



# THE JEPSON GLOBE

A Newsletter from the *Friends of The Jepson Herbarium*

VOLUME 30 NUMBER 2, Fall 2020

## Director's Column: The Importance of Public Education and Increasing Diversity in Science

By Brent D. Mishler

A core part of the mission of the University and Jepson Herbaria is to provide educational opportunities for undergraduates, graduate students, and post-docs. Beyond those traditional educational goals, we have actively worked on broader outreach efforts, to make tangible contributions to increasing public knowledge and awareness of scientific topics and to increase the racial, ethnic, and gender diversity represented in science.

Our efforts have been guided through our NSF-funded projects, led through the individual initiative of faculty, staff, and students, and supported by our *Friends*. Here, I mention a few examples out of many and have selected a representation of the different types of outreach opportunities the herbaria is engaged in.

### Public Engagement Supported by Grants

The NSF Dimensions of Biodiversity grant on desert mosses that I presented in a previous column (*The Jepson Globe* 26(2), 2016) has sponsored a number of great outreach efforts. For example, in March 2019 UC/JEPS graduate students Jenna Ekwealor and Ixchel Gonzalez led a workshop at a STEM conference for middle-school girls in

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*Klara Scharnagl doing field work for her dissertation in Costa Rica.*

## Welcome Klara Scharnagl! The new Tucker Curator of Lichenology

Klara Scharnagl will be joining the University and Jepson Herbaria as the Tucker Curator of Lichenology in 2021, and she (and we) could not be more thrilled! Klara grew up in Miami, Florida, with a passion for the outdoors; from exploring her own backyard with her sister, to annual pilgrimages to Everglades National Park, to family summer camping trips in the Smoky Mountains of North Carolina, where she first fell in love with fungi. Her first volunteer position in high school was at the Fairchild Tropical Botanic Garden Herbarium, where she worked with other volunteers to prepare, mount, and digitize plant specimens from around the world. The joy she felt in that experience has led

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## Jepson Workshop Results in a New Country Record

By Michael Simpson, Professor Emeritus at San Diego State University

During the Jepson workshop “Botany of Borrego Springs with Emphasis on Borages” (taught April 12-14, 2019) a novel plant discovery was made. The workshop was taught at the Steele Burnand Anza-Borrego Desert Research Center in Borrego Springs, CA. On the afternoon of the first day, I took the students on a hike in an adjacent wash to look at the common borages, plants like *Cryptantha barbiger* var. *barbiger*, *Cryptantha maritima* var. *maritima*, *Johnstonella angustifolia*, and a lone *Cryptantha cycloptera* f. *cycloptera*. As the group was coming back, walking in the upper wash adjacent to the Center, two of the students, Jillian Stephens and Stella Yang, noticed a plant and, as is typical on trips like this, asked “What’s this one?” I took a quick glance, assuming it was just another *Johnstonella angustifolia*, one of the most common annuals in the area. But, after a second glance, I replied, “That looks a little different” and to Jillian, “Can you collect a sample for me, to bring back to the lab?”

The sample was collected and put

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the Bay Area. The workshop was called "The Living Skin of the Earth." In it, the girls learned about the importance of biocrust communities, learned to recognize major organisms in them, and experimented to test the effect of different levels of biodiversity in the biocrust community on soil aggregate stability. At the other end of the age spectrum, in February 2020, the project held an extensive three-day public workshop at Zzyzx in the Mojave Desert entitled "Charismatic Microflora: The Ecology and Management of Biological Soil Crusts." The workshop combined classroom lectures with hands-on activities at the microscope, and visits to the field. Topics addressed included: what a biocrust is, how it functions, how to identify biocrust organisms, and how these organisms manage to survive and reproduce in such a seemingly harsh environment. There was an emphasis on how to manage biocrusts,

which appealed to the diverse group of participants including land managers, consultants, agency botanists, ecologists, and amateur plant enthusiasts.


