

Flora of North America

Contributors to Volume 28

Bruce H. Allen
Tomotsugu Arikawa
Jillian D. Bainard
Mona Bourell
William R. Buck
John A. Christy
Steven P. Churchill
Howard A. Crum†
Patricia M. Eckel
Jean Faubert
Íñigo Granzow-de la Cerda
Dana G. Griffin III
Judith A. Harpel
Terry A. Hedderson
Lars Hedenäs

Masanobu Higuchi
Michael S. Ignatov
Robert R. Ireland Jr.
David W. Jamieson
Robert E. Magill
Piers Majestyk
Paul C. Marino
Terry T. McIntosh
Norton G. Miller†
Gert Steen Mogensen
Clayton Newberry
Steven G. Newmaster
Angela E. Newton
Daniel H. Norris

Terry J. O'Brien
Paul L. Redfearn Jr.
William D. Reese†
Joseph R. Rohrer
Inés Sastre-De Jesús
Wilfred B. Schofield†
A. Jonathan Shaw
James R. Shevock
John R. Spence
Lloyd R. Stark
Stephen L. Timme†
Alain Vanderpoorten
Dale H. Vitt
William A. Weber
Richard H. Zander

Editors for Volume 28

Ariel S. Buback
Technical Editor (2011–2014)

Marshall R. Crosby
Taxon Editor

Claudio Delgadillo M.
Taxon Editor

Patricia M. Eckel
Taxon Editor

Kanchi Gandhi
Nomenclatural Advisor

Pat Harris
Technical Editor (–2010)

Martha J. Hill
Assisting Technical Editor

Robert W. Kiger
Bibliographic Editor

Terry T. McIntosh
Taxon Editor

Robert E. Magill
Nomenclatural Editor

Heidi H. Schmidt
Managing Editor

Lloyd R. Stark
Taxon Editor

Barbara M. Thiers
Former Lead Editor

Dale H. Vitt
Taxon Editor

Richard H. Zander
Lead and Taxon Editor

James L. Zarucchi
Editorial Director

Volume Composition

Kristin Pierce
Compositor and Editorial Assistant

Heidi H. Schmidt
Production Coordinator and
Managing Editor

Flora of North America
North of Mexico

Edited by FLORA OF NORTH AMERICA EDITORIAL COMMITTEE

VOLUME 28

Bryophyta, part 2

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research,
scholarship, and education by publishing worldwide.

Oxford New York
Auckland Cape Town Dar es Salaam Hong Kong Karachi
Kuala Lumpur Madrid Melbourne Mexico City Nairobi
New Delhi Shanghai Taipei Toronto

With offices in
Argentina Austria Brazil Chile Czech Republic France Greece
Guatemala Hungary Italy Japan Poland Portugal Singapore
South Korea Switzerland Thailand Turkey Ukraine Vietnam

Oxford is a registered trademark of Oxford University Press in the UK and certain other countries.

Published by Oxford University Press, Inc.
198 Madison Avenue, New York, New York 10016
www.oup.com

Copyright © 2014 by Flora of North America Association

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior written permission of the Flora of North America Association, or as expressly permitted by law, by license, or under terms agreed with the appropriate reproduction rights organization. Inquiries concerning reproduction outside the scope of the above should be sent to the Flora of North America Association.

You must not circulate this work in any other form and you must impose this same condition on any acquirer.

Library of Congress Cataloging-in-Publication Data
(Revised for Volume 28)

Flora of North America North of Mexico
edited by Flora of North America Editorial Committee.
Includes bibliographical references and indexes.

