



Sego Lily

Newsletter of the Utah Native Plant Society

March 2013
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Cave primrose (Primula specuicola) is one of our earliest flowering plants in the spring, earning it the alternative name of Easter-flower. This species is found primarily in hanging gardens and is restricted to the Colorado River and its main tributaries in southeastern Utah and northern Arizona. Cave primrose can be recognized by its erect, toothed leaves that are green above but covered by white mealy ("farinose") hairs on the margins and undersides. Sylvia Kelso has suggested that P. specuicola evolved from populations of the wide-ranging boreal species P. mistassinica that became isolated on the Colorado Plateau following the Pleistocene. Photo by Bill Gray.

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.**

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

Sego Lily Editor: Walter Fertig (walt@kanab.net). The deadline for the May 2013 *Sego Lily* is 15 April 2013.

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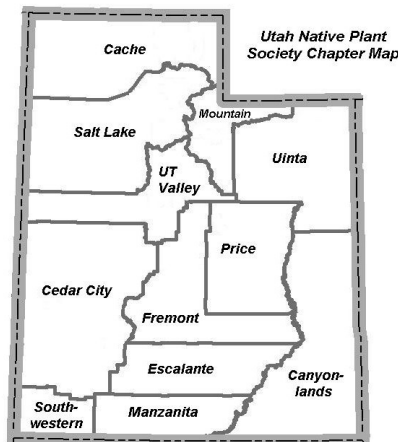
The *Sego Lily* is a publication of the Utah Native Plant Society, a 501(c)(3) not-for-profit organization dedicated to conserving and promoting stewardship of our native plants.



Chapter News

Cache: Plant Propagation Workshop, Thursday, March 14 @ 6 PM and Saturday, March 16 @ 9 AM. USU Teaching Greenhouse (1390 North 800 East Logan). Registration: \$20 for UNPS members of Cache Master Gardeners (must state at time of registration); \$25 for all others. Cost includes growing materials and selected seeds. Other seeds or cuttings available for additional purchase to cover cost. \$5 for printed workbook (must be requested at time of registration, otherwise all printed materials will be available online). To register, please call 435-752-6263 or email taun.beddes@usu.edu. For more information, please contact Michael Piep at Michael.piep@usu.edu. Co-sponsored by the Cache Chapter and the Cache Master Gardeners - *Michael Piep*.

Salt Lake: March 6, 7 PM at REI (3300 S and 3300 E): Walter Fertig, past president of UNPS and *Sego Lily*



editor, will give a program on "Wildflowers of Zion National Park".

Southwestern: In response to participants in our pruning workshop, Rick Heflebower is planning a grafting workshop for Saturday, March 2, at 10 AM at the Canyon Community Center in Springdale. Rick will also talk briefly about fruits brought to the area by early pioneers. - *Margaret Malm*

Above: What is this funny thing? If you have to ask, you probably are like me and don't have a smart phone and so won't be able to upload content from this issue. So just enjoy the abstract patterns. If you are tech-savvy, give thanks to Bill Gray for making this QR ("Quick Response") code for us.

Utah Valley: For anyone interested in a morning hiking group in Utah Valley contact me at 801-377-5918 or celestegk@gmail.com for directions and more details. First outing will be Tuesday, April 9th at 9:30 AM, weather permitting. Meet at the Rock Canyon trailhead in Provo near the restrooms. The next week (April 16th) will be a Shoreline Trail hike starting at Slade Canyon in Provo. This is not the Plants and Preschoolers Group, as we will be hiking further and rougher terrain, but everyone is welcome. We will try to make this a regular event every Tuesday morning. - *Celeste Kennard*

Bulletin Board

2013 Utah Rare Plant Meeting: The annual rare plant meeting sponsored by the Utah Native Plant Society and Red Butte Garden is scheduled for Tuesday, March 5, 2013 from 9 AM to 4 PM in the conference room at Red Butte Garden. The meeting will include more than a dozen 15-20 minute presentations by a variety of speakers studying plant conservation biology in Utah. Some of the speakers and topics for this year's meeting include: Jena Lewinsohn, USFWS (Autumn buttercup); Tony Frates, UNPS (Wasatch fitweed pollination), Hope Hornbeck, SWCA (Demographic monitoring of rare Uinta Basin cacti); Rita Reisor, Red Butte Garden (Gierisch's globemallow and Uinta Basin hookless cactus); Blake Wellard, University of Utah (*Petalonyx parryi*); Robert Fitts, UT Conservation Data Center (update on rare plant studies); Juliette Baker, Utah State University (Shrubby reed-mustard); Jason Alexander, Utah Valley University (UVU projects); Dorde Woodruff, cactophile (*Sclerocactus blainei*); Michael Piep, Utah State University (Utah fungi); Leigh Johnson, Brigham Young University (Mussentuchit gilia); Loreen Allphin Rapier, Brigham Young University (Conservation of rare *Boechea*); Jim Harris, Utah Valley University (Deep River Range *Drabas*); Mitch Power, University of Utah (role of museums and herbaria in global change research), Ron Bolander, UT BLM (BLM update), and Wayne Padgett, UT BLM (Rare plant considerations in use of native plants for restoration in the Colorado Plateau).

