

Notes on occurrence and distribution of some filmy ferns in Andaman and Nicobar Islands, India

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Abstract

Trichomanes bipunctatum Poir. and *T. minutum* Blume are reported here as new record for Andaman and Nicobar Islands. Occurrence of *T. motleyi* (Bosch) Bosch is confirmed in Andaman, initially reported by Beddome in 1883 but without citing any collection. Present collection of *T. motleyi* from Andaman after more than 130 years is significant.

Keywords

Trichomanes, Andaman Islands, New record.

Introduction

Hymenophyllaceae (filmy fern family) is one of the largest families of ferns and comprises about 600 species (Iwatsuki, 1990), generally grows at humid and shady conditions on mossy substrata as lithophytes or epiphyte. Almost all the members of this family are with one cell thick lamina and marginal tubular or cup-shaped sunken sori in which sporangia arises on a receptacle and covered by bivalvate or tubular involucre hence can be distinguished from other ferns. The family is well studied by various renowned Pteridologists (van den Bosch 1858, 1861a,b; Prantl, 1875; Copeland, 1933, 1937, 1938, 1941; Morton, 1942, 1968; Pichi-Sermolli, 1977; Iwatsuki, 1984, 1985, 1990; Ebihara *et al.*, 2006) but till date there is no general consensus about the number of genera within the family. Traditionally, the filmy ferns are grouped in to two genera (*Trichomanes* J.E. Smith and *Hymenophyllum* L.) and this bigeneric system is accepted by most of the taxonomists (Moore, 1857; Mettenius, 1864; Presl, 1836, 1843; Hooker, 1846; Hooker & Baker, 1865-68; Smith, 1875; Beddome, 1883; Clarke, 1880; Fraser-Jenkins, 2009) and also accepted in present communication.

Andaman and Nicobar Islands constitute an ideal habitat and niches for ferns in general and filmy ferns in particular. They are poorly understood in India in general and Andaman and Nicobar islands in particular, hence a detailed study of Indian filmy ferns is urgently required. At present about forty species of filmy ferns are reported from India, out of them 29 species are *Trichomanes s.l.* (Fraser-Jenkins 2008, 2009). Initially, only two species of *Trichomanes* (*Trichomanes motleyi* and *T. kurzii* Bedd.) were reported by Beddome (1883) from Andaman and Nicobar Islands. Later, Dixit and Sinha (2001) reported six species of *Trichomanes s.l.* from these islands. However, Fraser-Jenkins (2008) accepted the occurrence of four *Trichomanes* from Andaman and Nicobar.

During the recent survey, present authors collected three species of *Trichomanes* from these Islands which are taxonomically and phytogeographically interesting for India. Among them two are new record for these islands and third species collected after more than a century. Hence a brief note is presented here along with detail images to facilitate their identification.

Taxonomy and Distribution note

Trichomanes bipunctatum Poir., Encycl. (Lamarck) 8(1): 69. 1808; Clarke, Trans. Linn. Soc. Lond. II. Bot. 429. 1880 (*p.p.*); Beddome, Handb. Ferns Brit. India 41.1883 (*p. p.*).

Crepidomanes bipunctatum (Poir.) Copel., Philipp. J. Sci. 67(1): 59. 1938. *Didymoglossum bipunctatum* (Poir.) E. Fourn., Ann. Sci. Nat., Bot., sér. 5, 18: 263. 1873. *Hymenophyllum alatum* Schkuhr, Krypt. Gew. 1: 133, t. 135b. 1809, non Sw. (1801). *Hymenophyllum filicula* Bory ex Willd., Sp. Plant. [Linnaeus], ed. 4, 5(1): 528. 1810. *Trichomanes filicula* (Bory ex Willd.) Bory, in Duperrey, Voy. Monde, Crypt. 6: 283. 1829. *Taschneria filicula* (Bory) C. Presl, Epim. Bot. 258. 1851. *Didymoglossum griffithii* Bosch, Ned. Kruid. Arch. 5(3): 141. 1863. *Trichomanes griffithii* (Bosch) Panigrahi, Phytologia 31(3): 256. 1975. *Crepidomanes griffithii* (Bosch) R.D. Dixit & B. Ghosh, in Dixit, Census Ind. Pterid.: 91. 1984. *Crepidomanes dilatatum* Ching & Chu H. Wang, Act. Phytotax. Sin. 8: 163, t. 19. 1959.

