VOL. 14 NO. 1 JAN / FEB 1991

CALENDAR OF EVENTS

Jan 10-12 Lytle Preserve Fencing project (see article on Lytle Preserve).

Jan 14 Cache Chapter Meeting, Vince Tepedino, reproductive ecologist at the USDA Bee Laboratory will be the guest speaker. Logan City Public Meeting Room, 255 no main (library) Logan, UT.

Jan 14 Mon. 7:30 Utah Museum of Natural History: Winter lecture series "Our Vanishing Natural Laboratories: Tropical Biodiversity & Meolicene" East High Auditorium $3.00 admission.

Jan 15 Tues. 7:30 Logan Canyon Public Hearing, (see article).

Jan 21 Mon. 7:30 Utah Museum of Natural History winter lecture series "Conserving Tropical Wildlife: Present Problems and Future Solutions". East High Auditorium, $3.00 admission.

Jan 23 Wed. 7:30 Salt Lake Chapter Meeting, Planting the Oquirrhs: A modern day Johnny Appleseed. Speaker Paul Rockich has been planting since 1959 and was recently the topic of articles in People Magazine and Readers Digest. New address Granite Park Junior High School, 450 East 3700 South, SLC. Executive Board Meeting at 6:45.

Jan 24-26 Lytle Preserve Fencing Project (See article on Lytle Preserve).

Jan 28 Mon. UMNH Winter Lecture Series "On the Ground in Brazil: Cultural & Economic Factors Affecting the Fate of the Rainforest". East High Auditorium, $3.00 admission.

Feb 2 Sat. 2:00 UMNH Winter Lecture Series. Global Sustainability: The Greenbelt Movement in Africa And The Individuals Role". Fine Arts Auditorium U of U

campus, $3.00 admission.

Feb 4 — UMNH Winter Lecture Series
"The Last Great Forests in the United States: Bringing It All Back Home". East High Auditorium, $3.00 admission.

Feb 7-8 — Lytle Preserve Fencing Project.

Feb 11 Mon. 7:30 — Cache Chapter Meeting, The speaker will be Swede Dahl, USU Horticulturist. Logan City Public Meeting Room, (library) 255 North Main.

Feb 14-18 — Lytle Preserve Fencing Project.

Feb 27 Wed. 7:30 — Salt Lake Chapter Meeting.
Dr. Kevin Jones, an Archeologist with Utah's Division of State History will speak on Native Plants for Native Americans. Granite Park Junior High, 450 East, 3700 South. Executive Board Meeting at 6:45.

The Sego Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent the editor, Jo Stolhand, P.O. Box 520041 Salt Lake City, UT 84152-0041. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable article for publication. Calendar items of interest to our membership are requested.

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Mountain Lover-One of My Favorite Native Plants
By Bill Wagner

Paxistima Myrsinites
(Pachystima, Pachistima)
Mountain Lover, Oregon Boxwood, Mountain Hedge
Zones 1-10.

Mountain Lover is a low growing evergreen shrub that ranges from Montana and British Columbia to New Mexico and California. In Utah, this plan is generally found growing in Aspen and fir stands, but is also seen with oak, maple, spruce, and pine etc.

On the Wasatch Front, it is found from the foothills to subalpine. It grows to four feet tall, but is generally shorter, and forms patches 4-20 feet wide by underground runners. In Bingham Canyon I have seen a patch that is about 8-10 feet wide by 6-8 feet tall growing on a south facing slope free of trees. This is extremely rare.

I have been growing Mountain Lover in my yard for about 15 years and have been very pleased with it. It has down well in both heavy shade and almost full sun. The more sun it gets, the taller it grows. At one time I had one plant that reached about 3 1/2 feet tall. Mountain Lover is very easy to grow and maintain provided you have well-drained soil (this is a must). Because most residential landscapes receive a lot of water, less water is recommended if possible.

Mountain Lover is drought tolerant, and could get by with much less water, but with the different types of plants that

Mountain Lover

I have growing with it, more water is needed to maintain a lush and appealing look through-out the planting bed. It has been disease and insect resistant, at least so far.

Mountain Lover blends well with many different types of plants such as ferns, Hosta Lilys, Columbines, Sweet Woodruff, Bronz Ajuge, Mugho Pine, and Oregon Grape. It adds a unique tough to a vase of cut flowers. I have also used cuttings in Christmas center pieces along with fir and juniper. If you like and east to maintain, low growing (1-3 ft.) evergreen shrub, I highly recommend it.

If you would like to see these plants, call me at my residence for a tour. 942-1295.

Sources of information:

Flora of Colorado - Rydberg
Spring Flora of the Wasatch Region - Garrett
Flora of the Central Wasatch Front, Utah - Arnow and Wyckoff
Uinta Basin Flora - Goodrich and Neese
New Western Garden Book - Sunset

SHRUB DIEBACK IN THE GREAT BASIN

Dieback is the term used to describe the widespread death of a plant species. In forest ecosystems, dieback's have been attributed to pathogens such as diseases or insects, although industrial pollution in Europe and in the Easter U.S. has also been identified as contributing factors. These fining indicate that dieback is a much more complex phenomenon than a simple relationship between aging plants and infectious organisms.

Dieback of shrub stand in the Great Basin has been observed since 1982. Although these shrubs may appear to be part of a barren landscape, they are often the principal food for livestock and wildlife during the winter months when other forage is scarce. Shrubs are often the dominant plants in many communities, even those that have not been disturbed. According to one estimate, on million acres of shrublands in Utah have been affected by shrub dieback (Nelson et al. 1988). The important species involved include sagebrush (Artemisia tridentata), budsage (Artemisia spinescens), shadscale (Atriplex Confertifolia) four-winged saltbrush (Artiplex canescens) and winterfat (Ceratoides lanata). The most dramatic and extensive dieback affected shadscale and found-winged saltbrush' in some valleys, nearly all these shrubs were eliminated.

A NATURAL BUT IRREGULAR PHENOMENON

Ranchers and land managers were anxious to learn whether livestock grazing was related to shrub dieback. However, since shrub dieback has also occurred on lands that had not been grazed for 30 to 50 years, such as those associated with the U.S. Air Force Eagle Firing Range and U.S. Army Dugway Proving Ground, livestock grazing does not appear to be a factor in dieback. Shrub dieback, similar to forest dieback, appears to be a natural phenomenon associated with Great Basin shrub-grass ecosystems. Dieback does not occur on a regular cycle, but is probably has occurred several times during the past 70 to 80 years. A theory of natural dieback proposed by Mueller-Dombois (1988) attributes its start to predisposing factors such as stands of old, even-aged plants, which often grow on marginal soils. Shadscale, one of the shrubs affected by dieback, evolved the ability to colonize areas that were once beneath the surface of pleistocene lakes, such as glacial Lake Bonneville, during the last 12,000 years (Stutz and Sanderson 1983). As a result, shadscale may be only marginally adapted to these sites.

Disturbances of the ecosystem by abiotic factors, such as recurring climatic extremes (e.g., drought or above-normal precipitation) or abnormal fluctuations in temperature may also have a role. These factors may weaken plants and make them more susceptible to lethal agents, including diseases and insects, which are often present in low numbers in healthy plan communities. These agents can then increase, spread quickly and ultimately kill an entire stand.

Although shrub dieback in the Great Basin is not as well documented and has not been studied as thoroughly as forest dieback, several historical accounts are consistent with dieback. Photographs taken by H.L. Shantz near Modena, Utah, in 1913 and 1915 show large areas of dead sagebrush. It is not known when these sagebrush plants died. Because sagebrush wood decomposes slowly and many of the branches are still connected to the shrubs, dieback probably occurred within 10 years of the date the photographs were taken. These areas were relocated and photographed again by R.M. Turner in 1968 and by Rogers (1982) in 1977. The later photographs show that sagebrush and become reestablished on the sites by 1968. Although Shantz believed that competition from galelta grass (Hilaria jamesii) killed sagebrush, Rogers (1982) disagreed with this hypothesis and noted that galleta grass cover has changed very little in the area. Young sagebrush are growing with the galleta grass in the photos taken in 1968 and 1977.

THE ROLE OF CLIMATE

There is another explanation consistent with the natural dieback theory. Climatological records for Modena indicate that the years from 1901 to 1904, several years before Shantz first photographed the area, were characterized by drought. Precipitation was above normal from summer 1904 until winter 1908 (fig.1). These precipitation patterns may have made the shrubs more susceptible to an outbreak of disease or insect damage.

Drought has been implicated in shrub death several times at the Desert Experimental Range in west central Utah. Severe reduction in shadscale abundance were noted during drought periods of 1933-34, 1942-43, 1949-52, 1954-55, 1970-71 and 1975-76 (Blaisdel and Holmgren 1984, Nelson et al. 1988) and when green rabbitbrush (chrysothamnus viscidiflorus) was abundant during the late 1950's (Ellison 1960).

However,, the current wave of shrub dieback is probably not due to drought. Climatic records indicate that the Great Basin received above normal precipitation, particularly in valleys, which are often closed systems for water movement, may have temporarily waterlogged the root-zone of the shrubs, which could have limited the oxygen that shrubs needed to survive. Some shrubs, such as greasewood (Sarcobatus vermiculatus), seem to be adapted to waterlogging, but sagebrush and possible shadscale are sensitive to these conditions (Lunt, Letey and Clark 1973, Ganskopp 1986. Dieback initialed in wet areas may then have spread to drier sites. In 1987, we studied Great Basin Shrub dieback in Puddle Valley, Utah, which is located about 50 miles west of Salt Lake City. Shrub dieback is severe in this area and the water tends to stand following snowmelt during years characterized by above normal precipitation. We employed remote sensing (Pyke and Price 1989) and examined the relationship between vegetation succession and hydrology (Dobrowolski and Ewing 1989).

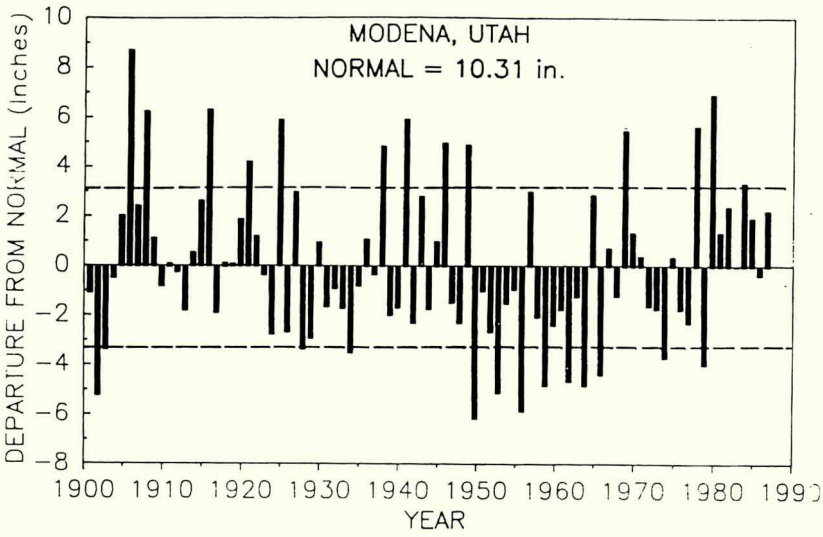


FIGURE 1. Departure from normal precipitation for Modena, Utah, from 1901-1987. Normal precipitation is the 87-year mean of annual precipitation and the broken lines indicate ± 1 S.D. of the mean.

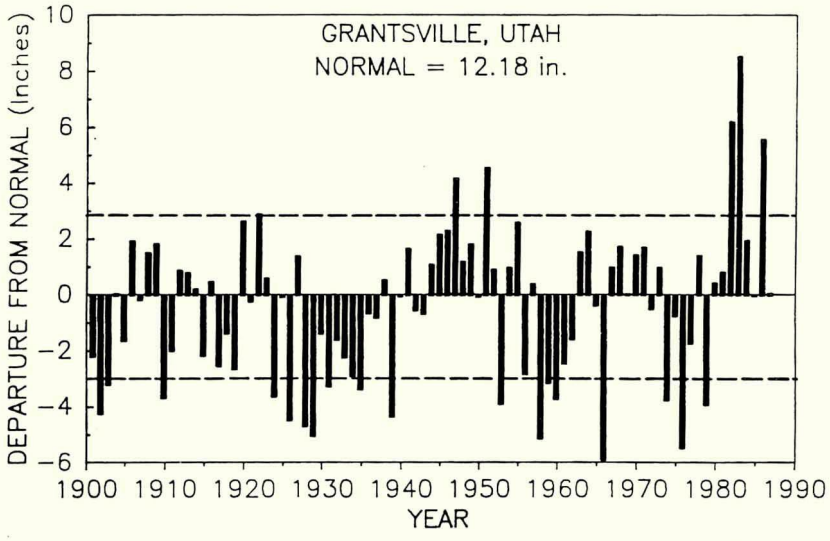
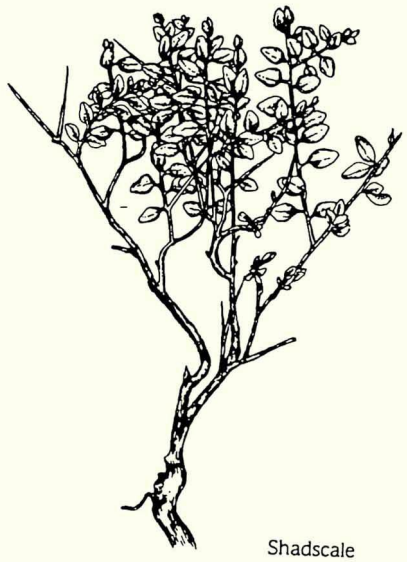
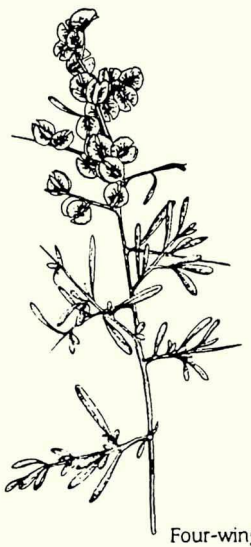


FIGURE 2. Departure from normal precipitation for Grantsville, Utah, from 1901-1987. Normal precipitation is the 87-year mean of annual precipitation and the broken lines indicate ± 1 S.D. of the mean.



Shadscale

Downy Chess
(cheatgrass)



Four-winged
Saltbush

Satellite Images Employed

LANDSAT satellite images were studied to determine whether they could be used to monitor subtle changes in vegetation that might be associated with climatic changes, and to thereby determine the extent of dieback. Satellite imagery has been used to monitor dramatic changes in vegetation such as deforestation or decertification (Rasool 1985). Climatic change is likely to cause subtler gains or losses in plant species, changes more similar to those associated with natural diebacks.

We utilized two imagery techniques. One involved the classification of the image into classes of vegetation; one vegetation class was associated with known areas of shadscale dieback. Spectral classes which occurred in areas of dieback more often than normal were used to identify and map areas affected by shadscale dieback. (Fig.3). We conducted ground surveys to determine the accuracy of our predictions. Our predictions were correct 70 percent of the time. We estimate that shadscale dieback affects 30 percent of the land in Puddle Valley, about 10,700 acres.

The second imagery technique, the change detection method, utilized one image taken before dieback occurred and one following dieback. Vales of the post-dieback image were then "subtracted" from the pre-dieback image. Those areas in which spectral classes changed should theoretically be areas of potential dieback. However, the amount and composition of annual plants in semiarid regions may change annually, which can make it more difficult to interpret data from this technique. So far, we have not successfully used this technique to map areas in which dieback has occurred.

We are studying the vegetation dynamics and hydrology in a valley bottom where severe shadscale dieback (1,200-2,000) shrubs/acre) occurs in a circular pattern 5-6 miles in diameter. In this portion of the valley, the dieback has affected all shadscale communities to the eastern border of their distribution. On the western slop of the valley, a distinct (750 foot) dieback "front" separates healthy shadscale from affected areas.

Waterlogging and Dieback

Field research in Puddle Valley is now attempting to determine whether shrub dieback is continuing and the extent of recent changes in vegetation. We are also trying to learn whether an oxygen deficiency resulting from temporary water logging of the root-zone triggered the dieback.

Permanent transect and permanent plots have been established across the valley and through areas of severe and moderate dieback as well as healthy shrub communities to study vegetation dynamics. During the early autumn of 1987 and 1988, we carefully surveyed the vegetation in these plots. The analysis of this data and of environmental characteristics (soils, topography, salinity) indicated the relationship between vegetation structure, environment, dieback patterns and succession. Comparing how

vegetation changes along the permanent transect indicated short-term changes in vegetation dynamics within dieback areas.

Shrub dieback in Puddle Valley is patchy (Fig.4) and seems to be concentrated in the valley bottom. Undesirable plants such as Halogeton (Halogeton glomeratus) and cheat-grass (Bromus tectorium) have invaded areas where shadscale has died. The continued dieback of shadscale may pretend the loss of all older shrubs. Shadscale seedlings are growing in areas of greatest shrub density prior to the dieback and where cheatgrass cover is less than 70 percent.