Participants can register online at the Red Butte Garden website (www.redbuttegarden.org/conservation) or by calling the Red Butte front desk (801-585-0556). A boxed lunch will be provided as part of the \$15 registration fee, but only for those who register before March 1. —*W. Fertig*

UNPS Scholarship: Students are encouraged to apply for the annual UNPS student research scholarship. The Society will award \$500-1000 for research proposals that address native plant taxonomy, ecology, or biology within the state of Utah. See the UNPS website for more details and the application form. Applications are due by 1 April 2013.

Help Wanted: The Utah Conservation Data Center (natural heritage program) needs help with general office work, mapping plant occurrences, and field work. This is a great opportunity to learn GIS. Please contact Robert Fitts in the botany program for more information (801-538-4742).

Photos Needed: Bruce Barnes of Flora ID Northwest is revising his Interactive Plant Key for the flora of Utah and is in need of a few photos. Of the 3418 species of flowering plants, gymnosperms, ferns, and lycophytes in his guide, he is missing just the following 12 species! If you have a photograph of one of these plants and are willing to share it, Bruce will include your name in the lower corner of the image, add you to the acknowledgements in the User's Guide, and send you a complimentary copy of the key (all while you retain copyright). The missing species (including their range in parentheses) are: *Aquilegia desolaticola* (NE Utah), *Boechea pendulina* (statewide), *Eremogone loisiae* (N Utah and Wasatch Range), *Erigeron higginsii* (Washington Co.), *Erigeron huberi* (NE Utah), *Eriogonum domitum* (House Range in Millard Co.), *Lepidium moabense* (SC and SE Utah), *Navarretia furnissii* (N Utah), *Navarretia saximontana* (Garfield Co.), *Phacelia argylensis* (NE Utah), *Potentilla holmgrenii* (Juab Co.), and *Suaeda linifolia* (N Utah). Send images or questions to Bruce at flora.id@wtechlink.us

Herbarium Days at Utah Valley University (Saturdays March 30, April 27, and May 25): The UVU Herbarium is sponsoring another series of workshops to train volunteers how to use our digital imaging system and how to mount plant specimens. Volunteers at these workshops greatly accelerate the herbarium's progress in processing our backlog and will learn more about the plants in our region in the process. We will be going back to holding the event on Saturdays and will now be located in the new UVU herbarium facilities. The herbarium, will also be hosting a Utah Valley Chapter meeting toward the end of the volunteer session. Plant mounting will take place in SB 277 in the new Science Building and run from 1 PM until 5 PM. The meeting will start around 4 PM. For the meeting I will be continuing my seminar series titled "Pictorial Introduction to the Morphology of Utah's Beardtongues". Parking is not currently available in the Sorenson Visitor Lot due to construction, but is available at the Lakeside Visitor Lot (at the south entrance past the traffic circle off University Avenue) and the student lots between the UCCU events center and the library. For further information, contact me (801-863-6806; alexanja@uvu.edu) - *Jason Alexander*

New Life Member: Claire Crow of Tucson, AZ (formerly wildlife biologist for Zion NP) is our newest life member. Thanks Claire. This just proves you can like that "other kingdom", but still appreciate native plants!

Pocket Sagebrush Guide Available for Free Download: UNPS board member Leila Shultz has a new publication on identifying the woody sagebrush species of western North America. This non-technical and fully illustrated field guide is available to download from www.sagestep.org/pubs/pubs/sagebrush_pock_guide.pdf

Holmgrens Honored by American Society of Plant Taxonomists

Citing their many contributions to botany, the American Society of Plant Taxonomists conferred the 2012 Asa Gray Award to Drs. Patricia and Noel Holmgren of the New York Botanical Garden. The award honors Asa Gray (1810-1888), the most prominent American plant taxonomist of the second half of the 19th Century. Among their many accomplishments, the Holmgrens recently completed the 8 volume *Intermountain Flora* series (1972-2012) and edited the *Index Herbariorum* and *Illustrated Companion to Gleason and Cronquist's Manual of Vascular Plants*. Pat was Director of the New York Botanical Garden from 1981-1990 and a past president of the American Society of Plant Taxonomists and the Botanical Society of America. Noel was formerly editor-in-chief of the New York Botanical Garden's journal *Brittonia*. Although both Holmgrens are now retired to Logan, Utah (where Noel's father, Arthur was a curator of the Intermountain Herbarium at Utah State University), they remain active in western botany. Noel is currently working on the treatment of his beloved genus *Penstemon* for the Flora of Oregon project.

