



Sego Lily



Newsletter of the Utah Native Plant Society

November 2013
(volume 36 number 6)

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Douglas's catchfly (*Silene douglasii*) is a member of the pink family (Caryophyllaceae) despite having white flowers. Actually, the pinks are so-named because of the deep lobing of their petals, as if cut by pinking shears. In some species the five petals are so deeply divided that the flowers appear to have 10 petals. Members of the genus *Silene* often have fringed or lobed appendages called auricles arising from the narrow base (or claw) of each petal blade. The shape of the auricles can be useful in identification, but are best observed in fresh material, as their shape can be distorted when pressed and dried. Douglas's catchfly is one of a dozen species in the catchfly group in Utah (sometimes divided into two somewhat artificial genera, *Lychnis* and *Silene* based on the number of styles and teeth on the fruiting capsules). It is common in mountain brush, forest, and sage steppe in the northern part of the state. Photo by Steve Hegji.

Utah Native Plant Society



Utah Native Plant Society

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Website: For late-breaking news, the UNPS store, the *Sego Lily* archives, Chapter events, sources of native plants, the digital Utah Rare Plant Field Guide, and more, go to unps.org. **Many thanks to Xmission for sponsoring our website.**

Sego Lily Editor: Walter Fertig (waltola64@gmail.com). The deadline for the January 2014 *Sego Lily* is 15 December 2013.

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The *Sego Lily* is a publication of the Utah Native Plant Society, a 501(c)(3) not-for-profit organization dedicated to conserving and promoting stewardship of our native plants.

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

Chapter News

Salt Lake: November meeting: Wednesday, Nov 6, 7 PM, REI (3300 E 3300 S, Salt Lake City). Utah is the most wasteful water user in the country with residents using nearly twice the per capita US average. Some Utah cities use three times this average, and a whopping 70% of residential water is used for overwatering lawns each summer. Zach Frankel, Executive Director of Utah Rivers Council will introduce us to the broad range of things the Council is doing to ensure that our rivers and their associated wetlands remain healthy for the plants and animals (and us) that depend on them. One of their programs is "Rip Your Strip" which encourages people to replace water-guzzling grass with more river-friendly alternatives.

December 4, 7 PM (REI meeting room): Utah's remote and rugged San Francisco Mountains are home to ghost towns, gold, marble, and other mineral claims, and rare plants. Steve Hegji spent time there with Jason Alexander investigating the "Milkvetch Mystery of the San Francisco Mountains" - *Bill Gray*

Members of the Salt Lake Chapter have recently been given permission to harvest seeds of native wetland forbs from Salt Lake County property. The seeds will be grown by chapter members for use in small-scale wetland restoration projects following the removal of Russian-olive. Desert Water Gardens (3674 S 900 E Salt Lake City) has recently offered the Salt Lake Chapter some greenhouse space to grow native forbs.—*Blake Wellard*



Photo: Tony Frates of UNPS discusses greenhouse space and wetland species with Desert Water Gardens greenhouse manager Sheida Harjarian. Sheida will be assisting in seed germination and future wetland restoration.



Bulletin Board

UNPS Annual Members Meeting, Saturday November 16: The Utah Native Plant Society annual members meeting is scheduled for Saturday, November 16 at Utah Valley University. The formal meeting will begin at 3 PM with a short UNPS business meeting, followed by a presentation by UVU herbarium curator Jason Alexander entitled "Can digital image vouchers increase the participation of citizen scientists in herbarium research?" After this presentation, there will be a potluck dinner with a New World cuisine theme. Early birds may wish to take part in a session from 1-3 PM on digitizing and mounting plant specimens. The volunteer session will be in room SB277 in the Science Building on the UVU campus, with the formal meeting and potluck next door in SB 275. Visitors on weekends can park for free in any student or faculty parking stall. For this meeting, lots L3 and L14 on the north side of campus and lots L1 and M26 on the south side are recommended. The pay lots have been converted to a machine pay-per-hour system and are not recommended (the fee is currently \$2 per hour). For further information, please call me (801-863-8606) or email (alexanja@uvu.edu) - *Jason Alexander*.

