



THE JEPSON GLOBE

A Newsletter from *The Jepson Herbarium*

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Update from the Consortium of California Herbaria

By Jason Alexander

The Consortium of California Herbaria has continued to grow and both CCH1 and CCH2 have new features. This article focuses on the major overhaul of CCH1, the portal that is closely linked to the *Jepson eFlora* and the taxonomy recognized therein. Because CCH1 is limited to California and vascular plants whereas CCH2 is global in scope and includes all herbarium collections (not limited to vascular plants), we are able to more intensely curate the data in CCH1 and strengthen the connection between specimen data and the *Jepson eFlora*.

In 2020 and 2021, the California Phenology Thematic Collections Network (CAP-TCN) grant continued despite the pandemic. Membership in CCH also continued to grow. In 2022, the CAP-TCN grant is nearing the end of its funding period and the addition of new specimens, images, and phenological (i.e., flowering time) data from nearly 1 million herbarium specimens is nearly complete. In 2019, there were 43 California members of the CCH. Over the past two years, ten new herbaria have joined as members: Bureau of Land Management, Eagle Lake Field Office Herbarium (ELH); Green Diamond Resource Co. (GDRC); Lassen Volcanic National Park (LVNP); Mendocino College Coast Center Herbarium (MCCC); Sonoma State University Herbarium (NCC); Pacific Union College Herbarium (Continued on page 8)



Gabrielle Rosa. Photo by Ana Penny

Gabrielle Rosa New Curatorial Assistant

My passion for environmental science developed at a young age while growing up in Florida. The various ecosystems, habitats, and wide diversity of plants sparked my deep passion and curiosity for the botanical sciences, even before I formally studied them in school.

In 2015, I earned my B.S. in Environmental Studies from the University of Central Florida. Soon after graduating I pursued an opportunity as a Herbarium Specialist at the New York Botanical Garden (NYBG). I focused on collection management and collaborated with the National Science Foundation's digitization research project: Mobilizing New England Vascular Plant Specimen Data to Track Environmental Change.

Digitizing 1.3 million vascular (Continued on page 3)






Curator's column: *The Jepson eFlora* ten years later

By Bruce G. Baldwin

A decade ago, in January 2012, the second edition of *The Jepson Manual* was published and the *Jepson eFlora* was launched as an online, living flora that could be updated more readily than a print book. At the time, the concept of a living flora that is revised frequently and regularly was novel, and it remains a pioneering effort in floristics worldwide. To date, we have posted nine annual revisions, one per year since inception of the *eFlora*, that have included many minimum-rank taxa (species, subspecies, and varieties) new to California and often to science, as well as taxonomic revisions on a broader scale that reflect changing understanding of deeper evolutionary relationships of our native and naturalized plants.

Some of the lessons that have been learned from this effort over the past 10 years include a stronger appreciation for the rapid pace of botanical discovery that has revealed more diversity and diversification in the California flora than was previously recognized. Our enhanced awareness of just how quickly (Continued on page 2)

ALSO IN THIS ISSUE

-  *Jepson eFlora* Revision 9
-  Visting Researchers
-  Cryptogam Volunteer Program
-  New Thelypteridaceae Book
-  Special Gift Acknowledgements

(Continued from page 1)

new discoveries warranting taxonomic changes have occurred has reinforced the importance of taking a more active approach to floristics than has generally been attempted, especially from the standpoint of conservation. Incorporating newly recognized taxa for California into *eFlora* treatments is one of the best ways to ensure that they will not be overlooked, which is a special concern when most plant taxa new to California are rare or endangered within the state or, often, globally.

Looking back at the revisions to the *eFlora* since its inception a decade ago, there have been about 220 changes that primarily reflect changes in taxonomic position or rank of previously recognized minimum-rank taxa, as understanding of their evolutionary relationships has changed over time. Change in position may represent movement of a species to a different genus or of a subspecies to a different species, for example. Sometimes such changes involve a change in rank, for example, as new evidence indicates that a subspecies is not so closely related to the species within which it was included or any other recognized species. Such name changes that reflect a substantial change in understanding of plant relationships vastly outnumber the relative handful that have occurred for California plants over the past 10 years for strictly nomenclatural reasons (e.g., discovery of an earlier published name for the same plant) and that are not included in the above tally but have been incorporated in the *eFlora*.

Other changes to the *eFlora* over the past decade include the addition of 109 accepted minimum-rank native taxa that were not recognized for California in the second edition of *The Jepson Manual*. About half (54) of these additions represent plants that were described as new to science in recent years and the rest include taxa that bear a scientific name that was


validly published earlier, even though many are of novel circumscription (that is, they include the type specimen of a previously recognized minimum-rank taxon but may include populations that do not match the earlier botanist's concept of that taxon). A minority of these new minimum-rank native taxa in the *eFlora* represent range extensions of plants long known from elsewhere but only recently documented by collections inside California. In addition, there have been 17 naturalized taxa and at least one waif added to the *eFlora*.

