



Sego Lily

Newsletter of the Utah Native Plant Society

May 2011 (volume 34 number 3)

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Left: Jewelflower or Heartleaf nippletwist (Streptanthus cordatus), can be easily recognized by its purplish brown 4-petaled flowers, dagger-shaped fruit pods, clasping stem leaves, and toothed basal leaves. The scientific name for the genus translates from the Greek for "twisted flower" in reference to the crisped margins of the petals. The genus is entirely restricted to the western United States and northern Mexico, with the greatest number of species endemic to California. S. cordatus is the most widespread species, ranging from Oregon and Wyoming to California, Arizona, and New Mexico. Jewelflower blooms in early spring in pinyon-juniper, sagebrush, and brushy woodlands on rocky soils and is a popular host plant for butterflies. Illustration by W. Fertig.

Utah Native Plant Society



Utah Native Plant Society

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Many thanks to Xmission for sponsoring our website.

For more information on UNPS: Contact Bill King (801-582-0432) or Susan Fitts (801-756-6177), or write to UNPS, PO Box 520041, Salt Lake City, UT, 84152-0041 or email unps@unps.org

Sego Lily Editor: Walter Fertig (walt@kanab.net). The deadline for the July 2011 *Sego Lily* is 15 June 2011.

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Chapter News

Cache: Several workshops are planned for this spring and summer through Utah State University and the chapter.

Saturday, 14 May - Aquatic Plants. Aquatic plants serve as environmental quality indicators and are becoming increasingly popular garden plants (though some are invasive weeds). We will look at native aquatic plants, learn how to recognize and identify many of them, and point out the potentially harmful species that have been introduced. Time: 10:00 am. Cost: \$25. Meet: Geol 301.

Friday/Saturday May 20-21 Introduction to Mushroom Identification. Learn about the fungal community in northern Utah at the fungal workshop! On the first day we will learn basic fungal facts and collection tips. On Saturday, we will go on a field excursion to find the vast array of local species. Time: 6:00 pm. Cost: \$40.

Tuesday June 7 - Richard J. Shaw Wildflower Walk. First led by the



late Dr. Shaw, this hike through the lower portion of Green Canyon was renamed in his honor by the Intermountain Herbarium and local chapter. Enjoy the beauty of the area and a relaxing walk through nature. Local botanists will add bits of humor, lore and a great deal of information as they point out characteristics used to identify many of the plants encountered. Time: 6:30 pm. Cost:

Free. Meet: Upper end of Green Canyon parking lot.

Saturday/Sunday June 11-12: Standardized Photography for Plant Identification. Dr. Bruce Kirchoff will be with us in Logan to share his experiences and provide training in plant photography. There is an increasing need for standardized views of plants to help in the identification process. We are beginning to build a library of these standardized images of our local plant species in the anticipation of future software that will allow for the submission of a photo and return a probable identification. Time: TBA. Cost: TBA

Saturday June 25
2011 Alternascapes Garden Tour: Join the Cache Chapter and the Cache County Master Gardeners for this year's installment of our popular garden tour. Visit 6-10 gardens in the Providence, Nibley and Millville areas of Cache Valley, get garden tips, advice, and enjoy some spectacular views of the valley.

Tickets may be purchased on June 25 at our information booth located at Zollinger Park (51 North 200 West Providence). Time: 11-4. Cost: TBA. For more information contact the Cache County Extension Office or e-mail ascap2011org@saabra.org.

Tuesday - Thursday July 5-7
Introduction to Bryophytes: Bryophytes (mosses, liverworts & hornworts) are infrequently studied and collected here in the Intermountain West. We have asked Bryologist Dr. John Spence (botanist at Glen Canyon Nat. Rec. Area) to come to Logan and offer an introductory course on the identification of this increasingly ecologically important group of organisms.

We will take a field trip up Logan Canyon either Wednesday or Thursday to view these tiny beauties in their natural habitat. Time: 10:00 am – 4:00 pm. Cost: \$50. Meet: Geol 301.

For more information, or to register for any of these events, contact the herbarium at 453-797-0061 or michael.piep@usu.edu. - *Michael Piep*

Fremont (Richfield area): The Fremont Chapter is getting into full swing for the spring. March's meeting was a wonderful presentation by Merrill Johnson from Great Basin Natives on his methods for propagating native plants. Our members are also beginning yard cleanups as one of our annual fundraisers, and maintenance of our native gardens at both Sam Stowe Campground and the Sevier County Administration Building. We are working on plans for an ethnobotany garden at the Fremont Indian State Park visitor center and are always looking for ways to share the joy of natives.

