



THE JEPSON GLOBE

A Newsletter from the *Friends of The Jepson Herbarium*

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Director's Column

by Brent D. Mishler

Bryophyte Biology

The bryophytes, with more than 20,000 species worldwide, are the most diverse set of land plants aside from the flowering plants. The group includes three quite distinct lineages (i.e., mosses, hornworts, and liverworts), some familiar species frequently encountered in mesic forests and along streams, as well as a number of less familiar species of tropical rain forests, arctic tundra, and desert boulders. The bryophytes have an ancient history; they are remnant lineages surviving today from the spectacular radiation of the land plants in the Devonian Period, some 400-450 million years ago. These three main bryophyte lineages (not monophyletic taken together), plus a fourth lineage (the tracheophytes, i.e., the so-called vascular plants), comprise the monophyletic embryophytes (land plants), arguably one of the most important lineages to have arisen in earth's history — they made possible

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Dr. Paul Silva and Dr. Richard L. Moe

Announcing the Silva Center for Phycological Documentation

From its beginnings in the 19th Century, the University Herbarium (UC) has emphasized phycological collections. William Setchell, who was interested in marine algal taxonomy and biogeography, communicated with phycologists worldwide and built up the herbarium and library through exchange. Because of his early efforts, UC is a repository of much early European and Japanese phycological literature as well as type specimens.

G. F. Papenfuss, who succeeded Setchell, also promoted a global reach for UC phycology. He was an enthusiastic advocate of the interchange of phycological information, engaging in prolific correspondence and attending international meetings.







Paul Silva has continued the

tradition of Setchell and Papenfuss and has brought to UC a principal role in phycological nomenclature. He assembled a comprehensive index of algal names (the *Index Nominum Algarum*) and a corresponding index of phycological literature (*Bibliotheca Phycologica Universalis*). He was a founding member of several national and international phycological societies and has served as editor and reviewer throughout his career. He is an editor of the *International Code of Botanical Nomenclature* and is chairman of the *Committee for the Nomenclature of Algae*. The authors of numerous taxonomic, bibliographic, and nomenclatural compilations have acknowledged their debt to Silva.

Upon his retirement, Silva established an endowment fund for the

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Polytrichum in full glory (Eric Harris)

the colonization of land by animals, and evolved an unparalleled diversity of size, structure, chemistry, and function. Yet, despite their diversity, phylogenetic importance, and key roles in the ecosystems of the world, study of many aspects of the biology of bryophytes has lagged behind that of the larger land plants, perhaps because of their small size and the few scientists specializing on them. This is unfortunate because of the intrinsic scientific interest of these plants. I would like to summarize here a little of what we do know about their biology, as an encouragement for you to get to know them better.

One might assume, to start with, that bryophytes are biologically like their larger cousins, just smaller versions. But, is this a reasonable assumption? In what ways does bryophyte biology differ from that of the larger tracheophytes? The short answer: in almost every way possible! The groups didn't evolve on different planets, but their differences could almost make you think they did. They certainly adopted very different approaches to being a land plant on *this* planet. Many aspects need much more study, but what is known about bryophyte biology suggests that in general the bryophytes differ in most ways in their genetics, physiology, ecology, and evolution from tracheophytes. I will go through these contrasts in list

form below, in hopes of summarizing how different major lineages have solved the problem of life on land, in a way useful for thinking about these remarkable little plants.

Major differences in bryophyte biology from tracheophytes include:

(1) *Haploid dominance in the alternation of generations.* Unlike the situation in tracheophytes, the green, vegetative part of the life-cycle in bryophytes is haploid. Without the genetic benefits of dominance, genes acting in the gametophyte are presumably subject to relatively severe selection. This affects reproductive biology as well, e.g., selfing in a bryophyte has very different implications (complete homozygosity) than selfing in a diploid.

(2) *Extensive phenotypic plasticity.* Studies have shown that bryophytes tend to have very high amounts of morphological and physiological plasticity. This may compensate for the demonstrated low levels of ecotypic differentiation in bryophyte species, even between widely different latitudes.

(3) *Poikilohydry and desiccation-tolerance.* Poikilohydry is the rapid equilibration of the plant's water content to that of the surrounding environment, while desiccation tolerance is the ability of a plant to recover after being air-dry at the cellular level. All bryophytes have these abilities

to some extent, probably as a retention of traits of early land plants, while these traits were lost in the evolution of larger, more complex, and endohydric tracheophytes.

