Sego Lily

Newsletter of the Utah Native Plant Society

VOL. 22 No. 1 **JAN/FEB 1999**

CALENDAR OF EVENTS

February 10, 6:00 PM	UNPS Board Meeting,, USFS Shrub Lab, Provo
February 12, 7:00 PM	SL Chapter Meeting: Wildflowers of Anza-Borrego-DickHildreth, Sugarhouse Park Garden Center
February 6 and 13	SL and Utah Valley Chapters: Susan Meyer, **Native Plant Propagation Workshop**. Preregister, See page 6
March 5, 7:00 PM	SLChapter: Program TBA
March 10, 6:00 PM	UNPS Board Meeting, RBG&A Ft. Douglas
March 13, 9:00 AM to ?	Stansbury Island field trip UNPS, WRGS, RBG&A, Meet at RBG&A Visitors Center
April 2, 7:00 PM	SLChapter: Utah Astragalus- Dr. Stanley L. Welch, Sugarhouse Park Garden Center

See Page 6 for more activities.

Four-winged Saltbush

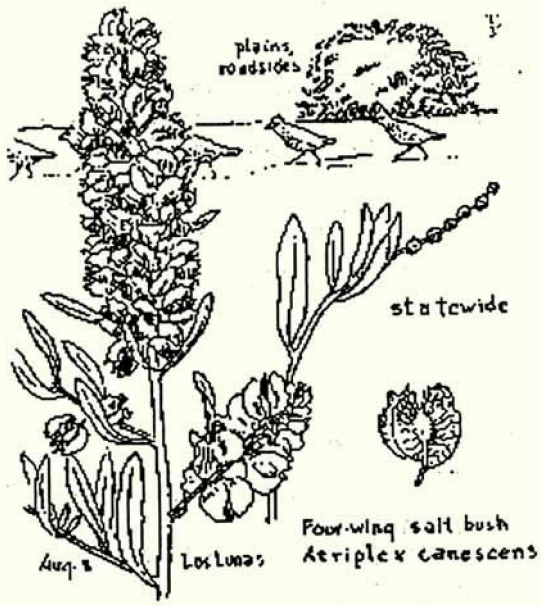
By Joe Ideker

Reprinted from the Native Plant Society of Texas Newsletter, 16(2):4, 1998

Four-winged Saltbush has found use as a hedge or an ornamental background for flowerbeds. This drought tolerant bush needs no watering once rooted, but light watering improves appearance and growth. It is an ideal xeriscape shrub, unless one insists on showy flowers, which it lacks. With taproots reaching down as far as 12 meters (40 feet), the extensive root system makes this drought resistant shrub useful in erosion control. It provides a palatable food of high nutritious value for cattle, sheep, goats, and deer, including both leaves and seed. But in a few scattered cases where too much may have been eaten, it has allegedly killed sheep and goats. It provides cover, shade, food, and roosts for birds like Scaled Quail and small mammals such as Porcupines, Ground Squirrels, Rock Squirrels, and Jackrabbits. Caterpillars of the Pygmy Blue (Brephidium exile) and probably several skippers, consume the leaves. The pollen causes hay fever and thus is used in immunization extracts. The Goshute Indians (of Utah) ground the seeds to use as a baking powder in bread making.

Four-winged Saltbush occurs on various soils including saline and alkaline soils of dry mesa, salt or alkaline valleys, sandy deserts, prairies, slopes, and hillsides from the western lower Rio Grande Valley west into Arizona and California and north into South Dakota (the type locality), Alberta, and Washington. In Mexico, it occurs from Baja California and Keyhole south into San Luis Potosi and Zacatecas at altitudes from 9 to 7,000 feet. The shrub is grayish, erect, evergreen, and loosely to densely branched. It can reach 2.5 meters (8 feet), but is usually 1 to 1.5 meters tall. Deep-rooted and variable in shape, it has brittle, gray-scurfy stems and thick silvery-gray leaves. The four-winged fruit characterize Atriplex canescens, which is a member of the Chenopdiaceae (Goosefoot Family). Atriplex comes from a Latinizing of the Greek word atraphaxys which means orach, (which is a vegetable of this genus), while the Latin canescens refers to the canescent (silvery or white) scurf of the leaves and stems. Four-winged Saltbrush is called Chamiso in Mexico.

Four-winged Saltbush bears numerous, simple, alternate, evergreen, sessile or nearly so leaves. The linear to spatulate to oblong leaves have usually blunt tips, narrowed bases, and entire margins. They measure 1-5 cm (0.4 - 2 inches) long and 0.3-1.2 cm wide. Each thick leaf has one nerve and a dense, silvery-gray scurf on both surfaces, which gradually becomes lost with age. The stout, terete, brittle, smooth, gray-scurfy twigs have a gray bark, which exfoliates in thin layers when older. Four-winged Saltbush bears unisexual flowers usually on separate plants, rarely on the same, from April to October. The male flower heads appear clustered in dense spikes from terminal, leafy-based panicles. The perianth is 3-5 cleft with a stamen inserted at the base of each lobe. The 2-celled anther produces abundant pollen. The female flowers, also in spikes on densely leafy-bracted panicles, lack perianths. Each flower has 2 stigmas and has 2 connivent bractlets subtending its base. The fruit are utricles enclosed in 4- winged bracts. Produced in great quantities almost every year, they follow flower production. The fruit are 4-15 cm (0. 16 - 0.6 inch)



long. They vary considerably in size and shape in different regions. The sessile or short-peduncled bracts are little, compressed united to their summit. They develop the characteristic two pairs of wings. To propagate, gather the fruit when ripe. The abundant seeds needs no cleaning. The seeds average 22,500 seeds per pound with about 85% purity. Germination averages 30-60 percent. The seeds may be broadcast locally at a rate of 14-16 pounds per acre to reseed broad, sandy loam range areas or planted in containers for fewer plants as soon as ripe. Viability lasts several years if stored in a dry place. Seeds can be stored and planted the next Spring or wet period. Cover with about 3 mm of soil. Seedlings tolerate full sunshine, but are susceptible to dropping off during their first fortnight.

Medicinal Plants of the Desert and Canyon West
Medicinal Plants of the Mountain West

By Michael Moore
Museum of New Mexico Press

Book Review by Tim McKimmie
From Native Plant Society of New Mexico

These two works have not been previously reviewed in the Newsletter, perhaps because our membership has not had a focus on the medicinal uses of plants (though we occasionally print articles on the subject). Since the "Mountain West" volume was published in 1979 it hardly makes sense to wait any longer.

First, let me say that these books are not field guides. For positive identification, users will need to refer to other sources. On the other hand, the "appearance" section for each plant may provide plant characteristics that one will not find in a flora such as "stickiness"; fragrance; color and texture of stems and bark, and other often delightful ways of describing a particular species. Plant family, genus, and species are given with some species just listed as "sp." indicating that any of them is acceptable. Common names, often several of them, are also listed. Importantly, Spanish common names are included, since curanderas may use these terms.

Moore does not attempt to rally against traditional medicine, noting that many of the plants listed were historically used by physicians and even today appear in such traditional sources as the National Formulary. Other countries such as Germany, however, conduct far more research on the effects of medicinal plants. Medicine is the largest industry in the United States yet has not been very supportive of "alternatives". A primary weapon of the industry, drugs are a double-edged sword, providing cures to serious illnesses but often inducing unacceptable side affects. From his own back yard, however, Moore criticizes the "chronic pussyfooting in regards to dosage and qualitative opinions" presented in many recent herb books. Users of this work are cautioned that he is presenting "guide-lines" that may work differently with different individuals and that factors such as race, diet, sex, and time need also be taken into account.

Andrew Weil, who introduced the "Desert and Canyon" book (1989), noted that useful information on herbal medicine is hard to obtain. He lauded "Desert and Canyon" as striking a balance between the extremes where such books often fall, of being too technical or too general. Moore is well respected among herbalists and his writing style is concise, instructive, with lots of human-interest and a bit of humor. The geographic area, about which he writes, the American West, has not been as extensively studied "herbally", as has the east. Further, the climatic extremes of the west seem to be responsible for the production of unique plant compounds.

Each book treats more than 100 plants most of which can be considered natives. Each is illustrated with a good line drawing and some are accompanied by color photographs. A good description of plant habitat is provided and distribution maps accompany the "Desert and Canyon" volume. Instructions for plant collection include what plant part to collect and how to preserve it. Of great concern to Native Plant Society members, of course, is the extent of collection. A book such as this will certainly increase the amount of plant material collected. Moore recommends conservation practices including how to minimize damage to perennials and to the health of plant populations.

Instructions for various preparation methods (teas, decoctions, infusions, etc.) are described and information on chemical constituents is included. The section on medicinal uses is the largest part of each entry and often provides fascinating anecdotal and historical descriptions. Includes bibliography and therapeutic use and name indexes. Although I am not qualified to comment on the herbal

prescriptions or make comparison with other works I think that people will find this information worth reading whether for it's medicinal and ethnobotanical information, or for its fresh look at habitat and plant descriptions.

The Endangered Species Act and Plants: Cutting Through the Confusion

By Walter Fertig
reprinted from Castilleja: The Newsletter of the Wyoming Native Plant Society

Awareness and concern for endangered animals has grown tremendously since the passage of the Endangered Species Act (ESA) nearly 25 years ago. This is especially true in a state like Wyoming, where such high profile threatened and endangered species as the black-footed ferret, gray wolf, grizzly bear, bald eagle, and peregrine falcon all occur. Discussion and debate over the ESA and its ramifications on everyday life have become commonplace today. A very different situation exists in the botanical world. Threatened and endangered plants receive far less attention than their vertebrate kin, even though they make up nearly 60% of the current roster of Endangered species nationwide. A lot of confusion exists regarding the degree of protection that plants receive under the ESA. Such misunderstandings are especially dangerous because they can erode society's support for the Act. Public support is critical if the conservation goals of the ESA are to be achieved at the local level where rare species actually occur.

The most common "myth" regarding plants and the ESA is the idea that rare plants receive the same amount of protection as animals under the ESA, especially on private lands. In reality, the ESA's Section 9 rules on "take" and habitat protection on private property apply primarily to animals. Landowners are not prohibited by the ESA from harming listed plants or destroying their habitat on their own property, unless they are receiving federal money for a development project. This follows a lone legal tradition, dating to Roman law, in which plants are viewed as the property of the landowner. By contrast, animals have historically been considered property of the monarchy or society, but not of the private citizen on whose property they might reside. Amendments to the original ESA do provide a few protections for listed Threatened and Endangered plants on private lands. Plants are protected from illegal harvest or take by people trespassing on private land and are protected from interstate trade. These provisions were enacted primarily to protect commercially valuable species, such as rare cacti, from over harvest. The use of certain herbicides that are hazardous to listed plants may also be restricted on private lands under rules adopted by the Environmental Protection Agency.

The main protection for listed plants under the ESA comes on public lands. Under Section 7 of the Act, federal agencies are required to consult with the US Fish and Wildlife Service to ensure that government actions do not negatively impact a listed species. The use of public lands by private citizens, industry and agricultural leaseholders may be restricted under the ESA if such uses are not compatible with the needs of an endangered species.

The protection of the ESA applies only to plants that are officially listed as Threatened or Endangered (or have been formally proposed for listing). It does not apply to the hundreds of "candidate" species, many of which should be listed, but the proper documentation has yet to be completed. Most federal land management agencies have adopted internal policies to protect these candidate species and to ensure that agency actions do not contribute to the need to list them under the ESA. This proactive approach has been useful in providing needed management attention for a number of rare species on BLM and Forest Service lands, without invoking the ESA.

The second major source of confusion regarding endangered plants is the lack of information on the

management needs of these species. Both proponents and opponents of the ESA often assume that drastic management changes must be made when a species becomes listed, or when a previously listed plant is discovered at a new site. The management needs of a given species often vary from site to site, and are dependent on a number of factors, including the species' life history characteristics and dependence on natural disturbance. In many situations, the best management may be the continuation of current activities (with or without slight modifications). People often fail to realize that rare species are fairly sensitive indicators of habitat condition, and their presence at a site may suggest that existing management activities have been compatible with them. One final mistake regards the fear of additional information on the locations and natural history of endangered plants. There is often a common feeling that information can only be used against landowners and other users. In reality more and better information can vastly improve management actions and prevent our limited conservation resources from being used inappropriately. In Wyoming, there are a number of cases in which additional field research has resulted in the removal of plant species from consideration for listing under the ESA due to the discovery of many additional populations. Research can also clarify the management needs of a species, resulting in improved practices and the elimination of unneeded land-use restrictions.

The key to overcoming current misunderstandings about the ESA and plants is through improved education and outreach. This is especially important in order to address the concerns of private landowners, public land users, and other "stakeholders" who are (or perceive that they are) negatively impacted by endangered plants. Better outreach is needed to make people aware of what rare species may be present in their local area and their actual level of protection and management needs. Without education, the long-term survival of many of our rarest plants will remain in jeopardy.

1999 UNPS Board of Directors

Those elected at the 1998 annual meeting are:

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UTAH NATIVE PLANT SOCIETY
Salt Lake Chapter monthly meeting schedule
First Friday of Each Month-
7:00 PM
Sugarhouse Park Garden Center

The spring meetings are listed on the front cover. Other upcoming meetings include:

May 7: Possible garden tour

June-Sept: Field outings TBA including:
- Susan Meyer - Garden of Penstemons - Picnic
- Xeriscape Garden - UNPS Utah County Chapter

Native Plant Propagation Workshop
by the Utah Valley Chapter

Hands-on Experience Growing Utah Native Wildflowers, Shrubs, and Ornamental Grasses from Seed

Two Sessions:

Saturday, February 6, 1999
9 am to 12:30 pm
USFS Shrub Sciences Laboratory
Greenhouse Complex
1325 East 820 North
Provo, Utah

Saturday, February 13, 1999
1 pm to 4:30 pm
U of U Grounds Greenhouse
Corner Conner and Pollock (450 South)
Fort Douglas
Salt Lake City, Utah

This workshop is part of the Utah Heritage Garden Program, which has the goal of increasing love and knowledge of native plants through horticulture.

Participants will receive information on native plant horticulture and will have the opportunity to take home planted seeds and watch them grow.

Space is limited. Please preregister by mailing your name, phone number or e-mail, address and session location with your $5.00 fee by January 31 to:

Celeste Kennard,
306 North 600 East,
Provo, Utah 84606

Please include a phone number or e-mail address where we can reach you to confirm your space. Call Celeste at 801-377-5918 for more information.

Common Names
Fred Johnson, White Pine Chapter
Idaho Native Plant Society

Are you fascinated with unusual common names? Are you perplexed by names: for example — why don't our meadow rues grow in meadows? And why is a Pseudotsuga (false-hemlock) called Douglas fir when it isn't either a fir (Abies) or a hemlock (Tsuga)? Why do some common names just add to the confusion, such as five tree genera which have the common name of "cedar" in westem North America (Thuja, Chamaecyparis, Libocedrus, Torrea, and Juniperus)? Some common names are simply intriguing, others are picturesque, and some are really cryptic. Here are some of my favorites. How many do you know? Match the common names below with the first-cited ("accepted") common names from Hitchcock's "Flora." All of these plants grow in Idaho, either native or escaped. Answers are on Back

1. Doll's eyes.
2. Pilgrim's blush
3. Enchanter's-nightshade
4. Viper's bugloss
5. Hairy Albert
6. Puccoon
7. Spiders-on-a-stick
8. Pathfinder
9. Ghost orchid
10. Bowdark

A Look at Linum and Linen

By Susan Erwin

Reprinted from Sage Notes,
Idaho Native Plant Society,
May 1994

Linum lewisii is one of nearly 100 species in the genus Linum, a member of the flax family (Linaceae). Members of this family may be found throughout the world in both hemispheres, and may be one of the most important vegetable fibers from the standpoint of widespread and continuous usage. Most of us know it as that pretty yet frustrating blue perennial that drops its petals when picked and opens only a few blossoms at any one time. Although found throughout the world, in North America, flax species are common in the west and Midwest in dry, sunny habitats with well-drained soils. Flowers can be white, blue, yellow, or red. Petals stay on the plant for only a short time after blooming. Blue flax is a handsome plant commonly used as an ornamental in landscape gardening. In the west, prairie flax was first described by Meriwether Lewis near the Continental Divide in Montana on the Lewis and Clark Expedition. It has been written that Native Americans used the plant in baskets, mats, snowshoes, fishnets, strings, and cords. Flax species in general are considered poor to fair as livestock forage. Some species are poisonous to livestock, containing cyanide compounds in the seeds. The European species of flax, *Linum usiatissimum*, was imported and widely cultivated by the early American colonists, and later on the prairies as Americans headed west. Diminishing supplies of imported textiles in the early 17th Century necessitated growing flax in the colonies to provide fiber for weaving textiles. The Massachusetts General Court ordered boys and girls to be taught to spin, and families to grow a certain amount of flax each year, or pay a fine!

