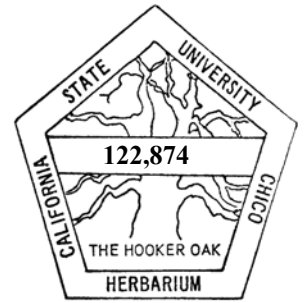




Friends of the Herbarium

The Chico State Herbarium
California State University, Chico



Volume 26 Number 2
October 2020

25th Anniversary Fall Newsletter

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with Guest Speaker

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Join us!

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Announcing:
Friends of the Herbarium Annual Meeting
October 22, 2020
7:00—8:00 pm
Virtual Meeting (via Zoom)

**Capturing California's Flowers:
Building community, capacity, and
discovery by digitizing herbarium
specimens**

Guest Speaker:
Katelin Pearson

Curator, Robert F. Hoover Herbarium
Project Manager, California Phenology TCN
California Polytechnic State University



More information on page 2

Also included:

Jim Jokerst Botany Award winner—Jacob Ewald
**“Species Boundaries in Two Northern
California Monkeyflowers”**

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 the Research Foundation 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.

BOARD OF DIRECTORS

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Newsletter

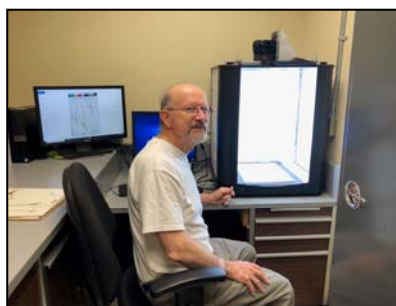
Volume 26 Number 2

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.

(Continued from page 1)

Annual Meeting Guest Speaker: Pearson Overview:

Digitizing nearly one million herbarium specimens in only four years has proven an enormous task, yet the herbaria of California have rallied heroically to advance this effort. Now in year 2 of this successful NSF-funded "California Phenology (CAP) Network", we have witnessed excellent progress toward our goals despite setbacks due to wildfires, infestations, and COVID-19. The CAP Network presses onward to produce high-quality specimen images, transcribed label data, georeferenced locality data, and data on the flowering and fruiting times of plants across the state, as well as education and outreach resources to expose a broader diversity of people to the rich resource of publicly accessible herbarium specimen data. This project has brought California's herbaria together to build tremendous capacity for the botanical community and beyond.

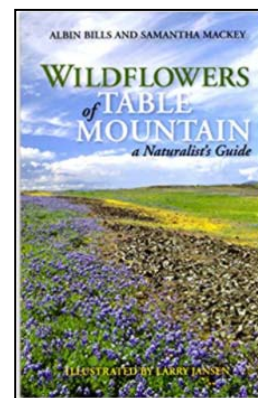


Lawrence Janeway (above) imaging herbarium specimens which are then uploaded to the Consortium of California Herbaria (<https://www.cch2.org/portal/>) and available to all. An example of a CHSC imaged specimen (right) with color band at top used for camera calibration during the imaging process.



The Chico State Herbarium remains closed to in-person visits for the time being. Workshops sponsored by the Friends have also been put on hold until the University reopens. However, if you have botanical questions, please feel free to reach out to Lawrence Janeway (LJaneway@csuchico.edu), the Herbarium Curator or Colleen Hatfield (chatfield@csuchico.edu), the Herbarium Director and we will work to help you if we can.

