



THE JEPSON GLOBE

A Newsletter from the *Friends of The Jepson Herbarium*

VOLUME 22 NUMBER 1, Spring 2012

Director's Column:

New Methods for Biodiversity Assessment: A Sabbatical Report

By Brent D. Mishler

Understanding the spatial patterns of biodiversity is critical for conservation planning, given the need to prioritize efforts in the face of rapid habitat loss and human-induced climate change. Fortunately, new methods for large-scale analyses within a phylogenetic framework have been developed for application to questions of diversity and endemism.

I spent Fall semester (June to December, 2011) on sabbatical in Canberra, Australia, at the Centre for Australian National Biodiversity Research (<http://www.anbg.gov.au/cpbr/index.html>). My research goal was to help develop new phylogenetic methods to measure biodiversity on a landscape scale. I needed to do this work there, because at the moment the data necessary for this sort of research is only available in Australia, due to their completely digitized herbaria records (Australia's Virtual Herbarium (AVH); <http://www.chah.gov.au/avh>) and readily available online taxonomic and GIS resources. Prospects for applying these methods in North America are bright, given current herbaria digitization efforts in California (Consortium of California Herbaria; <http://ucjeps.berkeley.edu/consortium/about.html>) and across the US (iDigBio; <https://www.idigbio.org>).

I was hosted by Dr. Joe Miller and worked with him and his team of experts in phylogenetics, bryophytes, GIS, niche modeling, GenBank, DNA sequencing, etc. The primary aim was to investigate

(Continued on page 4.)



Herbaria Archivist Amy Kasameyer (left) and Amy St. John (right), with three of Sara Plummer Lemmon's oil paintings.

Photo by Kelly Agnew

St. John Family Gift to Archives

By Kelly Agnew

The Archives at the University and Jepson Herbaria recently received a significant gift of letters and research materials from Amy St. John, granddaughter of Dr. Harold St. John (1892-1991). Dr. St. John was best known for his South Pacific botanical studies, but he was also related to Sara Plummer Lemmon and her husband, John Gill Lemmon, who were important early California botanists.

The recently donated collection contained some significant objects including Sara Plummer's painting of *Eschscholzia californica* (the painting on the left in the above image), which was part of Sara's efforts to have the California poppy named as the official state flower in 1903. Another notable piece is the painting featured in the

(Continued on page 6.)

Jepson Manual: Announcements

(1) The second edition of *The Jepson Manual* is also available as an ebook. Ideally suited for use in the field, The Digital *Jepson Manual* provides an unparalleled new level of interactivity, portability, and convenience.

- Keys link forward and backward to other taxonomic levels
- Plate references in taxonomic treatments link to plates
- Plate captions link to taxonomic treatments
- Glossary terms link to relevant illustrations
- A list of families links each family to its taxonomic treatment
- The index is fully linked
- More information at: www.ucpress.edu/go/digitaljepson

(2) The Jepson Online Interchange now has several helpful tools to help users relate TJM (1993) to TJM2 (2012). Those include (A) the Dynamic Concordance which allows users to use names from the 1993 *Manual* to search for changes in the Second Edition, (B) a browsable list of names that were included in the 1993 *Manual* but that are not included in the Second Edition (superseded names), and (C) a mechanism to retrieve names (and other data) from the eFlora.

<http://ucjeps.berkeley.edu/interchange/>

(3) Errata are being posted here: http://ucjeps.berkeley.edu/JM12_errata.html.

ALSO IN THIS ISSUE

- Grad Students' Trip to Chile
- CAL Weed Mapper
- JSTOR Web Tools



The story of two California botanists' recent long-distance dispersal to Chile

By Matt Guilliams and Michael Park

We are graduate students in Bruce Baldwin's lab. Our dissertation interests are focused on the evolution of plants in vernal pools. Vernal pools are unique habitats found in temperate regions with Mediterranean climates and are characterized by ponding in the winter and spring followed by complete drying by summer. Some vernal pool taxa in California have close relatives in Chile. Because no relatives are found between these regions, it is suspected that birds have carried seeds across this great span (i.e., disjunct plant distributions and long-distance dispersals). These phenomena may apply to nearly 130 taxa, most of which are not from vernal pools but from adjacent habitats such as grasslands and wildflower fields.