In some cases, further study of Californian plants has necessitated removal of taxa from our flora, although such outcomes have been relatively uncommon. Improved understanding of plant evolutionary relationships resulted in rejection of only about six minimum-rank taxa that were recognized in the second edition of *The Jepson Manual* but are now considered synonyms of other, previously recognized taxa. In addition, about the same number of minimum-rank taxa recognized earlier for California are now understood to have been based on misinterpreted specimens that do not reflect occurrence of those taxa within the state. The overall increase in native plant diversity recognized in the *eFlora* over the past 10 years continues a long standing trend of discovery and description of Californian taxa that has not abated in well over a century.

As Willis Linn Jepson noted long ago, no flora is ever complete because botanical knowledge is constantly improving and refinements will always be necessary to reflect that progress in understanding. Collaboration with our Jepson Flora Project (JFP) authors to achieve our goal of revising treatments as needed to incorporate new discoveries remains the most effective means of making such progress. It has been a great pleasure to work with the many authors and editors who have contrib-

uted revisions over the past decade and I thank everyone who has participated, including support from the *Friends of the Jepson Herbarium*. I welcome and encourage our JFP community of contributors to remain involved and to let me know if you are able to initiate effort on needed revisions of a treatment that you have authored or that includes taxa you have studied. Such participation is key to making the most of this important effort.

I also thank Jason Alexander, Staci Markos, Dick Moe, Tom Rosatti, and Niles Klazenga (KeyBase) for their diligent work to enhance the *Jepson eFlora* with the following features: Illustrations from *The Jepson Manual*, individual distribution maps for all recognized taxa linking the *Jepson eFlora* bioregional maps with distribution records from the Consortium of California Herbaria (CCH), "yellow flags" to draw attention to interesting conflicts between CCH specimen localities and *eFlora* bioregional distributions, filtered keys so that users can focus in on a geographic area of concern (thereby shortening the keys and simplifying identification), display of verified images from CalPhotos, links (where relevant) to the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Plants of California*, California Invasive Plant Council (Cal-IPC), and California Department of Food and Agriculture (CDFA), links to the *Jepson Videos: Visual Guides to the Plants of California*, links to the full annotated nomenclatural and taxonomic record for accepted names in the Jepson Flora Project's *Index of California Plant Names* (ICPN), which in some cases provides more extensive synonymy than is given in the *eFlora*, and continuous correction of minor errors (listed as errata on the *eFlora* website).

I encourage our readers to explore the floristic resources of the *Jepson eFlora!* 

Distinguished Guests Visit UC/JEPS to Study Plant Pathology

In February 2022, the University and Jepson Herbaria and the UC Davis Herbarium welcomed a group of distinguished visitors from France: Adrien Rieux, French Agricultural Research Centre for International Development (CIRAD, France), and Nathalie Becker and Paola Campos, Institute of Systematics, Evolution and Biodiversity (ISYEB) from the National Museum of Natural History (Paris). They are collaborating with Rodrigo Almeida's group at UC Berkeley to identify historical traces of an infectious plant pathogen *Xylella fastidiosa*.

Xylella fastidiosa is a bacterial crop pathogen that causes serious diseases on a large number of economically important plant crop species including grapevine, plum, coffee, almond, mulberry, peach, and citrus; the pathogen also infects many ornamental and shade tree species. *Xylella fastidiosa* causes major environmental, economic, and social impacts mostly because of decreases in crop yield and quality, although it can cause plant death. The pathogen is also of quarantine importance and there are restrictions to access to some export markets. *Xylella fastidiosa* was generally thought of as a pathogen of the Americas since the disease it causes on grapevines (Pierce's disease) was first described in 1892 in California, having destroyed thousands of acres of grapevines. *Xylella fastidiosa* was also responsible for the spread of phony peach disease within the southeastern US from the 1890s until about 1930. More recently the pathogen was introduced in Europe with new epidemics being reported in Italy (2013), France, and Spain. With no known cure, it represents a major threat to both American, European, and global agriculture.

In order to most effectively manage *X. fastidiosa* current epidemics



Adrien Rieux, Nathalie Becker and Paola Campos in February 2022. Photo by Staci Markos.

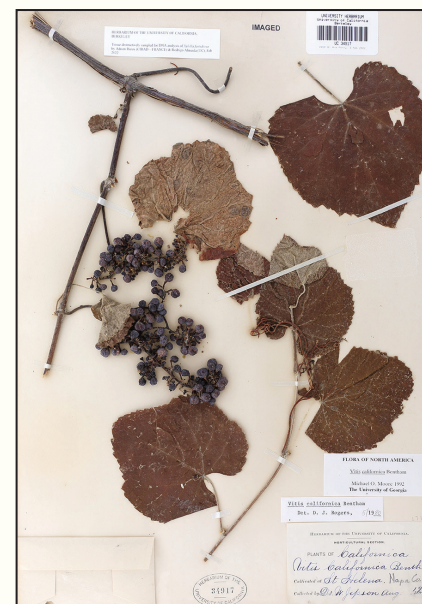
and prevent future ones, particularly in the context of global change, the team seeks to better understand the factors underlying its emergence, adaptation, and spread.

