

# Moss Flora of Central America

## Part 1. Sphagnaceae - Calymperaceae

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### Table of Contents

Introduction

Acknowledgments

Moss Flora of Central America

Sphagnaceae by Howard Crum

Andreaeaceae

Seligeriaceae

Ditrichaceae

Fissidentaceae by Ronald A. Pursell

Bruchiaceae

Dicranaceae

Leucobryaceae

Leucophanaceae by Noris Salazar Allen

Calymperaceae by William D. Reese

Literature Cited

Index

### Introduction

Central America has one of the most diverse moss floras in the world. Its 871 species are found in an area three-fourths the size of Texas. Indeed, it has roughly the same number of mosses as Colombia, which is nearly twice as large. There are several factors responsible for this remarkable diversity. Central America is a tropical region with a diverse landscape marked by great vertical relief. Thus, the region provides a broad range of habitats in a small area. Central America also has an eclectic moss flora that has benefited from its physical closeness to three distinct and diverse species-source areas: South America, North America and the Caribbean.

The Central American region is treated here as a political unit extending from the southern border of Mexico eastward and southward to the northern border of Colombia. The area includes seven countries, Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama. This region stretches from latitude 7° to 19° N with a longitudinal axis running northwest to southeast for 1,800 km. The total area encompassed is 522,765 km<sup>2</sup>.

Parts of at least three tectonic plates (North American, Caribbean, and Nazca plates) have contributed to the Central American land mass, and because of this the region is geologically complex. Nevertheless, it can be grossly divided in two: a northern part, continental in character, including Guatemala, Belize, Honduras, El Salvador and northern Nicaragua, and a southern part, oceanic in origin, consisting of southern Nicaragua to Panama. The southern part now occupies an intermediate position between a purely oceanic and a purely continental crust. One of the most distinctive geological features of Central America is the Nicaraguan Depression thought to mark the boundary between the northern and southern parts of Central America. This depression runs from the northern Caribbean coast of Costa Rica through southwestern Nicaragua. Much of the Nicaraguan Depression is occupied by Lake Managua and Lake Nicaragua.

Central America is a region of pronounced vertical relief. To the north the mountains form an arc extending from southwestern Guatemala through northern Honduras and into northern Nicaragua. These northern sierras consist of several parallel mountain chains separated by faults and grabens. The sierras of southern Central America begin as low-altitude ranges on the Pacific coast of Nicaragua and extend through Costa Rica and Panama. Below the northern sierras (central Nicaragua, southwestern Honduras, and parts of El

Salvador) are large areas of tertiary volcanic ranges and plateaus, and a narrow chain of quaternary volcanoes, some still active, occurs along the Pacific side of the region.

The quaternary volcanic chain is nearly continuous from the Mexican border to northern Costa Rica and extends sporadically from southern Costa Rica through Panama. It is paralleled, in the Pacific Ocean, by the Middle American Trench. This chain of volcanoes is thought to be causally related to active subduction of the Cocos Plate below the North American and Caribbean plates.

The northern edge of Central America (Petén region of Guatemala and Belize) consists of low-lying areas of extensive limestone formations. This region forms tablelands in the north and in the south merges via chains of folded mountains with the sierras of Guatemala. Major areas of coastal plains are found in eastern Belize, western Guatemala, eastern Honduras (Mosquitia embayment), eastern Nicaragua (Caribbean coastal plain), and northeastern Costa Rica (Limón basin).

Endemism in Central American mosses appears to be low. Only 10% (20 out of 203) of the species treated in Part 1 of the *Moss Flora of Central America* are endemic. Since Central America is a region that connects two continental masses that have basically different moss floras - Laurasian North America with a strong Hypnobryalean component and Gondwanalandian South America with a strong Isobryalean component - the region is likely to be phytogeographically complex. At present a definitive statement on the phytogeographic relationships of Central American mosses cannot be made because only the first fourth of the mosses have been treated in detail. Several broad patterns, however, are evident.

Most Central American mosses belong to a northern neotropical flora that extends from southern Mexico, through Central America, Colombia, Venezuela, the Guianas, Ecuador, and parts of Peru and Brazil. Central American mosses are an integral part of the northern neotropical flora. A closely allied but extremely rare element of the Central American flora is that part whose affinities are with the Guayana Highlands of South America. An outstanding example of this pattern is the presence of *Octoblepharum tatei* in the mountains of northeastern Honduras.