Soils influence the fate of temporary surface moisture from rainfall or snowmelt in salt desert basins such as Puddle Valley. Factors such as texture, permeability and salinity affect the amount and timing of moisture infiltration and storage in the root zone. The reduced permeability of soils in Great Basin desert valleys often means soils are waterlogged following spring snowmelt (G. Kidd, Bureau of Land Management, personal communication). Waterlogging may also occur from melting snow over partially thawed soil or over a duripan.

To determine whether soil oxygen levels are reduced in waterlogged soils during spring snowmelt, we placed soil sensors at various depths to continuously monitor freezing depth and root-zone moisture levels. We also constructed experimental water containment ponds to measure soil moisture and oxygen levels after applying know amounts of water. Oxygen levels in both experiments are determined with a platinum microelectrode (Armstrong and Wright 1976). During 1988, soil moisture levels were greater in dieback areas of the valley bottom than in the valley margin. Soils in the valley bottom tended to be more finely-textured, and have greater water-holding capacity but poorer permeability than soils in the valley margin. During snowmelt in 1989, however, surface soil moisture levels remained elevated at the valley margin, probably because temperatures were lower at these higher elevations, thus delaying and extending snowmelt. The persistence of wet surface conditions over deeper, frozen soil layers on the valley margin may explain patchy dieback areas in these regions, in spite of the more permeable soils.

Studies of the dieback front, show no strong relationship between healthy or affected shrubs and environmental characteristics. Stutz and Sanderson (1983) found genetically diverse shadscale populations across the shoreline of Pleistocene Lake Bonneville. We are now determining whether genetic difference among mature shrub in Puddle Valley may explain difference in survival along these dieback fronts.

Reprinted from Utah Science, Summer of 1989.

EDITORS NOTE

The Government sources referred to in the "Factsheet" of the last issue of the Sego Lily are based on USDA, USDI and other government publications.

WORKING TOGETHER TO CONSERVE PLANTS IN THE GREAT BASIN

Pamela Mills Poulson

Conserving rare plants in the vast expanses of the Great Basin is an enormous job. The Great Basin covers over 24,000 square miles of the interior of western North American and includes portions of eight states (UT, NV, ID< OR, WA, CA, AZ, NM). Nearly two thirds of the area is "wide open" public land administered by the Bureau of Land Management, the U.S. Forest Service, the U.S. Department of Defense, the U.S. Department of Energy, the Bureau of Indian Affairs, the states themselves and the National Park Service. Since virtually all candidate plants occur only on public lands, cooperative efforts among administrative agencies is a necessity of plant conservation in the Great Basin.

When first proposed in 1983, stewardship of the Great Basin as a member of the Center for Plant Conservation seemed like an unsurmountable assignment to the State Arboretum of Utah. The Great Basin ranked third after Hawaii and California in the number of high priority plant taxa. At the time, SAU saw itself as a small institution, with no research personnel and very limited propagation facilities. However, recognizing the legislated role and commitment to conservation, SAU took on the task. Work began slowly, mostly as accumulating reference material and information of work already completed. Meanwhile, a call for assistance in laboratory/greenhouse space and manpower received overwhelming response.

What evolved was a network of agencies working together to meet the mission of the Center for Plant Conservation in the Great Basin. Regional botanists representing the University of Utah, Utah State University, Brigham Young University, Weber State College, the U.S. Forest Service and the U.S. Fish and Wildlife service now assist in field inventory and collection, most often with no renumeration. Native Plants, Inc., a private corporation specializing in biotechnology and reclamation, carries out soil and plant material analysis. The University Of Utah Department of Biology, a premier institution of microbiologic and genetic research, conducts propagation tests, stores plant material and maintains and monitors the growing plants in controlled environments.

Assistance comes from the private sector as well. Members of the Utah Native Plant Society meet annually to nominate plants for federal listing and to discuss and implement conservation techniques which range from the production of informational publications and multimedia presentations to conducting inventories, installing signage and fencing and patrolling off-road vehicle cross-country races. The Society awarded a $2000 grant to a BYU graduate student to conduct intensive field studies of Arctomecon humilis one of the most threatened species of the Great Basin.

The Nature Conservatory established the Utah Natural Heritage program in the summer of 1988. The State Arboretum of Utah, along with the State

Division of Lands and Forestry are co-sponsors of this program, which is designed to inventory habitat types of Utah with an emphasis on habitats of endangered species. Once underway, the Natural Heritage Program will be able to assist in identification of necessary growing conditions, some of which are extremely harsh and for which the Great Basin is well known (i.e. 6" annual precipitation, soil pH 8.3!)

The mission of the Center for Plant Conservation has been dynamically accepted in the West. It has brought together diverse agencies and people in a collaborative effort to surmount an enormous task. Working together, this unique network within a network can steward those 24,000 wide open miles. Cooperation is what keeps plant conservation alive and thriving in the Great Basin.

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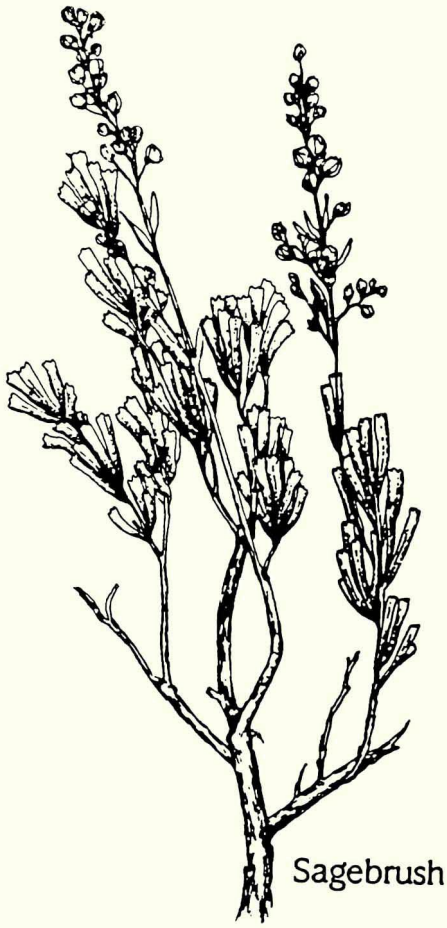

Sagebrush

Pam Poulson is Assistant to the Director of the State Arboretum and State President of UNPS

SAGEBRUSH

(By Mark Twain, (a.k.a. Samuel L. Clemens), from Roughing It

"I do not remember where we first came across "sagebrush," but as I have been speaking of it, I may as well describe it. This is easily done, for if the reader can imagine a gnarled and venerable live oak tree reduced to a little shrub tow feet high, with its rough bark, its foliage, its twisted boughs, all complete, he can picture the "sagebrush" exactly. Often, on lazy afternoons in the mountains, I have lain on the ground with my face under a sagebrush, and entertained myself with fancying that the gnats among its foliage were Lilliputian birds, and that the ants marching and counter marching about its base wire Lilliputian flocks and herds, and myself some vast loafer from Brobdingnag waiting to catch a little citizen and eat him.

It is an imposing monarch of the forest in exquisite miniature, is the "sagebrush".

Its foliage is a graying green, and gives that tint to desert and mountain. It smells like our domestic sage, and "sage tea" made from it tastes like the sage tea which all boys are too well acquainted with. The sagebrush is a singularly hardy plant, and grown right in the midst of deep sand, and among barren rocks, where nothing else in the vegetable world would try t grow, except "bunch grass". The sage bushes grow from three to six or seven feet apart, all over the mountains and deserts of the Far West, clear to the borders of California. There is not a tree of any kind in the deserts, for hundreds of miles - there is no vegetation at all in a regular desert, except the sagebrush and its cousin the "greasewood," which is so much like the sagebrush that the difference amounts to little. Campfires and hot suppers in the deserts would be impossible but for the friendly sagebrush. Its trunk is large as a boy's wrist (and from that up to a man's arm), and its crooked branches are half as large as its trunk - all good, sound, hard wood, very like oak.
When a party camps, the first thing to be done is to cut sagebrush; and in a few minutes there is an opulent pile of it ready for use. A hole a foot wide, two feet deep, and two feet long is dug, and sagebrush chopped up and burned in it till it is full to the brim with glowing coals. Then the cooking begins, and there is no smoke, and consequently no swearing. Such a fire will keep all night, with very little replenishing; and it makes a very social campfire, and one around which the most impossible reminiscences sound plausible, instructive, and profoundly entertaining.
Sagebrush is very fair fuel, but as a vegetable it is a distinguished failure. Nothing can abide the task of it but the jackass and his illegitimate child the mule. But their testimony to its nutritiousness is worth nothin', for they will eat pine knots, or anthracite coal, or brass filings, or lead pipe, or old bottle, or any thing that comes handy..."

<u>Reprinted from Douglasia, Fall 1990</u>

NOTICE

NEW MEETING TIME AND PLACE
Salt Lake City Chapter is changing their meeting time to 7:30 pm on the fourth <u>WEDNESDAY</u> of the month. They will meet at:

Granite Park Junior High School
450 East 3700 South
Salt Lake City.

Enter from 500 East and watch for signs at front entrance as to the room number. The new location is hopefully more centrally located with more accessible parking. There will be an officers meeting at 6:45 pm before the general meeting.

TREE DEATH AS AN ECOLOGICAL PROCESS

The causes, consequences, and variability of tree mortality

by Jerry Franklin, H.H. Shugart, and Mark E. Harmon.

Tree death is so commonplace that the casual observer might logically assume it to be well understood by biologist. Some causes of tree mortality are obvious and even spectacular events, such as wildfire's and hurricanes. But overall the patterns and causes of tree death typically are complex and we are only beginning to appreciate the complexities. Understanding and predicting tree mortality is critical in both applied and basic ecology. Practically speaking, information on mortality is essential in calculating forest stand yields and allocating efforts in tending and protecting forests. A thorough knowledge of tree death is also necessary to interpret correctly the dying back of forests. Yet, despite its long history, forest husbandry lacks a comprehensive understanding of tree mortality.

In basic ecology, tree death is relevant to a broad array of topics. Ecologists focusing on ecosystems, communities, populations, physiology, and evolution al find tree death significant to their perspectives. Tree mortality exemplifies several important principles of ecological complexity.

Tree death can be used to illustrate the variability of an ecological process in terms of rates, as well as causal factors or mechanisms; the necessity for defining the spatial and temporal scales of interest; and the importance of the natural history of species and ecosystems in understanding ecological processes. Studies of tree death can also illustrate the relevance and validity of differing viewpoints - those of different disciplines or scales - on the same process.

An emphasis on these general features of ecological processes and systems is especially appropriate in view of the all-too-human tendency of ecologists to seize upon one viewpoint to the exclusion of al others. The problem is compounded by attempts to define many ecological problems rigidly in terms of either/or hypotheses. Many of the ecological processes and systems are not sufficiently well understood, or are too complex, to be described in such limited terms.

It is tempting to use simple systems and models to circumvent the complexity introduced by the varied natural histories of species and natural ecosystems. Unfortunately, such simplifications can also mislead the unwary about important ecological processes.

In this article, intended to provide a context for the other articles in this issue of BioScience, we proved an overview of tree death as a rich ecological process. We include its consequences and causes, its variability, and the importance of species' natural histories. We also use tree death to illustrate some general aspects of ecological processes.

<u>Consequences Of Tree Death</u>

Tree death's importance in ecology reflects the multiple roles that a tree plays. It is a primary producer, a storage compartment, and a support structure. Tree death removes a genetically distinct individual from the stand, but it also provides additional resources to the ecosystem. In this way, the death process itself does important work (Table 1).

The Function of dead trees in the ecosystem has rarely received the consideration that it deserves. At the time a tree dies, it has only partially fulfilled its potential ecological function. In its dead form, a tree continues to play numerous roles as it influences surrounding organisms. Of course, the impact of the individual tree gradually fades as it decomposed and its resources dispersed, but the woody structure may remain for centuries and influence habitat conditions for millennia.

Some ecological changes brought about by the death of a tree (Table 1):

Altered tree population structure
Altered community structure
Shift from biomass to necromass
Resources released (light, nutrients, moisture)
Resources stored by decomposers
New resources created
Structures (snags or logs) for wildlife
Habitat for decomposer organisms
Complex organic compounds
Work carried out-
Kills other trees or organisms by crushing
Mixes soil (in case of uprooting)

While many organisms display a continuum of ecological roles between the living and dead forms, with a gradual fading of influence after death, in trees this continuum is more apparent because of their size, durability, and multiplicity of roles in the ecosystem.

Although from an ecosystem perspective the tree is shifted from the category of living to dead matter, physiologically, some (even most) of a tree (e.g., the heartwood) could be considered dead much earlier and significant portions of a live tree may already have been decomposed. In a live conifer, only about ten percent of the cells are actually alive: the leaves (three percent), inner bark (phloem and cambium, five percent) and ray cells in sapwood (two percent). Some processes associated with dead trees begin while the tree is still alive. For example, fungi are already at work rotting the woody material, and animals excavate the dead parts of living trees. In contrast, a dead tree or log in an advanced state of decay may include a considerable number of living cells, as much as 35% of the biomass may be live fungal cells alone.

Tree death substantially increases the resources (e.g., light, nutrients, water, and energy) available to other organisms in the ecosystem. The amount of resources mad available depends on the number and size of trees that die. The resources may be made available instantaneously (e.g., light or very slowly (e.g., nutrients and energy contained within the boles). The dad tree may also function as a sink where nutrient resources brought in by the decomposer organisms are immobilized for a period of

time.
The dead tree is itself a major new resource for the ecosystem, whether as a snag (standing dead tree) or as a downed log. The importance of dead wood structures to the geological and ecological functions of forest and stream ecosystems is well known.
With the large array of organisms present in the decaying log, it may be more "alive" than a living bole. In addition to being the habitat of decomposer organisms, dead trees provide critical habitat for sheltering and feeding a variety of animal species. Snags and logs also provide habitat for plants of higher orders. Indeed, the seedbeds provided by "nurse logs" may be the primary sites for tree reproduction in some ecosystems. Along with the nutrients and energy released by the decomposition process, there is also significant nitrogen fixation by organisms living within (in terrestrial habitats) and on (in stream habitats) and wood itself.
Woody structures also influence geomorphic processes. For example, they serve as erosion barriers on forest slopes and, in smaller forest streams, they contribute to development of stepped steam profiles, reduce channel erosion, and create more retentive stream reaches..
Tree death may itself do important mechanical work. Falling trees or snags often kill other trees or other organisms. More than 15% of the mortality in mature and old-growth Douglas-fir stands in the Pacific Northwest consists of trees knocked over, broken, or crushed by falling trees. The uprooting of trees lifts and mixes forest soil, an important ecological process. For example, in Sitka spruce-western hemlock (Picea Sitchensis-Tsuga Heterophylla) forests of southeastern Alaska, soil churning by the roots of wind thrown trees retards development in the soil of impervious layers of mineral deposits, known as iron pan. Without this process, standing pools of water would eventually produce swampy forest sites.

Reprinted from Douglasia Newsletter of the Washington Native Plant Society, Spring 1989.

ANNUAL NEW WORLD PARTY
by Andy Boyak

November 5, the UNPS held their New World potluck party at the Granite Park Junior High School. This was the annual party for the state membership. The food was potluck and made from ingredient native to the New World. This year we had a preponderance of pumpkin pies, 3 different kinds and in addition a delicious sweet potato pie. Various breads and cakes were featured such as cranberry bread, nut bread, corn meal muffins and an interesting corn bread the Okelberry's brought made from blue corn meal.

In accordance with the bylaws the nominating committee presented a slate of officer nominees to serve for the ensuing year. The members voted unanimous approval.

As mentioned above this meeting was held at the Granite Park Junior High School, 450 E. 3700 S. Salt Lake City. The school

graciously offered there facilities for this meeting. They have also offered to let us hold all of our regular monthly meeting in their school. Everyone thought this would be an excellent idea. The school has good meeting rooms, ample parking, is located on level ground and is centrally located, at least for County residents.
An executive board meeting was held after the party.

LYTLE PRESERVE

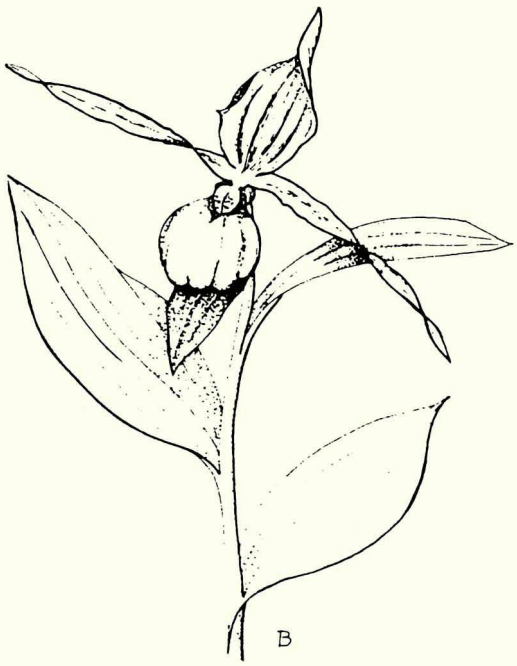
In December of 1990 the UNPS received a letter of appreciation from Brigham Young University for their donation of $1,000 to the Lytle Preserve for the purpose of building a new fence. The approximately 1.87 miles of fence will encompass the historic Hannah Leavitt Terry homestead, orchard and adjacent upland and riparian portions of the Preserve. The Lytle Preserve is owned by BYU and is situated in a Mojave Desert zone at Beaver Dam Wash near St. George, Utah. Volunteers are needed for the fence building project (see schedule of work days at front of newsletter).

