



Sego Lily

Newsletter of the Utah Native Plant Society

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Desert mule's-ears (*Wyethia scabra*) forms dense mounds up to four feet across and two feet wide and produces numerous, cheerful, sunflower-like yellow heads over much of the spring and summer. Recently this species was transferred to its own genus, *Scabrethia*, for the sandpapery ("scabrous") foliage. To learn more about growing this and other desert plants, see the article on page 10. Photos by Julie Kraft.

Utah Native Plant Society



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Sego Lily Editor: Walter Fertig (waltola64@gmail.com). The deadline for the Winter 2015/16 *Sego Lily* is 31 December 2015.

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Utah Native Plant Society, PO Box 520041, Salt Lake City, UT, 84152-0041. Email: unps@unps.org



Utah Native Plant Society Chapters

Unidentified Flowering Object

This month's UFO looks a bit like a clutch of baby Oviraptor dinosaurs emerging from their nest, but is actually the inflorescence of an early-blooming native plant species of the plateaus of southern Utah. Jeff Lauersdorf photographed the plants near Escalante in March and sent them in for identification. Can you tell what it is?

The Fall Unidentified Flowering Object was Slender-spire orchid (*Piperia unalascensis* or *Habenaria unalascensis*) photographed by Steve Hegji near Alpine, Utah.

Have a UFO to share? Send it in! - *W. Fertig*

Bulletin Board

2016 Penstemon Festival, May 21: see page 5 for full description.

Salt Lake Chapter Meetings: WRGS Cactus gardens tour, May 21, 2016. Be prepared for a treat, this year we are forgoing our usual rock garden tour at the end of April and have planned a special cactus garden tour on Saturday, May 21. Cacti are seldom in flower in April, but May is a different story.

We will meet at 11 AM at a garden new to us owned by Steve Slotboom at 616 West 3765 South in Salt Lake City. Along with the tour there will be light refreshments and the opportunity to learn about using winter hardy cactus and succulents in your garden. From here we will travel to Bountiful to visit the marvelous cactus garden of Jeff Brimley (106 West 700 North). A sculpture artist as well as a masterful gardener, Jeff has created many fine decorative and entertaining details in his garden. Wrapping up the day is a garden tour and potluck barbecue at Judy Johnson's Intermountain Cactus and display gardens in Kaysville (1478 North 750 East). Prepare to be dazzled by the *Yucca brevifolia* in the front and the wide variety of cactus and succulents, many of which are available for sale. For more information on the tour (which will proceed rain or shine) contact Cindy Cromer (801-209-9225) or Cathy King (801-867-3595).

Ten years ago, the Wasatch Rock Garden Society hooked up with the Utah Native Plant Society for an overnight field trip to The Wedge on the San Rafael Swell. It was a fantastically enjoyable botanical and social adventure, not to mention the wonderful scenic overlook of the 'Little Grand Canyon'. William Gray compiled a long list of plants observed that weekend. WRGS is planning a return field trip, given the recent decent precipitation in the southern half of the state and UNPS members are once again invited to participate. The adventure is currently and almost firmly set for June 4th and 5th. More definite details will be forthcoming. If you would like to sign up or have questions, contact John Stireman at jostire@gmail.com. —Cathy King

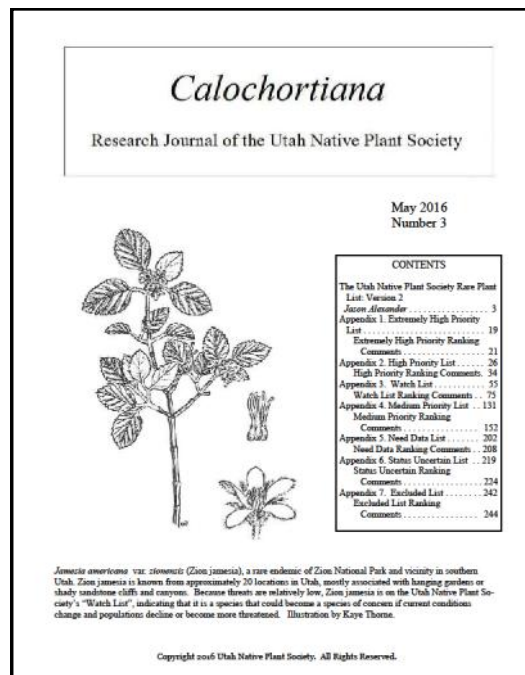
UNPS Wildflower Poster Back in Stock: This winter, UNPS made a new printing of David Gardner's classic Utah Wildflowers poster on heavy poster stock. If your old copy is faded or torn and in need of replacement, or you need a gift for that someone special, order a new poster (or two) at the UNPS online store (unps.org).