The second largest phytogeographic element in the Central American moss flora has north temperate affinities. This element of the flora is best represented in northern Central America and includes such species as *Sphagnum imbricatum*, *Andreaea alpestris*, *Blindia acuta*, *Fissidens dubius*, *Trematodon longicollis*, *Anisathecium rujescens*, and *Dicranum flagellare*. A subset of this northern element consists of species whose affinities are with those of northern Mexico and the southwestern region of the United States. *Dicranum rhabdocarpum* exemplifies this type of pattern.

Another relatively large element in the flora is made up of species more commonly found in the Caribbean region. This Caribbean element is found in the southeastern United States, eastern Mexico, the Caribbean islands, low-lying areas of the Guianas, and southeastern Brazil. The Caribbean element in Central America is most common in Belize, northern Guatemala, and northeastern Nicaragua. Species with this type of distribution include *Sphagnum portoricense*, *Campylopus angustirietis*, *Leucoloma mariei*, *Hookeriopsis websteri*, *Fissidens weirii* var. *insertus*, *Dicranella harrisii*, *Leucobryum incurvifolium*, *Octoblepharum cylindricum*, and many members of the Calymperaceae.

There is a small number of Central American mosses that are also found in Africa. These, however, do not represent a discrete floristic element but rather a relationship between the African mosses and the northern neotropical flora. At present the number of species with this type of distribution is small, but it will surely increase as the African flora becomes better known. Central American mosses with this distribution include *Campylopus nivalis*, *Ochrobryum gardneri*, *Leucophanes molleri*, and *Syrrhopodon cryptocarpus*.

South temperate floristic elements are occasionally found in Central America. *Andreaea subulata* is an example of a south temperate species that reaches its northernmost limit in Honduras. It is otherwise known from southeastern Australia, New Zealand, South Africa, and Patagonia, with isolated mountain stations in Borneo, eastern Africa, and the Andes of Colombia and Bolivia. A somewhat similar distribution pattern is shown by *Tristichium mirabile* and *Aongstroemia julacea*, which are present at high elevations in Costa Rica as well as isolated mountain stations throughout the Southern Hemisphere.

*Garckea flexuosa* is a common and weedy Asian species known in Central America from a single Panamanian locality. Its occurrence in Central America may be anthropomorphic, since it was collected just outside an American Air Force base.

The Moss Flora of Central America attempts to treat all mosses known or reported from the region. It is specimen-based, and wherever possible type specimens have been examined. Type information is given for all species. However, not all type material has been examined. Examination of type material is indicated within the text by the citation of an *Index Herbariorum*, Ed. 8 acronym at the end of the type information.

The families will be treated sequentially in roughly the same phylogenetic sequence as Bartram's *Mosses of Guatemala* (1949). As much as possible the generic keys and descriptions refer to the genera as a whole not just to the species found in Central America. To facilitate use, the genera are arranged alphabetically within the families and the species alphabetically within genera. There is one exception to this arrangement: *Sphagnum* species are arranged alphabetically under their sections.

Generic and species descriptions are short, emphasizing only features critical for recognition. For each species a list of previously published illustrations is given. Short, concise habitat notes based on my field experience with the species or taken from specimen labels follow the citation of illustrations. The distribution of all species is determined by the examination of specimens. All species for which a specimen cannot be located are placed in a "Species Excluded" section. The distribution of species within each country is documented by the citation of one specimen from each political unit, department or province, in which the species occurs.

An indication of the world range of each species, based on an examination of specimens or extracted from reliable literature reports, is given. With two exceptions, the system put forward by the *World Geographical Scheme for Recording Plant Distributions* (Hollis & Brummitt, 1992), at the continental and regional levels, is used for world ranges. Within the citations only the regional groups are named, and they are arranged into continental groups that are set off from each other by semicolons. Here all of Mexico and Central America, as defined above, are treated as continental regions, set off by semicolons. Hollis and Brummitt divide Mexico between their Northern and Southern American continents and treat Central America as part of Southern America.

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