

Hookeriaceae Species and Distribution in Africa, Europe, Asia, Australia and Oceania

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Abstract

This is the third and last in the series of papers on the distribution of the Hookeriaceae. The first (4) pertained to North and Central America and West Indies, and the second (6) to South America.

No Antarctic or cosmopolitan species of Hookeriaceae have been noted. Endemism occurs frequently in the family. An observation of the world distribution of genera shows that nine genera are known only from one area and twelve genera occur in more than one area but have a hemisphere or a continental distribution, such as in the Americas, in the West Indies and the Americas, or in Asia.

In the progress of the monographic studies in the Hookeriaceae and due to the publication of Volume 5 of *Index Muscorum* (7), the following changes and additions in synonymy, authors of epithets, and distribution have been made since publications (4) and (6)¹ *Callicostella depressa* var. *rubella* (Besch.) Wijk & Marg. = *C. depressa* (Hedw.) Jaeg.—Am 2-5; **C. filescens* (Besch.) Jaeg.—Am 3; *C. leonii* Thér. = *Pilotrichidium leonii* (Thér.) Crum & Bartr.—Am 3; **C. merkelii* (Hornsch.) Aongstr.—Am 5; *C. strumulosa* (Hampe & Lor.) Jaeg.—Am 4, 5; **C. subdepressa* (Besch.) Kindb.—Am 5; *C. wallisii* Fleisch. = *nom. nud.* —Am 2. *Crossomitrium crügeri* C. Müll. = *C. patrisiae* (Brid.) C. Müll.—Am 1-6; *C. herminieri* (Besch.) Jaeg.—Am 2, 3. *Cyclodictyon blandum* (Lor.) Kuntze = *C. varians* (Sull.) Kuntze—Am 1, 3, 5; *C. pallens* (Mitt.) Kuntze = *C. varians* (Sull.) Kuntze—Am 1, 3, 5; **C. regnellianum* (C. Müll.) Broth. ex Par.—Am 5; *C. varians* (Sull.) Kuntze—Am 1, 3, 5. *Distichophyllum densirete* Broth. = **Leskeodon densiretis* (Broth.) Broth.—Am 5; **D. fasciculatum* Mitt.—Afr 4, Am 6, Oc. **Eriopus haitensis* Crum & Steere—Am 3. *Hemiragis aurea* (Brid.) Kindb.—Am 2-5. *Hookeria viridula* Mitt. = *Cyclodictyon viridulum* (Mitt.) Kuntze—Am 4, 5; *H. wallisii* C. Müll. = *nom. nud.* —Am 2. *Hookeriopsis diffusa* (Wils.) Jaeg.—Am 2, 4; **H. fissidentoides* (Hook. & Wils.) Jaeg.—Am 3; **H. heteroica* Card. has recently been collected in Mississippi, previously known from Mexico—Am 1; **H. luteo-viridis* (Besch.) Kindb.—Am 5; **H. perfulva* (C. Müll.) Broth. ex Par.—Am 5; **H. websteri* Crum & Bartr.—Am 3. *Hypnella diversifolia* (Mitt.) Jaeg. = *Neohypnella diversifolia* (Mitt.) Welch & Crum —Am 3-5. *Isodrepanium lentulum* (Wils.) Britt.—1-5. *Lepidopilidium divaricatum* (Doz. & Molk.) Broth.—Am 2-5. *Lepidopilum calomicron* Broth. = **Crossomitrium calomicron* (Broth.) Welch—Am 3; *L. diaphanum* (Hedw.) Mitt.—Am 2-4; *L. pumilum* Mitt.—Am 2, 4; *L. sub-tortifolium* Bartr.—Am 1-2. **Leskeodon parvifolius* Bartr.—Am 4; **L. wallisii* (C. Müll.) Broth. ex Par.—Am 4. *Neohypnella chrysophyllopodia*

¹ It is assumed that the introductory pages of the first (4) and second (6) papers will be reviewed before reading this treatise.

* The asterisk before the epithet in the following lists indicates the species, varieties, and forms which are not known to occur in geographical areas other than the one cited.

(C. Müll.) Bartr. = *N. diversifolia* (Mitt.) Welch & Crum—Am 2, 4, 5; *N. mucronifolia* Bartr. = *N. diversifolia*. *Pseudohypmella mucronifolia* Bartr. ex Welch & Crum in error for *Neohypmella mucronifolia*. *Thamniopsis killipii* (Williams) Bartr.—Am 4, 5.

Africa, America, Asia, Australia, Europe, and Oceania are abbreviated, respectively, as Afr, Am, As, Austr, Eur, and Oc. The numbers following the abbreviations refer to specific areas in these countries, as used in *Index Muscorum* and by previous papers on the distribution of Hookeriaceae.

An observation of the world distribution of genera shows that the following are known from one area or one continent only: *Archboldiella* and *Leskeodontopsis*, As 4; *Orontobryum*, As 3; *Bellia*, Austr 2; *Callicostellopsis*, *Stenodesmus*, and *Thamniopsis*, Am 4; *Lamprophyllum*, Am 6; and *Tetrastichium*, Afr 1.

Further observations show that additional genera occur in more than one area and have a hemispheric or a continental distribution: *Adelothecium*, Am 1-5; *Amblytropis*, Am 3-4; *Chaetomitriopsis*, As 2-4; *Crossomitrium*, Am 1-6; *Dimorphocladon*, As 3-4; *Helicoblepharum*, Am 4-5; *Hemiragis*, Am 2-5; *Isodrepanium*, Am 1-5; *Neohypmella*, Am 2, 3, 5; *Philophyllum*, Am 2, 4, 5; *Rhynchostegiopsis*, Am 2-5; and *Stenodictyon*, Am 2-4.

