



THE JEPSON GLOBE

A Newsletter from the *Friends of The Jepson Herbarium*

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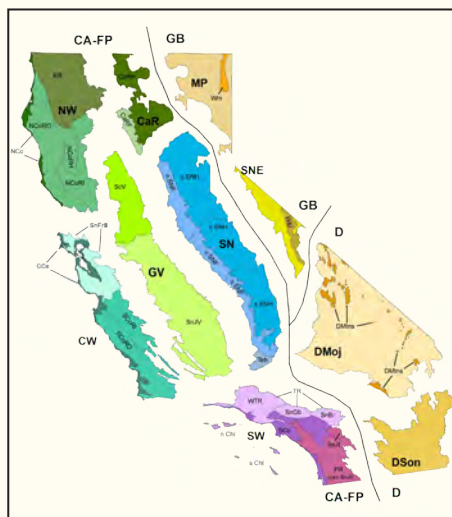
Curator's Column: Museomics Reveals Secrets of the Dead

By Bruce G. Baldwin

Over the last decade, herbaria have received well-deserved publicity as treasure troves of undiscovered biodiversity, with the recognition that most “new” species named in the last half-century have long resided in collections prior to their detection and original description. The prospect also has emerged for unlocking the secrets of plants and other organisms that no longer share our planet as living organisms and, sadly, reside *only* in collections. Technological advances that now allow for DNA sequencing on a genomic scale also are well suited for studying old, highly degraded specimens, as recent reconstruction of the Neanderthal genome has shown.

An example of how next-generation DNA sequencing of herbarium specimens can contribute to studying extinct plants was published in January (Zedane et al. 2016. *Biol. J. Linn. Soc.* 117: 44–57). That study, which I enjoyed participating in, focused on a plant that has the sad distinction of being the only genus to become extinct historically in the California Floristic Province (CA-FP): *Hesperelaea* (Oleaceae). *Hesperelaea* was an endemic tree on Guadalupe Island, at the southwest corner of the CA-FP, ~150 miles west of the Baja California Peninsula. Edward Palmer made the first and only collection of *Hesperelaea* in 1875 and noted that feral goats had killed all but a few individuals of that species, which was

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Map of California, split apart to show the Regions of the Jepson eFlora.

Source: Jepson Flora Project.

Regional dichotomous keys now available for the Jepson eFlora

By David Baxter and Niels Klazenga

The Jepson Flora Project has collaborated with Niels Klazenga, Royal Botanic Gardens Victoria to integrate the Jepson eFlora dichotomous keys into the Atlas of Living Australia's dichotomous key platform KeyBase. Now, eFlora users are able to select the region in which they found a plant, and get a simplified version of the eFlora key for identifying plants in that region. The new interface is now available at ucjeps.berkeley.edu/eflora/filter_keys.html.

California's beta diversity

California is a famous “biodiversity hotspot,” boasting over 6,500 native plant taxa. Biodiversity researchers refer to the total number of species in an area as “alpha diversity.” California

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The Jepson Manual: Vascular Plants of California, Second Edition: Supplement III

By Bruce G. Baldwin

The latest set of revisions to *The Jepson Manual*, second edition (TJM2) and the *Jepson eFlora* was released online in December 2015. The rapid pace of discovery and description of vascular plant taxa that are new-to-science for California and the rarity and endangerment of most of those new taxa have warranted prioritization of revisions that incorporate such diversity — and newly introduced, putatively aggressive invasives — so that detection of such plants in the field and in collections is not impeded. The continuing taxonomic reorganization of genera and, to some extent, families in order to reflect improved understanding of relationships more precisely is also important to capture in the *Jepson eFlora* and TJM2 Supplements. In situations when limited time and resources require a choice between pursuing such revisions versus those that involve incorporation in floristic resources of new minimum-rank rarities or invasives, then priority must go to the latter, in the interests of

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ALSO IN THIS ISSUE

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- Unexpected Fossil Flora
- New Faces in the Herbaria
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- Summary of Changes in Revision 3

Unveiling John Muir's Herbarium (JOMU)

By Andrew S. Doran, Assistant Director for Collections

John Muir was one of America's most famous environmentalists/conservationists, and herbaria in the United States have scatterings of his botanical specimens (73 specimens are cataloged in the Consortium of California Herbaria). Muir's specimens were highlighted in the 2008 publication *Nature's Beloved Son, John Muir's Botanical Legacy* by Bonnie Geisel, but few people are aware that the bulk of his specimens and his personal herbarium (over 1,000 specimens) are part of the museum collection of the John Muir National Historic Site, a unit of the National Park Service located in Martinez, California. Although he traveled widely, it is fitting that his specimens are now preserved and cared for as part Muir's house where he raised a family with his wife Louie Strentzel and lived the last 24 years of his life. Muir's granddaugh-