Herbarium Days at Utah Valley University, Saturday, November 23rd: The UVU Herbarium is holding another series of volunteer days for mounting and digital imaging of specimens. Volunteer activities will take place in SB 277 in the Science Building and run from 1 PM until 5 PM. The herbarium will also be hosting a Utah Valley Chapter meeting toward the end of the volunteer session around 4 PM, where I will be continuing my education seminar series on difficult-to-identify Utah plant families and digital vouchering of plants in the field. For further information, please call me (801-863-8606) or email (alexanja@uvu.edu) - *Jason Alexander*.

Help Wanted: Red Butte Garden is looking for a Plant Conservation Field Assistant for 12 months, starting on January 2, 2014. The successful applicant will be part of the Conservation Department at the Garden and will help with various research projects pertaining to rare plant conservation in Utah. Tasks will include field work in spring and summer to locate rare plant populations and collect seed, data entry, seed processing, plant propagation, and GIS mapping. Candidates should have experience with plant identification, biological field work, or GIS. Funding will be through Americorp. For more information on compensation, duties, and how to apply, consult the website: <http://www.usu.edu/ucc/html/join-ucc/individual-placements>. The application deadline is December 1, 2013. To apply, submit an Americorp application at www.usu.edu/ucc/html/join-ucc/online-application and email a resume to Rita Reisor at Rita.Reisor@redbutte.utah.edu.

New Flora of the Four Corners: The long-awaited *Flora of the Four Corners Region* was published by the Missouri Botanical Garden Press in September 2013. This book covers the vascular plant flora of southeastern Utah, southwestern Colorado, northwestern New Mexico, and northeastern Arizona and is written by Ken Heil, Steve O'Kane, Linda Mary Reeves, and Arnold Clifford—all experts on the plants of the area. For more information and to take advantage of the introductory price, go to www.mbgpress.info.

Unidentified Fruiting Object

This month we take a break from Unidentified Flowers to the other kind of UFO: unidentified fruiting objects. The specimen at right (photographed by Bill Gray) may resemble a medieval mace, but is actually the fruiting head of a common mountain plant. Any guesses?

The September UFO was Creeping nailwort, *Paronychia sessiliflora*. This inconspicuous, mat-forming member of the pink family (Caryophyllaceae) gets its common and Latin names from its use for treating various ailments of fingernails. I took the photo along a sandstone rim in the San Rafael Swell this past June.

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

In Quotes: "Weeds are flowers too, once you get to know them." A.A. Milne



Grow This: Golden-aster

By Tony Frates

A plant that I believe is the “most perfect” replacement for the invasive species Myrtle spurge (*Euphorbia myrsinites*) in the Salt Lake valley/ foothills and Wasatch Front in general is Hispid golden-aster (*Heterotheca villosa* or *Chrysopsis villosa*).

Why is golden-aster ideal? Let me count the ways:

1. Golden-aster is an abundant, native species that grows in similar habitats and niches where Myrtle spurge has been introduced or escaped;

2. It has a similar low growth shape and attractive foliage for most of the year;

3. Hispid golden-aster has considerable genetic variability and grows in a wide range of habitats;

4. This species lives for a long time. I have four to five year old plants in my garden that show no signs of slowing down;

5. Golden-aster flowers abundantly for a long period of time (a feature that home/commercial gardeners always demand);

6. Because it flowers in the spring and fall golden-aster serves the needs of many different pollinators. By contrast, Myrtle spurge blooms earlier in the year and serves a smaller set of pollinators;

7. Hispid golden-aster is allelopathic and a weed fighter. It is one of our most important plants in the fight against *Secale cereale*, *Linaria dalmatica*, and others;

8. It produces abundant seed and is easy to grow;

9. Once established, it requires little water, and in fact is one of most drought tolerant plants I know of.

Could there possibly be a better species than this to replace Myrtle spurge?

This species should be planted in homes (certainly every rock garden along the Wasatch Front should be using it), parking strips, and commercial sites. It is ideal for Bonneville bench-dune remnant habitat which is

basically what we have along the Wasatch Front that most homes have been built over. This is specifically the kind of habitat from which people should be removing Myrtle spurge.

The best news of all is that seed is available to be collected from the wild for free right now. Just in time!

Golden-aster for President!

Below: Hispid golden-aster by Tony Frates.