Plants small, 4 – 10 cm long, once pinnate and pinnatifid or lobed, stipe and rachis winged and minute hairy, hairs short and dense at lower portion and become smaller club-shaped and sparser upwards; lateral pinnae fan-shaped and lobed, margins entire, apex round, sori marginal, sunk, tubular or pouch shaped, indusium bilipped, broad and dilated at base only, apex shortly triangular, receptacle somewhat exerted, lobes with long sub-marginal continuous false veins, oblique or internal false veins absent (Figure 1).

Specimen examined: India, Little Andaman, Krishna Nalah water fall, 25 masl., 04 April 2012, Lalji Singh 29517, (PBL & BSD).

Distribution: India (Andaman & Nicobar –present report, Andhra Pradesh, Arunachal Pradesh, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tamil Nadu, West Bengal); S. E. Asia & E Asia, Africa, Australia and Pacific Islands.

Notes: During British period, this species was poorly understood and studied in broader sense as an assemblage of many species like *Trichomanes campanulatum* Roxb., *Trichomanes latealatum* (Bosch) C. B. Clarke, *Trichomanes insigne* (Bosch) Bedd. etc. and were reported only from mainland India (Clarke 1880, Beddome 1883). Dixit (1984) listed *Crepidomanes griffithii* (Bosch) R.D. Dixit & B. Ghosh (a synonym of *T. bipunctatum*) from Andaman which subsequently followed by Chandra (2000). But

the report of Dixit (1984) was an error, the specimens of *Crepidomanes griffithii* (= *T. bipunctatum*) was not found during the compiling of Pteridophytic flora of Andaman and Nicobar islands, hence it was not reported by Dixit & Sinha (2001). Further, they (Dixit & Sinha, 2001) erroneously treated *Trichomanes bipunctatum* as a synonym of *T. latealatum*. Hence, there is no authentic report of *T. bipunctatum* from Andaman and Nicobar islands is taxonomically interesting which is reported here as a new record to Indian islands.

Trichomanes minutum Blume, Enum. Plant. Javae 2: 223. 1828.

Gonocormus minutus (Blume) Bosch, Verh. Kon. Akad. Wetensch. Amsterdam 9(6): 7-8, t. 3. 1861. *Crepidomanes minutum* (Blume) K. Iwats., J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 13(5): 524. 1985. *Trichomanes proliferum* forma *minutum* (Blume) Manickam & Irud., Pterid. Fl. W. Ghats S. India 151-152. 1992, comb. inval. *Trichomanes proliferum* var. *minutum* (Blume) C. A. Hameed, Filmy Ferns S. India 106. 2003, comb. inval. (misplaced). *Trichomanes proliferum* Blume, Enum. Pl. Javae 2: 224. 1828. *Gonocormus prolifer* (Blume) Prantl, Unters. Morph. Gefässkrypt. 1. Hymenoph. 51. 1875. *Crepidomanes proliferum* (Blume) Bostock, in Bostock & Spokes, Hymenophyllaceae, in Orchard & McCarthy, Fl. Australia 48: 706. 1998. *Trichomanes diffusum* Blume, Enum. Pl. Javae 2: 225. 1828. *Gonocormus diffusus* (Blume) Bosch, Verh. Kon. Akad. Wetensch. Amsterdam 9(6): 9. 1861. *Trichomanes bifolium* Blume, Enum. Plant. Javae 2: 224. *Trichomanes palmatum* C. Presl, Abhand. Kon. Böhm. Ges. Wiss., 5, 3: 16, 39. 1843. *Trichomanes subpinnatifidum* Bosch, Ned. Kruid. Arch. 5(2): 141. 1861. *Trichomanes teysmannii* Bosch, Ned. Kruid. Arch. 5(2): 142. 1861. *Gonocormus teysmannii* (Bosch) Bosch, Verh. Kon. Akad. Wetensch. Amsterdam 9(6): 19, t. 5. 1861. *Trichomanes boninicola* Nakai, Bot. Mag. Tokyo 40: 262. 1926. *Gonocormus boninicola* (Nakai) Tagawa, J. Jap. Bot. 26: 186. 1951. *Trichomanes orbiculatum* Ching ex Ogata, J. Jap. Bot. 15: 694. 1938. *Gonocormus siamensis* Tagawa & K. Iwats., Act. Phytotax. Geobot. 22: 99, t. 3. 1967. *Trichomanes saxifragoides* C. Presl, Abhandl. Kon. Böhm. Ges. Wiss., 5, 3: 39. 1843. *Gonocormus saxifragoides* (C. Presl) Bosch, Verh. Kon. Akad. Wetensch. Amsterdam 9(6): 9. 1861. *Trichomanes parvulum* sensu Blume, Enum. Plant. Javae 2: 223. 1828, non Poir. 1808.

