Friends of the Herbarium

The Chico State Herbarium
California State University, Chico

Volume 27 Number 2

October 2021

Fall Newsletter

Articles in this Newsletter:

Announcing:
Friends of the Herbarium Annual Meeting

October 21, 2021
6:30—8:00 pm
Virtual Meeting (via Zoom)

Guest Speaker: Julie Kierstead

Professional Botanist
US Forest Service—Retired

Botanizing the Trinity Ultramafic Sheet in the Klamath Mountains of Northwest California

More information on page 2

Also included:

Jim Jokerst Botany Award winner—Claire Monahan
"Post-Fire Regeneration of Blue Oak Woodlands: Comparisons of Wild-fire and Prescribed Burns"

More information on page 8

Plus Herbarium and Friends' Updates

(Check the Friends website for the Zoom link)

The **Friends of the Chico State Herbarium**, California State University, Chico, was formed to help maintain the high quality of work known to be associated with the Herbarium. The primary purpose of the group is to provide community support for the Herbarium. This includes raising funds for items that are not covered under the University budget, in particular the curator's position. Scientific and academic pursuits as well as community outreach are the focus of the group. The Friends also offer low cost workshops and classes on various botanical topics.

The **Friends of the Herbarium** operates under the auspices of Chico State Enterprises at the California State University, Chico, and as such enjoys non-profit status and has access to the use of University classrooms and equipment.

Memberships are renewed on January 1 of each year.

Newsletter

Volume 27 Number 2

The Newsletter is published two times per year by the **Friends of the Herbarium**, California State University, Chico. Subscription is free with membership. Submissions on herbarium-related topics are welcome.

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Botanizing the Trinity Ultramafic Sheet in the Klamath Mountains of Northwest California

Julie Kierstead

What makes the Trinity Ultramafic Sheet special floristically? A combination of diversity of topography, elevation, substrate; a lot of water—snowmelt, groundwater, springs, rivers and perennial streams; a lot of rock; large continuous areas of serpentinite and peridotite; and the great age of the landscape, are what makes this a special place for people who love plants. We will discuss geology, logistics of getting to the good places, and we will present information on endemic and disjunct plants of the area.

Julie Kierstead has been a professional botanist since 1976, doing rare plant surveys and conservation work in Oregon and California. She has a B.S. in botany from Oregon State University and an M.S. in biology from Northern Arizona University, and worked in the herbarium at both schools. Julie worked for Berry Botanic Garden in Portland as conservation director from 1982 until 1988, developing a seed bank for rare & endangered plants of the Pacific Northwest, and lobbying for the Oregon state Endangered Species Act. From 1989 to 2019 she was Forest Botanist for the Shasta-Trinity National Forest in Redding, CA; she retired from the Forest Service in 2019. With Gary Nakamura she edited the 2001 publication Field Guide to Selected Rare Plants of Northern California, published by the University of California. Recently she's coauthored papers naming several new rare northwest California endemic plants, including *Vaccinium shastense*, *Adiantum shastense*, and *Erythronium shastense*; a monograph of *Sedum* subgenus *Gormania*, a new *Allium* (in press), and she coauthored Ken DeCamp's Wildflowers of California's Klamath Mountains (2021). Julie has served on the boards of Northern California Botanists, the California Native Plant Society certification board and Calflora. She is a member of the CNPS Rare Plant Program Committee, and is a CNPS California certified consulting botanist. Julie has taught several Jepson field workshops in northwest California. Oh, and she has two fabulous grown sons, one in Sacramento and one in Portland!

Photo by
Julie Kierstead

Back in Business at the Herbarium

By Cindy Weiner

Workstation for databasing specimens.