Volunteers should wear old, but warm clothing and have durable gloves. They are also asked to bring their own tools: shovels, crowbars, post drivers, fence stretchers, pliers, hammers etc. Some trailer facilities may be available for those not wishing to camp. Call the MLB Life Science Museum (801) 378-5052 for further information and to reserve your work space.

WILDFLOWER WATCH

Ben Franklin of the Utah Heritage Foundation is asking UNPS members and friends to report sightings of **Cypripedium Calceolus** (Yellow Ladyslipper). Once fairly common in Utah there is now only one known population. **Cypripedium fasciculatum** (Brownie Ladyslipper) is another orchid the Utah Heritage Foundation is mapping. They are aware of the Lake Blanche population and several sites int he Uinta Mountains, and are especially interested in other sites in the state. You can contact Ben Franklin through:

Utah Heritage Foundation
1636 West North Temple, Suite 316
Salt Lake City, Utah 84116-3193
(801) 538-5522



Yellow Ladies Slipper

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

Address Correction Requested

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KUDOS

Many thanks to Janet Williams for her excellent and arduous endeavor in editing and publishing the **Sego Lily** for the last two years. The quality of her newsletter has increased circulation and membership in the UNPS. Janet has decided to retire as editor and UNPS has found it difficult to find someone to follow in her footsteps. Jo Stolhand will fill in as acting newsletter editor until a volunteer steps forward.

WILDFLOWER POSTER

Sending flowers to someone special for Valentine's Day? The Utah Wildflower poster is still available. Flowers that will last all year. Order for yourself or someone else special by sending $10.00 plus $1.50 for shipping and handling to:

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

Membership Application

❑ New Member ❑ Renewal ❑ Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

- ❑ Student/Senior.....$ 5.00
- ❑ Individual.....$ 10.00
- ❑ Family.....$ 15.00
- ❑ Supporting.....$ 30.00
- ❑ Corporate.....$ 30.00 and up
- ❑ Life.....$250.00

❑ 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:

Pam Poulsen, treasurer,
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 information down and mail it with payment for the category of membership.)

VOL. 14 NO. 2 MARCH/APRIL 1991

CALENDAR OF EVENTS

Mar 11 Mon 7:30 pm	Cache Chapter Meeting, Duane Atwood, Regional botanist for the forest service will speak about protecting endangered plants. Logan City Public Meeting Room, (library) 255 No. Main, Logan.
Mar 27 Wed 7:30 pm	Salt Lake Chapter Meeting A botanical illustration workshop. You have learned to photograph flowers now learn to sketch them. UNPS will supply materials and instructor. Executive Board Meeting at 6:30 pm. Granite Park Junior High School, 450 East 3700 South, SLC.
Apr 8 Mon 7:30 pm	Cache Chapter Meeting, Kathlyn Collins will speak on "Landscaping with Native Plants". Logan City Public Meeting Room (Library) 255 No. Main, Logan.
Apr 20	Earth Day Utah, watch local newspaper for schedule of activities.
Apr 24 Wed 7:30 pm	Salt Lake Chapter Meeting. Mary Pat Matheson acting Executive Director of the Red Butte Gardens and Arboretum will speak on the Arboretum's role in assisting the Center for Plant Conservation in the preservation of native plants. Executive Board Meeting at 6:30. Granite Park Junior High School, 450 East 3700 South, SLC.
Apr 24 Apr 26 Fri	Tree planting at the Edith Bowen Native Plant Garden on the Utah State University campus at Logan. Flower seeds will also be on sale.
Apr 27 10-2:00	Cache Chapter Native Plant Sale Edith Bowen Native Plant Garden
May 4	Second Annual Dimple Dell Day

Sat 8-1:00 — Join us at Dimple Dell (10365 S. 1300 E., Sandy) Learn from expert botanist, zoologist, ecologist, and geologist, walk with the Volksmarchers, earn Cub Scout merit badges, breathe some fresh air, and enjoy a day with mother nature.

May — Primula maguirei fieldtrip. Watch Sego Lily for further details.

June 13-15 — Annual Threatened and Endanger Conference sponsored by UNPS. Thursday will be at the Panguith High School for classes. Friday we will be doing field work at Red Canyon. Saturday we will take fieldtrips to see some rare plants of the area.

July — Tony Grove Fieldtrip. Exact dates will be announced later.

Aug 23-24 — Mushroom Hunt at Boulder Mountain, organized by Dr. Brent Palmer from SUSC. We are looking forward to having several experts including Dr. Kent and Vera McKnight. More details in later issues of the Sego Lily.

STARTING WILDFLOWERS IN THE WINDOWSILL IN THE WINTER
BY Pam Poulson

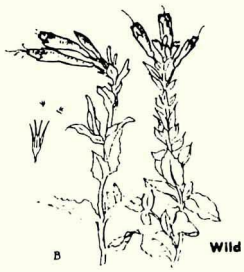
Last year at the end of January, I got cabin fever. The white sky and the white ground and the cold air was just about more than I could stand. Wildflowers were as far away as they could possibly be, and I missed them. I started thinking of all the wildflower seeds I had collected and purchased throughout 1984 and the limited reading on propagation I had done, and decided to give it a try. Although my techniques were not as scientific as Jim Borland's they were logical and successful. My logic was this: Where do the specific flowers grow? What conditions are required for them to stratify and germinate in their native habitats.

My techniques were grossly simplified into two avenues of approach: 1) a dry, warm "desert" treatment and 2) a moist, cool "forest" treatment".

Desert Treatment: (**Gaillardia Pinnatifida, Eschscholzia Californica, ambiguus, zinnia grandiflora, Gilia Aggregata, Allium nevadense, Heterotheca villosa, Linum lewisii, Oenothera pallida, Argemone munita, Sphaeralcea coccinea)** no stratification. Plant in peat pots, barely covering the seeds with a mixture of 3 parts sand and 1 part Cascade. Seeds are planted in peat pots to avoid need of transplanting, which many wildflowers cannot take. Keep soil evenly moist. Place in bright, south facing windowsill. Seeds germinate within one week! What did I do with tiny plants in February? Unfortunately, the best thing to do with plants once they have germinated and have their first true leaves is plant them outside, in the ground. I sprouted another set of desert wildflowers in April. This technique also works well for plants that grow in scree at high altitudes, where soil is non-existent and water runs off quickly.

Forest treatment: (**Iris missouriensis, Allium accuminatum, Monardella odaratissima, Zauschneria californica, Viquieria multiflor, Eriogonum heracleoides, Dodecatheon pauciflorum, Wyethia helianthoides,**

Lilium pardilinum, Erythronium multiscapoidia, Calochortus leichtlinii, Achillea millifolium, Penstemon ssp., Aquilegia ssp.) Stratify in moist peat moss in ziplock bags in the refrigerator (not the freezer) until tiny roots appear. This takes from 4-6 weeks and can take up to a whole year,but uses up time so that when the tiny plants are ready for the outdoors, the outdoors is ready for them. Plant in peat pots (peat moss and all), barely covering the seeds with a mixture of 1 part sand and 1 part Cascade. Keep soil evenly moist. A south windowsill exposure is not necessary. Seeds germinate as fast as three days! Move to sunny window. Plant outside in the ground when the first true leaves appear.



Wild Fuchsia

All of the above mentioned wildflowers were successful, grew well in my native landscaped yard and most bloomed. Some of the perennial's will not bloom until next year (Dick Hildreth calls their first year "perenniating") and the bulb plants will not bloom for a couple of years. It is interesting to note that with just the little extra water the wildflowers received in my xeric landscape, they had a longer blooming period. Two perennial genera that are extremely easy to germinate and grow are two favorites: **Aquilegia ssp., a d Penstemon ssp.**. There's always room for more of them and the **Aquilegia** promiscuously propagates itself throughout the garden. Beware of **Achillea**, however. It is another heavy propagator (both seeds and rhizomes) and can get out of hand fast! Three annuals that did exceedingly well were **Clarkia pulchella, Phacelia campanularia and Verbesina encelioides.** They bloomed all summer. The **Clarkia** and the **Campanularia** were pretty and I collected their seed for 1986. But the **Verbensina,** a close relative of the common sunflower, became weedy. Avoid it if you have a choice.

Bluebell

All in all, my February and March were more bright than they might have been, and it's thrilling to see a wildflower in bloom that you have watched closely from its seedhood. If you would like to know specific details on my "scientific" methods or there is a particular species you would like to discuss, give me a call.

CACHE CHAPTER JANUARY MEETING
by Robert Fitts

Reproductive biology of endangered plants is studied by Vince Tepedino of the USDA Bee Lab in Logan. His concerns about the loss of pollinators of threatened and endangered plants during spraying to control grasshoppers has led to interesting research. The objectives of the work include: identification of threatened and endangered species, determining the breeding systems of these plants, identification of pollinators, discovering the flight distances of the pollinators.
Some plants reproduce asexually or have flowers that pollinate themselves. But most plants need an

insect to bring the pollen either from another flower on the same plant or from a flower on another plant.
Bees are the insect that most often transfer pollen from one flower to another. The wild bees involved have a lifestyle that is very different from the familiar honeybee. They don't live in hives and make honey, but nest alone in diverse places. Some nest in snail shells, oak galls and cracks in rocks. They may use leaves or flower petals to build nests, burrow in bark, under rocks or build nests of mud. Each female works independently to create a place for her young to mature.

Where ever cows are grazed, spraying for grasshoppers must be considered. The loss of pollinating insects in grasshopper control programs could be important to the plant populations. Other studies focus in on the loss of predators and parasites of grasshoppers.

The pictures of **Pediocactus sileri** and **Arctomecon humilis** with pollinating insects in the flowers were fascinating.
Thanks to Vince for a wonderful presentation.

PROPAGATION FROM WILD SEED
by James Borland

The seed propagation of native plants in general is very similar to the propagation of temperate zone native plants anywhere in the world. Temperate zone plants are subjected to more vagaries of weather and fill more ecological niches than either the plants of the tropics or colder arctic zones. Germination strategies are therefore more varied in temperate zone produced seed than for seed from higher or lower latitudes.

Crucial to the understanding of germination factors is the realization that the seed is a physiologically living, breathing, and adaptable organism. Like all living things, it is the product of its past history, present environment, and genetic makeup. For example, it is not unusual for seed to have developed a thicker or tougher seed coat in response to an unusually dry growing season. Conversely, domesticating a plant and paying particular attention to its water and nutritional needs will often result in the production of easily germinated seed, sometimes with the elimination, or at least the amelioration of dormancy factors. As if anticipating future problems with a conducive germination environment, several species (e.g. **Kochia** and **Salsola**) are capable of producing simultaneously, or over a season, two or more distinctly different seed types which require different environmental conditions for germination.

An inherent quality of seed is that its viability and thus germinability generally decline with storage time as the seed physiologically ages. Yet, seed of several **Atriplex** species (and other species) seem to defy this maxim by increasing in germinability with several months of dry storage or after-ripening. This period of after-ripening is necessary to allow the immature embryo to become physiologically mature and able to perceive the subsequent cool and moist period then necessary for germination. Although we occasionally collect immature seed when it is realized that we won't be back this way again, we anticipate that it may not germinate and are not disappointed when it does not. However, "green" **Aquilegia caerulea** seed will generally germinate quicker without any pretreatment than will seed gathered from ripe capsules. Seed storage conditions will vastly affect ultimate germinability. High temperatures are to be avoided at all costs. Chemical reactions, which are the driving force of all biology, accelerate with temperature, thus

hastening the physiological aging process. Conversely, short exposures to high temperatures have promoted germination in seed of some desert plants. Equally important is seed moisture content. Combinations of high temperature and high seed moisture during storage seriously hasten death. Because seeds have the ability to lose or gain moisture from the air, properly dried seed in improperly sealed seed containers can either gain moisture in older moisture laden refrigerators or lose additional moisture in frost free models.

Many species produce seed with immature embryos which are ripened only by subjecting them to moisture and temperatures between 34-41 degrees F. Although it is not known exactly why the additional development occurs only under these conditions, one plausible theory advanced by some involves the greater amount of oxygen which can be absorbed by water at lower temperatures. This "extra" oxygen may be necessary for certain pregermination reactions.

Stratification is the term most often used to explain the process of subjecting seeds to these moist and cool conditions. The term originally was used to describe the process of alternating layers of seed between layers of a moisture holding material such as peat moss or sand. The container holding the moistened, layered, or stratified seed was then moved to an enclosure where the temperature was maintained at 34-41 degrees F. for the prescribed period for that species. A common misconception regarding stratification is thinking that only cold temperatures are necessary for conditioning the seed for germination. The seed **must** be moist. Subjecting seed to cold-moist conditions where there is no need to do so coan reduce germinability.

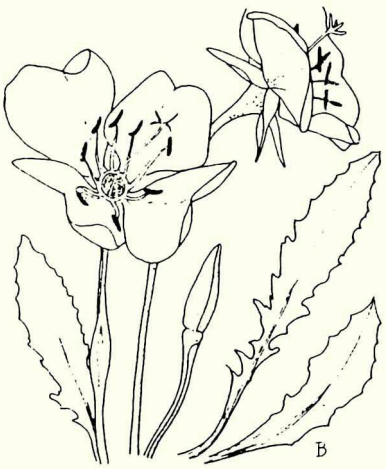
Often germination temperatures are only vicariously reported. One lot of seed will generally display a small range of optimum germination temperatures with germination percentages falling off gradually as temperatures are increased or decreased. Repeated tests with many well collected seed have shown that having fluctuating temperatures--daytime for eight hours 20 degrees higher than night temperatures for 16 hours--results in better and quicker germination than a constant temperature.

It is not commonly known that seed must be sown immediately after stratification. If it is allowed to dry out, it may either go dormant again, sometimes then requiring even more complex procedures to break dormancy, or die. Freezing is a pregermination procedure not described yet recommended by many, but apparently without much support. Since most biological activity ceases at below freezing temperatures, especially at temperatures commonly found in residential freezers, it is doubtful that these temperatures have any effect. The potential benefit of cracking recalcitrant seed coats by freezing should occur in a matter of minutes. This benefit could be more conveniently accomplished through some other scarification procedure such as a quick whir in the food processor.

Another important germination factor is the presence or absence of light for germination. The best and most convenient artificial source is fluorescent lamps. Although some seed's light requirements may be satisfied by minute quantities and duration of light, general recommendations for these seeds are exposures to 10-150 foot candles during the eight hour high temperature fluctuation period. Seed requiring a dark period for germination often fail to germinate or germinate poorly under continuous light.

I've been using high light intensity 24 hours a day on **Eriogonum**

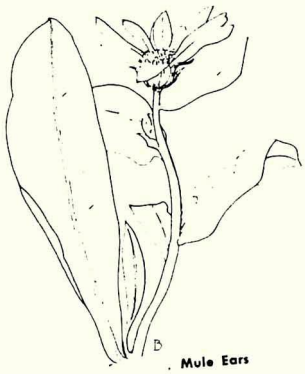
seedlings and practically everything has produced wonderfully blooming plants in my gardens this summer. This light is supplied through high pressure sodium vapor lamps that provide a maximum of 600 foot-candles of light. There are potentially two benefits to be derived from using this setup. One involves a 24 hour growing day and the other is the prevention of potential dormancy imposed by the long night length in early spring when these seedlings are being grown.



Evening Primrose

It is probable that young seedlings are unable to perceive day length until some later maturation point and therefore the benefit of the 24 hour light is solely one of an extended growth period. All of these factors, plus temperature, interplay with growth and are little understood except for a few economically important crops. So--we are guessing here, but it works. The question is one of degree. Am I putting in more energy than is required for the desired results of accelerating growth?

Replicating germination tests precisely is difficult without full control over the test environment. When seed lot, seed age, storage environment and germination testthen expectations for similar results with your own seed often can be only wishful. Reported germination instructions, then, are best used as guides to the methods and procedures necessary to germinate your own seeds.



Mule Ears

Remember the seed you sow represents only a portion of the species' adaptability to its site. If ability to change is the name of the game, then it should not surprise us that next year's crop of seed may differ in its germination requirements.

Reprinted from the Northern Nevada Native Plant Society Newsletter with permission of the author, James Borland, Chief Propagator of the Denver Botanic Garden.

