



BRYOPHYTES DATABASE IN TAMIL NADU



by

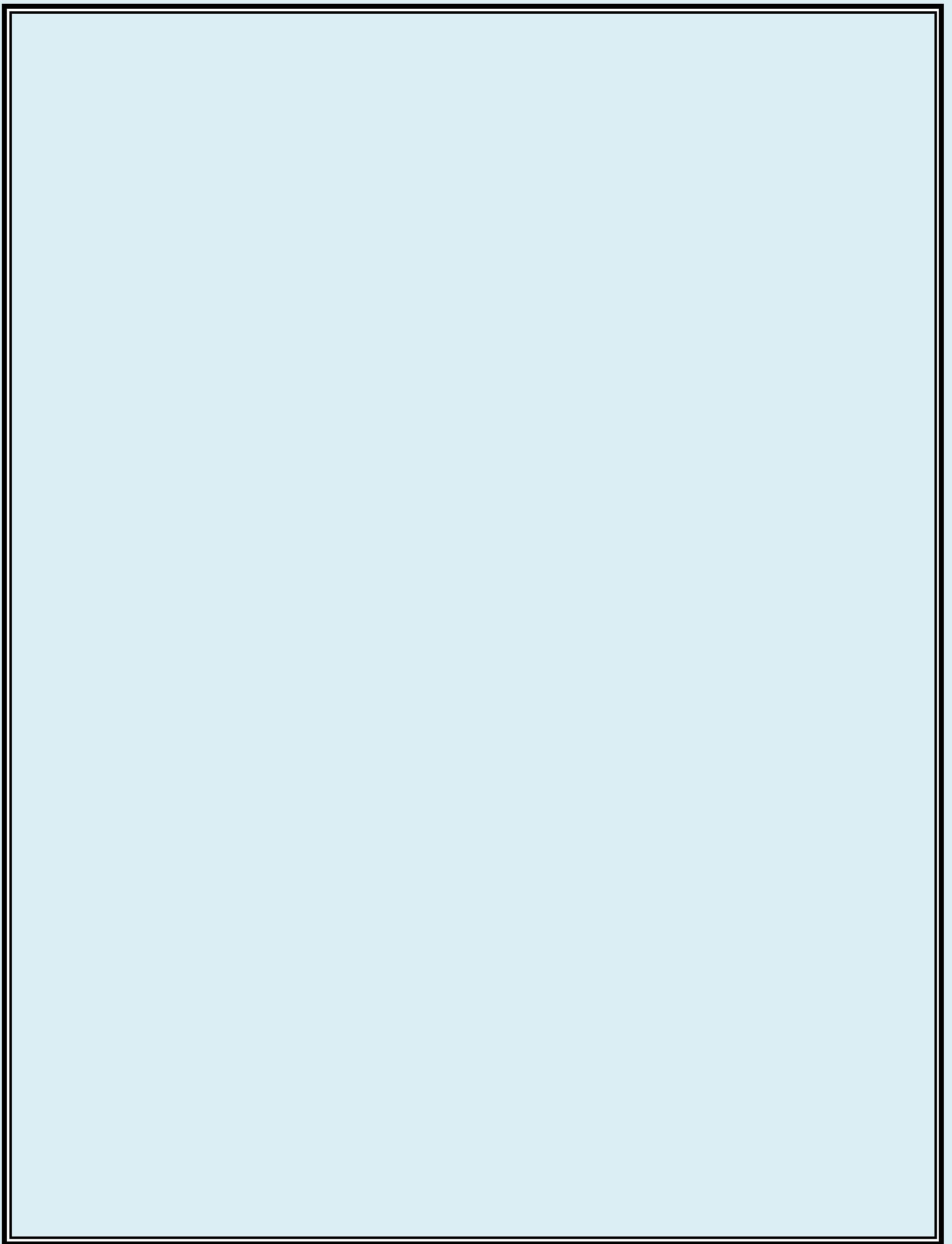
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INTRODUCTION

The term bryophyta means a moss plant, derived from the Greek words *bryon* meaning moss and *phyton* meaning plant. It was Robert Brown who first introduced this term in 1864 to include the algae, the fungi, the lichens and the mosses. However, in recent years this term has been used to denote this group of plants which includes the *Hepaticae*, the *Anthocerotae* and the *Musci*.

Bryophytes occupy an important place in the plant kingdom, although they were thought to be of little economic value. They are the simplest and the most primitive of the land plants. They are the pioneers to colonize terrestrial habitat from aquatic environment. Their adaptation to a terrestrial mode of life is partial as water is indispensable in one stage or another in their life cycle. Hence, they are also known as the *amphibians* of the plant kingdom. They have a remarkable capacity to absorb water and turn fresh in no time, which has given them the name the *resurrection plants*. These plants occur more commonly during rainy seasons and also in humid areas. Their growth is gregarious and within a short period they become so abundant as to occupy large areas, but usually do not form a very conspicuous part of the vegetation. Though basically terrestrial, there are a few aquatic forms such as *Riccia fluitans*, *Ricciocarpus natans* and *Riella spp.* Moreover *Cryptothallus* and *Buxbaumia* are saprophytic genera of liverworts and mosses on contrary to the rest of the bryophytes, which are autotrophic.

Usually, bryophytes show a preference to inhabit microclimatic niches such as crevices of rocks and trees, near small shady springs and so on. But they are seen growing on a wide range of substrata. They may be old discarded/abandoned leather,

rubber and wooden goods, tiled and asbestos roofs, on mortar of stone and mud walls. Besides these, growing as epiphytes on barks of trees (corticolous), on leaves (epiphyllous or folicolous), on rocks (rupicolous), on pebbles and stones (saxicolous), on fallen logs (lignicolous), river banks and road side cuts is a common sight. A notable feature of certain bryophytes is their remarkable capacity to endure drought and are usually known as the *Xeromorphic* forms. They form the secondary colonizers after lichens on barren rocks.

THE IMPORTANCE OF BRYOPHYTES

Bryophytes are useful to human beings as well as to other organisms and the environment in many ways. They are the secondary colonizers on barren rocks next to lichens in plant succession in xerosere. Thus they help in weathering of soil. They are extremely good soil binders as they form large mats on forest floors and roadside cuts, thus controlling soil erosion. They are a good source of humus and hence a haven for a number of soil-dwelling invertebrates like earthworms. They form very good seed beds for seedlings and saplings particularly in evergreen forests. They are very good indicators of environmental pollution. Thallus extracts of *Marchantia polymorpha* and *Lunularia cruciata* show antifungal and antibacterial properties. A number of liverworts are known to be rich sources of terpenoids such as sesqui- and diterpenoids, and also aromatic compounds. They are very good laboratory specimens to carry out experiments on hybridization, apogamy, apospory, DNA targeting etc. and also to understand the process of evolution of land plants. They are also used in decorations in bouquets, vases etc.

Bryophytes are not only used by man but also by other vertebrates and invertebrates. Birds gathering bryophytes particularly mosses has already been reported by Pant and Tewari (1981). Whether to decorate their nests or to camouflage it is a little hard to explain. Similarly, bagworms and some spiders also gather bryophytes for their nests to camouflage themselves from predators.

THE DIVERSITY

So far, 960 genera and about 20,000 species of bryophytes are known to Plant Science.

India is one of the 12 megabiodiversity countries in the world. The large area and the variety of phytoclimatic conditions met within its different bio-geographical zones contribute to the great diversity of the Indian flora. These biogeographical zones with diverse topographical variations and climatic conditions, have been divided into seven bryogeographical regions. They are the Western Himalayas, the Eastern Himalayas, the Punjab and the West Rajasthan, the Gangetic Plains, the Central India, the Western and the Eastern Ghats and the Deccan Plateau. Recently, the islands of Andaman and Nicobar in the Bay of Bengal have been proposed as the eighth region to be included.

The Western Ghats also known as the Sahyadris in peninsular India is identified as one of the 'hotspots' in the world. The flora of this region has been studied with emphasis on the flowering plants and even the pteridophytes. However, our knowledge on the taxonomy and distribution of bryophytes is far from adequate and still relies on the work done during the late 19th and early 20th centuries. So far about 850 species of

liverworts belonging to 140 genera and 52 families and 2000 species of mosses belonging to 342 genera and 54 families are reported to occur in India. From the West Coast and the Western Ghats 121 species of liverworts with 10 endemic and 682 species of mosses with 190 endemic have been reported.

Authors of the plant names are abbreviated following Brummit and Powell (1992) and titles of journals and books are based on B-(otanico)-P-(eriodicum)-H-(untianum) (Lawrence & al., 1968), B-P-H/S (Bridson & Smith,1991), Taxonomic literature ed. 2 (Stafleu & Eowan, 1976 – 1986) and TL2 Supplements (Stafleu & Mennega, 1992 – 2000) respectively.