Calochortiana # 3: The third edition of the Utah Native Plant Society Technical Journal, *Calochortiana* will be out in mid-May and available for free download as a pdf document from the UNPS website. This issue features a revision of the UNPS Rare Plant Committee's "Rare Plants of Utah" list by Jason Alexander, chair of the Rare Plant Committee. *Calochortiana* # 2, featuring a key to the flora of Zion National Park, was published in late 2015 and is also available from the UNPS website.

UNPS Helps Weber State Science Fair: For the second consecutive year, the Utah Native Plant Society provided some of our plant posters (Utah Wildflowers and Threatened & Endangered Plants of Utah) and other materials as awards for the Botany category of the Ritchey Science and Engineering Fair, hosted annually by Weber State University. Last year we also provided a Utah plant ID CD-rom from Flora ID Northwest. This year a copy of the same CD was awarded the first prize winner (courtesy of Flora ID Northwest and Bruce Barnes). For more information about the Ritchey Science Fair, go to <http://ritcheyfair.org/>. - Tony Frates

Have a botanical meeting or chapter event to publicize? Send announcements to the editor.

In Quotes: "It is much better to learn the elements of geology, of botany, or ornithology and astronomy by word of mouth from a companion than dully from a book" Ralph Waldo Emerson, *Concord Walks*, 1904.



UNPS News

Ann Kelsey Fund for Botanical Research

Established: Ann Kelsey, a life member of UNPS, died in 2013 after a long battle with leukemia. Ann made many important contributions to botany in Utah and served the University of Utah for 23 years as the collections manager of the Garrett Herbarium. Ann played a key role in hosting the 2009 Southwest Rare Plants Conference. She was passionate about the importance of botanical collections, an inspirational colleague, and a tremendous presence for the botanical community.

The Ann Kelsey Fund was established in 2013 to support students conducting botanical research that highlights the important role of museum collections— either through studying existing specimens or contributing new specimens to the Garrett Herbarium. The funds are designed to support a project for up to one year and are being facilitated by the Garrett Herbariums staff at the Natural History Museum of Utah and faculty partners at the University of Utah. One grant of approximately \$500 will be awarded annually.

The Salt Lake Chapter of UNPS voted last year to contribute \$500 to the Memorial Fund and the statewide Board of Directors of UNPS agreed to match the contribution. At the Utah Rare Plant Conference we handed over checks to NHMU to help boost the Fund's endowment. - *Bill Gray*

Below: Presentation of SLC chapter contribution to the Ann Kelsey Fund at the 2016 UNPS Rare Plant Meeting. From left to right, Elizabeth Johnson and Mitch Power of the Garrett Herbarium, Lester Aoki (Ann's husband), and Bill Gray



John Larry England (1947-2016): Long-time US Fish and Wildlife Service botanist Larry England passed away on 27 February. Larry (seen above with images reflecting the many rare plants he helped protect) had recently retired from the USFWS after a long career in public service that began with the BLM in Vernal Utah in the 1980s. For more than 40 years Larry also served with the Utah National Guard, including two years in Iraq as a Master Sergeant. While working in the Vernal area, Larry discovered an unusual penstemon along the White River that he described as *Penstemon albifluvis* (later renamed *P. scariosus* var. *albifluvis*). This narrow endemic of the Uinta Basin in NE Utah and W Colorado has been a candidate for listing under the Endangered Species Act and is considered Sensitive by the BLM. Larry contributed a lot of time and good information to the UNPS Rare Plant Committee during his tenure with the Fish and Wildlife Service and after his retirement. He was always cheerful and upbeat with a kind word for all—plant and human alike. - *W. Fertig*

Chapter News and Events

Fremont Chapter: Penstemon Festival, Saturday May 21, 2016: Once again, the UNPS Fremont Chapter is hosting a festival honoring the genus *Penstemon*, always a favorite of gardeners and native plant enthusiasts alike. The event will be held at Fremont Indian State Park's Sam Stowe Group Campground and include the following activities:

10 AM: Welcome: drinks & doughnuts.
Speaker: Dr. Robert Johnson from Brigham Young University

Noon: Lunch serves (sandwiches with chips and drinks)

1 PM: Guided driving tour to Devils Dance Floor to seek and find an amazing variety of wildflowers and native plants

4PM: Meet and greet at Sam Stowe Group Campground. Speaker: Bill Varga, Utah State University

5 PM: Dinner—hamburgers with all the fixins

6 PM: Entertainment and campfire

Tickets and registration: Before May 14, 2016, \$20. After that, or at the door = \$25. Mail check or money order to Central Utah Penstemon Festival, 451 South 300 East, Monroe, UT 84754 or register online at UNPS.org (go to 'buy now').

For more information, contact Karen Ivory @ 801-566-6767 or Janett Warner @ 435-527-1234 (janettwildland@gmail.com)

Sponsored by Great Basin Natives, Brooklyn Garden, Utah Public Radio, Plants for Western Landscapes, Utah Native Plant Society, Quality Inn and Suites, Utah State University Extension, and Perennial Favorites.



Canyonlands Chapter: Arches Peak Bloom Hike, April 23, 2016:

Thirteen hardy souls rallied for the wildflower walk in Arches on the warm but very windy morning of Saturday, April 23. We made our way down slickrock and sandy-bottomed washes in the vicinity of the rim of Courthouse Wash. Roughly 46 plants were seen that were either in full flower, just finishing flowering or with just a few first flowers peeking out.

Showy common flowers were Eaton's penstemon (*Penstemon eatonii*), two species of evening primrose (*Oenothera caespitosa* and *O. pallida*), two species of yellow-flowering cryptanth (*Cryptantha flava* and *Cryptantha flavoculata*), and most unusually, Zion's sweetpea (*Lathyrus brachycalyx* var. *zionis*). Cliffrose (*Purshia mexicana*) was full of buds, and low branches on several of the shrubs were in flower.

Our wildflower group also explored some non-flowering species, as well as both cool-season grasses in bloom and warm-season grasses, just beginning to green up at their bases. One section of the walk passed some vegetated sand dunes at the edge of the wash, with the sand-loving resin-bush (*Vancleavea stylosa*), not yet flowering, as well as purple sage at the earliest stages of budding and flowering (*Poliomintha incana*). - Mary Moran

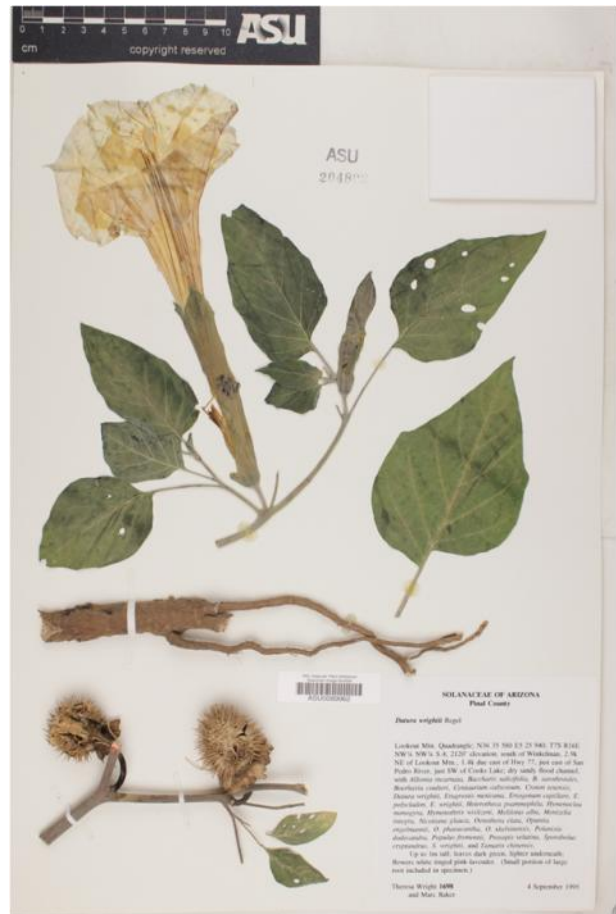
Are Herbaria Still Relevant in the 21st Century?