DESERT MILKVETCH

Ben Franklin
Utah Natural Heritage Program

(Portions of the following are condensed from a report prepared as an end product of a joint agreement entered into between the Manti-LaSal National Forest [M-LNF] and the Utah Natural Heritage Program [UTHP]).

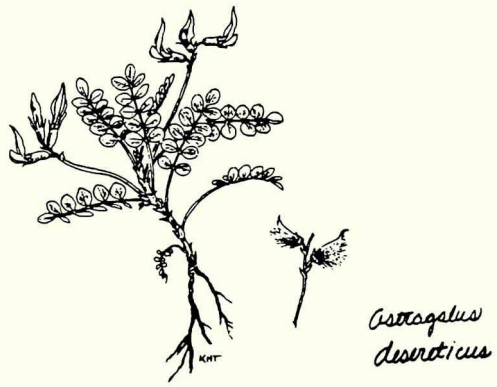
Astragalus desereticus Barneby (desert milkvetch), a Utah endemic and a federal candidate

(category 2), was first collected by Marcus E. Jones "below" the town of Indianola, Sanpete County on the 2nd day of June 1893. It was later collected by Ivar Tidestrom (author of Flora of Utah and Nevada) on the 17th of June 1909, again near Indianola. It "...long remained obscure, but..." is now known to occur "...within a short distance from a road that has been traversed by botanists for almost a century since..." the plant's "...initial discovery. It was rediscovered by Elizabeth Neese in May of 1981, after a hiatus of some six decades" (A Utah Flora).

Indianola, Sanpete County is situated adjacent to the Sanpete-Utah County line. Collections made "below" Indianola (presumably down-slope along Thistle Creek drainage) would be located in Utah County. The Jones and Tidestrom collections are, therefore, questionably from Sanpete County and were likely taken from near the town of Birdseye, Utah County, presently the only know location for desert milkvetch.

Desert milkvetch grows in an open pinyon pine and Utah juniper community where it is associated with big sagebrush, gambel oak, short-stem buckwheat, indian rice grass, needle-and-thread grass, bitterbrush, and plateau penstemon. It is narrowly restricted in that it occurs exclusively on sandy-gravelly soils weathered from the Moroni Formation. It grows most abundantly on steep south and west (rarely north) facing slopes, but also does well on larger, west-facing road-cuts where plants are typically larger than those found in undisturbed habitat.

During the month of May, 1990 the area in the vicinity of Birdseye was surveyed (1) to determine the boundaries of the Birdseye occurrence of desert milkvetch and (2) to locate additional potential habitat. The boundaries of the Birdseye occurrence were determined and it was estimated that, within those boundaries, there were fewer than 5000 plants. As a result of previous field-work in the Birdseye area, Bob Thompson of the M-LNF had concluded that desert milkvetch was specific to the sandy soils of the Moroni Formation. The immediately adjacent North Horn Formation was surveyed at Birdseye and at several other locations to substantiate this conclusion. Desert milkvetch did not extend onto the North Horn Formation and, therefore, the Moroni Formation became the focus for all additional survey to locate potential habitat; none was found.



Desert milkvetch was not located on M-LNF. The land on which it does occur is owned by the Division of Wildlife Resources (DWR) and by three private land owners, the greater portion being DWR. The DWR land is a wildlife management area which is also used for cattle grazing. The tops of the benches have been chained and seeded to improve the wildlife habitat.

Additional potential habitat, i.e. the Moroni Formation, is located south and southwest of Birdseye on private and Uinta National Forest lands. However, for the following reasons location of additional good habitat and new occurrences is not anticipated: 1) extensive settlement has resulted in the cultivation and heavy use of the Moroni Formation at locations to the south of Birdseye, 2) the numerous, though undocumented,

relocation attempts leading up to the 1981 rediscovery of A. desereticus indicate that the area has been intensely looked at, and 3) a precursory inspection of the remaining potential habitat found no locations that appeared to be geologically similar to the Birdseye occurrence (the Moroni Formation is quite variable). Though new occurrences are not anticipated, further survey is planned by UTHP in 1991.

The Great Basin Field Office of The Nature Conservancy, in anticipation of the upgrading of the Federal listing status of desert milkvetch, has made preliminary contact with private landowners. They have been made aware of its presence on their land, of its rarity, and of the concern for the species survival. Their willingness to sell their segment of desert milkvetch habitat was also discussed. Initial contacts have been positive.

Only a general estimation of the number of plants was made during the survey. It will be necessary to obtain more accurate figures from each of the separate slopes on which desert milkvetch occurs. To accomplish this, if there is interest, a UNPS field trip will be scheduled for the last Saturday of April.

NOTICE

Membership Renewal. We don't wish to drop you from our mailing and membership list, but we have quite a few members delinquent in their renewal. Please check your mailing label and update your membership if you need to do so. If you disagree with our records please send your canceled checks. The mailing labels are updated to February 1 to the best of our knowledge.

Utah's Wilderness: A Vehicle For Plant Conservation

By: Catherine Jean, Forest Service Botanist, Chilquin District, Oregon

Utah's public wild lands are under review for wilderness designation and the scope of involvement has reached well beyond the state boundaries and has become a national issue. Why? Because the legacy of the Colorado Plateau, its deserts. canyons, rivers and unique flora have captivated the attention of many concerned individuals and conservation groups. The decision of what lands will remain wilderness is currently under consideration by the Bureau of Land Management (BLM), a decision that will ensure or rob the wilderness legacy of our descendants. Conservation through wilderness designation is one of many vehicles through which we can protect pristine biological resources.

Members of Utah Native Plant Society have long been involved in plant conservation programs; they have assisted the UlS. Fish & Wildlife Service during the review for threatened and Endangered plant species and have been an invaluable source of public awareness of the unique flora of Utah. As individuals concerned about plant conservation, we have an opportunity to participate in the decision of wilderness designation. Utah's flora, particularly that of the Colorado Plateau is an unique and valuable resource deserving of protection for many reasons.

First, the floristic diversity of the Colorado Plateau is amplified by migratory routes between major physiographic provinces; influence from the Rocky Mountains, the Mojave Desert and Great Basin have contributed to the unique blending of vegetation found of the plateau. Second, the pronounced effect of elevation, slope and aspect results

from topography composed of deep sandstone canyons, Pinyon/Juniper mesas and high elevation mountains. The climate is considered hot and arid, conditions for growth are often rigorous. Finally, the geomorphic action of uplift and erosion have exposed several geologic layers, each with a different parent material substrate. The edaphic difference are often portrayed by a change in vegetation type as each parent material provides a different level of plant nutrient and mineral resources and soil texture which control the available moisture necessary for plant development. The ecological consequence of this land provides an array of habitats which in turn contributes to the diversity of the native flora.

The cumulative influence of these attributes have bestowed the land with a rich floristic culture composed of both regional species and those endemic only to the Colorado Plateau. A number of endemic plants inhibit BLM lands proposed for wilderness by both BLM and the Utah Wilderness Coalition (UWC). Endsmism implies a species is restricted to a geographic region, topographic unit or edaphic situation. On younger Cretaceous formation, **Penstemon atwoodii,** Atwood's beardtongue, **Xylorhiza cronquistii,** Cronquist aster and **Astragalus malacoides,** Kaipaorwits milkvetch occupy the Kaipaorwits formation in the proposed Wahweap-Paradise Canyon wilderness of Glen Canyon. Beneath the Kaiparowits on the Tropic Shale formation, Cymopterus higginsii, Higgin's bisquitroot and **Virguiera soliceps,** Paria sunflower, both Tropic Shale endemics are found. The panoramic slickrock of the Navaho formation provides habitat for **Daela epcia**, Hole-in-the-rock prairie clover on the sandstone bedrock of the Little Rockies wilderness near the Henry Mountains. Although considered a desert, hidden deep with the Canyon lands are seeps and springs the nourish plant life. Both **Zigadenus vaginatus,** alcove death camus and **Erigeron kachienensis,** Kachina daisy inhibit hanging gardens in the Fish & Owl Creek units of the San Juan: Anazazi wilderness.

The Colorado Plateau is known for its rich source of endemic plant species. Many endemics are uncommon and others are rare. Rarity alone does not imply endangerment or a threat with extinction, however, without a recognizable threat to the species, many endemics are not considered for candidates to the list of Threatened and Endangered plants and receive no legal protection offered by the Endangered Species Act. It is commendable that the BLM has a plant conservation program, yet to fully protect the vast array of plant communities and those unique plants that inhibit them, all conservation solutions must be considered.

Strategies for plant conservation, both within government and public programs are more pro-active than ever. Wilderness designation of BLM public lands can help "protect Utah's native flora" by providing a means of curtailing the imminent destruction of wild lands. A significant biological resource, Utah's native flora, found on publicly owned BLM lands is currently under consideration for wilderness designation, an act which will ensure population viability of many endemic and uncommon plant species found within the wilderness boundaries. Support of wilderness today can make a difference in Utah's flora in our future.

I would like to acknowledge Four-Corner's School of Outdoor Education, Monticello Utah, for sponsoring my participation in an outdoor learning program and for the school's support of Utah's wild land protection.

NATIVE BEES: THE OTHER NATIVE PLANT ENTHUSIASTS

BY: Vince Tepedino and Susan Geer

Eccentric humans roaming the hinterlands in scruffy hiking boots, hand-lenses and plant presses at the ready, are not alone in their enthusiasm for native plants. Other enthusiasts are about, bootless but winged,noisily investigating flowers with organic "hand-lenses" and other sensory equipment. In place of plant presses they carry built-in "pollen baskets" and "nectar buckets" into which they pack their booty. These other enthusiasts are our native bees, and they were active in the flower trade long before men could point to flowers and give them name. Indeed, if native plant societies are composed of beings that foster plant abundance and diversity, then charter membership belong to bees.

These six-legged soul mates of UNPS'ers are members of the Hymenoptera, the large insect order which also includes wasps and ants. The bees are 3000+ species strong nationwide, with more than 800 species in Utah along. Native species range in size from 2-3mm to about 20mm, and in color from drab brown or black, through red, yellow and orange, to bright metallic blue and green. Some are slight in shape while the robust dimensions of others bring burly football player William "Refrigerator" Perry to mind.

Despite their wide range in aspect, several attributes render them immediately recognizable: a Dolly Parton-like "Wasp Waist" (Albeit without exaggerated anterioventral prominence); four wings, two more than flies, which also visit flowers with great frequency; a sting (most noticeable if you attempt to pat them on the back or butt); and general hairiness - if bees were the size of beavers they would be prized for their fur. They are most easily confused with the stinging wasps, their close, but much less hairy, and frequently less friendly, relatives. Indeed, they are commonly (and erroneously) blamed for the sting more freely given by wasps. But unlike their more pugnacious relatives, these strict vegetarians are uninterested in meals of flesh and do not sting offensively.

Most of our native bees share a number of other, poorly appreciated, characteristics. The term"poorly appreciated" is apt because the impressions that most people have of bee life are formed from the notoriety of the ubiquitous honeybee which is neither native nor typical. For example, unlike the honeybee, most bees are not social: there is no hive, no honey, no workers, no cast system. There are queens, in a manner of speaking, but in contrast to the honeybee queen whose command is the worker's wish, solitary bee queens reign over a subjectless realm. They can expect no help in foraging, or in nest construction and upkeep. No kamikaze viragos take to the air i hoer or the nests defense. Nor is support forthcoming from the rakish consort of the queen, who, free of guilt and the threat of a garnished salary, supplies only a brief moment of passion and then moves on to try to impassion others. In bees (and most other Hymenoptera) even this male "contribution" can be dispensed with because females that do not mate still produce male (but not female) offspring.

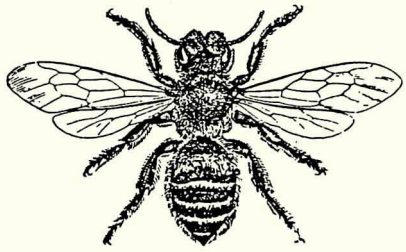
These "queens" could serve as fitting symbols for today's liberated woman: toiling alone, the excavate, construct or select a nest (apartment), supply the requisite furnishings and food, and rear their several offspring in separate rooms termed cells. Furnishings may be a lining of leaves that cover the cell walls, or a coat of glandular material applied by the females mouthparts to

waterproof the cell. Food is nectar and pollen collected during frequent foraging trips. Nectar is carried internally in the cop, pollen is carried on hairy pollen baskets on the hind legs or on the underside of the abdomen. The female molds a provision loaf from the food accumulated over several collecting trips, and lays an egg upon it when it is of sufficient size to support the maturation of a singly offspring. Immediately after egg-laying, she seals the cell with a wall of sil, leaves or other material, and stars another cell in the same nest. Mother and offspring never meet; by the time babies' development is completed to the adult stage, mom is long since dead.

Our solitary "queens" construct or select nest of three broad types. Some species excavate tunnels in soil or wood. In soil, side branches usually emanate from the main tunnel and end in one or more cells but the variety of nest floor plans is endless. Hard, bare ground like that of infrequently used dirt roadways is preferred by some excavators; others are enamored of ground in sparsely to heavily vegetated areas. Characteristics such as soil texture, temperature, slope and aspect may also be important in determining whether a site is attractive. The alkali bee **Nomia Melanderi**, a species sometimes used for the commercial pollination of alfalfa, prefers bare but moist alkali flats in which to nest. **Nomia** bees use the same site from year-to-year and huge aggregations of independently nesting females may build up. There is so much noise from the activity at such sites that they are usually heard before they are seen.

A second type is comprised by those species that seek out vacant holes (frequently made by beetles) in dead twigs, branches, or stumps. These species typically produce linear, unbranched nests in which one cell is directly behind another. Two commonly used commercial pollinators, **Megachile rotundata,** the alfalfa leafcutting bee, and the blue orchar bee **Osmia Lignaria**, a pollinator of apples, use existing holes. Such beneficial species are easily persuaded to use artificial nesting blocks in backyards or agricultural fields.

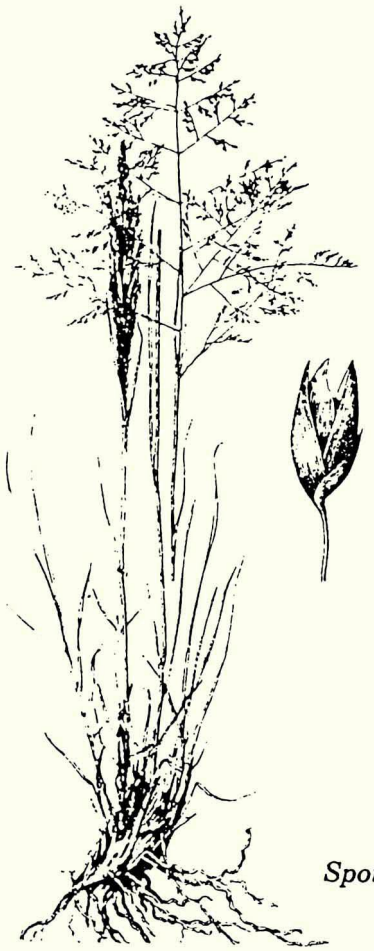
A final group of species are the mason bees. These aptly named artisans construct hard, heavy, nests of mud. In areas with moist, clayey soil they can be seen rolling little balls of mud with their mandibles and feet and tucking them up under their chin for transport back to the nesting site. Nests may be attached to rock, twigs or branches, or to the walls, eaves or roofs of houses. They are sometimes a problem in rural areas of southern Europe where accumulations of nest over many years may be heavy enough to collapse less sturdy roofs.



Bees are enthusiasts of flowers for compelling reasons: over the last 100 million or so years, their very existence has come to depend almost exclusively upon the nourishment offered by pollen and nectar. Not unexpectedly then, they are admirably attuned, morphologically, physiologically and haviorally to manipulating flowers. But the bees that rapidly expanded into these new niche eons ago have not remained simple exploiters. Instead, they have

become winged appendages of flowering plants. Indeed, it was really the plants that started the whole business, probably because attracting insects was an effective way of trading gametes with another member of the species, i.e., reproducing sexually. After all, plants can't just retract their roots and boogie down to there nearest gathering place for some radical socializing. To get their genes next to some fresh (not to mention cute) genetic material they need a go-between, a matchmaker. If flowering plants are the organic world's Miles Standishes, then bees are the flowering plant's John Aldens. Remember that, the next time you want to swat one.

Vincent Tepedino* and Susan Geer
Bee Biology and Systematics Lab
Utah State University
Logan, UT 84322-5310
*US Department of Agriculture
Agricultural Research Service.



Sporobolus airoides

GRASSY NATIVES FOR TURF & GARDEN

BY: MARV POULSON

Grasses have long been viewed as important ground covers. Few other plants tolerate the trampling and manicuring we inflict on our grass lawns. While sod forming grasses serve well for this, clumping types have largely been ignored until quite recently. Clumpers are now being sought as garden ornamental for specimens, accents, and borders. Grasses and grass-like plants are fast becoming widely used for the wonderful texture and color they offer in the garden.