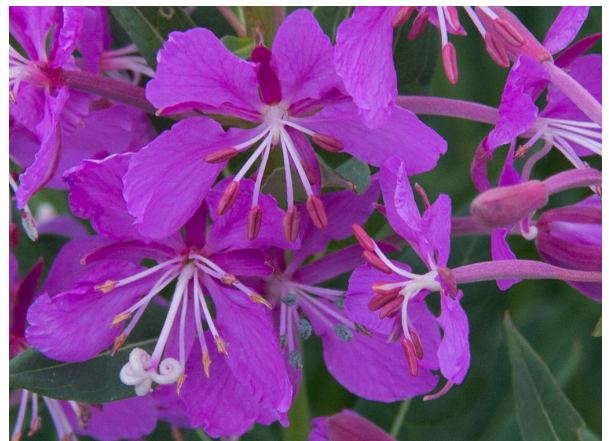


Above: Noel (kneeling) and Pat Holmgren in their natural habitat, pressing a collection of *Silene petersonii* var. *petersonii* (left) for the New York Botanical Garden herbarium outside of Cedar Breaks National Monument, Utah, in 2009. Photos by W. Fertig.

Unidentified Flowering Object: This month's UFO is provided by Bill Gray of the Salt Lake City Chapter. While perhaps not as challenging as some of our recent UFOs, study the photo carefully to notice the differences between each flower. Why does the flower at lower left have an enlarged white 4-lobed stigma, but the others do not? Why are the stamens full and pink in some flowers, but withered and even greenish-blue in others?

The January UFO was *Evolvulus nuttallianus*, a member of the morning-glory family (Convolvulaceae).

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



In Quotes: "If you want to walk fast, walk alone. If you want to walk far, walk with others. Unless you are on a plant walk, in which case you will be lucky to get 100 feet from the cars in two hours" - modified African proverb

Hanging Gardens of Utah

By Walter Fertig

Although best known for his exploration of the Grand Canyon and contributions to geology and linguistics, Major John Wesley Powell was also an astute ecologist. In late July 1869, Powell's small fleet of wooden boats paused in the deep canyon of the Colorado River near modern-day Page, Arizona, for a brief side trip to explore an unusual vegetation feature. "Sometimes the rocks are overhanging" Powell noted in his book *Canyons of the Colorado*, "in other curves curious narrow glens are found. Through these we climb, by a narrow stairway, perhaps several hundred feet, to where a spring bursts out from under an overhanging cliff and where cottonwoods and willows stand, while along the curves of the brooklet oaks grow, and other rich vegetation is seen, in marked contrast to the general appearance of naked rock". Powell named these features oak glens, and the canyon in which they occurred Glen Canyon.

Powell was the first scientist to recognize what we now call "hanging gardens". Not unlike their namesake from ancient Babylon, hanging gardens consist of plants clinging to steep cliffs, rubble fields, or alcoves associated with small seeps in otherwise barren settings. Hanging gardens are only found in the Colorado Plateau area of Utah, Arizona, and Colorado along the main stem of the Colorado River and its tributaries. Although small in size, hanging gardens are important oases of cool shade, water, and cover in a sea of aridity and thus attract disproportionate attention from wildlife and humans.

Three ingredients are necessary for a hanging garden: a reliable water source, the proper geology, and plants. Water is the most limiting ingredient in the desert, and the main reason that hanging gardens are neither larger nor occur more widely. Certain sandstone formations on the

Colorado Plateau have sufficient pore space between the sand grains or cracks and faults to act as giant rocky sponges that can accumulate and transport water from rain or melting snow. Water moves slowly through the sandstone (sometimes taking many years) until it hits an impervious layer of shale or heavy clay. When blocked by such an "aquitard" water flows laterally un-

sloughs off, creating a colluvial slope below and excising an alcove into the cliff face. Plant roots secrete mild acids that help weather the soft sandstone walls, further enhancing erosion. Rock spalled off the cliff face creates a steep talus slope of broken sandstone below. Some gardens may also have a deep plunge pool at their base formed by water pouring off smooth cliff faces after a torrential



Above: A complex hanging garden in Zion National Park consisting of a series of driplines wetting a shady back wall and a set of terraces. The vegetation consists of common riparian species such as *Calamagrostis scopulorum* and *Rhus trilobata* interspersed with hanging garden endemics like *Viola clauseniana*, *Dodecatheon pulchellum* var. *zionense*, *Aquilegia fosteri*, and *A. chrysantha*. Photo by W. Fertig.

til it either bypasses the barrier or reaches the surface to emerge as a seep. Often the seep is long and linear, forming a dripline. If the seep is sufficiently shaded within a deep canyon or by an overhanging ledge the wall will remain moist enough to allow plants to become established. These first plants must literally cling for their lives on the slickrock walls.

Over time, erosion caused by dripping water and the plants themselves helps sculpt the shape of the hanging garden. Saturated rock at the seep face becomes weak and

summer rainstorm. Plants may grow on the back wall of the alcove along the seep or dripline, on the overhanging roof of the alcove (such plants truly are "hanging on"), or among the colluvial debris at the base of the garden.