Photo by Cindy Weiner

The Chico State Herbarium was forced to close its doors in March 2020, near the beginning of the Coronavirus epidemic. Those of us who regularly spend time there were hoping it would be able to reopen after a few months. Instead, the campus switched over to distance learning for the school year beginning in August, and campus buildings were off limits to the general public. Lawrence Janeway, Herbarium Curator, and Nancy Groshong, Herbarium Assistant, returned to work under strict University guidelines, but Herbarium volunteers were still banned from the facility. Happily, volunteers were finally allowed to return on June 10 of this year, and the Herbarium finally reopened to the public in mid-August. Long-time volunteers Barb Castro and Cindy Weiner are very happy to be back, along with Herbarium Research Associate Rob Schlising. In addition, two new volunteers, Noelle Davis and Amanda Howey, have joined the team. Noelle recently moved to Chico from Santa Barbara, where she volunteered at the Santa Barbara Botanic Garden Herbarium. Amanda graduated from CSU Chico in the spring with a degree in biology and is taking a gap year before starting grad school. Cindy and Amanda are keeping busy adding newly accessioned specimens to the Consortium of California Herbaria database. Nancy continues her work to make digital images of the specimens to link with their information in the database. About 50% of the vascular plant specimens have been imaged so far. Barb and Noelle file the specimens after they are imaged. The Director of the Herbarium, Colleen Hatfield, comes by each Friday to check how things are going, happy to see the Herbarium back in business. The Herbarium is open to the public, by appointment only, on Fridays from 9 am-5pm. Email Lawrence at ljaneway@csuchico.edu to arrange an appointment. Masks are required indoors on campus. The Herbarium is located in Room 129 in Holt Hall. The door is generally locked, so you'll need to knock upon arrival.

Things are almost back to normal for Fridays in the Herbarium. (From left to right: Amanda Howey, Cindy Weiner, Rob Schlising and Barb Castro)

Photo by Colleen Hatfield

Lost & found: Meeting a Rare Bumble Bee in Plumas County

By John Whittlesey

You never know what you might discover on a mountain outing - a flower you've never seen, or mating robber flies that have the same coloration as the bumble bee just seen on the lupine. There is always something if we take time, look, listen – stay present and aware. On this day Jennifer Jewell and I were visiting Brady's Camp, a meadow outside of Quincy in Plumas County to look for flowers, flower visitors and leave the valley heat behind for few hours. Checking out bumble bees was definitely part of our agenda.

John in the meadow attempting to photograph *B. occidentalis.*
Photo by Rob Schlising

Despite the exceedingly dry season plenty of flowers were in bloom, and lots of bumble bees were visiting the colonies of *Monardella* and stands of *Agastache urticifolia*. The nearly always ubiquitous yellow face bumble bee (*Bombus vosnesenskii*) was the predominant pollinator at these two plants along with a few of the smaller *B. melanopygus.*

Jennifer had wandered into a small glade under a grove of lodgepole pine where the white umbels of Gray's lovage (*Ligusticum grayi*) were swaying in the breeze. She excitedly called to me to come over as she thought she'd seen a different bee. I hustled over, but the bee had flown off. She insisted I wait, which I did. The bee returned, but as I advanced carefully with camera poised it flew off again. This scenario was replayed several times, until at last the bee got close enough to get a good visual and take a few photos. With the breeze, and the fact that the bee spent maybe two seconds scurrying about over the umbel of small white flowers collecting well-focused photos was challenging. At some point I said that I thought we might be seeing *Bombus occidentalis*, the Western bumble bee, a bumble bee that while once common is now rare. Very rare, in fact.

In 2012 the late Robbin Thorp – who was California's native bee expert – was on a field trip searching for the exceedingly rare, and probably now extinct, Franklin's bumble bee up on a Mt. Shasta meadow. While

Closeup of Bombus occidentalis on Gray's lovage
Photo by John Whttlesey

Bombus occidentalis on Gray's lovage
Photo by John Whttlesey

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he did not find a Franklin's, he was thrilled to find a Western bumble bee (*Bombus occidentalis*). The group of naturalists with him were equally excited, as even in 2012 a sighting of *B. occidentalis* was already a rare find. The colony Jennifer and I were lucky enough to witness in Plumas County was one of only two documented observations of *B. occidentalis* in California this year.