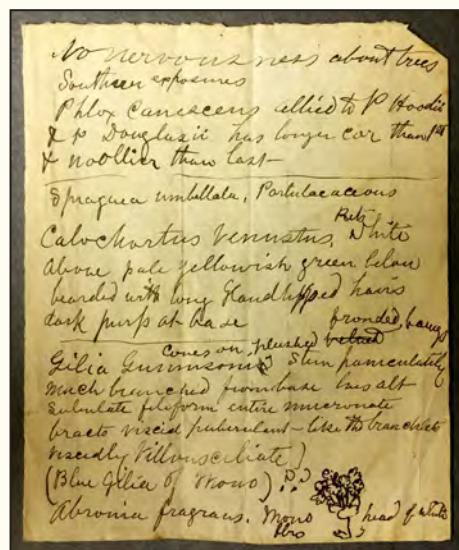


Fig 1. Some notes from the Muir herbarium include his descriptions of the plants he collected, which ultimately will be tied to his specimens. Data about the specimens is dispersed across numerous institutions that received his archives over the years as the house had passed out of family ownership by 1921 and was in private hands until the 1960s. Since then, ancestors have donated furniture, archives, and notes. Courtesy of the National Park Service, John Muir National Historic Site, JOMU 3561, B-2.

ter, Jean Hanna Clark, inherited Muir's historic herbarium collection, bundled with Muir's plant press. The specimens were first lent to the National Park Service by Mrs. Clark in the late 1960s and later donated to the park, along with the plant press, by her children in the 1980s.

It is clear from his numerous books that although his focus was conservation in a broad sense, his love and knowledge of plants was something he took most to heart. His notes and descriptions of them show that botany was one discipline he took very seriously (see Fig. 1) and he referred to himself as a botanist on several occasions.

In a new project, the University and Jepson Herbaria are working in partnership with the John Muir National Historic Site through a Cooperative Ecosystem Study Unit (CESU) agreement funded by the National Park Service to document and conserve Muir's historic herbarium using professional archival preservation and digitization techniques developed and employed on our own collections for many years, including connecting his specimens with his journals, notes, and archives.

Since the late 1970s, various preservation methods were used to curate his specimens and botanical notes but they did not conform to modern archival techniques and the specimens are in need of further conservation, curation, and digitization to make them more widely available.

Additionally, recataloging is also necessary to achieve better physical and intellectual curation of individual specimens because the collection was originally lump cataloged from two main expeditions: Muir's travels to Canada and Indiana (1864–1867) and his world tour to Australia, New Zealand, China, Japan, Hawaii, the western United States, Florida, Scotland, and South America (1903–1904).

To begin the project, the collection has been assigned the standardized Index Herbariorum designation 'JOMU.' Next, the specimens will be curated

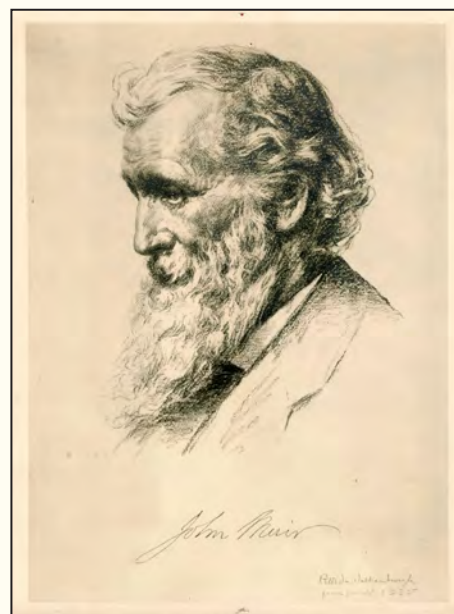


Fig 2. John Muir illustration by Peter Van Valkenburgh, who also sketched other notable naturalists in the early 20th century, including Willis Linn Jepson. Muir's specimens have been used in a variety of projects. For example, the Curator of the Jepson Herbarium, Bruce Baldwin, recently needed to sample tissue from a Muir specimen for genetic analysis, the type of one of the plant species named for Muir, *Carlquistia muirii* (Muir's tarplant), to determine whether that reportedly Yosemite specimen is referable to any of the geographically distinct, evolutionary lineages resolved within that species, which is otherwise unknown north of the Kings River drainage in the Sierra Nevada.

and mounted on archival paper. The second phase will be to print barcodes (JOMU catalog numbers) that will be linked to the original National Park 'Group' catalog numbers and data that are known about the specimen, including locality, date, and taxon name. The third phase will be to produce high resolution images of the specimens with their newly printed labels. These images will be linked to the catalog records and put online and made searchable, thus making this overlooked herbarium of the famous naturalist available for the first time.