The areas of distribution in the earlier publications (4, 6) are repeated for reference. America 1: North America (Canada, United States, Mexico), Greenland, Aleutian Islands, Bermudas; America 2: Central America and Cocos Island; America 3: West Indian Islands (Greater and Lesser Antilles, Bahamas) except Trinidad and Tobago; America 4: Venezuela, Colombia, Peru, Bolivia, Ecuador, Galapagos Islands; America 5: Brazil, Paraguay, Guiana, Trinidad, Tobago; and America 6: Chile, Argentina, Uruguay, Falkland Islands, and Hermite Island.

The following islands have been included with Africa: the Azores, Canary Islands, Madeira Islands, Saint Helena Island, Madagascar Island, Mauritius Island (formerly Isle de France), Réunion Island (formerly Bourbon) and Kerguelén (Desolation Island).

If tropical Africa is considered as a distribution center, we find species which occur in Africa also occurring in Europe and Asia, as well as Australia to the east and the Americas to the west, particularly South America. *Cyclodictyon laete-virens* has been reported from throughout Africa and in Europe. *Daltonia angustifolia* occurs in Africa, Asia, and New Zealand, and *D. strictifolia* in Africa and Asia. *D. splachnoides* has been recorded in America, Africa, Europe, and Australia. Collections of *Eriopus cristatus* have been reported from Africa, South America, Australia, New Zealand, and Oceania. Apparently *Hookeria lucens* grows in cooler areas than the great majority of the species since it occurs in northern Africa and adjacent Asia, Europe, and northern North America.

Endemism in African Hookeriaceae is greatest in Afr 2, consisting of 67 species and varieties. Afr 3 has 35 species, and Afr 1 and Afr 4, two and six, respectively. The Hookeriaceae are represented in Afr 1 by four species; Afr 2 by 89 species, varieties, and forms; Afr 3 with 56 species and varieties; and Afr 4 by 14.

The European species of Hookeriaceae have extensive distribution records. *Cyclodictyon laete-virens* occurs also in Afr 1-4; *Daltonia splachnoides* in Afr 2, Am 2, Austr 1, 2; *Distichophyllum carinatum* in As 2; *Eriopus apiculatus* (1) (introduced and established in England), in Austr 1, 2, Am 6; and *Hookeria lucens* in Am 1, Afr 1, and As 5.

One hundred and sixty-eight species, subspecies, and varieties have been reported from As 4, 57 from As 3, 27 from As 2, one from As 5, and one from As 1. It is evident that the center of distribution of Asiatic species is As 4. Ten endemic species, subspecies, and varieties of Hookeriaceae are known in As 2, 28 in As 3, and 126 in As 4.

Distichophyllum carinatum occurs in Eur as well as in As 2. As 2 has in common with Oc: *Callicostella papillata*, *Cyclodictyon blume-anum*, *Distichophyllum mittenii*, and *Hookeria acutifolia* which also occurs in Am 1-5 and As 3-4. In addition to As 2-4, *Daltonia angustifolia* also occurs in Afr 2-3 and Austr 2, and var. *strictifolia* in Afr 3. Twenty Asian species occur in Oc, six in Afr 3, four in Afr 2, three in Austr 1, and three in Austr 2. *Hookeria lucens* has been reported from As 5, Eur, Afr 1, and Am 1. *H. acutifolia* has been recorded in As 2-4, Am 1-5, and Oc. The following species in As 3 also occur in Oc: *Callicostella papillata*, *C. prabaktiana*, *Cyclodictyon blumeanum*, *Daltonia contorta*, *Distichophyllum mittenii*, and *Hookeria acutifolia* (also in As 2, 4, and Am 1-5). *Hookeriopsis pallidifolia* has been reported from Afr 2 as well as As 3. In addition to As 4, *Callicostella kaernbachii*, *Chaetomitrium tahitense*, var. *deplanchei*, and *Cyclodictyon lepidum* occur in Austr 1; *Callicostella papillata*, *C. prabaktiana*, *Chaetomitrium tahitense*, var. *deplanchei*, *Cyclodictyon blumeanum*, var. *vescoanum*, *Daltonia contorta*, *Distichophyllum mittenii*, *D. undulatum*, *Eriopus remotifolia*, *Hookeria acutifolia* (also As 2, 3, Am 1-5), and *Leskeodon acuminatus* occur in Oc; *Daltonia angustifolia* in Austr 2 and Afr 2, 3, and its var. *strictifolia* in Afr 3. One species, *Hookeria lucens* (Hedw.) Sm., is the only species known from As 5. This species also grows in Eur, Afr 1, and Am 1, a northern distribution in comparison with the subtropical and tropical habitats of the great majority of species.

Australia and Tasmania have 34 species of Hookeriaceae, 19 of which are endemic; and New Zealand, etc., 26 species, varieties, and forms, 15 of which are endemic. In the distribution of species, Australia and Tasmania have 9 species in common with New Zealand, and 7 in common with Am 6, 3 each with As 4, Afr 3, and Oc, and 1 each with Eur, Afr 2, and Am 2. New Zealand has 9 species which also occur in Australia and Tasmania, and 6 in common with Am 6, 2 each with Afr 2 and 3, and 1 each with As 3 and 4, Eur, Am 2, and Oc. It is ap-

parent that Australia, Tasmania, and New Zealand have more species of Hookeriaceae in common with each other and with Am 6 than they have with other countries.