EARLIER WORK

The earliest work on Indian mosses dates back to 1741 by Dillenius in his *Historia muscorum*. This was followed much later by Linnaeus in 1753, where he included some Indian mosses along with higher plants in his *Species Plantarum*. Later, Buchanan Hamilton, a medical officer in the British Embassy in 1802, made a collection of mosses from Nepal which was published by Hooker in 1808 as *Musci Nepalensis*. It was only after this more serious studies on mosses were taken up by Hooker (1818 - 1820) where he described several new species. In 1825 he jointly made two publications with Greville on Indian mosses. In 1826 - 27, Schwägrichen included some Indian mosses in his supplement to Hedwig's *Species Muscorum*.

Our present knowledge of bryophytes relies mostly on such early works as Wallich (1828 - 32), Harvey and Hooker (1840), Griffith (1842, 1843). The first

bryophyte from the Southern Western Ghats was reported by Van Rheedes (1678 - 1703) in his monumental work on South Indian plants, Hortus Indicus Malabaricus. He described with illustrations one moss from Kerala as 'poovan-peda' (Vol. 12. t. 37. p. 71. 1693). This was later identified by Nicolson & al. (1988) as *Bryum bicolor* Dickson, in contradiction to the earlier interpretation as *B. coronatum* Schwägr. Montagne (1842) reported 100 species of mosses from Nilgris (Tamil Nadu) in his Cryptogamae Nilgherensis, Müller (1853) reported over 100 species of mosses from Nilgris in his Musci Neilgherrensens, Mitten (1859) reported over 700 species in his Musci Indiae Orientalis. Subsequently, Brotherus (1899) reported 86 species and Dixon (1909, 1911, 1912, 1914, 1921, 1938). From a few notable parts of the Western Ghats, Potier de la Varde (1928) described 100 species of mosses from the tropical rain forests of Silent Valley in Kerala, (1922 - 24) from the Western Ghats of Madurai (Tamil Nadu) in his Musci Madurensis, Foreau (1961, 1964) listed 368 species from the Palni hills (W. Ghats of Madurai) which included 95 new species and 15 varieties, and Raghavan and Wadhwa (1968, 1970) from Agumbe and Hulical ranges in Shimoga district of Karnataka. The only other comprehensive work on Indian mosses that gives some information on the habitat and distribution of the south Indian mosses including the Western Ghats is Gangulee's Mosses of eastern India and adjacent regions (1969 - 1980). More recent works are Mohamed's study (1981, 1982, 1984) on *Rhodobryum commersonii* (Schwägr.) Paris and *R. aubertii* (Schwägr.) Thér. in South India, *Bryum wightii* Mitt. and related species, and a synopsis of the genus *Rhodobryum* in Asia respectively. Ochi (1985) published an annotated list of mosses of the subfamily Bryoideae in south, southeast and east Asia, Ellis (1989) made a revision on the genus *Calymperes* in southern India and

neighbouring islands and Crum (1972) published a taxonomic account of the family Erpodiaceae in which there is a mention of one collection from the Travancore hills.

Similarly, the present knowledge of the liverworts relies mostly on the works of Mitten (1861) who reported 290 species of liverworts in his *Hepaticae Indiae Orientalis*, Stephani (1900 - 1924), Benedix (1953), Kashyap (1929, 1932), Chopra (1938, 1943), Bharadwaj (1950, 1958, 1960), Kachroo (1969, 1970a, 1970b, 1973), Kachroo & al. (1977), Udar (1976), Udar and Srivastava (1975, 1977), Joshi and Biradar (1984), Asthana and Srivastava (1991), Nath and Asthana (1998), Asthana & al. (1995), which pertain to different localities in southern India. The most recent works are by Daniels 1998, 2001, Daniels & Daniel 2003a, 2003b, 2004, Kumar and Maniselvan (1994), Maniselvan and Kumar (1998), Maniselvan and Kumar (2000a, 2000b), Nair and Madhusoodhanan (2001, 2002) in Kerala and that of Easa (2003) which is a documentation of bryophytes of Kerala, mostly based on earlier works.

THE CHECKLIST

Name of the species	-Systematic position
Mosses	
<i>Aerobryidium aureonitens</i> (Hook. ex Schwägr.) Broth	Meteoriaceae
<i>Aerobryidium filamentosum</i> (Hook.) M.Fleisch.	Meteoriaceae
<i>Aerobryidium wallichii</i> (Brid.) C.C.Towns.	Meteoriaceae
<i>Aerobryopsis longissima</i> (Dozy & Molk.) M.Fleisch.	Meteoriaceae
<i>Aerobryopsis membranacea</i> (Mitt.) Broth.	Meteoriaceae
<i>Anacamptodon validinervis</i> Dixon & P. de la Varde	Fabroniaceae
<i>Anoetangium aestivum</i> (Hedw.) Mitt.	Pottiaceae
<i>Anoetangium stracheyanum</i> Mitt.	Pottiaceae
<i>Anomobryum auratum</i> (Mitt.) A.Jaeger	Bryaceae
<i>Anomobryum julaceum</i> (Schrad. ex P.Gaertn., B.Mey. & Scherb.) Schimp. Bryaceae	
<i>Anomobryum schmidii</i> (Müll.Hal.) A.Jaeger	Bryaceae
<i>Anomobryum subnitidum</i> Cardot & P. de la Varde	Bryaceae
<i>Aptychella speciosa</i> (Mitt.) Tixier	Sematophyllaceae
<i>Aptychella tenuiramea</i> (Mitt.) Tixier	Sematophyllaceae
<i>Archidium birmannicum</i> Mitt. ex Dixon	Archidiaceae
<i>Archidium microthecium</i> Dixon & P. de la Varde	Archidiaceae
<i>Archidium ohioense</i> Schimp. ex Müll.Hal.	Archidiaceae
<i>Astomum minutum</i> Dixon P. de la Varde	Pottiaceae
<i>Atrichum longifolium</i> Cardot & Dixon ex Gangulee	Polytrichaceae

<i>Atrichum pallidum</i> Renauld & Cardot	Polytrichaceae
<i>Barbella pendula</i> (Sull.) M. Fleisch.	Meteoriaceae
<i>Barbellopsis trichophora</i> (Mont.) W.R. Buck	Meteoriaceae
<i>Barbula dharvarensis</i> Dixon	Pottiaceae
<i>Barbula indica</i> (Hook.) Spreng.	Pottiaceae
<i>Barbula javanica</i> Dozy & Molk.	Pottiaceae
<i>Barbula spathulifolia</i> (Dixon & P. de la Varde) R.H. Zander	Pottiaceae
<i>Barbula vardei</i>	Pottiaceae
<i>Bartramia gathica</i> Cardot & P. de la Varde	Bartramiaceae
<i>Bartramia madurensis</i> Dixon & P. de la Varde	Bartramiaceae
<i>Bartramidula roylei</i> (Hook.f.) Bruch & Schimp.	Bartramiaceae
<i>Bellibarbula recurva</i> (Griff.) R.H. Zander	Pottiaceae
<i>Brachymenium acuminatum</i> Harv.	Bryaceae
<i>Brachymenium bryoides</i> Hook. ex Schwägr.	Bryaceae
<i>Brachymenium capitulatum</i> (Mitt.) Paris	Bryaceae
<i>Brachymenium exile</i> (Dozy & Molk.) Bosch. & Sande Lac.	Bryaceae
<i>Brachymenium indicum</i> (Dozy & Molk.) Bosch. & Sande Lac.	Bryaceae
<i>Brachymenium leptophyllum</i> (Bruch & Schimp. ex Müll.Hal.) Bruch & Schimp.	Bryaceae
<i>Brachymenium nepalense</i> Hook.	Bryaceae
<i>Brachymenium pendulum</i> Mont.	Bryaceae
<i>Brachymenium systylium</i> (Müll.Hal.) A.Jaeger	Bryaceae
<i>Brachymenium walkeri</i> Broth.	Bryaceae

<i>Brachythecium buchananii</i> (Hook.) A.Jaeger	Brachytheciaceae
<i>Brachythecium nitidissimum</i> Dixon & P. de la Varde	Brachytheciaceae
<i>Brachythecium plumosum</i> (Hedw.) Bruch, Schimp. & W.Gümbel	Brachytheciaceae
<i>Brachythecium procumbens</i> (Mitt.) A.Jaeger	Brachytheciaceae
<i>Brachythecium salebrosum</i> (F.Weber & D.Mohr) Bruch, Schimp. & W.Gümbel	Brachytheciaceae
<i>Braunia apiculata</i> Cardot	Hedwigiaceae
<i>Braunia macrocarpa</i> (Müll.Hal.) A.Jaeger	Hedwigiaceae
<i>Braunia secunda</i> Hook.	Hedwigiaceae
<i>Breutelia dicranacea</i> (Müll.Hal.) Mitt.	Bartramiaceae
<i>Breutelia microdonta</i> (Mitt.) Broth.	Bartramiaceae
<i>Brothera leana</i> (Sull.) Müll.Hal.	Dicranaceae
<i>Bryhnia decurvans</i> (Mitt.) Dixon	Brachytheciaceae
<i>Bryocrunia vivicolor</i> (Broth. & Dixon) W.R. Buck	Sematophyllaceae
<i>Bryoerythrophyllum inaequalifolium</i> (Taylor) R.H. Zander	Pottiaceae
<i>Bryoerythrophyllum wallichii</i> (Mitt.) P.C. Chen	Pottiaceae
<i>Bryum alpinum</i> Huds. ex With.	Bryaceae
<i>Bryum apalodictyoides</i> Müll.Hal.	Bryaceae
<i>Bryum apiculatum</i> Schwägr.	Bryaceae
<i>Bryum argenteum</i> Hedw. var. <i>argenteum</i>	Bryaceae
<i>Bryum argenteum</i> Hedw. var. <i>australe</i> Rehmman ex Dixon	Bryaceae
<i>Bryum aubertii</i> (Schwägr.) Brid.	Bryaceae
<i>Bryum billardierei</i> Schwägr.	Bryaceae

