

## Introduction

### Scope of the Work

*Flora of North America North of Mexico* is a synoptic account of the plants of North America north of Mexico: the continental United States of America (including the Florida Keys and Aleutian Islands), Canada, Greenland (Kalâtdlit-Nunât), and St. Pierre and Miquelon. The *Flora* is intended to serve both as a means of identifying plants within the region and as a systematic conspectus of the North American flora.

The *Flora* will be published in 30 volumes. Volume 1 contains background information that is useful for understanding patterns in the flora. Volume 2 contains treatments of ferns and gymnosperms. Families in volumes 3–26, the angiosperms, were first arranged according to the classification system of A. Cronquist (1981) with some modifications, and starting with the publication of Volume 8, the circumscriptions and ordering of families generally follow those of the Angiosperm Phylogeny Group (see E. Haston et al. 2007). Bryophytes are being covered in volumes 27–29. Volume 30 will contain the cumulative bibliography and index.

The first two volumes were published in 1993, Volume 3 in 1997, and Volumes 22, 23, and 26, the first three of five volumes covering the monocotyledons, appeared in 2000, 2002, and 2002, respectively. Volume 4, the first part of the Caryophyllales, was published in late 2003. Volume 25, the second part of the Poaceae, was published in mid 2003, and Volume 24, the first part, was published in January 2007. Volume 5, completing the Caryophyllales plus Polygonales and Plumbaginales, was published in early 2005. Volumes 19–21, treating Asteraceae, were published in early 2006. Volume 27, the first of two volumes treating mosses in North America, was published in late 2007. Volume 8, Paeoniaceae to Ericaceae, was published in September 2009, and Volume 7, Salicaceae to Brassicaceae, in 2010. The correct bibliographic citation for the *Flora* is: *Flora of North America* Editorial Committee, eds. 1993+. *Flora of North America North of Mexico*. 17+ vols. New York and Oxford.

Volume 28 treats 698 species in 206 genera contained in 48 families. For additional statistics please refer to Table 1 on page xvii. With the publication of this volume, the treatment of mosses for the flora area is complete with a total of 1402 species in 333 genera classified in 81 families. For the genera, 17 (5%) are endemic to the flora area and 273 (19.5%) of the species are endemic with 36 (2.6%) of those considered to be of conservation concern. A combined index to the genera of mosses treated in volumes 27 and 28 appears on the back end papers of this volume.

### Contents · General

The *Flora* includes accepted names, selected synonyms, literature citations, identification keys, descriptions, phenological information, summaries of habitats and geographic ranges, and other biological observations. Each volume contains a bibliography and an index to the taxa included in that volume. The treatments, written and reviewed by experts from throughout the systematic botanical community, are based on original observations of herbarium specimens and, whenever possible, on living plants. These observations are supplemented by critical reviews of the literature.

Table 1. *Statistics for Volume 28 of Flora of North America*

Family	Total Genera	Total Species	Endemic Genera	Endemic Species	Introduced Species	Conservation Taxa
Splachnaceae	5	20	0	1	0	0
Meesiaceae	4	6	0	0	0	0
Catoscopiaceae	1	1	0	0	0	0
Orthotrichaceae	9	71	0	25	0	6
Hedwigiaceae	3	6	1	2	0	0
Aulacomniaceae	2	5	0	1	0	0
Bartramiaceae	5	22	0	0	0	0
Orthodontiaceae	1	2	0	0	0	0
Bryaceae	12	93	0	8	2	5
Roellobryaceae*	1	1	1	1	0	0
Pseudoditrichaceae*	1	1	1	1	0	1
Mielichhoferiaceae	3	36	0	6	0	1
Mniaceae	8	37	1	9	1	0
Rhizogoniaceae	1	1	0	0	0	0
Racopilaceae	1	1	0	0	0	0
Hookeriaceae	1	2	0	0	0	0
Daltoniaceae	1	1	0	0	0	0
Pilotrichaceae	3	3	0	0	0	0
Rutenbergiaceae	1	1	0	0	0	0
Hypopterygiaceae	1	2	0	0	0	1
Amblystegiaceae	20	57	1	7	0	0
Helodiaceae	2	4	0	1	0	0
Hylocomiaceae	7	12	1	2	0	0
Rhytidiaceae	1	1	0	0	0	0
Leskeaceae	9	28	0	7	0	1
Pterigynandraceae	4	8	0	1	0	0
Thuidiaceae	4	11	0	2	0	0
Calliergonaceae	7	20	0	2	0	0
Brachytheciaceae	19	72	1	22	1	0
Stereophyllaceae	3	3	0	0	0	0
Myriniaceae	2	2	0	0	0	0
Fabroniaceae	1	2	0	0	0	0
Meteoriaceae	2	2	0	0	0	0
Plagiotheciaceae	1	6	0	0	0	0
Fontinalaceae	3	15	1	9	0	1
Entodontaceae	1	10	0	3	0	0
Climaciaceae	1	2	0	0	0	0
Pleuroziopsaceae	1	1	0	0	0	0
Hypnaceae	19	62	1	6	0	1
Sematophyllaceae	9	15	0	7	0	0
Cryphaeaceae	3	6	0	3	0	0
Leucodontaceae	3	6	0	2	0	0
Pterobryaceae	3	4	0	0	0	0
Neckeraceae	8	14	2	4	0	1
Lembophyllaceae	3	7	2	5	0	0
Leptodontaceae	3	4	0	0	0	0
Anomodontaceae	2	9	0	0	0	1
Theliaceae	1	3	0	2	0	0
<b>Totals</b>	<b>206</b>	<b>698</b>	<b>13</b>	<b>138</b>	<b>4</b>	<b>19</b>