The first true linen industry started in the early 18th Century in New Hampshire by Scottish-Irish immigrants. Linen textiles were considered a status symbol during that time and continue to be considered a finer quality fabric. By the 19th Century, production of linen shifted from hand weaving and spinning to factories and automated machines. The transition to automation was slow in coming because of the difficulty in processing flax's brittle fibers. Eventually, cotton replaced linen as the fiber of choice because it was easier to process and was more readily available. Linen requires approximately one year from seed sowing to finished product. More labor intensive than cotton or wool, linen garments last just as long and actually improve with age and wear. Processing involves drying the plants, then beating them to separate the inner pith from the woody fibers. These fibers are then carded, combed, and spun in much the same way that wool is processed. Other uses for flax are linseed oil from the seeds and as a medicine for inflammation, coughs, ulcers, and burns.

There should be no monotony
In studying your botany.
It helps to train
And spur your brain
Unless you haven't gotany.

It teaches you, does botany
To know the plants and spotany.
And learn just why
They live or die ...
In case you plant or potany.

Anonymous
Occidental College Student
From Sage Notes
Idaho Native Plant Society

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c/o Jo Stolhand
Utah Native Plant Society
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Answers to Fred Johnson's "common names" quiz

1. Western red baneberry, *Actaea rubra* (the white berried phase).
2. Common mullein, *Verbascum thapsus.* (In days of yore, young ladies brushed their cheeks with the hairy leaves to bring a blush.)
3. Enchanter's-nightshade, *Circaea alpina.* (Circe was an enchantress of Greek mythology; however, "enchantress's nightshade" is tough to pronounce, hence the masculine name.)
4. Blueweed, *Echium vulgare* (escaped, origin: Europe).
5. Western hawkweed, *Hieracium albertinum.*
6. Western stoneseed, *Lithospermum ruderale.* (Whence "puccoonn? I know not.)
7. Cross-shaped mitrewort, *Mitella stauropetala.*
8. Trail-plant, *Adenocaulon bicolor.*
9. Phantom-orchid or snow orchid, *Eburophyton austiniae.*
10. Osage-orange, *Maclura pomifera.* (Escaped, origin: central USA. Bowdark is an anglicization of the French bois d'arc or wood for archery bows, one of the early important uses of this tree. But this tree, escaped in Hells Canyon, has other picturesque names, such as horse-apple--or would you prefer hedge-apple).

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☐ Please send a complimentary copy of the **Sego Lily** to the above individual.

Please enclose a check, payable to **Utah Native Plant Society,** and send it to:

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Utah Native Plant Society
P.O.Box 520041
Salt Lake City, Utah 84152-0041

If you prefer not to cut this out of your **Sego Lily,** feel free to copy the membership form or simply write the the information down and send it with payment and category of membership.

Sego Lily

Newsletter of the Utah Native Plant Society

VOL. 22 No. 2 **MAR/APR 1999**

CALENDAR OF EVENTS

April 2, 7 PM	S L Chapter: Utah Astragalus- Dr. Stanley L. Welch, Sugarhouse Park Garden Center
April 14, 6 PM	UNPS Board Meeting, RBG&A Ft. Douglas
April 23, 24, 25	Wildland Nursery, Open House, See back page for information
May 7, 7 PM	SL Chapter: Program TBA (Possible garden tour)
June-Sept	Field outings TBA: Susan Meyer Garden of Penstemons - Picnic Xeriscape Garden - UNPS Utah County Chapter Tour
UNPS Web Site	UNPS has entered the electronic age. The schedule will be updated and posted on our new web page www.Xmission.com/~UNPS. It is currently under construction. Our e-mail is UNPS@xmission.com.

Why Bother?
Or, The Importance of Knowing Which Sedge It Is

Bertie Weddell, White Pine Chapter, Idaho Native Plant Society

A few years ago, on a break during an excellent wetland plant identification course given by former CDC Botanist Rob Bursik, I overheard the following conversation in the bathroom between two members of a federal agency that will remain nameless. Rob had just given a lucid explanation of what a perigynium is, the difference between lenticular and trigonous achenes, how to distinguish the different kinds of *Carex* styles, etc.: "Why do we need to know which sedge it is? Isn't it enough just to know it's a sedge?" "Yeah, I mean aren't they all pretty much found in wet places'"

Well, no, it's a little more complicated than that. They aren't all found in wet places. And, yes, it is important to know which species you are dealing with because sedges are important indicators of wetland status, and the delineation of wetland boundaries has tremendous importance for the conservation and regulation of these ecosystems.

Until recently, wetlands in this country were viewed as places to be drained — to make room for agriculture and development and to get rid of mosquitoes. In the mid-1800s the federal government passed a series of Swamp Lands Acts that gave 65,000,000 acres of wetlands to 15 states for reclamation. This and similar policies worked so well that today less than 50% of our nation's original wetlands remain. By the 1930s it began to be obvious that while this widespread destruction of wetlands might have some short-term economic advantages, there was a down side too. Wetland loss combined with widespread drought caused waterfowl populations to plummet, and the federal government began purchasing wetlands to protect habitat for migratory birds. People gradually realized that in addition to providing habitat for fish, wildlife, and plants, wetlands perform many other useful functions such as storing floodwaters, improving water quality by trapping pollutants and other sediments, and facilitating groundwater recharge. All of this eventually led the federal government to do an about face regarding wetlands policy. With the passage of the Clean Water Act, it became illegal to place dredged or fill material in the nation's waters, including wetlands, without permission from the US Army Corps of Engineers (USACE). With this legislation, wetlands became the only type of ecosystem to be comprehensively regulated, regardless of land ownership, throughout the nation.

The Clean Water Act also made it imperative to have a method for mapping wetland boundaries, so that when a developer causes the loss of a given amount of wetland, he can be required to compensate, or "mitigate," for that loss by creating, enhancing, or restoring an equivalent or larger area of wetlands. It is important to have a delineation procedure that will neither omit areas that are wetlands nor incorrectly identify uplands as wetlands.

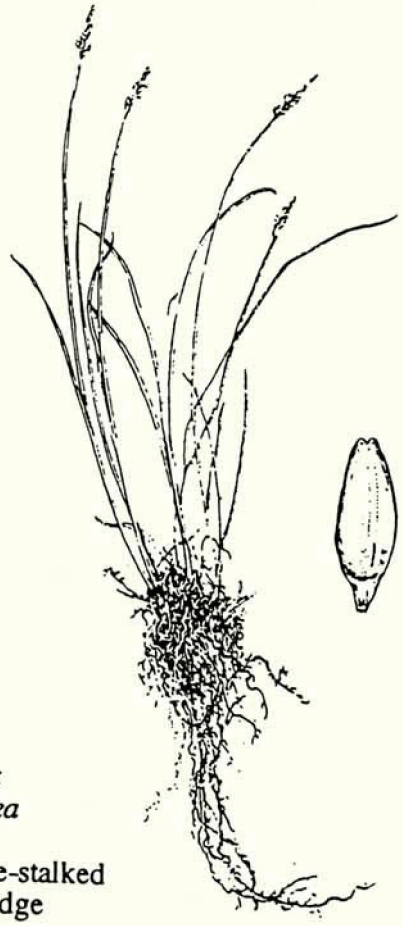
Several procedures have been proposed by various federal agencies for determining the boundaries of wetlands. The one that is currently required by the USACE, as well as by many local governments, was published by the USACE in 1987. The procedure requires the use of three types of indicators: hydrology, soils, and vegetation. To determine whether wetland vegetation is present, the indicator status of each dominant species is recorded. The indicator statuses reflect the probability that a species will occur in wetland. This is determined by referring to the "National List of Vascular Plant Species that Occur in Wetlands" (NLVPS), which was compiled by panels of experts for each region in the United States.

Obligate wetland species (OBL) virtually always occur in wetlands; upland species (UPL) virtually always occur in uplands. Common *cattail (Typha latifolia)* and yellow monkey-flower *(Mimulus guttatus)* have indicator statuses of OBL, meaning they are pretty much restricted to growing in wet places, whereas Japanese brome *(Bromus japonicus)* and spotted coral-root *(Corallorhiza maculata)* are found in uplands and have indicator statuses of UPL. The picture is complicated however, by facultative (FAC) species: those that can grow, reproduce, and compete under a variety of conditions of soil moisture ranging from well-drained to saturated. Utah honeysuckle *(Lonicera utahensis)* and black hawthorn *(Crataegus douglasii)* are examples of FAC species in our region. Facultative species are further divided into facultative wetland species (FACW), which usually occur in wetlands but are not restricted to them, and facultative upland species (FACU), which usually, but not always, are found in uplands. Even further refinements are added by pluses and minuses, with pluses indicating the wetter end of a category and minuses indicating the drier end. Communities in which more than 50% of the dominant species have indicator statuses of OBL, FACW, or FAC (excluding FAC-) are considered to have wetland vegetation.

Sedges, because there are so many of them and they vary so widely in their ecological amplitudes, are enormously useful for the purpose of wetland delineation, provided that they are correctly identified and that they have been assigned appropriate indicator statuses. Woolly sedge *(Carex lanuginosa)*, bristle-stalked sedge *(C. leptalea)*, inflated sedge *(C. vesicaria)*, and *C. utriculata* are obligate wetland species in our region, so places where they grow are probably going to be wetlands. But elk sedge *(Carex geyeri)*, northwest *sedge (C. concinnoides)*, and Ross sedge *(Carex rossii)*, occur in coniferous forests or prairies and do not even appear on the NLVPS. Still other carices are intermediate in their ecological niches, including big-leaf sedge, *C. amplifolia* (FACW+), black alpine sedge, *C. nigricans* (FACW), smooth- stem sedge, *C. laeviculmis* (FACW), soft-leaved sedge, *C. disperma* (FACW), inland sedge, *C. interior* (FACW-), Mertens' sedge, *C. mertensii* (FAC), and Dewey's sedge, *C. deweyana* (FACU).

Of course NPS members know that the real reason for learning your sedges is because it is fun. But if that isn't reason enough, now you know a strong practical (and political) reason why it matters which sedge it is.

The NLVPS can be obtained from the U.S. Fsh and Wildlife Service, Nadonal Wetlands Inventory Center, Suite 101, Monroe Building, 9720 Executive Center Drive, St. Petersburg, FL 33702-2440; phone (813) 570-5425; fax (813) 570-5409; or via e-mail from buck@wetlands.nwi.fws.gov. Ask for the February 15, 1997 edition of the "National List of Vascular Plant Species that Occur in Wetlands" compiled by Porter B. (Buck) Reed, Jr. Not all plants that occur in wetlands have been assigned indicator statuses; furthermore, some of the indicator statuses given in the NLVPS do not accurately reflect a plant's affinity for wetlands in our region. Since the list is revised periodically and the submission of comments is encouraged, however, there is plenty of opportunity for the list to be refined and improved. Comments can be sent to ecology@wetlands.nwi.fws.gov. This provides a valuable chance for anyone having experience with wetland plants in our region to have input into future iterations of the NLVPS.



Carex leptalea

Bristle-stalked sedge

Notes on the Taxonomy and Nomenclatural Changes in Carex

Alan Yen, University of Washington
Fred Weinmann, Environmental Protection Agency

Carex is the largest genus of vascular plants in North America and the Pacific Northwest. There are over 600 *Carex* species in North America, more than 130 of which are found in the Pacific Northwest. Most people find *Carex* to be an intimidating group of plants to learn, and there are good reasons for the general apprehension towards the genus. The differences among species are often minute and the interpretation of the characters ambiguous. This article covers a brief overview on the taxonomy of the genus *Carex*, characters used in delimiting major groups within the genus with

specific reference to Hitchcock's "Flora of the Pacific Northwest," and some nomenclatural changes since the publication of Hitchcock's "Flora."

Brief history on *Carex* taxonomy

The genus *Carex* was named by Linnaeus and is characterized by having achenes enclosed in bracts called perigynia. There are about 2,000 *Carex* worldwide, most of which are in the temperate regions. However, there is a distinct group of tropical *Carex* found in the montane areas of the tropics. *Carex* belongs to the tribe *Cariceae* in the family *Cyperaceae*, which comprises about 100 genera and 4,000-5,000 species. Four other genera are traditionally classified with *Carex* in the *Cariceae-Kobresia*, *Schoenoxiphium*, *Uncinia*, and *Cymophyllus*.

Carex traditionally is divided into three to four subgenera and about 80 sections. Recognition of subgenera within *Carex* is based entirely on phenetic similarity and may not necessarily reflect evolutionary relationships. Subgenus *Primocarex*, with 60 species, is characterized by a single terminal inflorescence and is considered artificial by most authors. Subgenus *Carex*, with 1,400 species, is a morphologically diverse group whose phylogenetic relationships within the subgenus and to other subgenera are unclear. Subgenus *Vignea*, with about 400 to 500 species, is generally considered a natural group, although this hypothesis has not been tested. Subgenus *Indocarex*, with about 100 mostly tropical species, is considered the most primitive subgenus in *Carex* by most, but not all, authors.

The present classification of *Carex*, except for the systematic position of *Primocarex*, largely follows the system of Georg Kukenthal (1909), who organized *Carex* into four subgenera, based on inflorescence structure. Kenneth Mackenzie (1931, 1935) was the last person to complete a comprehensive treatment of the North American *Carex*. Most regional floras in the United States follow the treatment of Mackenzie with some modifications. Because of the large size of the genus, taxonomic keys to species of *Carex* are almost always divided into groups. Some floras ("Flora of the Northeastern United States and Canada," "Flora of Canada") divide species into sections (such as *Ovales*, *Atratae*, *Limosae*, etc.), while others (such as "Flora of Pacific Northwest," "The Jepson Flora") divide species into morphologically similar groups.

All subgenera except *Indocarex* are present in the Pacific Northwest. Cronquist, in Hitchcock's "Flora of the Pacific Northwest," divided *Carex* into eight groups. Group I represents subgenus *Primocarex*; Groups II-V represent members of the subgenus *Carex*; and Groups VI-VIII represent members of the subgenus *Vignea*. *Primocarex* is characterized by a single terminal inflorescence unit. Subgenus *Carex* is characterized by separate male and female inflorescence units. Subgenus *Vignea* is characterized by having male and female flowers on the same inflorescence unit.

The following is a brief description of each of the eight groups in Hitchcock.

Subgenus *Primocarex*

Group I: There are 17 species in group I, all of which belong to the subgenus *Primocarex*. Common species in this group include *C. geyeri*, found in ponderosa pine forests, *C. nigricans*, found in wet meadows in the subalpine zone, *C. leptalea*, found in sphagnum bogs in mid-montane areas, and *C. scirpoidea*, found in open places and meadows at high elevation.

Subgenus *Carex*

Group II. There are eight species in group II, all of which are large, robust plants. The most common species in this group include *C. utriculata* (*C. rostrata* misapplied in Hitchcock) and *C. vesicaria*, which are both common in freshwater wetlands The real *C. rostrata* is one of the rarest plants in the U.S. The common plants called *C. rostrata* are really *C. utriculata*. *C. comosa* is a rare sedge in this group.

Carex utriculata

Beaked sedge

Reprinted from Frederick J. Hermann, Manual of the Carices of the Rocky Mountains and Colorado Basin, 1970, USDA Handbook.

Group III: There are nine species in group III, all of which have hairy perigynia Two species, *C. rossii* and. *C concinnoides*, are found commonly in the forests east of the Cascades. *C. luzulina* is found in mid-montane wetlands. *C. lanuginosa* and *C. lasiocarpa* are found in wetlands from low to mid elevation.

Group IV: There are 30 species in group IV, which is subdivided into four subgroups. All members of group IV have glabrous perigynia, separate male and female inflorescences, and three stigmas that wither after maturation. This is a complex group. Many taxa are common in the mountains, including *C. mertensii*, found in disturbed areas along trails and roads, *C. spectabilis*, found in mid-montane areas, *C. luzulina* (also in group III, for it sometimes has hair on the perigynia), found in wet areas in mid-montane areas, and *C. limos*a, found in bogs. *C. amplifolia* is found in low elevation wetlands.

Group V: Group V contains 18 species, which are characterized by having separate male and female inflorescence units and two stigma. The taxonomy of many of the species in group V has been revised by Lisa Standley (see below). This group contains some of the most common *Carex* species including *C. lenticularis* and *C. aquatilis*, both found in wet habitats from low to high elevation. One of the most beautiful species, the golden sedge, *C. aurea*, belongs to group V. *Carex aurea* has golden colored perigynia when mature and hence the name.

Subgenus *Vignea*

Group VI: There are 19 species in group VI, characterized by having male and female parts on the same inflorescence unit with male parts on top of female parts (androgynous) or plants dioecious. Many species in this group are common wetland species such as *C. cusickii*, *C. stipata*, *C. disperma*, and *C. diandra.*

Group VII: There are 11 species in group VII, which is characterized by having male and female parts on the same inflorescence unit with female parts on top of male parts (gynaecandrous) and wingless perigynia. The common species in this

Table 1. Nomenclatural changes since the publication of Hitchcock's "Flora of the Pacific Northwest."

