THE JEPSON GLOBE

A Newsletter from the *Friends of The Jepson Herbarium*

VOLUME 16 NUMBER 2 SEPTEMBER 2005

Curator's Column

by Bruce G. Baldwin

Last year, two new Ph.D. students joined my lab. Below, they introduce themselves and share their research plans. I was fortunate to recruit such stellar applicants, who both have strong interests in the California flora and passionate commitments to field botany. Welcome, Abby and Mike!

Michael Park

I am primarily interested in the evolution of plants and associated geological processes in California, and am working on the genus *Eryngium* (Apiaceae), which is found mainly in vernal pools. The evolution of Eryngium may be linked to that of vernals pools and I plan to study the historical development of both. I have also begun a taxonomic revision of California eryngia. In addition to my dissertation research on *Eryngium*, I have also been working extensively on the flora of the Mount Diablo area, and I plan to publish a flora that extends the fine work by Ertter and Bowerman — *The Flowering Plants and Ferns of Mount Diablo, California* - eastward to Morgan Territory. Last but not least, I am involved in a study with Bruce Baldwin and others to characterize the evolution of mating systems (the strategy of cross- and self-fertilization) and flower size in *Collinsia* and *Tonella* (Scrophulariaceae in *The Jepson Manual*).

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Above: Michael Park with *Eriogonum truncatum*.

Some thoughts on the rediscovery of Eriogonum truncatum

by Michael Park

The field season is winding down, and the Mount Diablo Buckwheat is currently present only as seed awaiting the winter and spring rains. Yet, the work continues. The Mount Diablo Buckwheat Working Group has been established through the combined efforts of the California State Parks, U.S. Fish and Wildlife Service, Jepson Herbarium, and UC Botanical Garden. The goals of the group are propagation and habitat conservation. Seed has been collected, but habitat stability is yet to be fully assessed. The buckwheat is found on slopes that apparently are prone to landslides. During the next year, we hope to gain a fuller understanding of the reproductive ecology and conditions that contributed to its persistence.

The finding of *Eriogonum*

Continued on page 2.

Jepson Manual Update: Attempting to Quantify the Changes Expected for TJM2

by Thomas J. Rosatti, Scientific Editor

In previous updates, various of the taxonomic and nomenclatural changes that have been proposed since *The Jepson Manual* (TJM) and that have been adopted by our authors for TJM2 have been summarized. Clearly, plant scientists have been very busy using traditional as well as modern techniques to determine or re-evaluate evolutionary relationships among plants and to reflect this information in classifying and naming them. Meanwhile, continued exploration by field botanists has revealed the presence in California of both native and naturalized plants previously unknown from the state, as well as plants previously unknown to science (newly described and named taxa). The dramatic numbers and kinds of changes resulting from all this research underscores the importance and urgency of producing a second edition of *The Jepson Manual* (TJM2), and at the same time is relevant to the issue of field portability of the book (i.e., will it be too heavy to carry?).

In this article, an attempt will be made to quantify these as well as other expected changes, in part for the purpose of estimating the size of TJM2. The estimates are based on information that has been submitted to the Index to California Plant Names (ICPN),

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Curator's Column, continued from page 1.

Abigail Moore

Grindelia is a genus of between 30 and 80 species in the Asteraceae (sunflower family) that has been a major problem for plant taxonomists, who have struggled with confusing patterns of variation in the group. It has a disjunct distribution, with some species native to western North America and Mexico and others native to southern South America. All of the species have

Above: Abigail Moore keying in the field

heads of yellow flowers and many series of green phyllaries. Most of the species also have a gummy substance on the heads that gives the genus the common name of gumweed.

I am currently doing field work to become familiar with the different species, the habitats in which they grow, and how much morphological variation typically occurs within a population. This fall and winter, I will be doing lab work to attempt to reconstruct the evolutionary relationships of the species of *Grindelia* using gene-sequence data and morphology. Once the relationships of the species are known, many other questions can be examined, such as how specialization for different soil types evolved and how many times the genus dispersed between North America and South America. I also would like to perform common garden experiments to discover how much of the variation in morphology is genetic and how much is due to the environments in which the plants grow.

Eriogonum, continued from page 1.

truncatum on Mount Diablo marked a high point for the field season this year. Though I gained tremendous personal satisfaction from the discovery itself, the public response to it was even more rewarding. In addition, I feel especially fortunate that the Jepson Herbarium (by way of the Lawrence Heckard Endowment) and the East Bay Chapter of the California Native Plant Society have funded my botanical explorations. Without guidance, training, and resources, the study that led to the wonderful discovery surely would have concluded prematurely (as an undergraduate senior thesis) with a less-than- thorough flora and no Mount Diablo Buckwheat.