In mid-September of 2011, we left comfortable California for the mysteries of central Chile. We came well prepared for the long flight with literature on the questions of disjunctions in plant distribution between these temperate regions of high species diversity and an early survey of vernal pools in Chile by Shannon Bliss. The ideas therein primed our excitement for this exploratory mission that contributed to an essentially sleepless overnight flight. (Michael: While Matt was not looking, I also flipped through Alvaro Jaramillo's *Birds of Chile*, memorizing the mugshots of suspects possibly involved in these long-distance dispersals.)

On arrival in Santiago, we headed directly for the sites of interest to the north. During the drive towards Los Vilos, we mused that, although the plants were foreign to us, the scenery looked very familiar. The first stop at a reported vernal pool complex near Batuco yielded two species of *Plagiobothrys*. But, like many such sites in California, this one had been ravaged by flattening of topographical features for agricultural "improvement;" we saw neither crops nor livestock. There were hillsides with shrubs that looked sclerophyllous even at 90 kmph. We saw scrub-dominated coastlines and mesas with openings that suggested vernal pools. These landscapes could be mistaken for ones out of California and suggested the striking similarities were from ecological convergence in response to climatic similarities driven by cold oceanic currents off the west coasts of both regions.

At a side trip away from the coast near Mincha, we found dried vernal pools filled with *Psilocarphus* (known by some as the Devil's cottonball). Along the same road at a partially full pool, we saw the first shorebirds of the trip – Baird's Sandpiper (*Calidris bairdii*), which weeks earlier could have staged in California, feeding in preparation for long-distance flight. Small numbers of this sandpiper travel every year



Michael Park looking for shorebirds known to migrate from California. Near the coast by the Mincha River.

Photo by Matt Guilliams

through California, mostly during fall migration. Compared to its close relatives, which winter in near tropical latitudes, the Baird's Sandpiper is longer-winged and migrates into temperate habitats of the Southern Hemisphere. It is rarely seen in Mexico and Central America during migration and may fly directly to Chile and Peru from staging areas in temperate North America.

We spent two days investigating coastal mesas and inland valleys near the wonderful and eclectic city of Valparaíso, a port town easily on-par with San Francisco and other large western North American coastal cities. We were looking for *Eryngium sparganoides*, a taxon that had been collected in Chile at just two or three locations. After the type had been collected in 1831, it was lost until recollected from a valley east of Valparaíso in 1966; it was last collected in 1982 from an adjacent valley. Thus we were not overly optimistic at our prospects. After spending an entire day walking reservoirs and other artificial impoundments in these valleys, where grapes are grown for wine production, we finally succeeded in locating the plant at the last potential locality. We owe this success entirely to Google Earth, which helped us identify suitable habitat from our desks in Berkeley with a high degree of precision.

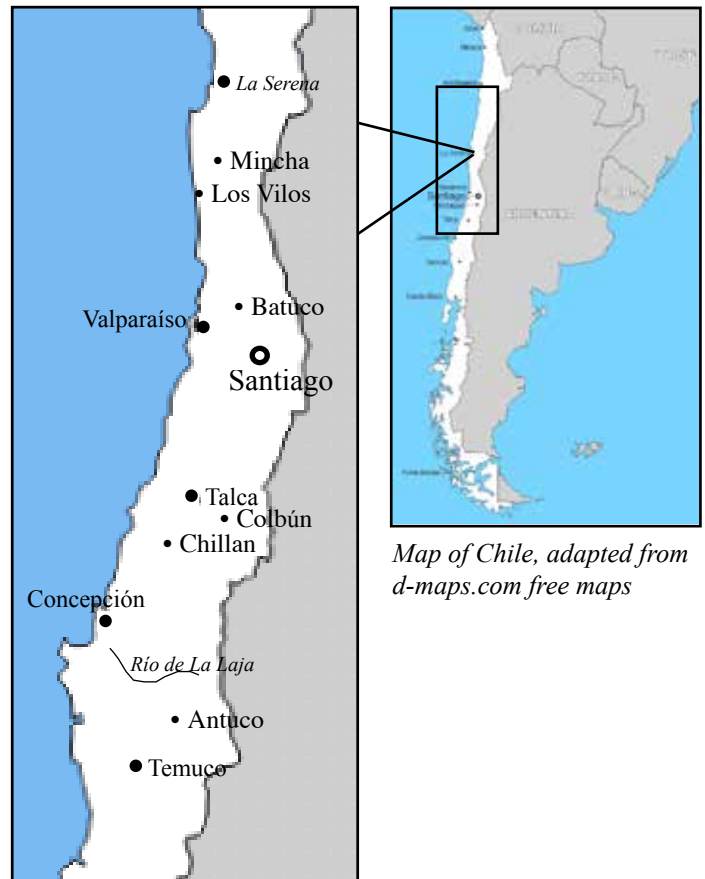
After the Valparaíso region, we aimed our vehicle south toward Talca, a mid-sized town of approximately 200,000 people. Talca is famous as the location where Chilean lib-