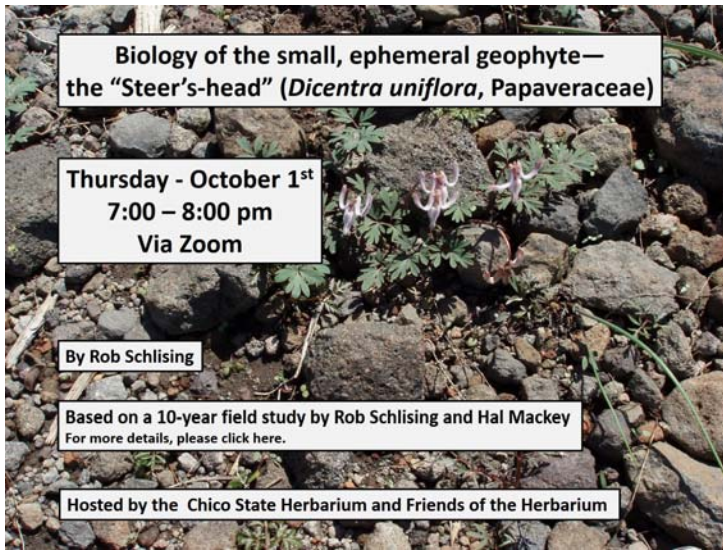
Importantly, we are able to ship books so if you want a book published by Studies of the Herbarium—<https://www.csuchico.edu/herbarium/studies/book-list.shtml>, please contact Janeway or Hatfield.



All Things Botanically Related

During these challenging times, the Friends of the Herbarium and the Chico State Herbarium want to provide a way for everyone to virtually escape to the natural world and marvel in it's wonders. To that end, we are working on launching a series of free virtual presentations.

Our first very successful effort was launched by Dr. Rob Schlising, Professor Emeritus at Chico State University who presented on his current research passion, the biology of *Dicentra uniflora* (see below). The presentation was delivered via zoom with 40 participants joining in. The discussion following the presentation was engaging and insightful. You can find a link to the presentation on the Friends website or the Herbarium website.



Biology of the small, ephemeral geophyte—
the "Steer's-head" (*Dicentra uniflora*, Papaveraceae)

Thursday - October 1st
7:00 – 8:00 pm
Via Zoom

By Rob Schlising

Based on a 10-year field study by Rob Schlising and Hal Mackey
For more details, please click here.

Hosted by the Chico State Herbarium and Friends of the Herbarium



Plant of *Dicentra uniflora*, showing nature of the mature leaf and the single flower, typically only up to 3 inches (7 cm) high. (Photo by Robert Fischer)

Below-ground parts of two plants, showing fresh tubers (tan), depleted tubers from last year (brown), and a cluster of 4 pale leafbase bulblets (which can provide vegetative reproduction) on top of the plant on the right. Each square of the grid is 1/5 inch (5 mm). (Photo by Rob Schlising)



Our next exciting presentation focuses on, of all things, butterflies of our region presented by Dr. Don Miller. Dr. Miller is an entomologist and professor at Chico State University. He has also led a number of butterfly identification workshops for the Friends of the Herbarium as well as orchestrating annual butterfly counts at Big Chico Creek Ecological Reserve.

"Ecology of Some California Butterflies and Their Host Plants."

Thursday, October 29, 2020. 7:00 — 8:00 pm
(via Zoom)

Dr. Miller will provide a brief overview of the history of the study of butterflies in our region, with particular reference to 19th-century naturalists. He will highlight the biology, ecology and behavior of representative families and species, in the context of their host-plant affinities and habitat requirements. He will also discuss ongoing efforts towards wise stewardship of our butterflies, their host plants and habitats in the Anthropocene.



Euphydryas editha on *Calyptridium* sp. At Lassen Peak 2019 (Photo by Don Miller)

Zoom details for this meeting on the Friends of the Herbarium and Chico State Herbarium webpages



We continue our celebration of the 25th-Anniversary of the Friends of the Chico State Herbarium by reflecting back on important events. We start with:

Distinguished Service Award—a 25-Year Retrospective

By Linnea Hanson

From time to time the Board of Directors of the Friends of The Chico State Herbarium awards its Distinguished Service Award to a person who has made great contributions to the Herbarium. This selection is made to recognize contributions to the Herbarium on a number of different levels, from volunteer service to dedicated employment, to management support. Each awardee is honored at the Annual Meeting, and receives a piece of original plant-oriented artwork and a congratulatory plaque to go with it.. Here we celebrate those who have received this award over the last 25 years:

DISTINGUISHED SERVICE AWARD

On October 26, during the General Meeting of the Friends of the Herbarium, **DR. VERNON OSWALD** was given a Distinguished Service award for his many contributions to the Herbarium.