Plants small (2 – 4 cm long) with 1 – 2 cm long wiry stipe; lamina circular or round, flabellately dissected to half way from edge and forming narrow irregular segments; veins dichotomous, without false veins; sori sunken at margins, tubular, indusial margins dilated. (Figure 2)

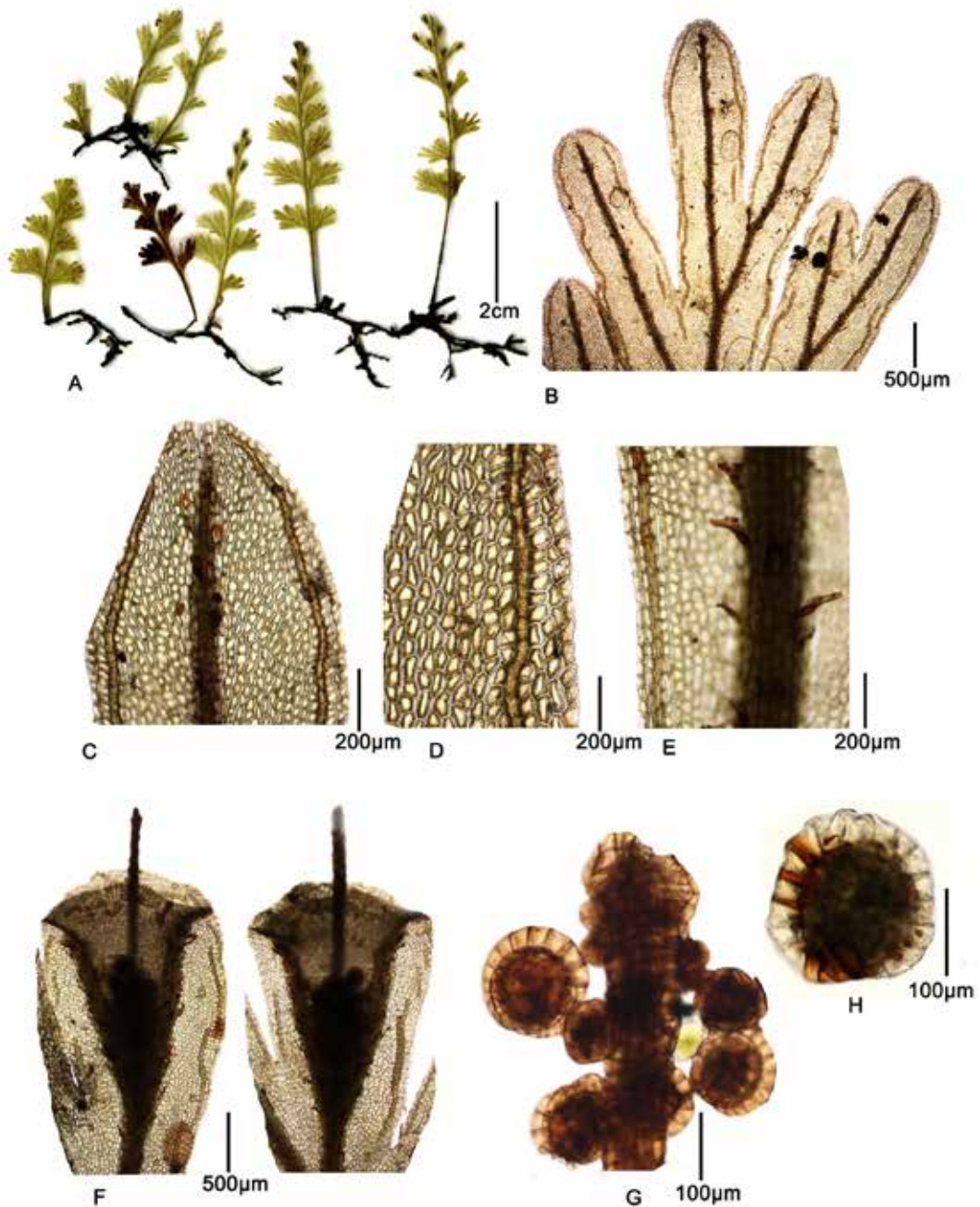


Fig 1. *Trichomanes bipunctatum* A. Plant habit (sterile & fertile); B – E. Enlarged frond showing veins, false veins, mid rib and cellular structure; F – G. Fertile fronds with involucre and sporangia; H. Sporangia.