Perhaps one of our biggest projects is renewing our Native Plant Calendar tradition for 2012. After a two-year hiatus, we'd like to reinstate this annual fundraiser. Our theme this year will highlight various chapters throughout the state with a photo of their choice and a brief paragraph about their chapter's accomplishments, membership, or other narrative.

We will have the calendar ready by August so they will be available for fall and winter sales. If your chapter is able to help sponsor the printing cost, we would appreciate any amount you can contribute. The work organizing the calendar, including the layout, graphics and fundraising is all donated by chapter members, and the beautiful calendars have been a fan favorite over the years.

In order to have the calendar ready by August, we need your contributions by May 15th 2011. For any questions, or to submit your high-resolution photo and information, please contact Janett at janettwildland@gmail.com. - *Lisa White*

Manzanita (Kane County): Dr. Mike Stevens of BYU gave a presentation on the genetics of *Penstemons* at our April meeting, held jointly with the Grand Staircase Escalante Partners group in Kanab. Mike is currently traveling across Utah gathering tissue samples and taking photos of rare and common *Penstemon* species to aid in his research on the evolution of this colorful genus. - *W. Fertig*

Salt Lake: We had two very enjoyable chapter meetings the last couple of months. In March, Ann Kelsey, collections manager at the Garrett Herbarium, led us through the process by which plant specimens are pressed, dried, and mounted. She explained not only the mechanics, but also why it is still important to continue depositing real samples in botanical museums. Other important parts of the talk included ethical guidelines for collecting, and the need for good documentation of location and habitat. A memorable bottom line for bringing samples to an herbarium for identification: "No flowers, no fruit, no service"!

Our April meeting featured the format that we have long called 'UFO Night': members submit photos of 'Unidentified Flowering Objects' which are built into a whodunit slide show. Bill Gray was in charge of the suspense, teasing the audience with a

wonderful variety of gorgeous pictures that had been submitted from members' trips around the state.

The next meeting will be held at 7 PM, Wednesday, May 4th at REI (33rd South and 33rd East in SLC). Steve Hegji will be sharing some of his secrets for taking great photos of our native plants. Come and get some tips on visualizing a good photo, and techniques for making it happen.—*Bill Gray*

Utah Valley: Thursday, 19 May: Election of Officers II. The chapter meeting is scheduled to start at 6 PM. The Utah Valley University herbarium will also be hosting a plant ID clinic after the meeting. Everyone is welcome to bring any unknown weedy or native plant specimens, pictures, or clippings for identification. If there is time or interest, herbarium curator Jason Alexander will also demonstrate how to identify one of the several difficult plant families in Utah. Due to construction, the closest parking to the herbarium is on the southern end of campus at the University Parkway entrance. The gates should be up in the pay lots C and L and the parking is free after 6 PM.

Saturday, 4 June 2011: Utah Valley will be hosting a trip to Price Recreation Area. Kim Despain will lead the hike to a Bristlecone pine forest. Meet at the trailhead at 10 AM (it is about 70 minutes from Provo). For more information, contact Celeste (celestegk@gmail.com) or Kim Despain (801-375-8267).

Saturday, 11 June, 10 AM: Ron Kass will lead a trip to Legacy Wetland Preserve. We will spend 3 hours on the North Salt Lake discussing the creation of wetlands, wetland ecology, and plant identification. Meet in the UVU visitors lot near the roundabout off of University Parkway. Contact Celeste (801-377-5918) for more info and to plan carpooling.

Plants and Preschoolers hikes continue every Thursday at 10 AM. Email Celeste to get on the mailing list for updates and locations. Everyone is invited, but these hikes are geared for those that are easily distracted by colorful things (like botanists and preschoolers).—*Celeste Kennard*

Bulletin Board

2011 UNPS Scholarship: UNPS is pleased to announce that Blake Wellard is the recipient of the 2011 student scholarship award. Blake is a Masters student at the University of Utah and is studying the biogeography of Few-lobed oak (*Quercus x pauciloba*) in northern Utah. This unusual oak is a hybrid between the widespread Gambel oak (*Q. gambelii*) and the Turbinella oak (*Q. turbinella*), known only from southern Utah today. Hybrids found in northern Utah are suspected to be thousands of years old and relicts from the mid-Holocene when the two parental taxa co-occurred in the area during a period of warmer and drier climate. Part of Blake's project will be to search for and map additional clones of Few-lobed oak before remnant populations are lost to urban sprawl and to better assess the full range of the hybrids. Blake's work, being done in conjunction with Dr. Mitch Power from the University of Utah, UNPS board member Dr. Ty Harrison, Drs Chuck Wullstein and Sue Harley, and society stalwart Tony Frates, will be featured in a future *Sego Lily* article. Funding for the UNPS scholarship comes from proceeds of UNPS posters and books and from generous contributions of society members.—*W. Fertig*