Contents: v. 1. Introduction—v. 2. Pteridophytes and gymnosperms—
v. 3. Magnoliophyta: Magnoliidae and Hamamelidae—
v. 22. Magnoliophyta: Alismatidae, Arecidae, Commelinidae (in part), and Zingiberidae—
v. 26. Magnoliophyta: Liliidae: Liliales and Orchidales—
v. 23. Magnoliophyta: Commelinidae (in part): Cyperaceae—
v. 25. Magnoliophyta: Commelinidae (in part): Poaceae, part 2—
v. 4. Magnoliophyta: Caryophyllidae (in part): part 1—
v. 5. Magnoliophyta: Caryophyllidae (in part): part 2—
v. 19, 20, 21. Magnoliophyta: Asteridae (in part): Asteraceae, parts 1–3—
v. 24. Magnoliophyta: Commelinidae (in part): Poaceae, part 1—
v. 27. Bryophyta, part 1—
v. 8. Magnoliophyta: Paeoniaceae to Ericaceae—
v. 7. Magnoliophyta: Salicaceae to Brassicaceae—
v. 28. Bryophyta, part 2

ISBN: 978-0-19-020275-0 (v. 28)

1. Botany—North America.
2. Botany—United States.
3. Botany—Canada.

I. Flora of North America Editorial Committee.
QK110.F55 2002 581.97 92-30459

1 2 3 4 5 6 7 8 9
Printed in the United States of America
on acid-free paper

Contents

Founding Member Institutions vi

Donors vii

Art Sponsors viii

Editorial Committee ix

Project Staff x

Contributors xi

Reviewers xiii

Acknowledgments xiv

Preface xv

Introduction xvi

BRYOPHYTA, in part

The Impact of Molecular Data on our Understanding
of the Bryophyte Flora of North America 3