(4) *Need for free water for sexual reproduction.* Another residual feature of the early land plants shared by modern bryophytes is the constraint imposed by the swimming sperm. Swimming gametes have short dispersal distances, which leads to frequent inbreeding in monoicous species (those with male and female gametangia on the same plant) and lack of sporophyte production in dioicous species (those with male and female gametangia on different plants).

(5) *The clump as a "super-organism."* Many mosses and some liverworts are essentially social organisms like bees or ants. This results from the combination of clonal growth, poikilohydry, and external water conduction. The plants in a clump are subject to natural selection as a group. Intimate contact of each vegetative cell with the environment, due to poikilohydry, lends itself to interplant chemical communication via pheromones, and extreme sensitivity to chemicals in the environment, including pollutants.

(6) *Heavy reliance on asexual reproduction.* Due to the difficulty of achieving fertilization, many bryophytes have evolutionarily lost functional sexuality. Many kinds of asexual propagules have evolved, and most vegetative cells of the plant can proliferate. Because bryophytes grow from an apical cell, somatic mutation allows genetic variation even within clones.


(7) *Small stature and the occupation of microhabitats.* Small size, lack of roots, and poikilohydry means that bryophytes are in a close relationship with only their immediate microenvironment. Over geological time, they are less influenced by climatic change than larger organisms, and linger in refugial habitats.

(8) *Less selection pressure from the*


biotic component of the environment than from the physical component. Vagility and establishment abilities of bryophytes are relatively poor. Available substrates are not filled in most mesic and xeric environments (although they may be in some hydric environments). The presence of other bryophytes nearby often appears beneficial to growth through enhanced water-holding capacity, rather than a source of competition.

(9) *Relatively slow evolutionary rates in morphology.* The fossil record of bryophytes indicates that ancient forms are very similar to modern ones. Biogeographically, bryophytes tend to follow the same historical patterns of disjunction as tracheophytes, but at a lower taxonomic level. This may indicate that developmental constraints play an unusually important evolutionary role.

The overall effect of these features on the evolutionary ecology of bryophytes makes them profoundly different from tracheophytes, and well worthy of study in their own right. You have many opportunities to get involved. UC/JEPS has a relatively large bryology program; current bryologists include Ben Carter, Eric Harris, Brent Mishler, Dan Norris, Jim Shevock, and Rebecca Welch. Jepson Weekend Workshops on bryophytes are offered each year (two this year: *Sphagnum* Feb. 24-25, and *Bryophyte Inventory and sampling techniques* March 1-4), as well as an annual bryophyte field trip (called SO BE FREE, to be held this year March 27-30 in the Chiricahua Mountains of southeastern Arizona — for details see: <http://ucjeps.berkeley.edu/bryolab/trips/sobefree.php>).

This column is based on: B.D. Mishler. 2001. Book review: The biology of bryophytes. *American Journal of Botany* 88: 2129 - 2131. 

University Herbarium to ensure that UC's role in the phycological world will be perpetuated. The endowment brings into being the Silva Center for Phycological Documentation, which has the goals of continuing to track the publication of algal names and taxonomic information, and to make that information conveniently available. Silva's indexes can now be reached via the Internet (see <http://ucjeps.berkeley.edu/INA.html>).

The first Silva Curator of Phycological Documentation will be Dr. Richard Moe, who has a strong background in marine phycology and has developed broad interests in electronic publication, databases, and Internet technology. 

JOIN US!
Botany Lunch
&
Herbarium Tea

Botany Lunch is the Herbaria's informal seminar series. Held weekly, topics range from travelogues to research presentations. Weekly emails announce the speaker and their topic. If you would like to be included on the list, please email Staci Markos (smarkos@berkeley.edu) or feel free to drop by the Herbarium, most Fridays during the semester from noon to 1:00 pm.

Herbarium Tea is an informal gathering of Herbaria faculty, staff, students, and visitors. *Friends* are also welcome to come and join in the conversation (every Wednesday during the semester from 3:00 pm to 3:30 pm in the reception area of the Herbaria).