### Student Employment Opportunities Supported by Grants

In the extensive series of grants awarded by NSF's Advancing Digitization of Biodiversity Collections program to UC/JEPS, we have exclusively employed undergraduates who are part of the Work-Study program at Cal. These are students who have met financial needs criteria and come from a diverse set of backgrounds. Most students come in knowing little about plants or botanical science and it has been wonderful to see them learn on the job. Many continue to work with us for years, decide to take some plant classes, choose to become science majors, or even in some cases, attend graduate school in botany. There is thus a unique dual benefit of employing work-study students; we have gotten hundreds of

thousands of specimens digitized at high quality while exposing hundreds of undergraduate students to botany who would probably never otherwise have had that chance. I'd like to give a shout-out to long-time staff member Margriet Wetherwax, who in recent years has been the guiding light for students in the digitizing lab, and who just retired at the end of June. We (and they) will miss her!

### Public Outreach Supported by our Friends

Gifts from our *Friends* support the development of our electronic resources, which are available to all with no charge. Our extensive network of resources, with a particular emphasis on California, allows anyone with an interest to take a deep dive into the worlds of botany, systematics, and evolution. Our new Jepson Videos (on YouTube) are being used widely by faculty at universities across California and as the videos gain recognition, the number and breadth of students reached has also grown.

We at UC/JEPS will carry on our efforts and continue to expand our mission to educate the public and increase awareness of and inclusivity in science. We welcome feedback and ideas on how we can grow. 

Top Photo: Ixchel Gonzalez teaching a workshop at a STEM conference for middle-school girls in the Bay Area (photo by Jenna Ekwealor).



Bottom Photo: Biocrust workshop lecture by Matt Bowker (photo by Brent Mishler)



Left Middle Photo: Biocrust workshop participants in the field (photo by Joe Flynn).



Above Photo: Student digitizers at work in the Herbaria, prior to the pandemic. (photo by Amy Kasameyer).

## GLORIA Great Basin and a Long Term Vision

By Jan Nachlinger, Lifetime Member of the Friends of the Jepson Herbarium

On a late July day each summer a group of GLORIAteers is high on a peak either along the eastern crest of the Sierra Nevada or a ridgeline in the Great Basin enjoying distant views of neighboring valleys and ranges as we document the presence and abundance of alpine plants. GLORIAteers are professionals, citizen scientists, and volunteers working for GLORIA Great Basin (GGB), an organization tracking climate change on thirty mountaintops in the Great Basin region of California and Nevada where species are spatially limited in their ability to adapt and survive over time. GGB is a regional body of the international GLORIA network, which is an acronym for Global Observation and Research Initiative in Alpine Environments ([gloria.ac.at](http://gloria.ac.at)).

GGB is about people, plants, and peaks in inspiring places. Many of the people involved are scientists, agency personnel, and university students, and include volunteers who come from far and wide with personal concerns about the effects climate change is having on alpine plant communities. The core GGB scientists, once all studying in California institutions, are now stretched across the country with their early career positions. They are Seema Sheth, GGB Science Director and Assistant Professor in plant evolutionary ecology at North Carolina State University; Meagan Oldfather, GGB Co-Director and Postdoctoral Scholar at University of Colorado, Boulder; Brian Smithers, GGB Co-Director/Field Coordinator and Research Assistant Professor at Montana State University; and Michael Koontz, GGB Secretary and Postdoctoral Scholar with the Earth Lab and CIRES at University of Colorado, Boulder. Agency partners include the USFS Pacific Southwest Research



Frequency measurements in a 10x10 m plot are being taken here at the lowest of four peaks in the Dunderberg target region. The background range beyond Mono Lake is the White Mountains where two GLORIA target regions occur on silicate and dolomite substrates. (Photo by Jan Nachlinger)

Station (PSW), Humboldt-Toiyabe National Forest, Inyo National Forest, Yosemite National Park, Sequoia & Kings Canyon National Parks, Great Basin National Park, and Death Valley National Park, among others, all with committed researchers, land managers, and park and forest ecologists. Although there are too many cooperating individuals to name here, a special shout-out is crucial for Connie Millar at PSW, co-founder of the North American GLORIA Chapter. Simply put, we are here because of her. And there are more than a hundred students and volunteers, some returning season after season to identify plants, estimate abundances, lay string plots, set up quadrats, take images, bury temperature sensors, and count hits of rock, scree, and bare ground. They endure steep climbs, chilling alpine winds, mosquitos, hail, distant thunder, and quick scrambles off peaks in inclement weather with potential lightning moving in. They use diminishing light or headlamps at the end of long days to verify plant identities using the *Jepson Manual* or the *Jepson eFlora* if there is connectivity. To name a few, they