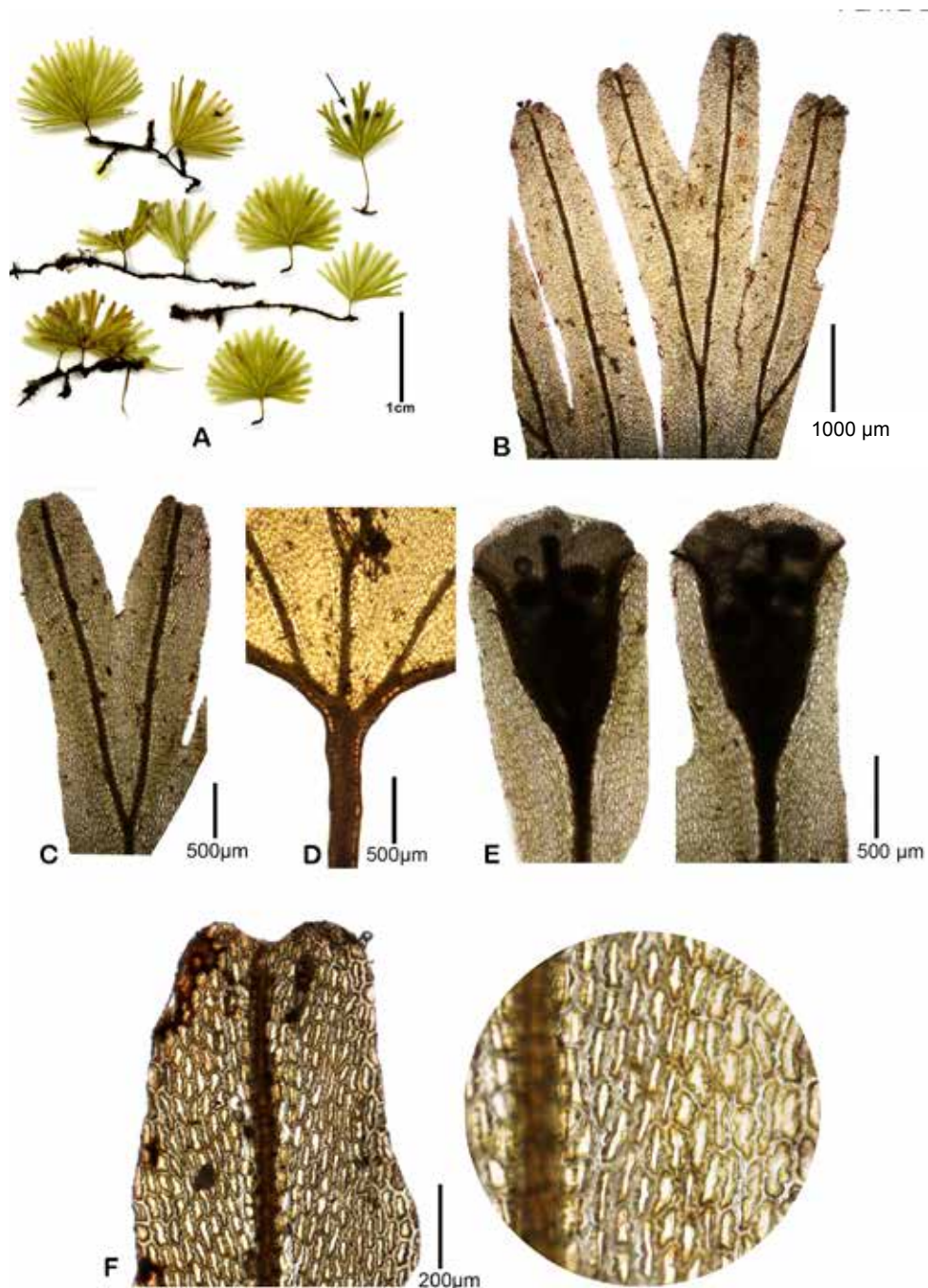


Fig 2. *Trichomanes minutum* A. Plant habit (sterile & fertile); B – C. Enlarged fronds; D. Veins at base of lamina; E. Fertile fronds with sporangia; F. Portion of lamina showing detail cellular structure.