Pterygophyllum balantii Broth. (*Hepaticina balantii* C. Müll. in *Hedwigia* 41:128. 1902) was described in his *Symbolae ad Bryologicam Australiae III*, without citation of locality as Australia, Tasmania, or New Zealand.

Austr 1 has 19 endemic species in the Hookeriaceae. Austr 1 and 2 have in common nine species. *Distichophyllum rotundifolium*, *Eriopus apiculatus*, *Pterygophyllum dentatum*, and *Sauloma tenella* occur in Austr 1, 2, and Am 6; *Distichophyllum assimile* and *Pterygophyllum obscurum* have been reported from Austr 1 and Am 6; *Callicostella kaernbachii*, *Chaetomitrium tahitense*, and var. *deplanchei* have habitats in Austr 1 and As 4. Austr 1 and Oc have in common: *Chaetomitrium tahitense*, var. *deplanchei*, and *Eriopus cristatus*. Species with a very extensive range of distribution are *Daltonia splachnoides* in Austr 1, 2, Afr 2, Eur, Am 2, and *Eriopus cristatus* in Austr 1, 2, Afr 3, Am 6, and Oc.

Austr 2 has seven endemic species, six varieties, and two forms in 26 representatives of the Hookeriaceae. Nine species occur in both Austr 1 and 2, and six of those in Austr 2 also grow in Am 6; *Distichophyllum rotundifolium*, *Eriopus apiculatus*, *E. cristatus*, *E. flexicollis*, *Pterygophyllum dentatum*, and *Sauloma tenella*. Three species of Austr 2 have an extensive range of distribution. *Daltonia angustifolia* has been reported from As 2-4 and Afr 2, 3; *D. splachnoides* from Austr 2, Afr 2, Am 2, and Eur; and *Eriopus cristatus* from Oc, Austr 1, Afr 3, and Am 6.

Endemism in the Hookeriaceae of Oceania consists of 45 species, six varieties, and one form. *Hookeria acutifolia* occurs in As 2-4 and Am 1-5, as well as in Oc. *Eriopus cristatus* has been reported from Oc, and also from Austr 1, 2, Afr 3, and Am 6. The distribution range of four species from Oceania extends into As 2: *Callicostella papillata*, *Cyclodictyon blumeinum*, *Distichophyllum mittenii*, and *Hookeria acutifolia*; six into As 3: *Callicostella papillata*, *C. prabaktiana*, *Cyclodictyon blumeinum*, *Daltonia contorta*, *Distichophyllum mittenii*, and *Hookeria acutifolia*; and 12 into As 4: *Callicostella papillata*, *C. prabaktiana*, *Chaetomitrium tahitense*, var. *deplanchei*, *Cyclodictyon blumeinum*, var. *vescoanum*, *Daltonia contorta*, *Distichophyllum mittenii*, *D. undulatum*, *Eriopus remotifolius*, *Hookeria acutifolia*, and *Leskeodon acuminatus*. Austr 1 and Oc have two species and a variety in common: *Chaetomitrium tahitense*, var. *deplanchei*, and *Eriopus cristatus*; and Austr 2 and Oc, 1: *E. cristatus*.

Hookeriaceae species of Oceania have a distributional relationship of 11 species with As 4, six with As 3, four with As 2, two with Austr 2, and one each with Austr 2, Afr 3, and Am 1-6.

Africa 1: North Africa, Madeira, Azores, Canary Islands.

Cyclodictyon laete-virens (Hook. & Tayl.) Mitt.; *Hookeria lucens* (Hedw.) Sm.; **Lepidopilum virens* Card.; **Tetrastichium fontanum* (Mitt.) Card.

Africa 2: Central Africa, Saint Helena Island, Fernando Po.