What is golden-aster? Few Utah plants elicit as much debate and confusion among taxonomists as the golden-asters. First off, authorities differ as to whether our species should be lumped with *Heterotheca*, or kept separate in *Chrysopsis*. John Semple and Guy Nesom agree on the first option (though on little else), and Arthur Cronquist and Stan Welsh prefer the latter in the *Intermountain Flora* and *Utah Flora*. The main difference between the genera is whether fruits associated with the ray flowers have a pappus similar to that of the disk flowers (in *Chrysopsis*) or lack a pappus (true *Heterotheca*). Unfortunately, this feature does not always hold, giving credence to those who would lump the genera under the older name, *Heterotheca*.

Setting aside the genus discussion, the above authors diverge widely in their recognition of species and varieties. Cronquist and Welsh emphasize the broad variability in the complex and name just 2-3 species: *villosa* (the most widespread taxon), *jonesii* (a sandstone endemic of southern Utah), and *zionensis* (a species with white-hairy foliage from sandy areas of Utah and Arizona). Semple and Nesom recognize these taxa and many more—mostly variants within *villosa* that differ in leaf shape, peduncle length, presence or absence of glandular hairs, and degree of pubescence. The great degree of morphological variability within *villosa* may be a factor of polyploidy, hybridization, and phenotypic plasticity. All of Semple and Nesom’s taxa overlap geographically, ecologically, and morphologically, and their keys and descriptions are confusing and contradictory. In a few thousand years all this variation may sort itself out, but for now, plant enthusiasts might best be served calling these yellow-flowered composites by the common name “golden aster”.

Of course, golden asters are not actually asters, and true asters are mostly restricted to Eurasia, but that is another story! - *W. Fertig*

Sereno Watson, the Accidental Occidental Botanist

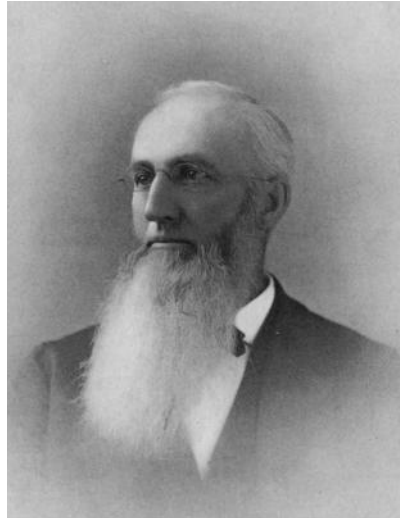
By Walter Fertig

Sereno Watson was 46 years and still looking for a purpose in life when he sailed from his native New England to California (via Panama) in March, 1867. Sandwiched between two stints as a student at Yale, Watson had spent the previous two decades working as a teacher, farmer, writer, insurance salesman and student of medicine, chemistry, and mineralogy, but nothing led to a career.

In California, Watson learned about the Clarence King expedition to survey the 40th Parallel and headed east determined to find the party and join its ranks. Crossing the Sierra Nevada on foot, Watson located the King camp on the Truckee River. Armed with a letter of introduction from a mutual acquaintance, Watson volunteered for any available job with the explorers. Impressed with the pluck of the barefoot Yale grad, but without a paying position to offer, King allowed Watson to join the expedition as a camp cook and helper.

William W. Bailey (later a professor of botany at Brown University) was the official botanist of the King expedition, but was in poor health. In addition to his other camp duties, Watson was assigned to help Bailey collect plant specimens. Although he had little botanical training or experience, Watson demonstrated an aptitude for field work. His endurance, patience, gentle nature, and keen eye for novel species earned Watson the respect of his peers in camp. When Brown was finally forced to resign from the expedition due to his lingering illness, Watson was promoted to fill his role. At long last, Watson seemed to have found his calling.

The King expedition continued east across Nevada and spent the winter of 1868-69 at Fort Douglas in Salt Lake City. After surveying the Great Salt Lake, Watson spent the summer of 1869 collecting plant specimens in the Wasatch and Uinta mountains. At least 68 of Watson's collections from Utah became type specimens - the



Above, left: Sereno Watson. Above right: *Penstemon sepalulus*, one of the many new species first collected by Watson in Utah's Wasatch Range in 1869. Photo by Bill Gray.

collections that taxonomists use for describing new species. Among Watson's more notable types are those of *Aquilegia flavescens*, *Aster kingii*, *Castilleja flava*, *Cercocarpus intricatus*, *Disporum trachycarpum*, *Mertensia brevistyla*, *Penstemon eatonii*, *P. platyphyllus*, and *Pinus contorta* var. *latifolia*.