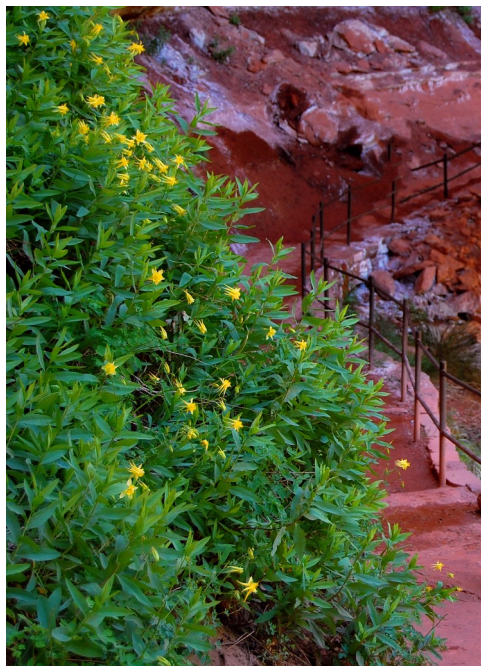
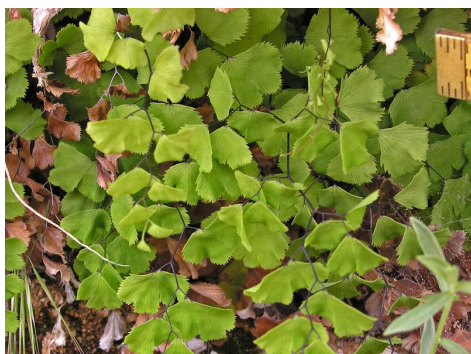
Hanging gardens form in a variety of geologic layers. Most often, gardens occur in thick, cross-bedded sandstones derived from ancient sand dunes, such as the Navajo and Entrada formations. One notable exception, however, is the Wingate Formation. This massive sandstone is not underlain by impervious clays,

and thus allows water to flow right through, rather than emerging in seeps. Hanging gardens have been documented in other formations, ranging from the Pennsylvanian age Hermosa Formation in Cataract Canyon to the Cretaceous Wahweap and Straight Cliffs formations in the Kaiparowits Plateau. Most of these formations are thinner or have less water-holding capacity than the Navajo or Entrada sandstones and tend to produce smaller seeps and less complex gardens.

Not all hanging gardens have the classic alcove-like morphology. In Zion National Park, many gardens occur on weeping walls, in which an entire cliff face may be wet from a parallel series of seeps, rather than a single seep or dripline. Also known as a window blind garden, this type often lacks a deeply eroded alcove roof. Sometimes they are associated with chimney-like deposits of dried carbonates called tufa. A less common hanging garden type consists of a series of terraces or stair steps. These form where the bedrock does not erode to form an alcove, but instead water flows over short ledges representing different sandstone or shale bands (Welsh and Toft 1981). Many variations occur, and some complex gardens may combine elements of two or more geomorphic types.

Until recently, hanging garden vegetation was often treated as a single, homogeneous ecological community. Studies by George Malanson (1980) in the Zion Narrows demonstrated that the species composition

Below: Southern maidenhair fern (Adiantum capillus-veneris), a common hanging garden species in Utah. Photo by Al Schneider (www.swcoloradowildflowers.com)



Above and left: Golden columbine (Aquilegia chrysantha) is a common hanging garden species in Zion National Park. It can hybridize with the red-flowered A. fosteri to form orange-yellow hybrids, which often occur with one or both parents. Elsewhere on the Colorado Plateau, this species is replaced by another yellow flowered species, A. micrantha. Photos by Steve Hegji.

of hanging gardens is actually quite diverse. Malanson found that gardens varied widely in species richness (ranging from 2 to 20 species) and representation of both common riparian species and hanging garden specialists. No single species occurred in all 29 gardens that he examined.

Fowler et al. (2007) reported similar results in a study of 73 gardens across the Colorado and Virgin River watersheds. The authors used cluster analysis to organize the hanging gardens into four main associations and a fifth, garbage-can group for sites that were sufficiently unique to defy classification. Each association was named for its most abundant species.

In Fowler's system, Southern maidenhair fern (*Adiantum capillus-veneris*) tends to be the dominant species in relatively simple gardens with a single dripline in Navajo or Entrada Sandstone. Alcove columbine (*Aquilegia micrantha*) is often the most abundant species in gardens on Cedar Mesa or Weber Sandstone with moist colluvial slopes (such as those at Natural Bridges and Dinosaur National Monuments). Larger, wetter, or more complex gardens tend to be dominated by Jones' reedgrass (*Calamagrostis scopulorum*) or Rydberg's thistle (*Cirsium rydbergii*).

Other hanging gardens, such as many from Zion National Park, don't easily fit into Fowler's categories and may be dominated by Zion shooting-star (*Dodecatheon pulchellum* var. *zionense*), Welsh's aster (*Aster welshii*), or Blueleaf aster (*Aster glaucodes*).