Second Edition of *The Jepson Manual*

Treatments for public viewing available at:

<http://ucjeps.berkeley.edu/jepson-manual/review/>

Please forward any comments you may have about these treatments to the Scientific Editor, Dr. Thomas Rosatti

ADOXACEAE: *SAMBUCUS*, *VIBURNUM*
ARACEAE: *LANDOLTIA*, *LEMNA*, *SPIRODELA*, *WOLFFIA*, *WOLFFIELLA*
BETULACEAE: *ALNUS*, *BETULA*, *CORYLUS*
BURSERACEAE: *BURSERA CALYCANTHACEAE:* *CALYCANTHUS*
CISTACEAE: *CISTUS*, *HELIANTHEMUM*, *TUBERARIA*
CONVOLVULACEAE: *IPOMOEA*
DIPSACACEAE: *DIPSACUS*, *SCABIOSA*
FOUQUIERIACEAE: *FOUQUIERIA*
GERANIACEAE: *GERANIUM*
GUNNERACEAE: *GUNNERA*
LENTIBULARIACEAE: *PINGUICULA*, *UTRICULARIA*
LINNAEACEAE: *LINNAEA*
LYTHRACEAE: *AMMANNIA*, *LYTHRUM*, *PUNICA*, *RODALA*
MYRSINACEAE: *ANAGALLIS*, *GLAUX*, *LYSIMACHIA*, *TRIENTALIS*
MYRTACEAE: *CHAMELAUCIUM*, *EUCALYPTUS*, *LEPTOSPERMUM*, *LUMA*, *MELALEUCA*, *MYRTUS*, *SYZIGIUM*
NITRARIACEAE: *PEGANUM*
NYCTAGINACEAE: *ABRONIA*, *ACLEISANTHES*, *ALLIONIA*, *ANULOCAULIS*, *BOERHAVIA*, *MIRABILIS*, *TRIPTEROCALYX*
ORCHIDACEAE: *LISTERA*
PHYTOLACCACEAE: *PHYTOLACCA*
PONTEDERIACEAE: *EICHHORNIA*, *HETERANTHERA*, *MONOCHORIA*
PRIMULACEAE: *ANDROSACE*, *DODECATHEON*
SARRACENIACEAE: *DARLINGTONIA*, *SARRACENIA*
SAURURACEAE: *ANEMOPSIS*
STYRACACEAE: *STYRAX*
TAMARICACEAE: *TAMARIX*
THEOPHRASTACEAE: *SAMOLUS*
VISCACEAE: *ARCEUTHOBIUM*, *PHORADENDRON*, *VISCUM*
ZINGIBERACEAE: *HEDYCHIUM*
ZYGOPHYLLACEAE: *FAGONIA*, *KALLSTROEMIA*, *LARREA*, *TRIBULUS*, *ZYGOPHYLLUM*

Jepson Herbarium Reception and Auction

On November 11, 2006, the Jepson Herbarium held a reception and auction to benefit the Jepson Flora Project.

We thank all of the individuals and businesses that donated items to the silent and live auctions (see list, page 5). We are truly grateful for your contributions! We also thank all of the attendees for coming to the event and showing your support for the Flora Project, and especially to table sponsors East Bay Chapter of CNPS, Huffman-Broadway Group, and Sycamore and Associates. Your commitment is a big part of our success!

Over 100 people attended the festivities and, as you can



Silent auction items included artwork, botanical trips, retreats, unique plants, wine, gift certificates, and more.



Bruce Baldwin addresses the crowd after dinner, as *T. rex* oversees the festivities



Attendees peruse the many quality silent auction items.



The herbarium truly underwent a major transformation - Jepson Vineyard's wine was served up at the bar

Photographs courtesy of Craig Norvell



Many attendees tried their luck at the "balloon game" where items displayed corresponded with colored balloons but remained a secret until the balloon was chosen and popped.

Thank You, Auction Donors!

*Albany Twin
American Musical Theatre
Ana Penny
Anonymous
Barbara Ertter
Bay Area Discovery Museum
Berkeley Horticultural Nursery
Berkeley Moving Arts
Berkeley Opera
Berkeley Repertory Theatre
Best Western Tree House Motor Inn
Bette's Oceanview Diner
Boomers! and Scandia Family Center
Bridget Wessa
Bruce Baldwin
Cal Flora
Cal IPC
Cal Performances
California Academy of Sciences
California Botanical Society
California Native Plant Society
Cartoon Art Museum
Chuck Quibell
Craig Norvell and Staci Markos
Cynthia Perrine
Dan Norris
David Margolies
Dieter Wilken
Disneyland Resort
East Bay Nursery
East Bay Regional Park District
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Freight and Salvage Coffee House
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Jepson Herbarium archives
Jim Andre
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Juniper Ridge, Western Wild Goods
Karen Markos
Kathleen Dickey
Katie's Dance Studio
Kurt Merg
La Note Restaurant Provencal
Lalime's Restaurant
Lamplighters Music Theatre
Lawrence Hall of Science
Lindsay Wildlife Museum
Madeline Mitchell
Margriet Wetherwax and
Kevin Downing
Mark Stromberg
Merritt Collge, Propagation Club
Mike Vasey & Patti Papeleux
Missouri Botanical Garden
Montclair Florist
Nancy Hillyard
Natural Grocery Company*