Four Corners Tree Planting: A tree planting ceremony will be held on April 22 at 12 noon at the Four Corners Monument (where Utah, Colorado, New Mexico, and Arizona come together). All members of the Utah Native Plant Society and the general public are invited to attend. The event will include Native American dancers, music, and food. A documentary film crew will be along to record the planting of native trees and shrubs from the area. Your native plant society, along with those of the neighboring states, has made a contribution to provide a "Utah" tree and some shrubs. The plantings will be watered and cared for by the staff that maintains the monument. - *Steve Hegji*

Field Botany Class in Moab Area, May 23-28, 2011: Join Utah State University professor Leila Shultz for 6 days of botanizing in eastern Utah and receive college credit at the same time. Enroll for WILD 4950/6900 for 3 credits through the Utah State University Moab Education Center (contact Janice Radcliff, 435-259-7432 or Janice.radcliff@usu.edu).

Penstemon Festival, June 3-4, 2011. Merrill Johnson of Great Basin Natives nursery and the Manzanita Chapter are sponsoring the 2011 *Penstemon* Festival in the Kanab area on the weekend of June 3-4. Festivities will begin with a native plant sale in Kanab on Friday afternoon, June 3, followed by a dinner and lecture in Kanab Friday night. The guest speaker will be *Sego Lily* editor and UNPS co-President Walter Fertig, who will regale the audience on "Stalking *Penstemons* in Wyoming and Utah". The chapter will be charging a modest fee for the dinner to defray expenses. On Saturday, the Manzanita chapter will lead a free wildflower foray through Johnson Canyon and Lick Wash on Grand Staircase-Escalante NM outside of Kanab, where we can expect to see several *Penstemons*, including local favorites *Penstemon laevis*, and *P. x jonesii* (right). The field day will conclude with lunch at Kanab master gardener Larry Baer's Deer Springs farm where he specializes in cultivating *Penstemons* and other southern Utah wildflowers. Final details on the festival are still being prepared—so contact Walt at walt@kanab.net for more information and to register. - *W. Fertig*



UNPS Survey : The UNPS board has put together an online survey to find out about what sort of botanical activities UNPS members most enjoy and what type of articles you would like to see in the *Sego Lily*. To participate in the survey (it is free and easy), go to <http://www.surveymonkey.com/s/JCS9KXX>

Right: Jones' penstemon (*Penstemon x jonesii*) from the base of the East Rim Trail, Zion National Park. Discovered and named for Marcus E. Jones, the Jones' penstemon is now regarded as a hybrid between the blue-flowered Smooth penstemon (*Penstemon laevis*) and the red-flowered Eaton's penstemon (*P. eatonii*). The hybrid may arise when pollen is transmitted by nectar-feeding hummingbirds that ordinarily just visit red-flowered plants. Variability in flower color may be the result of backcrosses with either parent. Photo by W. Fertig, 30 April 2009.

Engelmann and his Spruces: A Detective Story

By Al Schneider

Adapted from articles posted by the author at www.swcoloradowildflowers.com.

George Engelmann (1809-1884) was an eminent St. Louis physician and botanist. Born in Germany, he received his medical degree in 1831 and published his first botanical work in 1833. Though he kept company with Louis Agassiz and other eminent European scientists, Engelmann's adventurous spirit brought him to America in 1832, where he ultimately settled in St. Louis. The city was a starting point for many western explorations, and throughout the next 50 years Engelmann was sought out by many botanists for his expertise, support (botanical, financial, and moral), and connections with eastern botanists Asa Gray and John Torrey.

Engelmann received and described plant collections from many botanists and explorers, including Augustus Fendler, John Fremont, Charles Geyer, Josiah Gregg, Charles Parry, and Friedrich Wislizenus. Engelmann himself made a number of collecting trips to the eastern United States, Midwest, southwest, and California. He described 108 cacti, with "over two-thirds of the forms recognized today" according to Dr. Oscar Soule.

Henry Shaw, a wealthy St. Louis merchant, chose Engelmann as his principal advisor in the forming of the now world famous Missouri Botanical Garden. In 1890, after Engelmann's death, his plant collection of 100,000 specimens and personal library were donated to the garden. The Missouri Botanical Garden's herbarium now has 5.5 million specimens and is the sixth largest in the world.