Gray's lovage umbel

Photo by Jennifer Jewel

A week after Jennifer and I were there, Rob Schlising and I re-visited the site. There were more *B. occidentalis* than the first trip. We netted a couple, cooled them down, photographed them carefully for documentation and verification purposes and then released them back where we had caught them. The identification was confirmed by experts on iNaturalist, and Colin Dillingham, the Wildlife Biologist for the Mt. Hough Ranger District in the Plumas National Forest district where we found the bee, was notified about the sighting. Colin and I set up a day to meet, but then the Dixie Fire erupted.

At this point, the fate of these *Bombus occidentalis* colonies is uncertain. Fire fighters cut lines on ridges above the meadow and cut down smaller trees in the area of the meadow. The fire was kept at bay and the meadow did not burn. However, significant dozer activity took place around the meadow. We can only hope the colony/colonies survived the dozer activity, or that some new queens have been reared, that they've found males to fertilize their eggs, and finally that they've found a safe place to wait out the rest of the year until the warmer days of next summer bring them back out to start their nesting and the next generation. At this point, every native bumble bee matters a great deal to the ecosystems with which they co-exist. And while every species of native bumble bee is under some pressure, we know that there is still a chance for *Bombus occidentalis* in California.

Jokerst Awardee—Claire Monahan

The Friends of the Herbarium sponsors the annual Jim Jokerst Field Botany Award for graduate or undergraduate student projects. The recent awardee for the Jokerst Award is Claire Monahan. Her project is entitled "Post-fire Regeneration of Blue Oak Woodlands: Comparison of Wildfire and Prescribed Burns." Claire is interested in comparing regeneration patterns of woody species, specifically focusing on blue oak (*Quercus douglasii*). To do this, she is comparing woody seedling abundance in both natural and prescribed burn areas with varying burn severity as well as adjacent dozer lines created to fight or manage the fires. It is well documented that blue oak vegetation communities are on the decline in California. Claire's research will provide insights into how fire severity and fire management impact these sensitive communities and their potential to bounce back.

Claire in the field sampling oak seedlings

Photo by Kristen Kaczynski

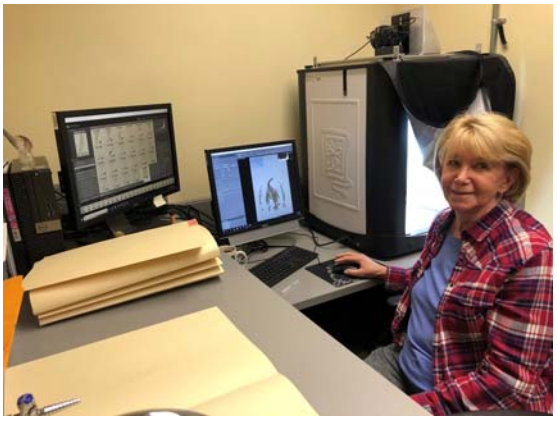
Claire will present the results of her research that the award helps fund at the Annual Meeting in mid-October. We hope you can join us for this interesting talk.

Herbarium Update—Fall 2021

by Lawrence Janeway, Curator

After four months locked out of the Herbarium at the start of the pandemic as part of the shutdown of the University, followed by a year of only our minimal part time staff being allowed to enter the Herbarium to work, it was a tremendous relief that with the University preparing for partial student in-person instruction in this Fall semester, in July the Herbarium could finally welcome back its steadfast volunteers and also welcome visitors.