Specimen examined: India, Little Andaman, Krishna Nalah water fall, 25 masl., 04 April 2012, *Lalji Singh* 29516, (PBL & BSD) .

Distribution: India (Andaman & Nicobar –present report, Karnataka, Kerala, Tamil Nadu); China, Indonesia, Malaysia, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam, Australia, New Guinea; Pacific Islands.

Notes: Following Blume (1828), Beddome (1865-70, 1883) reported *T. parvulum* Poir. from Nilghiris, later *Trichomanes saxifragoides* C. Presl is also reported from various parts of India. Many taxonomists treated both species as synonyms. In recent years many species of Blume were sunk in *T. minutum* (Iwatsuki 1985, 1988; Liu *et al.*, 2013) including *Trichomanes proliferum* Blume and *Trichomanes saxifragoides*. This treatment is also accepted here but detail revisionary study of this cryptic complex is needed. However, some Pteridologists have now initiated studies on such complexes of filmy ferns (Nitta *et al.*, 2011). Beddome (1883) had misapplied the name '*T. parvulum*' for a S. E. Asian species but true "*parvulum*" is from Africa and is *Hymenophyllum* (now synonymized under *H. sibthorpidoides*) not *Trichomanes*.

On reviewing the Indian fern literature (Beddome, 1883, 1892; Clarke, 1880; Dixit, 1984; Dixit & Sinha, 2001; Chandra, 2000; Fraser-Jenkins, 2008) *T. minutum* (including its synonyms *Trichomanes saxifragoides*, *Trichomanes proliferum* or *Trichomanes parvulum*) is so far not reported from Andaman and Nicobar islands, hence it is reported here as a new record for Indian islands.

Trichomanes motleyi (Bosch) Bosch, Ned. Kruidk. Arch. 5(2): 145. 1861; Beddome, Handb, Ferns Brit, India 36. 1883.

Microgonium motleyi Bosch, Verhandl. Kon. Akad. Wetensch Amsterdam 9(6): 5, t. 1. 1861. *Didymoglossum motleyi* (Bosch) Ebihara & K. Iwats., Blumea 51(2): 236. 2006. *Trichomanes beccarianum* Ces., Atti Acad. Napoli 7(8): 8, t. 1, f. 2. 1876. *Microgonium beccarianum* (Ces.) Copel., Philipp. J. Sci. 67: 63. 1938. *Trichomanes cognatum* Ces., Rend. Acad. Napoli 16: 24, 28. 1877, non C. Presl (1843). *Trichomanes motleyi* var. *cognatum* (Ces.) C. Chr., Index Fil.: 637. 1906. *Trichomanes minutissimum* Alderw., Philipp. J. Sci. 11: 102, t. 5, f. 1. 1916.

Plants small hairy (4 – 10 mm) with long creeping rhizome; hairs are longer on rhizome, stipe (if present) and lower portion of veins and become shorter and sparser on upper part of veins. Lamina cordate or orbicular sessile or shortly stalked, margins entire, shortly notched at

apical portion in fertile lamina, veins spreading, simple or rarely forked, sori apical on notch, tubular, mouth dilated (Figure 3).

Specimen examined: India, Little Andaman: Krishna Nalah water fall, 25 m., 04 April 2012, *Lalji Singh* 29518, (PBL & BSD) .

Distribution: India (Andaman & Nicobar), Indonesia, Japan, Malaysia, Myanmar, Sri Lanka, Taiwan, Thailand, Vietnam, Australia, New Guinea, Pacific Islands etc.

Notes: It was reported from Andaman by Beddome (1883) without citing any collection. Based on Beddome (1883) it is also listed from Andaman by Dixit (1984), Chandra (2000) and Fraser-Jenkins (2008). On the other hand, while revising the Hymenophyllaceae of Sri Lanka, Sledge (1968) stated that *T. motleyi* had not been found in India. Dixit and Sinha (2001) also not reported this species in the Pteridophytic flora of Andaman and Nicobar. Perhaps they could neither collect the specimen from these Islands nor any collection in CAL or PBL. More confusion on its distribution arose when Beddome (1883) treated *Trichomanes henzeiense* Hook. from Burma (Beddome 1865-70) as synonym of *T. motleyi*. Following Beddome (1883), subsequent workers like Dixit (1984), Chandra (2000) and Fraser-Jenkins (2008) listed this species from Andaman Islands but till date the specimen upon which Beddome's report (1883) was based, has not been traced in any herbaria. Moreover, after Indian independence there is no report on its collection from Andaman (Dixit & Sinha, 2001). Hence present report warrants the occurrence of *T. motleyi* in Andaman and Nicobar islands and correction towards the statement of Sledge (1968) who stated that *T. motleyi* had not been found in India. Furthermore, present collection is recollection of this minute fern after more than 130 years of its first report from India.