<i>Bryum caespiticium</i> Hedw.	Bryaceae
<i>Bryum capillare</i> Hedw.	Bryaceae
<i>Bryum cellulare</i> Hook.	Bryaceae
<i>Bryum coronatum</i> Schwägr.	Bryaceae
<i>Bryum euryphyllum</i> Cardot & P. de la Varde	Bryaceae
<i>Bryum lamprostegrum</i> Müll.Hal.	Bryaceae
<i>Bryum neelgheriense</i> Mont. var. <i>neelgheriense</i>	Bryaceae
<i>Bryum pachycladum</i> Cardot ex P. de la Varde	Bryaceae
<i>Bryum pallescens</i> Schleich ex Schwägr.	Bryaceae
<i>Bryum paradoxum</i> Schwägr.	Bryaceae
<i>Bryum pseudotriquetrum</i> (Hedw.) P.Gaertn. var. <i>pseudotriquetrum</i>	Bryaceae
<i>Bryum retusifolium</i> Cardot & P. de la Varde	Bryaceae
<i>Bryum thomsonii</i> Mitt.	Bryaceae
<i>Bryum uliginosum</i> (Brid.) Bruch & Schimp.	Bryaceae
<i>Bryum wightii</i> Mitt.	Bryaceae
<i>Calymperes afzelii</i> Sw.	Calymperaceae
<i>Calymperes erosum</i> Müll.Hal.	Calymperaceae
<i>Calymperes graeffeanum</i> Müll.Hal.	Calymperaceae
<i>Calymperes lonchophyllum</i> Schwägr. subsp. <i>lonchophyllum</i>	Calymperaceae
<i>Calymperes motleyi</i> Mitt. ex Dozy & Molk.	Calymperaceae
<i>Calymperes tenerum</i> Müll.Hal.	Calymperaceae
<i>Calypothecium auriculatum</i> (Dixon) Nog.	Neckeraceae
<i>Calypothecium oxyphyllum</i> Dixon & P. de la Varde	Neckeraceae

<i>Calyptothecium recurvulum</i> (Broth.) Broth.	Neckeraceae
<i>Calyptothecium symphysodontoides</i> Dixon & P. de la Varde	Neckeraceae
<i>Calyptothecium wightii</i> (Mitt.) M. Fleisch.	Neckeraceae
<i>Campyodontium perplicatum</i> (Thér. & P. de la Varde) Broth.	Entodontaceae
<i>Campylopodium phascoides</i> (Müll.Hal.) Paris	Dicranaceae
<i>Campylopus andreanus</i> Cardot & P. de la Varde	Dicranaceae
<i>Campylopus comosus</i> (Reinw. & Hornsch.) Bosch & Sande Lac.	Dicranaceae
<i>Campylopus ericoides</i> (Griff.) A.Jaeger	Dicranaceae
<i>Campylopus flagelliferus</i> (Müll.Hal.) A.Jaeger	Dicranaceae
<i>Campylopus gracilis</i> (Mitt.) A.Jaeger	Dicranaceae
<i>Campylopus introflexus</i> (Hedw.) Brid. var. <i>introflexus</i>	Dicranaceae
<i>Campylopus involutus</i> (Müll.Hal.) A.Jaeger	Dicranaceae
<i>Campylopus nivalis</i> (Brid.) Brid. var. <i>nivalis</i>	Dicranaceae
<i>Campylopus pilifer</i> Brid.	Dicranaceae
<i>Campylopus richardii</i> Brid.	Dicranaceae
<i>Campylopus savannarum</i> (Müll.Hal.) Mitt.	Dicranaceae
<i>Campylopus schmidii</i> (Müll.Hal.) A.Jaeger	Dicranaceae
<i>Campylopus subfragilis</i> Renauld & Cardot	Dicranaceae
<i>Campylopus umbellatus</i> (Arn.) Paris	Dicranaceae
<i>Campylopus zollingerianus</i> (Müll.Hal.) Bosch & Sande Lac.	Dicranaceae
<i>Ceratodon purpureus</i> (Hedw.) Brid. var. <i>purpureus</i>	Ditrichaceae
<i>Ceratodon purpureus</i> (Hedw.) Brid. var. <i>stenocarpus</i>	Ditrichaceae
<i>Chaetomitrium papillifolium</i> Bosch & Sande Lac.	Hookeriaceae

<i>Chenia leptophylla</i> (Müll.Hal.) R.H. Zander	Pottiaceae
<i>Chrysocladium retrorsum</i> (Mitt.) M. Fleisch.	Meteoriaceae
<i>Claopodium assurgens</i> (Sull. & Lesq.) Cardot	Thuidiaceae
<i>Claopodium pellucinerve</i> (Mitt.) Best	Thuidiaceae
<i>Claopodium prionophyllum</i> (Müll.Hal.) Broth.	Thuidiaceae
<i>Cryptopapillaria fuscescens</i> (Hook.) M. Menzel	Meteoriaceae
<i>Ctenidium lychnites</i> (Mitt.) Broth.	Hypnaceae
<i>Diaphanodon blandus</i> (Harv.) Renauld & Cardot	Trachypodaceae
<i>Dicranella divaricata</i> (Mitt.) A.Jaeger	Dicranaceae
<i>Dicranella griffithii</i> (Mitt.) Giese & J.-P.Frahm	Dicranaceae
<i>Dicranella heteromalla</i> Hedw.	Dicranaceae
<i>Dicranella stricticaulis</i> Cardot & P. de la Varde	Dicranaceae
<i>Dicranodontium denudatum</i> (Brid.) E.Britton	Dicranaceae
<i>Dicranodontium uncinatum</i> (Harv.) A.Jaeger	Dicranaceae
<i>Dicranoloma brevisetum</i> (Dozy & Molk.) Paris	Dicranaceae
<i>Dicranum dilatinerve</i> Cardot & P. de la Varde	Dicranaceae
<i>Dicranum psathyrum</i> Klazenga	Dicranaceae
<i>Didymodon rigidulus</i> Hedw.	Pottiaceae
<i>Diphyscium fasciculatum</i> Mitt.	Diphysciaceae
<i>Diphyscium mucronifolium</i> Mitt.	Diphysciaceae
<i>Distichophyllum montagneanum</i>	Hookeriaceae
<i>Distichophyllum succulentum</i> (Mitt.) Broth.	Hookeriaceae
<i>Ditrichum amoenum</i> (Thwaites & Mitt.) Paris	Ditrichaceae

<i>Ditrichum difficile</i> (Duby) M.Fleisch.	Ditrichaceae
<i>Ditrichum tortipes</i> (Mitt.) Kuntze var. <i>strictum</i> Dixon & P. de la Varde	Ditrichaceae
<i>Ditrichum tortipes</i> (Mitt.) Kuntze var. <i>tortipes</i>	Ditrichaceae
<i>Ectropothecium andrei</i> Cardot & P. de la Varde	Hypnaceae
<i>Ectropothecium cyperoides</i> (Hook.) A. Jaeger	Hypnaceae
<i>Ectropothecium densum</i> Dixon & P. dela Varde	Hypnaceae
<i>Ectropothecium drepanocladoides</i> Broth. & P. de la Varde	Hypnaceae
<i>Ectropothecium laevigatum</i> Thwaites & Mitt.	Hypnaceae
<i>Ectropothecium manii</i> Broth.	Hypnaceae
<i>Ectropothecium zollingeri</i>	Sematophyllaceae
<i>Entodon macropodus</i> (Hedw.) Müll.Hal.	Entodontaceae
<i>Entodon myurus</i> (Hook.) Hampe	Entodontaceae
<i>Entodon obtusatus</i> Broth.	Entodontaceae
<i>Entodontopsis nitens</i> (Mitt.) W.R. Buck	Plagiotheciaceae
<i>Entodontopsis wightii</i> (Mitt.) W.R. Buck	Plagiotheciaceae
<i>Entosthodon diversinervis</i> Müll.Hal.	Funariaceae
<i>Entosthodon perrottetii</i> (Mont.) Müll.Hal.	Funariaceae
<i>Entosthodon physcomitrioides</i> (Mont.) Mitt.	Funariaceae
<i>Entosthodon pilifer</i> Mitt.	Funariaceae
<i>Entosthodon planifolius</i> Thwaites & Mitt.	Funariaceae
<i>Entosthodon submarginatus</i> Müll.Hal.	Funariaceae
<i>Entosthodon wichurae</i> M.Fleisch.	Funariaceae
<i>Erpodium biseriatum</i> (Austin) Austin	Erpodiaceae