While the rediscovery of the Mount Diablo Buckwheat is a "once in a lifetime" find for me, events such as the rediscovery of "presumed extinct" species occur on a somewhat regular basis. Just prior to this discovery, Ivory-Billed Woodpecker and Catalina Grass (*Dissanthelium californicum*) were found. But none of these three species was located as the result of a narrow and focused search.

This raises the question of whether surveys should be organized to relocate rare or missing species as the primary or secondary objective. The Mount Diablo Buckwheat was found during the course of a continuing study in which the primary goal is to locate and thoroughly document the plant resources of southeastern Mount Diablo and all of Morgan Territory in public land. The secondary objective is to seek out plants that are rare or had not been sighted within the boundaries in recent time. *Eriogonum truncatum*, *Blepharizonia plumosa*, and others were specifically sought out. Previous attempts to locate the buckwheat involved surveys with primary goals of finding the plant and had ended in failure.

Barbara Ertter has stated to me that an intensive, multi-year survey with the goal of producing a robust and recent flora has a higher likelihood of discovering new, rare, or endangered plants than a survey that focuses on historical locations for a handful of plants. I concur. In my experience, an open mind with a flexible search image will yield far more discoveries or surprises (and enjoyment!) than a strategy employing a fixed or narrow search image. Try it the next time you are botanizing. Keeping a species account for the day is a good way to slow oneself and train the mind to be flexible and open.

The study of plants truly is an endeavor to educate one-self and others. I feel thrilled that I have had the opportunity to contribute to the understanding of the natural world, and more specifically Mount Diablo, the eastern backyard of the San Francisco Bay region. Recently, I had questioned whether my work on the mountain (or more generally as a botanist) would mean much to anyone outside of academic circles. But that all changed on May 10, when I stumbled upon the now infamous pink flowers. The rediscovery of the Mount Diablo Buckwheat represents to me the opportunity to make a difference, of getting a second chance to do the right thing, doing what you believe in, and most importantly discovering oneself. I believe I have found my calling.

Jepson Manual Update, continued from page 1.

through the Jepson Online Interchange. Additional changes are expected as treatments for TJM2 are submitted over the coming months.

Terminal Taxa

Unfortunately, the Floristic Summary (numbers of taxa in various floristic categories) given in Appendix I of TJM is inaccurate, in part because the process of generating these numbers can be complicated, and in part because the numbers involved sometimes are misunderstood. According to Dick Moe, Database Administrator and Webmaster for the Jepson Flora Project, approximately the following numbers of species and terminal taxa (discussed below) were treated in TJM, in the following categories:

Table 1. Species and Terminal Taxa Treated Fully in TJM

species: 6057
terminal taxa: 7266
terminal taxa recognized at specific (species) rank: 5001
  native: 4013
  alien: 988
terminal taxa recognized at infraspecific rank: 2265
  native: 2184
  alien: 81

A "terminal taxon" can be thought of as a kind of plant (i.e., a biological entity); the number of "terminal taxa" in a flora equals the number of different kinds of plants in that flora. A "species" is (equals) a "terminal taxon" if it does not include any infraspecific taxa (subspecies or varieties) in a flora; if a species does include infraspecific taxa in a flora, it is not considered a terminal taxon, but the included infraspecific taxa are. In other words, if a species is represented in California by three subspecies, there are three different kinds of plants involved, not four (i.e., there are three terminal taxa, all recognized at infraspecific rank). Accordingly, for example: *Asplenium septentrionale*, including no infraspecific taxa, is counted as one species and one terminal taxon recognized at specific rank; *Pinus contorta*, including subsp. *bolanderi*, subsp. *contorta*, and subsp. *murrayana*, is counted as one species, no terminal taxa recognized at specific rank, and three terminal taxa recognized at infraspecific rank. Thus, the number of "species" in Table 1 is greater than the number of "terminal taxa recognized at species rank": of the 6057 species treated in TJM, 5001 qualified as "terminal taxa recognized at specific rank" because they did not include any infraspecific taxa. From this, it can be calculated that the number of species in TJM in which infraspecific taxa were recognized (i.e., the number of species not counted as "terminal taxa recognized at specific rank") is 1056 (6057 - 5001).

According to the numbers above, the total number of terminal taxa in TJM was 7266, of which 6197 (4013 + 2184) were considered to be native, and 1069 (988 + 81) were alien (mostly naturalized, but some waifs).