By Walter Fertig, Arizona State University herbarium

The oldest herbaria date to the Middle Ages when European physicians first learned that dried and pressed plants could retain their color and appearance for decades if properly preserved. Initially specimens were bound in books to provide doctors with a handy reference for identifying the sources of herbal medicines. Over time it became more convenient to keep specimens on loose sheets that could be arranged in various ways. Nascent taxonomists could even begin to organize their collections according to patterns. Linnaeus, the creator of our modern taxonomic system, had a home herbarium that he could rearrange as he saw fit, and other scholars kept personal collections too. Ultimately, small collections coalesced into larger public repositories, often housed in major universities or botanical gardens. In the 19th and early to mid 20th centuries, herbaria were at the forefront of research into the genealogical relationships of plants based on outward appearance (morphology) and internal anatomy.

Such work continues to this day, but has long been overshadowed by more sophisticated techniques and more modern analytical tools. Not surprisingly, traditional herbarium taxonomy has declined in prestige and funding. In the past twenty years one herbarium in seven has closed due to budget cuts or shifts in academic priorities (Deng 2015). In most cases, these collections have been absorbed by larger institutions, such as the recent merger of the University of Missouri Herbarium by the Missouri Botanical Garden. More ominous is the growing trend of vacant positions not being refilled, degree programs in botany disappearing, and reduced hours of operation. Just this March, a major National Science Foundation program that has traditionally funded specimen digitization and large capital expenses (such as new cabinets) was suspended.

If herbaria are to survive, those of us who care about them need to do a better job of demonstrating their value to society. While conventional taxonomic research remains important, herbaria are also increasingly relevant in the fields of ecology, biogeography, and conservation biology. Specimens are also valuable for building public



Above: Herbarium specimen of Datura wrightii (Sacred datura or jimsonweed) from the Arizona State University herbarium. Such specimens are useful to taxonomists studying the range of morphological variation across plant populations. The locality information on the label, especially if mapped in a digital database, is increasingly important for predicting species distributions, determining gaps in protection, and tracking the spread of weeds or response of species to climate change. More importantly, specimens are beautiful and build public appreciation for plants and botany.

appreciation of plants and of botany in general. Rather than hiding our specimens behind cabinet doors, we need to make them more accessible, especially digitally.

Each herbarium sheet has three main pieces of information. The most obvious is the physical specimen itself: stems, leaves, roots, flowers, and fruits. From these, researchers can determine the identity of the species and recognize the diversity among individual plants within and between populations. Measurements and obser-

vations of specimens is the basis for species descriptions and identification keys. Additional information can be gleaned from the internal chemistry of the specimens, especially genetic data from nuclear and organelle DNA. Such data can be used to reconstruct phylogenetic relationships among species, genera, and families. Perhaps the most useful information, however, comes from the specimen label which records the name of the species (and any subsequent changes or corrections), the collector, the date of the collection, locality, and other data on habitat, elevation, associated species, or abundance. These three datasets are the foundation of taxonomic research and can be especially useful in studies of ecology and conservation biology.

For taxonomists, the most important specimens are the type collections, which provide the basis for species names and taxonomic concepts. When a new species is discovered, a holotype is designated and deposited in an herbarium to serve as the standard (or archetype) for which all other individuals of the species are compared. A recent study found that nearly one-quarter of all newly documented species were already found within existing herbarium collections but had been initially misidentified or unidentified (Bebber et al. 2010). The authors even suggested that as many as 70,000 undescribed plant species might still be lurking within the world's herbaria.

Herbarium specimens can also be a source for new records of pathogens and parasites. In the 1990s, the late John Baxter, a retired mycologist, discovered over 30 state records of rust and smut fungi growing on plant specimens in the Rocky Mountain Herbarium at the University of Wyoming. One of these was *Puccinia yosemitana*, a rust from California and Colorado that was new to Wyoming. Baxter found it growing on a specimen of Opal phlox (*Phlox opalensis*) that I had collected in SW Wyoming a few years earlier. I had failed to notice the yellow-orange fruiting structures when making the voucher as part of a rare plant survey.

Specimen vouchers (deposited in herbaria) are important for documenting new occurrences of rare and unusual plants. Compared to observation records or photographs, physical specimens are easier to corroborate if there is any debate about a report's authenticity. This can be especially important in ecological studies or when developing checklists for protected areas, such as national parks or wildlife refuges.