Splachnaceae 14

Meesiaceae 30

Catoscopiaceae 35

Orthotrichaceae 37

Hedwigiaceae 83

Aulacomniaceae 91

Bartramiaceae 97

Orthodontiaceae 113

Bryaceae 117

Roellobryaceae 186

Pseudoditrichaceae 188

Mielichhoferiaceae 190

Mniaceae 215

Rhizogoniaceae 244

Racopilaceae 246

Hookeriaceae 248

Daltoniaceae 251

Pilotrichaceae 254

Rutenbergiaceae 259

Hypopterygiaceae 261

Amblystegiaceae 263

Helodiaceae 320

Hylocomiaceae 325

Rhytidiaceae 338

Leskeaceae 340

Pterigynandraceae 366

Thuidiaceae 373

Calliergonaceae 384

Brachytheciaceae 404

Stereophyllaceae 469

Myriniaceae 474

Fabroniaceae 477

Meteoriaceae 479

Plagiotheciaceae 483

Fontinalaceae 489

Entodontaceae 502

Climaciaceae 508

Pleuroziopsaceae 512

Hypnaceae 515

Sematophyllaceae 571

Cryphaeaceae 584

Leucodontaceae 590

Pterobryaceae 597

Neckeraceae 602

Lembophyllaceae 616

Leptodontaceae 623

Anomodontaceae 629

Theliaceae 637

Key to the Moss Genera of North America North of
Mexico 640

Errata to Volume 27 668

Literature Cited 669

Index 688

FOUNDING MEMBER INSTITUTIONS

Flora of North America Association

Agriculture and Agri-Food Canada <i>Ottawa, Ontario</i>	Kansas State University <i>Manhattan, Kansas</i>	University of Idaho <i>Moscow, Idaho</i>
Arnold Arboretum <i>Jamaica Plain, Massachusetts</i>	Missouri Botanical Garden <i>St. Louis, Missouri</i>	University of Illinois <i>Urbana-Champaign, Illinois</i>
Canadian Museum of Nature <i>Ottawa, Ontario</i>	New Mexico State University <i>Las Cruces, New Mexico</i>	University of Iowa <i>Iowa City, Iowa</i>
Carnegie Museum of Natural History <i>Pittsburgh, Pennsylvania</i>	The New York Botanical Garden <i>Bronx, New York</i>	The University of Kansas <i>Lawrence, Kansas</i>
Field Museum of Natural History <i>Chicago, Illinois</i>	New York State Museum <i>Albany, New York</i>	University of Michigan <i>Ann Arbor, Michigan</i>
Fish and Wildlife Service United States Department of the Interior <i>Washington, D.C.</i>	Northern Kentucky University <i>Highland Heights, Kentucky</i>	University of Oklahoma <i>Norman, Oklahoma</i>
Harvard University Herbaria <i>Cambridge, Massachusetts</i>	Université de Montréal <i>Montréal, Québec</i>	University of Ottawa <i>Ottawa, Ontario</i>
Hunt Institute for Botanical Documentation Carnegie Mellon University <i>Pittsburgh, Pennsylvania</i>	University of Alaska <i>Fairbanks, Alaska</i>	University of Southwestern Louisiana <i>Lafayette, Louisiana</i>
Jacksonville State University <i>Jacksonville, Alabama</i>	University of Alberta <i>Edmonton, Alberta</i>	The University of Texas <i>Austin, Texas</i>
Jardin Botanique de Montréal <i>Montréal, Québec</i>	The University of British Columbia <i>Vancouver, British Columbia</i>	University of Western Ontario <i>London, Ontario</i>
	University of California <i>Berkeley, California</i>	University of Wyoming <i>Laramie, Wyoming</i>
	University of California <i>Davis, California</i>	Utah State University <i>Logan, Utah</i>

*For their support of the preparation of this volume,