Dr. Oswald was born and raised a few miles from Akron, Ohio, in the small town of Hartville. He completed both his undergraduate and graduate work at Ohio State University, and after receiving his Ph.D. in zoology in 1957, he took a position in the Biology Department of CSU, Chico. His course in invertebrate zoology and general biology became exceptionally popular, and in 1983 many were sorry to see him take an early retirement. Two years before he retired, Dr. Oswald began photographing wildflowers, and his ensuing hard work and experience led to his becoming an accomplished field botanist. With the extensive collaboration of Lowell Ahart, Dr. Oswald eventually produced the very useful and thorough "Manual of the Vascular Plants of Butte County, California," which is now published by the California Native Plant Society. He also revised the "Flora of Lassen National Park," and has authored or is authoring other similar floras.

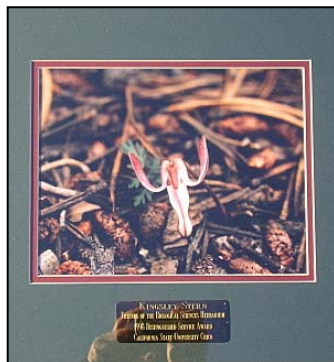
The award Plaque, which was beautifully designed and constructed of stained glass by Randy Rickert, included images of Mt. Lassen and *Arnica* flowers. After the meeting Dr. Oswald and friends adjourned to Kramore Inn for dinner and fellowship. Thanks again, Vern, for all you've done for the Herbarium, and for field botanists in general! KS

1996 Vernon H. Oswald. Award plaque was a stained glass by Randy Rickert (Joyce Lacey's husband) which included images of Mt. Lassen and *Arnica* flowers. Vern produced "Manual of the Vascular Plants of Butte County, California" and Selected Plants of Northern California and Adjacent Nevada" with Lowell Ahart and authored several other floras.



1997 Lowell Ahart. Award was a painting of Ahart's Buckwheat (*Eriogonum umbellatum* var. *aharti*) by Judy McCrary. Besides working with Vern on the "Manual of the Vascular Plants of Butte County, California" and "Selected Plants of Northern California and Adjacent Nevada", Lowell has also mounted many of the specimens in the Chico State Herbarium.

1998 Kingsley Stern. Award was a photo of Steer's Head (*Dicentra uniflora*) by Linnea Hanson. Kingsley was the Director of the Chico State Herbarium for 34 years. The herbarium grew from 2800 specimens to more than 71,000 specimens



1999 Jan Monelo. Award was a photo of Purple Mouse Ears (*Diplacus (Mimulus) douglasii*) by Kingsley Stern. Jan was instrumental in bringing together the people who formed the founding board members of the Friends of the Herbarium in 1995. Jan was one of the founding members.



2000 Michael Abruzzo. Award was a vase etched with an Interior Live Oak (*Quercus wislizeni*) by Kerry Rippon. As the Department of Biology chair Mike was instrumental in the renovation of the herbarium in 2000.



2002 Lawrence Janeway. Award was a vase etched with Brewer's Sedge (*Carex breweri*) by Kerry Rippon. Lawrence began as a student assistant, then volunteer, then assistant curator and now the curator of the Chico State Herbarium.



Continued on Page 5

(Continued from Page 4—25th-Anniversary Distinguished Service Award Retrospective)



2004 Patricia Edelman. Award was a vase etched with California Lady's Slipper Orchid (*Cypripedium californicum*) by Kerry Rippon. Patricia was very supportive of the Chico State Herbarium as the Department of Biology chair.



2005 Bill Carlson. Award was a vase etched with Bristlecone Pine (*Pinus longaeva*) by Kerry Rippon. Bill was a dedicated volunteer that added the latitude and longitude to the specimens so that Global Positioning Station Units could be used to find the locations of the specimens in the field.