The King expedition ended at the railhead at Green River, Wyoming in 1869. Watson returned to Yale that fall to work on the unknown specimens he and Bailey collected. At the invitation of Asa Gray (the preeminent American taxonomist of the day) Watson traveled to Harvard to complete the work. In August 1871, Watson published the 426 page *Catalogue of the Known Plants of Nevada and Utah* as the fifth volume in King's report on the exploration of the 40th Parallel. In the work, Watson discussed 1325 species, many of which he or Gray named as new to science. This was the first floristic checklist of the Intermountain region.

Impressed with Watson's scholarship, Gray hired him as his assistant. Watson would remain at Harvard until his death in 1892. During

this span, Watson wrote 18 monographs as part of the *Contributions to American Botany* series. Among his specialities were *Amaranthus*, *Apiaceae*, *Boraginaceae*, *Brassicaceae* (especially *Arabis* and *Lepidium*), *Caryophyllaceae*, *Chenopodiaceae* (*Atriplex* and *Chenopodium*), *Fabaceae* (*Astragalus* and *Lupinus*), *Liliaceae* (*Allium* and *Calochortus*), *Polygonaceae*, and *Rosaceae*. Watson described or revised over 200 species and varieties that are still recognized in the flora of Utah. Other contributions included the first volume of the North American botany bibliographic index, a flora of California, and a revision of Gray's *Manual of the Botany of the Northern United States*. At least a dozen Utah plant species are named after Watson.

William Brewster summed up Watson's character in his biography: "He was by nature excessively diffident, retiring, reticent, and silent. He possessed keen powers of observation, a love of nature and nature study, combined with an excellent physique." It took him half his life, but the quiet farm boy from Connecticut ultimately found his purpose in the study of western plants.

“Dear US Agricultural Research Service ...”

Western Native Plant Societies Urge Caution in Introducing New Plant Species

By Peter Lesica

In early August a consortium of six western native plant societies (Arizona, Idaho, Montana, Nevada, Oregon, and Utah), led by the Montana Native Plant Society, sent a letter to the US Agricultural Research Service urging the agency to exercise greater caution when introducing exotic plants into the United States. A shortened version of the letter follows; so far we have not received a reply.

“We are writing on behalf of many thousands of members of western native plant societies. We are dedicated to conserving the native flora of western North America. We are concerned about the U.S. Department of Agriculture’s continuing practice of promoting the introduction of non-native species into the native plant communities of the western United States.”

“Tamarisks were introduced into the U.S. as ornamentals. The USDA was cultivating these species in 1868 and presumably began distributing them for bank stabilization soon thereafter. These plants are now listed as noxious weeds throughout the west and hundreds of millions of dollars have been spent trying to control them in order to protect riparian habitat. Lehmann lovegrass was introduced into Arizona by the USDA in the 1930s. It frequently displaces native vegetation. Selections of buffelgrass were released by the NRCS plant materials center in Texas in 1977. Buffelgrass grows densely and crowds out native plants of similar size and promotes larger fires in areas that were not historically fire-prone, resulting in the death of most native woody plants. Annual fescue was released and is considered aggressive and invasive. Garrison creeping foxtail was released for commercial use by NRCS in 1959. The plant escapes into native subirrigated

meadows and riparian areas where it forms monocultures and is no longer considered desirable as a pasture grass. A selection of Canada bluegrass was released in 2003 by the NRCS Plant Materials Center at Bridger, Montana. The plant frequently escapes and invades native rangeland and has formed persistent monocultures in some areas of Montana. Forage kochia was introduced into North America by the US Forest Service and NRCS in 1966 and released in 1984 for use as forage and soil erosion control. The plant successfully competes with both weeds and desirable native plants and is capable of invading native rangelands.”

“We recognize that USDA has done good work in developing sel-

ections of native plants useful in restoration and that the above introductions were made with good intent. However, we are concerned with the introduction of exotic plants, many of which have had an adverse effect on native biological diversity.”

“We urge USDA to take two steps to address these concerns. First, rigorous testing for adverse effects to native plant communities should be required before exotic plants are released for commercial use. Second, and more importantly, we strongly urge USDA to develop and release native rather than exotic species for restoration purposes.”

Adapted from the Fall 2013 issue of Kelsey, the newsletter of the Montana Native Plant Society.