Warm-season vs. Cool-season Grasses

Warm-season grasses grow during the hot part of the year, remaining green until going dormant and beige when the cool of Autumn comes. On the other hand, cool-season grasses grow in the spring and fall when it is cool. These grasses go dormant in the heat of summer unless they are given enough water to keep them actively growing. In our region, warm season grasses are considered much more drought tolerant in the landscape because they require much less water to remain green during the season of greatest turf use.

Traditional residential and commercial landscapes in Utah usually include large areas of turf both as design elements and as play or living spaces. The most commonly used grasses in our turf areas are blends of various Kentucky Bluegrass cultivars, These cool season grasses must be watered heavily to keep them lush and hardy during the summer months. As much as 50% of water used in landscapes goes to maintaining turf areas.

Cool Season Grasses
Turf Grasses

Two genera of cool season grasses make up the bulk of varieties available for lawns in our region.

Kentucky Bluegrass (**Poa Pratensis**) varieties have been used almost exclusively in Utah landscapes for many years and remain the common choice by home owners and commercial landscape managers. Bluegrass sod is wildly grown and available for planting lawn areas.

Tall Fescue (**Festuca Aruninacea**) varieties, especially some of the newly developed dwarf-tall Fescue grasses offer a desirable alternative to Bluegrass. Fescue tolerate shade much better than Bluegrass and require far less water for summer 35 to 30 percent -- which represents a significant way to reduce landscape water consumption and save substantially on water bills. The newly developed dwarf-tall Fescue are my favorite turf grasses with the variety Bonsai being among the best.

The new dwarfs have fine soft textures and rich green color to match the familiar Bluegrass color. Another advantage of the dwarf Fescue is the slow rate of growth. These means that moving a dwarf-tall Fescue lawn need only be down half as often as a conventional Bluegrass. Until this year a dwarf-tall Fescue lawn had to be planted from seed. Finally sod is now becoming available locally as a few enlightened sod farms will offer them for the first time in Utah.

Ornamental Grasses

While several grasses and grass-like plants are now available for planting as ornamental in landscape, few natives are among them. As with the cool-season turf grasses, the ornamental require abundant water throughout the summer to sustain their color vitality.

Blue Fescue (**Festuca ovina glauca**) is the most readily available native ornamental. It is a dwarf, dense mounding grass with very narrow, blue-gray blades. Excellent for borders, massing or rock gardens.

Alpine Bluegrass (**Poa Alpina**) dwarf tufted perennial with narrow blue-green blades with inflorescence reaching 12 to 18 inches and often persisting through the next season after drying. Useful in rookeries and borders.

Blue grama

Warm Season Grasses
Turf Grasses

Buffalo Grass or Mosquito Grass (Bouteloua gracilis) is a low growing, blue-green, bunch grass (12 to 18 inches tall) which can be grown to form a tight turf. Mowing encourages tillering (sprouting at the base). The result is a very finely textured lawn. For turf areas mowing can be infrequent but will be necessary to maintain a neat look. Informal areas can be left most of the season with mowing limited to late season when removal of dry grass and seed stems will prepare the area for winter by reducing the amount of garden debris over winter.

Like buffalo grass, Blue Grama assumes a dormant straw color by early Autumn. I find that Blue Grama has a slightly longer green season than buffalo grass -- a week earlier in April and a week or two later in the

fall -- even under the small watering conditions.
Seeding rates for turf range from 4-7 pounds per 1000 square feet. Seeding more heavily will establish a tight sod more quickly than lighter rates.

Ornamental Grasses

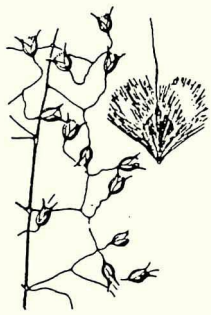
Blue Grama Grass **(Bouteloua gracilis)** also offers a very attractive ornamental quality when planted as a clump accent in the garden. The long, weeping blue-green blades form an attractive low fountain above which straight stemmed flower heads rise with a whimsical brush-like inflorescence that retains its character throughout the remainder of the season.

Plant seeds shallow in August for Autumn germination and establishment or in spring after danger of frost.

Indian Rice Grass **(Oryzopsis hymenoides)** forms a very attractive, tight bunch with long, slender, green leaves that cure to straw when dormant. The 1-2 foot flower/seed stems are very distinctive and beautiful. They are attractive in dried arrangements, adding an airy graceful character. This dependable performer does best in full sun and sandy soil, though it will tolerate more favorable sil conditions nicely. In the landscape use Indian Rice Grass an ornamental only since it does not tolerate mowing or foot traffic.
Plant seeds 1-2 inches deep in fall for spring germination or start in containers for planting out in mid-spring.

Alkali Sacaton **(Sporbolus cryptandrus)** develops a tight bunch to 2 feet tall with very light and airy character. Seed heads rise above the bluish blades. This drought tolerant perennial performs well in poor soil with little attention,making it well suited to sand situation.

When seeking to establish the minimal amount of water necessary to sustain the vitality of turf, the plants must be established rowing vigorously. Also, the mowing programs should be maintained as normal and fertilizer applied only lightly but frequently during the course of reducing the watering program to a sustainable minimum. Realize also that when every fertilizer is applied, plants require increased moisture to assimilate the additional nutrients without harmful stress or plant damage. Fortunately, grasses are particularly hardy plants and have a good ability to recover from stress.



INDIAN RICEGRASS

When approaching the minimum water necessary to keep a turf healthy in mid-summer we look for signs of stress as the indicator of the minimum limit. Once this is known, water should be increase slightly -- only slightly-- to provide a minimal buffer to tide the plants over an unexpected hot or windy spell. Then as normal seasonal changes occur, watering can be decreased for cooling and increased for warming trends.

Like other hardy native plants, native grasses have developed characteristics that are well suited to growing condition in our region. They require less water and fertilizer as well as less maintenance than exotic types form wetter climates. Use of native grasses in the landscape is still in the early stages, but slowly increasing. New varieties coupled with greater public awareness will help

stimulate increased use of these attractive and valuable landscape plants. With increasing pressure of water conservation and other environmental concerns the role of careful landscape practices will make using natives more acceptable in general practice, and for good reason. Native grasses are truly beautiful, functional and environmentally compatible.

Sources:
Sod
Lake Mountain Turf
9980 South State Street
Sandy, UT
562-9090

Container Grown Ornamental
Glover Nursery
799 East 6600 South
Murray, UT 84107
261-3363

Kurt Blumel, Inc.
2740 Greene Lane
Baldwin, Maryland 21013-9523
(301) 557-7229

Millcreek Gardens
3500 South 900 East
SLC, UT
487-4131

Valley Nursery
6484 South 2000 East
Ogden, UT 84405
479-6060

Wasatch Shadows Nursery
9295 South 255 West
Sandy, UT
566-0608

Seed
Plants of the Southwest
930 Baca Street
Santa Fe, New Mexico 87501
(505) 983-1548

OBITUARY

Bassett Maquire, founder and first curator of the Intermountain Herbarium, died at his home in New York on February 6, 1991. He was 86. His wife, Celia Maquire, nursed him through his painful bout with leukemia and was by his side when he died.

In 1931, Dr. Maquire was hired to teach in the Department of Botany in days when USU was called the Utah College of Agriculture. One of his first jobs here was to bring together the plant collections that had been made in the area. He combined the collection on the campus and founded the Intermountain Herbarium in 1931. Among his great legacies are the students who learned by working with him in the laboratory and filed. Arthur Holmgren, Professor emeritus of Biology and the second curator of the intermountain Herbarium, studied with Bassett Maguire. Another student in one of the first plant taxonomy classes was Arthur Cronquist, distinguished professor of botany at the New York Botanical Garden.
Dr. Maquire left Utah State University in 1943 in order to work at the New York Botanical Garden on the Intermountain Flora project. When other duties in tropical studies started taking most of his energies, he asked that Art Holmgren take over as the leader for the Intermountain Flora project.

Leila Shultz, Curator
Intermountain Herbarium

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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FIELD BOTANY: FLORA OF THE TETONS
JUNE 20-23
DR. LEILA SHULTZ

ACADEMIC CREDIT

The plant diversity of the Tetons makes this an excellent place to learn about North American Flora and to learn about the diverse plant communities of the Rocky Mountain Region. Emphasis in the course will be on learning to recognize the identifying characteristics of common plant families and to become familiar with technical keys to plant species. Fee $180.00 includes tram ticket.

Teton Science School
P.O. Box 68
Kelly, WY 83011
(307) 733-4765

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Membership Application

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Check membership category desired:

- ❑ Student/Senior.....$ 5.00
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- ❑ Supporting.....$ 30.00
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- ❑ Life.....$250.00

❑ 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:

Pam Poulsen, treasurer,
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 information down and mail it with payment for the category of membership.)

VOL. 14 NO.3 **MAY/JUNE 1991**

CALENDAR OF EVENTS

MAY 4 Sat. 8:00 am	Dimple Dell Day Dimple Dell Entrance, 10365 S. 1300 East, Sandy This will be a Saturday morning devoted to public awareness of Dimple Dell under the auspices of the UNPS and other organizations.
MAY 14 Mon 7:30 pm	Cache Chapter Meeting See Blue Cards for details.
MAY 18 Sat 9:00 am	Twelfth Annual Plant Sale, Red Butte Garden & Arboretun Plants of every description! Prices from $1 to $100. Bring questions, our sales people are horticulturists! South of Huntsman Center, U of U campus.
May 18 Sat 10:00 am	Foothills Fieldtrip Informal tour to the foothills adjacent to the Red Butte Gardens during the height of the spring flowering season. Red Butte Garden's parking lot.
May 23 Wed 7:30	Salt Lake Chapter Meeting Pepper Provenzano of Tree Utah will be the guest speaker. Executive Board Meeting at 6:30 p.m., Granite Park Junior High School, 450 East, 3700 South, SLC.
June 1 Sat 10:00 am	Jordan River Wetlands Fieldtrip One day tour of the Jordan River wetlands, Neffs Grove historic site, ruins of ancient Indian campsite and Harrison Farm. This will offer an excellent opportunity to observe the recovery of wetlands after the cessation of grazing. Meet at NE corner of South Town Mall Parking Lot, 10400 South and State Street, (near bank of Dry Creek). Bring lunch.
June 10	Cache Chapter, No Meeting.
June 20-22	Threatened & Endangered Conference - Red Canyon We will meet at noon, Thursday, June 20th at the Panguitch High School. (See article for more information).
June 26	Salt Lake Chapter - No Meeting.

June 29 Sat 9:00 am — Uinta Fieldtrip
One day trip from Beaver Creek and Provo River drainages to Bald Mountain. Trip is being scheduled earlier than our previous trip to find more early blooming plants.

July 8 — Cache Chapter - No Meeting.

July 12-13 — Tony Grove Lake Fieldtrip
Camping will be Friday evening, field trip to start at 10:00 Saturday morning, bring lunch. Place will be the Tony Grove Lake campground. For field trip only, meet at the Tony Grove Lake Parking Lot. Overnight trip, Dutch oven dinner Friday night. This trip is also scheuduled early to find early blooming plants. Camping at Tony Grove Lake is first come first served at this time of year.

July 24 — Salt Lake Chapter - No Meeting.

July 27 Sat 10:00 a.m. — Albion Basin Fieldtrip
Bring lunch, one day trip. This has become a favorite annual trip. Meet at the end of pavement at Alta.

Aug 12 — Cache Chapter - No Meeting.

Aug 23-24 to — Boulder Mountain Mushroom Hunt
This trip wil be led by several mushroom experts and will be similar in scope our Cedar breaks trip last year. Time and place will be forthcoming.

Aug 28 — Salt Lake Chapter - No Meeting.

WILDFLOWER HOTLINE

581-5322 (then press 3)

A weekly updated flower report of whats blooming and where in the state. Near the end of May, first of June, listen for fieldtrip information to see the Sego Lily and Steershead.

RED BUTTE GARDEN & ARBORETUM SATURDAY WALKS IN RED BUTTE CANYON

MAY 4 Geology and Spring Wildflowers of Red Butte, Howard Ritzma, Geologist, W. Richard Hildreth, RBG&A.
8:00 a.m. to 1:00 p.m., RBG&A entrance gate.

June 8 Birds of Red Butte, Mark Stackhouse of the Tracy Aviary. 8:00 a.m. - 1:00 p.m. RBG&A entrance gate.

June 28 Birding at Red Butte, led by Margy Halpin & Dick Bailey, 6-8:30 p.m.

Fees, $5.00 for members, $6.00 for non-members.

OOPS

In the Mar-Apr edition of the Sego Lily we mistakenly corrected the article by Ben Franklin. **Astragalus desereticus** is in fact commonly titled the deseret milkvetch not the desert milkvetch. Our apologies to Ben for our error.

Threatened & Endangered Conference

Come along for the Red Canyon T&E meet set for June by Pam Poulson and Ben Franklin.

Over the past three years the Utah Native Plant Society Threatened and Endanger Species conference have devlopped into productive meetings that generate real number and programf or Utah's land managers. The 1991 session will be even better !

Join us Thursday, June 20 through Saturday June 22 for a spectrum of work meetings and field trips inw hich the entiure family can participate. The schedule is designed to have all the technical meetings and field studies on Thursday and Friday, with the cookout on Friday night and informative filed trips on Sauterudy. This way, people who cannot get off work can still be involved. Plan your family weekend around the meetings and take off into the beauty of central Utah at their conclusion. Here's the scoop:

Meetings: Panguitch High School - We promise to not be inside for more than 5 hours total!

Camping: Dixie National Forest Red Canyon Campground - Thanks to the Dixie National Forest, camping will be free in the Red Canyon Campground. Camp in any site on a first come first served basis. The fee collector will be aware of our conference, just tell him your're with us!

Meals: On your own except for our Friday night cookout.

Field Trips: Various locations.

Thursday (Panguitch High School)
12:00 Noon Greetings and Introductions
Review Plant List
Recommend listings and delistings
2:30 Break: Cookies and Punch
2:45 "Red Canyon Endemics" Alyce Hreha, University of Utah "The Red Canyon Botanical Preserve Project: Duane Atwood, US Forest Service.
5:00 p.m. Adjourn

Friday (Start from Red Canyon Campground)
8:00 am "Reconnaisance of Red Canyon for Preserve Sites" Duane Atwood. We will divide into groups to evaluate sites for desgination as Botanical Preserves. Following our filed studies, we will reconvene at Red Canyon campground to report our finding, select and recommend at site.

Evening: Dutch oven Dinner financed by UNPS and cooked by Duane Atwood from the US Forest Service (payment for your hard field work)! Please RSVP for dinner before May 31, to Pam Poulson at 581-3744.

Saturday (Start from Red Canyon Campground)
All Day Field tour of listed and candidate species:
Autumn Buttercup
Aquarius Paintbrush
Gilia caespitosa
Lepidium montanum
Astragalus serpens
Any others nearby that we can think of.

For further information on the 1991 UNPS T&E Conference call Pam Poulson, 581-3744.

JOHN CHARLES FREMONT

by: **Stanley L. Welsh**
illustrated by **Kaye Thorne**

Beginnings

John Charles Fremont was many things, topographer, mathematician, pathfinder and explorer, scientist and skilled observer, political candidate, governor and senator of California, military officer, administrator, entrepreneur, and husband and father, among others. Hidden within his list of roles and accomplishments is that of botanical pioneer, collector and coauthor. Much has been written about many aspects of his personality and life, but his role in botany is somewhat obscured within the large bibliography of his life and works.

Fremont was born on 21 January 1813 in Savannah, Georgia to Jean Charles Fremont and Anne Beverley Whiting Prior. Jean and Anne were not legally married because Anne was already married to Major John Pryor. The marriage to Pryor could not have been completely satisfactory because of the differences in their ages: he was 62 and she was 17 when they married. She ran away with Jean and bore him three children. John Charles was the eldest. Jean died in 1818, prior to the death of Major Pryor, so a marriage was never a possibility.

John Charles went to school in Charleston, South Carolina, where he received a classical education. He was "a boy with fine features topped by a beautiful mass of curly, dark hair; and his light blue eyes and olive-colored skin made him stand out." He came under the guidance of Joel Roberts Poinsett, later minister to Mexico, who helped young John Charles secure a position as teacher of Mathematics on a naval vessel on a cruise down the coast of South America. The two year assignment ended in June of 1835, and Poinsett again aided him with an assignment as assistant engineer for a survey of a route for a railroad from Charleston to Cincinnati. In 1836 Fremont was engaged in still another survey, of the Cherokee lands in North Carolina, Tennessee, and Georgia. Following that survey Poinsett, then Secretary of War supported Fremont's application for a commission as Second Lieutenant in the United States Topographical Corps. He had already joined the Joseph Nicolas Nicollet expedition for a survey of the territory lying between the Mississippi and Missouri rivers.