This collaborative project involving CIRAD (Agricultural Research for Development, France), National Museum of Natural History (Paris, France), and UC Berkeley (Department of Environmental Science Policy and Management) aims to identify historical traces of *X. fastidiosa* infections within the collections housed in the University and Jepson Herbaria. DNA of possibly infected samples will consequently be extracted, sequenced, and analyzed. The results will give precious information on several parameters such as the

(Continued from page 1)

plant specimens from herbaria across New England, I helped enhance their data with geo-referencing, habitat, and phenological information. The goal was to gather data from specimens to support studies on the impact of environmental change in the New England region, specifically over the last three centuries. This research project was a cornerstone to my developing career in the botanical sciences.

After the project ended in 2017, I decided to explore the field of horticulture. This exploration took me to Seattle where I began a position



Vitis californica, Jepson 1901
St. Helena, UC34917

mutation rate of *X. fastidiosa* and the history of disease emergence. Through this work, the team hopes to gain a better understanding of the spread of the diseases caused by this pathogen.

This visit was supported by the 2019 "Make Our Planet Great Again" Initiative from the Thomas Jefferson Fund, a program sponsored by the French Embassy in the USA. 🌍


at the University of Washington as a Horticultural Manager, specializing in plant identification and propagation. Eventually, I began to miss herbarium research and decided to explore other opportunities. This led me to a position as the general manager of a plant nursery in Fremont, just north of Seattle.

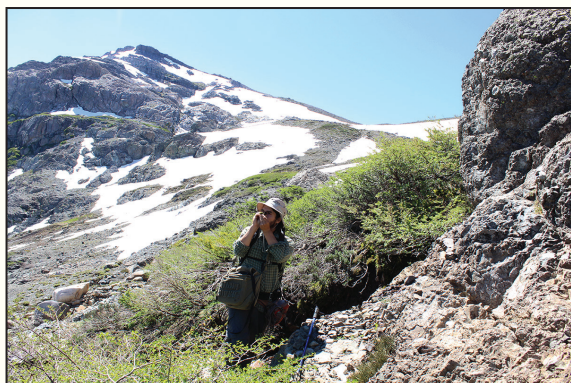
By 2020, the world had changed drastically. By the end of the year, I found the perfect position – working at the University and Jepson Herbaria. I jumped at the chance to move my family to California and am overjoyed to be here. 🌍

Javier Jauregui-Lazo Awarded Prestigious Post-doctoral Fellowship

Javier Jauregui-Lazo is a Chilean native who joined Brent Mishler's lab as a graduate student to begin his academic journey on studying moss biology, evolution, and functional

morphology. Javier was recently awarded the Katherine Esau Postdoctoral Fellowship in the Plant Biology Department at UC Davis. His new position will begin in September 2022 and builds upon his prior knowledge and expertise in describing the dynamics of ectohydry in mosses. He will apply approaches in molecular biology, genomics, and cutting-edge imaging to determine the underlying molecular and developmental basis of water-related traits in mosses. His research will provide a linkage between leaf development and its un-

derlying molecular and morphological mechanisms, to illuminate the role of mosses as key regulators of water retention, storage, and flow in dryland ecosystems. With this new position, Javi will be contributing to the field of plant anatomy and morphology as well as evo-devo. He will also be honoring Katherine Esau, one of the most distinguished plant anatomists in the world. Dr. Katherine Esau (1898-1997) was awarded the National Medal of Science in 1989. To read more about her life and work, please see this article: <http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/esau-katherine.pdf> 



Javier checking the ID of *Syntrichia* inhabiting sites at high elevation in the Andes of Central Chile. Photo by Javier Jauregui-Lazo.


New Cryptogam Volunteer Program

In February 2022, Tucker Curator of Lichens Klara Scharnagl, with the help of Jim Shevock from California Academy of Sciences, initiated a cryptogam volunteer program at the University & Jepson Herbaria. This program focuses on work in our cryptogam collections – the bryophytes and lichens.

The cadre of volunteers meets on Wednesday and Friday mornings in the herbaria conference room to help prepare specimens for the collection. Main tasks include placing specimens into archival quality paper packets, gluing labels and annotations, and adding barcodes. In just a few short weeks, our volunteers have already prepared several boxes of specimens for the collection.

An un-accessioned specimen is not useful to anyone. Once a specimen is digitized and accessioned, the speci-

men and its associated data become available to researchers, students, taxonomists, artists, and the general public. Our amazing cryptogam volunteer cadre is going to help to make thousands of such specimens available.

If you are interested in joining our cryptogam volunteer program, please email Dr. Klara Scharnagl at: lichen_curator@berkeley.edu. 



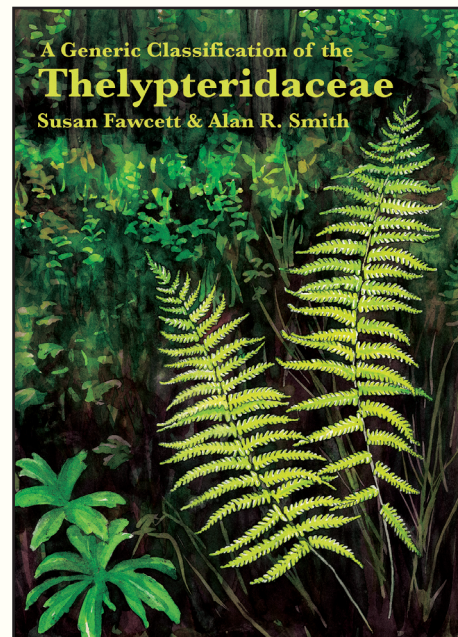
The Wednesday morning cryptogam cadre hard at work barcoding and packeting bryophyte specimens collected by Dan Norris. Photo by Klara Scharnagl.