Above: Tall buttercup (Ranunculus acris) is a native of the Old World which has become established over much of the United States, including northern Utah. Some forms in Europe are grown as ornamentals, though the species is usually considered weedy in its native range. In North America it can be a nuisance in gardens and is poisonous to livestock if eaten in large amounts. The state of Montana lists Tall buttercup as an official Noxious weed. Ranunculus acris was probably released unintentionally on this continent, but is one of hundreds of exotics that have had unintended negative consequences. Illustration by W. Fertig.

Is this Utah's Highest-Elevation Cactus?

Article and Photos By Dorde W. Woodruff

Frisco Peak stands alone in the San Francisco Mountains of our West Desert with a high degree of what is called prominence — nothing near it is very high.

It used to have one of those 100-mile views one could find scattered across the state. Not any more, since the onset of coal-fired power plants — unless there has just been a good rain or a strong wind to get rid of the murk. It's still an outstanding view, though.

Because of this prominence the top of Frisco Peak is home to several antenna towers and a hang glider launch platform with an extra-long ride. Its dark-sky attributes led to the installation of a University of Utah telescope in 2009.

Due to its suitability for these facilities, there is a road to the top. If you like a challenging drive, you can add that to its attractions. The long lower part is easy, but then the road ascends the northern ridge. This upper part is steep and rocky, requiring low range four-wheel-drive and high clearance. When I first drove it in the 70s, it was narrower and rockier, and it was scary. It's wide enough now and not that intimidating — other than to be sure to keep your vehicle chugging on.

I must not have walked around much that first time because I didn't see any prickly pear plants. (The drive must have been enough of an adventure without exploring the top.) But in 2005 I revisited and did walk around. I found an *Opuntia* colony on a southeast-facing slope just east of the 9660' summit ridge. Plants were growing at about 9575' in broken rocks of the Precambrian Mutual Formation, a pale, pink-



Above: View from the summit of Frisco Peak.

to-purple quartzite. They were scattered among sagebrush in openings between ponderosa, limber pine, and white fir. This is not a common plant association for *Opuntia*.

The plants are not as large and spiny as the usual West Desert *Opuntias*. Pads are tightly clustered, and the plants themselves are not more than two pads high. On June 9, 2005, there were a few smallish, light yellow flowers at the northernmost of the clumps, but mostly there were immature buds. Most of

these died, too immature to persist, on the specimens I collected, but a few were far enough along to open. They developed into pale yellow flowers with reddish mid-ribs and reddish tips on sepaloid parts, the red diminishing inward. They had narrow petals, pale yellow anthers, very pale yellow filaments and styles, and medium-dark green stigmas. Flowers were 2 to 2¼" wide, and 1½ to 2¼" tall from the bottom of the receptacle. There was some variation in vegetative characters of the plants.

Often high elevation or northern *Opuntias* are hybrids with *Opuntia fragilis*, presumably for cold tolerance. *O. fragilis* and *O. polyacantha* are the most northern species, extending even into Canada. The Frisco Peak plants are on the small side, and flowers resemble those of *O. fragilis*. Hybrid *Opuntias* can vary enormously as to how much of which parent is retained.

Our UNPS cactus research group has been very busy researching Utah *Opuntias*, which have never been well known or well described. *Opuntia* is the most difficult of our Utah cactus genera. Since it is our most common genus it has more opportunities to hybridize than other genera, and it has a wealth of polyploidy, facilitating hybridization. Lack of fieldwork in Utah, lack of knowledge of the family Cactaceae, and dependence on previous work in the cacti has led to our *Opuntias* never being sorted out well. We're working on it, but it takes many miles of travel, a lot of specimens, and a lot of chromosome counting.

We've found that it takes a botanist with a good grounding in classical botany and cytogenetics, who has a willingness to travel over the state extensively, to begin to understand our *Opuntias*. And we have such a person in Dean Stock, a molecular cytogeneticist retired to Kanab, in the heart of one of Utah's worst and most complex messes of *Opuntia*.

Dean studied both plants and animals at the University of Utah with some of our most famous classical biologists. He understands the necessity of applying a balanced approach, using both cytogenetics and morphology, to the *Opuntia* problem.

In order to sort out the many cactus hybrids, you have to first

know the species, which are not always well described. Type specimens (the collection on which a species concept is based) may be complicated hybrids. One needs to look at local populations of *Opuntia* in the field and at the range of variation in the population, not just herbarium specimens. Relying on specimens can be problematic for several reasons. Cacti are generally not well represented in herbaria, because many botanists don't want to deal with them. They are difficult to handle, difficult to make good specimens of, and have a different morphology. Often cactus specimens don't have the flowers or fruit or both that may be needed for determination.