The fourth phase will be identifying related specimen data in Muir's journals. Since 1970, the Holt-Atherton

(Continued on page 3)

(JOMU, continued from page 2)


Special Collections at the University of the Pacific (UOP) has been the repository for the John Muir Papers and over a dozen Muir related collections, including Muir's journals from 1867–1913. The UOP collection will be critical in helping to piece together specimen data. Additional information will come from archives at other institutions, including Harvard, where botanist Asa Gray received some of Muir's specimens. 



Fig 3. John Muir's house in Martinez, CA. Muir (pictured with his family) married Louie Strenzel in 1880, moved into the house in 1890 and lived there until his death in 1914 with already established specimens of *Washingtonia filifera* at the front entrance. Image courtesy of the National Park Service, John Muir National Historic Site, JOMU 1732.



Fig 4. The Muir house in 2015 with the same, more mature palms. The house is open to the public 7 days a week from 10 AM to 5 PM. Hopefully, in the future, there will be an exhibit on Muir's botanical expeditions. The property also has a number of historic structures including the Martinez Adobe, built in 1849 by the family for whom the town of Martinez was named. Photo by Andrew Doran.

(Curator's column, continued from page 1)


named for him, *H. palmeri*. Removal of the goats about 10 years ago led to resurgence of the vegetation, rediscovery of plants long thought to be extinct or extirpated, and even discovery of putatively native species not previously documented there. Prospects for rediscovering *Hesperelaea* appear bleak, however, based on its conspicuous habit and long apparent absence.

Relationships of *Hesperelaea* were an unsolved mystery prior to the study by Zedane et al. The morphology of *Hesperelaea* is somewhat anomalous in the olive family, with truly free rather than fused petals, for example. A short DNA sequence obtained in an earlier investigation by others succeeded in placing the genus in the subtribe Oleinae but the vast diversity of that subtribe and lack of resolution within it precluded evolutionary or biogeographic understanding about the origin of *Hesperelaea*.

Results of the museomics study

revealed that *Hesperelaea* was most closely related to an endemic Ecuadorian genus, *Priogymnanthus*, with two species, and a genus familiar to many California botanists, *Forestiera*, which includes our desert olive, *F. pubescens*. Although desert olive occurs in the CA-FP, it is evidently no more closely related to *Hesperelaea* than other species of *Forestiera*, which occurs widely from the neotropics to temperate North America. In other words, divergence of *Hesperelaea* from its closest living relatives appears to have preceded diversification of *Forestiera*. Rigorous estimation of the timing of that (Early Miocene) divergence event based on the molecular phylogeny indicated that the *Hesperelaea* lineage is much older than the oldest age estimates for Guadalupe Island (7 ± 2 million years), from potassium-argon dating. Based on those findings, *Hesperelaea* certainly warrants continued treatment as a monotypic genus and appears to be a

bona fide paleo-endemic of Guadalupe Island. In the absence of known fossils, the ancestral distribution of the *Hesperelaea* lineage remains unknown, but it probably occurred on the North American mainland prior to dispersal to Guadalupe Island and subsequently went extinct everywhere except on the island, where it evidently thrived until goats were released there in the 1800s.

We now understand that the Guadalupe Island vascular flora, with >20% endemism, not only includes an unusual example of adaptive radiation in the California Islands, in *Deinandra* (Compositae), but also contained a relict genus on par with the island ironwood, *Lyonothamnus*, of the Channel Islands. By deepening our understanding of the natural history of Guadalupe Island, this new knowledge about one of its extinct botanical gems reinforces the importance of efforts to save what is left of its unique biota. 

(KeyBase, continued from page 1)

plants have high alpha diversity but also have high “beta diversity” meaning that, within California, the plant diversity varies a lot from place to place. The flora of the Sierra Nevada is very different from the flora of the San Francisco Bay Area, which is again different from the flora of the Sonoran Desert, and so on.

The *Jepson eFlora* divides California into 35 ecologically distinct “bioregions” for the purpose of indicating where plant taxa grow (cover image). For each terminal taxon, the *eFlora* lists the bioregions in which the plant grows. For example, *Arctostaphylos montaraensis* (Montara manzanita) only grows in the Central Coast (CCo) and San Francisco Bay Area (SnFrB) subregions. With all taxa taken into account, each region has its own unique subset of the state’s flora.

KeyBase

Normally, to identify a plant found in the San Francisco Bay Area, one would have to use the full dichotomous key of the *eFlora*. That is a key to almost 8,000 terminal taxa, when only 2,111 of those plant taxa are known to grow in SnFrB. Thus, many of the key leads are irrelevant to plants from that location.