The rare *Eriogonum ovalifolium* var. *caelestinum* occurs only in the high central Sierra Nevada and in the Toiyabe Range in central Nevada. The plant just behind it is the commonly encountered alpine subshrub *Linanthus pungens*. (Photo by Jan Nachlinger)

are Ellen and Michael from Oakland, Kimiora from the Sierra foothills, Tom and Barbara from Inverness, Stella from the south Bay Area, Jamey and Logan from Reno, Dylan from Santa Cruz, and Jodie, Drew, Melissa, Alison, Ken, and Kristin. They bring their unique skills, love of the high mountains, enthusiasm for the project, and hope for the future.

Among the plants encountered at the selected peaks there are the nearly ubiquitous alpine finds: *Elymus elymoides*, *Erigeron compositus* and *E. pygmaeus*, *Castilleja nana*, *Eremogone kingii* var. *glabrescens*, *Selaginella watsonii*, *Phlox condensata*, *Koeleria macrantha*, and *Linanthus pungens*. Do they have genetic, morphological, physiological, or dispersal traits that will allow them to survive, if not thrive, in a potentially drier and warmer peak environment? Will we record declines, flat lines, or increases in their abundance and distribution over time? Is thermophilization occurring—the process where warm-loving species increase in presence and abundance? Will cover of woody plants increase,

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her to stay connected with herbaria and natural history collections throughout her career.

During her undergraduate years at the University of Chicago, where she majored in the History, Philosophy and Social Studies of Science and Medicine, Klara pursued an opportunity to volunteer at the Field Museum of Natural History in the Botany Department. This is where she was first introduced to lichenized fungi and the lichen symbiosis. Who knows whether it was the cool setting of the Field Museum research area (a whole labyrinth behind the public exhibits), the tremendous enthusiasm expressed by the graduate researchers she was working with, or the fact that lichens are fascinating rule-defying holobionts, but she has been passionate about lichens and lichenological research ever since.

Klara's passion for fungi and lichens led her to dive deep into the world of fungal symbioses. For her master's thesis at Florida International University, she investigated the impact of arbuscular mycorrhizal fungi on the salinity tolerance of native and invasive legumes in the pine rockland ecosystem. For her Ph.D., she turned back to lichens. Her doctoral dissertation focused



*Klara Scharnagl doing field work for her dissertation in North Carolina. (Photo by Matthew Chansler)*


on the latitudinal diversity gradient of lichens in the Americas. She both used and contributed to lichen herbarium collections throughout this work.

Klara is currently co-PI of a long-term research project on Niwot Ridge, Colorado, investigating community turnover and the impacts of climate change on alpine plants and lichens. In addition, she is involved in a long-term collaboration monitoring the recovery of epiphytic lichens under different tropical forest restoration strategies in Costa Rica. In addition to lichens, her

research interests include evolution through deep time and colonization of land by photosynthetic organisms, symbiosis and the role of cooperation in ecology and evolution, salinity gradients and the role of sodium in ecosystem and physiological functioning, and fungal growth and communication.

Klara enjoys exploring new places, and getting to know the fungi, lichens, and slime molds that reside there (and the people too!). She loves sharing this wonder with others and has participated in many community engagement events throughout her career. She is currently serving on the Executive Committee of the American Bryological and Lichenological Society and is also currently serving as a PLANTS mentor and Planting Science liaison through the Botanical Society of America. She is very passionate about fostering inclusive communities at all levels of scientific research, education, and communication.

Klara is very excited to join the botanical team at the University and Jepson Herbaria, to get to know and grow the lichen collection, and to get to know the lichens of California. At a time when many collections are being defunded or down-sized, she believes it is time to shed some new light and energy on the importance of natural history collections and to rethink the way we interact with both the physical and the digitized specimens. Klara is overbrimming with ideas and is excited to share these with you soon! She is looking forward to leading forays and projects in urban, suburban, and wild environments and to investigate patterns of lichen communities along environmental (salinity, elevational, latitudinal) gradients. She is also excited to continue collaborations based on her current postdoctoral research (at the Sainsbury Laboratory in Norwich, UK) on the molecular and environmental mechanisms through which the lichen symbiosis is initiated and maintained.