\* = endemic to flora area

## Basic Concepts

Our goal is to make the *Flora* as clear, concise, and informative as practicable so that it can be an important resource for both botanists and nonbotanists. To this end, we are attempting to be consistent in style and content from the first volume to the last. Readers may assume that a term has the same meaning each time it appears and that, within groups, descriptions may be compared directly with one another. Any departures from consistent usage will be explicitly noted in the treatments (see References).

Treatments are intended to reflect current knowledge of taxa throughout their ranges worldwide, and classifications are therefore based on all available evidence. Where notable differences of opinion about the classification of a group occur, appropriate references are mentioned in the discussion of the group.

Documentation and arguments supporting significantly revised classifications are published separately in botanical journals before publication of the pertinent volume of the *Flora*. Similarly, all new names and new combinations are published elsewhere prior to their use in the *Flora*. No nomenclatural innovations will be published intentionally in the *Flora*.

Taxa treated in full include extant and recently extinct native species, hybrids that are well established (or frequent), and waifs or cultivated plants that are found frequently outside cultivation and give the appearance of being naturalized. Taxa mentioned only in discussions include waifs or naturalized plants now known only from isolated old records and some non-native, economically important or extensively cultivated plants, particularly when they are relatives of native species. Excluded names and taxa are listed at the ends of appropriate sections, for example, species at the end of genus, genera at the end of family.

Treatments are intended to be succinct and diagnostic but adequately descriptive. Characters and character states used in the keys are repeated in the descriptions. Descriptions of related taxa at the same rank are directly comparable.

With few exceptions, taxa are presented in taxonomic sequence. If an author is unable to produce a classification, the taxa are arranged alphabetically and the reasons are given in the discussion.

Treatments of hybrids follow that of one of the putative parents. Hybrid complexes are treated at the ends of their genera, after the descriptions of species.

We have attempted to keep terminology as simple as accuracy permits. Common English equivalents usually have been used in place of Latin or Latinized terms or other specialized terminology, whenever the correct meaning could be conveyed in approximately the same space, for example, “pitted” rather than “foveolate,” but “striate” rather than “with fine longitudinal lines.” See *Glossarium polyglottum bryologiae. A multilingual glossary for bryology* (R. E. Magill 1990) and *Categorical Glossary for the Flora of North America Project* (R. W. Kiger and D. M. Porter 2001; also available online at <http://huntbot.andrew.cmu.edu>) for standard definitions of generally used terms. Very specialized terms are defined, and sometimes illustrated, in the relevant family or generic treatments.

## References

Authoritative general reference works used for style are *The Chicago Manual of Style*, ed. 14 (University of Chicago Press 1993); *Webster's New Geographical Dictionary* (Merriam-Webster 1988); and *The Random House Dictionary of the English Language*, ed. 2, unabridged (S. B. Flexner and L. C. Hauck 1987). *B-P-H/S. Botanico-Periodicum-Huntianum/Supplementum*

(G. D. R. Bridson and E. R. Smith 1991) has been used for abbreviations of serial titles, and *Taxonomic Literature*, ed. 2 (F. A. Stafleu and R. S. Cowan 1976–1988) and its supplements by Stafleu et al. (1992–2009) have been used for abbreviations of book titles.

## Graphic Elements

All genera and approximately 53 percent of the species in this volume are illustrated. The illustrations may show diagnostic traits or complex structures. Most illustrations have been drawn from herbarium specimens selected by the authors. Data on specimens that were used and parts that were illustrated have been recorded. This information, together with the archivally preserved original drawings, is deposited in the Missouri Botanical Garden Archives and is available for scholarly study.

## Specific Information in Treatments

### *Keys*

Dichotomous keys are included for all ranks below family if two or more taxa are treated. More than one key may be given to facilitate identification of sterile material. A separate key to all of the genera treated in volumes 27 and 28 of the *Flora* begins on page 640 in this volume.

### *Nomenclatural Information*

Basionyms of accepted names, with author and bibliographic citations, are listed first in synonymy, followed by any other synonyms in common recent use, listed in alphabetical order, without bibliographic citations.

The last names of authors of taxonomic names have been spelled out. The conventions of *Authors of Plant Names* (R. K. Brummitt and C. E. Powell 1992) have been used as a guide for including first initials to discriminate individuals who share surnames.

