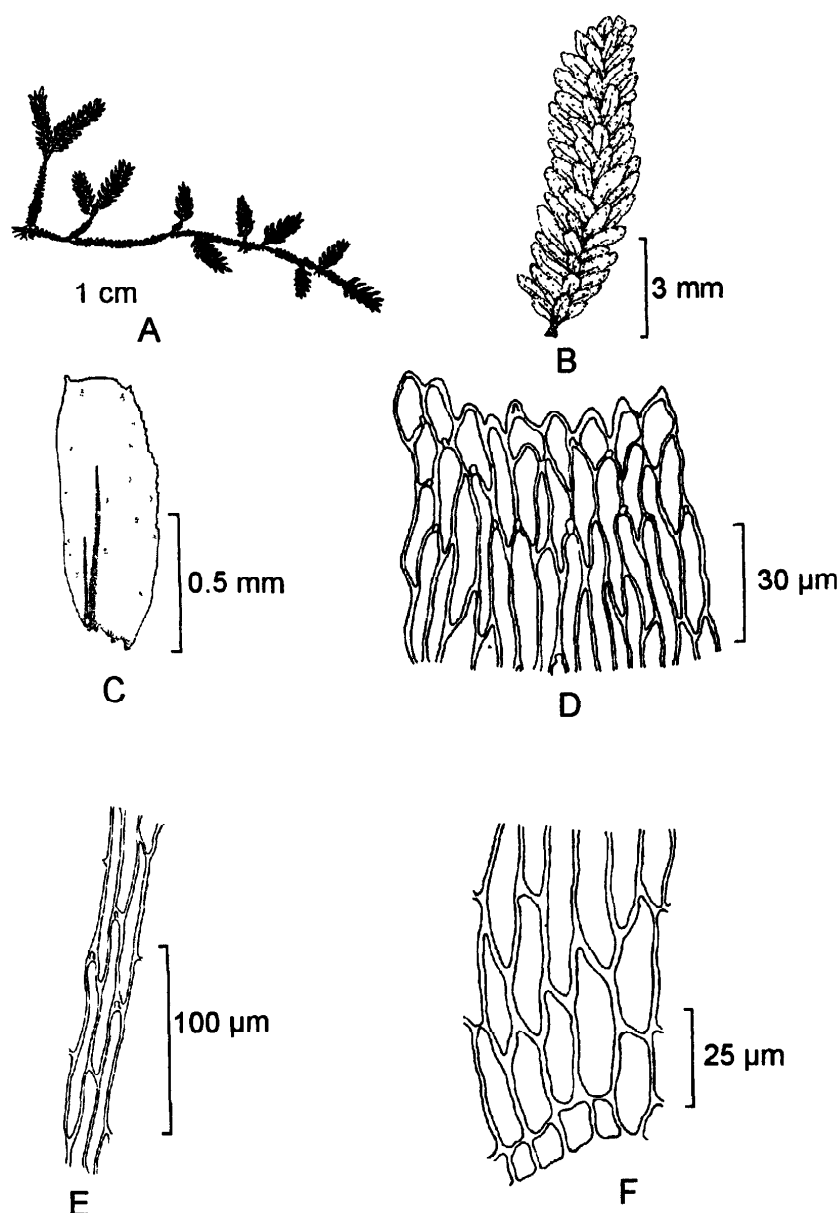


Fig. 4. *Glossadelphus bilobatus* (Dixon) Broth. : A. Plant; B. Branch; C. Leaf; D. Leaf apical cells; E. Leaf median cells; F. Leaf basal cells (Drawn from *Daniels & J.L. Carmel* 43).

Pseudobarbella ancistrodes (Renauld & Cardot) M.G. Manuel, Bryologist 80: 596. 1977; H. Akiyama, Nat. Hum. Act. 2: 12. 1997. *Meteorium ancistrodes* Renauld & Cardot, Bull. Soc. Roy. Bot. Belgique 34: 72. 1895. Types: Bhutan, *Heribaud* s.n. (PC); India, E. Himalaya (W. Bengal), Darjeeling, *Stevens* s.n. (PC). *Meteoriopsis ancistrodes* (Renauld & Cardot) Broth. in Engl. & Prantl, Nat. Pflanzemfam. 1(3): 826. 1906; Bruehl, Rec. Bot. Surv. India 13(1): 74. 1931; R.S. Chopra, Tax. Indian Moss.: 351. 1975; Gangulee, Mosses E. India 2(5): 1352, f. 664. 1976; J. Lal, Checklist Indian Moss.: 88. 2005. *M. reclinata* (Müll.Hal.) M. Fleisch. ex Broth. var. *ancistrodes* (Renauld & Cardot) Nog., J. Hattori Bot. Lab. 41: 338. 1976. (Fig. 5)