Due to its isolation, the Virgin River has a suite of hanging garden species that are not found on the main stem of the Colorado River. Even more interesting, is the presence of "congener pairs" (closely related members of the same genus) in which one species is in the Virgin drainage and the other in the Colorado. Perhaps the most notable such pair is Cardinal monkey-flower (*Mimulus cardinalis*) and Eastwood's monkey-flower (*M. eastwoodiae*). Both species have large, two-lipped, reddish-orange corollas and sharply toothed, opposite leaves. Cardinal monkey-flower ranges widely across western North America, though it only occurs in Zion National Park in Utah. Eastwood's monkey-flower is endemic to the canyons of the Colorado River in the Four Corners Region, but is absent from Zion. *Mimulus eastwoodiae* probably evolved from populations of *M. cardinalis* that became isolated in relatively recent times.

In other cases, the less common member of a congener pair is restricted to the Virgin River, while



Above: Eastwood's monkey-flower (*Mimulus eastwoodiae*), a Colorado River endemic named for pioneer botanist Alice Eastwood, who was one of the first collectors of the hanging garden flora of southeastern Utah, especially in the Bluff area. Photo by Al Schneider (www.swcoloradowildflowers.com).

the more widespread species occupies the main stem of the Colorado. Hays' sedge (*Carex haysii*) of Zion National Park closely resembles Canyonlands sedge (*C. curatorum*) of the Colorado River, but has larger and more narrowly lance-shaped perigynia. Clausen's violet (*Viola clauseniana*) is a blue-flowered Zion endemic replaced by Northern bog violet (*V. nephrophylla*) in Colorado River gardens. The recently discovered Joanna's thistle (*Cirsium joannae*) is restricted to Zion, while the comparable Rydberg's thistle is more widespread. Both are remarkable in having stems up to 6 feet tall and basal leaves over a foot long.

Nearly half a dozen species and varieties of columbine are found in hanging garden sites across Utah. These can be divided into two groups depending on flower color (whitish/yellow vs. red/orange). White or cream-flowered Alcove columbine (*A. micrantha*) is replaced by Golden columbine (*A. chrysantha*) in Zion and *A. desolaticola* in Desolation Canyon on the Green River. Among reddish flowered species, *A. formosa* is wide-ranging but gives way to *A. fosteri* in Zion NP, *A. micrantha* var. *loriae* in the Grand Staircase area, and bicolored *A. micrantha* var. *grahamii* near Dinosaur National Monument. Hybrids may occur wherever yellow and red species come in contact. Inter-

mediates between *A. chrysantha* and *A. fosteri*, recognized by their orangish flowers, are common at the Weeping Rock hanging garden in Zion National Park.

In all, more than 200 plant species have been documented from hanging gardens in Utah. These species fall into four main categories: hanging garden endemics, widespread wetland species, upland species, and disjuncts. Only about a dozen species are strict hanging garden endemics (occurring nowhere else) and another dozen or so can also be found along stream-sides or in upland habitats. Besides the endemics mentioned previously are such species as Kachina daisy (*Erigeron kachinensis*), Alcove primrose (*Primula specuicola*), Zion jamesia (*Jamesia americana* var. *zionis*), Toft's yucca (*Yucca toftiae*), Alcove bog orchid (*Platanthera zothecina*), Alcove rock-daisy (*Perityle specuicola*), and Alcove death camas (*Zigadenus* or *Anticlea vaginata*).

Disjuncts found in hanging gardens are often species more typical of cool, northerly climates that became isolated in the canyon country after the Pleistocene, or have arrived more recently via long-distance dispersal. A number of Great Plains grasses also re-occur in hanging gardens, including Bushy

bluestem (*Andropogon glomeratus*), Indiangrass (*Sorghastrum nutans*), Switchgrass (*Panicum virgatum*) and Little bluestem (*Schizachyrium scoparium*).

Many of the largest and most interesting hanging gardens in Utah are found in National Parks and Monuments. Despite their legal protection, these gardens are still vulnerable to a number of threats. Hanging garden soils are fragile and easily disturbed by visitors or livestock going off trail. Invasive weeds are becoming a problem in many parks, particularly tamarisk. In Zion, introduced Tall fescue (*Festuca arundinacea*) is becoming increasingly common in some hanging garden sites and may be crowding out rare species, such as Clausen's violet at Weeping Rock.

Perhaps the greatest threat comes from drought and water development. The potential effects of climate change on hanging gardens are poorly understood, as models predict both hotter temperatures and wetter conditions in the southwest. Diversion of water from seeps for stock tanks or human use has dewatered many hanging gardens. Dam construction and reservoirs in the Colorado River have flooded some sites. It is sadly ironic that formation of Lake Powell destroyed many of the "oak glens" that were originally discovered by John Wesley Powell.