<i>Erpodium mangiferae</i> Müll.Hal.	Erpodiaceae
<i>Erythrodontium julaceum</i> (Hook. ex Schwägr.) Paris	Entodontaceae
<i>Eurhynchium vagans</i> (A.Jaeger) E.B.Bartram	Brachytheciaceae
<i>Fabronia curvirostris</i> Dozy & Molk.	Fabroniaceae
<i>Fabronia goughii</i> Mont.	Fabroniaceae
<i>Fabronia madurensis</i> Dixon & P. de la Varde	Fabroniaceae
<i>Fabronia pusilla</i> Raddi	Fabroniaceae
<i>Fabronia schmidii</i> Müll.Hal.	Fabroniaceae
<i>Fabronia secunda</i> Mont.	Fabroniaceae
<i>Fissidens amplifolius</i> Dixon & P. de la Varde	Fissidentaceae
<i>Fissidens anomalus</i> Mont.	Fissidentaceae
<i>Fissidens asplenioides</i> Hedw.	Fissidentaceae
<i>Fissidens auriculatus</i> Müll.Hal.	Fissidentaceae
<i>Fissidens beckettii</i> Mitt.	Fissidentaceae
<i>Fissidens bryoides</i> Hedw.	Fissidentaceae
<i>Fissidens ceylonensis</i> Dozy & Molk. var. <i>acutifolius</i> Dixon & P. de la Varde	Fissidentaceae
<i>Fissidens ceylonensis</i> Dozy & Molk. var. <i>ceylonensis</i>	Fissidentaceae
<i>Fissidens crenulatus</i> Mitt. var. <i>crenulatus</i>	Fissidentaceae
<i>Fissidens crispulus</i> Brid. var. <i>crispulus</i>	Fissidentaceae
<i>Fissidens crispulus</i> Brid. var. <i>robinsonii</i> (Broth.) Z.Iwats. & Z.H.Li	Fissidentaceae
<i>Fissidens diversifolius</i> Mitt.	Fissidentaceae
<i>Fissidens dubius</i> P.Beauv.	Fissidentaceae

<i>Fissidens excedens</i> Broth.	Fissidentaceae
<i>Fissidens flaccidus</i> Brid.	Fissidentaceae
<i>Fissidens ganguleei</i> Nork.	Fissidentaceae
<i>Fissidens gardneri</i> Mitt.	Fissidentaceae
<i>Fissidens grandifrons</i> Brid.	Fissidentaceae
<i>Fissidens griffithii</i> Gangulee	Fissidentaceae
<i>Fissidens hyalinus</i> Hook.f. & Wilson	Fissidentaceae
<i>Fissidens incognitus</i> Gangulee	Fissidentaceae
<i>Fissidens involutus</i> Mitt. subsp. <i>curvato-involutus</i> (Dixon) Gangulee	Fissidentaceae
<i>Fissidens involutus</i> Mitt. subsp. <i>involutus</i>	Fissidentaceae
<i>Fissidens jungermannioides</i> Griff.	Fissidentaceae
<i>Fissidens kalimpongensis</i> Gangulee	Fissidentaceae
<i>Fissidens karwarensis</i> Dixon	Fissidentaceae
<i>Fissidens microdictyon</i> Dixon & P. de la Varde	Fissidentaceae
<i>Fissidens perumalensis</i> Dixon & P. de la Varde	Fissidentaceae
<i>Fissidens schmidii</i> Müll.Hal.	Fissidentaceae
<i>Fissidens serratus</i> Müll.Hal. var. <i>serratus</i>	Fissidentaceae
<i>Fissidens subangustus</i> M.Fleisch.	Fissidentaceae
<i>Fissidens subbryoides</i> Gangulee	Fissidentaceae
<i>Fissidens subpulchellus</i> Nork.	Fissidentaceae
<i>Fissidens teraicola</i> Müll.Hal.	Fissidentaceae
<i>Fissidens virens</i> Thwaites & Mitt.	Fissidentaceae
<i>Fissidens walkeri</i> Broth.	Fissidentaceae

<i>Fissidens zippelianus</i> Dozy & Molk.	Fissidentaceae
<i>Fissidens zollingeri</i> Mont.	Fissidentaceae
<i>Floribundaria floribunda</i> (Dozy & Molk.) M. Fleisch.	Meteoriaceae
<i>Floribundaria thuidioides</i> M. Fleisch.	Meteoriaceae
<i>Foreauella orthothecia</i> (Schwägr.) Dixon & P. de la Varde	Sematophyllaceae
<i>Forsstroemia indica</i> (Mont.) Paris	Cryphareaceae
<i>Funaria excurrentinervis</i> Cardot & P. de la Varde	Funariaceae
<i>Funaria hygrometrica</i> Hedw. var. <i>calvescens</i> (Schwägr.) Mont.	Funariaceae
<i>Funaria hygrometrica</i> Hedw. var. <i>hygrometrica</i>	Funariaceae
<i>Funaria pulchra</i> Dixon & P. de la Varde	Funariaceae
<i>Funaria sinuato-limbata</i> Cardot & P. de la Varde	Funariaceae
<i>Gamiella ceylonensis</i> (Broth. in Herzog) B.C. Tan & W.R. Buck	Sematophyllaceae
<i>Garckea flexuosa</i> (Griff.) Margad. & Nork.	Ditrichaceae
<i>Glossadelphus anisopterus</i> (Cardot & P. de la Varde) Broth.	Sematophyllaceae
<i>Glossadelphus ivoreanus</i> (Mitt.) M. Fleisch.	Sematophyllaceae
<i>Grimmia indica</i> (Dixon & P. de la Varde) Goffinet & Greven	Grimmiaceae
<i>Grimmia ovalis</i> (Hedw.) Lindb.	Grimmiaceae
<i>Gymnostomiella vernicosa</i> (Hook.) M. Fleisch.	Pottiaceae
<i>Gymnostomum calcareum</i> Nees & Hornsch.	Pottiaceae
<i>Haplocladium microphyllum</i> subsp. <i>virginianum</i> (Brid.) Reimers	Thuidiaceae
<i>Hedwigidium integrifolium</i> (P.Beauv.) Dixon	Hedwigiaceae
<i>Herpetineuron toccoae</i> (Sull. & Lesq.) Cardot	Thuidiaceae
<i>Himantocladium cyclophyllum</i> (Mitt.) M. Fleisch.	Neckeraceae

<i>Holomitrium densifolium</i> (Wilson) Wijk. & Margad.	Dicranaceae
<i>Homalia trichomanoides</i> (Hedw.) Schimp.	Neckeraceae
<i>Homaliadelphus targionianus</i> (Mitt.) Dixon & P. de la Varde	Neckeraceae
<i>Homaliodendron exiguum</i> (Bosch & Sande Lac.) M. Fleisch.	Neckeraceae
<i>Homaliodendron flabellatum</i> (Sm.) M. Fleisch.	Neckeraceae
<i>Homaliodendron microdendron</i> (Mont.) M. Fleisch.	Neckeraceae
<i>Homaliodendron montagneanum</i> (Müll.Hal.) M. Fleisch.	Neckeraceae
<i>Homalothecium sericeum</i> Schimp.	Brachytheciaceae
<i>Hookeria acutifolia</i> Hook. & Grev.	Hookeriaceae
<i>Hyophila comosa</i> Dixon & P. de la Varde	Pottiaceae
<i>Hyophila grandiretis</i> Dixon & P. de la Varde	Pottiaceae
<i>Hyophila involuta</i> (Hook.) A. Jaeger	Pottiaceae
<i>Hyophila mollifolia</i> Dixon & P. de la Varde	Pottiaceae
<i>Hyophila spathulata</i> (Harv.) A. Jaeger	Pottiaceae
<i>Hyophila viridula</i> Cardot & P. de la Varde	Pottiaceae
<i>Hypnum cupressiforme</i> Hedw.	Hypnaceae
<i>Hypopterygium tamarisci</i> (Sw.) Brid. ex Müll.Hal.	Hypopterygiaceae
<i>Isopterygium albescens</i> (Hook.) A. Jaeger	Hypnaceae
<i>Isopterygium lignicola</i> (Mitt.) A. Jaeger	Hypnaceae
<i>Isopterygium undulatum</i> Dixon & P. de la Varde	Hypnaceae
<i>Isotheciopsis comes</i> (Griff.) Nog.	Meteoriaceae
<i>Jaegerina stolonifera</i> Müll.Hal. var. <i>incrassata</i> P. de la Varde	Pterobryaceae
<i>Jaegerina stolonifera</i> Müll.Hal. var. <i>stolonifera</i>	Pterobryaceae