Engelmann is honored in the names of many plants. One of the best known is Engelmann spruce (*Picea engelmannii*). Engelmann also named and described the Blue spruce (*Picea pungens*), the state tree of Colorado and Utah, in 1879. The first authenticated collection of



Above: Engelmann spruce (*Picea engelmannii*). Photo by Al Schneider from www.swcoloradowildflowers.com

Blue spruce was made by Charles Parry in 1862 on Pikes Peak, who sent some of these collections to his friend, Engelmann. The delay of about 17 years in assigning the *Picea pungens* name was due to an interesting story of misidentification and more sophisticated classification of conifers.

When Parry first collected the specimen, he and Engelmann considered it to be *Abies menziesii*. This name had been given to the Pacific coast giant spruce trees, what we now call Sitka spruce, *Picea sitchensis*. The identification of Colorado blue spruce as Sitka spruce persisted into the 1870s. Engelmann reviewed the naming of Colorado blue spruce in the late 1870s, perhaps prompted after he read that Sitka spruce was renamed *Picea sitchensis* by Elie Carriere. Carriere's 1867 book on conifer classification included reassigning a number of *Abies* species to the genus *Picea*. Engelmann may have also come to realize that his description of Blue spruce collected by Parry just did

not fit Lindley's description of the Sitka spruce.

There are more convolutions in the naming of two spruces that Parry collected in 1862. Parry published two names for his Engelmann spruce: *Picea engelmannii* (May 4, 1863) and *Abies engelmannii* (May 4 an October 31, 1863). Parry and Engelmann must have published the *Abies* name because they believed their May 4 1863 publication of *P. engelmannii* was in error. James Reveal explains "the concept of what constituted a genus among the conifers was in a state of flux in 1863 and would only be resolved with Carriere's publication four years later. No doubt Engelmann decided that *Picea* should be included in *Abies*. This was the view of many at the time."

Colorado blue spruce and Engelmann spruce are very common Rocky Mountain trees. How is it possible that previous western explorers and botanists (Lewis, Douglas, Gambel, James, Fendler, Fremont, Hayden) missed these very common trees? Are there collections and names that have been overlooked?

Part of the answer to the above question came in an email exchange between Reveal, Stanley Welsh, and myself. Welsh is an expert on John C. Fremont's botanical collections (see March *Sego Lily*) and he indicates that Fremont did collect what came to be known as *Picea engelmannii* nearly 20 years before Parry collected it. "As to the *Picea* specimen cited as *engelmannii* in my write-up of Fremont's collections, you [Reveal] have already noted that the Los Gatos [California] information on the label is wrong as to the year of collection, and it is also probably wrong as to location [central California]. [Fremont's] label information was open to questions more likely than not, and he had probably ... [collected it] in 1845, but God knows where." Fremont collected for John Torrey but the specimen in question apparently never made it to Torrey, was never described, and thus never credited to Fremont.

The naming of plants is often not a simple story.



2011 Utah Rare Plant Meeting

On March 8, Red Butte Garden and the Utah Native Plant Society hosted the annual Utah Rare Plant meeting, held in the new annex at Red Butte. More than 50 botanists from Utah and adjacent states braved a spring snow storm to attend and hear presentations from a baker's dozen of speakers. The meeting concluded with a brief session on revising the UNPS rare plant list for 2011.

The following are selected abstracts from several speakers. Copies of powerpoint presentations are available on the Red Butte Garden website—www.redbuttegarden.org/conservation/RPTF.

Effect of storage time, site, and floral morph on seed germination of the threatened distylous primrose *Primula cusickiana* var. *maguirei*. By Andrew Rayburn and Jacob Davidson, Utah State University. *Ex situ* conservation of rare plant species requires an understanding of conditions required for seed germination. We report the first successful germination trials for Maguire primrose, a threatened endemic perennial herb narrowly restricted to a single 20-km stretch of Logan Canyon in northern Utah. We used cold, moist stratification and germination under the same conditions to compare percent germination and time required for germination (T_{50}) for Maguire primrose seed collected from different sites (upper and lower canyon populations) and flower morphs (pin or thrum) that had been stored for either one or two years. Total germination was 55.8% over 270 days. Time to first germination was approximately 75 days, with peak germination across treatments occurring between 165-180 days. There were strong effects of flower morph and storage time on mean percent germination across treatments, in addition to a significant storage time x site interaction and significant differences in mean percent germination between treatments. There were also strong ef-



Above, from left: Jena Lewinsohn, Ann Kelsey, and Mindy Wheeler 'studying' one of the posters at the March 2011 Utah Rare Plant Meeting at Red Butte Garden. Photo by Tony Frates.

fects of storage time and site on mean T_{50} values across treatments, in addition to significant differences in mean T_{50} values between treatments. Our results contribute to the understanding of germination biology for Maguire primrose, and inform future efforts for this threatened species.