The high-elevation *Opuntia* on Frisco peak is one of the dry-fruited taxa. Dry-fruited species in general are more tolerant of cold than fleshy-fruited ones. At this time our best guess is that it's a hybrid between *O. fragilis* and a widespread, lower-elevation hybrid often misidentified in the past as *O. hystricina*. Evidence indicates the latter taxon, as applied in Utah, is a hybrid of *O. erinacea* (*O. erinacea* being most often seen in the St. George area) and *O. macrorhiza*, which evidently in an era more favorable to it was much more widespread across the state than it is now. We will know more after further study of the genus in the West Desert.

The distribution of *O. macrorhiza* has so far been the most



Above: Cuttings from the Frisco Peak population transplanted to Salt Lake City for study.



Above: Frisco Peak *Opuntia* in flower.

difficult of Utah's cactus species to define. Herbarium specimens are often wrongly determined because they lack flowers or fruit. To know if it is truly *O. macrorhiza*, you have to see the cream-colored stigmas and the tall, narrow, spineless fleshy fruit. Though we have corrected many determinations of *O. macrorhiza*, we are now finding its hybrids in many places throughout the state. The species has been authenticated in one area of Kane County, and seen in the midst of its hybrids at Natural Bridges National Monument in San Juan County. Otherwise, at present the species is only native to Utah on the western flank of the Wasatch Mountains, mainly near the old Pleistocene Lake Bonneville shoreline levels. Due to lack of another *Opuntia* species to hybridize with in that area, and the milder climate (compared to the rest of the northern part of the state), we have isolated colonies that

reached here in former, more temperate times and were able to persist.

A Utah Flora (2003) lists our highest elevation *Opuntia* at 2810 meters, about 9219' feet. Stan Welsh's crew was very good about collecting everything, not leaving out cacti, so the BYU herbarium's collection of Cactaceae is by far the best in the state. *Pediocactus simpsonii* is a high elevation cactus often found on high ridges, and Welsh lists it as high as 2830 m, or about 9284'. Please let me know if you should find any cactus higher than our *Opuntia* on Frisco Peak, at about 9575'; next time I go I will measure the height of the very highest plant!

If you visit Frisco Peak to see our highest, hardest prickly pear, the interesting array of antennas, and the marvelous view,

you can also find your way over to the lower southern flank of the mountain and its mining era ruins. Read up about it first, it is an outstanding old mining site.

The county maintains the lower, less steep part of the road to the peak, and the BLM maintains the steep higher part. It was last bladed a couple of years ago, so there is now more loose gravel than usual. Don't tackle this road without a good 4WD vehicle. It departs NW from Highway 21 about 6.3 miles (depending on your vehicle's trip meter) west of Highway 257 in Milford. Soon there is a fork in the road. Take the left branch leading westerly. The Frisco Peak area is at the top edge of the "Wah Wah Mtns South" map of the BLM Surface Management series, and the south edge of the "Wah Wah Mtns North" map. The turnoff is at about 38° 26' 21" 113° 09' 12" (datum WGS84), farther east than you would expect.

Noteworthy Discoveries:

A New Species of *Gilia* (*Gilia karenae*) from the San Rafael Swell

By Ron Kass

Finding a new species is often the result of botanical expertise and being in the right place at the right time. In May of 2012, I was conducting an inventory for the Despain footcactus (*Pediocactus despanii*) near the Wedge Overlook in the San Rafael Swell. I was accompanied by my wife Karen, and after a long day in the field she noticed a lavender-flowered *Gilia* growing on the barrens of the Carmel Formation. Upon close examination, I decided it was something I had not encountered in the Swell on previous inventories. After collecting some material and taking several photographs we made a detailed examination of all the *Gilias* in the Utah Flora, without finding a match. I took the specimen to Dr. Stanley Welsh at BYU for a final consultation. Lo and behold, a smile broke out on Stan's face and we both agreed it was an undescribed species.

A week later the three of us visited the site to collect voucher material. After considerable debate, Stan said it was in the best interest of long-term marital harmony to name it after my wife. Shortly afterwards, we sat down and described *Gilia karenae* for publication in the *Western North American Naturalist*.



