

# Hookeriaceae Species and Distribution in North and Central America and West Indies<sup>1</sup>

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## Abstract

Since 1808, when the original description of *Hookeria* was published, the number of species described in the Hookeriaceae, a moss family, has increased into the hundreds. In the large amount of literature which has resulted, there are very few keys to genera and species. Floras, manuals, and monographs treating this family are scarce. A list of presently known North and Central American and West Indian species of Hookeriaceae in a geographical assemblage is presented as an aid to determining collections of Hookeriaceae from these specific geographical areas. Apparently, the center of distribution of the species in this family, in the Americas, is in the tropics. The directions of distribution are mostly north and south. The patterns of distribution are presented. In the Hookeriaceae, the number of genera and species and endemism increase from Alaska and Canada to and through Central America and the West Indies. One species, *Hookeria acutifolia* Hook. & Grev., has been collected in five Indiana counties.

Many years ago, the late Edwin B. Bartram suggested to the author that the Hookeriaceae needed monographic study. The original description of the genus *Hookeria* was published in 1808. The number of species and varieties described since that date is in the hundreds. The writer once counted the names (species, varieties, and forms) in the family, approaching a total of almost one thousand. Many of these are synonyms and probably the number of synonyms will increase as monographic studies are completed. Also, it may be assumed that new species will be described. The family Hookeriaceae is composed of 38 genera.

In the study of the collections of Hookeriaceae and in the determination of specimens from various countries and islands, one discovers that the number of keys to the genera and species is very small. Those which exist are for the specific areas covered by the publications. The descriptions are in a large number of publications throughout the world and often in articles other than moss floras or manuals. Frequently the treatises pertain to all mosses of a specific area and have no keys.

Under these circumstances, how may one proceed upon receipt of numerous collections for determination if one is unacquainted with the Hookeriaceae of that specific country or island, and of publications pertaining to same? In doing monographic work in this family, the writer has prepared a card file of the species, varieties, and forms, and the references to publications concerning each. A reference library of the original descriptions of each and additional source materials are at

<sup>1</sup> This paper is dedicated to Dr. Ralph E. Cleland in appreciation of his invitation to teach the first Bryophyte Course in an Indiana University Summer Session, in 1956, and in gratitude for the privilege of working with him as an expedient chairman, on Indiana Academy of Science committees.

hand. Recently the author has completed a list of Hookeriaceae species and varieties with the geographical areas of the world in which each occurs. These data provide an indication of the descriptions of genera and species which may be read by a bryologist as an aid in determining the collections from a specific area.

This list has been compiled from the four volumes of *Index Muscorum*, prepared by Wijk, Margadant, and Florschütz (3) for the International Bureau of Plant Taxonomy and Nomenclature of the International Association for Plant Taxonomy. Without these very useful volumes, this reference material concerning Hookeriaceae species and distribution could not have been assembled.

The names recorded in the following lists are those cited in the *Index* (3) as valid epithets. The synonyms have been omitted. Apparently the *Index* treats Mexico as a part of Central America instead of North America. The author refers to North America as composed of Canada, United States, and Mexico. The species listed under America 1 in this study are based upon the writer's monographic publications (1, 2) on North American Hookeriaceae; some of those under America 3 are included in the author's manuscript, in process, on Cuban Hookeriaceae. The asterisk before the epithet indicates the species and varieties which are not known to occur in other geographical areas than the one cited.

A survey of the Hookeriaceae genera in North America, beginning in the far north, shows one genus in Alaska, Canada, and through the mainland of the United States to the southeastern states, where there are three additional genera. The number increases to eleven in Mexico. In Central America, the same genera occur with eight additional, making a total of nineteen genera. In the West Indies there are eighteen genera known, adding one to the Central American list and omitting two.

Continuing the survey, the number of species increases from one in Alaska to two in Canada and the mainland of the United States, while in the southeastern states four species are known, resulting in a total of five for Canada and the United States. In Mexico there are thirty-one additional species, making a total of thirty-six North American species. Continuing into Central America, ninety-five species and varieties have been recorded. The number reported for the West Indies is one hundred and eight species and varieties. In comparing the species recorded for Central America with those of North America, there are over two and one-half times as many in Central America, and three times as many in the West Indian Islands. These data show that this family of mosses is more abundant in tropical areas than in the North Temperate zone. No Hookeriaceae are known in Arctica and Antarctica.