You can read Klara's poem *The Lichenarium* on page 10. 

## Endowment Funds Support Vital Staff Positions



*Shirley Tucker (in 2016) standing beside her name, which is inscribed on the Builders of Berkeley monument at UC Berkeley. The monument honors the vision, leadership, and commitment of the university's leading benefactors.*

The Tucker Curator of Lichenology is supported by an endowment fund established by Dr. Shirley Tucker, a distinguished scholar whose accomplishments in lichenology, as well as other areas of botany, have been widely recognized. We sincerely thank Dr. Tucker for her generosity and foresight. Her gift ensures that lichenology research will continue at the University and Jepson Herbaria and that we have the staff and resources to house and curate lichen specimens and share information about lichens with the world.

## Alumni and Graduate Student News

### Bryophytes in the News: What can be Discovered if you Turn Over Rocks!

Jenna Ekwealor's research on desert mosses was recently featured in the New York Times (July 29, 2020)! Jenna is a graduate student working with Brent Mishler and she and her former Master's advisor, Kirsten Fisher (Mishler lab alumna, now a faculty member at California State University, Los Angeles) have discovered something interesting in the Mojave Desert. Some mosses find protection from the



The study site was in the rocky, dry Sheep Creek wash in the Mojave Desert. (UC Berkeley photo by Jenna Ekwealor)

relentless sun and heat by sheltering under translucent quartz pebbles, essentially using the rocks as sunshades. Last winter, their research continued and they placed temperature and humidity sensors under milky quartz pebbles to record the microclimate. They found that the rock acts as a buffer for the extremes of the climate at their desert study site, which is at high elevation where it gets really hot in the summer and really cold in the winter. The quartz rock keeps the mosses underneath cooler during the hot parts of the year and warmer during the cold periods. The rocks also provide increased relative humidity, an important factor for these plants that dry out when the relative humidity is too low.

Jenna is fascinated by the tiny world of mosses and leads local moss walks for the bryophyte chapter of the California Native Plant Society. Her research reminds us that we have to

remember to see the world from the perspective of a very small plant. 🌿

*A link to a longer version of this article, written by Robert Sanders, may be found on the Herbaria's web site.*



*In the Mojave Desert, a translucent quartz rock keeps the soil moist, the moss green and cuts the intensity of sunlight. Nearby moss shrivels and turns black in the dry air and intense desert sun. The moss species is *Syntrichia caninervis*. (Photo by Kirsten Fisher)*

### A New Face in the University and Jepson Herbaria

This fall, David Adelhelm will join the Rothfels lab as a Ph.D. student. He is interested in studying the evolution and ecology of polyploid ferns. At UC Berkeley, he hopes to better understand how a fern's niche may evolve following a whole genome duplication event. David recently completed a Bachelor of Science degree in botany at the University of Florida.

During his time as an undergraduate student, David worked as a research assistant in the Sessa and McDaniel labs, participating in a variety of projects surrounding the evolution and population genetics of seed-free

plants. Part of his ongoing research focuses on the morphological consequences and adaptations of polyploidy (the state of having higher than "normal" chromosome copy number) in the North American *Dryopteris* hybrid complex.

Outside of the lab, David volunteered at the FLAS herbarium where he helped restore bryophyte collections from the 1800s. He also helped teach summer camps in Orlando whenever possible and looks forward to more teaching and outreach opportunities as a graduate student at UC Berkeley. 🌿



*David at Cedar Key conducting fieldwork for coursework in Ichthyology (photo by Jennifer Cumbie).*

Save the Date! Alumni & Graduate Student Virtual Event  
October 3 at 11 am – Details soon!

## A Message to our *Friends* About the Jepson Workshop Program

This year has been unlike any other. The pandemic has affected each of us and every aspect of our society.