By compiling all the bioregional distribution information from the *eFlo-*

ra into regional checklists, KeyBase takes advantage of California’s beta diversity by filtering the dichotomous keys based on the checklist. Thus, by selecting the “SnFrB” option on KeyBase, you’ve turned a key to almost 8,000 taxa into a much simpler “Plants of the San Francisco Bay Area” key to only 2,111 taxa.


To continue with the *Arctostaphylos* example, let’s say someone finds an *A. montaraensis* in SnFrB but does not know what kind of *Arctostaphylos* it is. The full key to *Arctostaphylos* in the *eFlora* contains 95 taxa, but the filtered SnFrB key only contains 22 taxa and is much easier to manage. In the end, whether you already know the genus of the plant in question or have no idea what it is and need to start from the top, as long as you know what region the plant came from you can use KeyBase to narrow the choices.

Opportunities for improvement

The taxon ranges described in the *Jepson eFlora* are asserted by the taxonomic expert who is the author of those taxon treatments. As we have discovered from comparing maps of plant specimen records from the Consortium of California Herbaria to *eFlora* authored ranges in the **Yellow Flag project** (see Volume 23, No. 2 for more information), there are still many plant populations that occur outside the ranges stated in the *eFlora*. This limitation to the *eFlora* regional keys is also a great opportunity. Since the publication of *The Jepson Manual*, second edition, in 2012, the Jepson Flora Project team has updated hundreds of range statements in the *Jepson eFlora* as part of the Yellow Flag project, based mainly on input from the *eFlora* user community. If you believe you’ve found a plant in a region not represented in the *eFlora* or in KeyBase, please contact Staci Markos (smarkos@berkeley.edu). 

(Supplement Revision, continued from page 1)

native plant and ecosystem preservation. Such considerations are reflected in the groups chosen for revision in the latest set. We thank our loyal TJM2 and *eFlora* authors for their help in ensuring that those revisions are now freely available online.

See page 11 for a summary of changes made in Revision 3 of the *Jepson eFlora*. 



Eriastrum ertterae known only from the Lime Ridge area, east of the San Francisco Bay. Described in 2013 by David Gowen, a volunteer at the University and Jepson Herbaria, and named for Dr. Barbara Ertter, Curator of Western North American Flora.



Arctostaphylos montaraensis, a manzanita endemic to two mountains on the central coast of California. Photo by Neal Kramer.

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An Unexpected Fossil Flora

*By Barbara Ertter, Curator of
Western North American Flora*

While exploring off the beaten path in Ponderosa State Park, McCall, in one of the most popular summer recreation areas in Idaho, I had a big surprise when I stopped to answer my phone. Glancing down, I realized I was standing on top of a previously unknown Miocene fossil flora, estimated at 16 million years old. The broad-leaf fossil plants were clearly different from the conifer forest that currently dominated the area, consisting of pines, Douglas-fir, true firs, larch, and spruce.

My next step was to contact Diane Erwin, paleobotanist at the University and Jepson Herbaria's counterpart fossil collection, the UC Museum of Paleontology (UCMP). Diane referred me to Patrick Fields as the current expert on Miocene floras of southwestern Idaho and adjacent Oregon. Patrick had done his master's work at UCMP before going on for a PhD at Michigan State University, followed by a career at Olivet College. Fortuitously, both Patrick and I held research associate appointments at the Orma J. Smith Natural History Museum of The College of Idaho (my alma mater), where Patrick generally spent a month each summer to continue his work on local fossil floras.

The following summer, Patrick gave me and several other colleagues a crash course in fossil collecting at the site. The team also met with the supervisor and staff of Ponderosa State Park, who were understandably excited about

the find and thrilled with the proposal to develop interpretative displays and programs capitalizing on the fossil flora and the window it provides to the distant past. The *McCall Star-News* newspaper even ran a front-page article on the discovery, carefully keeping the exact locality obscure at the request of both scientists and park staff.

Most of the fossils accumulated over the subsequent two field seasons have yet to be identified. Those fossils that have been identified indicate that a flora very different from the current mixed conifer forest existed 16 million years ago. Most are genera that would be well-known to anyone familiar with deciduous forests in eastern North America: elm, oak, hickory, sycamore, and maple, among others. Modern-day counterparts of others are now restricted to other parts of the world, notably sequoia (California), ginkgo (China), and katsura (Japan). All of these genera were once much more widespread throughout the northern hemisphere, before present-day mountain ranges rose and disrupted rain patterns.