we gratefully acknowledge and thank:*

The Andrew W. Mellon Foundation

The David and Lucile Packard Foundation

an anonymous foundation

Chanticleer Foundation

National Science Foundation

(Award DEB-0072754)

The Fairweather Foundation

ChevronTexaco

ESRI

Chris Davidson and Sharon Christoph

Botanical Research Foundation of Idaho

*For sponsorship of illustrations included in this volume,
we express sincere appreciation to:*

American Bryological and Lichenological Society, Madison, Wisconsin – *Hylocomium splendens*, Hylocomiaceae
Ellen M. Anderson, Juneau, Alaska – *Paludella squarrosa*, Meesiaceae – in memory of Wilfred B. Schofield
Yelena Kosovich-Anderson, Cheyenne, Wyoming – *Tomentypnum falcifolium*, Amblystegiaceae & *Plagiobryoides
vinosula*, Bryaceae – in memory of Siberian bryologist Leonid V. Bardunov
James P. Bennett, Madison, Wisconsin – *Bartramia pomiformis*, Bartramiaceae
Marshall R. Crosby & Shelley L. Pryor, Sugar Grove, North Carolina – *Bryoandersonia illecebra*, Brachytheciaceae
Sandra J. Davis, Calgary, Alberta – *Cratoneuron filicinum*, Amblystegiaceae & *Orthotrichum obtusifolium*, Orthotrichaceae
Janice M. Glime, Houghton, Michigan – *Fontinalis neomexicana*, Fontinalaceae
Phillip Henderson, Fort Langley, British Columbia – *Ctenidium schofieldii*, Hypnaceae – in honor of Wilfred B. Schofield
Dale A. Kruse, College Station, Texas – *Donrichardsia macroneuron*, Brachytheciaceae
Stephen Lodder, Watsonville, California – *Alsia californica*, Leptodontaceae, *Claopodium whippleanum*,
Leskeaceae & *Antitrichia californica*, Leucodontaceae
Bruce McCune, Corvallis, Oregon – *Plagiomnium ciliare*, Mniaceae
Wynne Miles, Victoria, British Columbia – *Brotherella canadensis*, Sematophyllaceae – in honor of Wilfred B. Schofield
Harvey A. Miller, Palm Bay, Florida [general donation]
Montana Native Plant Society, Kelsey Chapter, Helena, Montana – *Scorpidium scorpioides*, Calliergonaceae
Montana Native Plant Society, Missoula, Montana – *Elodium blandowii*, Helodiaceae
Nancy R. Morin, Point Arena, California – *Thamnobryum allegheniense*, Neckeraceae – in honor of Marshall R. Crosby
Northwest Lichenologists, Corvallis, Oregon – *Tetraplodon mnioides*, Splachnaceae
Stephen P. Rae, Napa, California – *Anacolia menziesii*, Bartramiaceae & *Mnium ambiguum*, Mniaceae
James R. Shevock, San Francisco, California – *Bryocrumia vivicolor* & *Dacryophyllum falcifolium*, Hypnaceae,
Bestia longipes, Lembophyllaceae & *Porotrichum bigelovii*, Neckeraceae
John R. Spence, Page, Arizona – *Rosulabryum canariense*, Bryaceae
David Toren, San Francisco, California – *Bryum chryseum*, Bryaceae
Paul Wilson, Northridge, California – *Pseudoleskeella serpentinensis*, Leskeaceae & *Warnstorfia fluitans*, Calliergonaceae
Gerhard Winter, Herbarium Senckenbergianum, Frankfurt am Main, Germany – *Fontinalis antipyretica*,
Fontinalaceae – in memory of Jan-Peter Frahm
Carl Wishner, Chicago Park, California – *Meesia longiseta*, Meesiaceae