Accompanying the expedition, at the insistence of Nicollet, was the botanist Karl Andreas Geyer, 29, from Dresden, Germany. Nicollet was sufficiently interested in having a botanist on the expedition that he paid Geyer's salary privately. The field season of 1838 was spent surveying in Minnesota. During 1839 the survey party worked in the vicinity of Devil's Lake in present North Dakota, and from there into Minnesota. When Fremont returned to Washington toward the end of 1839 he went with Nicollet to a meeting with Secretary of War Poinsett and President Martin Van Buren. Nicollet had already given a glowing account of Fremont's performance on the two journeys of exploration to the upper middle west.

In Washington Charles moved with Nicollet into the residence of Ferdinand Hassler, superintendent of the United Sates Coast Survey. A visitor to the Hassler home was the senior senator from Missouri, Thomas Hart Benton, whose dream of a United States extending from the Atlantic to the Pacific fell within Fremont's vision. Fremont would provide the maps and information that would aid emigrants in moving west. The meeting with Benton was pivotal for Fremont, who was invited to the Benton home for dinners. There he heard the Senator and his friends discuss the grand ideas of empire. The older Benton children were attending a boarding school in Georgetown. Fremont went with Sarah, one of the Benton daughters to listen to music at the boarding school. There he first saw Jessie Benton (1824-1902), only fifteen years of age. Fremont was overwhelmed;"She made the effect that a rose of rare color of a beautiful picure would have done'" he said! His life was forever changed by the encounter.

Amphipappus fremontii

The Bentons were not as enthralled with the Fremont--Jessie romance as were the two principals in the emotional entanglement. Jessie was too young; and Fremont had no money and his career offered slow promotion and a migratory way of life. Senator Benton instructed Fremont to leave her alone, for a year at least. Fremont reluctantly agreed. At this point, on 4 June 1841, Charles received orders from Colonel Abert to go directly to St. Louis to make arrangements for a survey of the lower Des Moines River area in Iowa, country not previously mapped, Fremont was sent in place of Nicollet, who could not go because of illness. John Charles went to St. Louis, to the offices of Chouteaus's American Fur Company, who had helped outfit previous survey parties. Karl Geyer was again hired as botanist. Following the survey, Fremont went quickly to Washington City where the report of the expedition was prepared. In mid-August he visited the Benton home, ostensibly to tell Senator
Benton of his successful adventure in Iowa,

but in reality he went to see Jessie.

Hymenoclea salsola

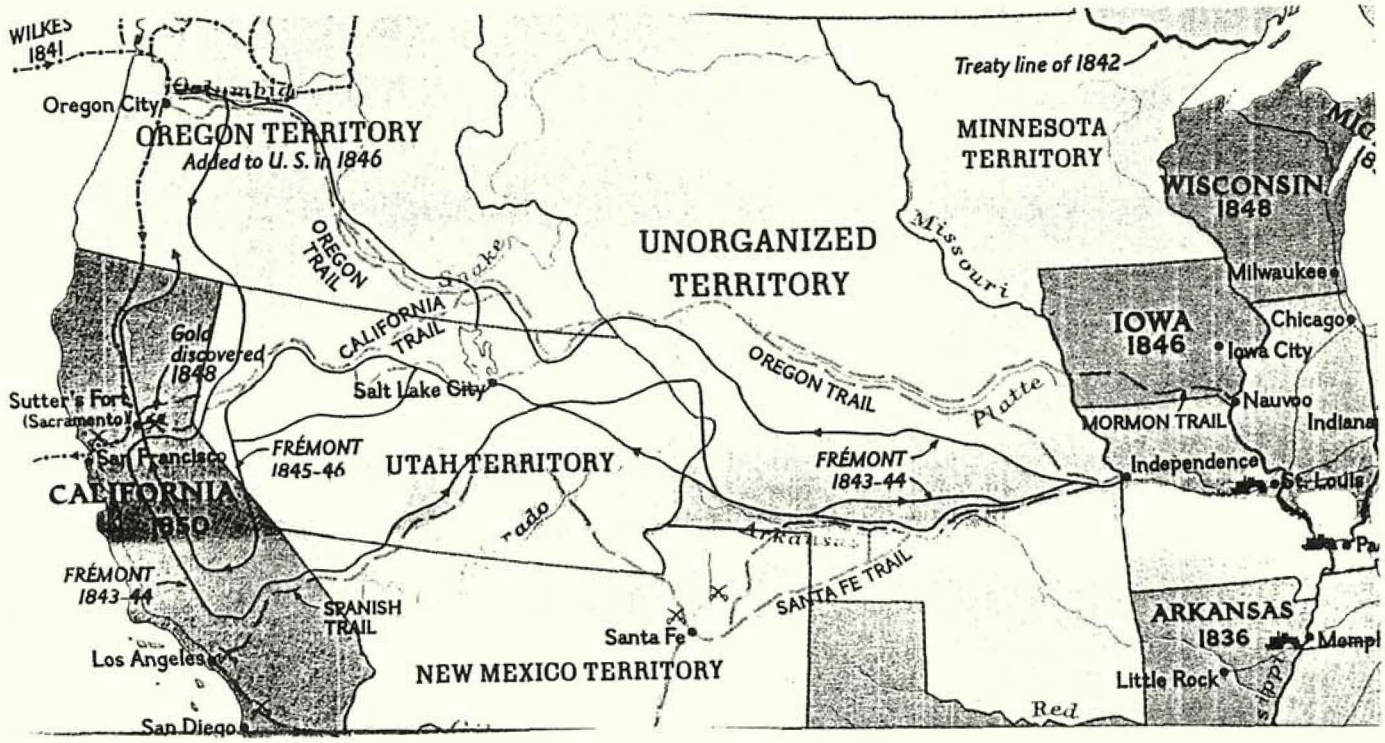
John Charles and Jessie should have had little opportunity to meet,but the meetings must have been frequent and of long duration because the entire manuscript document of Fremont's report on the Des Moines was submitted in Jessie's hand. Her parents must have known that she was helping Fremont with the report! With the intercessinon of Mrs. J.J.Crittenden, wife of the senator from Kentucky,they were allowed to meet secretly at her home. Mrs. Crittenden arranged for the wedding services for the impulsive couple, who had decided not to wait out the year dictated by Senator Benton. The wedding ceremony was performed by a Catholic priest, after two protestant ministers had refused to perform the ceremony. At the Crittenden home on 19 October 1841 Jessie, 17, and John Charles, 28, were married. For some months the couple kept the secret but,following a visit to Nicollet, who insisted that they tell her parents as soon as possible, they confronted Senator and Mrs. Benton the next morning. After an initial heated objection, the Senator welcomed them into his house, and he informed the distraught Mrs. Benton of the marriage and future living arranagements. John Charles now had the family he had so long lacked, and he was prepared as a topographer. The coincidence of union with this particular family and the need for topographic reconnaissance by the United States joined this man of destiny with the future of both family and country.

Second Expedition--1843-45

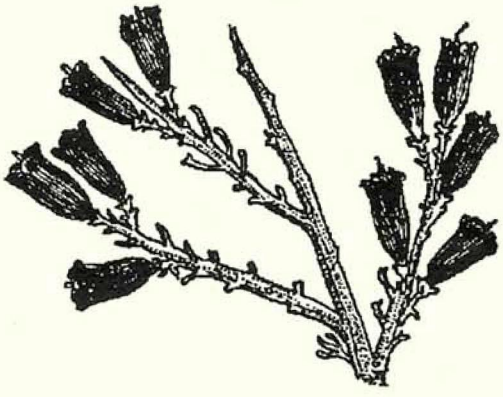
This was the most important expedition regarding botanical collections. He took the types of many additional genera and at least 70 new taxa in total. Included are the genera **Anisocoma**, **Amphipappus**, **Empletocladus**, **Coleogyne**, **Hymenoclea**, **Mononoptilon**, **Nicolletia**, **Oxystylis**, **Pterochiton**, and **Thamnosma**, All of these stand today, with the exception of **Emplectocladus** (a synonym of **Prunus**) and **Pterochiton** (included in **Atriplex canescens**). The nut pine, **Pinus monophylla**, was described from the collections. The first collections of Utah plants were made by Fremont on this expedition;the first from Weber, Washington, Utah, Duchesne, and Uintah counties were taken by him.

On 10 May [1844] the group crossed the Virgin [river], regained the Spanish Trail and proceeded into Utah.

We entered the Basin at that point, and have travelled in it ever since, having its southeastern rim (the Wah-satch mountain) on the right, and crossing the streams which flow down into it. The existence of the Basin is therefore an established fact in my mind; its extent and contents are yet to be better ascertained. It cannot be less than four or five hundred miles each way, and must lie principally in the Alta California... Of its interior, but little is known. It is called a desert, and, from what I saw of it, sterility may be its prominent characteristic; but where there is so much water, there must be some oasis. The great river, and great lake, reported may not be equal to the report; but where there is so much snow, there must be streams; and where there is no outlet, there must be lakes to hold the accumulated waters, or sands to swallow them up. In this eastern part of the Basin, containing Sevier, Utah, and Great Salt lakes, and the rivers and creeks falling into them, we know there is good soil and good grass, adapted to civilized settlements.



The contents of this Great Basin are yet to be examined. That it is peopled, we know; but miserably and sparsely...The rabbit is the largest animal known in this desert; its flesh affords a little meat; and their [the native people] bag-like covering is made of its skins. The wild sage is their only wood, and here it is of extraordinary size--sometimes a foot in diameter, and six or eight feet high. It serves for fuel, for building material, for shelter to the rabbits, and for some sort of covering for the feet and legs in cold weather.



Thamnosma montana

The whole idea of such a desert, and such a people, is a novelty in our country, and excites Asiatic, not American ideas. Interior basins, with their own systems of lakes and rivers, and often sterile, are common enough in Asia; people still in the elementary state of families, living in deserts,with no other occupation than the mere animal search for food, may still be seen in that ancient quarter of the globe; but in America such things are new and strange, unknown and unsuspected, and discredited when related. But I flatter myself that what is discovered, though not enough to satisfy curiosity, is sufficient to excite it, and that subsequent explorations will complete what has been commenced.

Coleogyne ramosissima

By 12 May they were at Mountain Meadows, where there was good grass. There they

stopped to rest their animals. Joseph Reddeford Walker, mountain man, arrived in the camp at Mountain Meadows, having followed Fremont across the Mohave. Walker was acquainted with the country between there and Utah Lake. He served as guide through this portion of Utah. By 23 May the party was at the Sevier River. Rush boats were made to carry the party and baggage across. Francois Badeau was accidentally killed when his rifle caught in the rush matrix of the boat and discharged, sending the ball through his head. The party turned east from Utah Lake on 27 May and entered Spanish Fork Canyon. The route was then to the head of the canyon, over Soldier Summit, and up the White River to the Avintiquin ridge. From there they descended into the Uinta Basin. The route chosen was

Prunus faciculata

along the north side of the basin, at right angles to the streams draining from the Uinta Mountains. Many of the streams were in flood and were crossed with great hazard. Uinta (Roubidoux) Fort was reached on 3 June. Some food supplies were obtained at the fort, but by 5 June the party was away across the Uinta River toward the east. Crossing Ashley Creek near present Vernal the party moved onto Diamond Mountain and into Brown's Park, in Colorado on 7 June. They had been in Utah slightly less than one month, and had crossed the state diagonally from southwest to northeast.

Monoptilon bellidiforme

Dr Stan Welsh recently completed a book, Botanical Contributions of Jean Charles Fremont to be published as a memoir of the New York Botanical Garden.

MESSAGE FROM THE PRESIDENT

In 1987 the UNPS made a rather cavalier decision to produce a wildflower poster. It was a grand idea, but the coffers of the society were never overflowing to the point of funding such an endeavor. With a loan from The Nature Conservancy we went ahead with the printing of a Utah Wildflower poster. Late in 1990 we realized we were in a dissimilar even unfamiliar situation. Though not "rolling in the clover" we had an excess beyond the needs of the society.

We called for ideas from readers of the Sego Lily. From the proposals sent to us the executives and board unanimously voted to partially fund four projects. One of these projects is the Wildflower Hotline at the Red Butte Garden and Arboretum at the University of Utah. The hotline gets a weekly update during the blooming season and we also hope to use it occasionally for announcing impromptu field trips. We have been closely associated with the Arboretum over the years and are appreciative of the organizational support we have recieved from them.

One of the goals of UNPS has been to increase education and awareness of native plants. For this reason we also chose the

Edith Bowen Native Plant Demonstration Garden at Utah State University as a recipient for another grant. The school will use the money for a sign project in the gardens. The Edith Bowen School is an elementary school and the children are involved in the gardening under the supervision of teachers, University staff and students. The garden also serves as a demonstration site for the public.

UNPS is also happy to contribute to the research fund for **Erigeron kachinensis**. The kachina daisy is found at Natural Bridges and is a candidate for federal listing. Loreen Allphin a graduate student of Kimball Harper's at Brigham Young University will be doing research on the daisy over the next two years and UNPS is committed to partial support for each year.

The Spanish Fork Ranger District recieved federal Challenge Cost-share funds to survey National Forest lands for suitable habitat for the endangered clay phacelia. Challenge Cost-share funds are given with the stipulation that an equal or greater amount of money or services be contributed from outside the Forest Service. We are joining others in meeting this stipulation to hopefully aid in the recovery of the clay phacelia.

In keeping with the goals of the Utah Native Plant Society, the executives and the board hope the membership agree that these are all projects which are worthy of our support.

Jo Stolhand
Pres.,UNPS

WILDFLOWER ALERT

Dr. Leila Schultz would like to have reports of any new distributions of Utah plants. If anyone finds a plant with a distribution not shown in the Atlas of Vascular Plants of Utah (Albee, Shultz, and Goodrich 1988, Univ. of Utah Museium of Natural History), please send a specimen to the Intermountain Herbarium (Dept. of Biology, Utah State University, Logan, UT 84322-5500). Leila will verity the identification and report the record in the Sego Lily. Specimens should be pressed between newsheets and should have a label with the collectors name, date, and place of collection (include county and specific locality information).

BLM WILDERNESS
by **Dave Gardner**

If one could look far enough into the future it may be seen that the national park, wildlife reserves, wilderness, and natural areas preserved now will become the crutch that props up the biosphere. The question is whether we will set aside large enough areas and give them adequate protection to keep the atmospheric, hydrologic, and biological functions of the earth operating properly.

The biological diversity that has given us food, shelter, medicine, and esthetic joy is being rapidly stripped away. Much is being lost before we come to understand it. We now realize that relatively large natural areas are required for the maintainence of a number of mammal and bird species. Mountain lions, bighorn sheep, elk, black bear and golden eagles are examples of essentially wilderness species. We should not lose sight of the fact that we are large mammals with our roots tied to the biosphere as well and the care we bestow on other species will reflect our own survival.

The Bureau of Land Management (BLM) has recently released the final environmental impact staement (EIS) for Utah wilderness. The Wilderness Act is a very good mechanism for making land use decisions that maximize protection of biodiversity. I know of very few legal tools that have as much power to minimize habitat fragmentaion and attendant loss of species in our few remaining natural areas. BLM is required to take steps to ensure the survival of sensitive species under its jurisdiction irregardless of the land use designation for a given area. An EIS must be completed wherever sensitive species may come in conflict with development scenarios. Because of this the impression given by the final EIS is that wilderness designation would have little or no effect on protection of rare species. I am not comfortable with this assumption because our understanding of the ecology of rare species is extremely limited. In many cases we don't know if pollination, dispersal, or germination may be dependant on specialized vectors outside the plant population area. Development that seems well removed and harmless may have impacts that cannot be easily forseen. Wilderness designation could act as a blanket protection for forces outside of plant or

animal populations that have everything to do with their survival. Among other concerns are recent actions by governmental agencies where development has taken the upper hand over rare species, i.e. the Mount Graham Red Squirrels loss of habitat to the University of Arizona's observatory.

In light of the fact that Utah has established so little wilderness on Forest Service domain, UNPS board members feel that we should support at least the 3.8 million acres proposed by the Utah Wilderness Association. My personal preference (and others of the board) is the 5 million acre proposal of the Utah Wilderness Coalition. Whichever proposal recieves strong public support will surely be whittled down further during Congressional perusal of individual WSAs (Wilderness Study Areas).

Your support for large acreage will certainly be needed in the fight to preserve biodiversity for the future.

Please write your congressman today!

FROM THE EIS

Special Status Plant Species

Special status plant species are defined as those species listed as threatened or endangered by FWS [Fish and Wildlife Service], species that are proposed for listing as threatened or endangered, Category 1 and 2 candidate species, and otherwise sensitive species (see App[endix 4).

In Utah, 16 plant species are listed as endangered or threatened (USDI, FWS, 1989). Eight listed endangered or threatened species are known to or may occur in 19 WSAs. These plant species and the WSAs in which they may occur are identified in Table 36.

In addition to the listed threatened or endangered species, there are currently 103 Category 1 and 2 candidate plant species in Utah. Forty-four of these species are known to or may occur in 69 of the WSAs. Appendix 4 lists these species and the WSAs in which they may occur.