2006 John Dittes. Award was a vase etched with Common Madia (*Madia elegans*) by Kerry Rippon. John provided excellent specimens to the Chico State Herbarium and taught excellent workshops for the Friends of the Chico State Herbarium.



2007 Kristina Schierenbeck. Award was a vase etched with True's Manzanita (*Arctostaphylos mewukka* subspecies *truei*) by Kerry Rippon. Kristina was the Director of the Herbarium from 1998 to 2007.



2018 Cindy Wiener. Award was a photo of Veiny Monardella (*Monardella venosa*) specimen. Cindy has been a dedicated volunteer assisting with many tasks including databasing the specimens in the Chico State Herbarium

Recognition for Administrative Contributions to the Herbarium and Friends Mission:

Margaret Owens, Dean
College of Natural Sciences

David Hassenzahl, Dean
College of Natural Sciences

Jeff Bell, Chair
Department of Biological
Sciences



Syrphid flies on hayfield tarweed
(Photo by John Whittlesey)



Friends of the Herbarium

Annual Meeting Speakers—a 25-year Retrospective

By Linnea Hanson

Each fall since the Friends of the Chico State Herbarium was formed there has been an annual meeting. We have had various guest speakers. At first they were from Chico State but then we began to invite various guest speakers from throughout Northern California. And one year we had several Chico State graduate students give presentations on the work they had been doing. Hosting an annual speaker from noted botanists and ecologists locally and throughout the region has been an enriching opportunity for all. The list below includes all of the talks that have occurred at our annual meeting in the fall since the Friends of the Chico State Herbarium was formed.

- 1995 Vesta Holt Reunion: Look at Biological Sciences Through the Years. Dr. Kingsley Stern
- 1996 Existence of *Clarkia mosquinii*. Lawrence Janeway
- 1997 Introduction to the Flora of North America Project. Dr. Kingsley Stern
Out of the Lab and into the Field: Trials and Tribulations in the Study of *Vaccinium*. Loren Gehrung
- 1998 History of the CSU Chico Herbarium and Stories from Plant Taxonomy. Dr. Kingsley Stern
The Herbarium: Now and in the Future. Dr. Kristina Schierenbeck
- 1999 Tours of the CSU Chico Herbarium and the Plant Evolution and Systematics Lab. Dr. Kristina Schierenbeck
- 2000 Origin and Relationships of California Tarweeds and Hawaiian Silverswords. Dr. Bruce Baldwin, Jepson Herbarium, University of California, Berkeley
- 2001 Progress and Promise in our Understanding of Vernal Pool Ecology and Conservation, Dr. Michael Barbour University of California, Davis
- 2002 Climate Change As An Ecosystem Architect: Implications to Rare Plant Ecology, Conservation and Restoration. Dr. Connie Millar, United States Forest Service Pacific Southwest Research Station ⇒
- 2003 What Plant is That? How to Manage Plant Identification in an Era of Taxonomic Change. Ellen Dean, Director and Curator of the University of California Davis Herbarium
- 2004 Sierra Nevada Native Grass Seed Program. Linnea Hanson, United States Forest Service, Plumas National Forest
- 2005 Biogeography of California: What Can We Learn From the Mosses about Past and Future Climate Change? James R. Shevock, United States National Park Service Research Coordinator
- 2006 Taxonomic and Geographic Patterns in the Serpentine Endemic Flora of California. Dr. Hugh Safford, United States Forest Service, Pacific Southwest Region.
- 2007 Herbaria and Other Natural History Collections: Their Importance in Conservation and Sustainability. Dr. Tom Griggs, River Partners
- 2008 The Ecology and Evolution of *Arctostaphylos*. Dr. Tom Parker, San Francisco State University
- 2009 The New Manual of California Vegetation and What it Can do for You. Todd Keeler-Wolf, ⇔ California Department of Fish and Wildlife
- 2010 Research in Northern California Botany by Chico State Graduate Students:
- Melissa Patterson: Conservation Biology of a Rare Northern Californian Endemic Plant, *Phacelia cookeri* (Boraginaceae)
 - Nicole Habecker: The Ecological Niche Scenario as an Isolating Factor between *Mimulus*



(Continued on page 7)

(Continued from page 6: Annual Speaker Retrospective)

glaucescens and *Mimulus guttatus*.