*For sponsorship of illustrations included in the previous moss volume,
we also thank:*

Botanical Club of Wisconsin, Markesan, Wisconsin – *Schistostega pennata*, Schistostegaceae
Olivia L. Bottum, Ann Arbor, Michigan – *Sphagnum steerei*, Sphagnaceae – in memory of Gladys Bottum
Patricia M. Eckel, St. Louis, Missouri – *Grimmia brittoniae*, Grimmiaceae
A. Virginia Freire, Stevens Point, Wisconsin – *Timmia megapolitana* subsp. *megapolitana*, Timmiaceae
Ohio Moss and Lichen Association, Columbus, Ohio – *Polytrichastrum ohioense*, Polytrichaceae
Stephen P. Rae, Napa, California – *Meiotrichum lyallii*, Polytrichaceae & *Scouleria aquatica*, Scouleriaceae
Richard H. Zander & Patricia M. Eckel, St. Louis, Missouri – *Erpodium acrifolium*, Erpodiaceae – in memory of
Ronald A. Pursell

VASCULAR PLANTS

- Kerry A. Barringer
Taxon Editor
Jersey City, New Jersey
- David E. Boufford
Taxon Editor and Regional Coordinator,
Northeastern United States
Harvard University Herbaria
Cambridge, Massachusetts
- Luc Brouillet
Taxon Editor and Regional Coordinator,
Eastern Canada and Greenland
Institut de recherche en biologie végétale
Université de Montréal
Montréal, Québec
- Wayne J. Elisens
Taxon Editor
University of Oklahoma
Norman, Oklahoma
- Bruce A. Ford
Taxon Editor and Regional Coordinator,
Western Canada
University of Manitoba
Winnipeg, Manitoba
- Craig C. Freeman
Taxon Editor and Regional Coordinator,
North Central United States
R. L. McGregor Herbarium
The University of Kansas
Lawrence, Kansas
- Kanchi Gandhi
Nomenclatural Editor
Harvard University Herbaria
Cambridge, Massachusetts
- David E. Giblin
Taxon Editor
University of Washington
Seattle, Washington
- Lynn J. Gillespie
Taxon Editor
Canadian Museum of Nature
Ottawa, Ontario
- Ronald L. Hartman
Taxon Editor and Regional Coordinator, Rocky Mountains
University of Wyoming
Laramie, Wyoming
- Steffi M. Ickert-Bond
Regional Coordinator, Alaska and Yukon
University of Alaska,
Museum of the North
Fairbanks, Alaska
- Robert W. Kiger
Bibliographic and Taxon Editor
Hunt Institute for Botanical Documentation
Carnegie Mellon University
Pittsburgh, Pennsylvania
- Geoffrey A. Levin
Taxon Editor
Illinois Natural History Survey
Champaign, Illinois
- Barney L. Lipscomb
Botanical Research Institute of
Texas
Fort Worth, Texas
- Timothy K. Lowrey
Taxon Editor
University of New Mexico
Albuquerque, New Mexico
- James A. Macklin
Harvard University Herbaria
Cambridge, Massachusetts
- Gerry Moore
Liason to Governmental Agencies
United States Department of Agriculture
Greensboro, North Carolina
- Nancy R. Morin
Taxon Editor and Regional Coordinator,
Southwestern United States
Point Arena, California
- Robert F. C. Naczi
The New York Botanical Garden
Bronx, New York
- Jackie M. Poole
Taxon Editor and Regional Coordinator,
South Central United States
Texas Parks and Wildlife Department
Austin, Texas
- Richard K. Rabeler
Taxon Editor
University of Michigan
Ann Arbor, Michigan
- Jay A. Raveill
Taxon Editor
University of Central Missouri
Warrensburg, Missouri
- Heidi H. Schmidt
Managing Editor
Missouri Botanical Garden
St. Louis, Missouri
- Leila M. Shultz
Taxon Editor
Utah State University
Logan, Utah
- John L. Strother
Reviewing and Taxon Editor
University of California
Berkeley, California
- Janet R. Sullivan
Taxon Editor
University of New Hampshire
Durham, New Hampshire
- Debra K. Trock
Taxon Editor
California Academy of Sciences
San Francisco, California
- Gordon C. Tucker
Taxon Editor
Eastern Illinois University
Charleston, Illinois
- Michael A. Vincent
Taxon Editor
Miami University
Oxford, Ohio
- Alan S. Weakley
Taxon Editor and Regional Coordinator,
Southeastern United States
University of North Carolina
Chapel Hill, North Carolina
- Elizabeth H. Zacharias
Berkeley, California
- James L. Zarucchi
Editorial Director
Missouri Botanical Garden
St. Louis, Missouri

BRYOPHYTES

- Terry T. McIntosh
Taxon Editor
University of British Columbia
Vancouver, British Columbia
- Dale H. Vitt
Taxon Editor
Southern Illinois University
Carbondale, Illinois
- David H. Wagner
Taxon Editor
Northwest Botanical Institute
Eugene, Oregon
- Alan T. Whittemore
Taxon Editor
United States National Arboretum
Washington, D.C.
- Richard H. Zander
Bryophyte Coordinator and Taxon Editor
Missouri Botanical Garden
St. Louis, Missouri

Emeritus/a Members of the Editorial Committee

- George W. Argus
Merrickville, Ontario
- Mary E. Barkworth
Logan, Utah
- Marshall R. Crosby
Sugar Grove, North Carolina
- Claudio Delgadillo M.
Mexico City, Mexico
- Marie L. Hicks
Moab, Utah
- Marshall C. Johnston
Austin, Texas
- Aaron I. Liston
Corvallis, Oregon
- John McNeill
Edinburgh, Scotland
- Barbara M. Murray
Fairbanks, Alaska
- David F. Murray
Fairbanks, Alaska
- J. Scott Peterson
Baton Rouge, Louisiana
- Alan R. Smith
Berkeley, California
- Richard W. Spellenberg
Las Cruces, New Mexico
- Lloyd R. Stark
Las Vegas, Nevada
- Barbara M. Thiers
Bronx, New York
- Rahmona A. Thompson
Ada, Oklahoma
- Frederick H. Utech
Pittsburgh, Pennsylvania

*Project Staff — past and present
involved with the preparation of Volume 28*

Burgund Bassüner, *Information Coordinator*
Ariel S. Buback, *Technical Editor*
Trisha K. Distler, *GIS Analyst*
Patricia M. Eckel, *Illustrator*
Pat Harris, *Technical Editor*
Martha J. Hill, *Assisting Technical Editor*
Cassandra L. Howard, *Editorial Assistant*
John Myers, *Illustration Compositor*
Kristin Pierce, *Compositor and Editorial Assistant*
Hong Song, *Programmer*