(Chile, cont. from page 2)

erator Bernardo O'Higgins signed the document declaring Chile's independence from Spain. As might be expected near an old city (est. 1692), the surrounding region has a long history of agricultural usage, and native, valley-bottom landscapes such as those supporting vernal pools were virtually non-existent. It was here, near the town of Colbún, where we first noticed extensive, apparently new plantations of *Eucalyptus* and *Pinus radiata* where once vernal pool landscapes had existed. Finding only remnant traces of vernal pools, we were forced to ask some residents where we might find other similar habitat. Luckily, one of these young men directed us toward a small complex of previously undocumented river terrace vernal pools. We collected specimens of everything.

We continued south toward Chillán, the birthplace of O'Higgins and itself a relatively old city (est. 1580). After driving through many new forests of *Eucalyptus* and *Pinus radiata* on unsuccessful attempts to locate three historical vernal pool localities, we struck a course due east along the rio Laja to the foothills of the Andes. There, near the resort town of Antuco, we collected in vernal pools occurring in topographic depressions on a relatively young, cemented volcanic mudflow, or lahar. Although not hyper-diverse, hiking among these intact pools in such an unusual landscape was a highlight of the trip.

Having exhausted most of the potential vernal pool localities we had identified remotely, we traveled toward the Universidad de Concepción, where collaborators at Chile's largest herbarium (CONC) were awaiting us. Curator Alicia Marticorena provided a warm welcome and carte blanche access to the herbarium resources. In total, we traveled over 2,000 kilometers, amassing hundreds of specimens of vernal pool plants from throughout the Mediterranean region of Chile. The flora of most of these localities had never been documented, and judging by pace of afforestation in Chile,



Map of Chile, adapted from d-maps.com free maps

many will not survive to be revisited in the future. All specimens were left in Chile, where one set would be deposited in CONC and the other forwarded to us at UC/JEPS.

Our experiences in Chile, though brief and scarcely sampling the geographic and biotic diversity, brought to life those concepts raised by botanists who preceded us there. Some observations led to new insights and possible explanations for old questions. But many questions remain unanswered, and future expeditions are planned. 📍



Matt Guilliams studying vernal pool plants in Valparaiso region (near Casablanca). Photo by Michael Park



Pool in lahar (cemented volcanic mudflows) near Antuco. Photo by Michael Park

Cal Weed Mapper

A new website for mapping invasive plant spread and planning regional management strategies



Data from the Consortium of California Herbaria have been used by the California Invasive Plant Council (Cal-IPC) to develop CalWeedMapper, a new tool for surveillance, eradication, and containment of non-native plants.

At CalWeedMapper, users can generate a report for their region that can be used to prioritize their invasive plant management, to coordinate at the landscape level (county, watershed, state park, etc.) and to justify funding requests. For some species, CalWeedMapper also provides maps of suitable range that show where a plant might be able to grow in the future.

The CalWeedMapper website displays data on all 212 invasive plant species from Cal-IPC's statewide Inventory. These data combine two sources: interviews with invasive plant experts and occurrence information from Calflora and the Consortium of California Herbaria (CCH). The maps show abundance, spread, and management status for each species, displayed by USGS quadrangle.