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Agropyron by any Other Name is Still a Wheatgrass

By Peter Lesica and Matt Lavin

(adapted from *Kelsey*, the newsletter of the Montana Native Plant Society, Winter 2004)

It seems that every few months now we are confronted with the unwanted news that members of our flora have “new” scientific names. “Which of the several scientific names should I be using” is a refrain often heard. Actually, it is often the case that many of these new names were proposed decades ago. Regardless, it wasn’t easy learning all those Linnaean binomials, and few appreciate having to repeat the effort. In our first plant taxonomy courses we were told that scientific names were essential because they were stable and universal, while common names varied depending on region and generation. These days it seems that the common names are more stable; *Elymus spicatus*, *Agropyron spicatum*, and *Pseudoroegneria spicata* are all currently used scientific names for bluebunch wheatgrass. So why are we burdened with all this nomenclatural instability?

To explore this question we must recall the history of biological naming. Our modern system was developed by Carl Linnaeus, a Swedish biologist in the middle 18th Century. He proposed the binomial system in which each species is identified by a unique Latinized epithet and a generic epithet shared by other similar species. Linnaeus primarily used stamen characters to assign degree of similarity. He developed this system before Darwin and Wallace introduced the ideas of natural selection and the evolution of species. Once it was accepted that newer species evolved from older species, taxonomists strove to construct classifications based on principles of Darwinian evolution. Thus, taxonomic nomenclature came to serve two functions: (1) providing standardized names to facilitate communication and (2) reflecting evolutionary relationships. Unfortunately, serving two functions often causes conflict.



Above: Quackgrass, a.k.a. Agropyron repens, Elymus repens, or Elytrigia repens is a useful forage grass but tends to spread aggressively by subterranean stems (rhizomes) and infest fields of cultivated crops and wildlands. The species was originally named by Linnaeus as Triticum repens in Species Plantarum (1753) but transferred to Agropyron by Beauvois in 1812, Elytrigia by Desvoux (1895), and Elymus by Gould in 1947. Each name change was prompted by a revision of the generic concepts of the Triticeae, one of the more complex tribes of Poaceae. Adapting to new names is not a burden unique to the current generation of botanists. Illustration from Hitchcock and Chase (1950).

Reasons for the current round of scientific name changes relate to one of the other of taxonomy’s functions. A perennial cause of nomenclatural instability centers around the debate over what delineates a species. In plant taxonomy the issue has turned as much on opinion

as data. “Splitters” believe there is merit in recognizing small but consistent variation at the species level, while “lumpers” prefer to emphasize the close relationship among variants. In the first half of the last century Kenneth Mackenzie and others recognized many different species

of similar-appearing sedges. Then Arthur Cronquist, who authored floras for much of North America in the latter part of the century, lumped many of these sedge species together. Now sedge experts are more inclined to be splitters, and many of the species recognized during Mackenzie's time have been resurrected in the *Flora of North America* treatment. What's old is new again, and those of us who cut our teeth on Cronquist's treatments will be learning a lot of new old names. This seems like the most arbitrary reason for nomenclatural instability, but it will probably continue as long as taxonomists remain human.

The most understandable reason for nomenclatural revisions has to do with standardization. A great many botanical names were generated during the latter part of the 19th and early part of the 20th centuries. These names were published in journals and books that had limited geographic distribution at the time. Presl described *Poa secunda* as new to science in an obscure European publication in 1830 based on a collection from Chile. More than 60 years later Vasey described the same species as *Poa sandbergii* in the *Contributions from the U.S. National Herbarium*, apparently unaware of Presl's description. All this began to change when communication and travel increased dramatically following World War II. Museum specimens and literature were exchanged freely, and Elizabeth Kellogg, working at Harvard, realized that these two bluegrass species were the same. International rules of nomenclature specify that the earliest published name takes precedence, so the correct scientific name for Sandberg bluegrass became *Poa secunda*, both in South America and here. It's the globalization of botany.

Many recent name changes at the level of genus and family are due to new insights on evolutionary relationships. For example, there is now unequivocal evidence that tall fescue (*Festuca arundinacea*) and meadow fescue (*F. pratensis*), two tame hay meadow grasses, are more closely related to species of ryegrass (*Lolium* spp.) than they are to other fescues.

Indeed, hybrids between meadow fescue and other ryegrasses are often used in lawn seed mixes. So these former fescue grasses have been transferred to *Lolium*.^{*} There is good evidence that some members of the goldenweed genus (*Haplopappus*) are more closely related to goldenrods (*Solidago*), while others are closer to rabbitbrush (*Chrysothamnus*).

Some of these insights come from new analytical methods made possible by computers. Others can be traced to recent advances in molecular biology. Up until 50 years ago, plant taxonomy relied entirely on morphological characters such as fruit shape, number of stamens, type of hairs, etc. Shared traits can be an unreliable indication of close relationship because they can also evolve in unrelated groups as a result of convergent natural selection. For example, many species of cushion plants occur on windswept alpine ridges. They superficially resemble each other because they suffer the same harsh conditions, but they come from many different and unrelated plant families. Modern plant systematists are using portions of DNA and computers that can analyze lots of data to uncover past misunderstandings in evolutionary relationships made using earlier morphological methods. Although molecular characters and analytical methods have advanced the field of biological taxonomy, these approaches may not always yield a definitive answer. Analyzing two different regions of DNA sometimes fails to give congruent classifications, and phylogenetic analysis yields only the most likely classification. Nonetheless, plant systematists are constructing classifications that better reflect the course of past evolution, and they are changing the nomenclature to reflect their new understanding.