- Erin Gottachalk Fisher: Vernal Pool Restoration for Two Rare Grasses, *Neostapfia colusana* and *Tuctoria greenei*, at the Sacramento National Wildlife Refuge Complex.
- Tim Hanson: Assessing the Ecology and Life History Traits of a Rare California Endemic, *Monardella douglasii* ssp. *venosa* (Lamiaceae)
- Melissa Ha: The Selection of Pollinator-mediated Competition and Facilitation on Phenology in the Genus *Clarkia* (farewell to spring, Onagraceae)
- Rachael Francis: Assessing Restoration in Sierra Nevada Meadows.

2011 Stories from Pollination Heaven: 5 Years of Studying Flowers and Pollinators at Humboldt State University. Dr. Michael Mesler, Humboldt State University

2012 From the Mountain Tops to Canyon Bottoms: Climate's Variable Effect on Sierran Ecosystems. Dr. Connie Millar, United States Forest Service, Pacific Southwest Research Station

2013 Monster Plants. Dr. Barry Rice, Sierra College and University of California Davis Center for Plant Diversity

2014 Exploring the Conifer Diversity of the Klamath Mountains and Beyond. Michael Kaufman, Humboldt County Educator and Author

2015 Web of Polyploidy in *Penstemon*. Dr. Shannon Datwyler. California State University, Sacramento

2016 The Diverse World of Salvias: A Genus Well Traveled. John Whittlesey. Canyon Creek Nursery and Design

2017 The Role of Ecological Restoration in a Changing World. Tom Gardali. Point blue Conservation Science.

2018 Cultivating Place: Leveraging Our Human Impulse to Garden in the Service of Plants. Jennifer Jewell. Creator and Host of Cultivating Place: Conversations on Natural History and the Human Impulse to Garden

2019 Fire Regime Alteration in Natural Areas: Fire Regime Alterations in Natural Areas Underscores the Need to Restore a Key Ecological Process. Michelle Coppoletta, United State Forest Service, Sierra Cascade Province



2013—Rice



2014—Kaufman



2015—Datwyler



2016—Whittlesey



2017—Gardali



2018—Jewell



2019—Coppoletta



Jim Jokerst Field Botany Award

By Adrienne Edwards and Lawrence Janeway

Each spring the Friends of The Chico State Herbarium at California State University Chico offers an award to support and encourage student research at Chico State involving field aspects of botany, and ecology with a strong botanical component. This award is named in memory of Jim Jokerst, a graduate of CSU Chico, an excellent field botanist and a well known and highly respected botanist in the northern California botanical community. Jim was also an active user and supporter of The Chico State Herbarium when he was a student at CSU Chico and a botanical consultant in the Chico area (later to be highly regarded at a Sacramento consulting firm). This award is in the amount of \$1000 and has been awarded to deserving graduate and undergraduate students annually since 1995. In addition to receiving the funding, the students also share their research at the annual meeting of the Friends. This year at the annual meeting, we will hear from the most recent winner, Jake Ewald and his exciting work on the intersection of species boundaries in monkeyflowers. Below is a list of those who have received the Jokerst Award.