NAME IN HITCHCOCK	NEW NAME	REFERENCE
C. foetida	*C. vernacula*	Mastrogiuseppe 1993
C. foetida comprises both American and European plants. The American plants have more often been called *C. vernacula*, although Cronquist, in Hitchcock's "Flora" thought the American plants deserved only varietal status. However, both Mackenzie (1931, 1935) and Mastrogiuseppe (1993) recognized *C. vernacula* at the species level.		
C. limnophila	*C. microptera*	Whitkus and Packer 1984
C. limnophila was merged with *C. microptera* in a study of the *C. macloviana* complex by Whitkus and Packer. There have been numerous name changes in this group, which includes *C. pachystachya*, *C. haydeniana*, *C. microptera*, and *C. macloviana*. Whitkus and Packer's treatment is similar to that in Hitchcock's "Flora" in that the species names of *C. pachystachya*, *C. haydeniana*, and *C. microptera* were all preserved. The definition of *C. macloviana* was expanded to *C. limnophila*.		
C. muricata	C. echinata subsp. echinata	Reznicek 1980
C. phyllomanica	*C. echinata* subsp. *phyllomanica*	Reznicek 1980
Reznicek (1980) revised the taxonomy of *Carex* section *Stellulatae*, to which *C. muricata and C. phyllomanica* both belong. Reznicek concluded, on the basis of herbarium records, that *C. muricata* L. is an incorrect name for *C. echinata* subsp. *echinata* and *C. phyllomanica* is merely a subspecies of *C. echinata*.		
C. pensylvanica var. *vespertina*	*C. inops* subsp. *inops*	Crins & Ball 1982
C. pensylvanica var. *digyna*	*C. inops* subsp. *heliophila*	Crins & Ball 1982
Crins and Ball studied the taxonomy of the *C. pensylvanica* complex and concluded on the basis of cytological and geographical evidence that all western *C. pensylvanica* should be *C. inops*, with two subspecies. " The Jepson Manual" follows this treatment.		
C. oederi	*C. viridula* subsp. *viridula* var. *viridula*	Crins and Ball 1988
C. viridula is a widespread taxon with circumpolar distribution. On the basis of a study of the morphology, genetics, ecology, and geography of the *Carex flava* complex, Crins and Ball chose to use *C. viridula*, for which *C. oederi* is a synonym.		
C. rostrata	*C. rostrata* and *C. utriculata*	Reznicek 1985
The common wetland *C. rostrata* should be called *C. utriculata*. (See "The True *Carex rostrata* in the American Rockies," p.ll)		
C. eurycarpa	*C. angustata*	Standley 1985
C. prionophylla	*C. scopulorum* var. *prionophylla*	Standley 1985
C. lenticularis	*C. lenticularis* var. *dolia*	Standley 1985
	C. lenticularis var. *impressa*	Standley 1985
	C. lenticularis var. *lenticularis*	Standley 1985
	C. lenticularis var. *lipocarpa*	Standley 1985
	C. lenticularis var. *limnophila*	Standley 1985
C. sitchensis	*C. aquatilis* var. *dives*	Standley 1985
Standley merged *C. sitchensis*, a robust plant found near the coast, into *C. aquatilis* var. *dives*, and *C. prionophylla* into *C. scopulorum* var. *prionophylla*. Three new varieties of *C. lenticularis* (var. *dolia*, var. *lipocarpa*, and var. *impressa*) were described. In addition, *C. eurycarpa* was changed to *C. angustata* for the former name was misapplied.		
C. saxatilis var. *major*	*C. saxtilis*	Ford and Ball 1992
C. saxatilis var. *major* has long been thought to be a synonym of *C. saxatilis*. However, Ford and Ball (1992) reported that the type for *C. saxatilis* var. *major* is a hybrid between *C. saxtilis and C. utriculata*, therefore the type is invalid.		
C. stenophylla	*C. eleocharis*	Mastrogiuseppe 1993
C. stenophylla is another example of a European name applied to American plants. Cronquist, in Hitchcock's "Flora," believed that *C. stenophylla* and *C. eleocbaris* cannot be sorted out without reference to geography. However, both Mackenzie (1931, 1935) and Mastrogiuseppe (1993), adopted the name *C. eleocharis* to refer to the American plants.		

group include *C. deweyana* (a forest species), *C. canescens*, *C. echinata* var. *echinata* [=*C. muricata*], *C. interior*, and *C. laeviculmus*, all of which are found in freshwater wetlands at various elevations.

Group VIII: There are 25 species in group VIII, which is characterized by having male and female parts on the same inflorescence unit, with female parts on top of male parts (gynaecandrous) and winged perigynia. All members of group VIII belong to *Carex* section *Ovales*, a complex and notoriously difficult section. Several species in this group key out in more than one place in Hitchcock's "Flora," indicating the difficulties involved in species delineation. One of the most common species is *Carex pachystachya*, found in many different habitats from low to high elevation. A taxonomic revision of the *Carex pachystachya* complex by R. Whitkus was published in 1984, resulting in some name changes in this group.

Acknowledgements

The authors would like to acknowledge Lisa Standley for her contribution to the initial organization of an article like this one and Art Kruckeberg for kindly providing that initial manuscript.

References

Crins, W. J. and P. W. Ball. 1982. The taxonomy of the *Carex pensylvanica* complex (*Cyperaceae*) in North America. Can. J. Bot. 61:1692-1717.

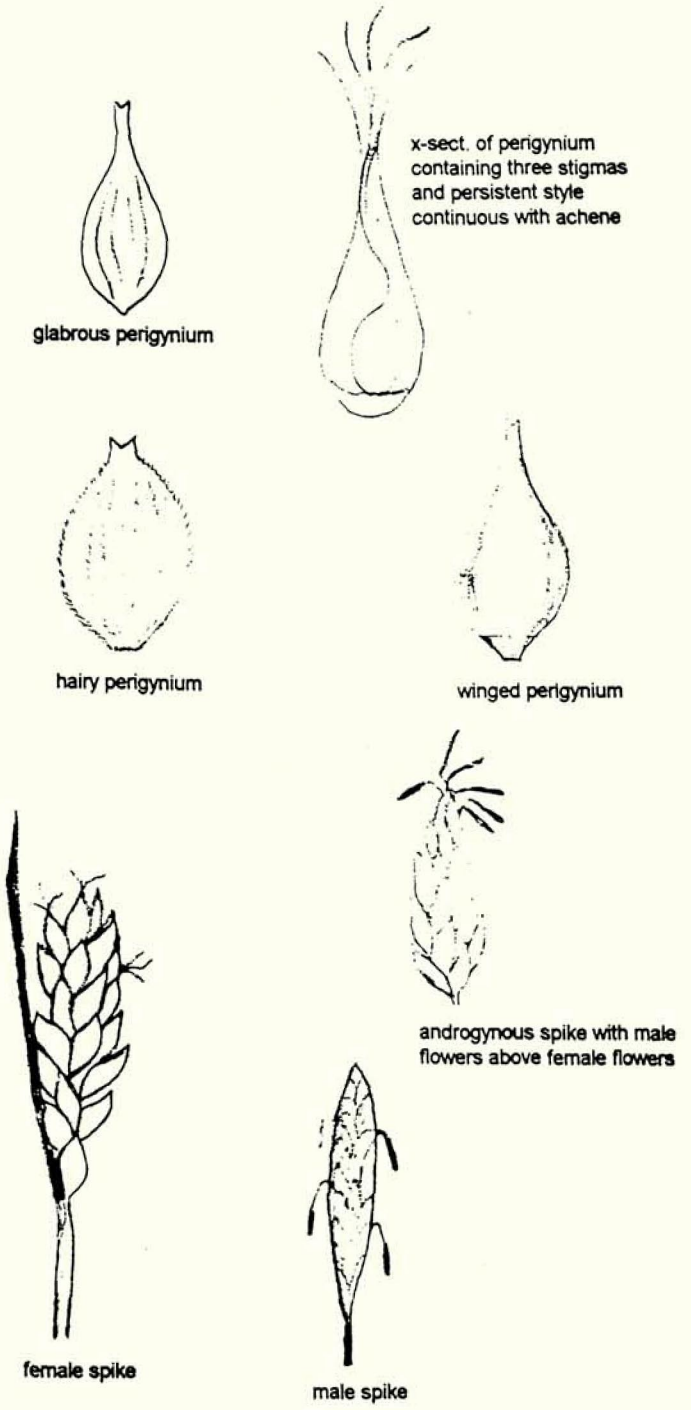
Crins, W. J. and P. W. Ball. 1988. Taxonomy of the *Carex flava* complex (*Cyperaceae*) in North America and northern Eurasia. II. Taxonomic treatment. Can. J. Bot. 67:1048-1065.

Ford, B. A. and P. W. Ball. 1992. The taxonomy of the circumpolar short-beaked taxa of *Carex* section *Vesicariae*. Syst. Bot. 17:620-639.

Kukenthal, G. 1909. *Cyperaceae-Caricoideae*. In Das Pflanzenreich IV. Vol. 20, heft 38. A. Engler, ed. Wilhelm Englemann, Leipzig. pp. 1-824.

Mackenzie, K. K. 1931. *Cyperaceae-Cariceae*. N. Am. Flora 18 (1-3): 1-168.

Mackenzie, K. K. 1935. *Cyperaceae-Cariceae*. N. Am. Flora 18 (4-7): 169-478.



Mastrogiuseppe, J. 1993. *Carex*. Pp. 1107-1138 in The Jepson manual, higher plants of California. J. C. Hickman, ed. Univ. Calif. Press, Berkeley.
Reznicek, A. A. and P. W. Ball. 1980. The taxonomy of *Carex*, section *Stellulatae* in North America north of Mexico. Contribution of the Univ. Mich. Herbarium 14:153-203.
Reznicek, A. A. 1985. What is *Carex rostrata* Stokes? Am. J. Bot. 72:966.
Standley, L A. 1985. Systematics of the *Acutae* group of *Carex* (*Cyperaceae*) in the Pacific Northwest. Syst. Bot. Monogr. Vol. 7.
Whitkus, R and J. G. Packer. 1984. A contribution to the taxonomy of the *Carex macloviana* aggregate (*Cyperaceae*) in western Canada and Alaska. Can. J. Bot. 62:1592-1607.

Adapted from "Douglasia," the newsletter of the Washington Native Plant Society and "Sage Notes," Newsletter of the Idaho Native Plant society.

NATIVE PLANT CONSERVATION INITIATIVE

1999 Action Agenda Meeting Highlights
Lady Bird Johnson Wildflower Center,
Austin, Texas, January 11-15, 1999
by Dr. Alyce M. Hreha, UNPS Board of Directors

Background

The Utah Native Plant Society (UNPS) Board of Directors recently voted to join the Native Plant Conservation Initiative (NPCI). The NPCI is a consortium of ten federal agencies (Members) and over 100 non-federal Cooperators representing several disciplines within the conservation field: biologists, botanists, horticulturists, habitat preservationists, resource managers, conservation organizations, concerned citizens, nature lovers and gardeners. Any interested organization with a mission statement that includes preserving and protecting our nation's ecosystems and their components may become a Cooperator. Some of the Cooperators include: TNC, botanical gardens such as Red Butte Garden, native plant societies, private consultants, seed companies, nurseries and garden clubs.

NPCI's National Strategy

Cooperators pledge their support to the NPCI's National Stategy which consists of six objectives (NPCI, 1995). They are to:

- Bring people and organizations together to share resources and talents to effectively conserve the nation's native plants.
- Provide opportunities for people to enjoy, understand and value native plants and plant communities.
- Ensure conservation and restoration of native plants and natural plant communities through ecosystem-based conservation.
- Encourage the scientific community to conduct research and develop technology in support of native plant conservation.
- Encourage practices that support appropriate and sustainable uses of beneficial plants.
- Promote the development and use of coordinated databases and information-sharing to support native plant conservation.

NPCI Members and Cooperators collaborate in order to solve native plant extinction problems and restore native habitats, ensuring ecosystem preservation. Federal plant conservation resources are pooled at the national level to provide a focused, strategic approach to plant conservation at the local level on both public and private lands. NPCI seeks to eliminate duplication of effort and increase effectiveness of these programs (NPCI, 1995).

Benefits to NPCI Cooperators

NPCI Cooperators:

- may apply for conservation grants awarded by the NPCI through the National Fish and Wildlife Foundation.
- have access to combined resources and shared knowledgeof all Members and Cooperators such as grant project reports, restoration models and educational guides and material.
- will receive the NPCI newletter, *Planting Foundations* and other NPCI publications.
- can be linked to NCPI's website (http://www.nps.gov/plants/).
- may host the NPCI traveling exhibit which highlights uses, conservation and threats to native plants.
- may participate in the five working groups: Exotics, Pollinators, Restoration, Information Sharing and Public Outreach.

NPCI Action Agenda Meeting

I had the opportunity of representing the UNPS at the NPCI Action Agenda Meeting that was held January 11-15, 1999 at the Lady Bird Johnson Wildflower Center in Austin, Texas. The Meeting was attended by more than 100 NPCI representatives from federal agencies and organizations throughout the U.S. There was a high percentage of federal government agencies represented including the national botanists from the U.S. Forest Service and Bureau of Land Management.

I spent most of my time talking to the representatives from other state native plant societies. The president of the Indiana Native Plant and Wildflower Society was especially exuberant about promoting the native plant conservation message to the public. The Indiana Society has over 600 active and enthusiastic members.

From my conversations with meeting attendees, I came to the conclusion that plant conservation problems are similar across the country but the flora affected changes from place to place. Development is decreasing native plant habitat and native plant communities are in peril due to the effects of habitat fragmentation and invasion by exotic plant species. Although funding for plant conservation programs is scarce to non-existant in most places, there seems to be a genuine interest by the general public to initiate volunteer efforts and perpetuate conservation projects.

On Monday afternoon (1/11/99), we assembled in the auditorium at the Wildflower Center for introductions by Dr. Robert Breunig, Wildflower Center Director and Peggy Olwell, Federal NPCI Chairwoman. After the keynote address by Dr. Peter White, Director of the North Carolina Botanical Garden, we listened to speakers address various topics regarding the operating procedures and previous accomplishments of the NPCI.

We spent the next two days in two different working groups developing action plans to acheive the desired outcomes/group objectives. I participated in the Exotics Working Group on Tuesday (1/12/99) and Restoration Working Group on Wednesday (1/13/99). On Thursday morning (1/14/99), we re-assembled in the auditorium for reports from the five working groups on exotics, pollinators, restoration, information sharing and public outreach. There were several excellent ideas presented during this session. Friday morning (1/15/99), we went on an extremely informative field trip to the Mayfield and Forest Ridge Preserves to see Austin's best examples of habitat restoration and endangered species preservation.

The best part of the meeting was the luncheon and the special award presentation to Lady Bird Johnson by Secretary of Interior Bruce Babbitt held in the Wildflower Center's Visitors Gallery. There were huge bouquets of flowers placed at strategic locations within the Visitors Gallery and lovely

wildflower arrangements on each table. The meal was a feast fit for any botanist or gardener extraordinaire. Flowers and herbs decorated our plates and garnished our food and drinks. I have never seen such attention to detail or so many secret servicemen in my life.

Secretary Babbitt, on behalf of the NPCI, presented Lady Bird with a lifetime acheivement award for founding the Lady Bird Johnson Wildflower Center and her contributions to national wildflower conservation. At 86 years of age, the Texas Grand Dame of Wildflower Conservation stood proudly accepting her award and said she "wanted to preserve the beautiful wildflowers of this great country for her grandchildren, especially the Texas Blue Bonnets."

The purpose of the Wildflower Center is to educate people about the environmental necessity, economic value and natural beauty of native plants. The Wildflower Center provides information to state highway departments, landscape designers, developers, teachers and backyard gardeners. By sharing its knowledge, the Center encourages a legacy of regional beauty, economic savings and restoration of damaged habitats (LBJWC,1997).

"Whatever its condition, the environment is, after all, a reflection of ourselves-our tastes, our aspirations, our successes and our failures."
-Lady Bird Johnson.

Let us all pitch in to continue the conservation legacy of this great Lady from Texas and help protect Utah's diversified native flora. If you want to volunteer to promote and implement the NPCI Strategy objectives by planting native landscapes or working on restoration projects come to the UNPS meetings and get involved. With your help, the UNPS can create conservation "successes" here in the Intermountain Region

References

National Plant Conservation Initiative. 1995. NPCI National Framework for Progress, 12p.

Lady Bird Johnson Wildflower Center. 1997. Lady Bird Johnson Wildflower Center Map and Guide Pamphlet

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Dick Hildreth Receives Lifetime Acheivement Award

Red Butte Garden's Education Director, W. R. (Dick) Hildreth, received the Utah Community Forest Council's first "Lifetime Achievement Award" during its annual membership meeting on November 6, 1998. The award was established to recognize individuals who have made exceptional contributions to the community in the areas of arboriculture and forestry. Dick was recognized for 21 years of educational work he has provided for Red Butte Garden and the community. Among his many contributions to the community, Dick established the Utah Native Plant Society in 1978, co-founded the Utah Community Forest Council in 1991, and helped the International Society of Arboriculture establish a certification program in this region, thereby decreasing damage to trees due to unprofessional care.