[Andrew Rayburn also reported on his study of moss facilitation of Maguire primrose, described in the January 2011 issue of *Sego Lily*.]

Reproductive ecology of *Hesperidanthus suffrutescens* (Shrubby reed-mustard), an endangered desert shrub. By Matt Lewis, Utah State University. Successful conservation of endangered plants must begin with an understanding of their reproductive ecology. Unfortunately, many of the processes involved in reproduction (i.e. pollination, seed set, and resource allocation) have received little study for most endangered plants. We studied the reproductive ecology of the endangered Shrubby reed-mustard in the Uinta Basin of eastern Utah. A total of 120 plants from three populations received four treat-

ments in a pollinator exclusion experiment designed to determine which pollination mechanism produces the most fruits and seeds as well as the degree of self-compatibility among flowers. In addition, flower visitors were observed, collected, and identified to determine potential pollinators. First year results show that out-crossed flowers produced significantly more fruits and seeds compared to the control suggesting pollen may be limiting. Interestingly, while *Hesperidanthus suffrutescens* has been assumed to be self-compatible, both selfing treatments produced very few fruits or seeds compared to the control and out-crossed flowers. Overall, these results suggest a lack of self-compatibility and indicate that the pollinators needed for successful reproduction may, in fact, be limiting. This study highlights the importance of native pollinator fauna while providing managers the basic reproduction ecology needed to protect this endemic desert shrub.

Identifying plants: different strokes for different folks. By Mary Barkworth, Utah State Univer-

sity. We are developing new identification tools for the region's plants. Our current focus is on developing directed choice keys and making them available on the web both as PDF files and as interactive keys with embedded illustrations and links to descriptive pages. We are also developing multi-access keys, but because they require more data, they are progressing more slowly. Our other interest is developing image-based identification tools.

These rank the similarity of a submitted image to images in a reference collection. To narrow possible answers down to a single species, it will usually be necessary to submit multiple images of a plant just as one refines a text-based search by adding additional terms. Development of image-matching software is in its infancy, but digital infants often mature rapidly. A bigger problem is developing the image reference library. This will require recording and documenting a series of standardized images for all the regions' species; a task that will require collaboration and development of new resources for which we are seeking funding. Our hope is that providing multiple approaches to plant identification will entice more people into looking at and caring about plants, whether in their backyards or the areas between.

Hot of the Press: USFWS 12-month finding on a petition to list *Astragalus hamiltonii* and *Penstemon flowersii*. By Jessi Brunson. In response to a petition to list 206 species in the Mountain-Prairie Region, the US Fish and Wildlife Service Utah Field Office recently completed a status review that addressed 5 plant species found in Utah. We analyzed potential factors that may affect *Astragalus hamiltonii* and *Penstemon flowersii* and found no information that indicates these species are in danger of extinction or are likely to become endangered within the foreseeable future. We concluded that listing *A. hamiltonii* and *P. flowersii* as threatened or endangered under the Endangered Species Act is not warranted.

Send Info on Updating the UNPS Rare Plant List by June 30

The UNPS Rare Plant Committee held a brief meeting at the conclusion of the rare plant meeting at Red Butte to discuss potential changes to the Society's Utah rare plant list. In retrospect, having the session at the end of a busy day of meetings and socialization was probably not the best idea—many likely participants could not stay or were too tired to fully participate! We did solicit new information on several likely additions to the list, including *Eriogonum corymbosum* var. *nilesii* (found in southern Utah along the proposed Lake Powell water pipeline route), *E. mortonianum* (new to Utah, see page 11), and *Frasera ackermaniana* (recently described as endemic to the Uintah Basin).

The committee still plans to revise the state list later this year. If you were unable to attend this year's meeting, or have new information that would affect the status of a species already on the list, please submit your comments by 30 June to walt@kanab.net. Revisions will be published in the *Sego Lily* this fall.—Walter Fertig

Hot of the Press: USFWS 12-month finding on a petition to list *Eriogonum soredium*, *Lepidium ostleri*, and *Trifolium friscanum*. By Daniela Roth. In response to a petition to list 206 species in the Mountain-Prairie Region, the US Fish and Wildlife Service Utah Field Office recently completed a status review that addressed 5 plant species found in Utah. We analyzed potential factors that may affect *Eriogonum soredium*, *Lepidium ostleri*, and *Trifolium friscanum* and found mining, non-native invasive species, inadequate regulatory mechanisms, and small population size threaten these 3 species. We concluded that listing these plants as threatened or endangered under the Endangered Species Act is warranted, but pre-

cluded by the need to complete other high priority listing actions. These three plants will be classified as candidate species until a listing can be prepared.