*Oakland Athletics
Oakland Museum of California
Old Faithful Geyser of California
Patrick Karvasales Photography
Peet's Coffee & Tea
Phyllis Faber
Punchline Comedy Club,
Restaurant and Bar
Quady Winery
Rebecca Guenther
Richard Beidleman
Richard Moe
Ripley's Believe It or Not Museum
San Francisco Zoo
Sarber's In-House Digital Photo Lab
Sorensen's Resort
Stephen Joseph Photography
Steve Junak
Sue Johnson Custom Lamps
Sugar Bowl
Susan Cochrane Levitsky
Sweet Potatoes
Theatre Works
Tom Rosatti
Toni Corelli
Trey Gisclair
UC Botanic Garden
UC Press
Vella's Locker Room
Yulan Chang Tong*

Announcements

Website Undergoing Updates

Even if you can't make it to Berkeley to visit the University and Jepson Herbaria in person, you can glean a lot of information by visiting our website (ucjeps.berkeley.edu). In addition to the many online taxonomic and specimen databases, Jepson Flora Project resources, and general information about visiting and using the collection, our website is being augmented and revised to include additional information about lesser-known herbaria resources and people.

A collective effort by staff and researchers, the project is overseen by Administrative Curator Andrew Doran with Webmaster Chris Meacham posting content to the site. Research Associate Richard Beidleman has spent countless hours documenting the herbaria archives and many of these special collections of slides, photographs, specimens, books, and other items of botanical interest are now listed online at ucjeps.berkeley.edu/main/archives.

A complete staff directory is now up-to-date and includes web pages for some individuals, a news feature highlighting special projects or recognition the herbaria receives from the public, and ongoing updates to the botanical databases.

Take a minute to visit our revised site and let us know if there is anything else you'd like to see added.

New Faces in the Herbarium

Collections Management

Three new curatorial assistants have joined the University and Jepson Herbaria. All three are mostly working on the transfer and incorporation of the Los Angeles County Museum collections, into the UC herbarium, which involves extensive curatorial work. We introduce these new staff members below and describe some of their individual projects.



Rachel Brush is becoming an expert user of the herbarium database (SMASCH) and has been training others in its use. Rachel is working on updating changes in the filing of *Agoseris*, which has recently been rearranged by

Dr. Strother according to the nomenclature and taxonomy in *Flora of North America North of Mexico*. Rachel came to the herbaria from California Native Plant Society, where she was a seasonal botanist conducting vegetation surveys in the Sierra Nevada foothills. Rachel recently attended the Northern California Botanists meeting in Chico, where a number of talks centered around land management and conservation related topics.



Petra Foerster is re-curating the type specimen collections of both herbaria. This will involve making new genus and species covers, producing high resolution scans of specimens, and making sure that label data have been captured correctly. Starting with the ferns, Petra is working under the supervision of Dr. Alan Smith. A native of Germany, Petra has worked for the National Park Hainich, a new

national park two hours east of Frankfurt, where she conducted an inventory of all the vascular plants and coordinated surveys of the bryophytes, lichens, and fungi.



Rebecca Guenther has been working with Kathy Ann Miller to curate and file marine algae from the Los Angeles County Museum. Since starting work at the herbaria in May 2006, Rebecca has made a trip to Egypt where she was working for Operation Wallacea. She was working as a senior botanist on

a grazing analysis study in the St. Katherines Protected Reserve on the Sinai Peninsula. During her second trip to the reserve, Rebecca lived with the Jebalya Bedouin and acquired a great deal of their ethnobotanical knowledge. During her time at our herbaria, Rebecca has developed a keen interest in the phycological holdings at UC and with three previous generations of phycologists in the herbarium Rebecca has come to the right place! Coralline algae and diatoms are particular areas of interest and Rebecca intends to pursue a graduate degree studying one of these groups.