Plants glossy, yellowish green above, orange-brown to dark brown below; branches irregular, pendant, 8–12 cm long. Leaves squarrose, spreading, 1.5–2.5 × 0.9–1.2 mm, ovate-lanceolate from a broad erect sheathing base, plicate, canaliculate, faintly toothed at margin below, distinctly toothed and slightly reflexed above, aristate, distinctly toothed on arista; cells incrassate, linear, elongate, 1- or 2-papillate in centre of lumen; apical ones 36–50 × 4–6 µm; median ones 36–60 × 4–7 µm; basal ones 32–80 × 4–10 µm, rectangular, epapillate, faintly porose; costa single, half as long as leaf. Sporophyte not seen.

Habitat: Corticolous in evergreen forests, c. 1110 m.

Distribution: India: Himalaya and W. Ghats of Tamil Nadu (Kanyakumari); Southeast Asia.

Specimen examined: Tamil Nadu, Kanyakumari Dist., W. Ghats, Agasthyamalai Biosphere Reserve, Muthukuzhivayal, c. 1110 m, 08.12.2009, *Daniels & Mabel* 549.

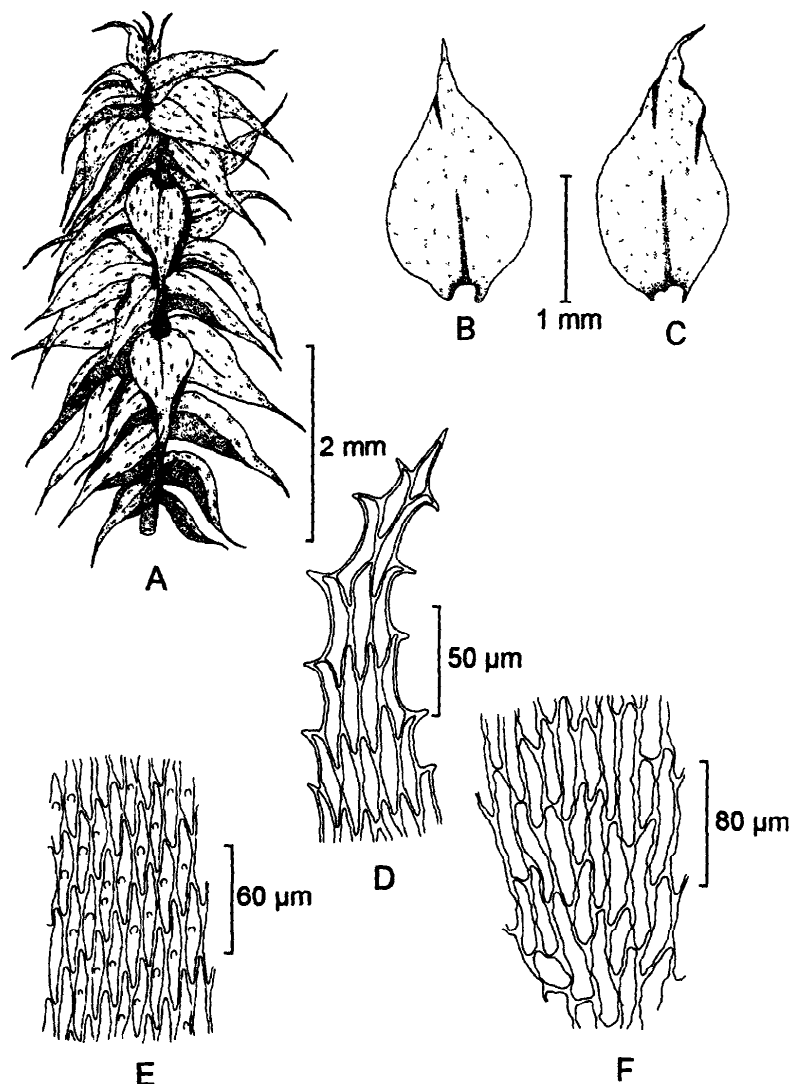


Fig. 5. *Pseudobarbella ancistrodes* (Renauld & Cardot) M.G. Manuel : A. Plant; B & C. Leaves; D. Leaf apical cells; E. Leaf median cells; F. Leaf basal cells (Drawn from *Daniels & Mabel* 549).