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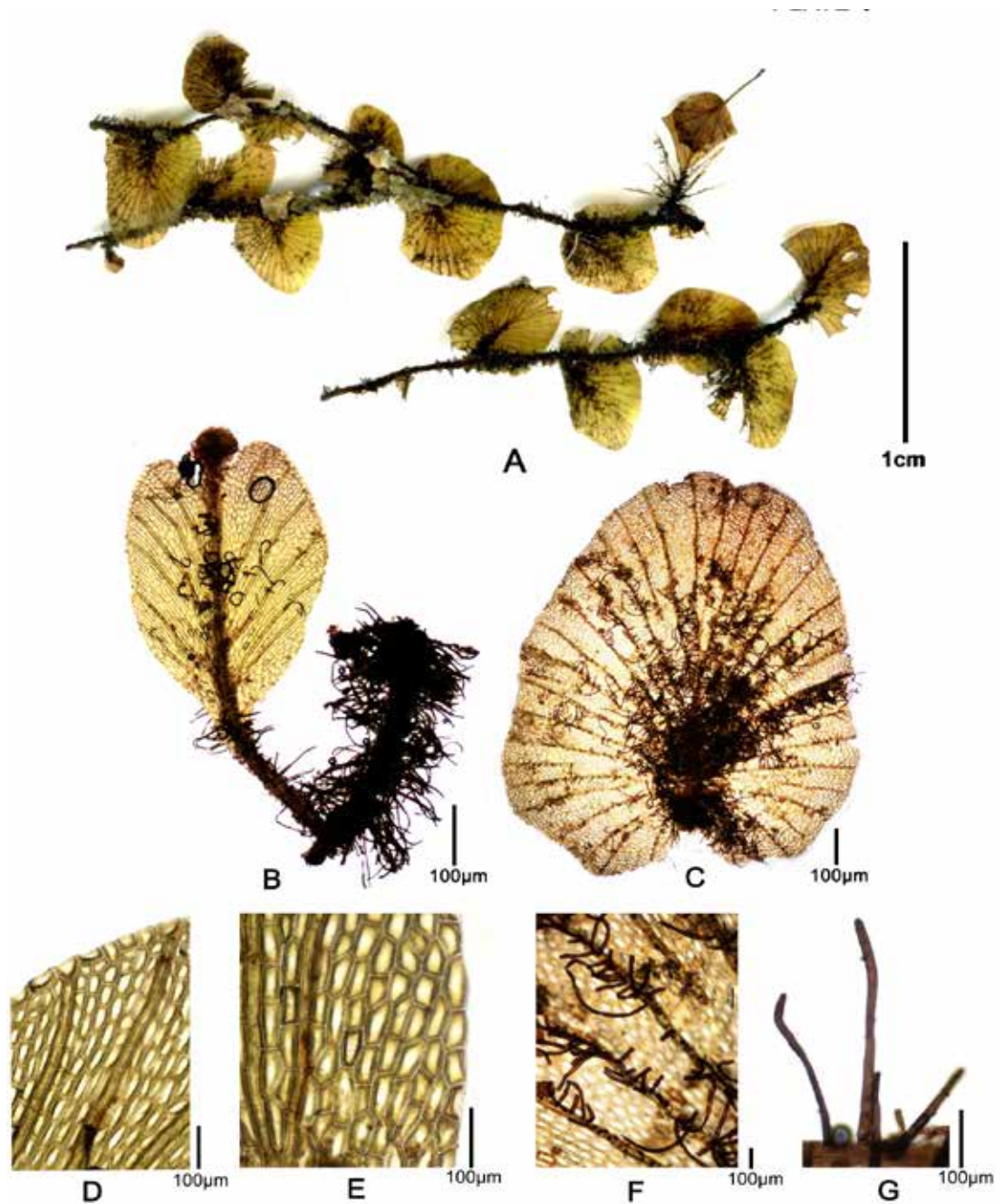


Fig. 3. *Trichomanes motleyi* A. Plant habit; B. Fertile frond; C. Sterile frond; D – E. Enlarged lamina showing veins and cellular structure; F – G. Enlarged lamina showing arrangement of hairs and hairs enlarged.

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