<i>Juratzkaea indica</i> Broth. & P. de la Varde	Fabroniaceae
<i>Lepidopilidium furcatum</i> (Thwaites) Mitt.	Hookeriaceae
<i>Leptotrichella denticulate</i> (Cardot & P. de la Varde) Ochyra	Ditrichaceae
<i>Leptotrichella schmidii</i> (Müll.Hal.) Ochyra	Ditrichaceae
<i>Leskea consanguinea</i> (Mont.) Mitt.	Leskeaceae
<i>Leucobryum aduncum</i> Dozy & Molk	Leucobryaceae
<i>Leucobryum aduncum</i> Dozy & Molk. var. <i>scalare</i> (Müll.Hal.) A. Eddy	Leucobryaceae
<i>Leucobryum bowringii</i> Mitt.	Leucobryaceae
<i>Leucobryum humillimum</i> Cardot	Leucobryaceae
<i>Leucobryum javense</i> (Brid.) Mitt.	Leucobryaceae
<i>Leucobryum juniperoideum</i> (Brid.) Müll.Hal.	Leucobryaceae
<i>Leucoloma amoene-virens</i> Mitt.	Dicranaceae
<i>Leucoloma molle</i> (Müll.Hal.) Mitt.	Dicranaceae
<i>Leucoloma nitens</i> (Thwaites & Mitt.) A.Jaeger	Dicranaceae
<i>Leucoloma taylorii</i> (Schwägr.) Mitt.	Dicranaceae
<i>Leucoloma tenerum</i> Mitt.	Dicranaceae
<i>Leucophanes glaucum</i> (Schwägr.) Mitt.	Leucobryaceae
<i>Leucophanes octoblepharioides</i> Brid.	Leucobryaceae
<i>Levierella fabroniacea</i> Müll.Hal.	Fabroniaceae
<i>Lopidium struthiopteris</i> (Brid.) M. Fleisch.	Hypopterygiaceae
<i>Macgregorella indica</i> (Broth.) W.R.Buck	Fabroniaceae
<i>Macrocoma tenuis</i> subsp. <i>sullivantii</i> (Müll.Hal.) Vitt	Orthotrichaceae
<i>Macromitrium calymperoideum</i> Mitt.	Othotrichaceae

<i>Macromitrium japonicum</i> Dozy & Molk.	Orthotrichaceae
<i>Macromitrium moorcroftii</i> (Hook. & Grev.) Schwägr.	Orthotrichaceae
<i>Macromitrium nepalense</i> (Hook. & Grev.) Schwägr.	Orthotrichaceae
<i>Macromitrium polygonostomum</i> Dixon & P. de la Varde	Orthotrichaceae
<i>Macromitrium schmidii</i> Müll.Hal.	Orthotrichaceae
<i>Macromitrium sulcatum</i> (Hook.) Brid.	Orthotrichaceae
<i>Macromitrium turgidum</i> Dixon	Orthotrichaceae
<i>Macrothamniella pilosula</i> (Mitt.) M.Fleisch.	Hylocomiaceae
<i>Macrothamnium macrocarpum</i> (Reinw. & Hornsch.) M.Fleisch.	Hylocomiaceae
<i>Mesonodon flavescens</i> (Hook.) W.R.Buck	Entodontaceae
<i>Meteoriopsis reclinata</i> (Müll.Hal.) M. Fleisch.	Meteoriaceae
<i>Meteoriopsis squarrosa</i> (Hook.) M. Fleisch.	Meteoriaceae
<i>Meteorium buchananii</i> (Brid.) Broth.	Meteoriaceae
<i>Meteorium polytrichum</i> Dozy & Molk.	Meteoriaceae
<i>Meteorium subpolytrichum</i> subsp. <i>subpolytrichum</i>	Meteoriaceae
<i>Microcampylopus khasianus</i> (Griff.) Giese & J.-P.Frahm	Dicranaceae
<i>Mielichhoferia schmidii</i> Müll.Hal.	Bryaceae
<i>Nanothecium foreaui</i> Dixon & P. de la Varde	Entodontaceae
<i>Neckera aequalifolia</i> Müll.Hal.	Neckeraceae
<i>Neckera andrei</i> Thér. & P. de la Varde	Neckeraceae
<i>Neckera goughiana</i> Mitt.	Neckeraceae
<i>Neckera pennata</i> Hedw. var. <i>rhytidiodonta</i> Dixon & P. de la Varde	Neckeraceae
<i>Neckera pennata</i> Hedw.	Neckeraceae

<i>Neckera semicrispa</i> Cardot & P. de la Varde	Neckeraceae
<i>Neckeropsis exserta</i> (Hook. ex Schwägr.) Broth.	Neckeraceae
<i>Noguchiodendron sphaerocarpum</i> (Nog.) Ninh & Pocs	Neckeraceae
<i>Octoblepharum albidum</i> Hedw.	Leucobryaceae
<i>Oedycladium rufescens</i> (Reinw. & Hornsch.) Mitt.	Myuriaceae
<i>Oreoweisia laxifolia</i> (Hook.f.) Kindb.	Dicranaceae
<i>Oxyrrhynchium ovatum</i> Cardot & P. de la Varde	Brachytheciaceae
<i>Palamocladium leskeoides</i> (Hook.) E.Britton	Brachytheciaceae
<i>Papillaria crocea</i> (Hampe) A. Jaeger	Meteoriaceae
<i>Papillaria leuconeura</i> (Müll.Hal.) A. Jaeger	Meteoriaceae
<i>Pelekium contortulum</i> (Mitt.) Touw	Thuidiaceae
<i>Pelekium investe</i> (Mitt.) Touw	Thuidiaceae
<i>Pelekium versicolor</i> (Hornsch. ex Müll.Hal.)Touw	Thuidiaceae
<i>Philonotis dispersa</i> (Cardot & P. de la Varde) D.G.Griffin & W.R.Buck	Bartramiaceae
<i>Philonotis falcata</i> (Hook.) Mitt.	Bartramiaceae
<i>Philonotis fontana</i> (Hedw.) Brid.	Bartramiaceae
<i>Philonotis hastata</i> (Duby) Wijk. & Margad.	Bartramiaceae
<i>Philonotis mollis</i> (Dozy & Molk.) Mitt.	Bartramiaceae
<i>Philonotis subrigida</i> Cardot & P. de la Varde	Bartramiaceae
<i>Philonotis thwaitesii</i> Mitt.	Bartramiaceae
<i>Philonotis tomentella</i> Molendo	Bartramiaceae
<i>Physcomitrium coorgense</i> Broth.	Funariaceae
<i>Pinnatella alopecuroides</i> (Hook.) M. Fleisch.	Neckeraceae

<i>Pinnatella foreauana</i> Thér. & P. de la Varde	Neckeraceae
<i>Plagiomnium integrum</i> (Bosch & Sande Lac.) T.J. Kop.	Mniaceae
<i>Plagiomnium rhynchophorum</i> (Hook.) T.J. Kop.	Mniaceae
<i>Plagiomnium rostratum</i> (Schrad.) T.J. Kop.	Mniaceae
<i>Plagiomnium succulentum</i> (Mitt.) T.J. Kop.	Mniaceae
<i>Plagiothecium neckeroideum</i> var. <i>madurense</i> Dixon & P. de la Varde	Plagiotheciaceae
<i>Plagiothecium vesiculariopsis</i> Dixon & P. de la Varde	Plagiotheciaceae
<i>Plagithecium neckeroideum</i> var. <i>sikkimense</i> Renault & Cardot	Plagiotheciaceae
<i>Platydictya madurensis</i> (Cardot & P. de la Varde) R.S.Chopra	Amblystegiaceae
<i>Platyhypnidium muelleri</i> (A.Jaeger) M.Fleisch.	Amblystegiaceae
<i>Platyhypnidium riparioides</i> (Hedw.) Dixon	Amblystegiaceae
<i>Pleuridium denticulatum</i> (Müll.Hal.) Mitt.	Ditrichaceae
<i>Pogonatum aloides</i> (Hedw.) P. Beauv.	Polytrichaceae
<i>Pogonatum inflexum</i> (Lindb.) Sande Lac.	Polytrichaceae
<i>Pogonatum microstomum</i> (Schwägr.) Brid.	Polytrichaceae
<i>Pogonatum neesii</i> (Müll.Hal.) Dozy	Polytrichaceae
<i>Pogonatum patulum</i> (Harv.) Mitt.	Polytrichaceae
<i>Pogonatum perichaetiale</i> (Mont.) A. Jaeger subsp. <i>perichaetiale</i>	Polytrichaceae
<i>Pogonatum subtortile</i> (Müll.Hal.) A. Jaeger	Polytrichaceae
<i>Pogonatum urnigerum</i> (Hedw.) P. Beauv.	Polytrichaceae
<i>Pohlia camptotrachela</i> (Renauld & Cardot) Broth.	Bryaceae
<i>Pohlia elongata</i> Hedw.	Bryaceae
<i>Pohlia flexuosa</i> Hook.	Bryaceae