**Actinodontium dusenii* Broth.; **A. streptogoneum* Broth.; *Callicostella africana* Mitt.; **C. ascenionis* (C. Müll.) Kindb.; **C. attenuata* (C. Müll.) Kindb.; *C. brevipes* (Broth.) Broth.; **C. chevalieri* Broth. in Corb.; **C. chinophylla* (C. Müll.) Kindb.; *C. constricta* (C. Müll.) Kindb.; **C. emarginatula* Broth. in Corb.; *C. eroso-truncata* Card.; *C. fissidentella* (Besch.) Kindb.; **C. gabonesis* Broth. & P. Varde; *C. lacerans* (C. Müll.) Jaeg.; *C. leptocladula* (Broth.) Broth.; **C. maclaudii* (Par. & Broth.) Broth.; **C. papillosula* Broth. & P. Varde; **C. perpapillata* Broth. & P. Varde; *C. pusilla* Broth. ex Demar. & P. Varde; *C. salaziae* (Besch.) Kindb.; *C. seychellensis* (Besch.) Kindb.; **C. submarginatula* Broth. & P. Varde; *C. tristis* (C. Müll.) Broth.; **C. usambarica* (Broth.) Broth.; **Chaetomitrium dusenii* C. Müll. ex Broth.; **C. dusenii* var. *brevinerve* (P. Varde) P. Varde; **Cyclodictyon bidentatum* Demar.; *C. borbonicum* (Besch.) Broth.; **C. brevifolium* Broth. in Mildbr.; **C. crassicaule* Broth. in Mildbr.; **C. delicatum* P. Varde; **C. dixonianum* Demar.; **C. filicuspis* P. Varde; *C. hildebrandtii* (C. Müll.) Kuntze; **C. immersum* Broth. & P. Varde; **C. krebedjense* Broth.; **C. krebedjense* var. *argutidens* P. Varde; *C. laete-virens* (Hook. and Tayl.) Mitt.; **C. lebrunii* Demar. & P. Varde; **C. perlimbatum* Broth.; **C. preussii* (Broth.) Broth.; **C. recognitum* Demar. & P. Varde; **C. spectabile* Broth. in Mildbr.; **C. subbrevifolium* Broth.; **C. subobtusifolium* Dix. ex Demar. & P. Varde; *C. vallis-gratiae* (C. Müll.) Kuntze; *C. vallis-gratiae* f. *breutelianum* (Hampe) Demar. & P. Varde; *C. vesiculosum* (Brid.) Kuntze; *Daltonia angustifolia* Doz. & Molk.; **D. constricta* P. Varde; **D. dusenii* C. Müll. ex Broth.; **D. euryloma* P. Varde; **D. longinervis* Mitt.; **D. mildbraedii* Broth. in Mildbr.; **D. mildbraedii* var. *laevis* Demar. & Leroy; **D. minor* Besch.; **D. minuta* Thér.; **D. plicata* P. Varde; *D. splachnoides* (Sm.) Hook. & Tayl.; **D. tortifolia* Demar. & P. Varde; **Distichophyllidium africanum* Demar. & P. Varde; **Distichophyllum procumbens* Mitt.; **D. rigidicaule* (Dus.) Broth.; **D. rigidicaule* var. *gabonense* (P. Varde) P. Varde; **Hookeria contracta* Gepp in Hiern.; **Hookeriopsis ambigua* P. Varde; **H. angolensis* (Welw. & Dub.) Broth. ex Par.; **H. cheiloneura* (Broth.) Broth.; **H. gabonensis* Broth. & P. Varde; **H. mittenii* P. Varde; *H. pallidifolia* (Mitt.) Geh. & Herz.; **H. papillosula* Broth. & P. Varde; *H. pappeana* (Hampe) Jaeg.; **H. staudtii* (Broth.) Broth.; **Hypnella abrupta* (Mitt.) Jaeg.; **H. guineensis* Broth. & Par.; **Lepidopilidium cyrtostegium* (Ren. & Card.) Card. in Grand.; **L. devexum* (Mitt.) Broth.; **L. hanningtonii* (Mitt.) Broth.; **L. subdevexum* (Broth.) Broth.; **L. subdevexum* var. *intermedium* P. Varde; **L. thériotii* Nav. in Dix. & Thér.; **Lepidopilum callochlorum* (C. Müll.) ex Broth.; *L. dusenii*

C. Müll. ex Broth.; **L. hirsutum* (Besch.) Broth. var. *tuberculatum* Thér.; **L. lastii* Mitt.; **L. niveum* (C. Müll.) Kindb.; **Sauloma africana* Dix. & Thér.; **S. tisserantii* P. Varde.

Africa 3: Madagascar, Mauritius, Réunion Islands.

**Actinodontium hirsutum* Besch. var. *ramosum* Besch.; *Callicostella africana* Mitt.; *C. brevipes* (Broth.) Broth.; *C. constricta* (C. Müll.) Kindb.; *C. erosotruncata* Card.; *C. fissidentella* (Besch.) Kindb.; *C. lacerans* (C. Müll.) Jaeg.; **C. laeviuscula* Mitt.; *C. leptocladula* (Broth.) Broth.; *C. papillata* (Mont.) Mitt.; *C. papillata* var. *brevifolia* Fleisch.; **C. parvocellulata* Demar. & P. Varde; **C. perrotii* (Par.) Broth.; *C. pusilla* Broth. ex Demar. & P. Varde; *C. salaziae* (Besch.) Kindb.; *C. seychellensis* (Besch.) Kindb.; **Chaetomitrium borbonicum* Besch.; **C. comorense* Hampe ex C. Müll.; **Cyclodictyon aubertii* (P. Beauv.) Kuntze; *C. borbonicum* (Besch.) Broth.; *C. hildebrandtii* (C. Müll.) Kuntze; *C. laete-virens* (Hook. & Tayl.) Mitt.; **C. perrottetii* Demar. & P. Varde; *C. vallis-gratiae* (C. Müll.) Kuntze; *C. vallis-gratiae* f. *breutelianum* (Hampe) Demar. & P. Varde; *C. vesiculosum* (Brid.) Kuntze; *Daltonia angustifolia* Doz. & Mol.; *D. angustifolia* var. *strictifolia* (Mitt.) Fleisch.; **D. forsythii* Broth. ex Card. in Grand.; **D. latimarginata* Besch.; **D. latimarginata* var. *madagassa* Ren.; **D. stenoloma* Besch.; **Distichophyllum mascarenicum* Besch.; **Eriopus asplenioides* (Brid.) Besch.; *E. cristatus* (Hedw.) Brid. in C. Müll.; **E. fragilis* C. Müll.; **Hookeria splachnifolia* (Brid.) Arnott; **Hookeriopsis darntyi* (Besch.) Broth. in Card. in Grand.; **H. diversifolia* (Ren. & Card.) Broth. ex Card. in Grand.; **Hypnella semi-scabra* Ren. & Card.; **H. viridis* Ren. & Card.; **Lepidopilidium attenuatum* Thér.; **L. brunneolum* (C. Müll.) Broth.; **L. cespitosum* (Besch.) Broth.; **L. chenagonii* (Ren. & Card.) Card. in Grand.; **L. corbieri* (Ren. & Card.) Card. in Grand.; **L. flexuosum* (Besch.) Broth. ex Par.; **L. isleanum* (Besch.) Broth.; **L. parvulum* Card. in Grand.; **L. subrevolutum* (Ren. & Card.) Card. in Grand.; **Lepidopilum carrougeanum* Thér. & P. Varde; **L. hirsutum* (Besch.) Broth.; **L. hirsutum* var. *ramosum* Besch.; **L. hirsutum* var. *tuberculatum* Thér.; **L. humblotii* Ren. & Card.; **L. verrucipes* Card. in Grand.