Above: Karen's *Gilia*, a new species from Utah's San Rafael Swell. Below: Habitat of Karen's *Gilia*. Photos by Ron Kass

This beautiful plant is a long-lived mound-forming perennial with leaves that are small, rounded to ovate or some crenate to serrate with short flattened petioles. The flowers are 8-12 mm long and lavender-colored, fading to blue.

Karen's *Gilia* differs from the other perennial members of the group of allied species in both leaf conformation and flower color.

The type population is very small and apparently restricted to gypsiferous soils of the Carmel Formation. Gypsum is a valuable commodity and the population is located close to nearby gypsum leases. The available gypsum habitat in the Swell is extensive and would require an in depth inventory. It is essential this new species distribution be mapped to determine its extent, ecology, and future outcome amidst impending threats of mineral and oil and gas development in the Swell. We plan on obtaining funds and volunteers to inventory the area next spring.



Botanica

Odds and Ends from the World of Botany

Just How Many Plant Species Are There?

It is one of the most fundamental questions in botany, but one of the most difficult to answer: how many plant species are present on Earth? Much of the confusion stems from the lack of complete surveys of many of the world's most species-rich (and often remote) areas. The number of practicing taxonomists may be inadequate to the task, especially in the species-rich tropics. Taxonomic revisions cloud the issue too, as specialists may disagree as to what separates one species from another. Although usually done inadvertently, the same species may be given multiple names by different taxonomists, making it a challenge to keep a tally of good taxa. Finally, species are being lost to extinction faster than they can be named, especially in some of the most threatened and species-rich regions.

These challenges have not kept taxonomists from trying to estimate the number of plant species worldwide. For many years, the best estimate of total plant species richness was approximately 250,000 species (Mabberley 1997). In the past decade several authors have suggested this number is too conservative. Prance et al. (2002) noted the discovery of 2350 new plant species over a 9-year period in just four tropical countries (Madagascar, Cameroon, Brazil, and Brunei), suggesting that the number of vascular plant species in the world is probably 300,000-320,000. Govaerts (2001) conducted an extensive literature review of the number of accepted taxa for each continent and major island group. Accounting for synonyms, he derived an estimate of 422,127 plant species on Earth. Bramwell (2002) divided the world into different floristic regions based on endemism (species restricted to a limited area) and estimated the number of species in each region based on

the number of endemics and number of taxa reported in the largest country in the region. His grand total of 421,968 plant species was remarkably close to that calculated independently by Govaerts.

Needless to say, not all botanists have accepted these revised estimates. The calculations of Bramwell and Govaerts in particular have been criticized as being too high based on problems with potentially double-counting species that occur across continents or eco-regions (Ungricht 2004).

In 2010, The Royal Botanical Garden at Kew and the Missouri Botanical Garden launched a joint effort to calculate the number of accepted plant species on the website "The Plant List" (www.theplantlist.org). The Plant List is based on a review of over 1 million published botanical names. So far, experts have verified at least 298,900 names as legitimate, unique species (28.7% of the total). Nearly 478,000 names have been rejected as synonyms and another 263,000 still remain to be assessed or placed. Other researchers using similar methods to account for synonymy estimate the total global flora at 352,000 species (Paton et al. 2008).

How many plant species remain to be discovered? Joppa et al. (2010) analyzed changes in the number of practicing taxonomists and the number of new species named in 5-year intervals over the past 250 years, to estimate that 10-20% of the world's plant species have not yet been found. Most of the unnamed species will come from diversity hotspots, which coincidentally are among the Earth's most threatened areas from development and habitat loss. If these estimates are true, the number of plant species at risk of extinction worldwide may be as great as 33 percent. - *W. Fertig*

From the Editor-

After twelve years in southern Utah, Laura and I relocated to Phoenix, AZ, in October. I have started a new job as Assistant Curator of the Arizona State University herbarium. My responsibilities include managing the lichen collection and the SEINet website. I'm having a wonderful time playing in the herbarium and learning the Sonoran flora.

Despite my change of residency, I have asked the UNPS board to continue as editor of the *Sego Lily*. It has been my great pleasure to edit the newsletter and *Calochortiana* for the past seven years. Besides, no one else wanted the job! Please note that my email address has changed for all manuscript and photo submissions.

Thanks to all of you who have contributed articles, photos, artwork, news stories, or your time reading each issue-

Your umbel editor,

Walter Fertig
waltola64@gmail.com

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