Contributors to Volume 28

Bruce H. Allen
Missouri Botanical Garden
St. Louis, Missouri

Tomotsugu Arikawa
Keio University
Yokohama, Japan

Jillian D. Bainard
University of Saskatchewan
Saskatoon, Saskatchewan

Mona Bourell
California Academy of Sciences
San Francisco, California

William R. Buck
The New York Botanical Garden
Bronx, New York

John A. Christy
Oregon Natural Heritage
Information Center
Oregon State University
Portland, Oregon

Steven P. Churchill
Missouri Botanical Garden
St. Louis, Missouri

Howard A. Crum†
University of Michigan
Ann Arbor, Michigan

Patricia M. Eckel
Missouri Botanical Garden
St. Louis, Missouri

Jean Faubert
Société québécoise de bryologie
Saint-Valerian-de-Rimouski, Québec

Íñigo Granzow-de la Cerda
University of Michigan
Ann Arbor, Michigan

Dana G. Griffin III
University of Florida
Gainesville, Florida

Judith A. Harpel
Brush Prairie, Washington

Terry A. Hedderson
University of Cape Town
Rondebosch, South Africa

Lars Hedenäs
Swedish Museum of Natural History
Stockholm, Sweden

Masanobu Higuchi
National Science Museum
Tsukuba, Japan

Michael S. Ignatov
Main Botanical Garden
Moscow, Russia

Robert R. Ireland Jr.
Stittsville, Ontario

David W. Jamieson
Fort Lewis College
Durango, Colorado

Robert E. Magill
Missouri Botanical Garden
St. Louis, Missouri

Piers Majestyk
Duke University
Durham, North Carolina

Paul C. Marino
Memorial University
St. John's, Newfoundland

Terry T. McIntosh
University of British Columbia
Vancouver, British Columbia

Norton G. Miller†
New York State Museum
Albany, New York

Gert Steen Mogensen
University of Copenhagen
Copenhagen, Denmark

Clayton Newberry
Bureau of Land Management
Vernal, Utah

Steven G. Newmaster
University of Guelph
Guelph, Ontario

Angela E. Newton
The Natural History Museum
London, England

Daniel H. Norris
University of California
Berkeley, California

Terry J. O'Brien
Rowan University
Glassboro, New Jersey

Paul L. Redfearn Jr.
Powell Gardens
Kansas City, Missouri

William D. Reese†
University of Louisiana
Lafayette, Louisiana

Joseph R. Rohrer
University of Wisconsin
Eau Claire, Wisconsin

Inés Sastre-De Jesús
University of Puerto Rico
Mayaguez, Puerto Rico

Wilfred B. Schofield†
University of British Columbia
Vancouver, British Columbia

A. Jonathan Shaw
Duke University
Durham, North Carolina

James R. Shevock
California Academy of Sciences
San Francisco, California

John R. Spence
Glen Canyon National Recreation
Area
National Park Service
Page, Arizona

Lloyd R. Stark
University of Nevada
Las Vegas, Nevada

Stephen L. Timme†
Pittsburg State University
Pittsburg, Kansas

Alain Vanderpoorten
University of Liège
Liège, Belgium

Dale H. Vitt
Southern Illinois University
Carbondale, Illinois

William A. Weber
University of Colorado Museum
Boulder, Colorado

Richard H. Zander
Missouri Botanical Garden
St. Louis, Missouri

Reviewers

Bruce H. Allen
Missouri Botanical Garden
St. Louis, Missouri

Lewis E. Anderson†
Duke University
Durham, North Carolina

William R. Buck
The New York Botanical Garden
Bronx, New York

Benjamin E. Carter
University of California
Berkeley, California

Howard A. Crum†
University of Michigan
Ann Arbor, Michigan

Claudio Delgadillo M.
Universidad Nacional Autónoma
de México
Mexico City, Mexico