We started the year with an ambitious line-up of workshops and events and by mid-March shelter-in-place orders were issued and we began working remotely. In the best interest of our instructors and participants, we immediately began canceling and rescheduling workshops. As the months went on, more workshops were cancelled and then, in mid-July, the final decision was made by the Chancellor of UC Berkeley to cancel all in-person workshops for the entire campus community through December 31, 2020. The impact on our program has been severe. As many of our *Friends* know, the income from the workshop program directly supports the position of Public Programs Coordinator. Therefore, it is our sad duty to share the news that we were not able to continue this position. Please join us in honoring Allyson Greenlon's many contributions to our public programs and to the Herbaria as a whole. We will really miss her dedication to sharing knowledge about plants with others, her hard work to create and run engaging programs, and the creative and positive energy she brought to the Herbaria.

We also thank all of our *Friends* and the instructors who have supported the Jepson Workshop program over 26 wonderful years. We don't know what the future holds but one thing is certain, when it is safe to offer workshops again, we will begin and the plants will be there for us.

We anxiously await the time when we can see you all again and share our mutual appreciation of the California flora! 🍷

Right: A Parmotrema seen during the Lichen workshop (photo by Joe Flynn).



Below: Biocrust workshop participants, starring biocrust in the foreground (photo by Mandy Slate).



Bottom Right: Participants hiking at the Amargosa Workshop (photo by Sophia Winitsky).



## *Friends of the Jepson Herbarium*

### Members' Night

Saturday, October 17, 2020

A virtual event

Every other year, we host an event for members. In past years, we've hosted Peter Raven for an engaging discussion, honored the establishment of an endowment fund that supports the position of Tucker Curator of Lichenology, and celebrated 25 years of Jepson Workshops. These have all been wonderful events and the energy among our botanical friends and colleagues is uplifting and inspiring.

This year we had hoped to host a similar live event, but because of the pandemic we will host it as a virtual event. The topic will be a look at recent research on California plant diversity and conservation conducted by Brent Mishler and Bruce Baldwin. One upside may be that more of our friends from across the state and beyond can join the conversation.

Event details will be coming soon. For now, save-the-date! We hope to see you all soon!

*The event will be preceded by a four-hour online workshop titled "New phylogenetic approaches to assessing California floristic diversity, endemism, and conservation priorities." To register, please visit our website.*

## Grant-Funded Projects Still Operate During the Pandemic

The pandemic has affected the entire world and severely disrupted just about everything. We hope our friends and colleagues are safe and healthy. In March of this year, when the shelter-in-place orders were issued, faculty, staff, and students had to quickly move off campus and begin the process of settling into remote work, instruction,



Ana Penny digitizing specimens in the Herbarium (photo by Staci Markos).

and learning. Some of the most negative impacts have been in our outreach programs (see previous page) and our specimen digitization pipelines. The digitization efforts are largely operated with undergraduate students and, since students have not been allowed on campus, direct work with specimens has been halted (for now). The students were able to keep working remotely, however (databasing specimens that were already imaged) – and we thank each of them for their excellent effort and flexibility!

Following strict safety guidelines and protocols, our collections management team is back in the herbaria and can answer questions about specimens by email or phone. The fall semester will allow a few students to come back to campus, so we will be able to begin digitizing specimens again (albeit at a much smaller scale).

The Jepson Video project is going strong, with new videos released each week. We hope these videos will help faculty across the state as many of them begin teaching remotely. If you haven't already subscribed to our YouTube channel, sign up today to receive notification when a new video is posted! 📺



Caulanthus anceps from one of the newest Jepson Videos.

## Jepson Illustrations: Uses and Updates in the *eFlora*

The illustrations in the second edition of *The Jepson Manual* have been used in a variety of ways. A recent example includes using the illustrations on signs along the interpretive trail at Huckleberry Botanic Regional Preserve in the East Bay Hills. According to the park district, the preserve is an "... ecological jewel. The native plant community is found nowhere else in the East Bay. It represents a relic plant association found only in certain areas along California's coast where ideal soil and climatic conditions exist." We are happy to share TJM2 illustrations for educational

purposes. Have a project you'd like to discuss? Please email Staci Markos (smarkos@berkeley.edu).