UC and JEPS Fern Curators Revise a Major Fern Family

Susan Fawcett and Alan Smith, Research Botanists in the University and Jepson Herbaria, recently released a new book, *A Generic Classification of the Thelypteridaceae*, published by the Botanical Research Institute of Texas Press. This group, historically included within the wood-fern genus *Dryopteris* (now understood to be distantly related), is one of the most species-rich among the ferns and has been one of the more poorly known and studied families. Its size and complexity, with subtle and confusing patterns of diversity, have been impediments to close scrutiny by fern systematists. As a consequence, the classification of the Thelypteridaceae has been a source of controversy. Earlier treatments have variously split its 1,200 species into upwards of 30 genera, or lumped them all together into a single genus, *Thelypteris*. The present treatment is the result of both morphological study of herbarium specimens and a molecular phylogenetic dataset


including 400 nuclear genes representing more than 600 samples, assembled with the help of an international team of collaborators, and with an emphasis on resolving the most challenging taxonomic groups. A complementary study focused on the molecular phylogenetic results supporting the new classification was published in the journal *Systematic Botany* in December 2021. A majority of the specimen vouchers used in the molecular study are deposited in UC. The new classification provides recircumscriptions of 14 genera, seven new genera, and 176 new names. With financial support from the Rolla and Alice Tryon Endowment at the Pringle Herbarium, the Alan R. Smith Fern Research and Curation Fund, and the University of California at Berkeley Research Impact Initiative, and BRIT Press, the book was published free and Open Access, and with hard copies available for \$25 from shop.brit.org/books.

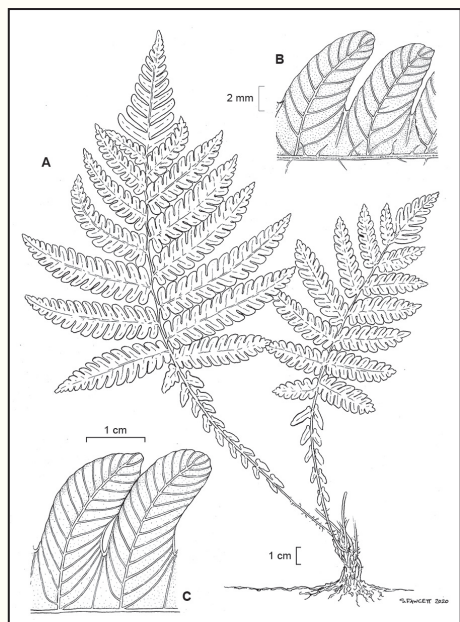
This study has resulted in taxonomic changes to the two members of Thelypteridaceae native to California. *Thelypteris nevadensis*, known from the Klamath Ranges, North Coast Ranges, and High Sierra Nevada within California, is now treated in the predominantly neotropical genus *Amauropelta*, along with its Eastern North American sister species, *Amauropelta noveboracensis*. *Thelypteris puberula* var. *sonorensis*, from the South Coast, San Jacinto, San Gabriel, and western Transverse ranges within California, is now treated in the genus *Pelazoneuron*, a mostly neotropical group that Alan Smith first began studying for his doctoral research at Iowa State University more than 50 years ago. Both of these nomenclatural changes were adopted in the latest revision of the *Jepson eFlora*. The ongoing work of Fawcett, Smith, and their collaborators has resulted in the recent



The new book, which features artwork by Fawcett, is available through Botanical Research Institute of Texas Press, shop.brit.org.

publication of several new species of Thelypteridaceae from the Dominican Republic, the Peruvian Andes, and the Solomon Islands.

The collaboration between Fawcett and Smith began in 2013 when Susan volunteered to help with fern curation at UC and JEPS, first mounting specimens, later with filing, pulling loans, and other routine curatorial activities. With Smith's guidance, she began helping with specimen identification, and familiarizing herself with potential avenues for research. With Smith's encouragement, she decided to pursue a Ph.D. at the University of Vermont. The publication of the generic classification and global phylogeny were the result of her dissertation, completed in the Barrington/Sundue lab in 2020. The "seeds" (or we should say "spores") that inspired this work, were sown by interactions, conversations, and exposure to this fascinating family during her pre-Ph.D. mentorship at UC. 



Steiropteris deltoidea, Fawcett 464 (VT) A. habit. B. pinna lobes, adaxial view. C. *Mesophlebion* sp., Karger 1796 (VT), pinna lobes, abaxial view.

Jepson eFlora Revision 9 (December 2021)

Revision 9 involves treatments that have changed taxonomically (e.g., taxa added or deleted) since Revision 8 of the *Jepson eFlora*. A summary of the changes incorporated in the *eFlora* is presented below.