Dick also had a vital role in the planning and development of Red Butte Garden. In the early years, he assembled a board of scientists and community leaders to help promote and define the vision of the organization. He also acted solely as the staff of the Garden, doing everything from collecting plant species to establishing the Garden's educational programs. He remains one of the most knowledgable horticulturists in the state (as well as in California, where he began his career with the University of California at Davis Arboretum).

When asked what inspired him to devote his life to plants, he jokingly responded, "Well, when you grow up on the United States Department of Agriculture Horticultural Research and Plant Introduction Station, you don't really have much of a choice." Located in Cheyenne, Wyoming, the station researches all types of plants for the high plains area. Dick's father was a researcher there, and early on, gave Dick some projects to work on, including collection of seed from plant selections

grown in the research fields. Dick began his first horticultural research project at thirteen, hybridizing *Clematis paniculata.*

After more than two decades with Red Butte Garden, Dick will be retiring this summer. He says he plans to resume some plant breeding projects which he began almost 30 years ago.

Wanted:
Interested gardeners to participate in a comparative study of backyard pollinators.

Vince Tepedino of the USDA ARS Bee Biology & Systematics Lab in Logan would like to hear from gardeners in the Salt Lake Valley who are interested in participating in a study of the effects of urbanization on local native bee pollinators. If you have a flower/vegetable garden and a spot on a fence/barn/tree, etc. where a small, unobtrusive nesting station (it's just a cardboard tube with straw inserts) could be placed, let Vince know either by e-mail or snailmail.

The species that will use these tubes to nest in are not aggressive (unless, of course, you decide to try to harvest their pelts). It would also help if you were willing to observe the nest tubes once per week and just record which tubes had been plugged: this would take 5 - 10 minutes per week.

Vince is interested in several participants each in deep urban (Salt Lake City), suburban and rural settings. Everything you need gratefully supplied by USDA. Please respond as soon as possible to: Vincent J. Tepedino, USDA ARS Bee Biology & Systematics Lab, Department of Biology, Utah State University, Logan UT 84322-5310. e-mail: andrena@biology.usu.edu

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Research Grants from UNPS

Utah Native Plant Society has money available to assist graduate student research and other projects that highlight Utah native plants or plant communities. Projects could include, but are not limited to: education, conservation, field surveys of rare species, experimental research, or horticulture. The grant program is open to individuals, groups or organizations. Proposals from UNPS chapters and committees are not eligible for this program and should be submitted directly to the Board of Directors for consideration. Awards will be made on a competitive basis. The award limit is $1000 per project per year.

Proposals should consist of a brief outline (one or two pages) consisting of the following sections:

Introduction, project description, relevance to the purpose of UNPS, objectives of the study, methods to be used, how results will be handled (report, publication, or other form of final product). The applicant's background and statement of qualifications or resume and project budget should be submitted with the proposal. Awarded projects must, at completion, submit a brief summary of the project for publication in Sego Lily.

Proposals should be submitted by May 1, 1999, to: UNPS, P.O. Box 520041, Salt Lake City, Utah, 84152-0041, attn: Proposal Review Committee. Awards will be decided by June 1, 1999. In future years, the deadline for proposals will be March 1, and awards will be decided by mid-April.

UNPS SEGO LILY
c/o Jo Stolhand
Utah Native Plant Society
P.O.Box 520041
Salt Lake City, UT 84152-0041

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WILDLAND NURSERY would like to extend a special invitation to members of the Utah Native Plant Society to our open house on April 23, 24 and 25, 1999. Our goal at Wildland Nursery is not only to provide a wide variety of native plants, but also to support efforts to educate people in the benefits of using natives in the landscape. We are a new business but growing quickly, your suggestions to help us serve you would be greatly appreciated. The nursery is located at 12211south 4000 west in Riverton, UT. Hours are 9:00 am to 6:00 PM Monday through Friday and 9:00 to 5:00 on Saturday. And our **new** address is wildlandnursery@www.com.

Membership Application

❒ New Member ❒ Renewal ❒ Gift

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❒ Please send a complimentary copy of the **Sego Lily** to the above individual.

Please enclose a check, payable to **Utah Native Plant Society,** and send it to:

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Salt Lake City, Utah 84152-0041

If you prefer not to cut this out of your **Sego Lily**, feel free to copy the membership form or simply write the the information down and send it with payment and category of membership.

Sego Lily

Newsletter of the Utah Native Plant Society

VOL. 22 No. 3 **May/Jun 1999**

CALENDAR OF EVENTS

Thursday, May 13 3:30 PM	Salt Lake Chapter meeting, John and Mary Jim English Garden Tour. Outstanding collection of hemlocks and desert plants. 2453 East 3080 South (Gregson), SLC
Saturday, May 15. 9:00 AM	Utah Heritage Garden open house and breakfast pot-luck, Wasatch Elementary School, 1080 North 900 East, Provo, Public invited, bring food!
Wednesday, May 19 6:00 PM	Board of Directors Meeting, RBGA, Ft. Douglas
Thursday, May 20 7:00 PM	Tree planting ceremony to celabrate Dick Hildreth's retirement. Cottom's Gulch, W. of Museum of Natural History On the U. of Utah campus.
Saturday, May 22 9:00-11:30 AM	Rock Canyon Nature Day. Utah Heritage Garden planting party, Rock Canyon Trailhead Park, just east of the LDS temple in Provo. Come early (7:00 am) for great birdwatching with experts; bring your lunch for a picnic in the Pavilion, and stay to hear about Weeds versus Wildflowers and proposed plans for restoration of the canyon mouth.
Saturday June 12 9:00 am	Joint Salt Lake and Utah Valley chapter meeting and Heritage Garden tour. Meet at the Thanksgiving Point Animal Park Heritage Garden, proceed to Rock Canyon Trailhead and Wasatch School Heritage Gardens, then to the Meyer-Schultz residence in Elk Ridge for penstemon viewing and potluck lunch on the deck.
July 10, 1999 9:00 AM to 4:00	Intermountain Natives for Low-Water Utah Landscapes: A Symposium on their Propagation, Production, and Use. Utah State University Biology and Natural Resources Building rm 102. Details inside.

The Complex Web of Life Under Ground

Peter Lesica, Montana Natural Heritage Program
from Kelseya, the newsletter of the Montana Native Plant Society, Autumn 1999.
Reprinted with permission.

Achlorophyllous (non-green) plants usually attract notice. They seem so anomalous, so "unnatural." Green plants use chlorophyll to capture sunlight and produce food. These white, yellow or red plants are clearly different; how do they make a living? For many years it was thought that some achlorophyllous plants were saprophytes (obtaining nutrition from decaying plant material) or mycorrhizal (implying mutual benefit to both partners). We now know that neither is the case. All achlorophyllous vascular plants in Montana are parasites; they obtain nutrition from a host, damaging but not killing that host. The process of parasitism is varied and interesting.

In our area achlorophyllous plants occur in five plant families:

- Loranthaceae (mistletoes)
- Cuscutaceae (dodders)
- Orobanchaceae (broomrapes)
- Ericaceae (ericads)
- Orchidaceae (orchids)

Mistletoes and dodders attach themselves to the branches of other vascular plants and live their entire lives completely in the vegetation canopy. Dwarf mistletoes (*Arceuthobium* spp.) parasitize coniferous trees causing deformed branches, and heavy infestations may eventually kill the host. Dodders (*Cuscuta* spp.) twine around the stems and leaves of herbaceous and shrubby host plants in many families. Both mistletoes and dodders are perennials and can cause damage of economic importance by infesting commercial timber or crops.

Broomrapes (*Orobanche* spp.) also parasitize green vascular plants, but they do it underground, attaching their roots to the roots of a host. Many species specialize on hosts in the Aster Family, especially sagebrushes (*Artemisia* spp.), however, one-flowered broomrape (*O. uniflora*) has much more catholic tastes. Many species of broomrape are annuals. All three of these groups of plants have long been recognized as parasitic.

It is the achlorophyllous orchids and ericads that cause confusion about life history. These include the coral-root orchids (*Corallorhiza* spp.) and candy stripe (*Allotropa virgata*), Indian pipe (*Monotropa uniflora*), pinesap (*Hypopitys monotropa*), and pinedrops (*Pterospora andromeda*) in the Ericaceae. These plants usually occur in forest soils with deep humus layers.

This led to the belief that they were obtaining nutrition directly from decaying plant material. Later it was observed that their roots or rhizomes are filled with fungal hyphae. Some scientists assumed that these achlorophyllous plants formed a below-ground symbiotic partnership with the fungal mycelium the way most vascular plants do. However, green plants supply their fungal partners with carbohydrates in exchange for soil nutrients true symbiosis, but achlorophyllous plants have no means to manufacture food so they have no way to benefit their associated fungi. Rather, the plants induce the fungal mycelium to enter their roots and then digest them—parasitism not symbiosis.

The achlorophyllous ericads are usually associated with the same fungi that form mycorrhizal symbioses with coniferous forest trees. Pinesap parasitizes members of the genus *Suillus*, *Rhizopogon*, and close relatives; Indian pipe was found with members of the genus *Russula*; and pinesap parasitizes a single species of *Rhizopogon* throughout its entire range. Like the achlorophyllous vascular plants, these fungi cannot manufacture complex carbon compounds such as sugars. But with their fine net of subterranean hyphae, they sequester mineral nutrients from the soil and supply them to their tree partners in exchange for carbohydrates that the trees have in excess. Carbon compounds are made by conifers, transferred to the mycorrhizal fungus, and then taken by the pinedrops or Indian pipe. In this way the trees supply both the fungus and non-green plants with food. The wintergreens (*Pyrola* spp.) are

Striped coral-root
(*Corallorhiza striata*)
by Jeanne R. Janish.

From Vascular Plants of the Pacific Northwest, by C.L. Hitchcock et al., 1961, Univ. of Wash. Press. Reprinted with permission.

closely related to pinesap and pinedrops, and in some instances, they too may become totally dependent on fungi for carbohydrates. For many years leafless wintergreens were considered a distinct species, *Pyrola aphylla*, until it was discovered that different species of wintergreen could become leafless, presumably when there is a more substantial relationship with the fungi compared to their leafy conspecifics. These leafless wintergreens are considered an evolutionary intermediate stage between mycorrhizal and achlorophyllous species of the Wintergreen Family.

Coral-root orchids may also parasitize mycorrhizal fungi, but they have more often been found associated with root rotting fungi such as *Armillaria mellea*, the honey mushroom. These fungi parasitize coniferous trees for carbohydrates and are in turn parasitized by the orchids.
This life history helps explain results of a recent study from northwest Montana where spotted coral-root was found to be more common in old-growth forests compared to 80-year-old second growth. The root rot that foresters so despise is food for the orchids that we admire.

These simple-appearing plants give testimony to the complex web of life going on below ground.

Further Reading Furman, T.E. and J.M. Trappe. 1971. Phylogeny and ecology of achlorophyllous angiosperms. Quart Rev. of Biol. 46:219-225. Cullings, K.W., T.M. Szaro, and T.D. Bruns. 1996. Evolution of extreme specialization within a lineage of ectomycorrhizal epiparasites. Nature 379: 63-66.

A Rule of Thumb for Botanists: The 1-in-20 Rule

Dr. David H. Wagner
From the Oregon Flora On-Line Newsletter, Oregon State University, Vol. I (3), July 1995.
Reprinted with permission.

There have apparently been instances in the past where well-meaning botanists have destroyed plant populations through over zealous collecting. The

case most familiar to me concerns one of the world's rarest ferns, the pumice grape-fern, *Botrychium pumicola*. A student searching for new sites found two individuals of this species on Oregon's Tumalo Mountain in 1954 which he collected to make herbarium specimens. In the late 1970s I searched the top of Tumalo Mountain with friends. We were experienced fern hunters, but we found no *Botrychium*. I strongly suspect that the two plants removed in 1954 eliminated the population at this location. Today we would hope that botanists finding only one or two plants at a site would document their discovery with photographs and notes. Good photographs and careful field notes are increasingly acceptable for recording plant discoveries.

Nevertheless, from time to time, a field worker may encounter a small population of a plant and feel it is necessary to collect a bit of it for positive identification and documentation. The Native Plant Society of Oregon's Guidelines and Ethical Codes for botanists urges that a collector use good judgment and rules of thumb when deciding whether or not to collect. But in this case, what is a good rule of thumb? During the past 10 years, I have been using what I call he the "l-in-20 Rule."

The l-in-20 Rule dictates that a botanist never collect more than one out of 20 plants. It means NOT collecting ONE plant UNTIL you have found at least TWENTY. Only if 20 are found should you consider collecting one plant. And 40 should be present before two are taken, and so on. The rule applies to parts of plants, also: remove no more than 5% (one-twentieth) of a shrub, one fern frond from a clump of 20, 5% of a patch of moss, 5% of seeds from a plant. I use the 1-in-20 Rule whether I am collecting voucher specimens for the herbarium, doing rare plant work, or gathering common species for classroom use.

The l-in-20 Rule does not obviate the need for good judgment. Only when a botanist has the knowledge to assess whether collecting is both ecologically justified and legally permitted should a specimen be taken. Any pertinent factor relating to the survival of a population needs to be superimposed on the l-in-20 Rule. The main value of this rule of thumb is to provide a clear point of reference from which to begin assessing a situation. It helps a botanist determine how much time should be spent inventorying before sampling is appropriate. I suggest the l-in-20 Rule as a minimal criterion to be met before any taking of a plant be considered.

There is at least a modicum of scientific logic behind this rule. Statistically, a population sample of 19 is not significantly different from a sample of 20. One population geneticist I consulted advised me that contemporary statistical theory would support the 1-in-20 Rule. Another pointed out, however, that repeated collecting would tend to reduce every population to 19 individuals. This caution serves to emphasize that the l-in-20 Rule is a rule of thumb, not a license to ravage.

An interesting line of argument in support of the 1-in-20 Rule has developed since I first published the idea in the Bulletin of the Native Plant Society of Oregon in 1991. First, I received a letter from James Grimes of the New York Botanical Garden querying whether or not I had picked up the idea from a similar article he and others had published in the newsletter of the Idaho Native Plant Society a few years before. I honestly cannot recall seeing their note. Then, last year, four botanists from Australia and New Zealand published an article in the international journal, Taxon, which made essentially the same recommendation. Thus, three botanists or groups of botanists, deliberating independently, have arrived at the same standard. I submit that this concurrence from three separate sources speaks strongly for the sensibility of the l-in-20 Rule.

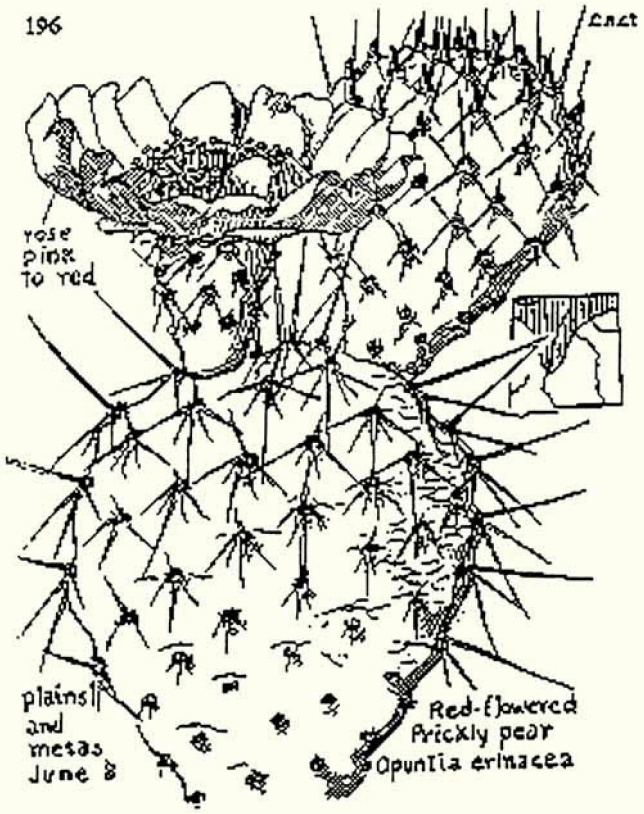
Awesome Opuntias

by Joseph Pearl
Reprinted from "Southwest Trees and Turf 3:12(9), 1998.

Enough of the negative talk of these great landscape plants, let me tell you some of the assets of the Opuntia genus. What a great plant to use for a

security hedge, a unique specimen plant and/or a wildlife habitat. For a low- or no-maintenance landscape, the Opuntia is the perfect plant. There are so many options available, that all one needs to do is take some time and research what type of cholla or prickly pear is most desired.

The flowering of the prickly pear is unequalled in the desert. The Engelman's prickly pear, with its vivid orange blooms, is a true spectacle. The bunny ears, with its profusion of yellow blooms, is up there in ornamental values as well. After flowering, the plants develop fruits called tunas. They can be used in making jams and jellies or even eaten raw. The pads of some -plants are also used as a food source for both people and animals.