During the University shutdown in 2020, I was still able to get into the Herbarium several times to be sure that the collection was safe and to deal with some other herbarium business, although each entry to the Herbarium required official approval. Once the University opened up for staff to again work on campus, I and the Herbarium's one other part time employee, as well as the Herbarium Director, were able to once again keep up with herbarium correspondence, deal with incoming specimens and loan and exchange shipments with other institutions, and other business. Nancy Groshong, our one employee, has continued concentrating on imaging our specimens, and barcoding them prior to imaging, such that we were able to greatly exceed our commitment to the NSF-funded California Phenology Thematic Collections Network.



Nancy Groshong at the imaging station in the Herbarium

Photo by Colleen Hatfield

Once the Herbarium was able to open to volunteers and visitors in July, we've welcomed back long-time volunteer and 2018 Friends of the Herbarium Distinguished Service Award recipient Cindy Wiener. In addition, Barbara Castro has greatly increased her volunteer time to weekly involvement. Two new volunteers, Noelle Davis and Amanda Howey, are currently being introduced to herbarium operations, which is most exciting for all of us in the Herbarium. Rob Schlising is also back as a regular visitor and occasional volunteer as he works on his own botanical projects and prepares some of his own specimens for donation to the Herbarium. A number of other visitors have come to the Herbarium to use the collection to help answer their varied botanical questions.

Barbara Castro and Noelle Davis, volunteers helping out in the Herbarium

Photo by Lawrence Janeway

The Herbarium, as usual, is now open every Friday 9:00am to 5:00pm. What is different, at this time, is that admission is *by appointment only*, by contacting me (via email at ljaneway@csuchico.edu) or the Director (chatfield@csuchico.edu). Appointments have been implemented not so much to restrict entry to the Herbarium, but to help us ensure that visitors fully understand University policy during these times of the continuing Covid-19 pandemic. Those policies include the wearing of masks

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The Endangered Butte County Meadowfoam – So Much Still to Learn

by Elena Gregg

I first heard about the endangered Butte County Meadowfoam (*Limnanthes floccosa* subsp. *californica*, BCM) back in 2006 when I started my career as a consulting botanist in the Chico area. It was clear to me right away as I entered the private consulting world that BCM was a touchy subject. For local developers and property owners it was like a dirty word since it was a "project killer" and I still remember the first new population of BCM I found and how upset the client was when they were informed of its discovery. The hostility toward this sweet innocent plant made me want to learn all I could about it and what might be required to protect and manage populations of BCM.

Fig 1. *Dialictus* sp. visiting a BCM flower at the Meriam Park Preserve

Photo by John Whittlesey

Butte County meadowfoam is part of a small family, Limnanthaceae, which has only two genera. The genus in which BCM occurs is often divided into two groups, Inflexae and Reflexae, based on the positon of the persistent petals during senescence. In Inflexae the petals fold inwards and enclose the seeds, or nutlets, and in Reflexae the petals bend back and expose the nutlets. BCM is in the Inflexae group and as the nutlets start maturing the petals and sepals envelop the nutlets and drop as a package when the nutlets reach full maturity. While there are numerous common species of meadowfoam that occur in the Sacramento Central Valley and some can even be found co-occurring with BCM, BCM is listed as both state and federally endangered since it is known to occur only within an approximately 28-mile strip of land through the center of Butte County and there are less than 30 populations of this species recorded. This plant primarily occurs in vernal swales and along the margins of vernal pools and typically starts flowering in March. Interestingly, each BCM flower has a short window of time (1 day) in which it is open for cross-pollination, after which it is capable of self-pollinating. While there is a great deal already described about BCM plants, there is so much still to learn, especially about their habitat requirements and management needs. In all of the published research I was able to obtain, there was limited information about modes of dispersal and specific pollinators of BCM. This was the impetus for attempts at some limited studies of my own.