Africa 4: South Africa, Kerguelen Island, Tristan da Cunha.

**Callicostella applanata* Broth. & Bryhn; *C. fissidentella* (Besch.) Kindb.; *C. salaziae* (Besch.) Kindb.; *C. tristis* (C. Müll.) Broth.; *Cyclodictyon laete-virens* (Hook. and Tayl.) Mitt.; *C. vallis-gratiae* (C. Müll.) Kuntze; *C. vallis-gratiae* f. *breutelianum* (Hampe) Demar. & P. Varde; **Daltonia tristansiensis* Dix. in Christ.; **Distichophyllum fasciculatum* Mitt.; *D. imbricatum* Mitt.; **D. multifolium* (Hornsch.) Sim; **D. taylorii* Sim; **Eriopus mniaceum* (C. Müll.) Broth.; *Hookeriopsis papeana* (Hampe) Jaeg.

Europe, Iceland, the Caucasus.

Cyclodictyon laete-virens (Hook. & Tayl.) Mitt.; *Daltonia splachnoides* (Sm.) Hook. & Tayl.; *Distichophyllum carinatum* Dix. & Nich.; *Eriopus apiculatus* (Hook. f. & Wils.) Mitt. (introduced and established in England); *Hookeria lucens* (Hedw.) Sm.

Asia 1: North Asia including Sakhalin Island.

Hookeria lucens (Hedw.) Sm.

Asia 2: China, Mongolia, Japan, Korea, Taiwan (Formosa).

Callicostella papillata (Mont.) Mitt.; *Chaetomitriopsis glaucocarpa* (Schwaegr.) Fleisch.; *Cyclodictyon blumeianum* (C. Müll.) Kuntze; *Daltonia angustifolia* Doz. & Molk.; *D. angustifolia* var. *strictifolia* (Mitt.) Fleisch.; *D. aristifolia* Ren. & Card.; **Distichophyllum brevirostratum* Thér.; *D. carinatum* Dix. & Nich.; **D. cavaleriei* Thér.; **D. collenchymatosum* Card.; *D. cuspidatum* (Doz. & Molk.) Doz. & Molk.; *D. gracilicaule* Fleisch.; *D. jungermannioides* (C. Müll.) Bosch & Lac.; **D. maibarae* Besch.; *D. mittenii* Bosch & Lac.; *D. montagneanum* (C. Müll.) Bosch & Lac.; *D. nigricaulis* Mitt. ex Bosch & Lac.; **D. obtusifolium* Thér.; **D. osterwaldii* Fleisch.; **D. stillicidiorum* Broth.; **Eriopus japonicus* Card. & Thér.; *E. parviretis* Fleisch.; **E. spinosus* Nog.; *Hookeria acutifolia* Hook. & Grev.; *Hookeriopsis pappiana* (Hampe) Jaeg.; *H. utacamundiana* (Mont.) Broth.; **H. yakushimensis* Toyama.

Asia 3: India, Pakistan, Ceylon, Burma, Thailand (Siam), Vietnam (Indochina).

Actinodontium ascendens Schwaegr.; *A. raphidostegum* (C. Müll.) Bosch & Lac.; *Callicostella papillata* (Mont.) Mitt.; *C. prabaktiana* (C. Müll.) Bosch & Lac.; *Chaetomitriopsis glaucocarpa* (Schwaegr.) Fleisch.; *Chaetomitrium ciliatum* Doz. & Molk. ex Bosch & Lac.; **C. confertum* Thwait. & Mitt.; *C. cucullatum* Dix.; *C. leptopoma* (Schwaegr.) Bosch & Lac.; **C. nervosum* Dix.; *C. papillifolium* Bosch & Lac.; *C. philippinense* (Mont.) Bosch & Lac.; *C. torquescens* Bosch & Lac.; **C. volutum* Mitt.; *Cyclodictyon blumeianum* (C. Müll.) Kuntze; *Daltonia angustifolia* Doz. & Molk.; *D. angustifolia* var. *strictifolia* (Mitt.) Fleisch.; **D. apiculata* Mitt.; **D. aristifolia* Ren. & Card. ssp. *leptophylla* Fleisch.; **D. brevipedunculata* Mitt.; *D. contorta* C. Müll.; *D. contorta* ssp. *macgregorii* (Broth.) Fleisch.; **D. flexifolia* Mitt.; **D. gemmipara* Dix.; **D. marginata* Griff.; **D. perlarixetis* Dix.; **D. reticulata* C. Müll.; **D. semitorta* Mitt.; **D. subangustifolia* Ren. & Card.; *Dimorphocladon borneense* Dix.; **Distichophyllum ceylanicum* (Mitt.) Par.; *D. cuspidatum* (Doz. & Molk.) Doz. & Molk.; **D. griffithii* (Mitt.) Par.; **D. heterophyllum* (Mitt.) Par.; **D. humifusum* (Mitt.) Par.; **D. limpidum* Thwait. & Mitt.; **D. madurense* Thér. & P. Varde; *D. mittenii* Bosch & Lac.; *D. montagneanum* (C. Müll.) Bosch & Lac.; *D. nigricaulis* Mitt. ex Bosch & Lac.; **D. obovatum* (Griff.) Par.; *D. schmidtii* Broth.; *D. sinuosulum* Dix.; **D. succulentum* (Mitt.) Broth.; **Eriopus bonianus* Besch.; **E. lucidus* Thwait. & Mitt.; *E. parviretis* Fleisch.; *E. remotifolius* C. Müll.; *Hookeria acutifolia* Hook. & Grev.; *Hookeriopsis pallidifolia* (Mitt.) Geh. & Herz.; **H. purpurata* (Mitt.) Broth.; **H. secunda* (Griff.) Broth.; **H. thwaitesiana* (Mitt.) Broth.; *H. utacamundiana* (Mont.) Broth.; **Lepidopilidium furcatum* (Thwait. & Mitt.) Broth.; **Orontobryum hookeri* (Mitt.) Fleisch.; *Pseudohypnella verrucosa* (Doz. & Molk.) Fleisch.