If only one infraspecific taxon within a species occurs in the flora area, nomenclatural information (literature citation, basionym with literature citation, relevant other synonyms) is given for the species, as is information on the number of infraspecific taxa in the species and their distribution worldwide, if known. A description and detailed distributional information are given only for the infraspecific taxon.

### *Descriptions*

Character states common to all taxa are noted in the description of the taxon at the next higher rank. For example, if sexual condition is dioicous for all species treated within a genus, that character state is given in the generic description. Characters used in keys are repeated in the descriptions. Characteristics are given as they occur in plants from the flora area. Characteristics that occur only in plants from outside the flora area may be given within square brackets, or instead may be noted in the discussion following the description. In families with one genus and one or more species, the family description is given as usual, the genus description is condensed, and the species are described as usual. Any special terms that may be used when describing members of a genus are presented and explained in the genus description or discussion.

Starting with volumes of the *Flora* published in 2014, some phrases in descriptions may appear within chevrons (often called angled brackets). Chevrons are used when information is included for one or some taxa at the same rank within the next higher level taxon but parallel information is missing in one or more of the remaining ones. An example where chevrons are used in this volume is in the description of *Splachnum* [see page 23], where additional information about the hypophyses — <globose to turbinate, sometimes umbrelliform> — is given; for the remaining four genera of Splachnaceae treated in the *Flora*, only the description of *Aplodon* contains additional information — <rounded> — with the remaining genera, *Tayloria*, *Tetraplodon*, and *Voitia*, lacking parallel information.

Twisting of leaves on stems, of seta, and of peristome is common in mosses. Terms for the direction of twist are many and not entirely telegraphic because of the three-dimensional nature. “Dextrose,” “to the right,” and “counterclockwise” all refer to the appearance of the twisted threads on a standard screw (driven clockwise, extracted counterclockwise). “Sinistrose,” etc., refer to the uncommon screw with reverse threads.

Because measurements and elevations are almost always approximate, modifiers such as “about,” “circa,” or “±” are usually omitted.

Unless otherwise noted, dimension are length × width. If only one dimension is given, it is length or height. All measurements are given in metric units.

Chromosome numbers generally are given in discussions when taxonomically important.

Date of capsule maturity is given by season, sometimes qualified by early, mid, or late, or by months. Elevations over 50 m generally are rounded to the nearest 100 m; those 50 m and under are rounded to the nearest 10 m. Mean sea level is shown as 0 m, with the understanding that this is approximate. Elevation often is omitted from herbarium specimen labels, particularly for collections made where the topography is not remarkable, and therefore precise elevation is sometimes not known for a given taxon. In many cases only general elevational terms are provided. “Low” is 0–199 m, “moderate” is 200–1599 m, “high” is 1600 m or more, with breaks corresponding to foothills of the Appalachians and foothills of the Rocky Mountains.

The term “introduced” is defined broadly to refer to plants that were released deliberately or accidentally into the flora and that now exist as wild plants in areas in which they were not recorded as native in the past. The distribution of non-native plants is often poorly documented and presence of the plants in the flora may be ephemeral.

If a taxon is globally rare or if its continued existence is threatened in some way, the words “of conservation concern” appear before the statements of elevation and geographic range.

The occurrence of species and infraspecific taxa within political subunits of the flora area is depicted by dots placed on the outline map to indicate occurrence in a state or province. The Nunavut boundary on the maps has been provided by the GeoAccess Division, Canada Centre for Remote Sensing, Earth Science. Authors are expected to have seen at least one specimen documenting each geographic unit record (except in rare cases when undoubted literature reports may be used) and have been urged to examine as many specimens as possible from throughout the range of each taxon. Additional information about taxon distribution may be presented in the discussion.

Distributions are stated in the following order: Greenland; St. Pierre and Miquelon; Canada (provinces and territories in alphabetic order); United States (states in alphabetic order); Mexico (11 northern states may be listed specifically, in alphabetic order); West Indies; Bermuda; Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama); South America; Europe, or Eurasia; Asia (including Indonesia); Africa; Atlantic Islands; Indian Ocean Islands; Pacific Islands; Australia; Subantarctic Islands; Antarctica.

*Discussion*

The discussion section may include information on taxonomic problems, distributional and ecological details, interesting biological phenomena, and economic uses.

*Selected References*

Major references used in preparation of a treatment or containing critical information about a taxon are cited following the discussion. These, and other works that are referred to in discussion or elsewhere, are included in Literature Cited at the end of the volume starting on page 669.

## CAUTION

The Flora of North America Editorial Committee **does not encourage, recommend, promote, or endorse** any of the folk remedies, culinary practices, or various utilizations of any plant described within this volume. Information about medicinal practices and/or ingestion of plants, or of any part or preparation thereof, has been included only for historical background and as a matter of interest. Under no circumstances should the information contained in these volumes be used in connection with medical treatment. Readers are strongly cautioned to remember that many plants in the flora are toxic or can cause unpleasant or adverse reactions if used or encountered carelessly.

Key to boxed codes used in this volume following accepted names:

- endemic to the flora area
- illustrated