Researchers

Marcus Lehnert, has joined us from the Georg-August University in Göttingen, Germany, as a graduate student for the 2006 – 2007 academic year. His exchange was arranged by the Education Abroad Program (EAP), a mutual exchange program between the University of Göttingen and the University of California.


Marcus was born on Oct 1st, 1975, in Neustadt/Holstein, Germany. His Ph.D. research started with the revision of the fern genus *Melpomene*, for which he was granted a stipend by the German Academic Exchange Service (DAAD, or Deutscher Akademischer Austauschdienst). His first year was spent traveling and collecting in South America. From his base at the Instituto de Ecología de la Universidad Mayor de San Andres, La Paz, Bolivia, he traveled most of Bolivia, Peru, and Ecuador, with short expeditions to northern Argentina and southeastern Brazil. After returning to Germany, he was employed as a research scientist for three years in the DFG (German Science Foundation) in the project “Cryptogamic

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plant diversity of the *Purdiaea nutans* forest in southern Ecuador and its relationship to soil, climate, and vegetation structure.” This work focused on the ecology and diversity of cryptogams and allowed Marcus to visit Ecuador two more times, as well as to make a short trip to Bogotá, Colombia.

His current project is a revision of the neotropical scaly tree ferns of the family Cyatheaceae, a family containing about 200 species. Revised 30 years ago by the pteridologist Rolla M. Tryon and his students, Marcus’s work focuses on incorporating the new species discovered or named since Tryon’s publication. Furthermore, the genera had been split up unnaturally back then and were revised each by a different scientist in a sometimes very different manner. Combining the old descriptions of the species according to the genera accepted today results in a heterogenic conglomerate. He intends to give a standardized description to each species, incorporating field observations on the habit of the plants, a character often neglected in the past.

Marcus’s future plans are still vague, apart from his return to Germany in May and obtaining his degree in the following months, but he would like to investigate the genus *Cyathea* further, focusing on the phylogeny and ecology. 

Announcements

Cal Day 2007

April 21st

Cal Day 2007 will be held on Saturday, April 21. This is a campus-wide open house event, celebrating the many programs and achievements of the University of California and surrounding community. Admission to all events is free. The herbaria, along with the five other museums that make up the Berkeley Natural History Museums, will have collective and individual exhibits, tours, and activities for kids and their families.

Tours of the University and Jepson Herbaria will be given by curators and research staff and held on the hour, between 10 a.m. and 3 p.m. The herbaria’s front office will also showcase wildflower and fungi displays, a plant-mounting activity for kids, t-shirt sales, and exhibits on herbaria programs and recent accomplishments. Research and administrative staff will be on hand to answer questions.

THE JEPSON HERBARIUM PROJECTS & RESOURCES

The Jepson Flora Project

Second Edition of *The Jepson Manual*
Online Interchange for California Floristics
Jepson Desert Manual

Online Horticultural Database
Electronic Publication of Jepson’s
A Flora of California

Ecological Flora of California

Publications & Research Projects

Constancea: University of California
electronic publications in botany

DeCew’s Guide to the Seaweeds

Unravelling the dynamics of mating-system
evolution in tribe Collinsieae

Building the Tree of Life — A National Resource for Phyloinformatics and Computational Phylogenetics

Deep Green Plant Phylogenetics: Novel Analytical Methods for Scaling Data from Genomics to Morphology

Beyond “Deep Green”: Towards an Integration of Plant Phylogenetics and Plant Genomics

Demography and Germination Ecology of the Endangered Santa Cruz Tarplant

Phylogeny and evolution of the true thistles, genus *Cirsium* (Compositae)

Niche conservatism, functional trait evolution

and the diversification of the California vernal pool flora

Educational Services & Resources

Botanical Workshops & Courses

Plant Identification

2,200,000+ Worldwide Plant Specimens

Botanical Library and Slide Collection

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Director: Professor Brent Mishler

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Research Associate: Bridget Wessa

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Project Research Specialists:

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Project Manager: Staci Markos

Webmaster: Chris Meacham

Database Admin.: Richard Moe

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Managing Editor: Margriet Wetherwax

Administrative Curator: Andrew Doran

Senior Museum Preparator: Ana Penny

Assistant Museum Scientist: Kim Kersh

Development Coordinator:

Staci Markos

Education Program & Globe Editor

Cynthia Perrine

Volunteers Needed!