Brief Summary of Changes in Revision 9:

FERNS

THELYPTERIDACEAE:

Thelypteris: Californian taxa moved to *Amauropelta* and *Pelazoneuron*, leaving no taxa of *Thelypteris* in California

Thelypteris nevadensis transferred to *Amauropelta*, as *Amauropelta nevadensis*

Thelypteris puberula var. *sonorensis* transferred to *Pelazoneuron*, as *Pelazoneuron puberulum* var. *sonorensis*



Pelazoneuron puberulum var. *sonorensis*. Photo by Susan Fawcett

ANGIOSPERMS

BORAGINACEAE:

Cryptantha: Some Californian taxa transferred to *Eremocarya*, *Greeneocharis*, *Johnstonella*, and *Oreocarya*

Cryptantha angustifolia transferred to *Johnstonella*, as *Johnstonella angustifolia*

Cryptantha catalinensis newly described, added, as native

Cryptantha clementina newly described, added, as native

Cryptantha celosoides transferred to *Oreocarya*, as *Oreocarya glomerata*

Cryptantha cinerea var. *abortiva* transferred to *Oreocarya* and treated at species rank, as *Oreocarya abortiva*

Cryptantha circumscissa transferred to *Greeneocharis*, as *Greeneocharis circumscissa*

Cryptantha circumscissa var. *circumscissa* transferred to *Greeneocharis*, as *Greeneocharis circumscissa* var. *circumscissa*

Cryptantha circumscissa var. *rosulata* transferred to *Greeneocharis*, as *Greeneocharis circumscissa* var. *rosulata*

Cryptantha confertiflora transferred to *Oreocarya*, as *Oreocarya confertiflora*

Cryptantha costata transferred to *Johnstonella*, as *Johnstonella costata*

Cryptantha crymophila transferred to *Oreocarya*, as *Oreocarya crymophila*

Cryptantha flavoculata transferred to *Oreocarya*, as *Oreocarya flavoculata*

Cryptantha hispidissima recognized, added, as native

Cryptantha hoffmannii transferred to *Oreocarya*, as *Oreocarya hoffmannii*

Cryptantha holoptera transferred to *Johnstonella*, as *Johnstonella holoptera*

Cryptantha humilis transferred to *Oreocarya* and treated at subspecies rank, as *Oreocarya humilis* subsp. *humilis*

Cryptantha inaequata transferred to *Johnstonella*, as *Johnstonella inaequata*

Cryptantha intermedia var. *hendersonii* treated at species rank, as *Cryptantha hendersonii*

Cryptantha intermedia var. *johnstonii* recognized, added, as native

Cryptantha kinkiensis recently described, added, as native

Cryptantha maritima var. *maritima* recognized, as native

Cryptantha maritima var. *pilosa* recognized, added, as native

Cryptantha micrantha transferred to *Eremocarya*, as *Eremocarya micrantha*

Cryptantha micrantha var. *lepida* transferred to *Eremocarya* and treated at species rank, as *Eremocarya lepida*

Cryptantha micrantha var. *micrantha* transferred to *Eremocarya*, as *Eremocarya micrantha* var. *micrantha*

Cryptantha nevadensis var. *nevadensis* treated at species rank, as *Cryptantha nevadensis*

Cryptantha nevadensis var. *rigida* treated at species rank, as *Cryptantha juniperensis*

Cryptantha nubigena transferred to *Oreocarya*, as *Oreocarya nubigena*

Cryptantha pterocarya var. *cycloptera* treated at species rank, as *Cryptantha cycloptera*

Cryptantha pterocarya var. *stenoloba* recognized, added, as native

Cryptantha racemosa transferred to *Johnstonella*, as *Johnstonella racemosa*

Cryptantha roosiorum transferred to *Oreocarya*, as *Oreocarya roosiorum*

Cryptantha schoolcraftii transferred to *Oreocarya*, as *Oreocarya schoolcraftii*

Cryptantha similis transferred to *Greeneocharis*, as *Greeneocharis similis*

Cryptantha sobolifera added, transferred to *Oreocarya*, as *Oreocarya sobolifera*, as native

Cryptantha subretusa transferred to *Oreocarya*, as *Oreocarya subretusa*

Cryptantha tumulosa transferred to *Oreocarya*, as *Oreocarya tumulosa*

Cryptantha virginensis transferred to *Oreocarya*, as *Oreocarya virginensis*

Cryptantha wigginsii new to California, added, as native

Cynoglossum: Native Californian taxa transferred to *Adelinia* and *Andersonglossum*, leaving one naturalized taxon of *Cynoglossum* in California

Cynoglossum grande transferred to *Adelinia*, as *Adelinia grandis*
Cynoglossum occidentale transferred to *Andersonglossum*, as
Andersonglossum occidentale

Johnstonella angelica new to California, added, as native
Pectocarya: One species transferred to *Gruvelia*

Pectocarya anisocarpa newly described, added, as native
Pectocarya pusilla transferred to *Gruvelia*, as *Gruvelia pusilla*

Plagiobothrys: One species transferred to each of three genera,
Amsinckiopsis, *Simpsonanthus*, and *Sonnea*

Plagiobothrys hispidus transferred to *Sonnea*, as *Sonnea hispida*

Plagiobothrys jonesii transferred to *Simpsonanthus*, as *Simpsonanthus jonesii*

Plagiobothrys kingii transferred to *Amsinckiopsis*, as *Amsinckiopsis kingii*

Plagiobothrys kingii var. *harknessii* transferred to *Amsinckiopsis*,
as *Amsinckiopsis kingii* var. *harknessii*

Plagiobothrys kingii var. *kingii* transferred to *Amsinckiopsis*, as
Amsinckiopsis kingii var. *kingii*



Oreocarya confertiflora. Photo by Staci Markos.