In the past, users of specimen data had to either visit herbaria in person or arrange to borrow material. With the advent of digital databases, herbarium records are now readily available around the clock and from any home, office, or mobile device that has internet access (even in the field). Online databases include standard label information (species name, collector, date, locality, habitat)

and often have maps of collection sites and digital images of the actual specimen. These data can be queried in numerous ways to create local or range-wide distribution maps or customized species lists. Individual herbaria are increasingly pooling their digital data into regional and national networks, such as SEINet (Southwest Environmental Information Network), the Consortium of Intermountain Herbaria, or the Consortium of Pacific Northwest Herbaria, allowing users to access millions of records with ease. Other digital products, such as interactive keys, image libraries, and links to original botanical literature, are greatly increasing the utility and scope of herbarium information.

Brick-and-mortar herbaria (and the professional staff needed to maintain them) are still vital for plant identification services. Potential clients range from farmers and ranchers, government biologists, and industry consultants to home gardeners, amateur naturalists, and school children: essentially anyone who might need assistance identifying mystery plants. Sometimes herbarium staff are asked to provide expertise on plant fragments rather than whole specimens. Such "forensic botany" can help archeologists interpret prehistoric sites, paleoecologists infer past climates, and law enforcement officers solve crimes.

Herbaria can also be thought of as vast genetic libraries. Rather than having to travel around the world to gather samples, researchers have millions of collections at their disposal, already identified to species and with collection dates and localities provided. In the case of extinct or protected species, herbarium specimens may be the only material available for study. Older specimens can offer a window into changes in genetic structure in populations and evidence of ongoing evolution.

There have been challenges in utilizing herbarium collections in molecular research. Initially researchers had difficulty extracting sufficient quantities of DNA from old collections. DNA can also be altered if specimens were pickled or dried improperly. Some species are reluctant to give up their genetic resources, especially succulents or plants rich in sap or resins.

Recent advances in molecular techniques are resolving many of these problems. A recent study (Choi et al. 2015) found no relationship between the age of a specimen and the purity of DNA that could be extracted and later amplified. Ames and Spooner (2008) used DNA from 200-year old herbarium specimens of Irish potato in Europe to match unique genetic markers with their source populations in the Andes and lowlands of Chile and help determine the multiple points of origin of this important crop plant.

Herbarium specimens can also be time capsules of past environmental conditions. Atmospheric carbon dioxide levels have been recorded in herbarium specimens collected in the late 1700s and

compared with recently collected plants to document changes in the concentration of greenhouse gases since the industrial revolution (Bonal et al. 2011). Lichens are particularly useful bioindicators of air pollution and historical collections have been used by researchers to trace the decrease in air quality and subsequent changes in the lichen flora in the Los Angeles area over the past century (Riddell et al. 2011).

Locality data from herbarium specimens is also useful in studying the spread of invasive weeds. One example is Stinknet (*Oncosiphon piluliferum*), a malodorous annual weed from South Africa that recently became established in the American Southwest. Based on herbarium collections, this species was first collected in Los Angeles and Phoenix in 1981. It remained uncommon and infrequently documented until about 2005, when populations began to appear regularly in southern California and central Arizona. At first the invader was a mystery, but again herbaria demonstrated their worth by providing weed specialists with the correct identification. Information from collections is marking the steady progress of this species as it marches south towards Mexico.

Digital locality data from herbarium specimens can be used in modeling the potential distribution of weeds, rare plants, and other species of high management interest. At the University of Wyoming, I used more than 325,000 digital records in the Rocky Mountain herbarium database to identify patterns in the presence and inferred absence of 200 randomly selected plant species with a mix of environmental variables (average monthly temperature and precipitation, bedrock geology, soil type, vegetation, etc.). The resulting models identified areas of likely and unlikely habitat that could then be checked to determine if the target species was present. This study resulted in the discovery of several new populations of critically endangered plant species.

Locality data from herbarium collections can also be used to identify gaps in the network of protected areas, such as national parks, wilderness areas, special botanical areas, and Nature Conservancy preserves. In Wyoming, 10.6% of the state is "protected", but these areas tend to be concentrated nonrandomly in the northwest corner of the state and at high elevations. Based on herbarium records, I found that 18% of the state's plant species were completely absent from these protected areas. Unprotected plants tended to be restricted to specific habitats and regions (such as deserts, grasslands, and the Black Hills) that were not well represented in the existing protected area network. In addition, rare species were more than twice as likely to be unprotected as common species. These results should be helpful in targeting specific areas and species in need of conservation attention (Fertig 2011).