Jennifer Doubt
Canadian Museum of Nature
Ottawa, Ontario

Isabel Draper
Universidad Autónoma de Madrid
Madrid, Spain

Janice M. Glime
Michigan Technological University
Houghton, Michigan

Bernard Goffinet
University of Connecticut
Storrs, Connecticut

Lars Hedenäs
Swedish Museum of Natural History
Stockholm, Sweden

Robert R. Ireland Jr.
Stittsville, Ontario

David W. Jamieson
Fort Lewis College
Durango, Colorado

Robert E. Magill
Missouri Botanical Garden
St. Louis, Missouri

Piers Majestyk
Duke University
Durham, North Carolina

Kenneth D. McFarland
University of Tennessee
Knoxville, Tennessee

Terry T. McIntosh
University of British Columbia
Vancouver, British Columbia

Norton G. Miller†
New York State Museum
Albany, New York

Angela E. Newton
The Natural History Museum
London, England

Terry J. O'Brien
Rowan University
Glassboro, New Jersey

Ryszard Ochrya
Botanical Institute
Polish Academy of Sciences
Kraców, Poland

Ronald A. Pursell†
Missouri Botanical Garden
St. Louis, Missouri

Paul L. Redfearn Jr.
Powell Gardens
Kansas City, Missouri

William D. Reese†
University of Louisiana
Lafayette, Louisiana

Wilfred B. Schofield†
University of British Columbia
Vancouver, British Columbia

A. Jonathan Shaw
Duke University
Durham, North Carolina

James R. Shevock
California Academy of Sciences
San Francisco, California

John R. Spence
Glen Canyon National Recreation
Area
National Park Service
Page, Arizona

Benito C. Tan
University of California
Berkeley, California

Barbara M. Thiers
The New York Botanical Garden
Bronx, New York

Steven L. Timme†
Pittsburg State University
Pittsburg, Kansas

Andries Touw
Leiden University
Leiden, Netherlands

Dale H. Vitt
Southern Illinois University
Carbondale, Illinois

William A. Weber
University of Colorado Museum
Boulder, Colorado

Alan T. Whittemore
U.S. National Arboretum
Washington, DC

Richard H. Zander
Missouri Botanical Garden
St. Louis, Missouri

Acknowledgments

Members of the Flora of North America Association (FNAA), especially those involved in the preparation and production of this volume, extend special thanks to:

Barney L. Lipscomb, editor of *Journal of the Botanical Research Institute of Texas* [formerly *Sida*], and Guy L. Nesom, editor of *Phytoneuron*, who ensured that new species and combinations were published promptly, such that these taxa could be included in the published bryophyte volumes.

The U.S. Fish and Wildlife Service (USFWS) is acknowledged for having provided Federal assistance in the form of a joint agreement to share Flora of North America- and USFWS-funded illustrations used in this volume for the *Illustrated Moss Flora of the Aleutian Islands*, an identification manual edited by Wilfred B. Schofield† and Stephen S. Talbot.

We appreciate the efforts of many individuals who provided advice, corrections, encouragement, and support for the bryophyte team of authors and editors. Special thanks go to Pat Harris, technical editor for the moss volumes through 2010, and to Ariel S. Buback in her capacity as technical editor for Volume 28 since the beginning of 2011; we extend special thanks to both of them for their dedication to the *Flora* project. We single out James L. Zarucchi, whose unrelenting insistence on clarity, consistency, and completeness improved the books immeasurably.

To the authors who contributed treatments to this volume, we extend our deepest appreciation for their hard work, scholarly contributions, and patience throughout the editing and composition process.

Finally, we thankfully acknowledge the dedication and organizational skills of Heidi H. Schmidt, especially in overseeing the final and exacting process of volume composition.