As for the wildlife that are attracted to this genus, I do not know where to start. Perhaps the cactus wren, who has found residence in the cholla, is a good place to begin. What about the prickly pear, that provides sustenance for the collared peccary, A.K.A. javelina? These two are just the tip of the iceberg of the wild critters that depend the Opuntia genus.

As far as where these plants can be found growing in the deserts, look in Arizona, New Mexico, Mexico, California, Utah, Baja California, and Texas. They can be found growing at elevations as high as 6,000 feet down to sea level. They grow in areas that will make you scratch your head and wonder how they manage to survive.

When planting in the landscape, allow room for them to grow. No irrigation is needed once they are established, but a good drink every now and then is helpful. Although they are true desert dwellers, one must still remember that when using them in a landscape, some water will be required. The more they are watered, the larger they will get. Certainly not rocket science.

No matter how one looks at these plants, they are great to use in the landscape. Moderation should be used, but there are many varieties that can enhance a native landscape. Take some time before planting, and decide which ones will look the best. Remember to choose your planting location with caution and enjoy a plant that gets little positive recognition.

Propagation Workshops A Success

By Susan Meyer, Utah County Chapter

Over sixty people participated in UNPS-hosted plant propagation workshops held in early February in Provo and Salt Lake. People enjoyed the experience. Some comments we received on evaluations were "very informative", "educational and a lot of fun", and "hands on workshops are really the best way to learn".

Each person was given the opportunity to plant seeds of up to twelve species out of a total of nineteen different species for which seeds were provided. The species list included rarely grown plants like spider milkweed (*Asclepias asperula*) and shining muttongrass (*Poa fendleriana*), as well as old stand-bys like indian ricegrass (*Stipa*

hymenoides), Palmer penstemon (*Penstemon palmeri*) and showy goldeneye (*Viguera multiflora*). The list also included shrubs like green mormon tea (*Ephedra viridis*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*).

Each participant received a handout with descriptions and growing information for each species, as well as more general information about propagating natives from seed. We hope to use the workshop handouts as the beginning of a Utah native plant horticulture database on the newly-established UNPS website. This database will also include color pictures of the plants.

Participants took home their boxes of planted Spencer-Lemaire bookplanters and tried their hand at growing out the plants. On Saturday, May 1, about a third of the participants gathered at the Thanksgiving Point production greenhouses for a reunion and plant swap. While results were mixed, most of those who came to the reunion expressed interest in taking part in similar workshops in the future. Even better, they agreed to become part of a grower network for producing plants for the newly established Utah Heritage Garden program. The goal of this program is to increase awareness of native plants by establishing demonstration gardens at schools and other public places around the state. This year's workshops resulted in donation of almost a thousand plants to Heritage Garden projects, as well as providing plants for native plant gardens at the homes of participants.

We would like to thank the USDA Forest Service Shrub Sciences Laboratory, the University of Utah Grounds Department, and the production greenhouses at Thanksgiving Point for hosting our activities.

Intermountain Natives for Low-Water Utah Landscapes: A Symposium on their Propagation, Production, and Use

July 10, 1999
Utah State University Biology and Natural Resources Building, Room 102

The purpose of this symposium is to provide interested individuals in Utah's green industry the opportunity to hear some of Utah's plant professionals talk about their area of expertise regarding Intermountain West natives for use in low water landscapes and share their favorite native species. This symposium will also give those interested the chance to see low water demonstration landscapes and research at Utah State University regarding production and use of Intermountain natives.

9:00. Introduction and welcome by Roger Kjelgren, Associate Professor of Horticulture, Dept. Plant, Soils, and Biometeorology, Utah State university

9:10. Keynote address by Judy-Ann Buffmire, state representative to Utah legislature (D-SLC) on recent legislative developments on water conservation and her vision for the future

9:30. Bill Varga, (Dept. Plant, Soils, and Biometeorology) low water landscaping at the new Utah State University botanical garden in Kayesville

10:00. Dick Hildreath, University of Utah, Natives in the landscapes

10:30. Break

10:45 Susan Meyer, Forest Service Shrub Lab, Provo, on seed propagation of Intermountain natives

11:15. Robert Johnson, Great Basin Native Plant Nursery, Challenges facing growers of Intermountain natives

11:45. Janett Warner, Wildland Nursery the most confused woman about plants, not including

12:15. Lunch provided by Dept. Plant, Soils, and Biometeorology, Utah State University, networking on your own

1:00. Phil Allen, Botany Dept., Brigham Young University, using natives on the I-15 reconstruction
1:30. Franci Delong, Xeriscape Design, L.C., Salt Lake City, on designing and installing low water use landscapes
2:00. Roger Kjelgren, USU, on research into production and use of Intermountain natives for low water landscapes
2:30 Adjourn formal meeting, discuss potential for holding similar meeting next year, participants fill out survey forms
3:00-4.00. Meeting at farm for tour of USU low-water use landscaping with Intermountain native research and demonstration plots

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Heritage Garden Program
Picking Up Momentum

By Susan Meyer, Utah County Chapter

It's hard to believe that it has been less than a year since the Utah Valley chapter planted the inaugural Utah Heritage Garden at Wasatch Elementary School in Provo. The garden, which includes over ninety species of Utah natives, has grown very well and is getting ready to put on a spectacular bloom show in May and June this year. The garden has attracted quite a bit of attention, including the attention of the local school district. They included a visit to the Utah Heritage Garden at Wasatch School as one of ten recommended student activities in celebration of the Provo Sesquicentennial. Teachers at Wasatch Elementary recently honored Susan Meyer and Bitsy Schultz, chief planners and weeders, with Friend of Education awards for their efforts.

Sometime in the middle of winter we were approached by folks from the Animal Park at Thanksgiving Point about putting in a little Utah Heritage Garden, to be used as part of their environmental education program. The garden, which includes about twenty species of mostly streamside and mountain environments, was planted during Earth Week, on April 22. The main challenge at this garden was making it goatproof--it's located right next to the goat pens! We are still working on signs and interpretive materials. Several tens of thousands of schoolchildren take part in the environmental education program at Thanksgiving Point each year, so this garden is sure to get lots of use and visibility.

Our big planting project this spring is a new Utah Heritage Garden at the Rock Canyon Trailhead in Provo. This Provo City Park was built a few years ago; largely to protect the mouth of the canyon from motorized vehicle impacts. This is one of the very few city parks we know of where managers have vowed--no turf! So it's a natural for one of our gardens. It will include about fifty species native to the Wasatch Front. We decided to team up with some other organizations to get more visibility for our planting project. Rock Canyon Nature Day, May 22, will be co-hosted by the Utah Native Plant Society, the Uinta National Forest, the Forest Service Shrub Sciences Laboratory, Provo City Parks and Recreation, the Utah Division of Wildlife Resources, and the Rock Canyon Preservation Alliance. We invite all interested parties to help us plant our new Heritage Garden from 9:00-11:30 am that Saturday.

Not all the Heritage Garden action is in Utah Valley. Folks at the University of Utah Grounds Department have committed to plant a Utah Heritage Garden in one of the large circle beds on the mall. Their garden will feature a high-diversity xeriscape design with a lot of color. Another garden in the works is at Ensign Elementary School in Salt Lake, where there is already a fine 25-year-old planting of native shrubs on a steep former gravel quarry behind the school. We hope to add more shrubs as well as a lot of wildflowers, and to replace the exotic tall wheatgrass on the slopes with native basin wildrye. The first planting party at Ensign School is scheduled for sometime in October, to reduce the need for follow-up watering for establishment.

We would like to network with people who already have or know about native plant gardens or naturescapes in public places like schools and parks. If you know of any projects of this kind, please e-mail semeyer@sisna.com or call Susan Meyer at the Shrub Lab in Provo, 377-5717. Our goal is a directory and map, possibly on our website, to let people know about these projects. And please

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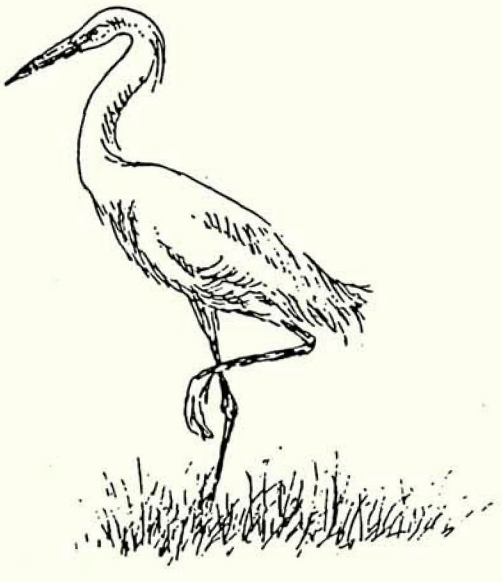
contact us if you have an idea for a new Heritage Garden.

WE HAVE HERITAGE GARDEN T-SHIRTS! These feature the beautiful Utah Ladyfinger Milkvetch logo and sell for $14.00. Proceeds will support the Heritage Garden Program. Get yours at one of the activities listed below, or contact semeyer@sisna.com or at 423-2603.



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SegoLily

Newsletter of the Utah Native Plant Society

VOL. 22 No. 4 **Jul/Aug 1999**

CALENDAR OF EVENTS

July 14th, 6:00 PM	UNPS Board of Directors Meeting, Potluck at the Meyers in Holladay. (801) 272-3275
July 17, 9:00 AM	Seed Collection Workshop, Shrub Sci. Lab, 735 N. 500 East, Provo. Susan Meyer will teach collection and processing of native seeds. Bring a hat, sunscreen, sturdy shoes, drinking water.
August 6-7	Wasatch Rock Garden Society Field trip to Ruby Mountains, NV. Call Bill King (801) 582-0432
Aug 14th, 8 or 9:00 AM	Albion Basin Wildflower Hike: Utah Valley Chapter, DWR Wildlife Heritage Program, Sherm Brough (943-6183 for time). Meet at Park and Ride lot near base of Little Cottonwood Canyon. Bring a lunch.
End of August, TBA	Hike Mt. Timpanogas to help make a plant list. Dea Nelson (Forest Service) will lead. Call Dea (423-3358) for details.

RED CANYON, UTAH: GEOLOGY AND PLANTS

by Alyce M. Hreha, Ph.D.

There are many scenic areas with alpine plant communities worthy of exploration within a short drive from Salt Lake City, Utah. During the summer months, when July temperatures usually top 100°F, what better relief could we offer visitors than a trip to the mountains? Higher elevations provide visitors with much-welcomed cooler temperatures, great scenery, and an abundance of wildflowers.

One of my favorite botanical areas to observe diminutive species is Red Canyon on the Dixie National Forest in Garfield County atop the Paunsaugunt Plateau of southern Utah. Red Canyon, named for its brightly colored, eroded knolls and scree slopes produced by the weathering and erosion of the red limestone member of the Claron Formation, is bisected by State Highway 12. The Red Canyon badlands are located on the western edge of the Paunsaugunt Plateau, while Bryce Canyon National Park, about ten miles to the southeast, makes up its eastern escarpment.

This region is composed of dry, sparsely vegetated, sloping terrain that forms an intricate system of deeply cut canyons and river valleys separated by high plateaus. A unique and endemic flora is restricted to the Claron Formation. Plant species restricted to unusual or distinct rock substrates and soils are called edaphic endemics. Edaphic endemics restricted to calcium-carbonate-rich strata are called calciphiles (limestone lovers). Many of this suite of calciphiles endemic to the Red Canyon area can also be found growing on the Claron Formation at Bryce Canyon National Park and Cedar Breaks National Monument.

Geology: The geological features of the magnificent scenery of this area are the remnants of extensive sediments deposited in a series of ancient Paleocene lakes during 60 million years of weathering and erosion. Sediment accumulation in these oscillating lakes varied as depositional environments and climatic conditions changed. The lakes gradually dried up, and the south-central portion of Utah was fragmented into a series of high, faulted plateaus, then subjected to millions of years of erosion.

The thickness of the Claron Formation varies. At Cedar Breaks, it exceeds 1000', while in the Bryce Canyon area it generally ranges from 500-800'. Variation in color is due to different amounts of iron and manganese present in the beds. Gradation from white to pink to red represents the state of oxidation and the concentration of these metals in each layer; the densely compacted, red, calcareous beds contain the most iron while the porous, white sandy beds contain the least.

Hardness or erodibility of the beds is highly variable and depends on their textural components and limestone (carbonate) content. Very soft beds have more clays and silts present while very resistant beds have a high percentage of limestone and dolomite. Softer beds erode to steep-sided slopes, while harder beds erode to form picturesque limestone spires, pinnacles, breaks, hoodoos, and walls, as well as natural amphitheaters, rock castles, and temples.

Outcrops of these rocks have been called the Badland Cliffs, Pink Cliffs, Sunset Cliffs, and Table Cliffs, all descriptive of landforms outstanding in form or color. These colorful landscapes attract millions of visitors to southern Utah each year.

The formation has been described as having a rapid rate of erosion, largely a function of creep resulting from winter freezing rather than from runoff produced from summer thunderstorms. The limestone rims at Bryce Canyon recede 10"-50" per century, which is considered quite rapid by geological standards. Water in the form of runoff from winter snow melt and heavy summer thunderstorms contributes to streamflow in this area and is the primary agent of erosion to these beds. Slopes are so steep (25-45°) that storm runoff travels rapidly, taking with it any loose material on its downhill course. Control of soil loss and the resultant heavy sedimentation are major soil erosion problems of this badland topography.

Townsendia minima

Soil weathering caused by winter freeze-thaw cycles or frost heaving loosens the rock fragments which are then carried downhill by the pelting force of rain during torrential downpours and landslides. As many as 200-300 freeze-thaw cycles per year are common on south-facing slopes where temperature fluctuation is most pronounced. Soil development is limited, resulting in shallower soils and sparser vegetation on south-facing slopes compared to north-facing slopes and relatively flat floodplain sites.

The slope soils in Red Canyon are a mixture of coarse limestone and fine clay particles arranged in alternating vertical bands overlain by gravel, scree, and talus. Slope soils are generally lacking in organic matter. North-facing slopes and floodplain sites have greater vegetative cover and more visible organic matter than south-facing slopes.

Climate: The average annual precipitation of 18.6" falls primarily in the form of snow from November through March. June is the driest month with less than an inch of precipitation, and August is the wettest month with almost 3" of precipitation from summer thunderstorms. The lowest mean monthly temperatures (22°F) occur in January while the highest mean temperatures (64°F) occur in July. Average highs are 80°F and average lows 40° for July. Red Canyon appears more xeric than these values would indicate, due to high daytime temperatures and the evaporative capacity of the air. Winds are light to moderate in all seasons, and evaporation exceeds annual precipitation. Valleys are generally semiarid, while plateaus tend to be wetter islands in a sea of semi-aridity.

In general, water availability is decreased on the predominantly dry substrates of the Claron Formation, which have low infiltration and high runoff rates. North-facing slopes are cooler and have more available water than south-facing slopes. Precipitation is unevenly distributed and creates many cycles of alternate wetting and drying. Soils range from spongy when saturated to brick hard when dry, especially on south-facing slopes. Even during the hot summer months when the soil surface appears dry, underlying soil seems to be fairly moist.

Plants: The plant community in in which most of the plants of interest to rock gardeners occur is called the Bryce Canyon breaks community. On northfacing slopes of Red Canyon the breaks community is dominated by coniferous trees from montane zones, such *as Abies concolor, Picea pungens, Pinus flexilis, P. longaeva* and *Psuedotsuga menzeisii*, as well as *Pinus ponderosa* and *Pinus edulis*, both more typical of lower elevation vegetations.

On south-facing slopes trees are almost absent, shrubs are uncommon, and herbaceous vegetation covers less than 10% of the ground. These slopes appear devoid of plants, but closer inspection reveals a variety of moundforming and rhizomatous species. The forb component is a mixture of common species from nearby vegetation zones and rare calciphiles. This unique assemblage of species differs from understory species found elsewhere in the area.

Some Red Canyon species, such as *Aquilegia scopulorum, Ivesia sabulosa, Eriogonum panguicense, Linum kingii, Monardella odoratissima,* and *Silene petersonii*, inhabit subalpine zones in other parts of their geographic ranges. These are tufted cushion plants or rhizomatous species with characteristics similar to those of alpine species.

There is a different group of species that are endemic to the Claron Limestone; i.e., they occur only on that substrate. These include *Castilleja revealii var. parvula, Cryptantha ochroleuca, Eriogonum aretioides, Penstemon bracteatus*, and *Silene petersonii. Silene petersonii* occurs as far distant as the Wasatch Plateau in central Utah, on the same formation. Other species, while occurring primarily on limestone, have also been occasionally found on other geologic substrates. These Red Canyon rarities are all caespitose perennials. Short descriptions follow:

Aquilegia scopulorum:: Erect clusters of inflorescences of sky blue flowers arising from dense rosettes of glabrous leaves originating from a woody caudex. Flowers in early summer.