Making herbaria relevant again

Hopefully the preceding examples have demonstrated the ongoing value of herbaria in contemporary research on plant taxonomy, ecology, and conservation biology. Herbarium supporters need to share this message with the public, our academic colleagues, and those who control research funding. I recommend the following actions:

1. Stop using images of scientists standing in front of open herbarium cabinets to illustrate our work (visit any herbarium home page and you will see what I am referring to). Our focus needs to be on the contents of the cabinets and not the cabinets themselves!

2. Expand the reach and quality of digital specimen databases and keep access to them free.

3. Provide technical services to the public, such as help with plant identifications, and do so with a smile.

4. Support and participate in research across disciplines and at local, state, regional, and international scales (no working in isolation!)

5. Create a positive environment for students, colleagues, and visitors.

6. Hold more outreach events with the public. Remember that people really like plants and are just as fascinated as we are by their diverse forms, colors, and beauty. There is something about seeing (and holding) a plant in person, even if dried and pressed, that is far superior to a photograph or video. Engaging visitors is a great way to recruit potential volunteers to mount, database, and file specimens and builds crucial support for the work that we do and love.

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Noteworthy Discoveries:

Spiny milkwort in the Uinta Basin

Back in June 2015, while conducting monitoring on a Uinta Basin endemic immediately west of the Green River in Uintah County, I stumbled across a curious plant that I had never seen before.

During my years conducting botanical work in the Basin I was surprised that I had never seen this particular plant before. The small cushion-like plant had thick, dark green leaves, spinose branches, and purple and yellow legume like flowers. Something told me that this is something I've never come across in any of my botanical forays in the Basin. I grabbed a small sample and returned to the truck. Over lunch, I took out the Uinta Basin Flora. I confess, initially I started with Fabaceae and struggled, but once I began at the beginning of the key, I quickly came to *Rhinotropis subspinosa* (S. Watson) J.R. Abbott or showy milkwort, a plant I had heard of but never seen.

The species used to belong to the genus *Polygala*, but has since been placed in the newly constructed genus *Rhinotropis* and a member of the Polygalaceae (milkwort family). Now this is where things get interesting. According to Goodrich and Huber, authors of *Uinta Basin Flora*,

this species is reported from Uintah County "but we have seen no specimens." Consulting *A Utah Flora* was no help either as "report of the species from Vernal is based on a mislabeled specimen." This was a curious situation. The species is wide-spread in southern and central Utah and is known from adjacent Grand and Carbon Counties just to the south of the Basin.

Perhaps this was the county record for the species? We returned later in the week and collected two vouchers and habitat data. Showy milkwort, like many of the endemics in the Basin,



occupies semi-barren shale outcrops. I counted 35 individuals on the one outcrop of shale, most of which were happily flowering. Showy milkwort is a member of a salt desert shrub plant community

dominated by *Ephedra torryeana* (Torrey joint-fir), *Atriplex confertifolia* (shadscale), *Atriplex gardneri* (Gardner saltbush), *Tetradymia nuttallii* (Nuttall horsebrush), *Achnatherum hymenoides* (Indian ricegrass), (*Mirabilis alipes*) four-o'clock, *Cryptantha rollinsii* (Rollins catseye), and *Erigeron pumilus* (Vernal daisy).

Looking around, there appears to be much habitat around the area and future surveys will likely turn up additional plants. After several months, the thought occurred to me that other people might be interested in hearing about the discovery. After discussing the find with (and giving up one of my vouchers to) Sherel Goodrich, I decided I would share

with the rest of Utah. I contacted Tony Frates about possible submission to the *Sego Lily* and he did some digging of his own on the species. He emailed shortly after our initial communication with the answer to



why showy milkwort has been reported but never seen in the county. Showy milkwort had been previously collected in the Basin in 1979 by Kathy Mutz, but the specimen now lives in the New York Botanical Gardens. While not the county record I initially thought, the discovery is important as it increases the known range of this species to the north and west. Additionally, the collection clears up

any confusion on the presence of the species in Uintah County. So, next time you find yourself in the beautiful and floristically rich Uinta Basin, keep your eye out for this awesome little shrub. - Matt Lewis

Grow This:

Desert Gardens

By Robert Dorn (Adapted from *Castilleja*, publication of the WY Native Plant Society, March 2015)

Desert gardens are frequently designed to replace water-consuming lawns with plants that do well with only natural precipitation. This garden is also called a xeriscape and requires a dry, well-drained site such as a south exposure or a rai (sed area with good drainage). Adding lots of gravel to the soil will help achieve favorable conditions. In addition to the five plant examples that follow, cacti are also suitable for the desert garden (see *Sego Lily Spring 2015*). The plants should not be given any supplemental water except during extreme drought or when first getting them established.