Asia 4: Indonesia, Malaya, Philippine Islands, New Guinea.

**Actinodontium ascendens* Schwaegr.; *A. raphidostegum* (C. Müll.) Bosch & Lac.; **Archboldiella pilifera* Bartr.; **Callicostella aiomensis* Bartr.; **C. armata* Herz.; **C. beccariana* (Hampe) Jaeg.; **C. chlonoura* C. Müll.; **C. eberhardtiana* Broth. & Par.; *C. kaernbachii* Broth.; **C. loriae* Fleisch.; *C. papillata* (Mont.) Mitt.; **C. papillata* var. *brevifolia* Fleisch.; **C. papillata* var. *viridissima* Dix.; **C. paupera* (C. Müll.) Kindb.; *C. prabaktiana* (C. Müll.) Bosch & Lac.; **C. prabaktiana* var. *acuminata* Baumg.; **C. pterygophylloides* (Broth.) Broth.; *Chaetomitriopsis glaucocarpa* (Schwaegr.) Fleisch.; **C. diversifolia* Zant.; **Chaetomitrium acanthocarpum* Bosch & Lac.; **C. auriculatum* Dix. & Herz.; **C. beccarii* Dix.; **C. bornense* Mitt.; **C. brassii* Bartr.; *C. ciliatum* Doz. & Molk. ex Bosch & Lac.; **C. crispifolium* Bartr.; **C. ctenidioides* Broth.; *C. cucullatum* Dix.; **C. divergens* Dix.; **C. elegans* Geh.; **C. elmeri* Broth.; **C. elongatum* (Doz. & Molk.) Doz. & Molk.; **C. everettii* Mitt. ex Dix.; **C. fimbriatum* (Doz. & Molk.) Bosch & Lac.; **C. finisterrae* Dix. & Herz.; **C. horridulum* Bosch & Lac.; **C. integrifolium* Bartr.; **C. laevifolium* Dix.; **C. laevisetum* Dix.; **C. lanceolatum* Bosch & Lac.; **C. lancifolium* Mitt.; **C. lauterbachii* Broth.; *C. leptopoma* (Schwaegr.) Bosch & Lac.; **C. leptopoma* var. *massartii* Ren. & Card.; **C. longisetulum* Bartr.; **C. macrohystrix* C. Müll.; **C. madangense* Bartr.; **C. nanohystrix* C. Müll.; *C. nematosum* Broth.; *C. orthorrhynchum* (Doz. & Molk.) Bosch & Lac.; **C. paleatum* (Hampe) Fleisch.; *C. papillifolium* Bosch & Lac.; **C. papuanum* Bartr.; **C. parcesetulosum* Bartr.; **C. perakense* Broth.; **C. perarmatum* Broth.; **C. perlaeve* Dix.; *C. philippinense* (Mont.) Bosch & Lac.; **C. plicatum* Bartr.; **C. poecilophyllum* Dix.; **C. pseudo-elongatum* Broth.; **C. pseudo-papillifolium* Bartr.; **C. recurvifolium* Fleisch.; **C. rigidulum* Broth.; **C. robbinsii* Bartr.; **C. roemerii* Fleisch.; **C. seriatum* Broth.; **C. setosum* Broth.; **C. spinosum* Bartr.; **C. sublaevisetum* Dix.; **C. subplicatum* Bartr.; *C. tahitense* (Sull.) Mitt.; **C. tahitense* var. *deplanchei* (Besch.) Wijk & Marg.; *C. torquescens* Bosch & Lac.; **C. torquescens* var. *barbatum* Dix.; **C. vrieseanum* Bosch & Lac.; **C. warburgii* Broth.; *C. weberi* Broth.; **C. wernerii* Herz.; **C. wildei* Zant.; *Cyclodietyon blumeum* (C. Müll.) Kuntze; **C. blumeum* var. *morokae* Fleisch.; *C. blumeum* var. *vescoanum* (Besch.) Fleisch.; **C. lepidum* (Mitt.) Broth. & Watts; *Daltonia angustifolia* Doz. & Molk.; **D. angustifolia* var. *gemmiphylla* Fleisch.; **D. angustifolia* var. *longipedunculata* (C. Müll.) Fleisch.; **D. angustifolia* var. *revoluta* (Broth.) Bartr.; *D. angustifolia* var. *strictifolia* (Mitt.) Fleisch.; *D. aristifolia* Ren. & Card.; **D. armata* Bartr.; **D. baumgartneri* Froehl.; *D. contorta* C. Müll.; *D. contorta* ssp. *mac-gregorii* (Broth.) Fleisch.; **D. contorta* var. *humilis* Fleisch.; **D. himalayensis* Dix. & Herz.; *D. pseudostenophylla* Bartr.; **D. schiffneri* Froehl.; **D. tuberculosa* Bartr.; *Dimorphocladon borneense* Dix.; **Distichophyllidium antavense* Zant.; **D. jungermanniaceum* Fleisch.; **D. nymphaeum* Fleisch.; **D. rhizophorum* Fleisch.; **Distichophyllum aciphyllum* Dix.; **D. angustifolium* Dix.; **D. angustissimum* Dix.; **D. borneense* Broth.; **D. brevispidatum* Bartr.; **D. brevispis* Fleisch.; **D. catinifolium* Froehl.; **D. cucullatum* Bartr.;