Users can generate reports in pdf format based on a selected region or



species. The Regional Management Opportunity Report provides a summary table of information for all plants that present opportunities for management in the selected region. The Regional Species Report provides a map that illustrates the plant's spatial distribution in the region.

This dynamic tool allows users to comment on and update abundance, spread, and management information. Also, any new occurrence data submitted to Calflora or specimen data submitted to the CCH will update the data in CalWeedMapper. As a result, the maps will show current information.

To show where a given plant is most likely to spread, CalWeedMapper also displays suitable range based on climate. Computer models were used to generate suitable range for some plant species based on where they currently grow. The maps show the areas that contain suitable range based on climate conditions in 2010 and 2050. These maps can help land managers with climate adaptation planning and preparing for the movement of new invasive plants into their region.

Please visit the site at: calweedmapper.calflora.org.

(Director's Column, cont. from page 1.)

the phylogenetic diversity and endemism of the bryophytes (mosses, liverworts and hornworts). Secondary goals were to do phylogenetic niche modeling of these plants and to test theories of bryophyte community assembly. We accomplished these goals and found that we could also do similar studies easily for some vascular plants that have a good phylogenetic understanding, such as *Acacia*, ferns, and conifers.

We mined GenBank for available DNA sequences of Australian bryophytes, sequenced DNA ourselves for key taxa not already sequenced, then reconstructed a molecular phylogenetic tree. This tree was analyzed in conjunction with the spatial information contained in AVH to identify geographic distributions and ecologically significant traits to address both biogeographic and evolutionary questions.

Biodiversity is usually measured by counting the number of species in a given area; these counts are then compared across a region to identify areas of high diversity and endemism. However, investigation of patterns of species diversity alone misses both the full richness of patterns that can be inferred with the analytical power that comes from a phylogenetic approach. Biodiversity and endemism are not just about species. Instead, the full set of nested clades representing phylogenetic relationships among organisms at all levels makes up biodiversity. Likewise, endemism is not just about species; clades at all levels can be endemic to a greater or lesser extent, and all levels are relevant to discovery and evaluation of centers of endemism. Our team explored the application of newer phylogenetic methods that take into account that part of the overall phylogenetic tree found in a particular area, rather than just counting species at the tips of the tree, namely Phylogenetic Diversity and Phylogenetic Endemism.

Our results make it clear that the centers of neoendemism and paleoendemism can be defined and distinguished when these phylogenetic methods are added to traditional species-based methods. We hope to apply these methods soon to the California flora, so stay tuned!



UC Type Specimen Images now hosted by JSTOR

More than 6000 type specimens from the University Herbarium are now available online, hosted by JSTOR Plants Science at plants.jstor.org. You can also access type specimens by searching by plant name on tropicos.org, and clicking on the JSTOR icon right after the name (it's a small maroon box with a "J" in it).

For example, if you search for *Amsinckia tessellata* on tropicos.org, the resulting page looks like Figure 1:

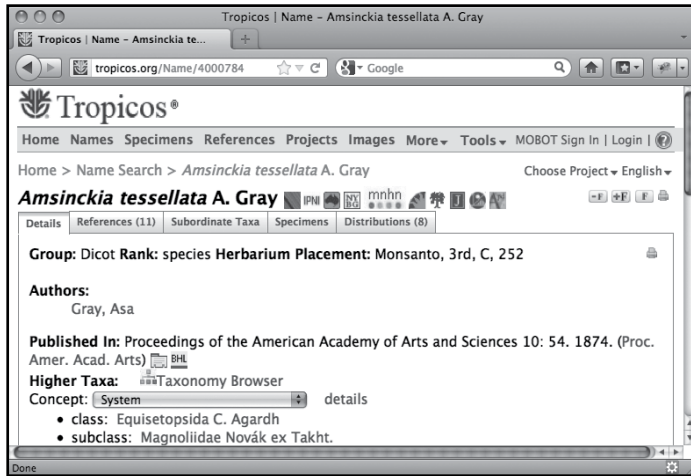


Figure 1. Tropicos plant name page.

Clicking on the maroon JSTOR icon right after the plant name takes you to the JSTOR site with all images from all participating herbaria from around the world linked to the same name you searched under (whether it is a basionym or current determination). If you hover your cursor over each image, a pop-up balloon indicates contributing herbarium and collection, date, etc.