In other illustration news, we have an important update for users of the *eFlora*, over the past several months, Roxanne Andersen has worked to update the names on illustrations for taxa that have undergone revision since TJM2.

Some good examples of such taxa include *Dodecatheon hendersonii*, now recognized as *Primula hendersonii*, *Mimulus pictus*, now recognized as *Diplacus pictus*, and *Orobanche corymbosa*, now recognized as *Aphyllon corymbosum*. In total, nearly 200 illustration units have been updated and should be included in the *eFlora* soon. 📺



Jepson illustrations used on signs in Huckleberry Botanic Regional Preserve.

(*Johnstonella* continued from page 1)

aside as the students dissected material of the common species they had collected. For some students this was the first time they'd used a dissecting microscope, essential for looking closely at the size, shape, and sculpturing pattern of the nutlets, features like these used to characterize and identify members of the Boraginaceae. Well, the workshop went on, with a field trip the next day to collect a greater diversity of borages, one highlight being *Eremocarya lepida*. The students were among a select few to observe “fornix bodies” in this species, these not known to occur in any other flowering plant, and whose function is still unknown; see Simpson et al. 2014. Madroño 61:259–275. Because of the flurry of activities going on in a workshop like this, I had forgotten about this unusual looking borage, until toward the end of the last day when I asked Stella to collect a little more material. It was only back at SDSU, however, that I closely examined these specimens, having one of those little moments of discovery, “Hmm, wait ... this shouldn't occur here! ...” The unusual looking plant turned out to be *Johnstonella angelica*, a species previously known only from Baja California, Mexico. This discovery was a 240 mile northward range extension of the species and is a first county, state, and country record. This

species was named originally in 1924 by I. M. Johnston (an expert of the family) as *Cryptantha angelica* after Isla Angél de la Guarda (Island of the Guardian Angel), the type locality. The samples collected by Jillian and Stella were processed into voucher specimens, now on the CCH2: SDSU22760, SDSU22773, plus one at SD awaiting processing). These two students contributed to a publication of the discovery: See Simpson, Stephens, and Yang. 2020. Madroño 67:5-8 for details.

In late February 2020, I was accompanied by two botanists, Rebecca Crowe, of the IRVC herbarium, and Brenda Bennett, a San Diego botanist, to survey for *Johnstonella angelica* in order to see if it was still present in the area and to what degree. We soon realized it was a bit early in the season but were able to find some small plants, just coming into fruit (making a single vouchered collection with photographs: SDSU22842). In one spot, we counted 46 plantlets, concluding that this species was at least well established in the immediate area. But, even after acquiring a search image for the plant, we found no other populations. I lamented surveying a little too soon and vowed to return a couple of weeks later, when the esteemed Peter Raven was planning a visit as part of a scheduled Bioblitz of the Research Center property. Of course, all was cancelled as the scale of the COVID-19 pandemic began to be realized. A more complete survey will have to wait until 2021.

How did this plant get there? So far, it is only known in the U.S. from a natural desert wash adjacent to the Steele Burnand Research Center in Borrego Springs. Should it be considered to be native or naturalized? Was it, as is not



*Johnstonella angelica*. Photograph by Michael Simpson, of Simpson 4316, 29 Feb 2020 (SDSU22842).

uncommon in this subtribe of the family, dispersed long-distance, most likely by birds? (See Guilliams et al. 2017. American Journal of Botany 104:1717-1728). Or, given its proximity to the Center, was it brought in on the boot or knapsack of a participant in a past workshop, or on the tread of a tire? We may never know for sure, but perhaps detailed molecular studies could narrow down the closest Mexican population to this one in the United States. At least now the word is out, for other botanists to be on the lookout for this species in adjacent desert habitats. If the species is concluded to be native, it would certainly be quite rare. But, it is apparently now reproducing prolifically and can no longer be considered a sporadic “waif”.