Queries executed on the "Editorial Summaries" in the ICPN database by Dick Moe (ICPN Editorial Summary Counts) indicated that approximately the following numbers of terminal taxa will be treated in TJM2, in the following categories (in parentheses are the numbers of additional taxa that possibly or probably will be included in each category, depending on the outcome of research currently under way):

Table 2. ICPN Editorial Summary Counts (Terminal Taxa)

A. described as new to science since TJM: 44 (43)

B. first reported for CA, as a native, since TJM (not new to science, but previously unknown from CA): 11 (16)

C. first reported for CA, as naturalized, since TJM (not new to science, but previously either not known to occur in CA, or known to occur in CA — e.g., as a waif or agricultural weed — but not known to be naturalized in CA) : 111 (227)

D. treated as a minor variant in TJM but as a recognized taxon (species, subsp., or. var.) since TJM: 8 (284) (of about 298 minor variants included in TJM)

E. treated in a different genus since TJM: 190 (60)

F. treated at a different rank (subsp. or var.) within the same species since TJM: 12 (4)

G. treated in a different species (subsp. or var.) since TJM: 7 (3)

H. treated at a different rank (species, subsp., or var.), in a different species, since TJM: 11 (14)

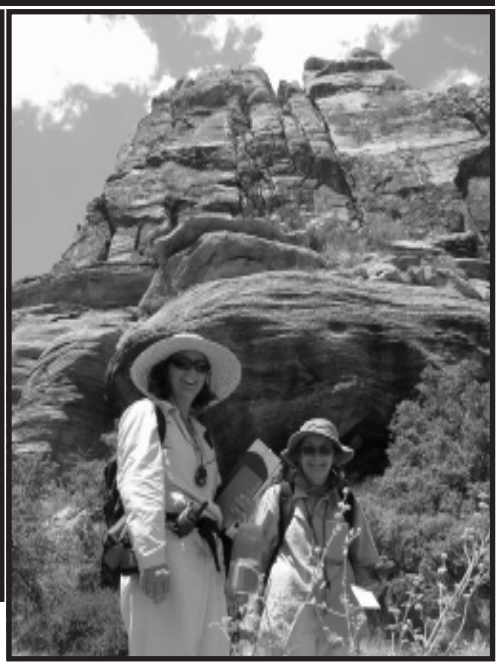
Based on estimates A-D in Table 2, currently we think that there are about an additional 174 terminal taxa confirmed by our authors (44 natives new to science, 11 natives new to CA, 8 natives treated as minor variants in TJM, and 111 naturalized aliens), with an additional 570 (43 natives new to science, 16 natives new to CA, 284 natives treated as minor variants in TJM, and 227 naturalized aliens) still under consideration by our authors. Thus, relative to TJM and in terms of terminal taxa, we already know that TJM2 will be at least 2.4% larger (7266 + 174 = 7440; 7266 x 1.024 = 7440), and possibly as much as 10.2% larger (7266 + 174 + 570 = 8010; 7266 x 1.102 = 8010). Depending on what we find in the treatments to be submitted in the months to come (a majority of all treatments have yet to be submitted), this figure could be even larger. Taxonomic

Continued on page 6.

Weekend Workshops Year in Review (2004 - 2005)

Eureka Dunes provides nice ambience for dinner

Salix instructor George Argus leads the group through keying at Sequoia N.P.



Anna Larsen and Hermi Hiatt pause at Red Rock Canyon

Thank you to our instructors and participants for another Great year of workshops in California and Nevada!

Otay Mesa instructor Scott McMillan engages his audience

Photographs courtesy of Anna Larsen and David Charlet

Martha Breed and Lyn Diana enjoy the view at Bear Basin Butte

Seaweeds co-instructor Kathy Ann Miller shows her enthusiasm for algae

New Additions to the Herbarium Family

Shannon Marcile Perrine
June 7, 2005
7 pounds 4 ounces, 19 1/2 inches

This summer proved to be an interesting and exciting time for the Herbarium. Two new babies were born! On June 7th Cynthia and her husband John welcomed Shannon Marcile and on August 21st, Staci and her husband Craig welcomed Garrison Tyler. Cynthia is back in the office and working hard to plan the 2005-2006 workshops schedule and Staci will return to the office in early November.

Garrison Tyler "Ty" Norvell
August 21, 2005
9 pounds, 21 3/4 inches

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).