There are also 10 rare, endemic or otherwise sensitive plant species that are known or thought to occure in 16 WSAs. These are species that are not listed as endangered, threatened, or as candidates. They are, however, of management concern to BLM (see Appendix 4 for a listing of these species and the WSAs in which they may occur). It is BLM policy to protect, conserve, and manage and protect all special status species.

Table 36
Known and Potential Occurrence of Listed
Threatened or Endangered Plant Species in BLM WSAs

Common Name	Scientific Name	WSA
Welsh's milkweed	Asclepias welshii	Moquith Mountain
Wright's fishhook cactus	Scelerocactus wrightiae	Mt. Ellen-Blue Hills, Fiddler Butte, Mt. PEnnell, Mt. Hillers, Little Rockies, San Rafael Reef, Crack Canyon, Muddy Creek, Devils Canyon, Sids Mountain, Mexican Mountain
Spineless hedgehog cactus	Echinocereus triglochidiatus var. inermis	Bridger Jack Mesa
Jones Cycladenia	Cycladenia humilis var. jonesii	Behind the Rocks, Mill Creek Canyon, Negro Bill Canyon, San Rafael Reef, Crack Canyon, Muddy Creek, Devils Canyon, Sids Mountain, Mexican Mountain
Maguire daisy	Erigeron maguirei var. maguirei	San Rafael Reef, Crack Canyon, Muddy Creek, Devils Canyon, Sids Mountain, Mexican Mountain
San Rafael cactus	Pediocactus despainii	San Rafael Reef, Crack Canyon, Muddy Creek, Devils Canyon, Sids Mountain, Mexican Mountain
Last Chance Townsendia	Townsendia aprica	San Rafael Reef, Crack Canyon, Muddy Creek, Devils Canyon, Sids Mountain, Mexican Mountain
Uinta Basin hookless cactus	Sclerocactus glaucus	Desolation Canyon

Source: Individual WSA Analyses and Appendix 4.

FEBRUARY SALT LAKE CHAPTER MEETING
by **Jo Stolhand**

What do packrat middens, bogs, and dung heaps have in common? If you didn't know the answer prior to our February meeting you probably aren't an archaeology buff and if you don't know yet you missed a very interesting speaker, Dr. David Madsen, State Archaeologist for Utah.

The woodrat (packrat) builds its nest of sticks and plant debris often in an area protected from predators such as rock crevices, caves, and overhangs. The woodrat has been around for many thousands of years and successive generations may use the nest. Woodrats forage on the vegetation within a small radius of their nest and while most of the forage is eaten some falls into the nest or is discarded outside the nest in piles (middens).
Besides plant particles, pollen is found in the nests and middens.

Bog sites such as those found in the Great Basin area can be trenched and the stratigraphy analyzed. Over the millenia as the environment changed, a pollen record was laid down in the peat bogs. Such stratification may also be seen in the banks of streambeds. The pollen is removed from surrounding minerals with acids. Every species of plant has a distinct pollen granule which can be stained and observed under a microscope.

Near Lake Powell there is a cave that Dr. Madsen referred to as "the elephant barn". Actually he clarified "it was a natural shelter for mammoths". Among the several feet of dung deposited in statifications over the years of their existence are undigested plant particles and pollen. Danger Cave in Nevada has stratifications of a similar type left by a hunter-gatherer society.

So what do packrat middens, bogs, and dung heaps have in common? If you analyze the nests or stratifications and determine the per centage of pollen of different species of plants you can reconstruct past environment, and vegetational communities.

Thank you Dr Madsen.

BIG TOOTH OR CANYON MAPLE
(ACER GRANDIDENTATUM)
by **Mike Alder**

The red color in the foothills and mountains of Utah in the autumn is largely due to this tree or tree-like shrub. A relative of the sugar maple, bigtooth maple leaves are filled with sugars which help to make the color so brilliant when the days grow cool and short. This is an exciting tree! The reason I say it is exciting is that it is a candidate for a new introduction to temperate climate horticulture worldwide.

Bigtooth is found throughout the Wasatch Mountains and appears in ranges in northern New Mexico and Arizona and even into the Big Bend Country in Texas. However, the center of the range of this tree is in Utah. Robert Ream, in his PhD thesis on the Natural Vegetation of Wasatch Mountains described the following physical traits of the "Maple Brush Community:"
1. Elevation (min.)4600 ft. (max.) 7000 ft.
2. Soil pH (min.) 5.5 (max.) 7.1
3. Related communities: Oak Brush, Mixed Shrub, Curl-leaf Mahogany
4. Commonly occuring species: Galium aprine, Quercus gambelii, Prunus virginiana var. melanocarpa, Allium acuminatum, Lathyrus pauciflorus, Achilliea lanulosa, Mahonia repens, Artemisia tridentata, Lactuca scariola, Bromus tectorum, Collomia linearis, Amelanchier alnifolia, Symphoricarpos oreophilus.

Big tooth maple has a fascinating habit of invading undisturbed Gambels'Oak groves. The seeds, in the form of samaras, filter down from mature maples into nearby shaded areas - often these are oak groves. Germination seems only to require cold moist conditions for a few weeks. If warmth comes and seeds have been stratified in snow layers one may actually see the seeds germinating on the surface of the spring snow. Establishment is a hazard not unfamiliar to most seeds trying to find a niche in natural conditions. Leaf litter from the year before and grasses or other cover species prohibit many of the sprouts from gaining a foothold. However, there is a lot of energy in this seed. Radicals emerging from the seed coat often reach two inches or more.

Once a seed finds a hospitable home it takes its time in early growth. Seedlings three years old or even older are often

found just six to eight inches tall. Establishment seems much more rapid in the shade and in dark rich soils that are tupical under oak groves. As a maple tree grows and gains stature it begins to shade the surrounding plants including oak which grows at the same elevation in many areas in Utah. Oak is not shade tolerant and soon dwindles in health and is often entirely replaced by maple.

Soil depth, exposure, elevation, and competition strongly affect the vigor of maple wherever it establishes. The tree is often stunted in difficult sites leading to some observers claiming it is a shrub. However, if the tree is planted in a home landscape and pruned up from the base it develops into an almost perfect size and shape for this use. Bigtooth specimens have commonly been observed in nature with a trunk diameter of 10 to 12 inches. These larger trees often reach a height of 30 feet or more. The early growth of individual maples is often multiple stemmed so it is common to have several trunks of small diameter instead of one large trunk. Imitating this effect in the home landscape makes this a choice clump specimen tree to create groves with. It has been this horticulturist's experience that big tooth likes to establish in the shade (just like in nature). If you plant this tree in the shade they will grow at double the rate they will in full sun. Other features of this maple for use in landscaping include:

1. The size (2"x 2") and appearance of the leaf
2. Overall height (under 30')
3. Smooth grey bark
4. Elegant silhouette winter and summer
5. Ability to be tapped for its sugary sap in the spring months to produce maple syrup. The horticulture industry developed long before the pioneers came to Utah. When they arrived, the wildness of the environment probably led them not to notice the value of this tree to world horticulture. Only now is it finally being recognized as a potential broad introduction. Because its root system seems slow to develop and because clones could help the domestication process it is now being budded onto sugar maple as a rootstock. Because there are certain limitations for the sugar maple in terms of its range this may be a potential setback in trying to introduce big tooth into the broadest possible market.

Should you know where to find trees larger than 4" in diameter for tapping sugar the process to tap them would be as follows. Drill a hole approximately 1/2" in diameter on an upward angle on the sunny side of the tree at about waist height. Insert a grooved dowel that has ability to hold a bucket or plastic bag to collect the dripping sap. After the sap begins to flow between January and March, the sap may be collected and boiled down (about 20 parts of water to one part syrup) slowly to avoid scorching.

ARTIST DEMONSTRATES PLANT ILLUSTRATING

By **Andrew Boyack**

Painting pictures of plants is not difficult we were told by Mary Lou Romney at the regular meeting of the UNPS on March 27, 1990. Mary Lou is an artist, botanical illustrator and instructor associated with the art department of the University of Utah. She is a member of the Utah Watercolor Society and was featured in a 1988 issue of the AMERICAN ARTIST.

Painting pictures for botanical illustration, though not difficult, Mary Lou said, does require special techniques somewhat akin to Japanese calligraphic painting. It requires a tight control and obtains its spontaneity, not from the large free flow washes usually typical of watercolor, but from the carefully planned design of shapes.

She began her demonstration by drawing a sketch of a flower with leaves and stems. She then filled the shapes with watercolor pencil marks blending them with a small brush and a little water. Leaves were painted in three glazes, pink, blue and yellow. Varying proportions of blue and yellow combined to form a variety of greens.

Mary Lou then demonstrated an alternate medium of illustration, scratchboard. This produces a white picture on a black background which has the appearance of a fine etching, a method well suited to illustrating the fine detail for botanical illustration. Following her demonstration she distributed paper, scratchboards and art materials to the audience and asked each one present to try making their own drawings under her supervision. We enjoyed the first hand experience. (See picture on next page).

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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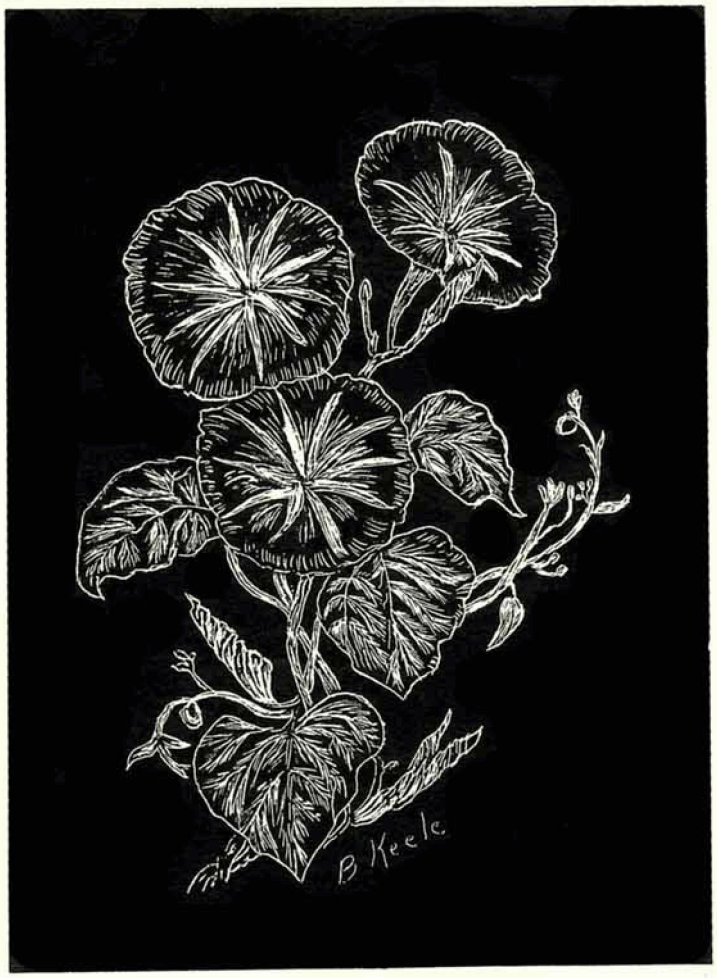

Membership Application

❑ New Member ❑ Renewal ❑ Gift

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Street _____

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Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

- ❑ Student/Senior .....$ 5.00
- ❑ Individual .....$ 10.00
- ❑ Family .....$ 15.00
- ❑ Supporting .....$ 30.00
- ❑ Corporate .....$ 30.00 and up
- ❑ Life $250.00

❑ 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:

Pam Poulsen, treasurer,
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 information down and mail it with payment for the category of membership.)

VOL. 14 NO. 4 **JULY/AUG 1991**

CALENDAR OF EVENTS

July 8 **Cache Chapter.** No meeting this month.

July 12-13 Fri.- Sat. **Tony Grove Lake Fieldtrip**. Camp Friday night at Tony Grove Lake campground. Come as early as possible since camping is first come, first served in this campground. Dutch oven dinner Friday night at 7:30 for $2.00. Bring your own eating utensils. Call Dave Okelberry, 968-6190, if you plan to eat dinner. Volunteers to help with meal preparation appreciated. Free pancake breakfast in the Tony Grove Campground from 7 to 9 Saturday morning. Guided plant fieldtrip begins at 10:00 Saturday at the Tony Grove Lake Parking lot. We hope to find early blooming plants at this time of year at this altitude. Bring your own lunch to enjoy after the fieldtrip.

July 24 **Salt Lake Chapter.** No meeting this month.

July 27 Saturday **Albion Basin Fieldtrip.** Bring your lunch and meet at the end of the pavement at Alta at 10:00 am. This has become a favorite annual trip for the Society.

August 12 **Cache Chapter.** No meeting this month.

August 15 Thursday **"Xeriscape" Landmark, Inc.** Thursday Garden Get-Together, Red Butte Gardens Amphitheatre, 11:30-1:00. Bring a lunch, lemonade provided free.

Aug. 23-24 Fri.-Sat. **Boulder Mountain Mushroom Hunt.** Unfortunately, this trip may be cancelled due to lack of leadership. Our mycologist trip leaders all have schedule conflicts and so far we haven't found any alternatives. If the trip materializes you will get a "blue card" notice.

August 28 **Salt Lake Chapter.** No meeting this month.

WILDFLOWER HOTLINE 533-5322, then press **3.** A wildflower report, updated weekly, of what's blooming and where in the state. New UNPS Fieldtrip information may be available at the end of the report.

The Sego Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent to the editor, Jo Stolhand, P.O. Box 520041, Salt Lake City, UT 84152-0041. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable articles for publication. Calendar items of interest to our membership are requested.

WHY PLANT NATIVES?

Richard Hildreth
Red Butte Gardens & Arboretum

Why plant natives? The obvious answer is that plants native to a given region are more likely to do well when used for landscaping or reclamation improvements. Cold hardy, heat, wind and soil tolerant, native tend to have fewer insect and disease problems. However, depending on their native habitats, many natives are not heat or drought tolerant; some will not tolerate full sun. Know the provenance of landscape plants and match it to the landscape setting.

Why plant natives? The visual quality of a created landscape will be more natural and appropriate within an existing native setting. Exotics may be discordant and a potential weed problem.

Why plant natives? Many woody species from the Utah flora are crown-sprouting, multiple trunked trees and shrubs which are able to withstand the annual prunings of hungry, browsing deer, elk and moose. They can, however, be trained to fewer multiple stems or a single stem. Natives are also more likely to survive fire.

Why plant natives? Even a relatively small residential lot in an urban setting will have numerous microclimates or niches which will support a diversity of plant forms and types. Understanding the nature of these mini-habitats and coupling this information to a complementary native will ensure successful establishment in the new garden. Thus, riparian species are matched to wetter, cooler portions of the garden, with an irrigation system to match the needs of plants in that area. Don't mix riparian species with desert species. Plant desert species in hotter, sunnier, well-drained sites in the landscape. Consider seeding annuals, certain perennials, and bulbous plants. Alpine belly-plants may require planting in a trough garden, specially constructed dry wall, or scree. Drainage and careful irrigation are important.

Why plant natives? The gardener who selects a native landscape trades slave labor associated with the weekly chores of lawn maintenance and hard edges for a more relaxed, natural and enjoyable living space. Vast expanses of green water/fertilizer-guzzling lawn are replaced with a riot of new flowers, colors, textures, and seasonal interest. The gardener spends time exploring diversity and expands his appreciation of native plants in their special habitats. You will want to live in that newly created space, so provide relaxing benches, patios, decks and water-saving native grass areas.

Xeriscape examples:
I-215
Beck Street overpass - reclaimed water
Ensign School
Sandy median
Park City demonstration garden
Edith Bowen School in Logan (USU campus)

Editor's note: In future articles Dick Hildreth will expound in more detail on the problems, care, compatibility, availability, and the excitement of planting with natives. He asks that readers send comments, questions, and personal experiences to him through the Utah Native Plant Society at the address on the back of this newsletter.

SAVING RARE PLANTS FROM OBLIVION

Andy Boyack
UNPS Fieldtrip Chair

Many endangered species of plants are slipping into oblivion to be forever lost. To help prevent this catastrophe from happening, the Red Butte Gardens and Arboretum with Mary Pat Matheson, executive director, is attempting to save these plants through "ex-situ" means, as Mary Pat described for us at the Salt Lake Chapter meeting April 24.

There are two approaches to saving an endangered species, in-situ and ex-situ. The in-situ approach consists of protecting the geographical area and environment where the plant grows and thus preserving its natural habitat. In ex-situ, endangered plants are studied and propagated under laboratory conditions in botanical gardens which is the work Mary Pat is doing in conjunction with the Center for Plant Conservation.