In conclusion, students can make important discoveries, as these two did in this workshop. It was they who first noticed a plant that looked a little different. Two things come to mind. First, the danger of expectations, in both science and in life. We often are deceived by them, in this case the expectation that the plant over there would be the typical one seen over and over that day. Second, the eyes of the novice. Students (and children), being inexperienced but full of wonder, will often notice things that the more seasoned of us might gloss over as common and unimportant. We should learn to listen to them. 🕒



Drone View looking NW at the Steele Burnand Anza-Borrego Desert Research Center (Photo by Dave Lynch, March 2, 2019)



## Margriet Wetherwax Retires from the Herbaria

On June 30th, Margriet Wetherwax retired. Many of our Friends and associates know Margriet from one of the many projects she has been involved with over the years.

We thank Margriet for everything she contributed to the Jepson Flora Project, collections management, the Jepson Workshops, and botanical research. Her efforts significantly contributed to the success of all that we do and we will sincerely miss her!

We asked Margriet to share with us a short list of the projects she was involved in, and while we knew she had worked in almost every aspect of the herbarium, it was still a surprise to see it in writing. Below she shares her herbarium experience.

“I arrived at the Herbaria in 1988 as a volunteer, working with Larry Heckard. I had left a job at the UW Madison Herbarium and was looking for a place where I could apply my knowledge and hone my skills. I assisted Larry with his research on *Castilleja*, counting fertile pollen grains of *Castilleja* hybrids and I helped move the Herbaria off campus so that our building (VLSB) could be remodeled. During that time, we also began working on the revision of *The Jepson Manual*. I authored several treatments and worked with illustrators and authors to copy edit and proofread their treatments. Sadly, Larry died before *The Jepson Manual* was completed but his spirit lived on and *The Jepson Manual: Higher Plants of California* was published in 1993.

In 1994, the Herbaria were moved



Left: Margriet at Member's Night 2016 (photo by Ana Penny). Right: Jepson Workshop, Flora of the Central Sierra 2003 (photo by Staci Markos).




back to the remodeled VLSB on the main campus. Bruce Baldwin joined the Herbaria as the Jepson Curator and I assisted him with tarplant research in the greenhouse. I also worked in the Jepson Library, cataloging books, organizing and maintaining references and journals, and organizing a book donation program for the *Friends of the Jepson Herbarium*. The Jepson Workshop program had begun and over the next 10 years or so, I taught workshops on various topics.

Beginning in 1999, I was the Managing Editor for the *Jepson Desert Manual* and I also wrote treatments, revised keys, worked with our page setter (UC Press), and many treatment authors. During this same time period, I became involved with a grant from the California Army National Guard to work on floristic surveys for Camp Roberts and Camp San Luis Obispo.

The next big project was TJM2 (published in 2012). That project brought more authors, more editing, more treatments to write, and more copy editing.

In the final years of my appointment, my duties shifted to Collections Management where I organized the Cryptogamic Library, curated the lichen collection, and managed students working on digitizing grants for algae, lichens, bryophytes, fungi, pteridophytes, mistletoes, and angiosperms.

My plans for the future include selling my house and moving to Oregon. But, meanwhile, I will be spending some volunteer time in the Herbaria working on the NSF Phenology grant, mostly imaging. I also have a couple of herbarium cases with my specimens that I have not had time to pay attention to until now!

Thanks all for a good time!” 

### Addendum to the Spring 2020 Globe

In Dennis Mudd's cover article on California lepidoptera in the Spring 2020 issue of *The Jepson Globe*, there was some confusion among our readership about the meaning of the term “host plant,” which refers to the plants utilized as food by the herbivorous larvae of butterflies and moths, rather than to the plants utilized as nectar sources by adults.



## The Lichenarium

A poem by Klara Scharnagl

Thank you to all the places,  
That, knowingly or not, allowed  
Explorer's trespass, whose eyes caught,  
While notes were furiously scribbled,  
Their cryptic quarry.  
The scraping of field knives  
The hammering of chisels  
The folding of paper packets at dusk  
Against the backdrop of frog and insect chorus

Thank you to the border crossing  
That stopped plants, soil, dung, blood  
But not the lichens -  
Air dried, considered benign  
Now safe in their cool dark cabinets

Thank you to the rocks and trees  
The many substrates that supported  
These strange creatures  
Then, chipped and hewn,  
To collect the stories of  
The place that once had been

Thanks to the signposts, recipes, lore  
Thanks to remaining mostly overlooked  
But to those who stopped to notice  
To, with hand lenses, illuminate  
Thanks to all who came before  
Who sought to understand  
These tough yet brittle forms  
These mysteries symbiotic

To those forms most wonderful  
And those more deeply hidden  
To your ponderful slow growth  
And to your medicine  
The weaving of the hyphae  
The photosynthesis  
The lichen as a landscape  
And all who dwell within

Behold the Lichenarium  
And the lichens waiting there  
Of your names and of your stories  
We will take the utmost care


Before we step into this library  
We take pause our thanks to give  
To all that are of lichens  
That once did, and now still, live.