Cryptantha ochroleuca : Low, caespitose perennial with several short stems of yellow forget-me-not like flowers from dense rosettes of hairy leaves. Flowers in early summer.

Cymopterus minimus:: Delicate umbel of yellow flowers with parsley-like leaves arising from subterranean stems. Flowers in early summer.

Lomatium minimum:: Umbels of yellow flowers on large caespitose mounds of parsley-like foliage in early summer.

Draba subalpina:: Tiny, dark green rosettes of thick leaves, with short stalks of little white flowers in clusters in early spring.

Lesquerella rubicundula : Tiny, grayish-green leaves in rosettes with short stalks of little, bright yellow flowers in clusters in early spring.

Eriogonum aretioides : Tiny mound-forming plants with minuscule, light yellow flowers in early summer.

Eriogonum panguicense : Rosettes to large mounds of lanceshaped, dark green leaves with slender stems and white flower clusters at top in late summer.

Oxytropis jonesii : Rosettes of grayish-green, fuzzy legume leaves with copious, stemless, pink-purple, pea-like flowers in early summer.

Penstemon bracteatus : Dwarf blue-violet beardtongue flowers arising in early summer from glaucous rosettes of spatulate to lanceolate leaves, rhizomatous.

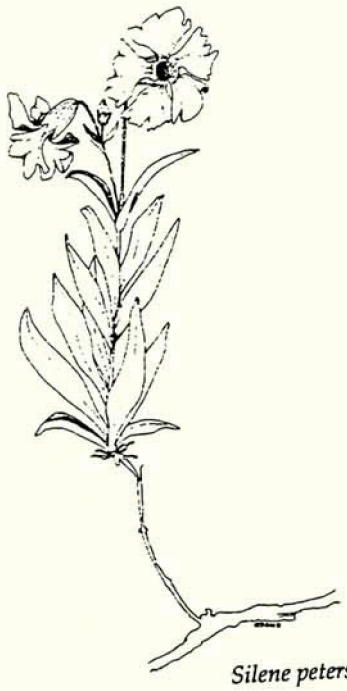
Phlox gladiformis : Large mounds of dark green, needle shaped leaves with thick clusters of white flowers in early summer.

Silene petersonii : Showy pink-purplish flower clusters on inflorescences arising from creeping rosettes of lance-shaped leaves. Flowers in late summer.

Townsendia montana var. minima : Light pink daisies packed into dense grayish green rosettes of lance-shaped leaves. Flowers in early summer.

The relatively barren knolls and scree slopes where these plants grow are unstable, highly eroded, and have shallow, rocky soils. It might be difficult for other plants to become established on these sites because of the apparent high soil temperatures, high evaporation rates, and fluctuating availability of moisture. In contrast to the harsh environment on the slopes, adjacent well-developed floodplain soils support a dense vegetative cover of big sagebrush (*Artemisia tridentata*) and rubber rabbitbrush (*Chrysothamnus nauseosus*) with an understory of common herbs, while the endemics are generally absent.

The endemics appear to be adapted to critical environmental factors such as shallow soils, winter freeze-thaw cycles, summer thunderstorms, high runoff accompanied by low infiltration rates, rapid rates of erosion, unstable or shifting substrates, fluctuating water availability, high evaporation rates, high amounts of solar radiation and surface albedo—all or any of which might exclude common species.



Silene petersonii

The species that make up this unique plant community have two different growth forms. Most of the species have rhizomes, while a few species have a vertical caudex. These growth forms are common to plants in alpine communities and serve as adaptations for survival on unstable slopes. The erosion associated with scree slopes in Red Canyon can be compared to the instability associated with talus slopes in alpine regions.

In general, the endemics seem to prefer south- and southwest-facing slopes but are found growing on every possible aspect, except the most northerly exposures, which are usually forested. The occurrence of the endemic species varies with slope inclination. Some species such as *Eriogonum panquicense, Lesquerella rubicundula* and *Townsendia montana var minima* appear to tolerate gentle to steep slopes (5-30°) while others such as *Penstemon bracteatus* and *Silene petersonii* appear restricted to steeper slopes (20-30°). Perhaps the latter are more tolerant of slope disturbance and heavy erosion.

Major federal land management agencies and conservation organizations in Utah have realized the importance of protecting these rare endemic species for years. Local botanists, especially Dr. Stanley Welsh and his colleagues at Brigham Young University Herbarium in Provo, Utah, have been instrumental in conservation efforts.

Because the distribution of these plants is closely tied to their geologic substrates, habitat destruction would be a major threat to their survival. Elimination of their critical habitat would decrease their abundance and ultimately push their small populations towards extinction. According to Dr. Welsh, plant species from families with the highest percentage of species restriction to unusual edaphic substrates appear to be at the highest risk of extinction. To protect these species, the US Fish and Wildlife Service has proposed listing many as threatened or endangered species.

The geologic substrates that support populations of these endemics in Red Canyon, as well as surrounding areas, have been located. Populations of these plants and their ecological requirements have been identified and studied. This information is being used by National Park Service (Bryce Canyon National Park and Cedar Breaks National Monument) and US Forest Service (Dixie National Forest) resource managers in the planning of effective management strategies to preserve these species in their habitats on the Claron Limestone.

Utah Natural Heritage Program (Dept. of Natural Resources, State Lands and Forestry Division) botanists are mapping the distributions of these species and studying their habitat requirements. This information will be used to initiate programs to protect them.

An article by Robert Mohlenbrock in *Natural History Magazine* in 1988 featured the unusual endemic flora restricted to the Claron Formation in Red Canyon, Utah. Since 1988, the US Forest Service has set aside two areas: 1) the Red Canyon Research Natural Area, 460 acres near Black Mountain, in cooperation with The Nature Conservancy and 2) the Claron Botanical Area proposed by The Nature Conservancy and the Utah Native Plant Society. Both areas, located on Forest Service land in Red Canyon, will provide protection to the calciphile plant communities. These preserves will also allow researchers to study these plant species and enable the public to observe this rare endemic flora.

Early collections of some of these endemic species were taken at their type location in Red Canyon by Marcus Jones and Bassett Maguire, two of Utah's botanical pioneers, around the turn of the century. You can experience the excitement these early botanical explorers must have felt when they drove through Red Canyon and discovered these tiny plant species growing in the screes. A visit to the area to observe these unique species in their native habitat would be rewarding to.novice and experienced rock gardener alike. Stop at the Red Canyon Visitors Center on Highway 12 for information on how to reach the Claron Botanical Area, by traveling over a few miles of dirt road off Highway 12. If you have time, you can also visit Cedar Breaks National Monument on the Markagunt Plateau, reached by traveling south on Highway 89 and turning west on Highway 14. Enjoy yourself, the scenery, and the plants. Please remember to take lots of photographs but leave only your footprints on the Claron Limestone. Your cooperation is required to help preserve these unusual species for future generations of rock garden and wildflower enthusiasts.

Drawings by Barbara Soha.

Alyce Hreha studied Red Canyon endemics while working on her doctorate in biogeography at the University of Utah and as a botanical consultant on several rare plant inventories and monitoring

projects. She is a past president of the Utah Native Plant Society as well as a board member. She is moving to Hawaii, where new botanical experiences will confront her.

Reprinted from the Rock Garden Quarterly 53(4):259-264, 1995.

Book Reviews:

The Alpine Flora of the Rocky Mountains, Volume 1, The Middle Rockies, by Richard W. Scott, 1996. University of Utah Press: Salt Lake City, Utah (Tel.: (800) 773-6672). 768 pp., 620 illus., 611 maps; hard cover, $110. ISBN 0-87480-482-5.

The University of Utah released in February 1997 Volume I of Richard W. Scott's planned three-part series *Alpine Flora of the Rockies*. A professor of biology at Central Wyoming College at Riverton, Wyoming, Mr. Scott has been studying alpine plants in the Rockies for over 20 years. He has undertaken a huge project. Volume I contains information on 609 species, 55 subspecies, and 314 varieties of alpine plants located above timberline (8,000' in Montana to 10,800' in Utah). The area covered includes parts of Montana, Idaho, Wyoming, and Utah, comprising alpine areas in 12 mountain ranges from the Beartooth and Bighorns on the north to the Wasatch, Uinta, and Medicine Bow on the South. There is a 30-page alpine and geologic primer followed by over 770 pages discussing each species. There are separate glossaries for alpine and botanical terms. Other appendices include a brief description of authors of accepted species, chromosome numbers of alpine plants, and a very good bibliography.

The book itself combines the features of an easy-to-understand flora and key and a distribution atlas. Each species is described in detail, located on a separate map by dots, and there is an illustration for each. The illustrations are from previously published material, supplemented by a few new drawings. Although useful, the illustrations are of varying detail and quality, and the artist for each is not identified.

While the distribution maps contain all known collections of the species within the area of study at any elevation, the description tells only where the plant can be found in alpine areas, and then only in very sweeping terms. Specific locations are not discussed. No elevation range is given for individual species. The book includes many plants I would normally expect to find in montane or subalpine environments, such as *Pyrola* and *Arnica*, which have been found in favorable alpine areas on occasion. Some of the species included challenge my concept of the definition of an alpine plant, e.g., nine of the thirteen Salix listed grow to more than 3' high.

The book seems more useful for keying out an unknown plant at an alpine site than to help you locate a particular species. However, the book is large (8 1/2" by 11"), and weighs around 5 lbs., and would be a burden to carry in your backpack—although I'm sure I will try.

Richard Scott is a self-proclaimed lumper and does not recognize many species proposed by others, choosing to reduce them to subspecies and varieties. He does list all synonyms for the species, sometimes as many as 20, and there are two great indices for all plant names mentioned in the book, one for common names and another for scientific names.

The book contains a wealth of information, gathered together for the alpine plant enthusiast. It is reasonably priced at about 12 cents a page, a bargain for all the work that went into it. If you have a strong interest in alpine plants from the Rockies, consider this series.
—William H. King

Conifers of California by Ronald Lanner. 1999. 288 pages, 54 original, full-page watercolor botanical illustrations, 165 photographs, and 54 range maps. Available from Cachuma Press, P.O. Box 560, Los Olivos. CA 93441.E-mail cachuma@silcom.com. $36.95 hardcover, $24.95 softcover.

Every once in a while a perfect book comes along. Author Ronald Lanner, artist Eugene Murman, and publisher John Evarts of Cachuma

Press have teamed up to create one: *Conifers of California.*

Ronald M. Lanner recently retired from a teaching and research career at Utah State University, that focused on the biology and ecology of forest trees, in particular conifers. California has the richest collection of conifers in the world for an equivalent area: 52 taxa, or about 10% of the world's total conifer taxa. The Pacific yew and California nutmeg are also included in the book.

Each species is treated to four to five large (7 x 9 $^{1}/_{4}$ inches) pages of text and illustrations. The text contains brief but satisfying sections on biology (habitat, size, use by indigenous and non-indigenous peoples, phylogenetic relationships to other species), key identifying features, and distribution (within and beyond California). The illustrations for each species feature a full-page color painting of foliage, cones and seeds by Eugene O. Murman (1874-1962). His drawings are . . . well, I can't think of adjectives grand enough to do them justice; elegant, accurate, and beautiful come to mind, but they're weak words in this case. I haven't seen anything better from Kew Garden artists. In addition are color photographs of the habitat and the tree and a distribution map taken from Griffin and Critchfield's 1972 classic, *The Distribution of Trees in California.* In addition, each genus gets a separate overview page, setting the scene for species that follow.

Everything is here. Would you like to know who discovered or named the tree? Interested in knowing whether the cones are serotinous? Want to know if it's endemic to California? Is it threatened by disease? How long do the needles stay attached? Want to know if it forms hybrids with other taxa, how to distinguish it from a closely related species, and if there are subspecific taxa? Curious about where and when the species or genus evolved, and whether its range is still changing? Or would you care to know how Native Americans utilized the plant? It's all here. Do you want to know where the information came from and how to find out more? The author provides a structured and annotated bibliography of nearly 100 references and a list of thirty journals that regularly publish articles about forest trees. References are not cited in the text, a wise choice given the broad taxonomic survey nature of most of the bibliographic entries. The absence of parenthetical references is very refreshing, and it contributes to a smooth, efficient flow of text.

The author's style is . . . hmm; another problem to find the right adjective. It's clean, that's what it is. Here's an example, from a page devoted to introducing the genus *Picea.*:

> The name *Picea*, derived from pix, the Latin term for pitch, is highly appropriate for this genus that comprises more than 30 species. Spruces produce copious amounts of pitch.... [They] bear their dangling seed cones high in the crown and the light, winged seeds quickly disperse when the cones open in the fall. Spruce needles are prickle-tipped and . . . as pleasant to hold as a handful of barbed wire.... Spruces inhabit moist forests from as far south as the Tropic of Cancer in Mexico to northern Siberia, and from sea level to Himalayan peaks nearing 15,000 feet in elevation. Most grow up in the shade and cast a dense shade of their own. Two of California's three spruces form the southern tips of ranges far more extensive further north, and one of them—Brewer spruce—is the rarest spruce in the United States.

As is obvious from the quote above, Lanner loves etymology, and many of his stories have to do with the scientific or common name. Here' s what he says about the common names of *Pinus sabiniana.*

> Many Californians know that gray pine long went by the name Diggerpine. Why the change? In this case Digger refers to California Indians in a way that is inaccurate, as well as offensive to them, so it is clearly not appropriate. Nor has it ever been the only common name in use.... [As] far back as 1874 it was called nut pine, blue, grayleaf, bull, and ghost pine.... Today one often hears this tree called foothill pine. Dendrology is under no obligation to prolong historic insults....

Scattered through the book are boxed essays on topics related to species described on adjacent pages. One essay is on closed-cone pines as a group, another describes the life cycle of a typical conifer, a third discusses phylogenetic relationships among several pinyon pines, and a fourth summarizes reasons for current taxonomic confusion with cypress species. Finally, there is an

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appendix rich in details about classification of hard and soft pines, known hybrids among the pines, and two keys to genera—one based on foliage, the other on cones.
—Michael Barbour

Reprinted from *Fremontia*, A Journal of the California Native Plant Society.

For more information about the Utah Native Plant Society please feel free to call:

Bill King	582-0432
Jo Stolhand	521-0069
Susan Garvin (Utah Valley Chapter)	377-5717
Larry and Therese Meyer	272-3275

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Newsletter of the Utah Native Plant Society

VOL. 22 No. 5 **Sept/Oct 1999**

CALENDAR OF EVENTS

Tuesday, October 26, 1999
6:00 PM

Board of Directors Meeting. Therese and Larry Meyer's House. 2931 Tolcate Lane, Holladay UT 272-3275. Lmeyer@lgcy.com.

Friday, November 12, 1999
5:00 Food Setup
5:30 Dinner and Meeting
7:00 Program

Annual Meeting and New World Potluck!

- Sugarhouse Garden Center, 1420 E 1300 South, Salt Lake City.
- Joint program, Marv Poulson, with the Wasatch Rock Garden Society.
- Turkey provided — bring your side dishes and desserts of New World foods.
- Annual business meeting and election of officers.

OUR UNIQUE FLORA: *PEDIOCACTUS SILERI*

BY SUE RUTMAN

Pediocactus sileri (Siler pincushion cactus) is a unspectacular species that occurs in northwestern Arizona and southwestern Utah. Ten years ago, this species was the center of a controversy that a great deal about pollinators and pesticides.

Most of the habitat of *P. sileri* is uninhabited and not even visited much by humans. On the vast Arizona Strip, *P. sileri* occurs on the flats or rolling hills of gypsiferous clay or sandy soils of the Moenkopi Formation. A spectacular backdrop of Navajo sandstone cliffs adds flare to the scenery.

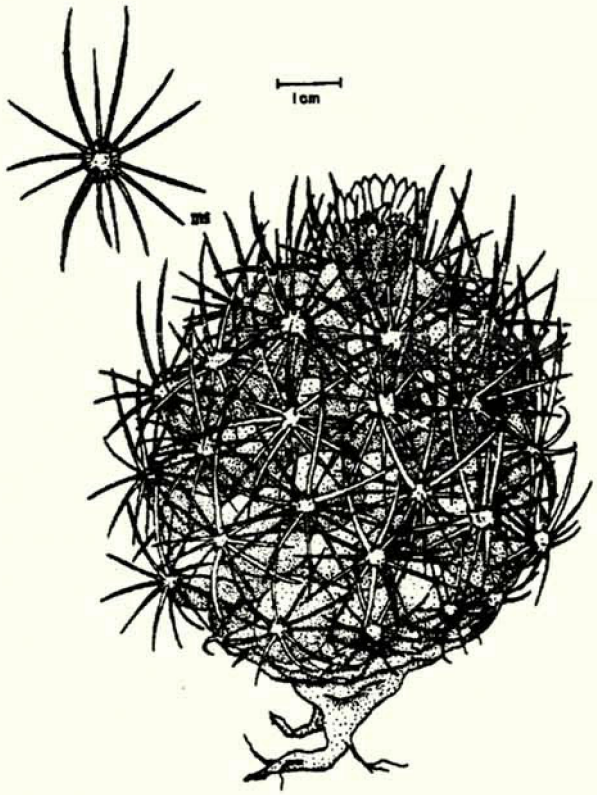
The habitat is sparsely vegetated and the P. sileri plants, growing in the open, are readily visible. These small globose or ovate cacti are about 5 tall (up to 18 inches) and 3-4 inches in diameter. Stems are mostly single but are sometimes clustered. The spines are born on tubercles. There are 3-7 slightly curved central spines about 1 inch long. A few of the central spines point upward, giving the plant a distinctive look. Flowers are yellowish with maroon veins and bloom in the spring.