<i>Pohlia trematodonte</i> (Müll.Hal.) Broth.	Bryaceae
<i>Pseudoleskeopsis zippelii</i> (Dozy & Molk.)	Leskeaceae
<i>Pseudosymblepharis bombayensis</i> (Müll.Hal.) P. Sollman	Pottiaceae
<i>Pseudotaxiphyllum distichaceum</i> (Mitt.) Z. Iwats.	Hypnaceae
<i>Pseudotaxiphyllum pohliaecarpum</i> (Sull. & Lesq.) Z. Iwats.	Hypnaceae
<i>Pterobryopsis acuminata</i> (Hook.) M. Fleisch.	Pterobryaceae
<i>Pterobryopsis divergens</i> (Mitt.) Nog.	Pterobryaceae
<i>Pterobryopsis gedehensis</i> M. Fleisch	Pterobryaceae
<i>Pterobryopsis orientalis</i> (Müll.Hal.) M. Fleisch.	Pterobryaceae
<i>Pterobryopsis schmidii</i> (Müll.Hal.) M. Fleisch.	Pterobryaceae
<i>Pterobryopsis scrabriuscula</i> (Mitt.) M. Fleisch.	Pterobryaceae
<i>Ptychomitrium tortula</i> (Harv.) A. Jaeger	Ptychomitriaceae
<i>Pylaisia falcata</i> Schimp.	Hypnaceae
<i>Pylaisiadelpha capillacea</i> (Griff.) B.C. Tan & Y. Zia	Sematophyllaceae
<i>Pyrrhobryum spiniforme</i> (Hedw.) Mitt.	Rhizogoniaceae
<i>Racomitrium subsecundum</i> (Hook. & Grev.) Mitt. var. <i>brachyphyllum</i> Cardot & P. de la Varde	Grimmiaceae
<i>Racopilum cuspidigerum</i> (Schwägr.) Ångstr.	Racopilaceae
<i>Racopilum orthocarpum</i> Wilson ex Mitt.	Racopilaceae
<i>Racopilum schmidii</i> (Müll.Hal.) Mitt. var. <i>breviastrum</i> Cardot	Racopilaceae
<i>Racopilum schmidii</i> (Müll.Hal.) Mitt. var. <i>schmidii</i>	Racopilaceae
<i>Radulina hamata</i> (Dozy & Molk.) W.R. Buck & B.C. Tan	Sematophyllaceae
<i>Regmatodon orthostegius</i> Mont.	Leskeaceae

<i>Rhachithecium perpusillum</i> (Thwaites & Mitt.) Broth.	Orthotrichaceae
<i>Rhamphidium madurense</i> Dixon & P. de la Varde	Ditrichaceae
<i>Rhaphidorrhynchium cucullifolium</i> (Cardot & Dixon) Broth.	Sematophyllaceae
<i>Rhaphidorrhynchium sebillei</i> Broth. & Thér.	Sematophyllaceae
<i>Rhaphidostichium subleptocarpum</i> (Thér. & P. de la Varde) Broth.	Sematophyllaceae
<i>Rhodobryum commersonii</i> (Schwägr.) Paris	Bryaceae
<i>Rhodobryum giganteum</i> (Schwägr.) Paris	Bryaceae
<i>Rhodobryum roseum</i> (Hedw.) Limpr.	Bryaceae
<i>Rhynchostegiella humillima</i> (Mitt.) Broth.	Brachytheciaceae
<i>Rhynchostegiella leiopoda</i> Dixon & Cardot	Brachytheciaceae
<i>Rhynchostegium brachythecioides</i> Dixon & P. de la Varde	Brachytheciaceae
<i>Rhynchostegium celebicum</i> (Sande Lac.) A.Jaeger	Brachytheciaceae
<i>Rhynchostegium javanicum</i> (Bél.) Besch.	Brachytheciaceae
<i>Schlotheimia grevilleana</i> Mitt.	Orthotrichaceae
<i>Schoenobryum concavifolium</i> (Griff.) Gangulee	Cryphaeaceae
<i>Schwetschkea applanata</i> (Thwaites & Mitt.) Broth.	Fabroniaceae
<i>Schwetschkeopsis elongata</i> (Dixon & P. de la Varde) W.R.Buck & H.A.Crum	Fabroniaceae
<i>Sematophyllum humile</i> (Mitt.) Broth.	Sematophyllaceae
<i>Sematophyllum subhumile</i> (Müll.Hal.) M. Fleisch.	Sematophyllaceae
<i>Sematophyllum subpinnatum</i> (Brid.) E. Britton	Sematophyllaceae
<i>Sphaerothecium reconditum</i> Thwaites & Mitt.	Dicranaceae
<i>Stereophyllum radiculosum</i> (Hook.) Mitt.	Plagiotheciaceae

<i>Symphyodon complanatus</i> Dixon	Neckeraceae
<i>Symphyodon pygmaeus</i> (Broth.) S. He & Snider	Neckeraceae
<i>Symphysodontella involuta</i> (Thwaites & Mott.) M. Fleisch.	Pterobryaceae
<i>Syntrichia fragilis</i> (Taylor) Ochyra	Pottiaceae
<i>Syrrhopodon gardneri</i> (Hook.) Schwägr.	Calymperaceae
<i>Syrrhopodon prolifer</i> Schwägr. var. <i>prolifer</i>	Calymperaceae
<i>Syrrhopodon semiliberus</i> (Mitt.) Besch. ex Paris	Calymperaceae
<i>Taxiphyllum isopterygioides</i> (Dixon) W.R.Buck	Sematophyllaceae
<i>Taxiphyllum minutirameum</i> (Müll.Hal.) H.A.Mill. & D.R.Sm.	Hypnaceae
<i>Taxiphyllum taxirameum</i> (Mitt.) M.Fleisch.	Hypnaceae
<i>Thamniopsis utacamundiana</i> (Mont.) W.R.Buck	Hookeriaceae
<i>Thamnobryum alleghaniense</i> (Müll.Hal.) Nieuwl.	Neckeraceae
<i>Thamnobryum alopecurum</i> (Hedw.) Nieuwl. ex Gangulee	Neckeraceae
<i>Thamnobryum parvulum</i> (Mitt.) R.S. Chopra	Neckeraceae
<i>Thamnobryum suserratum</i> (Hook.) Nog. & Z. Iwats.	Neckeraceae
<i>Thuidium cymbifolium</i> (Dozy & Molk.) Dozy & Molk.	Thuidiaceae
<i>Thuidium plumulosum</i> (Dozy & Molk.) Dozy & Molk.	Thuidiaceae
<i>Thuidium pristocalyx</i> var. <i>pristocalyx</i> (Müll.Hal.) A.Jaeger	Thuidiaceae
<i>Timmia megapolitana</i> Hedw.	Pottiaceae
<i>Timmiella anomala</i> (Bruch, Schimp. & W.Gümbel) Limpr.	Pottiaceae
<i>Toloxis semitorta</i> (Müll.Hal.) W.R.Buck	Meteoriaceae
<i>Trachycladiella sparsa</i> (Mitt.) M.Menzel	Meteoriaceae
<i>Trachyloma indicum</i> var. <i>indicum</i> Mitt.	Pterobryaceae

<i>Trachyphyllum inflexum</i> (Harv.) A.Gepp.	Entodontaceae
<i>Trachypodopsis serrulata</i> (P.Beauv.) M.Fleisch. var. <i>crispatula</i> (Hook.) Zanten	
	Trachypodaceae
<i>Trachypus bicolor</i> Reinw. & Hornsch. var. <i>bicolor</i>	Trachypodaceae
<i>Trachypus bicolor</i> var. <i>hispidus</i> (Müll.Hal.) Cardot	Trachypodaceae
<i>Trachypus humilis</i> Lindb. var. <i>humilis</i>	Trachypodaceae
<i>Trachypus humilis</i> Lindb. var. <i>tenerrimus</i> (Broth. ex Herzog) Zanten	Trachypodaceae
<i>Trematodon conformis</i> Mitt.	Dicranaceae
<i>Trematodon longicollis</i> Michx.	Dicranaceae
<i>Trematodon schmidii</i> Müll.Hal.	Dicranaceae
<i>Trichostomum hyalinoblastum</i> (Broth.) Broth.	Pottiaceae
<i>Trichostomum tenuirostre</i> (Hook. & Taylor) Lindb.	Pottiaceae
<i>Ulota schmidii</i> (Müll.Hal.) Mitt.	Orthotrichaceae
<i>Vesicularia firma</i> Dixon & P. de la Varde	Hypnaceae
<i>Vesicularia nitidula</i> Cardot & P. de la Varde	Hypnaceae
<i>Vesicularia reticulata</i> (Dozy & Molk.) Broth.	Hypnaceae
<i>Vesicularia subpilicuspis</i> Cardot & P. de la Varde	Hypnaceae
<i>Warburgiella leptorhynchoides</i> (Mont.) M. Fleisch	Sematophyllaceae
<i>Warburgiella perviridis</i> Dixon & P. de la Varde	Sematophyllaceae
<i>Weissia controversa</i> Hedw.	Pottiaceae
<i>Weissia edentula</i> Mitt.	Pottiaceae
<i>Weissia macrocarpa</i> Cardot & P. de la Varde	Pottiaceae

Wilsoniella decipiens (Mitt.) Alston var. *acutifolia* (Dixon) Wijk. & Margad.