Unfortunately for users of scientific names, many recently proposed name changes are based more on

opinion than sound scientific evidence. There may be preliminary evidence suggesting that the traditional scientific names don't accurately reflect evolutionary relationships. However, there is often not enough genetic or morphological evidence yet available to determine how the names should be changed to remedy the problem. New Linnaean binomials derived from inadequate, preliminary evidence will often prove no better than the names in current use. In many cases it would be a good idea to continue using traditional names until enough solid evidence compels us to change.

There are often several synonyms for a particular species, but few of us have the time or skill to evaluate all the evidence buried in the scientific literature. How should we choose the name to use? There are several good websites that provide synonyms for scientific names. These include Tropicos at the Missouri Botanical Garden website (<http://mobot.org/W3T/Search/vast.html>) and the International Plant Names Index (www.ipni.org/index.html). The US Department of Agriculture PLANTS website (<http://plants.usda.gov/index.html>) even suggests which names to accept. However, there is no such thing as a botanical nomenclature arbitration committee to decide which name should be in use. We agree with Wayne Ferren and Robert Haller, former editors for the California Botanical Society. Confusion can be minimized by adopting the nomenclature presented on a credible regional or local flora and reporting that source when you use scientific names.

Most plant systematists are students of evolution, and having classifications that reflect evolutionary processes is, in the long run, a valuable goal. Unfortunately, in the short term this goal is at odds with the other function of taxonomic nomenclature—stability and standardization. Like it or not, we're in for a period of nomenclatural revolution, but we hope to know more about the workings of nature in the process. We just wish our memories were as good as when we were twenty.

* But since transferred to their own genus, *Schedonorus*, in Volume 24 of *Flora of North America* (2007)

Grow This: Short Shrubs

By Robert Dorn (adapted from *Castilleja*, the publication of the Wyoming Native Plant Society)

Short shrubs are used mostly for cover, but some have attractive foliage, flowers, or fruits. A sampling follows:

Arctostaphylos uva-ursi, Bearberry, is a slow growing, evergreen, mat forming shrub which can reach about 1 foot high but is usually only a few inches tall. The leaves are dark green and shiny and often turn bronze or occasionally reddish in fall and winter. The inconspicuous white to pinkish flowers are only about 1/4 inch long. The fruits are berry-like and bright red and remain on the plant until the birds get them. The plant occurs naturally in moist woods and thickets in the mountains and foothills. It prefers moist but well-drained soil and is tolerant of heat, wind, and salt. It does best in shade or part shade. Small plants are easy to transplant and it is easy to propagate from 6 inch stem cuttings in late summer. Trim the leaves from the lower third, dip ends in rooting hormone, and plant the ends 2 inches deep in peat moss and sand in equal parts. Mist regularly. Keeping them in a mostly closed clear plastic container or covering will



Above: *Ceanothus velutinus* from Carbon County, Wyoming. Below: *Arctostaphylos uva-ursi*, from Albany County, Wyoming. Photos by Robert Dorn.

help retain humidity. Once rooted (generally 6-8 weeks), put in pots of equal parts sand and loamy soil, mulch heavily, and store in a cold area for the winter. Plant out in the spring minimizing disturbance to the roots. It is also available in the nursery trade.

Ceanothus velutinus, Big buckbrush, is an evergreen shrub to 3 feet (rarely 6 feet) high and often forms large dense colonies. The leaves are fragrant and the upper surface appears like it is

varnished. The white flowers are tiny but are aggregated into large, showy clusters at the ends of the branches. It occurs naturally in moist to dry open woods or open areas in the mountains. It requires good drainage in full sun and does not tolerate overwatering nor highly alkaline soils. It can be propagated from 2 or 3 inch branch tip cuttings in late summer dipped in rooting hormone. Provide bottom heat to the pots or flats (70-80° F). Growing from seed is a little tricky. Collect the seed just before the capsules open. Put the capsules into a paper bag immediately. The seeds fly out when the capsule splits. Bring some water to a near boil, turn off the heat, put in the seeds, and leave until the water cools. Then cold stratify for 60 days or more and surface sow. It may take 100 days or more for germination.



The Funny Pages:

Black-eyed Susan by Anne Garde [for best results, read out loud]

I rose early, at four o'clock, the morning glory still iris away. I was worried. Anemone of mine, Johnny Jump Up, was looking for me, and I'd heard he was carrying a pistil, a 357 magnolia. I ironed a periwinkled blouse, got dressed, and took a sprig of a dusty Miller's beer. Johnny Jump Up. He was one of several rhizomes who'd gone to seed in Forsythia, Montana. He was convicted of graft in 1984, arrested again in '85 for digging up coreopsis. Then he drifted on the wind up to my neighborhood, the corner of Hollyhock and Vine. He was a petal pusher in a phlox-house nearby.