Prioritizing and mapping rare plants in Zion National Park. By Walter Fertig. The National Park Service is obligated by internal policy to ensure the long-term survival of native plant species and prevent the need for rare taxa to become listed as Threatened or Endangered under the US Endangered Species Act. As many as 189 rare plant species have been recognized for Zion National Park, though these species had not previously been ranked according to a single prioritization system. In 2009, I was hired by Zion NP to revise the park's rare plant list following the criteria of the Utah Native Plant Society's Rare Plant Committee. The UNPS system assigns a conservation priority rank based on qualitative scoring of seven criteria: geographic range, number of individuals, number of populations, degree of habitat specialization, intrinsic rarity (such as pollination bottlenecks), threats, and trends. Of 192 native plant species from Zion that were evaluated, 3 were ranked as extremely high conservation priority, 9 as high priority, 29 were placed on a "watch list", and 10 were identified as needing more data. The remaining species, all formerly classified as "rare" in the park, were scored as medium or low conservation priority. This ranking approach is flexible, transparent, and allows park managers to focus management attention on a smaller subset of species at the greatest risk of extirpation. The system can also be revised as new information becomes available, as in 2010 when field surveys identified an additional new rare species (*Lepidium montanum* var. *heterophyllum*) for the watch list, and new occurrences of highly ranked species, such as *Astragalus ampullarioides*, *Lomatium graveolens* var. *clarkii*, and *Asplenium adiantum-nigrum*. With the revised rare plant list, Zion NP is currently developing a GIS database of mapped species locations.





Left: Photo # 1 of *Erythronium grandiflorum* looks great at first glance, but has subtle “distraction” problems.

Wildflower Photography Techniques: Distraction Subtraction

Text and Photos by Steve Hegji

Photographic composition is a big topic, and I'll bring elements of it into these articles from time to time. For now let's confine ourselves to a simple concept: pick out what elements of the picture you want your viewer's eye to be drawn to, and work to eliminate everything else. Because of the differences between what you see and what the camera sees, you have to train yourself to do this. As you bend down to photograph a flower, the only thing you “see” is how pretty it is. However, the camera picks up the straw, twigs, grass, small rocks, shadows, bright spots, conflicting colors, and other intrusions into your “pretty” flower picture. Try the following technique: once you've composed your picture in your mind, stop for a minute and consciously try to identify what other elements will be captured by the camera – then figure out how to subtract the distracting ones.

Now let's start with some pictures of *Erythronium grandiflorum* (Glacier lily) and we'll see how this “distraction subtraction” technique works. Photo #1 (above) highlights a nice specimen at anthesis. The beautiful yellow flower, with anthers covered in pollen, and the superior ovary poking out of the corolla is

clearly visible. One of the broad, rich green basal leaves nicely frames the left side of the photograph. The base of the flower is surrounded by a nice arrangement of Gambel Oak leaves, and there is some dappled shade from the bare oak branches above, which I find evokes a feeling of “being out in the woods.” But the photograph is not all it could be. The out-of-focus flower on the right edge keeps drawing the eye. We could crop that out of the picture, but

then one of the two pieces of straw at the bottom of the picture will now be at the edge and will detract from the main subject. If you carry a multitool with you, the pieces of straw can be clipped out before you take the picture. Randomly aligned pieces of straw are common villains in our photos.

Photo #2 (below) shows an arrangement I'd been trying to capture for several years – Glacier Lilies and

Below: Photo # 2—Glacier lilies in the snow





Glacier Lily
(*Erythronium grandiflorum*)

The genus *Erythronium* in the lily family contains approximately 27 species, all but four of which are native to North America. The sole European species, *E. dens-canis* (or “dog-tooth”) is atypical in having pinkish-purple flowers (most species are yellow or white). Linnaeus named the genus *Erythronium* from the Greek word “*erythros*” or red, for the anomalous European plants. Though not at all closely related to violets (which are dicots after all), the common name dog-tooth violet has persisted for the genus, as well as several other monikers including trout lily (for the speckled leaves of some species), fawn lily (for the appearance of flowers early in the spring with baby deer), avalanche lily, and glacier lily (the latter two for the arrival of flowers in late snowbanks).

Our single species in Utah is the “large-flowered” *Erythronium grandiflorum* and commonly goes by the name Glacier lily. It can be recognized by its bright yellow nodding flowers comprised of six tepals (actually three petals and three sepals of similar size and appearance) and bright yellow stamens that project beyond the perianth. The flowers are borne above a pair of green, egg-shaped leaves. Below ground, the Glacier lily has a deeply-buried starchy corm (actually a modified stem and not a root). Corms are eaten by bears and rodents, and were used by Indians for food. Though edible, corms can cause vomiting or a burning sensation in some people.