In addition to the Second Edition of *The Jepson Manual*, Jepson Flora Project staff and volunteers have been working on related resources. Check out these web pages:

Completed by Tim Kask, a list of genera in the index to scientific names appearing in Jepson's A Flora of California:
http://ucjeps.berkeley.edu/flora_genus_list.html

Developed by Tom Rosatti, Electronic, Interactive Identification Keys for California Plants Using MEKA (Multiple-Entry Key Algorithm). Keys are available for the Asteraceae and can be downloaded or used online:
http://ucjeps.berkeley.edu/keys/index.html

Search specimen data from the Consortium of California Herbaria including search capabilities using geographic place names. Over 450,000 records at:
http://ucjeps.berkeley.edu/interchange.html

Jepson Manual Update, continued from page 3.

splitting of families and genera from TJM into greater numbers of families and genera in TJM2 seems to be occurring at a much greater rate than the reverse (the taxonomic lumping of such groups). Such activity will require additional family and genus descriptions, and will add to the size of the book as well.

The changes or potential changes represented in E-H in Table 2 all entail changes in the names of plants already included in TJM. Most of these (E) involve changes in the genus name, which in some cases require changes in the specific epithet as well. The changes or potential changes represented by minor variants (D above; discussed below) only sometimes entail changes in the names involved.

Approximately 298 entities were treated as minor variants in TJM; that is, as variants (usually with names) that were not fully recognized taxonomically and not fully treated in the sense that they were not included in keys and not given their own full paragraph. Minor variants in TJM were, nevertheless, discussed at least briefly in the paragraph treating the taxon to which they were thought to be most closely related and/or with which they were most commonly confused. Such discussion was usually limited to one sentence, and nearly always included the phrase "have been called" immediately before the name (e.g., under *Isoetes bolanderi*, "Small pls of c SNH, NV, AZ (lf < 2.5 cm) have been called var. *pygmaea* (Engelm.) Clute.").

Most minor variants in TJM belonged to one of two general groups: cryptic taxa (those that were difficult or impossible to identify morphologically, but that differed in physiology, chemistry, molecular biology, or some other non-morphological aspect of their phenotype); or variants about which an author wished to remain noncommittal, because, for example, more research was required to determine whether or not to recognize them. For TJM2, authors have been allowed to recognize and fully treat cryptic taxa, and have been exhorted to resolve the issue of taxonomic recognition for taxa that were given noncommittal treatment in TJM. Thus, the number of minor variants to be included in TJM2 is expected to be considerably smaller than the number in TJM.

Although there will be fewer minor variants in TJM2, it is not yet clear what effect this will have on the size of the book. While some minor variants will be elevated to full taxonomic treatment (as varieties, subspecies, or species), and included in keys and given their own paragraphs, others will not be recognized taxonomically, and will occupy space only as names in synonymy. Thus far, of the approximately 298 minor variants in TJM, eight have been accorded full taxonomic status, and six have been reduced to synonymy. Resolution of the other 284 cases could impact significantly the ultimate size of TJM2.

Numbers of Terminal Taxa vs. Numbers of Names

It is important to realize that the number of terminal taxa in a flora (the number of different kinds of plants, as discussed above) is not equal to the number of names representing the different kinds of plants in that flora (e.g., three terminal taxa but four names are represented by a species with three infraspecific taxa) and that confusing the two can lead to gross miscalculations in attempts to quantify changes in biodiversity and the sizes of books.

For example, the numbers of names (not terminal taxa) in each of the Current Status Categories as indicated in ICPN on the Jepson Online Interchange (http://ucjeps.berkeley.edu/interchange/I_indexes.html) are indicated in Table 3.

Table 3. Numbers of Names in Current Status Categories in ICPN. JFP stands for Jepson Flora Project, and is a prefix we have given to our Current Status Categories in order to distinguish them from such labels assigned by CNPS and others. Names for which the Current Status is indicated to be tentative are those that possibly or probably will be assigned to that Current Status Category, pending a final decision by the author or authors of the group involved or by one or more of the Editors of the Jepson Flora Project.

JFP-1 (native): 7188
JFP-1 tentative: 185
JFP-2 (naturalized) 1222
JFP-2 tentative: 153

Comparing the number of terminal taxa in TJM (7266, from Table 1) to the number of names already confirmed for TJM2 (7188 + 1222 = 8410, from Table 3), would suggest incorrectly that in this way alone TJM2 would be about 15.7% (rather than 2.4%, as calculated above) larger than TJM, or that there would be 1141 (rather than 174, as indicated above) more taxa treated in TJM2.

The numbers of names expected for TJM2 is of interest because it is a better indicator of book size than is the number of terminal taxa. For a species with three subspecies, four paragraphs will be included (one for the species, and one each for the three subspecies), but only three terminal taxa will be represented.

Authors of Plant Names

It is standard practice in the literature of botany (e.g., monographs, checklists, floras) to indicate, after the scientific name of a plant, the person or persons who first described the corresponding taxon and gave it that name. This is done primarily to leave no doubt as to the name involved, because in some cases different plants have been

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given the same name by different authors (in which case only one, usually the earliest, is valid). Citation of the author of the plant name also provides a lead into the literature where the plant in question was first described and named.