According to the data available in this study of species and varieties within the geographical areas cited, a large number of endemic species occur in Central America and the West Indies, forty-four in the former and fifty-nine in the latter. In contrast, only seven endemic species are known presently in North America, all in Mexico.

The following distribution patterns and ranges have been observed in this study. Probably they will change somewhat as additional areas are covered by collectors in future years and as the monographic studies of the family are continued.

Some species occur from southeastern United States, through Mexico, Central America, West Indies, and the northern half of South America: e.g., *Adelothecium bogotense*, *Callicostella pallida*, *Cyclodictyon albicans*, *Hookeriopsis cruegeriana*, *Isodrepanium lentulum*, and *Lepidopilum radicale*. Other species are known from southeastern United States to southern South America: *Crossomitrium patrisiae*, *Daltonia gracilis*, *Lepidopilum polytrichoides*, and *L. scabrisetum*. *Cyclodictyon varians* has been recorded in southeastern United States and the West Indies.

Hookeriaceae presently known in Mexico and Central America are *Callicostella ciliata*, *Cyclodictyon erubescens*, *C. humectatum*, *Lepidopilum falcatum*, *L. mohrianum*, and *Leskeodon mexicanus*. A group of species known to occur in Mexico, Central America, and West Indies consists of *Callicostella bernoullii*, *Lepidopilum cubense*, and *Rhynchostegiopsis flexuosa*. *Cyclodictyon roridum*, *Daltonia longifolia*, and *Lepidopilum tortifolium* have been collected in Mexico, Central America, West Indies, and northwestern South America. Another pattern of distribution combines Mexico, West Indies, and northwestern South America as is illustrated by *Lepidopilum radicale*. Still another is composed of Mexico, Central America, and northwestern South America, as shown by collections of *Cyclodictyon rubrisetum*, *Lepidopilum brevipes*, and *L. carneum*.

There are some species which presently are not known to occur in North America. Considering Central America and the West Indies, the distribution range is illustrated by *Hookeriopsis falcata*, *Lepidopilum diaphanum*, and *Stenodictyon sericeum*. Another distribution pattern includes species from Central America, West Indies, and northwestern South America: *Callicostella scabriseta*, *Hookeriopsis falcata*, *H. undata*, *Leskeodon andicola*, and *L. pusillus*. *Callicostella depressa* and *Hookeriopsis acicularis* indicate a distribution pattern which includes Central America, West Indian Islands, and northeastern South America. A combination of Central America, West Indies, and the northern half of South America is indicated by *Cyclodictyon cuspidatum*, *Daltonia stenophylla*, and *Hemiragis aurea*. *Callicostella scabriseta* and *Hookeriopsis incurva* occur in Central America, West Indies, and throughout South America. It is also observed that Central America and northwestern South America have a distribution pattern as shown by *Daltonia tenuifolia*, *Hookeriopsis diffusa*, *H. subfalcata*, and *Lepidopilum semi-laeve*. Another pattern includes Central America and the northern half of South America, characterized by the following species: *Hookeriopsis crispa*, *H. variabilis*, *Hypnella pilifera*, and *Philophyllum tenuifolium*.

Based upon reports we note a distribution relationship between the West Indian Islands and northwestern South America as illustrated by *Callicostella rivularis*, *Cyclodictyon denticulatum*, *C. lindigianum*, *C.*

*ulophyllum*, *Lepidopilum muelleri*, and *L. robustum*. Another is between the West Indies and northeastern South America: e.g., *Cyclodictyon olfersianum*, *Hypnella cymbifolia*, *Lepidopilidium portoricense*, *Lepidopilum intermedium*, *L. subaurifolium*, *Leskeodon auratus*, and *L. cubensis*. Another combines the West Indies and the northern half of South America as indicated by *Hypnella diversifolia* and *H. leptorhyncha*.