University of Wyoming student Erik Hamerlynck found that Glacier lilies were able to assemble all the chemicals needed for photosynthesis while still deeply buried in the snow. The plants were able to prepare even though living in extreme cold and low light. Once they emerged from the snow, Glacier lilies were capable of photosynthesizing right away. Since conditions in the high country could be fickle, Hamerlynck observed that the lilies waited 2-3 days to begin food production, or until the soil began to thaw. - Walter Fertig

snow. It’s got some nice drops of water that have formed on the leaves because of the melting snow. But here’s my take on the distracting elements in the picture. First, I think there’s too much shadow; and to fix that problem I could have found a better specimen, waited for the sun to move a bit, or added some light of my own. Second, the main areas of interest – flower, leaves, and water droplets, don’t fill enough of the frame, which just provides opportunity for distracting elements to creep in to the photograph. Third, the oak branch in the left foreground is both too bright and out of focus, a very distracting combination.

We’ll finish up with Photo #3 (above). At the time I came across this plant, I thought it was the most perfect specimen I’d ever seen – three large blossoms standing tall and putting on a gorgeous display. I chose to compose the picture so that the plants were backlit and producing an explosion of rich yellow color (my favorite). I personally only had one problem with this photo, although you may have more since the “art of composition” is somewhat

Above: Photo 3 - a print of this is in the author’s cubicle. How might you have composed this image differently?

subjective. I’ll leave you to think about it, and what could have been done differently. All I will tell you is that I solved the problem by doing a “water color” conversion on the photo and a print of it sits in my cubicle, cheerfully brightening my work day. If you email me at stevehegji53@gmail.com I’ll send the digital image to you.

I always like to give you an internet reference where you can learn more. Go to <http://hanselmannphotography.com> and you’ll see a vertical list of links to Mr. Hanselmann’s articles on the left-hand side of the page. Near the bottom of that list are two articles titled “Composition 1” and “Composition 2.”

Looking forward to the July issue of *Sego Lily*, my next article will contain a checklist you can follow in the field that will help you improve your plant photographs.



Ants Helping Plants, or is it the Other Way Around?

By Walter Fertig

Adapted from the Newsletter of the Wyoming Native Plant Society

Western North America is home to a dozen species of sunflowers in the Composite genus *Helianthella*. Each species is characterized by subtle differences in leaf and floral morphology. The Aspen sunflower, *H. quinquenervis*, can be further distinguished by its unique means of defense against herbivory. Instead of relying on chemical or structural defenses, the plant utilizes aggressive ant guards for protection against insect pests. In return, the sunflower provides the ants with food in the form of nectar.

Similar ant-plant symbiotic relationships have evolved independently in hundreds of species of plants. In the majority of known cases the plant utilizes ant defenders in place of more conventional chemical deterrents. Ant protection is often more economical than chemicals and is not as easily circumvented by insect pests. In order for the system to work, however, the plant cosymbiont must be able to attract a steady population of ant guards. Without its partners, an ant plant is left defenseless and will suffer from reduced reproductive fitness, defoliation, and possibly even death.

Most *Helianthella* species utilize sesquiterpene lactones to defend against insect herbivores. The production of these toxins is a drain on the metabolism of the plant and reduces the amount of energy available for leaf, flower, and seed production. Toxins are most successful in deterring generalist-style insect herbivores, but may fail to discourage specialized feeders. A single mutation may alter the physiology of an insect pest, making it immune to existing chemical defenses. Chemical defenses are also more often a reaction mechanism rather than a preventive one. They are released only after physical damage has already been inflicted.

The use of ant defenders allows the Aspen sunflower to invest a



Above: Aspen sunflower (*Helianthella quinquenervis*) by Al Schneider (www.swcoloradowildflowers.com).

greater proportion of its energy towards seed production. Unlike chemical systems, ants provide a good defense against both specialized and unspecialized herbivores and can act before damage has occurred. Most importantly, insect herbivores must evolve behavioral modifications to overcome an ant defense. This is more difficult and takes a greater number of generations to accomplish than acquiring chemical immunity.

To attract ants, the aspen sunflower secretes carbohydrate and amino acid-rich nectar from nectaries located on the involucre bracts enclosing each developing flower head. The plant regulates ant activity and the cost of nectar production by secreting nectar gradually and only in small quant-

ities. As a result, ants are constantly travelling about the flower head in search of nectar. Foraging ants react aggressively to all insects they encounter, including other ants and potential herbivores. It is this aggressiveness that the sunflower relies on to drive off its many insect pests.