EHRETIACEAE:

Tiquilia transferred to Ehretiaceae from Boraginaceae



Tiquilia nuttallii. Photo by Steve Matson.

HELIOTROPIACEAE:

Heliotropium transferred to Heliotropiaceae from Boraginaceae

HYDROPHYLLACEAE:

Draperia, *Emmenanthe*, *Eucrypta*, *Hesperochiron*, *Howellanthus*,
Hydrophyllum, *Nemophila*, *Phacelia*, *Pholistoma*, *Romanzoffia*,
and *Tricardia* transferred to Hydrophyllaceae

Emmenanthe penduliflora var. *penduliflora* treated at species rank,
as *Emmenanthe penduliflora*

Emmenanthe penduliflora var. *rosea* treated at species rank, as *Emmenanthe rosea*

Hesperochiron californicus changed to *Hesperochiron nanus*, with
nomenclatural priority

LENNOACEAE:

Pholisma transferred to Lennoaceae

NAMACEAE:

Eriodictyon, *Nama*, and *Wigandia* transferred to Namaceae



Nama aretioides var. *multiflora*. Photo by Dana York.

POLEMONIACEAE:

Leptosiphon acicularis changed to *Leptosiphon aureus* Benth.,
with nomenclatural priority

Leptosiphon aureus (Nutt.) Benth. ex E. Vilm., an illegitimate
name (later homonym of *Leptosiphon aureus* Benth.),
changed to *Leptosiphon chrysanthus*

Leptosiphon aureus subsp. *aureus* changed to *Leptosiphon chrysanthus*
subsp. *chrysanthus*

Leptosiphon aureus subsp. *decorus* changed to *Leptosiphon chrysanthus*
subsp. *decorus*

Linanthus bigelovii in California treated as newly described sub-
species, *Linanthus bigelovii* subsp. *johnsonii*

Linanthus californicus subsp. *californicus*, newly recognized, as
native

Linanthus californicus subsp. *glandulosus*, newly recognized,
added, as native

Linanthus californicus subsp. *tomentosus*, newly recognized,
added, as native

Linanthus dichotomus subsp. *pattersonii*, newly described,
added, as native

Linanthus maculatus subsp. *emaculatus*, newly described, added,
as native

Linanthus maculatus subsp. *maculatus*, newly recognized, as
native

Linanthus pungens subsp. *hallii*, newly recognized, as native

Linanthus pungens subsp. *pulchriflorus*, newly recognized, as
native

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um (PUA); CSU Stanislaus Herbarium (SHTC); Salmon/Scott Ranger District, USFS, Fort Jones, CA (SSRD); Shasta-Trinity National Forest Herbarium (STNF); Herbarium of Sequoia and Kings Canyon National Parks (THRI). This brings the total California members of CCH to around 55.

During the same period, the new CCH1 portal was established and redevelopment is continuing with a goal of restoring most of the features present in the former CCH1 website.

The search page in the new CCH 1 interface is mostly the same format as the previous CCH1 interface and new features have been added. For example, fields from the *Jepson eFlora*, such as life form, endemism, and nativity are fully searchable. It is now possible, for example, to retrieve all of the specimens from a county that are determined as annual taxa in the *eFlora*. Other new features include the ability to add cultivated records to searches and to find records where the georeference county and label county are different.

The results pages also have new features. For example, the new tagging system will show more colored tags than the green tags present in the original CCH1. Green tags indicate specimens with georeferences identical to those in CCH2. Light blue tags indicate that CCH1 has changed or added the georeference. Yellow tags indicate that the georeference is outside the range of the species published in the *eFlora*. Specimens with poor georeferences are black tagged, as they were in the previous version of the CCH1 georeference webpage. However, in the new CCH1, those georeferences are removed and will not be mapped. Specimens with problem dates and specimen names are also tagged on the results page. These tags are also present on the detailed specimen page and some have comments on why they were tagged. See the tagging help page for more details

(https://ucjeps.berkeley.edu/consortium/flag_colors.html).


The specimen details page also has several new features. The previous version of CCH1 had a very extensive and detailed loading history, most of which was never available for public view. The first step to making this history visible to users was to include the metadata from the first time the specimen was loaded in CCH1. The first load name and first load date now show in a separate line for those records with those data recorded. In the future, a drop down table will be added that shows each date the name for that specimen changed. Similar to an annotation history, this name change history also includes when the CCH1 loading scripts changed a name.

Specimens with names not in the ICPN or *eFlora* are tagged with one or more descriptive phrases. The nativity status and lifeform habit are also added from the *eFlora*. Also during loading, the corrected form of the current determination is compared to the comprehensive taxon table and the current *eFlora* accepted name is shown on a separate line as well as a link to the *eFlora* species page. The tags present on the search page are also present here. Colored tags show up whenever data are changed from that found in CCH2. To see the original CCH2 data, users can click on the CCH2 link or click on the display table button at the bottom of the page. Image links and mapping will be restored to this page later this year.