Due to the positions of North, Central, and South America and the West Indian Islands, the north and south direction of distribution of species would be anticipated. However, three species, *Hookeria acutifolia*, *H. lucens*, and *Daltonia splachnoides*, appear to have an east and west direction of distribution. *Hookeria acutifolia* is a species with a very wide distribution, being reported from nine of the *Index Muscorum* geographical areas, including the three Americas, three Asiatic areas, and Oceania. *H. lucens* has been reported from northern North America, Europe, northern Africa and adjacent Asia. *Daltonia splachnoides* has been recorded from Central America, Europe, Central Africa, Australia, and New Zealand.

#### America 1: North America, Greenland, Aleutian Islands, Bermudas.

No Hookeriaceae are known from Greenland.

*Adelothecium bogotense* (Hampe) Mitt.; *Callicostella bernoullii* (Hampe) Broth.; *C. ciliata* (Schimp.) Jaeg.; \**C. mexicana* Robins. & Welch; *C. pallida* (Hornsch.) Aongstr.; *Crossomitrium patrisiae* (Brid.) C. Muell.; *Cyclodictyon albicans* (Hedw.) Kuntze; \**C. arsenei* Thér.; *C. erubescens* Bartr.; *C. humectatum* Card.; *C. roridum* (Hampe) Kuntze; *C. rubrisetum* (Mitt.) Kuntze; *C. varians* (Sull.) Kuntze (only species reported from Bermuda); *Daltonia gracilis* Mitt.; *D. longifolia* Tayl.; *Hookeria acutifolia* Hook. & Grev.; *H. lucens* (Hedw.) Sm. (northernmost species in Hookeriaceae); *Hookeriopsis cruegeriana* (C. Muell.) Jaeg.; \**H. heteroica* Card.; *Isodrepanium lentulum* (Wils.) Britt.; \**Lepidopilum apophysatum* Hampe; *L. brevipes* Mitt.; *L. carneum* Bartr.; *L. cubense* (Sull.) Mitt.; \**L. deppeanum* (C. Muell.) Mitt.; *L. falcatum* C. Muell.; \**L. filiferum* Besch.; *L. mohrianum* C. Muell.; \**L. nitidum* Besch.; *L. polytrichoides* (Hedw.) Brid.; *L. pringlei* Card.; *L. radicale* Mitt.; *L. scabrisetum* (Schwaeger.) Steere; *L. tortifolium* Mitt.; *Leskeodon mexicanus* Card.; *Rhynchostegiopsis flexuosa* (Sull.) C. Muell.

#### America 2: Central America and Cocos Island.

\**Actinodontium standleyi* Bartr.; *Adelothecium bogotense* (Hampe) Mitt.; \**Callicostella aquatica* Bartr.; *C. bernoullii* (Hampe) Broth.; *C. ciliata* (Schimp.) Jaeg.; *C. depressa* (Hedw.) Jaeg.; \**C. disticha* Aongstr.; \**C. fallax* (C. Muell.) Broth.; \**C. heterophylla* Aongstr.; \**C. hondurensis* Crum; \**C. oerstediana* (C. Muell.) Jaeg.; *C. pallida* (Hornsch.) Aongstr.; *C. scabriseta* (Hook.) Jaeg.; \**C. tenerrima* Bartr.; \**C. vatteri* Bartr.; \**C. virens* Ren. & Card.; \**Crossomitrium acuminatum* Bartr.; \**C. herminieri* (Besch.) Jaeg.; \**C. heterodontium* Ren. & Card.; \**C. oerstedianum* C. Muell.; *C. patrisiae* (Brid.) C. Muell.; \**C. scab-*