I knew he was trouble when he rhododendron to my house and said, "Hey, little Black-eyed Susan, wanna come over to my place and take a look at my vetches?" I didn't want to tell him that in all the cosmos, there was no one for me but Sweet William, so I said no, I was taking care of a pet dogwood that'd had a litter of poppies, which was weird cause she'd just been spaded. But Johnny had no sense of humor. He stamped his foot with impatiens. "You'll rue the day you turned me down" he snapped. Then he spit a wad of salvia into the petunia on my portulaca and stalked away. "Forget me not, Sue, cause I'll be zinnia."

Ever since then, he'd cultivated a relationship with Lily of the Valley, a self-sowing biennial. One day, I aster what she seed in him. "Mum's the word on this" she said, "He's got a trillium dollars in the bank."

"A trillium?" I snorted. "He's lime to you. Besides, what about love?"

"Alyssum" she said. "You bleeding hearts are all alike. Kid, you can go for a guy who'll azalea with affection. Orchid, you can be like me and try to marigold. Now begonia."

Now I was in my kitchen, mullein over these past events. But it was thyme to quit dilly-dahlia-ing. The calendula read August 3rd, and Johnny had sworn to propagate vengeance before the snowdrop.

I hopped into my auto-lobelia and drove over to Daisy's for help. Daisy was a pretty little transplant from Florida, who'd wilted in the humidity there, but was rooted in the well-drained soil of Bloom County. She mostly took care of her babies breath, but lately she'd branched out and was columbining work with home life. "We're all sick today, I think it's gaillardia" she said. "Even the cat's got harebells. If we could take a knapweed be OK." Her face was a bright yellow. She'd be no help.

I beetled feet over to Sweet William's. "Will, am I gladiolus to see you." "And Blackeyed Sue. I been praying-mantis see you. Let's lilac in the snow on the mountain before it all melts down the geranium. Let's ride a sage to Tansy-nia. It's only a chamomile away."

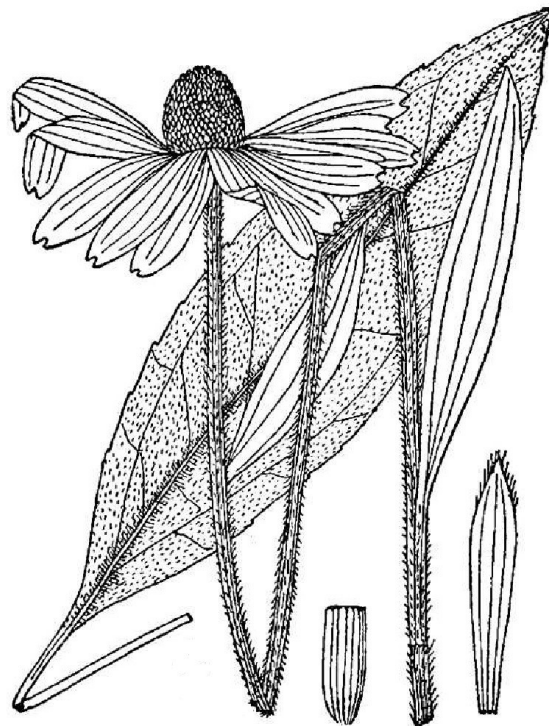
"Don't be fritillary, honeysuckle" I said, clinging to him. "Look. Here comes the clematis of the story."

Uh oh. Johnny had hired Pete Moss, a bearded iris-man to do me in. He was wearing a blue nectar and larkspurs. He had a larva men with him. The pests. They began to charge. In all the con-fuschia, I said to Will, "Stem still and give me some ground cover." I ran down the primrose path in my ladyslippers, right towards Pete. "Don't gimme any flax, bud or I'll slug ya," I said. "You'll look dandelion in the alley." "Don't gimme any flax bud," --Pete quoted me verbena. It nettled me. I clovered him with a 2x4.

"Sound the tim-pansy" we sang. "We won." "Curses," moaned Pete, "foliated again."

"I noticed Johnny Jump Up planted on the border. I've sunk pretty loam, Sue, but now I'm turning over a new leaf."

"Bouquet," I said. And he did. And Will and I lived pearly everlasting.



Above: Black-eyed Susan (*Rudbeckia hirta*) is native to the Great Plains and eastern North America, but is introduced in Utah. Three native species occur in the state. Cutleaf coneflower (*R. laciniata*) has showy yellow ray flowers and deeply lobed leaves and is known from the La Sals. Western coneflower (*R. occidentalis*) and Mountain coneflower (*R. montana*) lack ray flowers but are characterized by raised cones of black disk flowers. These two species differ in leaf shape, pubescence, and distribution, with Western coneflower being common throughout the mountains of Utah but Mountain coneflower only found in SW Utah. Illustration from Britton and Brown (1913) An Illustrated Flora of the Northern United States, Canada, and the British Possessions.

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