Fig 2. Picture of an *Andrena* sp. visiting a BCM flower at the Meriam Park Preserve

Photo by John Whittlesey

Pollinator Observations

Past pollinator studies on various species of *Limnanthes* had been conducted, but no specific studies had been conducted for BCM. Based on these past studies two oligolectic, or specialist, native bees were identified as being associated with the genus of *Limnanthes*, *Panurginus occidentalis* and *Andrena limnanthis*. In the literature for BCM, it was only assumed that these two species of oligolectc bees were pollinating BCM as well. To see if this could be confirmed, I decided to set up some pollinator observation plots at some known locations of BCM. Setting up stationary plots turned out to be problematic for a variety of reasons. I even

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tried setting up a camera to record any pollinator visitors to the plots. I got very little useable data from this time-intensive method and primarily only saw European honey bees visiting BCM in these static plots. I knew the method had to change. I decided to try just meandering through the BCM populations and see if I could capture pictures of visitors to BCM and collect the pollinators observed for further identification. To help me in this endeavor, I enlisted the help of John Whittlesey. I knew of his amazing skills at capturing images of pollinators and so when he agreed to help, I was so excited! Access to the Meriam Park Preserve (a BCM preserve located within the city limits of Chico) was granted and John and Jennifer Jewell met me out at the Preserve to see what pollinators we could find. Initially we only were seeing European honey bees and tumbling flower beetles on the BCM flowers, but as the day warmed up we started seeing two different native bees visiting BCM. Amazing pictures of both of these native bees were captured by John (Figures 1 and 2). I also collected these two species of bees. I am only a true beginner when it comes to bee identification, so I asked Rob Irwin if he would look at the two bees collected. Rob determined the smaller of the two bees to be a species of *Dialictus* (Figure 1) and the larger of the two bees to be a species of *Andrena* (Figure 2). All though identifying bees down to species level is a difficult prospect, I will be pursuing this further in the future since understanding the pollinators of BCM is very important in understanding the management requirements for the long-term success of BCM preserves.

Dispersal Questions

The other aspect of BCM's life history that has intrigued me is its mode of dispersal, especially since the nutlets of BCM are rather large and the current known populations of BCM have considerable distances between them. Since BCM occurs in wet swales and along the margins of vernal pools, it makes sense that BCM nutlets would have some sort of adaptations to allow them to move within and be transported locally by water. Very few studies have been done on this that are actually in the field setting and not in controlled environments or man-made wetlands. A laboratory study was done to determine the floating capacity of meadowfoam nutlets. Based on this study, BCM nutlets were observed floating for up to 3 days. However, in the field, I have observed the entire package of BCM nutlets, encased in their petals and sepals, floating and wondered if this might extend the period in which individual BCM nutlets might be able to float. Also, when using dip nets in vernal features known to support BCM during the winter time when the features are inundated, I found BCM and rosy meadowfoam (*Limnanthes douglasii* subsp. *rosea*) seeds captured in the net floating in water after capture (Figure 3). This made me also wonder, if I was kicking up seeds from the bottom of the pool and causing the nutlets to move through the water during the inundation phase of these vernal features, could cattle grazing on this land walking through and drinking water from these vernal features ingest BCM seed by accident and disperse nutlets longer distances? To try to determine if it would even be feasible for cattle

Fig 3. BCM nutlets captured during dip netting floating in water
Photo by Elena Gregg