Although Miocene floras containing these and other genera are well-represented throughout western North America, as affirmed by the extensive holdings of UCMP, the geology of the McCall area made it a very unlikely fossil locality. Neither the dominant granite of the Idaho Batholith nor the occasional outcrops of Columbia River Basalts are fossil-bearing, and Pleistocene glaciers would have churned up any exposed sedimentary deposits from earlier epochs. The fossil-bearing site that I stumbled across was evidently a rare exception, where a sediment-rich drainage had been sandwiched between the granite bedrock and volcanic effluvia.

Volcanic activity may have even helped create the fossil-bearing strata, by damming streams and covering



Hickory and other leaves on particularly rich fossil-bearing slab. Photo by Barbara Ertter.

fallen leaves with layers of ash and debris. Some strata at the fossil site are full of charred wood, possible testimony to fires triggered by the same volcanic eruptions. Lava flows then covered the area in several hundred feet of basalt, entombing the site and protecting the fossil-bearing sediments. Millions of years later, Pleistocene glaciers carved the edges of the basalt deposits, exposing the sediments and the record of a very different forest.

Fossils from the site, dubbed the Ponderosa Flora by Patrick Fields, are being curated at the Orma J. Smith Museum of Natural History at The College of Idaho, Caldwell; a set of specimens will eventually also find a home at Berkeley, in the Museum of Paleontology. 🗺️



Large sycamore leaf and redwood foliage. Photo by Barbara Ertter.



View east across Payette Lake to Ponderosa State Park on basalt-tipped peninsula. Photo by Barbara Ertter.



The Herbaria Welcome New Faces!

DR. CATHY RUSHWORTH joined the University and Jepson Herbaria as the Louise Kellogg Postdoctoral Fellow this past September, after completing her PhD at Duke University with Tom Mitchell-Olds. A native of the Washington D.C. area, Cathy first discovered a love of biology around the age of six, when she was alternately amazed by the toxicity of begonias and distressed by the particular cultivation requirements of lycopods.

After an undergraduate degree in communications at Emerson College, Cathy started working as a gardener and landscaper in New York City. This experience rejuvenated her childhood appreciation of plant variation and led to a research position in the Molecular Systematics Lab at Brooklyn Botanic Garden. She then moved to Cambridge where she accepted a lab manager posi-

tion at Harvard University. Following these ~5 years of work experience, Cathy joined the Mitchell-Olds lab at Duke, where her dissertation focused on the maintenance of sexual and asexual reproduction in natural populations of the mustard *Boechera retrofracta*. Cathy is truly excited about the evolutionary consequences of reproductive variation at both the genomic and ecological scale.

While at Berkeley, Cathy hopes to obtain bioinformatics skills and learn more about insects and pathogens. She will be working with Noah Whiteman, an associate professor in the department of Integrative Biology, to examine the relationship between asexual reproduction and herbivory using a combination of next generation sequencing, classical genetics techniques, and both field and greenhouse experiments.


FORREST FREUND is a PhD student in the Rothfels lab who specializes in the systematics and phylogenetics of seed-free vascular plants, specifically *Isoetes* of the Lycophytes. Forrest is a native Californian, having been born in Sonoma County. At age seven, he moved to West Marin, where he became fascinated with the diversity of plant life and developed an intense desire to explore and understand nature.

Intensely drawn to, in his own words, the “weird, obscure, or underappreciated” aspects of botany, Forrest initially had intended to focus his research interests on insectivory in plants. However, while getting his undergraduate degree at Humboldt State and working at the teaching greenhouse, he was introduced to the Lycophytes, which immediately drew his interest, prompting him to change his focus to *Isoetes*.

After completing his BS, Forrest went off to work for the Bureau of Land Management in the Mojave desert for ~2 years before being admitted to the botany program at Claremont Graduate University (CGU), where he continued


his research into *Isoetes*, with a new found focus on systematics, morphometrics, and phylogenetics. Upon completion of his MS, Forrest applied to and was accepted into the Integrative Biology program at UC Berkeley.

While at Berkeley, he hopes to continue what he began at CGU, using both morphometric and molecular phylogenetics to explore the diversity and evolution of *Isoetes* within the Pacific states. Of special interest is the use of Micro Computerized Tomography (micro CT) to look at the anatomy and morphology of *Isoetes* to find novel characters and gain improved understanding of how the plants develop in different environmental conditions. Additionally, he hopes to use population genetics to explore gene flow between disparate populations across the Pacific states.

Outside academia, Forrest enjoys the reading the works of H.P. Lovecraft and his contemporaries, as well as video gaming, drawing, model building, hiking, swimming, and long periods of quiet solitude enjoying the outdoors. 