*risetum* Bartr.; *C. wallisii* C. Muell.; *Cyclodictyon albicans* (Hedw.) Kuntze; \**C. brittonae* Bartr.; *C. cuspidatum* Kuntze; *C. erubescens* Bartr.; *C. humectatum* Card.; \**C. liebmannii* (Schimp.) Kuntze; \**C. maxonii* Williams; *C. roridum* (Hamp.) Kuntze; *C. rubrisetum* (Mitt.) Kuntze; *Daltonia gracilis* Mitt.; *D. longifolia* Tayl.; *D. splachnoides* (Sm.) Hook. & Tayl.; *D. stenophylla* Mitt.; *D. tenuifolia* Mitt.; *Hemiragis aurea* (Brid.) Ren. & Card.; *Hookeria acutifolia* Hook. & Grev.; *Hookeriopsis acicularis* (Mitt.) Jaeg.; \**H. angustiretis* Bartr.; \**H. callicostelloides* Herz. & Thér.; *H. crispa* (C. Muell.) Jaeg.; *H. cruegeriana* (C. Muell.) Jaeg.; *H. diffusa* (Mitt.) Jaeg.; *H. falcata* (Hook.) Jaeg.; *H. falcata* (Besch.) Jaeg.; \**H. guatemalensis* Bartr.; *H. incurva* (Hornsch.) Broth.; \**H. laevinervis* Ren. & Card.; \**H. levieri* (Broth.) Broth.; \**H. obtusifolia* Bartr.; \**H. panamensis* Bartr.; \**H. standleyi* Bartr.; *H. subfalcata* (Hamp.) Jaeg.; *H. undata* (Hedw.) Jaeg.; *H. variabilis* (Mitt.) Jaeg.; *Hypnella pilifera* (Hook. & Wils.) Jaeg.; \**H. wrightii* (Sull. & Lesq.) Jaeg.; *Isodrepanium lentulum* (Wils.) Britt.; \**Lepidopilidium subdivaricatum* (Ren. & Card.) Broth.; \**Lepidopilum apiculatum* Bartr.; \**L. apollinairei* Broth. & Par.; *L. brevipes* Mitt.; *L. carneum* Bartr.; \**L. contiguum* Ren. & Card.; \**L. crassisetum* Williams; *L. cubense* (Sull.) Mitt.; *L. diaphanum* (Hedw.) Mitt.; *L. falcatum* C. Muell.; \**L. floresianum* Ren. & Card.; \**L. genuflexum* C. Muell.; \**L. haplociliatum* (C. Muell.) Par.; \**L. lactenitens* Ren. & Card.; \**L. livens* Besch.; *L. mohrianum* C. Muell.; \**L. platyphyllum* Ren. & Card.; *L. polytrichoides* (Hedw.) Brid.; *L. pringlei* Card.; \**L. quadrifarium* Herz.; *L. radiale* Mitt.; \**L. rotundifolium* Bartr.; *L. scabrisetum* (Schwaegr.) Steere; *L. semi-laeve* Mitt.; \**L. skutchii* Bartr.; \**L. subtortifolium* Bartr.; *L. tortifolium* Mitt.; *Leskeodon andicola* (Spruce) Broth.; *L. mexicanus* Card.; *L. pusillus* (Mitt.) Broth.; \**Neohypnella mucronifolia* Bartr.; *Philophyllum tenuifolium* (Mitt.) Broth.; \**Pseudohypnella mucronifolia* Bartr.; *Rhynchostegiopsis flexuosa* (Sull.) C. Muell.; *Stenodictyon sericeum* Bartr.

### America 3: West Indies

\**Actinodontium portoricense* Crum & Steere; *Adelothecium bogotense* (Hamp.) Mitt.; \**Amblytropis denticulata* Thér.; *Callicostella bernoullii* (Hamp.) Broth.; \**C. colombica* Williams; *C. depressa* (Hedw.) Jaeg.; \**C. depressa* var. *rubella* (Besch.) Wijk & Marg.; \**C. depressula* Jaeg.; \**C. filescens* (Schimp.) Jaeg.; \**C. hahniana* (Besch.) Jaeg.; \**C. leonii* Thér.; *C. pallida* (Hornsch.) Aongstr.; \**C. radicans* (Besch.) Jaeg.; *C. rivularis* (Mitt.) Jaeg.; *C. scabriseta* (Hook.) Jaeg.; \**C. subfissidentoides* (Besch.) Broth.; *C. subpallida* Ren. & Card.; *Crossomitrium cruegeri* C. Muell.; \**C. cubense* P. Vard. & Thér.; \**C. orbiculatum* C. Muell.; *C. patrisiae* (Brid.) C. Muell.; \**C. sintenisii* C. Muell.; \**C. subepiphyllum* (Besch.) Jaeg.; *Cyclodictyon albicans* (Hedw.) Kuntze; \**C. albicaule* (Besch.) Kuntze; \**C. bicolor* (Besch.) Kuntze; \**C. blandum* (Lor.) Kuntze; *C. cuspidatum* Kuntze; \**C. densifolium* (Broth.) Broth.; *C. denticulatum* Kuntze; \**C. dussii* Broth.; \**C. hyalinum* (Besch.) Kuntze; \**C. limbatulum* (Broth.) Broth.; *C. lindigianum* (Hamp.) Kuntze; *C. lindigianum* var. *acunae* Thér.; \**C.*