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to disperse BCM nutlets, I worked with the Chico State University Farm to run an experiment with one of their cows that had a cannula inserted in her rumen (a plug that can be opened to have access to the inside of the rumen for experimental and instructional purposes). The experiment had two trials, one with BCM nutlets and one with rosy meadowfoam nutlets. A total of 907 BCM nutlets (collected after obtaining a permit from the California Department of Fish and Wildlife) and a total of 1,597 nutlets of the common rosy meadowfoam were put into the cow's rumen (the first of four stomach compartments) to determine if they could pass through the cow's stomachs and still be viable and germinate. The fecal matter, or pats, were collected, washed and sifted through to look for any meadowfoam nutlets (Figure 4). For the trial with BCM, the collections of the pats were conducted over a course of 72 hours and the trial with rosy meadowfoam was conducted over the course of 120 hours. Even using three graduated sieves, the left-over washed material to sift though was still voluminous and daunting to work though. The sifting work was taken on by Gallaway Enterprises staff biologists, Laura Lampe and Leah Cochran. Without their support, I would not have been able to sift through the material in a timely manner and am so grateful – it was no easy task! When the first intact nutlet was found, it was so exciting! However, ultimately an extremely low percentage of nutlets were found to be intact. After all of the sifting work was done 7 intact BCM nutlets and 21 intact rosy meadowfoam nutlets were found. But were they still viable? To answer this question I sent the nutlets to the Rancho Santa Ana Botanic Garden (now the California Botanic Garden) to be germinated. The tests found that 28.57% of the BCM nutlets were able to be germinated but only 4.76% of the rosy meadowfoam were germinated. The difference in germination percentage is interesting and may stem from the fact that BCM is known to have some degree of secondary seed dormancy, whereas this has not been documented in rosy meadowfoam.

Fig 4. Laura Lampe washing collected pats through graduated sieves

Photo by Elena Gregg

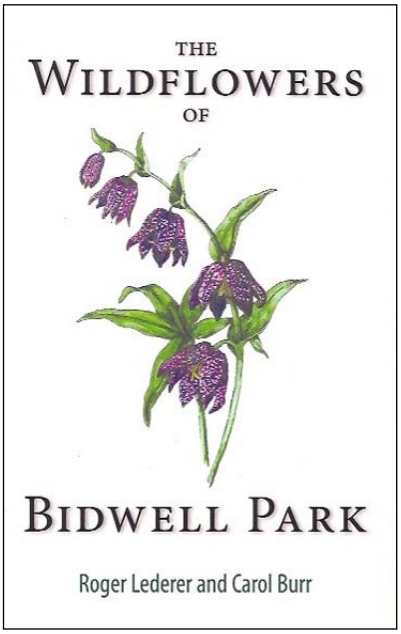
This experiment indicated that there is a chance of long distance dispersal of BCM via cattle, but it does not appear to be a high probability. Dispersal via water is still the dominant mode of localized dispersal, but my next goal is to look closer at exactly how far BCM nutlets can disperse in natural settings. This will be important to understand and could have significant implications on determining impacts to BCM habitat.

While I may be a bit biased, I think BCM is an amazing little plant. Not only is it adorable, but there are so many interesting aspects to its life history that are unusual, and it is one of the few species that is actually endemic solely to Butte County. As a plant lover and a Butte County resident I feel a responsibility to do what I can to speak up for this little plant. There are still many threats facing BCM, with development and land use change being the foremost, but the lack of management of the land on which known populations occur is also concerning. Even though BCM is listed as an endangered plant, which affords it some protection, understanding how best to manage lands that support BCM populations and understanding how BCM is dispersed through the landscape will be vital in securing the long-term protection of this species.

Book Review:

Roger Lederer and Carol Burr's "The Wildflowers of Bidwell Park"

Reviewed by Laurie Archambault, retired California State Parks botanist



The authors' new wildflower book for Bidwell Park in Chico, California is a companion to the previously released The Birds of Bidwell Park and The Trees of Bidwell Park both written by Roger Lederer, PhD and illustrated by Carol Burr, PhD. This attractive book uses common terms whenever possible, is easy to use, and is sized to fit in a day pack while hiking the park.

The Wildflowers of Bidwell Park includes 112 of the more common native and non-native plant species that can be found in the Lower, Middle, Upper South, or Upper North areas of the park. The areas are defined in the How to Use This Book Section and a map of Bidwell Park can be found near the back of the book. In addition, the 112 plant species described in the book are illustrated with colorful, original watercolor paintings created by Carol Burr.