1995	Elizabeth Hubert	Abiotic and biotic factors associated with <i>Nasella pulchra</i> at Dye Creek Preserve.
1995	Dan Efsseff	Root architecture of riparian tree species: the effect of soil texture.
1996	Caroline Warren	Seed biology of <i>Chamaesyce hooveri</i> at Vina Plains Preserve.
1996	Deborah Topp	Phenotypic plasticity: does <i>Ailanthus altissima</i> have what it takes to colonize the riparian habitat?
1997	Mike Dunbar	The effects of bovine fecal products on native <i>Delphinium</i> ("larkspur") located on Vina Plains Preserve.
1997	Loren Gehrung	Field studies in <i>Vaccinium</i> section <i>Myrtillus</i> .
1997	Samantha Mackey	Identifying critical life history stages and important environmental parameters for a rare borage, <i>Cryptantha crinita</i> .
1998	Ann Willyard	Distribution and habitat characteristics of <i>Rupertia hallii</i> (Fabaceae) and comparison of <i>R. hallii</i> with <i>R. physodes</i> .
1998	Laura Bogni	Determination of origin and taxonomic status of <i>Fritillaria eastwoodiae</i> (Liliaceae) using RAPD analysis.
1999	Natalie Wight	Effects of burning on rare alkali plants at the Sacramento National Wildlife Refuge Complex.
1999	David Parks	Evolutionary relationships of <i>Arctostaphylos mewukka</i> and associated species.
1999	Francis Phipps	RAPD and chloroplast DNA analysis of the six California populations of <i>Howellia aquatilis</i> .
2000	Leah Mahan	The growth and reproduction of <i>Hemizonia fitchii</i> in the northern Sacramento Valley of California.
2001	Gavin Blosser	Diversity and characterization of arbuscular mycorrhizal fungi in the soils of vernal pools in northern California.
2001	Colby Boggs	Reproductive Biology of <i>Dudleya cymosa</i> subsp. <i>cymosa</i> .
2002	Paul Kirk	Putative hybridization of <i>Juglans hindsii</i> in riparian forests of northern California.
2003	Halli Gaddis	A physiological comparison of <i>Erythronium multiscapoideum</i> both on and off a serpentine outcrop in Butte County.

(Continued on page 9)

(Continued from page 8: Jim Jokerst Field Botany Award)

2004	Christine Hantelman	Life history of <i>Sidalcea robusta</i> (Malvaceae), a rare endemic of Butte County, California.
2005	Catherine Little	A comparison of environmental gradients for understory species in restored and remnant riparian forests along the middle Sacramento River, California.
2006	Sheli Wingo-Tussing	Investigations of restoration and management of <i>Cordylanthus palmatus</i> (Scrophulariaceae) at Sacramento National Wildlife Refuge.
2007	Prairie Johnston	The effect of four levels of irradiance on the survival and growth rate of <i>Artemisia douglasiana</i> , <i>Clematis lingusticifolia</i> , and <i>Vitis californica</i> .
2010	Melanie Williams	Why am I rare? A case study of a rare serpentine endemic.
2011	Melissa Ha	Is late flowering in <i>Clarkia unguiculata</i> explained by pollinator-mediated interactions with co-flowering neighbors?
2012	Erin Gottschalk Fisher	Evaluating vernal pool restoration for two rare grasses, <i>Neostapfia colusana</i> (Colusa grass) and <i>Tuctoria greenei</i> (Greene's tuctoria).
2014	Badri Ghimire	Trophic relationships among deer, manzanita and manzanita leaf-gall aphids in the Big Chico Creek Ecological Reserve, Chico, California.
2015	Clara Buchholtz	Gall density of the Manzanita Leaf Gall Aphid (<i>Tamalia coweni</i>) and the presence of <i>Tamalia inquilinus</i> and other associates.
2018	Drew Gilberti	Understanding sweet bottom-up and top-down trophic cascades – <i>Disholcaspis eldoradensis</i> /
	Shawna Burns	Response to temperature in the ambiguous moss <i>Polytrichum piliferum</i>
2019	Constantin Raether	Defense against herbivory by galling Cynipidae wasps in valley oak (<i>Quercus lobata</i>): testing the Plant Vigor Hypothesis and the Phenological Synchrony Hypothesis in a large common garden experiment.
2019	Gabrielle Wyatt	Heavy metal phytoremediation at the Butte College Bioswale: phenological variances in three California natives
2020	Jake Ewald	Species boundaries in two Northern California monkeyflowers



Anthophora at Polanisia
(Photo by John Whittlesey)

An Overlooked Botanical Key

Reviewed by David Popp

Bruce Barnes has written a software program for the vascular plants of California that many will find helpful for identifying plants. XID Services, Inc. is the software database that runs the interactive key for California and other states and is under the name "Flora ID Northwest, LLC". The keys are available for many Western states and regions. This review is for one of those overlooked keys covering the California region which currently only runs on Windows and Android software systems.