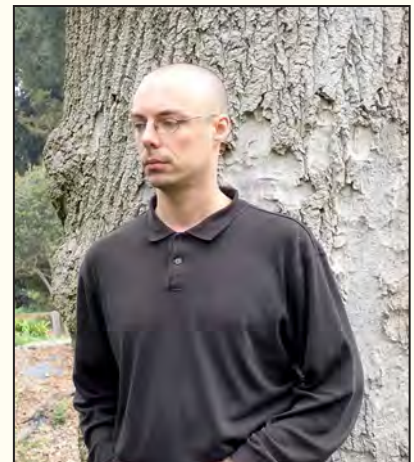


Cathy on Jebel Samhan, Oman, 2012.
Photo by Carl Rothfels.

In her spare time, Cathy enjoys hiking in any and all mountains, camping, traveling, and swimming in inadvisably cold water. 



Above, *Isoetes nuttallii*, from a seep population found on a granite outcrop north of Johnsondale, CA. Photo by Forrest Freund.
Below, Forrest Freund. Photo by Ana Penny.





Two students in the Baldwin lab receive Doctoral Dissertation Improvement Grants from NSF

We congratulate William A. Freyman, a third year graduate student, and Adam Schneider, a fourth year graduate student, on receiving NSF awards to support their dissertation work. These are highly competitive programs. The grants will provide support for both field work and lab work. Descriptions of their work are below.

William A. Freyman

Detecting introgression in the presence of incomplete lineage sorting: Phylogenomics and hybridization in Chylismia (Onagraceae).

Since Charles Darwin, biologists have understood that all organisms are united through a shared evolutionary history; all organisms are twigs on the tree of life. A major goal of evolutionary biology has been to use DNA sequences to reconstruct the evolutionary history of relationships among organisms — to reconstruct the tree of life. However, biologists are increasingly aware that

many species hybridize, resulting not in a bifurcating tree but a “network” of life. My research introduces a new mathematical model to infer hybridization over the tree of life and tests the model with DNA data from a group of highly hybridizing evening primrose plants that grow in the harsh habitats of the Sonoran, Mojave, and Great Basin deserts. The advances this research makes will aid researchers, conservationists, and citizen scientists as they work to conserve lineages across the tree of life that undergo hybridization.




Chylismia claviformis subsp. peirsonii.
Photo by Will Freyman.

Adam Schneider

Systematics, host-specificity, and genome evolution of holoparasitic plants: A case study in Orobanche (Orobanchaceae).

Parasitism is a unique life history strategy that has evolved independently dozens of times in plants, animals, and other organisms. Due to its high biodiversity and a good understanding of its mode of parasitism, the non-photosynthetic parasitic plant genus *Orobanche* provides a remarkable opportunity for understanding the unique macro- and micro-evolutionary consequences of parasitism through a phylogenetic framework. Adam’s recent work has identified both evolutionary and genetic consequences of parasitism, includ-

ing numerous host-specific lineages as well as host-to-parasite horizontal gene transfer. This research will use genomic-scale sequencing of new-world *Orobanche* and field studies across North America to develop the following: (1) a fine-scale understanding of tempo and mode of genome evolution in parasitic plants, (2) a better understanding of host-breadth, and (3) abiotic and biotic habitat characteristics of each lineage, with a taxonomic revision to follow. In addition to advancing the fields of evolutionary biology and ecology, an improved understanding of host specificity and parasite genomics may be of use in combating several invasive species of *Orobanche* that cause severe agricultural damage to tomato,

sunflower, and other crops in Europe, Asia, and the Americas. 




Orobanche fasciculata parasitizing *Erigeron*. Photo by Adam Schneider.



The University and Jepson Her-

baria were proud to host an NSF sponsored workshop for iDigBio (Integrated Digitized Biocollections) titled *Developing Standards for Scoring Phenology from Herbarium Specimens*. The workshop was organized as a collaboration between UCB and Jenn Yost (Cal Poly,

SLO), Susan Mazer (UCSB), and the iDigBio team of Gil Nelson (Florida State University), Pam Soltis (University of Florida), and Jill Goodwin (Florida Museum of Natural History). Over 40 participants spent March 12–13, 2016, developing data standards for scoring phenology from herbarium specimens. Hopefully, the resulting draft recommendations will be adopted

into the Darwin Core and Apple Core data standards and recommendations. These standards are necessary for phenological data to be comparable across institutions and will help to maximize the full research potential of specimens. Attendees included those working in collections, field-based phenology monitoring programs, phenology research, and data standards development. 