Ditrichaceae

Zygodon acutifolius Müll.Hal.

Orthotrichaceae

Zygodon humilis Thwaites & Mitt.

Orthotrichaceae

Zygodon reinwardtii (Hornsch.) A.Braun

Orthotrichaceae

Zygodon tetragonostomus A.Braun ex Bruch, Schimp. & W.Gümbel Orthotrichaceae

Liverworts

Acrolejeunea fertilis (Reinw. & al.) Schiffn.

Lejeuneaceae

Aneura pellioides (Horik.) Inoue

Aneuraceae

Aneura pinguis (L.) Dumort.

Aneuraceae

Archilejeunea polymorpha (Sande Lac.) B.Thiers & Gradst.

Lejeuneaceae

Asterella blumeana (Nees) Kachroo

Aytoniaceae

Asterella leptophylla (Mont.) Pandé & al.

Aytoniaceae

Asterella vulcanica (Schiffn.) Pandé & al.

Aytoniaceae

Asterella wallichiana (Lehm. & Lindenb.)

Aytoniaceae

Calypogeia arguta Mont. & Nees

Calypogeiaceae

Cheilolejeunea birmensis (Steph.) Mizut.

Lejeuneaceae

Cheilolejeunea imbricata (Nees) S.Hatt.

Lejeuneaceae

Cheilolejeunea intertexta (Lindenb.) Steph.

Lejeuneaceae

Cheilolejeunea khasiana (Mitt.) N.Kitag.

Lejeuneaceae

Cheilolejeunea laeviuscula (Mitt.) Steph.

Lejeuneaceae

Cheilolejeunea serpentina (Mitt.) Mizut.

Lejeuneaceae

Cheilolejeunea udarii G.Asthana & al.

Lejeuneaceae

Chonecolea schusteri Udar & A.Kumar

Chonecoleaceae

<i>Cololejeunea furcilibulata</i> (Berrie & E.W.Jones) R.M.Schust.	Lejeuneaceae
<i>Cololejeunea lanciloba</i> Steph.	Lejeuneaceae
<i>Cololejeunea minutissima</i> (Sm.) Schiffn.	Lejeuneaceae
<i>Cololejeunea spinosa</i> (Horik.) S.Hatt.	Lejeuneaceae
<i>Cyathodium aureonitens</i> (Griff.) Mitt.	Targioniaceae
<i>Cyathodium smaragdinum</i> Schiffn.	Targioniaceae
<i>Cyathodium tuberosum</i> Kashyap	Targioniaceae
<i>Drepanolejeunea angustifolia</i> (Mitt.) Grolle	Lejeuneaceae
<i>Drepanolejeunea ternatensis</i> (Gottsche) Steph.	Lejeuneaceae
<i>Dumortiera hirsuta</i> (Sw.) Nees	Marchantiaceae
<i>Exormotheca ceylonensis</i> Meijer	Exormothecaceae
<i>Exormotheca tuberifera</i> Kashyap	Exormothecaceae
<i>Fossombronia crispata</i> Lindb.	Fossombroniaceae
<i>Fossombronia foreaui</i> Udar & S.C.Srivast.	Fossombroniaceae
<i>Fossombronia himalayensis</i>	Fossombroniaceae
<i>Frullania acutiloba</i> Mitt.	Frullaniaceae
<i>Frullania apiculata</i> (Reinw. & al.) Dumort.	Frullaniaceae
<i>Frullania arecae</i> Mitt.	Frullaniaceae
<i>Frullania campanulata</i> Sande Lac.	Frullaniaceae
<i>Frullania densiloba</i> Steph.	Frullaniaceae
<i>Frullania ericoides</i> (Nees) Mont.	Frullaniaceae
<i>Frullania muscicola</i> Steph.	Frullaniaceae
<i>Frullania neurota</i> Taylor	Frullaniaceae
<i>Frullania serrata</i> Gottsche	Frullaniaceae
<i>Frullania tamarisci</i> (L.) Dumort.	Frullaniaceae
<i>Herbertus dicranus</i> (Taylor ex Gottsche & al.) Trevis.	Herbertaceae
<i>Herbertus pinnatus</i> (Steph.) H.A.Mill	Herbertaceae
<i>Heteroscyphus argutus</i> (Reinw. & al.) Schiffn.	Geocalycaceae
<i>Heteroscyphus orbiculatus</i> A.Srivast. & S.C.Srivast.	Geocalycaceae
<i>Heteroscyphus palniensis</i> A.Srivast. & S.C.Srivast.	Geocalycaceae
<i>Heteroscyphus perfoliatus</i> (Mont.) Schiffn.	Geocalycaceae

<i>Jungermannia tetragona</i> Lindenb.	Jungermanniaceae
<i>Lejeunea neelgherriana</i> Gottsche	Lejeuneaceae
<i>Leptolejeunea balansae</i> Steph.	Lejeuneaceae
<i>Leptolejeunea elliptica</i> (Lehm. & Lindenb.) Schiffn.	Lejeuneaceae
<i>Leptolejeunea himalayensis</i> Pandé & R.N.Misra	Lejeuneaceae
<i>Leptolejeunea maculata</i> (Mitt.) Schiffn.	Lejeuneaceae
<i>Leptolejeunea sikkimensis</i> Udar & U.S.Awasthi	Lejeuneaceae
<i>Leucolejeunea xanthocarpa</i> (Lehm. & Lindenb.) A.Evans	Lejeuneaceae
<i>Lophocolea bidentata</i> (L.) Dumort.	Geocalycaceae
<i>Lophocolea cuspidate</i> (Nees) Limpr.	Geocalycaceae
<i>Lophocolea heterophylla</i> (Schrad.) Dumort.	Geocalycaceae
<i>Lophocolea muricata</i> (Lehm.) Schiffn.	Geocalycaceae
<i>Lopholejeunea subfusca</i> (Nees) Schiffn.	Lejeuneaceae
<i>Lunularia cruciata</i> (L.) Dumort.	Lunulariaceae
<i>Mannia foreaui</i> Udar & V.Chandra	Aytoniaceae
<i>Marchantia indica</i> Kashyap	Marchantiaceae
<i>Marchantia nepalensis</i> Lehm. & Lindenb.	Marchantiaceae
<i>Marchantia palmata</i> Nees	Marchantiaceae
<i>Marchantia polymorpha</i> L.	Marchantiaceae
<i>Mastigolejeunea auriculata</i> (Wilson & Hook.) Schiffn.	Lejeuneaceae
<i>Metzgeria conjugata</i> Lindenb.	Metzgeriaceae
<i>Metzgeria consanguinea</i> Schiffn.	Metzgeriaceae
<i>Metzgeria furcata</i> (L.) Dumort.	Metzgeriaceae
<i>Metzgeria himalayensis</i> Kashyap	Metzgeriaceae
<i>Metzgeria indica</i> Udar & S.C.Srivast.	Metzgeriaceae
<i>Metzgeria lutescens</i> Steph.	Metzgeriaceae
<i>Metzgeria nilgiriensis</i> Udar & S.C.Srivast.	Metzgeriaceae
<i>Metzgeria pandei</i> S.C.Srivast. & Udar	Metzgeriaceae
<i>Microlejeunea ulicina</i> A.Evans	Lejeuneaceae
<i>Notoscyphus darjeelingensis</i> Udar & A.Kumar	Jungermanniaceae

<i>Notoscyphus lutescens</i> (Lehm.) Mitt.	Jungermanniaceae
<i>Notoscyphus pandei</i> Udar & A.Kumar	Jungermanniaceae
<i>Notoscyphus paroicus</i> Schiffn.	Jungermanniaceae
<i>Pallavicinia lyellii</i> (Hook.) S.Gray	Pallaviciniaceae
<i>Petalophyllum indicum</i> Kashyap	Fossombroniaceae
<i>Plagiochasma appendiculatum</i> Lehm. & Lindenb.	Aytoniaceae
<i>Plagiochasma japonicum</i> (Steph.) C.Massal.	Aytoniaceae
<i>Plagiochasma pterospermum</i> C.Massal.	Aytoniaceae
<i>Plagiochasma rupestre</i> (J.R.Forst. & G. Forst.) Steph.	Aytoniaceae
<i>Plagiochila elegans</i> Mitt.	Plagiochilaceae
<i>Plagiochila indica</i> Mitt. ex Steph.	Plagiochilaceae
<i>Plagiochila peradenyensis</i> Schiffn.	Plagiochilaceae
<i>Porella campylophylla</i> (Lehm. & Lindb.) Trevis. subsp. <i>campylophylla</i>	Porellaceae
<i>Porella campylophylla</i> (Lehm. & Lindb.) Trevis. subsp. <i>lancistipula</i> (Steph.) S.Hatt.	Porellaceae
<i>Porella perottetiana</i> (Mont.) Trevis. var. <i>perottetiana</i>	Porellaceae
<i>Radula madagascariensis</i> Gottsche	Radulaceae
<i>Radula nilgiriensis</i> Udar & A.Kumar	Radulaceae
<i>Radula onstraedii</i>	Radulaceae
<i>Reboulia hemisphaerica</i> (L.) Raddi	Aytoniaceae
<i>Riccardia levierii</i> Schiffn.	Riccardiaceae
<i>Riccardia multifida</i> (L.) S.Gray	Riccardiaceae
<i>Riccardia personii</i> Srivast. & Udar	Riccardiaceae
<i>Riccardia tenuicostata</i> Schiffn.	Riccardiaceae
<i>Riccia aravalliensis</i> Pandé & Udar	Ricciaceae
<i>Riccia billardieri</i> Mont. & Nees	Ricciaceae
<i>Riccia crozalsii</i> Levier	Ricciaceae
<i>Riccia discolor</i> Lehm. & Lindenb.	Ricciaceae
<i>Riccia fluitans</i> L.	Ricciaceae
<i>Riccia gangetica</i> Ahmad	Ricciaceae
<i>Riccia grollei</i> Udar	Ricciaceae