Sematophyllum micans (Mitt.) Braithw., Brit. Moss Fl. 3: 154. 1902; Gangulee, Moss. E. India 3(8): 1879, f. 956. 1980; J. Lal, Checklist Indian Moss.: 122. 2005. *Stereodon micans* Mitt., J. Proc. Linn. Soc., Bot. 1 (Suppl.): 114. 1859. Type: India, Himalaya (W. Bengal), Darjeeling, Tongloo, *J.D. Hooker* (BM). *Hypnum micans* Wilson in Hook., Brit. Fl. ed. 4, 2: 86. 1833, non Sw. 1829. (Fig. 6)

Plants caespitose, glossy, yellow-green. Stems creeping, c. 2.5 cm long; branches pinnate, erect, 2 - 6 mm, parallel. Leaves erectopatent, $0.9 - 1.3 \times 0.5 - 0.8$ mm, appressed to stem when dry, concave, ovate-acuminate, reflexed on one side at base, narrowly acute and faintly toothed at apex, ecostate; cells linear-rhomboid; apical cells $20 - 40 \times 4 - 8$ μ m; median ones $40 - 68 \times 4 - 6$ μ m, papillate at tip; basal ones $8 - 52 \times 4 - 8$ μ m; alar region swollen at extreme angles, with 1 or 2 distinctly large, ovate to oblong, $30 - 45 \times 15 - 18$ μ m hyaline cells. Sporophyte not seen.

Habitat: Rupicolous in evergreen forests, c. 820 m.

Distribution: India: Eastern Himalaya, W. Bengal (Darjeeling) and W. Ghats of Tamil Nadu (Kanyakumari); Europe, N. America.

Specimens examined: Tamil Nadu, Kanyakumari Dist., W. Ghats, Agasthyamalai Biosphere Reserve, Seafeld c. 820 m., 18.11.2008, *Daniels & Mabel* 19.