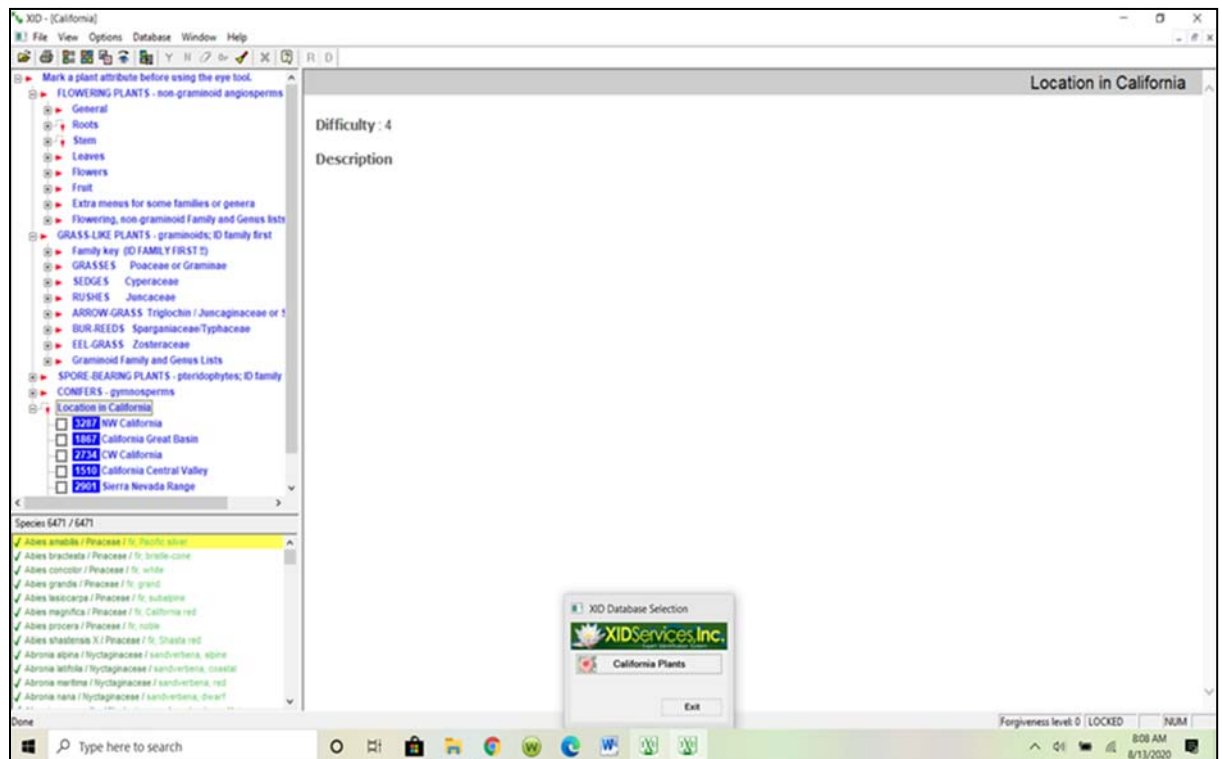
Interactive keys (or multi-entry keys) have been around for centuries but because of their awkward format of punch cards or tables they were not easy to use or carry around. With the technology of the computer, interactive taxonomic keys are much faster and easier to use than traditional dichotomous keys (single-access key) and can now be carried around as software on a laptop computer or your hand-held computer—better known as a smart phone.

Interactive keys also differ from dichotomous keys by allowing the user to select the character sequence and by comparing all the characters simultaneously (see figure below). The interactive key is a database program which sorts information of plant characters to identify the plant from the database. The sorting can also be done on three levels: families, genera and specific epithet, allowing the user to start at any level, much unlike dichotomous keys.