Although the species is now on the Federal threatened list, *Pediocactus sileri* was an endangered species in the late 1980's when the U S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) proposed to airily apply pesticide to over 150squaremiles of land on the Arizona Strip. APHIS and local ranchers wanted to control an outbreak of grasshoppers. Some of the land to be affected by the proposed project was home to *P. sileri.*

In what ways would pesticide application affect *P. sileri*? APHIS believed that if they sprayed the pesticide before the cactus started flowering, then the pollinators would not be affected. Vince Tepedino of the Bee Biology Lab at Utah State University knew otherwise. He had been studying the pollinators of *P. sileri* and had found a number of native bees, some of them new to science. If APHIS were to spray in the early spring, it would kill the male bees, which were active then. When the females emerged from underground in the summer, their mating partners would be absent. That meant the next generation of pollinators would be gone, too.

A battle ensued, and in the end the pesticide spraying did not occur, thanks to some legal and paperwork technicalities. This case was unusual because we had information about the native pollinators to help fight for the conservation of the bees and the cactus. With less information, the outcome might not have been the same. Perhaps *P. sileri* and the stand against APHIS can teach us the importance of respecting our ignorance when making land management decisions and of the valued of learning more about plants and pollinators.

From *The Plant Press* 23:2, 1999
The Arizona Native Plant Society



Pediocactus Sileri

Drawing: U. S. Fish & Wildlife Service

Steps to Prevent Plant Poisoning

By Shirley A. Weathers

Every year, poisonous plants cause death, temporary and chronic pain and illness, abortions, decreased productivity, and birth defects involving hundreds of thousands of grazing and browsing livestock. Horses, sheep, cattle, llamas, alpacas, goats, and pigs are affected. The annual economic loss amounts to hundreds of millions of dollars.

For complicated reasons of plant and animal evolution, well-nourished herbivores will generally avoid eating most toxic plants. The toxins in some plants make them unpalatable to animals—they either smell or taste bad. Animals learn from other animals, particularly their mothers, to avoid some of the other poisonous plants. Still other poisonous plants produce a disagreeable physiological sensation soon enough after ingestion that animals learn not to eat them at all or they stop before consuming toxic quantities. But these mechanisms of safe eating are not foolproof. As noted, above, poisoning does occur and when it does, it can be devastating to both animal and owner.

There are a variety of reasons why livestock eat poisonous plants. There are some to which livestock have been found to be attracted. Some unpalatable plants appear to lose their disagreeable odors or tastes when dried (as in hay); a significant cause of poisonings is consumption of toxic plant parts mixed in hay, silage, grain, or processed feed. Some typically safe plants become toxic when fertilized or treated with certain herbicides. They may simultaneously become more palatable. Weather stresses and other natural conditions may convert the non-toxic to toxic. Probably most importantly, if put into a situation where only poisonous plants are available or where they make up a large percentage of available forage, livestock will eat them.

Whether or not animals will be sickened by ingesting particular toxic plants is also a complex matter. Not all species of livestock are equally affected by or susceptible to various plant toxins. For example, it is thought at this time that only equines contract "chewing disease," a devastating illness involving irreversible brain damage caused by consumption of toxic amounts of *Centaurea solstitialis* or *Centaurea repens* (commonly known as Yellow starthistle and Russian knapweed, respectively). The relative health of the individual animal (or, if a ruminant, of the microflora in its rumen) can figure into how well it can handle some toxic substances in the plants it consumes. The digestive systems of some animal species can adapt to be able to detoxify higher levels of toxins with exposure. A substantial quantity of some plants must be ingested to trigger illness or death. A couple of leaves of other plants can kill.

Despite all of these variables (and more), experts agree that plant poisoning can be minimized. The best means is a combination of effective use of good information about toxic plants and the provision of adequate amounts of safe alternative food. In the unhappy event that poisoning occurs, being informed may facilitate effective response.

Here are some suggestions that may help owners of livestock of all types protect their animals from poisoning:

- Pasture management is critical. Learn about plants in pastures and the animals that will graze there. Seek help from Extension agents and others, if necessary. Some options:
  - Eliminate or fence securely around toxic plants, especially if animals may find them palatable or if they are highly toxic or abundant. NOTE: If you grub out highly poisonous plants such as the various Water hemlock species (*Cicuta* spp.), take

appropriate precautions to protect yourself and others, especially children.

- If animals will have access to less palatable toxic plants, ensure that they always have adequate safe forage available. Check plant levels and types periodically. Do not overgraze.
- Watch carefully in early spring or late fall when toxic plants may be more prevalent than others.
- Know which plants are drought resistant. They may be the only food available under some circumstances. Watch out for toxic plants that are evergreen from fall to spring.
- Ensure that animals have adequate water, as well as salt and mineral supplementation, if needed.
- Avoid giving access to plants during their toxic season(s).
- Check on your pastured animals regularly and know the signs of poisoning to allow prompt action in case poisoning occurs.
- Be careful with herbicides (including those that may be applied by others, e.g., local government entities). Learn about their direct effect on animals, whether animals have been found to be attracted by application of the product and, if palatability is likely to increase, know about the inherent toxicity of those plants.

- Be prepared to identify and respond appropriately to toxic plants when animals will be taken into unfamiliar areas. New poisonous plants may be eaten simply because the animal has no experience with them.
- Avoid driving animals through areas with high concentrations of toxic plants, particularly if they are hungry.
- When tying, picketing, or staking animals, identify, and avoid areas where they are likely to consume toxic plants. If at all possible, find a place that is grassy, rather than leafy. Most, although not all, wild grasses are safe forage. [Be able to identify and avoid *Triglochin maritima* (known in most areas as Seaside arrowgrass) and *Zigadenus* spp. (commonly known as Death camases, but there are several other common names).]
- Do not assume that others know about poisonous plants. Feeding animals "treats" seems to be an almost irresistible urge of humans. Educate both adults and children who may come in contact with animals so that they know not to feed them leaves, fruits, etc. (This exercise will also alert children to the whole issue of poisonous plants. Many plants are at least as dangerous for children to eat as livestock) Consider providing visitors with "official treats" that animals like and can safely eat.
- If animals are rented or lent to others, orient the temporary caretakers to toxic plants along with other instructions on care and handling. Provide plant identification resources to be taken along with the animals.
- When selling animals, ensure that buyers are aware of toxic plants. Consider providing pertinent materials to the new owners.
- Do not feed yard or garden vegetation (clippings or trimmings) to livestock.
- Try to arrange to walk uncut hay fields before buying and check hay when feeding. Buy grain and processed feeds from reputable sources.
- Consider removing toxic trees and shrubs in corrals, pastures, and yard that could be accessible to livestock. Of course, the urgency of this measure depends on the toxicity of the plants.

- Anticipate accidental circumstances such as leaves blown by wind or the fact that animals sometimes get out.
- The safest course during Christmas and other holidays is to avoid feeding trees or other greenery to livestock. Although *Pinus ponderosa* (Ponderosa pine, among other common names) is the most commonly referenced harmful member of the *Pinus* genus, other species and other conifers also may be toxic, especially if consumed in large quantities over a short period. Many common types of holiday decorative greenery can be deadly.
- Check branches and tree limbs brought down in pastures by storms to ensure that they are not from toxic trees.
- Plant poisoning is generally a complex medical situation and will probably require a veterinarian's evaluation and care. The following may be helpful for livestock owners to keep in mind:
  - Establish a connection with a veterinarian before an emergency arises. Locate a practitioner familiar with your species of animal(s) and involve him or her in routine care.
  - Ask for information about any plants in the area that may already have caused problems. If other animals have been poisoned by local plants, there is a good chance that local veterinarians at least will be aware of that. They also may have some good advice to give you about prevention or response or both.
  - If you will be taking animals into a situation where veterinarian assistance will be difficult to obtain, ask your veterinarian to discuss some prudent actions to take in the event of poisoning.
  - Always notify a veterinarian when plant poisoning is suspected. Be prepared to provide him or her with as much information as possible about the situation.
  - Discuss appropriate supportive/symptomatic care you may be able to provide to sick animals and be prepared to provide it until assistance arrives.
  - Try to identify any suspect plants.
  - Get a sample.
  - Inspect the area where the animal was grazing. Try to determine the amount and duration of consumption.
  - Observe and make careful note of any physiological or behavioral signs the affected animal may exhibit.
- Keep an open mind and investigate other possible toxic agents to which a sickened animal may have been exposed, as well as the possibility that another type of illness may be involved.

On a personal note, when I began this book, I understood the grave potential of plant poisoning, but had not had any direct experience with it. Then in the midst of writing it, our neighbors had to put down five horses due to Russian knapweed poisoning mentioned earlier in this article. Just after the book was published, one of our pack llamas plucked a large mouthful of a young Water hemlock plant as we prepared to cross a stream. Although almost certainly not a lethal dose for a 300 pound animal, I'm convinced that I prevented him from being sickened by recognizing and forcibly removing the plant matter from his mouth.

Shirley Weathers, co-owner of Walsh & Weathers Research and Policy Studies and Rosebud Llamas Utah, excerpted this article from her new book,

Field Guide to Plants Poisonous to Livestock-Western U. S. The book is designed to help livestock owners recognize over 100 toxic western plants and provide adequate basic knowledge to consider effective animal or pasture management responses when those plants are present. Possible physiological and behavioral signs of poisoning are also provided, as well as types of care or treatment that may be helpful. The field guide is $14.95 (Utah residents please add 6.00% sales tax), plus $3.00 shipping for one hook and $1.00 for each additional book. Mail orders to Rosebud Press, P. O. Box 270090, Fruitland, UT, 84027-0090. For questions or comments, phone (435) 548-2630, FAX (435) 548-2438, email wrw@ubtanet.com. Visit http://www.ubtanet.com/~wrw/ to see sample plant entries from the book.

Native Grasses for a Luscious Lawn

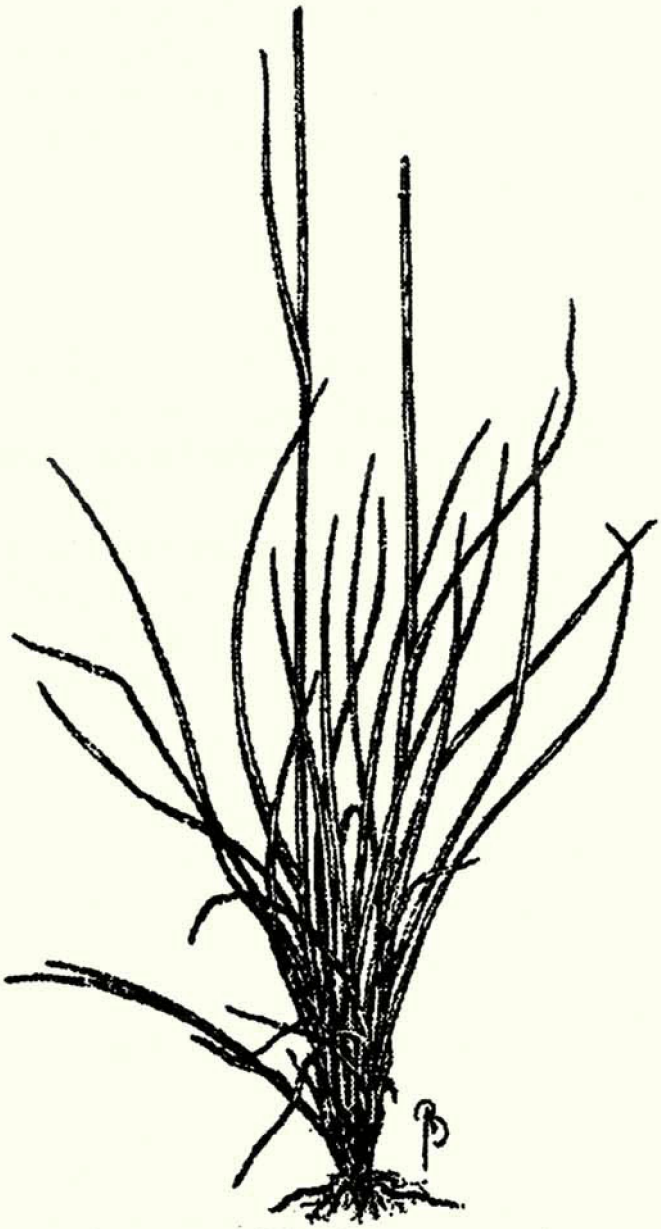
It is possible to have a great-looking lawn without hours of mowing, watering, weeding, and reseeding—think native! Native grasses are far easier to care for than conventional high-maintenance turf.

Understanding the growth habits of grasses will help you understand how to grow and manage them successfully. Cool-season grasses grow best in spring and fall and stay green into winter, but go dormant and turn brown in summer without prodigious amounts of water. Warm-season grasses do most of their growing in the hot summer, and go dormant when cold weather arrives.

Most warm-season grasses have a braching habit, and so need to be seeded heavily for a thick sod.

Following are five beautiful, carefree native alternatives to conventional turfgrass.

1) Buffalograss (*Buchloë dactyloides*) has prospered on the Great Plains for centuries. This native grass is a sod-forming species and uses water efficiently, having adapted over thousands of years to the periodic and prolonged droughts characteristic of the region. A warm-season grass, it is naturaly short (4 to 6 inches high), so no mowing is required.



Junegrass (Koeleria macrantha)

2) Red fescue (*Festuca rubra*) grows slowly and if left uncut reaches a mature height of only 8 to 12

inches. It doesn't like a lot of fertilizer, and thrives in dry, infertile soil. It tolerates not only partial shade but also drought. In fact, irrigation and and fertilizer actually restrict its development. A cool-season bunchgrass, it greens up early in the spring and is evergreen in some situations. Red fescue can withstand the cold of northerly climes and the heat of the upper South.

3) Pennsylvania sedge (*Carex pensylvanica*), like all sedges, is a close botanical cousin of the grasses and looks a lot like them. It is widely distributed throughout the eastern and central U.S. Its creeping foliage forms dense mats of medium-green, fine-textured foliage growing 6 to 8 inches when left unmowed.

4) Junegrass (*Koeleria macrantha*) prefers sandy or thin, gravelly soil—soil that tends to be dry and not very fertile. In fact, fertilizing june grass is not only unnecessary but can be downright detrimental. And this native grass is very drought-tolerant. A bunchgrass, it is found in prairie, open woods, and sandy soil from Ontario south to Louisiana and west to California.

5) Little bluestem (*Schizachyrium scoparium*) is a warmseason bunchgrass that is native throughout most of the U.S. and Canada. Like other warm-season grasses, it is fairly tolerant of poor soil, and therefore needs no fertilizer. It also requires no irrigation once established. Little bluestem makes an especially handsome low-maintenance lawn when mixed with other native grasses such as Pennsylvania sedge and tufted hairgrass (*Deschampia flexuosa*).

Excerpted from Easy Lawns: Low Maintenance Native Grassesfor Gardeners Everywhere © 1999 by Brooklyn Botanic Garden, 1000 Washington Ave., Brooklyn, NY 11225, (718) 623-7200. With Permission.

Weed Wilt:
Boon or Bane?

The infamous weed tree *Ailanthus altissima*, or tree-of-heaven, is being decimated by vascular wilt (due to the fungus *Verticillium dahliae*) in forested areas bordering Long Island Sound. Symptoms include leaf wilting, yellowing, and dropping in the summer, followed by tree death during the winter or, at latest, the next summer. All sizes and ages of trees are affected.

Tree-of-heaven is not native to North America, so restorationists who are opposed to exotic species should be happy if *Ailanthus altissima* disappears in the Northeast, right? Maybe not. According to the experts who have been following the wilt epidemic, openings in the forest resulting from destruction of the trees are rapidly being filled by even more worrisome invasive plants, such as oriental bittersweet (*Celastrus orbiculatus*), porcelainberry (*Ampelopsis brevipedunculata*), Japanese honeysuckle (*Lonicera japonica*), and multiflora rose (*Rosa multiflora*). Fewer *Ailanthus* could mean greater numbers of noxious plants in general!

Source: T Emmerich, M. Birmingham, and M. Daughirey, "Naturally Occurring Pathogen Is Killing *Ailanthus* (New York), Restoration and Management Notes 16(2), winter 1998, 223. (University of Wisconsin Press, Journals Division, 114 N. Murray St., Madison, WI 53715.)