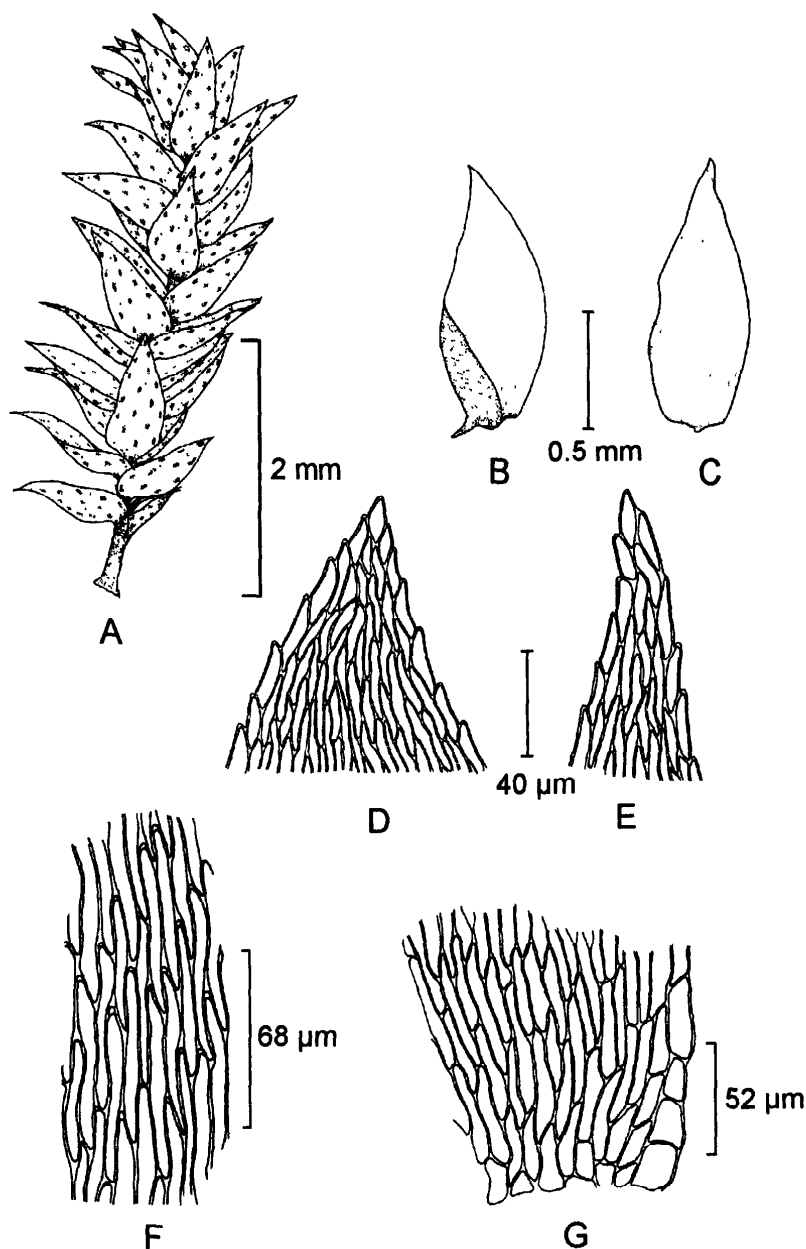


Fig. 6. *Sematophyllum micans* (Mitt.) Braithw. : A. Plant; B & C. Leaves; D & E. Leaf apical cells; F. Leaf median cells; G. Leaf basal cells (Drawn from *Daniels & Mabel* 19).

Taxithelium kerianum (Broth.) Broth. in Engl. & Prantl, Nat. Pflanzenfam. 1(3): 1901. 1908; Bruehl, Rec. Bot. Surv. India 13(1): 107. 1931; R.S. Chopra, Tax. Indian Moss.: 519. 1975; Gangulee, Moss E. India 3(8): 1921, f. 984. 1980; Vohra & Kar, Bull. Bot. Surv. India 38: 58. 1996; J. Lal, Checklist Indian Moss.: 130. 2005. *Trichosteleum kerianum* Broth., Oefvers. Förh. Finska Vetensk.-Soc. 33: 108. 1891. Type: Australia, Queensland, Haevey's Creek, Russell River, 1889, *F.M. Bailey* N598 (H-BR). (Fig. 7)

Plants robust, yellow-green. Stems creeping, 1.5 - 4.5 cm long; branches pinnate, complanate. Leaves not dense, erectopatent to spreading, $0.8 - 1.2 \times 0.2 - 0.4$ mm, concave, ovate-lanceolate, entire at margin, acute at apex, ecostate; cells linear, $24 - 32 \times 2 - 4$ μ m, narrowly acute at both ends; median ones $28 - 36 \times 4 - 6$ μ m, linear, distinctly seriate-papillate; basal ones $20 - 36 \times 4 - 6$ μ m; alar cells $20 - 52 \times 8 - 10$ μ m, rectangular, smooth. Sporophyte not seen.