New Edition of the Monterey County Flora

By Michael Mitchell

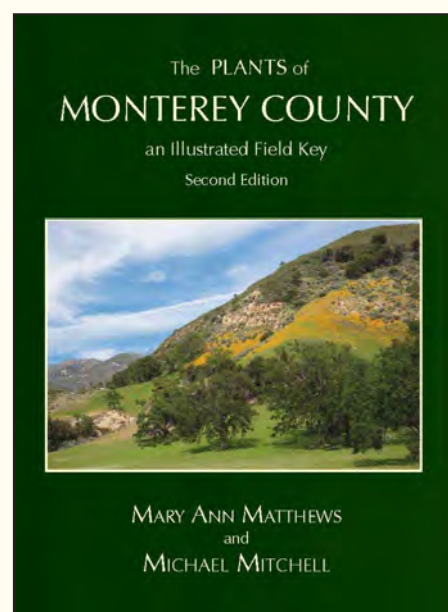
Monterey County is home to over 2,300 different vascular plants; a reflection of its extraordinarily varied geography, geology and climate. A field-portable key to this flora was first published in 1996 as *An Illustrated Field Key to the Flowering Plants of Monterey County and Ferns, Fern Allies, and Conifers*, by Mary Ann Matthews. The book was structured as a botanical key so as to be of more practical use than a simple plant list and it was also seen as a way of making more widely available many of the fine drawings from Abrams' *Illustrated Flora of the Pacific States*.

A new edition has recently been prepared under the more manageable title, "*The Plants of Monterey County – an Illustrated Field Key*" by Mary Ann Matthews and Michael Mitchell, and

published by the Monterey Bay Chapter of the California Native Plant Society.

The discovery of hundreds of new (to Monterey County) taxa coupled with the many taxonomic changes reflected in the second edition of *The Jepson Manual* (2012) made a thorough revision necessary. The revision was undertaken by Michael Mitchell, a member of the Board of the Monterey Bay Chapter of CNPS, with the enthusiastic support of Mary Ann Matthews and members of the Chapter.

Since 1993, *The Jepson Manual* has become an increasingly indispensable resource for anyone interested in the flora of California. In revising the Monterey County Flora, an effort was made to ensure that the keys and the information were aligned more closely with *The Jepson Manual*. The Jepson Online Interchange was an essential resource in this process. The Jepson Herbarium also played an important



role in allowing a large number of drawings from *The Jepson Manual* to be reproduced in the Monterey County Flora. Members of the Herbarium staff as well as contributors to *The Jepson Manual* gave generously of their time in dealing with technical issues. 🌿



From the Archives

What would you do if you found out a genus had been named after you?

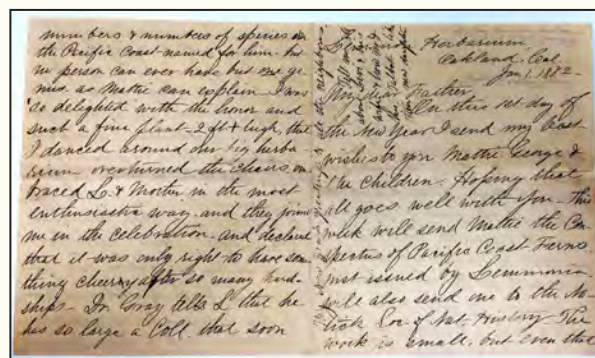
By Amy Kasameyer, Archivist

Sara Plummer Lemmon danced around the Lemmon Herbarium, overturning chairs! Sara Plummer Lemmon, co-founder of the Lemmon Herbarium with her husband John Gill Lemmon, was an early California botanist and botanical artist who spearheaded the campaign to make the California poppy the state flower. Below she tells the story in a letter sent to her father on January 1, 1882, after she heard Asa Gray had named *Plummera floribunda* in her honor.

In 1882 the Lemmon Herbarium was located at Blake House, in downtown Oakland. The Lemmons, along with John Gill Lemmon's mother Amila, also lived at Blake House. This letter was found by Wynne Brown, who has been researching Sara Plummer Lemmon in our archives. Thanks Wynne! 🌿

Image courtesy of the Archives of the University and Jepson Herbaria.

"We are busy in our small way over the botany. We find many honors and new discoveries as the result of our explorations in Arizona last year. Dr. Gray has recently returned from abroad and now takes up the work of botany with renewed vigor. In looking over our collection of Compositae we sent to him, as he is the only authority in America in that order, he writes before finishing the package, "Dear Lemmon, I know that you will be rejoiced to learn that I see among the exceptionally fine collection, a new genus that I take pleasure in naming for one of its discoverers – Plummera floribunda." This is the highest honor that can be given in botanic nomenclature as it is the type to a new genus. Then he named a beautiful Stevia, Stevia plummera, so you see, father, how your name is perpetuated and honored. I has a genus too, Lemmonia California, and a Stevia Lemmoni, numbers and numbers of species on the Pacific Coast named for him but no person can ever have but one genus, as Mattie can explain. I was so delighted with the honor – and such a fine plant – 2 feet+ high,



that I danced around our big herbarium overturned the chairs, embraced L & Mother in the most enthusiastic way, and they joined me in the celebration, and declared that it was only right to have something cheery after so many hardships."