*obliquicuspis* (C. Muell.) Crum & Bartr.; *C. olfersianum* (Hornsch.) Kuntze; \**C. prasiophyllum* (Besch.) Broth.; *C. roridum* (Hamp.) Kuntze; \**C. subglareosum* (Broth.) Broth.; *C. ulophyllum* (Besch.) Broth.; *C. varians* (Sull.) Kuntze; *Daltonia gracilis* Mitt.; *D. longifolia* Tayl.; *D. stenophylla* Mitt.; *Hemiragis aurea* (Brid.) Ren. & Card.; *Hookeria acutifolia* Hook. & Grev.; \**H. dussii* Besch.; \**H. obliquicuspis* C. Muell.; *Hookeriopsis acicularis* (Mitt.) Jaeg.; \**H. borinquensis* Crum & Steere; *H. cruegeriana* (C. Muell.) Jaeg.; \**H. cubensis* Thér.; \**H. dimorpha* (C. Muell.) Broth.; *H. falcata* (Hook.) Jaeg.; *H. falcatala* (Besch.) Jaeg.; \**H. fissidentoides* (Hook. f. & Wils.) Jaeg.; \**H. guadalupensis* (Brid.) Jaeg.; \**H. hospitans* (Besch.) Jaeg.; \**H. hypniformis* (Besch.) Jaeg.; *H. incurva* (Hornsch.) Broth.; \**H. leiophylla* (Besch.) Jaeg.; \**H. luteo-rufescens* (Besch.) Jaeg.; \**H. obsoletinervis* Thér.; \**H. rufa* (Besch.) Jaeg.; \**H. subincurva* Thér.; *H. undata* (Hedw.) Jaeg.; \**Hypnella cymbifolia* (Hamp.) Jaeg.; *H. diversifolia* (Mitt.) Jaeg.; \**H. filiformis* (Hook. & Grev.) Jaeg.; *H. leptorrhyncha* (Hook. & Grev.) Jaeg.; *Isodrepanium lentulum* (Wils.) Britt; *Lepidopilidium portoricense* (C. Muell.) Crum & Steere; \**Lepidopilum amplirete* (Sull.) Mitt.; \**L. antillarum* Mitt.; *L. aureo-fulvum* C. Muell.; *L. cubense* (Sull.) Mitt.; \**L. cubense* f. *integrifolia* Thér.; \**L. cubense* f. *latifolia* Thér.; \**L. cubense* f. *robusta* Thér.; *L. diaphanum* (Hedw.) Mitt.; \**L. dominicense* Bartr.; \**L. integrifolium* Broth.; *L. intermedium* (C. Muell.) Mitt.; *L. muelleri* (Hamp.) Spruce; *L. polytrichoides* (Hedw.) Brid.; \**L. polytrichoides* var. *pellucens* Besch.; \**L. purpurascens* Schimp.; *L. radiale* Mitt.; *L. robustum* Mitt.; *L. scabrisetum* (Schwaegr.) Steere; \**L. stolonaceum* C. Muell.; *L. subaurifolium* Geh. & Hamp.; *Leskeodon andicola* (Spruce) Broth.; *L. auratus* (C. Muell.) Broth.; *L. cubensis* (Mitt.) Thér.; \**L. dussii* (Besch.) Bartr.; \**L. longipilus* (Besch.) Bartr.; \**L. mariei* (Besch.) Broth.; \**L. parvulus* (Besch.) Broth.; *L. pusillus* (Mitt.) Broth.; \**Neohypnella diversifolia* (Mitt.) Welch & Crum; *Rhynchostegiopsis flexuosa* (Sull.) C. Muell.; \**R. lutescens* Britt.; \**R. planifolia* Crum & Bartr.; \**R. serrata* (Besch.) Broth.; \**Stenodictyon pallidum* Crum & Steere; *S. sericeum* Bartr.

This study of the citations in the *Index Muscorum* has given the writer a perspective of the family Hookeriaceae not attained previously through the monographic preparations.

#### Literature Cited

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