In the process of compiling and maintaining ICPN, it was determined that there were about 810 plant names for which some credible discrepancy existed in the literature of botany with respect to the correct citation of the author or authors of those plant names. Resolving such discrepancies often involves considerable time as well as expertise (including an extensive, working knowledge of the necessarily detailed and complex International Code of Botanical Nomenclature), so it is not surprising that the number was so high (cf., the numbers of terminal taxa and names discussed in this paper). Jeff Greenhouse, and to lesser extents other members of the Jepson Flora Project staff and others, have resolved about 204 of these discrepancies, thereby stabilizing these data for the first time in history, not only for Californians, but for anyone working with plants that occur in California. More of these discrepancies will be resolved within the Jepson Flora Project as work on TJM2 continues.

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.

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

2005-2006 Volunteer Saturdays
Oct 8, Nov 5, Dec 10, Jan 7,
Feb 11, March 11, Apr 8, May 13

The Jepson Herbarium Projects & Resources

The Jepson Flora Project
Second Edition of *The Jepson Manual*
Online Interchange for Advances in California Florisitcs
Jepson Desert Manual
Online Horticultural Database
Electronic Publication of Jepson's *A Flora of California*

Publications & Research Projects
Constancea: University of California electronic publications in botany
Tarweeds & Silverswords: Evolution of the Madiinae
DeCew's Guide to the Seaweeds
Flora of Mount Diablo
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
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Assistant Museum Scientist: Kim Kersh
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Staci Markos
Cynthia Perrine

California Native Plant Society

SEEKING AN EXECUTIVE DIRECTOR

Job Summary
CNPS is seeking an Executive Director who will be a strong and articulate leader for one of California's most effective conservation groups. The Executive Director will expand CNPS's fund-raising programs, develop programs that advance its mission, and implement the Society's strategic plan. The Executive Director will work closely with the Chapter Council leadership and the Society's Board of Directors. The Executive Director will develop and implement communications strategies to promote greater public awareness and understanding of the Society and its mission. Salary and benefits are competitive, commensurate with experience.

Deadline for Applications: October 31, 2005.
More information at www.cnps.org.

CNPS 40th ANNIVERSARY PARTY

The East Bay Chapter of CNPS is organizing an evening party celebrating the 40th anniversary of CNPS. The party coincides with the CNPS Chapter Council meetings in Berkeley on December 3. All members are invited to come to this very special celebration. There will be a silent auction along with food and drink, a jazz duo, and a live auction later in the evening.

Date: Friday, December 2, 2005

Time: 7:30 pm to 10:30 pm

Place: Brazilian Room, Tilden Regional Park, Berkeley, East Bay Regional Parks District

Please RSVP!!!!
to deliataylor@mac.com or
510 527 3912.
for more information
or to help, contact Delia

October 13
Native California bees and their native California host plants in urban environments
Gordon W. Frankie
Professor, Department of Environmental Science, Policy and Management, UC Berkeley
http://espm.berkeley.edu/directory/fac/frankie_g.html

November 10
The dangerous liaisons: an overview of how man can unwittingly introduce microbes capable of forever changing our natural ecosystems
Matteo Garbelotto
Adjunct Assistant Professor, Department of Environmental Science, Policy and Management, UC Berkeley
http://espm.berkeley.edu/directory/fac/garbelotto_m.html

Lectures are open to all and begin at 7:30 p.m., 2040 Valley Life Sciences Building
UC Berkeley

Refreshments will be served 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 support the Second Edition of *The Jepson Manual* with my gift of _____.

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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)

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$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.

Friends of the Jepson Herbarium
The Jepson Globe, Vol. 16 No. 2
1001 Valley Life Sciences Building #2465
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Berkeley, CA 94720-2465

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A preview of the 2005 - 2006 Weekend Workshop Series:

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Bryaceae
Mycorrhizae
Poaceae
Mojave Flora
Pollination Ecology
Vegetation Classification and Mapping (Point Reyes)
Flora of San Miguel Island
Field Photography
New Zealand Flora, Especially Ferns
Frontier Naturalists Afield
Tree of Life Series II: Species Concepts, Tree Thinking for Educators,
Molecular Phylogenetics Techniques, Hominid Evolution

The full program and registration information will be available in October.

For more information, please contact Cynthia Perrine at the Jepson Herbarium; phone: (510) 643-7008, email: cperrine@berkeley.edu. Please visit our Web site at: http://ucjeps.berkeley.edu/jepwkshp.html