Transcription courtesy of Wynne Brown.

Updating the Vascular Plant Checklist of the Crooked Creek Station, UC White Mountain Research Center


By Dylan Neubauer

For the past five summers, I have been “botanist-in-residence” at the UC White Mountain Research Center Crooked Creek Station at 10,150 ft. in the White Mountains of eastern California. Best known for the Great Basin bristlecone pine (*Pinus longaeva*), the White Mountains have long been a botanical destination, and many fine botanists—including W. H. Shockley, W. L. Jepson, Victor Duran, Mary DeDecker, D. W. Taylor, J. D. Morefield, and others—have made substantial collections there.

Mary DeDecker’s 1990s-era vascular plant checklist for the area around the station had fallen out of date. So, last summer, with permission from the Inyo N.F., I embarked on a project to press, mount, and database specimens of all taxa within a two-mile radius of

the buildings (ca. 250, equaling ca. ¼ of the White Mountains flora).

Despite the dry winter, late precipitation enabled me to collect the majority of taxa on my list, and I was able to add several new ones. In addition, I documented new populations for rare taxa including *Botrychium ascendens*, *Boechera pendulina*, *Transberingia bursifolia* subsp. *virgata*, *Potentilla concinna* var. *proxima*, and *Carex idahoensis*. A number of elevational shifts upward were also recorded.

Approximately 700 mounted sheets will be used as vouchers for an illustrated annotated checklist. A set is housed at the Jepson Herbarium, and high-resolution images of the sheets can be viewed on the UC/JEPS specimen portal. 



Astragalus oöphorus var. *oöphorus*.
Photo by Dylan Neubauer.



Townsendia leptotes. Photo by Dylan Neubauer.



UC White Mountain Research Center Crooked Creek Station. Photo by Dylan Neubauer.

JEPSON HERBARIUM RESOURCES & PROJECTS RELATED TO THE CALIFORNIA FLORA

Approximately 400,000 plant specimens from California

Director: Brent D. Mishler
California Phylodiversity Project
Systematics and ecology of *Syntrichia*

Jepson Curator: Bruce G. Baldwin
Jepson eFlora, Convening Editor
Systematics and evolution of Calif. tarweeds and relatives (tribe Madieae, Compositae), *Chaenactis* (Chaenactidiaceae, Compositae), and *Collinsia* (Plantaginaceae).

Curator of Ecology: David Ackerly
Ecology and evolution of California flora
Climate change impacts and conservation strategies

Curator of Ferns and Lycophytes: Carl Rothfels

Divergence and hybridization in Californian ferns and lycophytes (especially *Notholaena*, *Cystopteris*, *Isoetes*).

Curator of Monocots: Chelsea D. Specht
Evolution and biogeography of California monocots (including *Allium*, *Nolina*)
Population structure and floral color pattern diversity in the *Calochortus venustus* complex

Curator of W. N. Am. Botany: Barbara Ertter, *Flora of Mount Diablo* and flora of the East Bay
North American Potentilleae

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Constancea: UC Publications in Botany (online)

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The Jepson Herbarium is pleased to offer thanks to those who chose to honor or remember others
 with gifts to the herbarium, and those who gave funds for special projects.

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 David Lennette, special gift for digitizing bryophytes and lichens of Costa Rica
 Scott Koniecko, President of the Beatrix Farrand Society, special gift for digitizing Beatrix Farrand's herbarium from Bar Harbor, Maine.

Summary of changes made in Revision 3 of the *Jepson eFlora*, December 2015

CYPERACEAE

Carex cyrtostachya newly described, added, as native
Carex orestera newly described, added, as native,
replacing *Carex albonigra*
Carex xerophila newly described, added, as native

JUNCACEAE

Juncus bulbosus added, as naturalized
Juncus dichotomus added, as naturalized
Juncus elliottii added, as naturalized
Juncus trilocularis newly described, added, as native,
replacing *Juncus brachyphyllus*

POLEMONIACEAE

Eriastrum ertterae newly described, added, as native
Eriastrum rosamondense newly described, added, as native
Linanthus bernardinus newly described, added, as native



Linanthus bernardinus.
Photo by Duncan S. Bell.

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Wetland Delineation

April 30-May 1:

Introduction to Plant Morphology

July 28-31:

Remote Flora of the White Mountains

August 27:

San Francisco Bay Wetland Restoration

October 14-16:

Macrolichens around San Francisco Bay

Advanced Registration is required for all workshops.

Please call the Herbarium at (510) 643-7008 if you have additional questions.

Photo by Jack Owicki, TinyURL.com/OwickiPhotos