Picture-wing flies and agromyzid flies are the major insect herbivores of *Helianthella quinquenervis*. In both species, adults mate on the plants and females lay their eggs on the immature heads. Fly larvae complete their life cycle in the developing ovules and seeds. Large numbers of larvae can greatly reduce the seed yield of a plant. Aggressive ants interfere with flies trying to lay their eggs on the flower heads. Ants rarely kill flies outright, but can drive off egg-laden flies simply through their pugnacious behavior.

Experiments with sunflowers in which ants have been removed illustrate the success of the ant protect-

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ion system. Sunflowers with ant guards lost an average of only ten percent of their seeds to insect predation, while unprotected plants exhibited seed mortality rates as high as ninety percent. In the absence of ants the system backfires, as the nectararies attract more insect herbivores.

Despite its overall success, the ant defense system of *Helianthella quinquenervis* is not foolproof. Any gravid female fly that eludes the ant guards will be able to produce many offspring because ants do not seek out and destroy eggs, larvae, or pupae. Other insect pests, such as the *Hemeosoma* moth, can avoid ant guards altogether by laying its eggs at night, when ants are less active. Larger vertebrate herbivores, such as elk, are unaffected by pugnacious ant behavior, although the unpalatability of the ants themselves may discourage grazing. Overzealous protection can also be a disadvantage if ants discourage insect pollinators.

Due to their reliance on ants, Aspen sunflowers are restricted to areas where ants are abundant. Uneven distribution of ant colonies is probably the single most important factor in determining the survivability of seedlings. Transect studies following a gradient in ant density show that seed mortality rises with increasing distance from ant colonies.

The Aspen sunflower has diverged from its close relatives by evolving a non-chemical defense system in conjunction with aggressive ants. The immediate benefit to the plant is improved energy conservation. Less metabolic energy is required for defense and more can be invested in reproduction. Drawbacks include lessened fitness in the absence of ants and a reduced ability to pioneer new habitats. For good or bad, the evolutionary path taken by the Aspen sunflower has become intertwined with that followed by its ant partners.

References

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- Inouye, D. 1984. The ant and the sunflower. *Natural History* 93(6):48-53.



A New *Eriogonum* for Southern Utah: In October, 2009, I was walking my dogs on BLM lands just west of Kanab when I encountered a curious buckwheat. The plant had the growth habit and leaf characteristics of *Eriogonum microthecum* (common in the area), but the yellow flowers of Thompson's buckwheat (*E. corymbosum* var. *thompsoniae*, or *E. thompsoniae* var. *t.*), also found in the vicinity. I found only two individuals in late flower and made a meager collection to key out at home. Uncertain of its identity, I mailed the collection to buckwheat expert Dr. James Reveal at Cornell University for his opinion. Reveal wrote back thinking the specimen might be a hybrid of *E. corymbosum* but suggested I get better material.

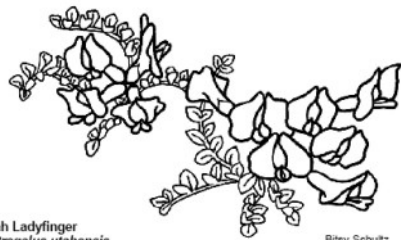
Nearly a year later, I returned to the site with my trusty canine team and relocated just one of the plants (the fate of the second specimen is unknown). This time, the plant was in full flower and I was able to take a set of photos and a better specimen. The plant had lemon-

Above: Morton's buckwheat (*Eriogonum mortonianum*) from outskirts of Kanab, Kane County, UT. Photo by W. Fertig, September 2010

yellow flowers and glabrous leaves with short petioles and inrolled margins. It was clearly not *E. microthecum*, *E. corymbosum*, or *E. thompsoniae*. I suspected the plant was Morton's buckwheat (*E. mortonianum*), a species known from just south of Kanab near Fredonia, Arizona. When I sent the photos and new specimen to Jim Reveal he replied that the mystery plant was indeed Morton's buckwheat and represented a first record for the state of Utah.

In Arizona, Morton's buckwheat is restricted to red gypsum-rich soils of the Moenkopi Formation on the Paiute Indian Reservation. The Kanab plants occur on rocky, reddish Moenave sandstone and clay in a Utah juniper/Two-needle pinyon community with rabbitbrush, galleta, and snakeweed. Additional habitat occurs on BLM lands south of the Vermilion Cliffs and west of Kanab and still needs to be surveyed for additional plants. - Walter Fertig





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