All plants described in the book are organized first by color and then alphabetized by plant family represented in each color. Each discussion of a plant species includes the Latin name and what it means, where the species is originally from, its current range, and where it can be found in Bidwell Park. Also included is a description of the main diagnostic features for each species such as the shape and arrangement of stems, leaves, and flowers, as well as some interesting or general observations about the plant. With all of this information and the way it is thoughtfully presented in the book, any person that is interested in wildflowers will be able to identify these species in the field.

This 132-page wildflower book includes a Dedication and Acknowledgements as well as a Table of Contents, Introduction, a section on How to Use This Book, a Glossary, Bibliography, an alphabetical list by plant family of the 273 Plants Described or Mentioned, an Index of Illustrated Plants listed alphabetically by common name, and a map of Bidwell Park.

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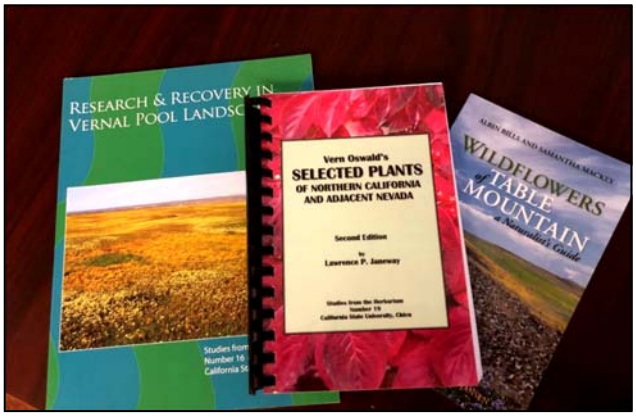
at all times while inside campus facilities (except within personal offices) and that visitors accessing campus facilities comply with CSU Chico vaccination policy, which is "Per CSU policy, vaccinations against COVID-19 will be required to access campus facilities and participate in in-person learning and activities this fall."

Thank you for your interest in and support for the Chico State Herbarium. And please do not hesitate to schedule an appointment if you have plant questions or to just say "Hi." We would love to see you.

Curator, Lawrence Janeway, busy as usual on Fridays.
Photo by Colleen Hatfield

Need to spruce up your t-shirt collection? Consider ordering a nifty t-shirt from the Friends of the Herbarium. Three colors (green, tan and blue) are available and sizes range from S to XL. Cost is $15 plus shipping.

Contact LJaneway@csuchico.edu or chatfield@csuchico.edu to place your order.



Now that cooler weather is here, it is time to get out and try to identify some fall plants. The Studies from the Herbarium has a number of books that can help. For more information and to see what books are there, go to www.csuchico.edu/herbarium/. Information on how to order can also be found there.

Please Renew for 2022

Yes, I Would Like to Join/Renew/Contribute!

- ☐ Student $20
- ☐ Individual $35
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- ☐ Lifetime $1,000
- ☐ Jim Jokerst Award ..... $_____
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Please make your check payable to: Chico State Enterprises (include Friends of the Herbarium on the memo line).
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"All Things Botanically Related" Presentation Series

Celebrating the One-Year Anniversary

Last fall, the Friends of the Herbarium and the Chico State Herbarium sorely missed interacting with others passionate about plants. We also wanted to provide a way for everyone to virtually escape to the natural world, marvel in it's wonders and generally share our passion for plants. so we started the "All Things Botanically Related" presentation series. To date we have hosted 15 presentations including the upcoming one by Julie Kierstead who will present at our Annual Meeting. All presentations are recorded and available for viewing at your leisure on the Friends of the Herbarium website. Presentations for the rest of this year include:

November 18, 2021 7:00—8:00pm
Botanizing California's high elevation five-needle pines

by Emily Brodie
UC Davis Ecology Graduate Program

December 16, 2021 7:00—8:00pm
The Bryophytes: Evidence of Ectohydry is Everywhere

By Nijmah Ali
Botanist and Biology Instructor, Butte College

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