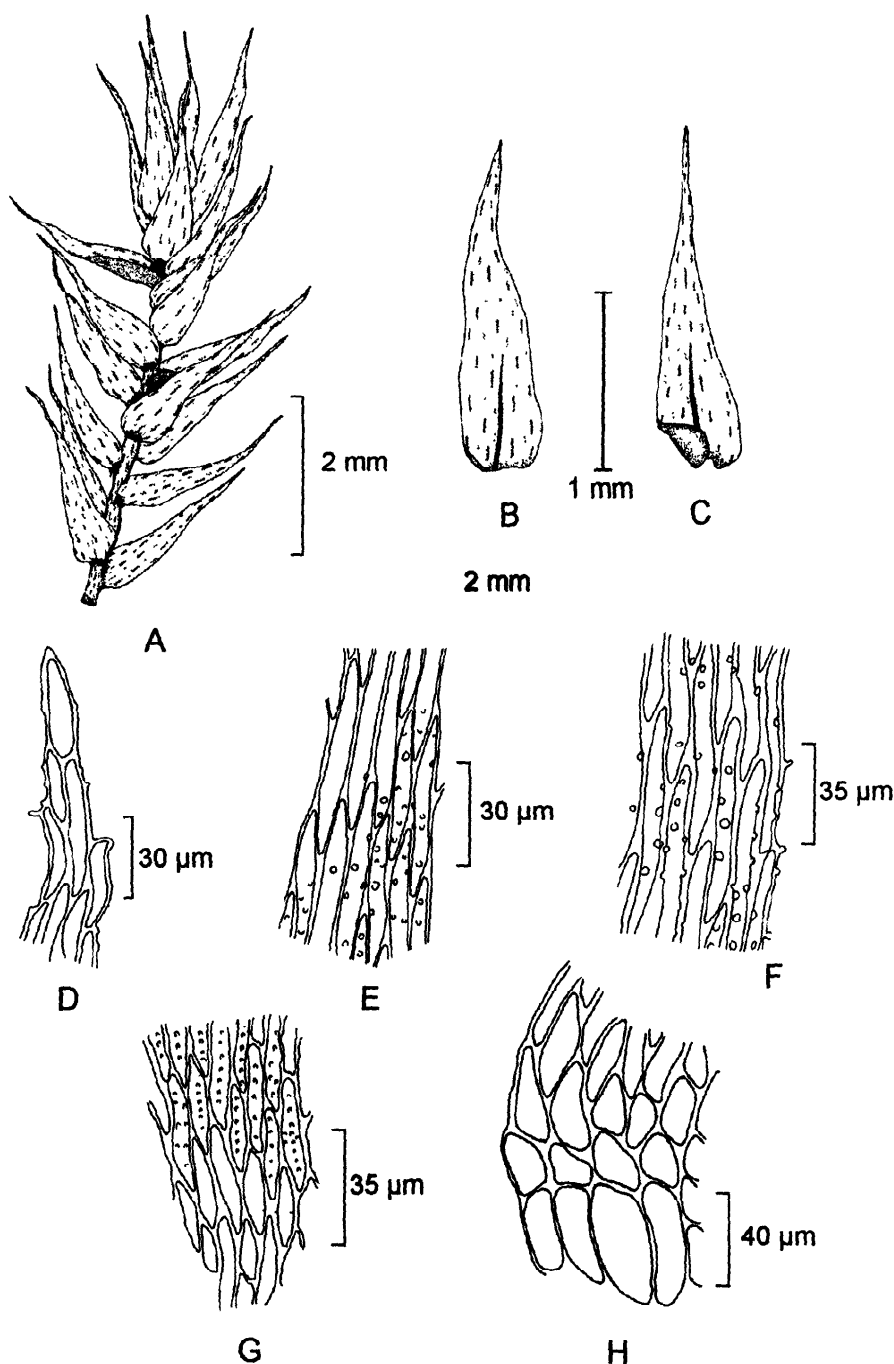


Fig. 7. *Taxithelium kerianum* (Broth.) Broth. : A. Plant; B & C. Leaves; D. Leaf apical cells; E. Leaf median cells; F. Leaf marginal cells; G. Leaf basal cells; H. Alar cells (Drawn from Daniels & Mabel 183).

Habitat: Corticolous in evergreen forests, c. 1110 m.

Distribution: India: Eastern Himalaya (Arunachal Pradesh), Nicobar Is. and W. Ghats of Tamil Nadu (Kanyakumari); Himalaya to Australia through Southeast Asia.

Specimens examined: Tamil Nadu, Kanyakumari Dist., W. Ghats, Agasthyamalai Biosphere Reserve, Muthukuzhivayal, c. 1110 m, 31.3.2009, *Daniels & Mabel* 183.

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अगस्त्यमलङ्ग जीवमंडल रिजर्व से पश्चिमी घाट के ब्रायोफ्लोरा के लिए नये माँस

ए.इ.डी. डैनियल्स, जे.एल.मेबेल एवं एस श्रीजी

ब्रायोफाइट विज्ञान प्रयोगशाला, वनस्पति विज्ञान विभाग एवं शोध केन्द्र
स्कॉट क्रिश्चियन महाविद्यालय (स्वायत्त), नगरक्वाइल-629003, तमिलनाडु

सार संक्षेप

हिमालय, पूर्वोत्तर एवं/या अंडमान निकोबार द्वीपसमूह से पूर्व ज्ञात माँस *चेटोमिट्रिअम* *पेपिलिफोलिअम*, *इंटोडॉन ओविकार्पस*, *इंटोडॉन स्केरिओसस*, *ग्लोसेडेल्फस बिलोबेटस*, *स्यूडोबर्बेला एसिस्ट्रोडिस*, *सेमेटोफाइलम माइकेंस* तथा *टैक्सिथेलिअम केरिएनम* का पश्चिमी घाट से अभिलेख, उनका विस्तृत वर्णन और चित्रांकन हुआ है।