From Plants and Gardens News 14(2):2, 1999
Brooklyn Botanic Garden

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Sego Lily

Newsletter of the Utah Native Plant Society

VOL. 22 No. 6 Nov/Dec 1999

CALENDAR OF EVENTS

Wednesday, December 1 6:30 PM	Mountain Chapter (used to be Summit County Chapter) meeting. Park City Library. 1255 Park Avenue. 6:30 business. 7:00 Dick Hildreth will speak on Wildflowers and Woody Plants of the Wasatch. Contact Abby Moore (435) 649-8859, balsamorhiza@hotmail.com for more information.
Friday, December 3 6 pm	The Utah Valley Chapter of UNPS will meet at 6 pm the evening of Friday, December 3, for a pot luck dinner followed by a round table discussion on exotic weed issues in northern Utah and how we might go about addressing them. Please come prepared to learn and to participate with your questions and insights. For information on meeting location, call Susan Garvin in Provo at 377-5717.
Tuesday, December 14 6-9 pm	The first of the Utah Native Plant Society's series of workshops that are dedicated to winter educational activities. Workshop #1 **Sagebrush and Rabbitbrush (Artemisia and Chrysothamnus),** Dr. Durant McArthur, at the U of Utah. See Page 5 for information on this workshop and the entire series!
February 12 February 19	This years edition of the Native Plant Propagation Workshops. See Back Page and sign up early.

UNPS GRANTS PROGRAM: CALL FOR GRANT PROPOSALS

See page 4 for application information

Stirring the Gene Pool: Will Data on Trees Lead to Forest of Understanding?

Barry A. Palevitz
September 27, 1999

Understanding the genetic structure of ecosystems is important in saving biodiversity. That's especially vital as humans fragment vast natural areas into isolated patches, cutting off avenues for outcrossing. Unfortunately, scientists' understanding of breeding systems and gene flow may be even more fragmented than the ecosystems.

Botanists are hard at work remedying the situation. Using genetic markers, they analyze plant paternity and infer how far pollen travels on gentle breezes or the backs and bills of animal pollinators. By comparison, however, not much is known about maternal gene flow in seeds after fertilization. "Seed movement is tougher to analyze, so it's been less well studied," says James Hamrick, population biologist at the University of Georgia.

Matthew Hamilton, assistant professor of biology at Georgetown University, has now partially filled the seed void using the tropical tree *Corythophora alta*. As major primary producers in terrestrial ecosystems, trees provide food and protection for a host of other species. Hamilton sampled 162 mature trees (trunks at least 10 cm in diameter at breast height) spread across seven populations in 1-10 hectare plots of fragmented and continuous Amazonian forest[1]. Reasoning that chloroplasts containing their own genes are transmitted exclusively in the maternal line in most plants, Hamilton assessed previous seed dispersal patterns by assaying trees for chloroplast DNA markers, or polymorphisms.

Hamilton expected wide seed dispersal, but that's not the case. The seven populations consisted of just two chloroplast haplotypes--combinations of DNA markers--with each population having just one haplotype. In other words, *Corythophora* populations show surprisingly little genetic variation when it comes to chloroplasts, and therefore very little seed mobility. "No one has ever seen such localized population structure for chloroplast DNA," says Hamilton.

Hamrick thinks Hamilton's data are "exceptional" in showing only two haplotypes. But what accounts for the pattern? "Because he's only seeing two haplotypes out of many possibilities, it tells me there's some history there." In other words, do the data reflect past patterns, before fragmentation? Adds Hamrick, "he might have found the exact same genetic structure if he'd gone in before fragmentation."

That's precisely what Hamilton thinks: "The majority of trees were present and growing before the forest was cleared." The pattern was there in the continuous forest before disturbance, and "those fragments are capturing a single lineage." Hamilton is now collecting samples 50-200 km distant to find out "if this is just a local effect or a much broader pattern."

But what could cause chloroplast homogeneity in a large forest? Hamrick wonders if it "could have been caused by two original parents carrying either haplotype that colonized this region." After all, the forest isn't older than about 10,000 years (going back to the last glacial period). Pre-Columbian Indians could have started the pattern by clearing and burning.

Hamilton isn't convinced: "There's no evidence I'm aware of that the forest was extensively cleared." Instead, he thinks the limited variation may be due to "isolation by distance"--seeds can't move very far from the parent tree. Though tropical forests are rich in biodiversity, individuals of each species are widely spaced. Hamilton thinks some sort of local selection effect is also possible. And he hasn't ruled humans out of the equation: "Chances are that [continued] fragmentation would reduce seed dispersal even further." Hamilton plans to examine younger trees. "If fragmentation is having an effect, we should see a difference between present and past population structure."

Have Pollen, Will Travel

Hamilton's data seem to agree with a proposal made by Paul Ehrlich and Peter Raven in 1969 that "gene flow in nature is much more restricted than commonly thought" and "at least in many cases is of little or no importance in maintaining ... species."[2] Instead, local selection pressures take precedence. That view dominated population genetics for years, but evidence to the contrary started accumulating in the 1980s. We now know that paternal genes in pollen often flow across large distances. According to Hamrick, "50-60 percent of

pollen comes from outside the stand in wind-pollinated species." Now biologists are seeing the same thing for insect-pollinated tropical trees. "Some of the larger native bees will forage over several kilometers."

Hamrick's own work on tropical strangler figs bears this out.[3] Tropical figs are keystone species--they reproduce year-round and thereby support a wide variety of fruit-eating animals. John Nason and E. Allen Herre, together with Hamrick, used paternity analysis and a handy plant/insect mutualism to estimate the number of trees composing an interbreeding unit in several fig species--that is, the number of trees in the male phase of reproduction surrounding a maternal tree. (Female parts develop before male stamens in these flowers.) The researchers took advantage of the fact that strangler figs are serviced by female wasps that become trapped after delivering pollen, and their own eggs, to female-stage flowers. By selecting a fruit with only one trapped wasp, the researchers knew that it received pollen from a single male flower. (Wasp eggs laid at the female stage develop into adults that emerge at the male stage, carrying pollen with them.)

Using protein markers called allozymes to judge genetic diversity, the group inferred breeding units of 150 to more than 750 trees--a lot more than are on the 15 km2 study site at Panama's Barro Colorado Island. In fact, breeding units may cover more than 600 km2. That kind of wide pollen base probably lets sparse fig trees reproduce in forest fragments. Unfortunately, pollination in most tropical trees doesn't involve the same kind of plant/wasp mutual admiration society, so they probably don't form large, interbreeding "metapopulations."

Why Slow Seeds?

If pollen travels so far in the tropics, why is seed dispersal so pokey, at least in Hamilton's trees? Part of the explanation may depend on who's eating the fruits and seeds. "I don't really know for sure what the dispersers are," admits Hamilton. So far, there's evidence for birds, rodents, and even primates. Hamilton also wants to look at nuclear genes and do paternity analysis to compare paternal and maternal gene flow. Resolving the issue is important. If seed dispersal is slow in other trees, how did they spread so rapidly after the last glaciation? Hamrick points to oaks: Did they migrate from the Mediterranean region to the rest of Europe in a coherent wave, or through long-distance jumps that established outpost colonies that gradually coalesced? With additional work on temperate as well as tropical species, maybe fragments of information will coalesce into a whole forest of understanding.

Barry A. Palevitz
(palevitz@dogwood.botany.uga.edu) is a contributing editor for The Scientist.

References

1. M.B. Hamilton, "Tropical tree gene flow and seed dispersal," Nature, 401:129?30, Sept. 9, 1999.
2. P.R. Ehrlich, P.H. Raven, "Differentiation of populations," Science, 165:1228?32, 1969.
3. J.D. Nason et al., "The breeding structure of a tropical keystone plant resource," Nature, 391:685?7, Feb. 12, 1998.

New Board of Directors Elected

The annual meeting was again a success. The new world potluck always inspires the best cooking energy and results in recipe exchanges. There was, of course, a business meeting as well.

The slate of nominees from the Nominating committee was unanimously approved. The Board of directors for the next year is:

Phil Allen *
Ben Franklin
Susan Garvin
Kim Harper
Dick Hildreth
Alyce Hreha
Mike Hubbard *
Bill King
Larry Meyer
Susan Meyer
Therese Meyer
Abby Moore *
Theresa Prendusi
Frank Smith *
Jo Stolhand
Janet Warner
Mindy Wheeler *

* indicates chapter presidents of the Utah Valley, Price, Mountain, Logan and Salt Lake chapters.

Ensign School Heritage Garden

The Ensign School Heritage Garden (at Macaw Junction) has been planted! Whew! All 700+ plants are in their new home with strong wishes from the planters and surrounding community for growing success.

This is the second extensive native planting on Ensign's large hill. The first native planting occurred about twenty years ago to control erosion into the school yard. Today, Ensign's "outdoor classroom's" east side has a wonderful stand of *Cercocarpus ledifolius, Purshia stansburiana, Rhus trilobata,* and *Rhus glabra,*

I don't know when Susan Meyer and Bitsy Schultz first picked Salt Lake City School District's Ensign Elementary School as a heritage garden site. But I'm grateful they did. Thanks to the year long coordinated work of many people, Ensign now has a native garden on its western edge, Macaw Junction. Many thanks to Brent Collett of Thanksgiving Point who donated so many of the plants in our new garden. To all of the participants of the seed propagation workshops, thanks for our plants. Thanks to Janett Warner of Wildland Nursery who housed and cared for our plants all summer so that we could plant this fall.

The actual planting was a week long process. For two evenings our auger crew of now very tired strong people drilled holes on the steep, south-facing slope in preparation for the classroom plantings. Classes came up onto the hill for one and one half days planting *Fallugia paradoxa, Purshia stansburiana, Rhus trilobata,* and *Ericameria nauseosa.* An all day Saturday planting of *Artemisia frigida, Penstemon eatonii, P. palmeri, P. strictus, P. cyananthus, P. comharrenus, P. utahensis, P. humilis, Aster glaucodes, Sphaeralcea grossulariafolia, Hymenoxys scaposus, Oenothera pallida, Eriogonum brevicaule, E. heracleoides, E. jamesii, E. ovalifolium, Stipa comata, Poa fendleriana, Oryzopsis hymenoides, Elymus cinereus,* and *Physaria chambersii.* finished the project and us.

It was very heartwarming while trying to keep one's balance on a steep slope and dig a planting hole to have a member of the community walk by, ask what we were doing, and then give resounding cheers for what we were doing. One person who was not a member of the school community helped to dig and plant because he believed in what we were doing. It was grand to plant alongside parents and their kids from the school community. A neighbor family supplied the water faucet we needed so that we could water the ground in preparation for digging and then water the hill's new inhabitants for two weeks until the fall rains (and snow) finally arrived.

Again, thanks to the plant donors, growers, and summer caretakers. Thanks also to the Heritage Garden arm of the Native Plant Society. Susan Meyer and Bitsy Schultz are remarkable ring leaders. Susan Garvin and Abby Moore are wonderful assistant ring leaders. Please stop by at Ensign Elementary School ("L" Street and 12th Avenue) in Salt Lake's Avenues area and visit this wonderful Heritage Garden.

UNPS GRANTS PROGRAM: CALL FOR GRANT PROPOSALS

The Utah Native Plant Society is accepting grant proposals for funds available for research projects during the 2000 grant cycle. The grant program is open to individuals, groups or organizations. Membership in the Society is not required to apply for or receive funding. Awards are to be decided on a competitive basis by the Board of Directors of the Society, and will be announced by April 1, 2000. Awards will be limited to $1000 per project per year, and multi-year projects will be considered. A stipulation of an award is that the researcher provides a written summary of the project at its conclusion for publication in our newsletter, Sego Lily.

Proposals should consist of a brief presentation (one or two pages) outlining:

- The project's goals, methods and relevance to the purpose of Utah Native Plant Society: "UNPS is a non-profit organization dedicated to the understanding, preservation, enjoyment, and responsible use of Utah native plants. Our goal is to foster public recognition of the diverse flora of the state; a natural treasure to be valued and respected."
- The applicant's background and a statement of qualifications or resume.
- A budget outlining expected costs involved in the project.

Proposals should be submitted by February 1, 2000 to: Utah Native Plant Society, 2000 Grants Program, P.O. Box 520041, Salt Lake City, Utah 84152-0041.

Utah Native Plant Society 1999- 2000
Workshop Series

The Utah Native Plant Society is excited and proud to present a series of workshops that are dedicated to winter educational activities for the 'botanically-appreciative' type. The workshops will be taught by some of the foremost botanists in the region who have a true appreciation and a deep knowledge of Utah's native flora. Attendees need no special skills or background; a love for plants and a desire to learn are the only prerequisites. The workshops will be held at the University of Utah, Room 230 in the North Biology (Talmage) building, and will last for approximately 3 hours. One workshop per month will be scheduled through April (perhaps even May!) at which time we all will head to the great outdoors to try out our new skills!

The following workshops are scheduled for the 1999-2000 season:

Workshop #1 **Sagebrush and Rabbitbrush**
(*Artemisia* and *Chrysothamnus*)
Leader: Dr. Durant McArthur

Tuesday, December 14, 1999 6-9 pm
Many may recognize the name Durant McArthur. Dr. McArthur is a lead scientist at the Seed and Shrub Laboratory in Provo, Utah. He is well-known in his field for his work with these two genera. With so much cross- pollination occurring out in the wild, and so much variation within the genera, Dr. McArthur will teach us what we should look for when trying to decipher distinct species. Dr. McArthur's knowledge about *Artemisia* and *Chrysothamnus* can be fully appreciated when any and all questions are asked...

Specific dates for the following workshops will be announced as the University's spring semester schedule is set:

Workshop #2 **Working with the *Asteraceae***
Leader: Dr. Susan Meyer

Date: To be announced (mid- January, 2000)

Dr. Susan Meyer is also part of the great team of scientists/botanists at the Seed and Shrub Laboratory in Provo. She will assist the workshop attendees in finding their way through the seemingly endless pages of Composites in the plant keys. Dr. Meyer will introduce participants to the tribes and subtribes of the family. Recognition of the tribes and subtribes of the *Compositae* and the organization of the family aids greatly in reducing the time needed to key specimens.

Workshop #3 **The Poaceae**
Leader: Dr. Kimball Harper

Date: To be announced (mid- February, 2000)

Dr. Kimball Harper's reputation as a great botanist, instructor, and mentor precedes him. Dr. Harper will cover the basics needed to take a grass through the keys as well as cover the characteristics of the grass tribes. This information will give workshop attendees the confidence needed to get through the Poaceae pages of the plant keys.

Workshop #4 **Introduction to the genus Carex**
Leader: Sherel Goodrich

Date: To be announced (mid- March, 2000)

Mr. Goodrich is a renowned botanist and ecologist, now working on the Ashley National Forest in Vernal, Utah. He is also a co-author of *A Utah Flora*. Need we say more? In addition to being a great botanist, Sherel is a wonderful speaker and instructor. This workshop will provide an introduction to the genus Carex, an extremely large, complex and enigmatic genus. This workshop has been requested often, so don't miss it!

Workshop #5 ***Astragalus***
Leader: Dr. Stan Welsh

Date: To be announced

Dr. Welsh is co-author of *A Utah Flora* and was the BYU Herbarium Curator for many years. The *Astragalus* is an extremely large genus, and Dr. Welsh will share his incredible wealth of knowledge about the intricacies of the Milkvetches.

To register for workshops and for more information, please call Mindy Wheeler at (801) 485-4695 and leave a message on the answering machine. You will receive a call back within a few days to secure your spot for the workshop(s) in which you are interested in attending. Workshops are limited to 25 participants, so sign up now! The cost will be $5.00 per workshop.

UNPS SEGO LILY
c/o Jo Stolhand
Utah Native Plant Society
P.O.Box 520041
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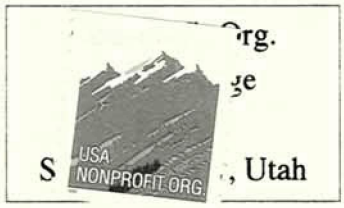

Plant Propagation Workshops:

The Utah Valley Chapter has decided to continue in the tradition of Utah Heritage Garden Native Plant Propagation Workshops --come learn how to grow natives from seed for your own garden and to help provide plants for the Utah Heritage Garden Program this spring. The Saturday morning workshops will be held in Provo on February 12 and in Salt Lake City on February 19, and will feature fifteen all-new species. Space is limited! Sign up now to reserve your spot by sending $5.00 with your name and contact information to: Susan Meyer, 412 East Salem Hills Circle, Elk Ridge UT 84651. We will respond by sending you more detailed information.

For more information about the Utah Native Plant Society please feel free to call:

Bill King	582-0432
Jo Stolhand	521-0069
Susan Garvin (Utah Valley Chapter)	377-5717
Larry and Therese Meyer	272-3275

Membership Application

❒ New Member ❒ Renewal ❒ Gift

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e-Mail _____

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❒ Lifetime	$250.00

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