There have been multiple questions and concerns regarding the archive of comments from the previous version of the CCH1 website. The comments interface and links are retired and not present in the new CCH1. The old comments database remains as a viewable archive on the CCH1 Curatorial Tools page (<https://ucjeps.berkeley.edu/consortium/curatorial.html>). A copy of these comments has been given to each CCH member. Members are responsible for reviewing these comments. Certain

comments, such as determinations and georeferences are now added to the new CCH1 database. When these are applied, they appear as colored tags next to the field to which they were added (light blue tags for georeferences; red tags for changes to the current determination). Some comments that just question the determination are not tagged, since most of these just state the determination may be incorrect without suggesting an alternative.

To track the development of CCH1, please see this new development page (<https://ucjeps.berkeley.edu/consortium/development.html>). This page is updated regularly as tasks are complete. A list of new and restored features for each CCH1 update can be found on this page (https://ucjeps.berkeley.edu/consortium/update_history.html). A report of new specimens and changed determinations can be found on the CCH1 New Record and Determination Log Archive (https://ucjeps.berkeley.edu/consortium/record_log_archive.html), which is formatted much like the old CCH1 page. However, there is now a third column. This column contains a report of each of the names corrected during the loading process. The previous version of CCH1 fixed typos and corrected other naming issues behind-the-scenes. Users could not tell if the names displayed in CCH1 were the exact same as the ones in the original file. This new page now lists all of the name corrections made for CCH1 during each new update.

Thank you to all of the collections that share data with the CCH, to the collectors who provide specimens, and to the people who have worked to make herbarium data digital! Digital specimen data have been used in countless studies and novel uses of herbarium data continue to surprise us. There is more work to be done and the improvements made to CCH1 and CCH2 have provided a strong foundation on which to continue building. 

Undergraduate Students Have Digitized Nearly 100,000 Specimens!

The digitizing lab is up and running! It is full of undergraduate students diligently working on the four projects listed below. Gabrielle Rosa, Amy Kasameyer, Klara Scharnagl, Ana Penny, and Bridget Wessa all help manage the students and keep the lab running smoothly. It's not an easy task, with over 20 students and constant movement of specimens from the collection to the lab, there are many moving parts. This year, the students have digitized over 95,000 specimens! It is wonderful to offer so many students a chance to become immersed in the herbaria, to learn more about collections, and to broaden their horizons by virtually taking them to places they have never been. Training is an important part of the mission of the herbaria and this element of undergraduate involvement is a critical component. The students have been working on our four current NSF digitizing grants.

Ferns. The Pteridological Collections Consortium: An integrative approach to pteridophyte diversity over the last 420 million years.

Imaging process since the beginning of fall quarter: 25,191 specimens

Phenology. Capturing California's Flowers: using digital images to investigate phenological change in a biodiversity hotspot.

Imaging progress since beginning of fall quarter: 36,579 specimens

Endless Forms. Digitizing "endless forms": facilitating research on imperiled plants with extreme morphologies.

Imaging progress since beginning of fall quarter: 23,293 specimens

GLOBAL Lichens & Bryophytes. Digitizing and imaging lichen and bryophyte specimens from global locations (outside of North America), contributing to a global portal for lichen and bryophyte collections.

Imaging progress since beginning of fall quarter: 6,129 specimens 



Samantha Chang (Ferns)
Uranchimég Altankhuyag (Phenology)
Alexis O'Connor (Ferns)
Photo by Amy Kasameyer.



Adrian Martinez (Lichens)
Marlee Meek (Ferns)
Photo by Amy Kasameyer.

Love ferns? Help transcribe specimen labels from home!

UC/JEPS is digitizing 180,000 pteridophyte specimens as part of the NSF funded collaborative research project The Pteridological Collections Consortium: An integrative approach to pteridophyte diversity over the last 420 million years. This project will digitize 1.6 million fossil and modern fern specimens held in 39 US museums and herbaria. All specimen images and data from this project will be freely available online at www.pteridoportal.org. Volunteers are critical in allowing us to "unlock the vaults" and make invaluable scientific data available to the global public. If you would like to volunteer for this project, please contact Amy Kasameyer (akasameyer@berkeley.edu); she can provide instructions and training. Volunteer work on this project can be done from your home, you do not need to travel to the Herbaria to help out with this project, so it is a great option for people who would like to get involved at the Herbaria without coming to campus.



Jeff Greenhouse, digitizer extraordinaire, is presented with a certificate honoring his 7,000th specimen digitized for the Pteridophyte Collections Consortium! From L to R, Amy Kasameyer, Alan Smith, Jeff Greenhouse, Susan Fawcett, Carl Rothfels. Photo by Staci Markos.