Above: Oval-leaf buckwheat by Al Schneider (www.swcoloradowildflowers.com)

Oval-leaf buckwheat (*Eriogonum ovalifolium*, above) grows to 8 inches high and often forms mats to 15 inches across. The leaves are basal, short, and spoon-shaped. The flowers are borne in a ball-like cluster at the tip of a stem with many stems per plant. Color ranges from white, cream, or yellow to pink or reddish depending on variety. The flowers appear from May to August depending on elevation. The plants occur naturally on hills, slopes, ridges and open prairies in the basins, val-



Above: Desert prince's-plume by Al Schneider (www.swcoloradowildflowers.com)

leys, plains, and mountains up to alpine slopes. They can be grown from seed lightly covered to allow some light exposure. It is also in the nursery trade.

Desert prince's-plume (*Stanleya pinnata*) grows to 4 feet high and wide with several to many stems per plant. The leaves are to 7 inches long and pinnately compound. The flowers are yellow, to 1 1/4 inches across with yellow stamens often longer than the petals, and scattered along the upper 15 inches or so of the stems in a narrow plume-like inflorescence. They appear from May to July. The plants occur naturally on dry, open hills, often on clay soils or soils containing selenium, in the plains and basins. They can be grown from seed planted about 1/4 inch deep but may take 2 or 3 years to flower. It is also in the nursery trade.

Badlands wyethia or mule's-ears (*Wyethia scabra* or *Scabrethia scabra*, see cover) grows to 2 feet tall and wide and is usually bushy with many flower-bearing branches. The leaves are narrow and to 7 inches long. The flowers are typical sunflower-like with yellow rays and disks, each flower head to 4 inches across and borne singly at the tips of stems and branches. They appear from May to July. The plants occur naturally in dry, barren places in the basins, especially where sandy. They can be grown from seed sown outdoors in fall or cold stratified for 60 days for spring planting. Seed is commercially available.



Above: Woody aster by Walter Fertig. Several other *Xylorhiza* species occur in Utah, some of which are quite rare.

Woody aster (*Xylorhiza glabriuscula*) grows to 1 foot tall and wide with a bushy growth form. The leaves are narrow and to 2.5 inches long. The flowers are typical sunflower-like but with white rays and yellow disks and to 1.5 inches across. They are solitary at the tips of stems and branches and appear from May to July. The plants occur naturally in dry, barren, clay areas of the plains and basins often where the soil contains selenium. It can be grown from seed.

Spanish bayonet (*Yucca glauca**) grows to 3 feet tall and nearly as wide. The leaves are evergreen and sword-shaped with very sharp tips and arranged in a large basal cluster. The flowers are

**Yucca glauca* is a Great Plains species that is not native to Utah. Several native species occur in the Beehive State and can be substituted in the desert garden, such as Narrowleaf yucca (*Yucca angustissima*), Banana yucca (*Y. baccata*), Bailey's yucca (*Y. baileyi*), Kanab yucca (*Yucca kanabensis*) and Harriman's yucca (*Y. harrimaniae*).

creamy-white or greenish-white, drooping, to 2 inches long, with many arranged on elongate stems overtopping the leaves. They fully open at night and close during the middle of the day and appear from May to July. The plants occur naturally on dry hills and prairies in the plains and basins. They can be grown from seed. Soaking the seed may help germination. Barely cover with soil to allow some light exposure. Stored seed should be cold stratified for 60 days or more before planting. If started in pots, make sure the pots are very deep and transplant when the plant has 2 or 3 grass-like leaves which may take a full year. The plants put most growth into the root system the first 2 years. Keep moist for that time period. It is also in the nursery trade.



Above: Bailey's yucca (*Yucca baileyi*) is common in the deserts of southeastern Utah. Like other members of the genus, it is pollinated by yucca moths, which carefully collect pollen and pack it onto the receptive stigma to ensure pollination. In return for its services, the moth lays its eggs inside the ovary and the developing moth larvae feed on unripened *Yucca* ovules. Photo by Walter Fertig.

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