If you click on a particular specimen image, you can use powerful zoom and measurement tools (Figures 2 & 3). There is also a menu of relevant searchable literature, including protologs for many, on the right-hand side of the page. The holotype for *Amsinckia tessellata* is housed at UC and was collected by William Brewer near Mt. Diablo in 1862. Images for isotypes are also available at the Smithsonian (US), Rancho Santa Ana (RSA), and the New York Botanical Garden (NYBG).

Clicking on the "VIEWER" tab allows you to zoom in on any aspect of the specimen you choose, to measure parts of the specimens with a calibrated ruler, and to download and e-mail any selected part of the image you like.

Figure 3 shows a close-up view of part of the UC holotype of *Amsinckia tessellata*.

The effort to scan all of the type specimens at UC is part of the Global Plants Initiative and is funded by the

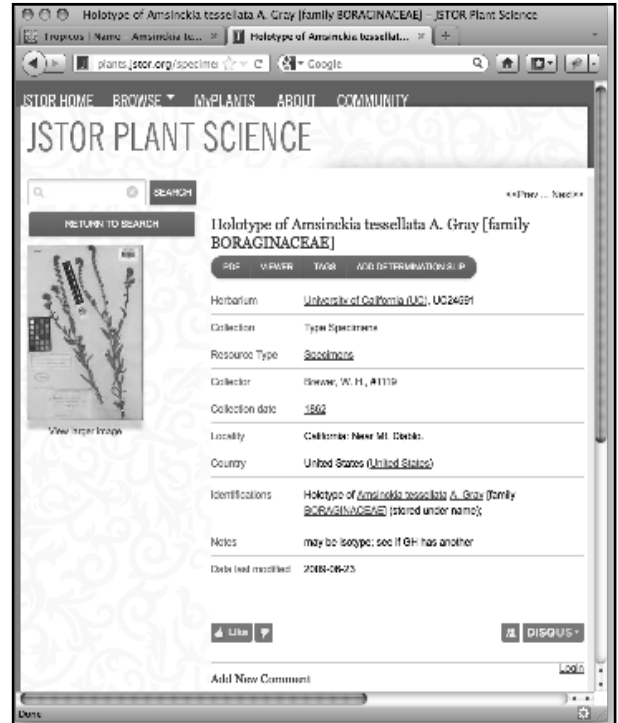


Figure 2. JSTOR specimen page



Figure 3. JSTOR specimen viewer

Andrew W. Mellon Foundation. The type specimens in the JEPS collection have also been scanned and are scheduled for uploading to the JSTOR site later this spring. JSTOR is constantly adding new material, so if your favorite taxa are not yet available, check back soon!

JSTOR Plant Science is currently being offered free of charge for all JSTOR participants and not for profit institutions. Marian Koshland Bioscience & Natural Resources Library has computers in the reference area that are for public use. It is closed 5/12-6/10, but other campus libraries also have public use computers.

(St John family gift, cont. from page 1.)

center of the above image, the California pitcher plant, *Darlingtonia californica*.

The Archives already had a substantial collection of Lemmon papers, including John Gill Lemmon's "Recollections of Rebel Prisons," documenting his incarceration at the notorious Andersonville Prison during the Civil War. However, this most recent gift contains letters from the Plummer family, starting in 1858, as well as many other botanical illustrations by Sara Plummer. It also has manuscripts about the Lemmons begun by Dr. St. John when he was a botany professor at the University of Hawai'i in Mānoa. The life and botanical adventures of Dr. St. John are also documented. These include his army service in France in World War I, his expeditions to Tahiti, his family's experiences in Hawai'i during the Pearl Harbor attack of 1941, and his search for quinine sources in Colombia during World War II.

While we are still busy cataloging the gift, we are very grateful to the St. John family for their donation and their efforts to preserve the collection for contemporary and future researchers. 🌱



June 1899. Sara Plummer Lemmon and John Gill Lemmon in the Lemmon Herbarium, Oakland. Sara is working on a study of a sugar pine cone, hanging on the stand on her desk. The pine cone painting is hanging in the Herbarium Archives today. The *Darlingtonia* painting in the St. John family gift can be seen on the lower right.