MEMORIAL & HONORIFIC GIFTS

In Memory of Larry Abers

Britt Thorsnes

In Memory of Clyde Calvin

Elisabeth Wheeler, Carol Wilson, and
Everett Wilson

In Memory of Geoff Chin

Chauncey Parker

In Memory of Julie Egert

Julie Nelson-Kierstead

In Memory of Lew Feldman

Eleanor Bade

In Memory of

Frank and Mary Fioranelli

Denise & David Evans

In Memory of Ann Fogel

Cathleen Fogel

In Honor of Pete Garcia

Alan I. Kaplan

In Honor of Amy Kasameyer

Sheila Humphreys

In Memory of Robert Lloyd

Theodora Lee Gregg

In Honor of Staci Markos

Alison Colwell

In Memory of Rod Park

Mary Beth Burnside

In Memory of Rob Schonholtz

Jane Hicks

In Memory of P.C. Silva's birthday

Kathy Ann Miller

In Honor of Alan R. Smith

Beth Alexander

In Memory of Tim Lukaszewski

Paul Preston

Big Thanks!

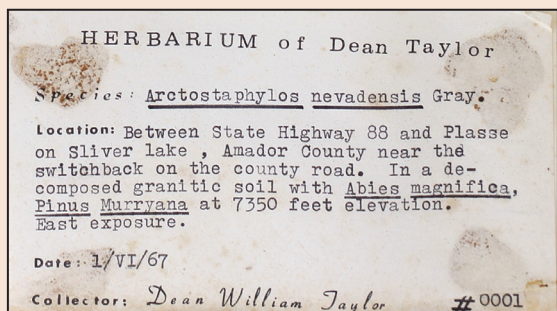
Thank you to all of our *Friends* who made a gift on BigGive, UC Berkeley's annual day of giving.

This year our campaign requested funds to help accession and image approximately 10,000 specimens from the late Dean Taylor.

Making specimens available to the public by databasing and imaging them so that they can be found online is an important part of the mission of the University and Jepson Herbaria.

With support from our *Friends*, Dean's collections will become part of the formal collection at JEPS and be visible to all who want to access them. The specimens share details of the incredible impact Dean had on California botany in terms of discovery, documentation, and teaching others about our wonderful flora.

Right: The first herbarium specimen Dean collected (#1, *Arctostaphylos nevadensis*, 1967). Below: Enlarged detail



SUPPORT THE HERBARIA

Name(s) _____

Address _____

City, State Zip _____

Telephone/ Email _____

FRIENDS OF THE JEPSON HERBARIUM (U0840)

Basic Membership (\$45 individual, \$60 family)

Basic members receive *The Jepson Globe* and discounts on Weekend Workshops.

Sustaining Membership (\$200)

Receive basic membership benefits plus acknowledgment in the *Jepson eFlora*.

Lifetime Membership (\$5,000 total, or pledge a minimum of \$250/year)

Demonstrate your dedication and commitment to the Jepson Herbarium with a lifetime membership. Gain recognition for your support in *The Jepson Globe* and the *Jepson eFlora*. Share your ideas with the Director and Curator at special, invitation-only events.

HERBARIA FUTURES ENDOWMENT (14891)

Support the infrastructure and care of the collections.

I prefer to receive my copy of *The Jepson Globe* electronically (no paper copy).

This gift is ___ in honor of, OR ___ in memory of:

My or my spouse's employer will match this gift. (Please enclose company form.)

Please send me information about including the Herbaria in my will or estate plan.

Please make your check payable to the **UC Berkeley Foundation**, charge your gift, or give online at: give.berkeley.edu/fund/?f=FU0840000

Amount \$ _____ Visa ___ Mastercard ___

Card # _____

Signature _____

Exp. Date _____

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Thank you for supporting the Herbaria!

JEPSON HERBARIUM RESOURCES & PROJECTS RELATED TO THE CALIFORNIA FLORA

The Jepson Herbarium includes 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

Systematics and evolution of Calif. tarweeds and relatives (tribe Madieae, Compositae), *Chaenactis* (Chaenactidiaceae, Compositae), and *Collinsia* (Plantaginaceae).

Curator of Ferns and Lycophytes:
Carl Rothfels

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

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

Asst. Director for Development & Outreach, and *Globe* editor: Staci Markos

Biodiversity Informatics Manager:
Jason Alexander

Collections Staff: Ana Penny,
Gabrielle Rosa

Archivist and Librarian:
Amy Kasameyer

Public Programs: Staci Markos,
Roxanne Andersen

Membership, workshop enrollment, and *Globe* design: Roxanne Andersen

Staff Research Associate: Bridget Wessa

Jepson Videos: Staci Markos, Amy Kasameyer

Trustees:
Vice Chancellor Emeritus Beth Burnside; Professor Emeritus Russell Jones; Professor Emeritus John Taylor and Professor Brent D. Mishler (ex officio)

***Constancea*:** UC Publications in Botany (online)



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Jepson Mini-workshops

There are two virtual workshops this year still open for registration!

For more information and to register go to <https://ucjeps.berkeley.edu/workshops/>

California Seaweeds: Seashores, kelp forests and climate change

Kathy Ann Miller

September 17, 2022: 1:00 pm – 5:00 pm



Point Arena seaweeds.
Photo by Kathy Ann Miller.

A big world in a small package: Lichen biology, identification, and conservation

Klara Scharnagl

October 1, 2022: 1:00 pm – 5:00 pm



Lobaria oregana.
Photo by Klara Scharnagl.