D. cuspidatum (Doz. & Molk.) Doz. & Molk.; **D. denticulatum* Dix.; **D. dixonii* Herz.; **D. elmeri* Broth.; **D. evanidolimbatus* Fleisch.; *D. gracilicaule* Fleisch.; *D. jungermannioides* (C. Müll.) Bosch & Lac.; **D. leiopogon* Dix.; **D. lixii* (Broth.) Thér.; **D. longipes* Broth.; **D. longobasis* Fleisch.; **D. lorianum* Fleisch.; **D. macropodium* Dix.; *D. mittenii* Bosch & Lac.; *D. montagneanum* (C. Müll.) Bosch & Lac.; **D. nidulans* Herz.; *D. nigricaulis* Mitt. ex Bosch & Lac.; **D. nigricaulis* var. *cirratum* (Ren. & Card.) Fleisch.; **D. nigricaulis* var. *complanatum* Fleisch.; **D. perundulatum* Dix.; **D. pullei* Dix.; **D. santosii* Bartr.; *D. schmidtii* Broth.; *D. sinuosulum* Dix.; **D. spathulatum* (Doz. & Molk.) Doz. & Molk.; **D. stipitatifolium* C. Müll.; **D. submucronatum* Fleisch.; **D. subnigricaulis* Broth.; **D. tortile* Doz. & Molk.; **D. turgidum* Bartr.; *D. undulatum* Doz. & Molk.; **Eriopus cristatus* (Hedw.) Brid.; **E. flaccidus* Broth.; **E. microblastus* Broth.; *E. parviretis* Fleisch.; **E. perlimbatus* Dix.; **E. ramosus* Fleisch.; *E. remotifolius* C. Müll.; *E. subremotifolius* Broth.; *Hookeria acutifolia* Hook. & Grev.; **Hookeriopsis geminidens* Broth.; **H. macropus* (Bosch & Lac.) Broth.; **H. majurei* Bartr.; *H. utacamundiana* (Mont.) Broth.; **H. wichurae* Fleisch.; *Leskeodon acuminatus* (Bosch & Lac.) Fleisch.; **L. acuminatus* var. *laeviseta* Zant.; **L. pandurifolius* Fleisch.; **L. philippinensis* Broth.; **L. robbinsii* Bartr.; **L. rotundifolius* Bartr.; **Leskeodontopsis pustulata* Zant.; *Pseudohypnella verrucosa* (Doz. & Molk.) Fleisch.; **Pterygophyllum javense* Dix.; **P. novae-guineae* Bartr.; **Sauloma tenuis* C. Müll.

Asia 5: Asiatic part of the Middle-East, including Cyprus.

Hookeria lucens (Hedw.) Sm.

Australia 1: Australia and Tasmania.

**Callicostella baileyi* (Broth.) Kindb.; *C. kaernbachii* Broth.; **C. rugiseta* Dix.; **Chaetomium entodontoides* Broth. & Watts; *C. tahitense* (Sull.) Mitt.; *C. tahitense* var. *deplanchei* (Besch.) Wijk & Marg.; *Cyclodictyon lepidum* (Mitt.) Broth. & Watts; **Daltonia pusilla* Hook. f. & Wils.; *D. splachnoides* (Sm.) Hook. & Tayl.; *Distichophyllum assimile* Broth.; **D. baileyanum* C. Müll.; **D. beccarii* (Hampe & Geh.) Par.; **D. complanatum* (Hampe) Mitt.; *D. crispulum* (Hook. f. & Wils.) Mitt.; **D. levieri* (Geh.) Broth.; **D. longicuspis* Broth.; *D. microcarpum* (Hedw.) Mitt.; **D. minutifolium* C. Müll.; *D. pulchellum* (Hampe) Mitt.; *D. rotundifolium* (Hook. f. & Wils.) C. Müll. & Broth.; **D. subminutifolium* (Broth. & Geh.) Fleisch.; **D. whiteleggeanum* C. Müll.; *Eriopus apiculatus* (Hook. f. & Wils.) Mitt.; **E. brassii* Bartr.; *E. cristatus* (Hedw.) Brid. in C. Müll.; **E. tasmanicus* Broth.; **Pterygophyllum bryoides* Broth.; *P. dentatum* (Hook. f. & Wils.) Dix.; **P. flaccidissimum* Broth.; *P. obscurum* Mitt.; **P. subrotundum* (Hampe) Jaeg.; **P. wattsii* Broth.; *Sauloma tenella* (Hook. f. & Wils.) Mitt.; **S. zetterstedtii* (C. Müll.) Jaeg.