Photo from the University and Jepson Herbaria Archives.

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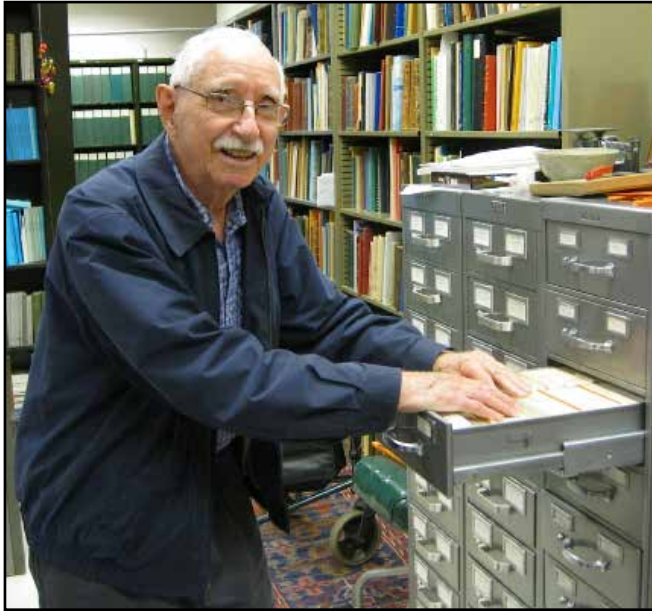
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COME CELEBRATE

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**Paul C. Silva's 90th birthday
and his legacy,
The Center for Phycological Documentation**

October 27, 2012



Paul Silva, 2011, working on the Index Nominum Algarum

Paul has chosen a theme for the morning's symposium:
"The integration of molecular data and algal taxonomy"

Speakers will be:

Max Hommersand (University of North Carolina)
Sandra Lindstrom (University of British Columbia)
Charles Delwiche (University of Maryland)
Robert Andersen (University of Washington)

The symposium will be followed by lunch and an afternoon party.

More details forthcoming for those who contact Richard Moe
(rlmoe@berkeley.edu) by June 1, 2012.

Save – the – date

**CALIFORNIA BOTANICAL SOCIETY
CENTENNIAL CELEBRATION**

April 12-14, 2013

*Day-long symposium, mixer, banquet, graduate student
meetings, and field trips*



THE JEPSON HERBARIUM PROJECTS & RESOURCES

The Jepson Flora Project

The Jepson Manual & Jepson Desert Manual
Online Interchange for California Floristics
A Flora of California (electronic)

Educational Services & Resources

Botanical Workshops & Courses
Plant Identification
2,200,000+ Worldwide Plant Specimens
Botanical Library & Archives

Publications & Research Projects

Constancea: UC Publications in Botany

Director: Brent D. Mishler

Deep Moss: Reconstructing the early evolution of mosses from comparative genomics
Moorea Biocode Project (a complete inventory of an island ecosystem)

Systematics and ecology of *Syntrichia*

Curator: Bruce G. Baldwin

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 Monocots: Chelsea D. Specht

Evolution and biogeography of Calif. monocots (including *Allium*, *Nolina*)
Systematics and evolution of Heliconiaceae, Costaceae, and Zingiberaceae
Floral developmental evolution in the tropical gingers (Zingiberales)

Curator of W. N. Am. Botany: Barbara Ertter
Flora of Mount Diablo & Flora of the East Bay
North American Potentillaceae

Trustees: Vice Chancellor Emeritus Roderic Park, Chairman; Vice Chancellor Emeritus Beth Burnside; UC Botanical Garden Director Paul Licht; Professors John Taylor and Brent D. Mishler (ex officio)

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2012 Jepson Herbarium Public Programs

The following workshops still have space. Register soon — they are filling quickly!

Dudleya

May 25-26

Carex

June 27-30

Juncaceae

June 30-July 2

Potentilla, Past and Present

July 14-15

Fall Spectacular in the Siskiyou

October 11-14

Evolution and Diversity of Mushrooms

December 8-9

For more information, contact Jeanne Marie Acceturo
(510) 643-7008, jmarie@berkeley.edu or visit our web site: <http://ucjeps.berkeley.edu/workshops/>

For Herbarium Updates:



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