Interactive keys are different than dichotomous keys because dichotomous keys give greater weight to flowering characters. They tend to miss other characters which are not used or show up later in the key, if at all. In addition, interactive keys give the end user the choice to choose the character they have or are familiar with as opposed to comparing single, contrasting characters in a set order and with an either/or choice.

The use of XID software allows the user to interact with the key choosing characters that are easily defined and recognized. The key allows user to review selections made by comparing and checking all the chosen plant features at once for any possible changes? These changes can immediately be altered or corrected. One nice feature of the program key is being able to select the feature that will list characters not used for further choices. The program has the ability of being able to set an error level of confidence when selecting characters which will allow for mistakes of character choices.

This key contains descriptive data for each plant species, and the addition of photographs makes the process of identifying plants much quicker



(Continued on page 12)

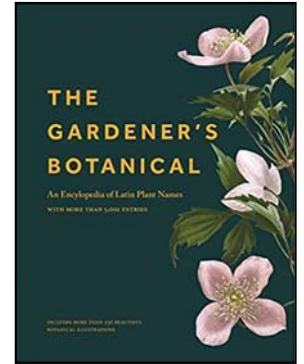
Book Review:

Dr. Ross Bayton's The Gardener's Botanical: An Encyclopedia of Latin Plant Names

By David Popp

The Gardener's Botanical contains definitions of more than 5,000 plant names along with more than 350 color illustrations. Scientific plant names are tools that give the knowledgeable user insight to unlocking valuable information and allowing communication to occur affluently.

Of all the books on Latin (Greek) plant names, this is my favorite one because of the way the topic is presented, interesting and artfully. This book is a delight to use and is presented in an older style which gives one the feel that you are reading a flower book from the nineteenth century. It is a hardback book with a canvas cover which includes a ribbon place holder. The author has interspaced beautiful, detailed, colored line drawings, in the style that one would see in the old Peterson's field guides. The drawings are used as examples to illustrate some plant names in the book. These beautiful line drawings appear as one turns every page. In addition, there are occasional added sections highlighting a genus with a short history about a specific genus popping up throughout the book (Genus Spotlight). And there are also short essays scattered throughout the book covering taxonomic history as side notes (Fact Spotlight). Included is an index of common names with more than 2,000 popular plants, cross-referenced with their binomial name in Latin.



Each word is listed with a pronunciation guide, definition, example plant, and where appropriate, etymology.

The book has a guide for using Latin, reasons why botanical Latin is used for plant names, a short history of botanical art, how the study of DNA is changing plant names, and applies uses of botanical Latin. This book contains over 350 pages that are a delight to pick up and scan through randomly while learning the meanings of botanical names and interesting facts.



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

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Mail to: Chico State Herbarium, c/o Biological Sciences Dept., California State University—Chico, Chico, CA 95929-0515

(Continued from page 10 - Overlooked Botanical Key)

and easier for the end user.

Dr. Barnes has spent the past 18 years creating and producing plant identification software for all the vascular plants of 18 states and 4 Canadian provinces. In addition, he has completed interactive keys to all the vascular plant families of the world, following the 4th Edition of the book, Contemporary Plant Systematics by Dennis W. Woodland based on the Angiosperm Phylogeny Group classification system.

All botanical keys have their faults. Mistakes in the database can cause one to error or get incomplete screening of the characters. One must learn the author's terminology and get use to the software. Using Dr. Barnes' key has a minor conflict for people that are used to using Jepson as its source for plant names (and in some cases plant characters may differ) because of the differences of names used by the Flora of North America North of Mexico. Just like Selected Plants of Northern California and Adjacent Nevada (from the Chico State Herbarium) this key is another hidden gem. "Flora ID Northwest for California" is an alternative key to help you on your botanical adventures in plant identification.

For more information about this type of keys visit: <http://flora-id.org/>



Bombus vosnesenskii on *Lupinus albifrons*
Photo by John Whittlesey



Friends of the Chico State Herbarium
California State University, Chico
Chico, CA 95929-0515