(GLORIA Great Basin continued from page 3)

changing structure and function in alpine plant communities?

What about the occasional or rare alpine plants we find on only one or a few peaks: *Anelsonia eurycarpa*, *Festuca minutiflora*, *Androsace septentrionalis*, *Draba breweri* and *D. oreibata* var. *serpentina*, *Erigeron algidus* and *E. grandiflorus*, *Polemonium chartaceum* and *P. viscosum*, *Poa abbreviata* subsp. *pattersonii* and *P. keckii*, *Primula parryi*, *Potentilla holmgrenii* and *P. morefieldii*, *Boechera depauperata*, *Carex incurviformis*, *Astragalus gilmanii*, *Eriogonum gracilipes* and *E. ovalifolium* var. *caelestinum*? The rarest are likely the most susceptible to extinction in their potentially diminishing mountaintop habitat where there is no nearby connectivity to appropriate sites. Will we document biotic homogenization—increasingly similar alpine plant communities at the cost of rare species losses? Will we see changes first on warmer south and west exposures?

The thirty peaks typically re-measured on a five-year timeline encompass the breadth of Great Basin landscapes and climate regimes. The three areas we call target regions located along the eastern Sierra Nevada spine encounter dry-summer Mediterranean regional climates, in contrast to the rain shadow effect in the Sweetwater Mountains, White Mountains, and Nevada's Snake Range with more typical Great Basin dry-summer cold-winter interior climate regimes, and in the southernmost region in the Panamint Range with a dry and hot summer desert climate. Each peak is unique in its flora, climate, geologic substrate, and topography but each target region is composed of peaks similar enough to be able to make comparisons among their peak elevational gradients. In the White Mountains, deemed a GLORIA master site, we take additional measurements on downslopes below four peaks on two different substrates to better understand the flora that we may eventually see moving up onto the mountaintops. Will these contrasting climate regimes respond differently to climate change?

Eight peaks were initially set up in 2004 with the most recent four additions in the Panamint Range set up nine years later. So, ecologic and climatic data have been collected for sixteen years at most. Consequently, we have initial descriptive presence, abundance, temperature, and snow duration information available now. We are still well within a timeframe of recording potential changes from shorter term weather cycles and we do not expect to be able to reliably link documented ecological changes to climate change for perhaps a thirty year timeframe. In that time, we know we will see scientists, volunteers, and partners come and go. We are fortunate to have some participants from the very beginning, including Connie Millar and Jim and Catie Bishop, providing the continuity needed on long term projects. We have started analyzing some of the initial data and have publications and documents on the website. Our plan is to continue encouraging a younger cadre of team members to get involved and be inspired to carry on the GLORIA Great Basin vision for many generations to come. Sign up at our website ([www.gloriagreatbasin.org](http://www.gloriagreatbasin.org)) or email Brian at [brian.smithers@montana.edu](mailto:brian.smithers@montana.edu) if you would like to participate. 

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## 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 Botany:**  
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 & Plant Identification:** Kim Kersh and Ana Penny

**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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*Achyrachaena mollis*



*Pseudotsuga*



*Geraea canescens*



*Sisyrinchium bellum*

### **Upcoming Jepson Events & Workshops**

Friends of the Jepson Herbarium  
Virtual Members' Night  
Saturday, October 17, 2020

Alumni & Graduate Student  
Virtual Event  
October 3 at 11 am

#### ***Virtual Workshops:***

Spatial phylogenetics: A "big data"  
approach integrating ecology, evolu-  
tion, and conservation  
October 17, 2020

Poaceae I  
December 10 – 11, 2020

Poaceae II  
December 12 – 13, 2020