VOLUNTEER OPPORTUNITIES IN THE UNIVERSITY AND JEPSON HERBARIA

Curatorial Volunteers Needed at the University and Jepson Herbaria!

Are you interested in learning more about the California flora, gaining first-hand experience with herbarium techniques, and socializing with fellow native plant enthusiasts? Then have we got a deal for you! Selected **Saturdays** of each month are **Group Volunteer Days** in the Herbaria. What better way to spend those rainy winter weekends!

Group Volunteer Saturdays begin at 10 am and finish up by 5 pm (participants need not stay the full time). We also welcome **individual volunteers** who can come in during our regular hours (M-F 8-5). We will try to match your unique interests and abilities.

2007 Volunteer Saturdays

March 10

April 14

May 12

For more information, please call or write to Ana Penny (510) 642-2465, apenny@berkeley.edu

March 15

The evolution of floristic modeling – Barbara Ertter, Curator of Western North American Flora, University and Jepson Herbaria, University of California, Berkeley
<http://ucjeps.berkeley.edu/people/ertter.html>

April 19

Functional diversity and alien grass impacts in a threatened dry forest ecosystem of Hawaii – Darren Sandquist, Department of Biological Science, California State University, Fullerton
<http://biology.fullerton.edu/people/faculty/darren-sandquist/index2.html>

Lectures are open to all and begin at 7:00 p.m., 2063 Valley Life Sciences Building
UC Berkeley

Refreshments will be served before (6:45) and after the seminars. For additional information please call (510) 643-7008 or visit (www.calbotsoc.org).



FRIENDS OF THE JEPSON HERBARIUM

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- I would like to join the *Friends* / renew my membership (contribution to the annual fund).
- I would like to support the Second Edition of *The Jepson Manual* with my gift of _____.
- Enclosed is _____ of a total pledge of _____ to be paid over _____ years.
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CATEGORIES OF GIVING

GIFTS TO SUPPORT THE SECOND EDITION

\$25,000 Honor the contributions and founding principles of W. L. Jepson, former Jepson Trustees Lincoln Constance and Robert Ornduff, and former Jepson Curators Rimo Bacigalupi and Lawrence R. Heckard

\$10,000 Support taxonomic efforts in an organizing unit of the *Manual*: Ferns, Gymnosperms, Dicots, or Monocots

\$5,000 Support floristic effort for a particular bioregion (Twenty-four listed in the *Manual*)

\$2,500 Support taxonomic work in a particular family. See the Herbarium web site for an up-to-date, complete list

\$1,000 Show enthusiasm for your favorite genus (pledge \$200 / 5 years)

ANNUAL SUPPORT

\$500 Contribute to the illustration of a new species

\$250 Help accession specimens from the backlog

\$100 Support taxonomic research at the species level

\$35/\$50 Basic membership in *Friends of the Jepson Herbarium*

SPONSORSHIP OPPORTUNITIES

are exclusive and will be available on a first-come, first-served basis. With approval from the donor, gifts at the \$1,000 level and above will be acknowledged in the front pages of *The Jepson Manual*. Gifts may be made as one-time payments or as a pledge, payable over 5 years.



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2007 Weekend Workshop Series
Workshops listed below are available for registration:

Basic Botany

Basics of Botanical Illustration (L. Vorobik); Collecting and Vouchering Specimens (M. Park & A. Moore); Jepson On-line Resources (S. Markos & R. Moe); Using Electronic Keys (C. Meacham & T. Rosatti)

Meet the Jepson Manual Authors

Potentilla (B. Ertter); *Eriogonum* (J. Reveal); *Chorizanthe* (J. Reveal); *Lupinus* (T. Sholars)

Weekend Workshops

Imperial County (J. Rebman); White Mountains (J. Morefield); *Mimulus* in Sequoia/Kings Canyon NP's (S. Schoenig); Flora of the Panamint Range (D. York)

Special Series

A Comprehensive History of Tanoaks (F. Bowcutt); Mushrooms & Mycchorizae-Mendocino (M. Garbelotto & T. Sholars)

Topics in Wildlife Ecology (Berkeley Natural History Museums)

Ecology and Epidemiology of Lyme Disease (B. Lane); Museum Preparation Techniques (M. Albe & J. Wilcox)

Please visit our Web site at: <http://ucjeps.berkeley.edu/workshops> for full descriptions and registration information,
or contact Cynthia Perrine, cperrine@berkeley.edu or (510) 643 - 7008