Australia 2: New Zealand, etc.

**Bellia nervosa* (Hook. f. & Wils.) Broth.; *Daltonia angustifolia* Doz. & Molk.; *D. splachnoides* (Sm.) Hook. & Tayl.; *Distichophyllum crispulum* (Hook. f. & Wils.) Mitt.; **D. crispulum* var. *adnatum* (Hook.

f. & Wils.) Dix.; *D. microcarpum* (Hedw.) Mitt.; **D. microcarpum* var. *homodictyon* Sainsb.; **D. microcladum* (Col.) Broth.; *D. pulchellum* (Hampe) Mitt.; **D. pulchellum* var. *ellipticifolium* Sainsb.; **D. pulchellum* var. *parvirete* Sainsb.; *D. rotundifolium* (Hook. f. & Wils.) C. Müll. & Broth.; *Eriopus apiculatus* (Hook. f. & Wils.) Mitt.; **E. brownii* Dix.; *E. cristatus* (Hedw.) Brid. in C. Müll.; *E. flexicollis* (Mitt.) Jaeg.; **Hookeria flava* Col.; *Pterygophyllum dentatum* (Hook. f. & Wils.) Dix.; **P. dentatum* var. *latifolium* (C. Müll.) Wijk & Marg.; **P. dentatum* var. *robustum* (Hook. f. & Wils.) Dix.; **P. distichophylloides* Broth. & Dix.; **P. quadrifarium* (Sm.) Brid.; **P. quadrifarium* f. *marginata* Sainsb.; **Sauloma macrospora* Sainsb.; *S. tenella* (Hook. f. & Wils.) Mitt.; **S. tenella* f. *propagulifera* Sainsb.

Oceania: Pacific Islands.

**Callicostella bisexualis* (Besch.) Jaeg.; **C. caledonica* Thér.; **C. campbelliana* (Hampe) Jaeg.; **C. chlorina* (Besch.) Broth.; **C. frateri* Broth. & Watts; **C. melanotheca* (Besch.) Jaeg.; **C. melanotheca* var. *scabriseta* Thér.; **C. nukahivensis* (Besch.) Broth.; **C. oblongifolia* (Sull.) Jaeg.; *C. papillata* (Mont.) Mitt.; *C. prabaktiana* (C. Müll.) Bosch & Lac.; **C. vesiculata* (C. Müll.) Jaeg.; **Chaetomitrium aneitense* Broth. & Watts; **C. callichroum* Besch.; **C. densum* Dix. ex Bartr.; **C. depressum* Mitt.; **C. frondosum* Mitt.; **C. hebridense* Dix.; *C. orthorrhynchum* (Doz. & Molk.) Bosch & Lac. var. *vitense* Bartr.; **C. rugifolium* (Sull.) Mitt.; **C. smithii* Bartr.; **C. speciosum* (Sull.) Mitt.; *C. tahitense* (Sull.) Mitt.; *C. tahitense* var. *deplanchei* (Besch.) Wijk & Marg.; *C. weberi* Broth.; **C. wheeleri* Hampe; **Cyclodictyon bescherellei* (Par.) Broth.; *C. blumeum* (C. Müll.) Kuntze; **C. blumeum* f. *graeffeanum* (C. Müll.) Fleisch.; *C. blumeum* var. *vescoanum* (Besch.) Fleisch.; **Daltonia baldwinii* Broth.; *D. contorta* C. Müll.; *D. pseudostenophylla* Bartr.; **D. rufescens* Broth.; **D. sphaerica* Besch.; **Distichophyllum muticum* Broth. & Par.; **Distichophyllum apiculigerum* Broth. & Par.; **D. capillatum* Mitt.; *D. cuspidatum* (Doz. & Molk.) Doz. & Molk.; *D. fasciculatum* Mitt.; **D. flavescens* (Mitt.) Mitt. in Seem.; **D. fossombronioides* Thér.; **D. francii* Thér.; **D. freycinetii* (Schwaegr.) Mitt.; **D. freycinetii* var. *crasseturgescens* C. Müll.; **D. graeffeanum* (C. Müll.) Broth.; *D. imbricatum* Mitt.; **D. koghiense* Thér.; **D. limbatulum* (C. Müll.) Par.; **D. lingulatum* Bartr.; *D. mittenii* Bosch & Lac.; *D. montagneanum* (C. Müll.) Bosch & Lac.; **D. nadeaudii* Besch.; **D. paradoxum* (Mont.) Mitt.; **D. samoanum* Fleisch.; **D. samoanum* var. *brevipes* Bartr.; **D. semimarginatum* Thér.; **D. tahitense* Besch.; **D. torquatifolium* Dix.; *D. undulatum* Doz. & Molk.; **D. vitianum* (Sull.) Mitt.; *Eriopus cristatus* (Hedw.) Brid. in C. Müll.; **E. marginatus* Thér.; **E. pacificus* (Besch.) Fleisch.; *E. remotifolius* C. Müll.; **E. subremotifolius* Broth.; *Hookeria acutifolia* Hook. & Grev.; **H. sandvicensis* Reichtdt.; **Hookeriopsis purpurea* (C. Müll.) Broth.; **H. purpurea* var. *acuminatula* (C. Müll.) Bartr.; **H. purpurea* var. *ligulacea* (C. Müll.) Bartr.; *Leskeodon acuminatus* (Bosch & Lac.) Fleisch.

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