<i>Riccia melanospora</i> Kashyap	Ricciaceae
<i>Riccia poihaiana</i> A.E.D.Daniels & P.Daniel	Ricciaceae
<i>Riccia sorocarpa</i> Bisch.	Ricciaceae
<i>Riccia velimalaiana</i> A.E.D.Daniels & P.Daniel	Ricciaceae
<i>Riccia warnstorffii</i> Limpr.	Ricciaceae
<i>Schiffneriolejeunea indica</i> (Steph.) Udar & R.N.Misra	Lejeuneaceae
<i>Spruceanthus semirepandus</i> Nees	Lejeuneaceae
<i>Targionia hypophylla</i> L.	Targioniaceae

Hornworts

<i>Anthoceros bharadwajii</i> Udar & Asthana	Anthocerotaceae
<i>Anthoceros crispulus</i> (Mont.) Douin	Anthocerotaceae
<i>Anthoceros erectus</i> Kashyap	Anthocerotaceae
<i>Anthoceros macrosporus</i> Steph.	Anthocerotaceae
<i>Anthoceros punctatus</i> L.	Anthocerotaceae
<i>Notothylas dissecta</i> Steph.	Notothylaceae
<i>Notothylas indica</i> Kashyap	Notothylaceae
<i>Phaeoceros carolianus</i> (Michx.) Prosk.	Anthocerotaceae
<i>Phaeoceros laevis</i> Prosk.	Anthocerotaceae

ENDEMIC/ENDANGERED BRYOPHYTES OF TAMILNADU

As no CAMP (Conservation Assessment Management Plan) has been done for any group of bryophytes in India, the exact status of these plants is not known. Therefore, the following list has been prepared mostly from my own surveys and 10 years of field experience and also based on the little information provided by Udar & Srivastava (1983), Vohra & Aziz (1997) and Singh (1997). However, due to the fast vanishing forests which leads to habitat loss, pollution and global warming, almost all bryophytes are gradually becoming vulnerable, endangered and some in a state of extinction in Tamilnadu. All hornworts are highly endangered in Tamilnadu.

MOSSES

Anacamptodon validinervis

Archidium microthecium

Bartramia madurensis

Dicranum dilatinerve

Distichophyllum succulentum

Ditrichum tortipes var. *strictum*

Ectropothecium densum

Entosthodon diversinervis

Fabronia curvirostris

Fabronia madurensis

Fabronia schmidii

Fissidens perumalensis

Glossadelphus anisopterus

Juratzkaea indica
Mielichoferia schmidii
Nanothecium foreau
Neckera aequalifolia
Neckera goughiana
Neckera semicrispa
Oxyrrhynchium ovatum
Philonotis subrigida
Pinnatella foreauana
Plagiothecium neckeroideum var. *madurensis*
Plagiothecium vesiculariopsis
Pleuridium denticulatum
Pohlia trematodonte
Racopilum schmidii var. *breviastrum*
Racopilum schmidii var. *schmidii*
Rhaphidorrhynchium sebilli
Rhynchostegiella leiopoda
Rhynchostegium brachythecioides
Schwetschkea indica
Sematophyllum subhumile
Thamnobryum parvulum
Trematodon schmidii
Trichostomum hyalinoblastum
Vesicularia nitidula
Vesicularia subpilicuspis
Weissia macrocarpa
Zygodon acutifolius

LIVERWORTS

Fossombronia foreau
Cheilolejeunea udarii

Heteroscyphus orbiculatus

Heteroscyphus palniensis

Heteroscyphus perfoliatus

Lophocolea bidentata

Lophocolea cuspidata

Lophocolea heterophylla

Lophocolea muricata

Metzgeria indica

Metzgeria nilgiriensis

Metzgeria pandei

Radula nilgiriensis

Mannia foreaui

Riccia grollei

Riccia poihaiana

Riccia warnstorffii

Riccia velimalaiana

RARE BRYOPHYTES OF TAMILNADU

MOSSES

Aerobryopsis membranacea

Anoetangium stracheyanum

Aptychella tenuiramea

Archidium birmannicum

Bellibarbula recurva

Brachymenium indicum

Brachymenium walkeri

Brachytecium nitidissimum

Brachytecium procumbens

Braunia secunda
Breutelia dicranacea
Brothera leana
Bryum euryphyllum
Bryum neelgheriense var. *neelgheriense*
Calymperes motleyi
Calypothecium oxyphyllum
Calypothecium symphysodontoides
Ectropothecium andrei
Ectropothecium cyperoides
Ectropothecium drepanocladoides
Ectropothecium laevigatum
Ectropothecium manii
Ectropothecium zollingeri
Fissidens crispulus var. *robinsonii*
Fissidens griffithii
Fissidens hyalinus
Fissidens jungermannioides
Fissidens karwarensis
Fissidens microdictyon
Fissidens subbryoides
Fissidens subpulchellus
Foreauella orthothecia
Forsstroemia indica
Funaria excurrentinervis
Funaria hygrometrica Hedw. var. *calvescens*
Funaria hygrometrica Hedw. var. *hygrometrica*
Funaria pulchra
Funaria sinuato-limbata
Hypopterygium tamarisci
Jaegerina stolonifera var. *incrassata*

Jaegerina stolonifera var. *stolonifera*

Physcomitrium coorgense

Pinnatella alopecuroides

Plagiomnium integrum

Pterobryopsis divergens

Regmatodon orthostegus

Sematophyllum humile

Ulota schmidii

Warburgiella perviridis

LIVERWORTS

Aneura pellioides

Aneura pinguis

Asterella blumeana

Asterella leptophylla

Asterella vulcanica

Asterella wallichiana

Calypogeia arguta

Chonecolea schusteri

Cololejeunea spinosa

Drepanolejeunea angustifolia

Drepanolejeunea ternatensis

Dumortiera hirsuta

Fossombronia crispata

Frullania neurota

Frullania serrata

Herbertus dicranus

Herbertus pinnatus

Lejeunea neelgherriana

Leptolejeunea balansae

Marchantia indica
Marchantia nepalensis
Marchantia palmata
Marchantia polymorpha
Notoscyphus darjeelingensis
Plagiochasma appendiculatum
Plagiochasma japonicum
Plagiochasma pterospermum
Radula madagascariensis
Radula onstraedii
Reboulia hemisphaerica
Targionia hypophylla

HORNWORTS

Anthoceros bharadwajii
Anthoceros crispulus
Anthoceros erectus
Anthoceros macrosporus
Anthoceros punctatus
Notothylas dissecta
Notothylas indica
Phaeoceros carolianus
Phaeoceros laevis

SUGGESTIONS

1. There is an urgent need to carryout a systematic floristic study on the bryophytes of South India particularly the Western and the Eastern Ghats.

2. Identify areas with luxuriant growth of bryophytes and try to understand their ecology.
3. Minimize environmental pollution and interference in the forests.
4. A habitat approach of conservation is mandatory.
5. However, if this is not possible the only other alternative is *ex situ* conservation by developing bryophyte gardens in glass and/or green houses.
6. Finally, make an *in vitro* propagation of threatened and endangered species to be re-introduced into the wild.

MAJOR GAPS IN TAMILNADU

- Lack of experts in the field
- Only a few educational and research institutions with good laboratory facilities
- No national or statelevel website or database available
- Lack of availability of literature
- The rate at which taxonomic revisions are being done outside India is not incorporated in India
- Lack of awareness towards this group of plants
- No reference herbarium available
- Very few sporadic studies and no systematic study carried out
- Lack of financial support to carry out surveys and taxonomic studies on this group

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International Database: www.mobot.org/MOBOT/tropicos/most/welcome.shtml
www.artdata.slu.se/guest/SSCBryo/BryoStart.htm

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