At present, Red Butte Gardens and Arboretum is studying the germination and propagation of eight endangered species from the Great Basin area. These are *Primula maguirei, Townsendia aprica, Sclerocactus wrightiae, Pediocactus despainei, Phacelia argillaceae, Eriogonum argophyllum, Spiranthes diluvialis, and Arctomecon humilis*

Attempts at germinating the seeds of these plants have not met with much success. Propagating rare plants is not easy for many reasons, among them being the difficulty of replicating the growing conditions that exist in the wild for these plants. However, as Mary Pat says in her article in the winter-spring 1991 issue of the Cultivator, where adequate habitat preservation is not possible, this ex-situ supplementary strategy must be tried if the plant species is to be saved.

UNPS REVISITS THE

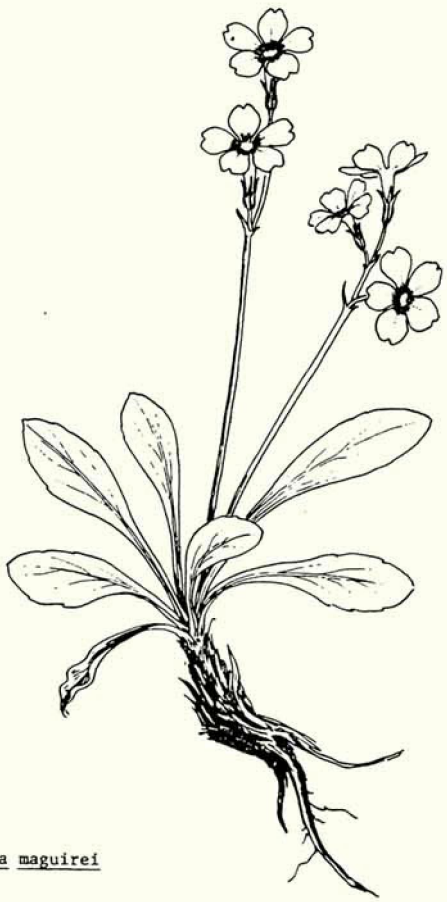
Primula maguirei

Andy Boyack
UNPS Fieldtrip Chair

On May 11, UNPS conducted a field trip to the Logan Canyon site of the *Primula maguirei* under the leadership of Leila Schultz, curator of the Utah State University herbarium. Our trip was a few days early for the best blooming time of this plant. We found lots of buds but very few blooms. The flowering season may have been late this year due to the cool weather in the latter half of April and early May. Spring Beauties *(Claytonia cordifolia)* were in bloom at the site which Leila said had usually bloomed and were gone by the time the *Primula* bloomed. Some *Mertensia* were beginning to bud and the *Draba maguirei* was in bloom.

In 1989 we visited the site on May 13 and found the *Primula maguirei* in full bloom with *Mertensia Clematis* and *Musineon lineare* also in flowering. April of 1989 was warmer and drier than it was this year.

Primula maguirei, Musineon Lineare and *Draba maguirei* are endemic to the Cache County area. *Primula maguirei* is listed on the Federal Threatened and Endangered Species list and the *Musineon lineare* has been suggested for it.



Primula maguirei

TREE UTAH ORIGINATOR TALKS TO SALT LAKE CHAPTER

Andy Boyack
UNPS Fieldtrip Chair

Tree Utah is an organization whose purpose is to promote the community planting of trees, according to Pepper Provenzano who spoke about it to the Salt Lake Chapter meeting on May 22. Mr. Provenzo started the organization four years ago when he became aware of the desperate situation of the Salt Lake City Urban Forestry Board's lack of funds to replace dying trees in the city.

Since its inception Tree Utah has been instrumental in the planting of more than 25,000 trees in the Wasatch area. They have worked with the Salt Lake City Urban Forestry Department, the State Lands and Forestry Department, the Forest Service and many community groups on tree planting projects. Some of these projects are the Wasatch Mountain State Park burn area, City Creek Canyon, Emigration Canyon burn area, This is the Place Monument, Salt Lake City Cemetary, and Salt Lake City block plantings.

Tree Utah would like to join forces with the Utah Native Plant Society for a specific planting project next spring in the Wasatch area. Mr. Provenzano mentioned several areas over-run with cheat grass that could benefit from tree plantings.

Salt Lake Chapter Explores Wetlands on Field Trip

Andy Boyack
UNPS Fieldtrip Chair

The Salt Lake Chapter had a fieldtrip June 1st to observe wetlands along Dry Creek and the Jordan River. The trip was ably led by Ty Harrison, biology professor at Westminster College.

The trip started at the northeast corner of the South Town Mall. There Ty showed us an historical monument (State St. and circa 10300 South) "Half Way House - Neff's Station" marking the location of a Pony Express station and an important early stop-over point for travelers and wagoneers hauling goods between Salt Lake and the south end of the valley. The original building has been moved to the Pioneer Trail State Park as the General Store.

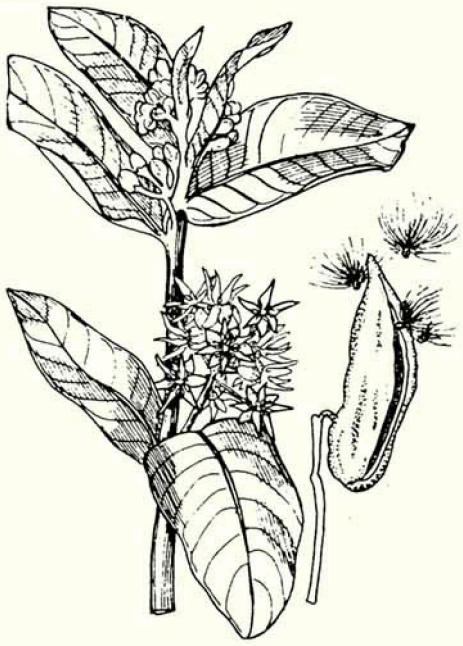
The South Town Mall is being extended northward encompassing the entire Dry Creek drainage between State Street and I-215. In the process the vegetation has been completely stripped, the riparian wetlands destroyed, the ground recontoured, and Dry Creek itself diverted to a new channel. A desolate site--which, of course, will be much improved with the addition of a

vast expanse of blacktop parking and with giant ZCMI and JC Penney-like monoliths plunked down here and there. A pathetic little two-acre patch of woodland at one edge of the mall has been preserved, a token memento of what the valley was once like.

The Mall development plans include "wetland mitigation" or the replacement of destroyed wetlands with new wetland or the equivalent. This includes a small shallow lake to create marshland and riprapping the Dry Creek stream bed to stillwater the stream. Native flora will be planted on the streambanks.

Ty next showed us a portion of the Harrison farm including sidehill ground below a bluff and a wide stretch of wetlands encompassing the Jordan River flood plain. The area has not been grazed for six years which has allowed forces of nature to develop unhindered. Among the forces were the '83 and '84 Jordan River flooding events which brought in a variety of new plants and destroyed others.

We found the wetlands covered with lush grass knee-high and a wide variety of plant species almost too numerous to mention. The list filled two pages of my notebook. A few were canary reed grass, 4 or 5 species of rushes, willows, teasel, and Annual Paint-brush *(Castilleja exilis)*, brought in by the flood, watercress, peppergrass, orach (better tasting than spinach), milkweed (edible after several boilings), and Silver Cinquefoil.



On the sidehill below the bluff grew bitterbrush, willow, greasewood, rabbitbrush, sagebrush, Fragrant Sumac (formerly called squawbush or skunkbush),and Golden Currant.

Several species of mushrooms were found which Ardeen Watts identified for us. Two of the species, Meadow Mushrooms and Shaggy Manes, were edible and delicious according to Ardeen.

We are indebted to Ty Harrison and Ardeen Watts for their knowledge and contributions on this trip, and to Ty Harrison's father, Parley Harrison, for the tour of his farm.

WEEDS

Stephen T. Burningham
Supervisor: Noxious Weeds
State of Utah Department of Agriculture
Division of Plant Industry

When the first pioneers entered the valleys and rangelands of the west, "they wrote of grass, belly-deep to their cattle, and of clear, generously flowing streams." But as the western movement continued, the pioneers, farmers and ranchers carried with them the seeds of many species of weeds. These weeds were not only new to the western ranges, but most of them were new to North America.

Because these weeds are not native to North America, there were no natural biological controls. The weeds were relatively free from competition, and readily infested new areas.

Dyers woad *Isatis tinctoria* L. is a weed that was valued as a medicinal herb. It was cultivated in both Continental Europe and England. Its origin was the steppes of Russia. During the colonization of early North America, the colonists introduced dyer's woad into Virginia and several of the surrounding colonies. As in England, the plant was valued for the purple dye extracted from the stems and leaves.

"Woad was first reported in Utah in 1917. Its official recognition came when Bassett Maguire collected a specimen for the USU herbarium in 1932 near the railroad in Perry. In the west, woad can also be found in California, Oregon, Montana, Wyoming and Idaho."

It is now estimated that dyer's woad has infested approximately 150,000 acres in Northern Utah.

Spotted knapweed *Centaurea maculosa* Lam. is a biennial or a short-lived perennial. Like dyers woad, it reproduces primarily by seed. The flowers of spotted knapweed are 3/4 of an inch wide and purple to pink in color. The name spotted comes from the bracts that have dark pointed tips making them appear spotted. This introduced perennial infests over 4.7 million acres of rangeland in Montana.

In 1980, a survey of exotic noxious weeds in Utah indicated that spotted knapweed was "not a serious problem." Only very small infestations were found. These small infestations, approximately 321 acres, were located in Cache, Emery and Beaver counties.

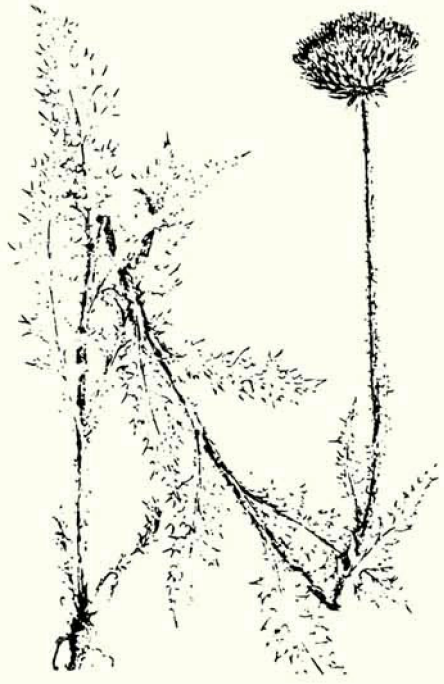
An update of the 1980 survey in September of 1984 reported five counties with infestations. "The 40 acre infestation in Cache County had spread to nearly 100 acres in one year." An additional update of the 1980 survey, completed as a master's thesis in 1989, reported 12 counties with spotted knapweed, with an estimated 1,649 acres infested.

In a nine year period, spotted knapweed spread from 321 acres in three counties to 1,649 acres in twelve counties.

Musk thistle *Carduus nutans* L. is a biennial weed, or sometimes a winter annual. It is normally a tall weed growing to six feet. The flowers are terminal on a naked stalk, deep rose, violet or purple in color, and very beautiful.

Musk thistle was introduced into the United States in the early part of the century and is now widespread throughout the U.S. and Canada. It is native to southern Europe and western Asia. Its aggressive nature allows it to spread rapidly, forming extremely dense stands which crowd out desirable forage.

Musk thistle was first identified in Utah about 1964. A survey of the counties in 1970 reported 19 counties with approximately 13,164 acres infested. The 1989 Exotic Noxious Weed Survey reported 27 counties with approximately 427,637 acres infested. Musk thistle had not been reported in Utah prior to 1963.



The noxious weeds discussed are only three weeds that plague Utah. Many people believe that these weeds are only a problem for farmers, but weeds on the farms are only one aspect of the weed problem. Every segment of society is affected by weeds. The U.S. Forest Service puts it this way: "Weeds cause more forest losses than all other pests combined. Inadequate control of forest weeds is causing a major shortage in future supplies of high quality wood products."

"Fantasy? No. Noxious weeds! The damage they do in Idaho alone is equivalent to the Teton Dam collapsing each year, as it did in June of 1976. The weed threat is many, many times more serious than any other long term enrivonmental pollution in the Intermountain Region."

In 1971, following numerous community public hearings and meetings with county commissioners, the state legislature enacted the Utah Noxious Weed Act.

The Weed Act and a statewide noxious weed control program are now firmly established in Utah and are having a positive effect on the control and spread of the 17 declared state noxious weeds.

The Weed Act is administered through the Department of Agriculture, and the control programs are developed and implemented by County Weed Control Boards, appointed by the county commissioners.

If you would like more information about noxious weeds or the state weed program, contact the Utah Department of Agriculture, your county Weed Control Supervisor, or County Agent.

HOMEMADE INSECTICIDE

Are you looking for an inexpensive, non-toxic insecticide? Researchers at a U.S. Agriculture Department lab in Phoenix, Arizona have effectively used a spray of soybean oil on cotton and then on garden plants (carrots, lettuce, peppers, cucumbers, eggplants and watermelon). Soybean oil is the ingredient in vegetable oil, a common cooking staple. But take care. Oil may burn the tender leaves of squash, cabbage and cauliflower. Soybean oil has proven effective in controlling aphids, spider mites, white-flies, and beet army worms.

Here is the recipe:

Stock solution

1 Tablespoon dishwashing detergent
1 cup oil

Spraying solution

1-2 1/2 teaspoons stock solution
1 cup water

Mix approximately 1/3 to 3/4 cup stock solution to 1 gallon water. Use a pump sprayer and apply every ten days.

Propagation and Use of *Castilleja linariaefolia* (Indian Paintbrush) in Native Plant Landscaping

Jim Harris
Cache Chapter, UNPS

The castillejas of the west make vivid exclamation marks of red, pink, yellow, and many shades in between from the desert floor to the tundra above timberline. They are scattered among the sagebrush or mixed in vast wildflower meadows in the mountains.

I could not imagine my home native plant landscape area without the bright paintbrushes. However, started plants were not available to my knowledge, and seed sources were fairly limited. I purchased a package labeled *Castilleja sp.* and tried to grow them several times on my window sill. The result was one plant which did not survive one season in the wildflower garden.

Several years ago (past failures forgotten) I purchased a package of *Castilleja linariaefolia* (the state flower of Wyoming and native to Utah) at a park store in Grand Teton National Park. It was from a wildflower series called Wildflowers of the Parks, and is still the only source of *Castilleja linariaefolia* I have found that can be purchased.

The following winter I experimented with my new-found knowledge of cold-moist stratification of native wildflower, shrub, and tree seeds. To make a long story short, I found that *Castilleja linariaefolia* germinated readily after only one month in the refrigerator.

Castilleja linariaefolia is considered parasitic to the roots of other plants, so it should be grown with other wildflowers and is very attractive when grown with *Artemisia frigida.* It can be grown, however, from seed to a plant large enough to plant in the wildflower garden without the benefit of other plants.

I am sure others may have a formula for growing *Castilleja linariaefolia*, but for those who would like to grow it for their own gardens, I will list the method I use.

1. Fill a shallow container with an even mix of coarse sand and potting soil (the container should be two to three inches deep with drainage holes, and the soil mix should be sterilized).
2. Thoroughly wet soil mix and let the mix conpletely drain.
3. Place seeds of *Castilleja linariaefolia* on top of moist soil mix. The seed should be 1/4 to 1/2 inch apart. Tweezers are a great tool for planting seed.
4. Cover the seed with approximately 1/8 inch of the same soil mix.
5. To settle the seed into the soil mix, mist the top of the soil with water from a spray bottle.
6. Cover the seed container with plastic wrap and place the container in the center section of the refrigerator (35 to 40 degrees) for one month.
7. At the end of one month, remove the seed container from the refrigerator and place in indirect light at room temperature until the seed germinates. Keep the soil mix moist until germination occurs. At this point it isn't long until tiny red seedlings start to appear.
8. When the first few seedlings appear, place the container in a sunny south or east window for four to six weeks. Water only when the soil mix is fairly dry. Set the container in water and let the soil take up water through the drainage holes. Remove the container from the water when the first sign of dampness appears on the soil surface.
9. After four to six weeks in the window sill the seedlings are now ready to transplant to individual containers. Remove the soil mix and plants from the original container carefully. With a watering can gently wash the soil away from the roots of the plants. Carefully tug on each plant (holding the plant by the leaves) until they are all separated. While you are working leave the plants on a wet paper towel.
10. In individual containers (I use styrofoam cups) spoon in an even mixture of sand and potting soil until the roots and stem of the plant are buried up to the base of the bottom leaves. After transplanting is complete water each container thoroughly and place in a flat.
11. In early April or later, the flats filled with *Castilleja linariaefolia* can be left outside to grow until late summer or early fall. The plants are extremely hardy, but they are better off if protected from hard freezes in the spring. Water only when fairly dry.
12. In August or September remove the container from each individual plant, leaving the root-filled soil undisturbed. Plant the Castillejas among Artemisia and other wildflowers. The soil for Castillejas and its associates should be mixed with gravel and sand for sharp drainage. Irrigation is not necessary, however, watering once every couple of weeks makes the plants

more lush and the flowers brighter and prettier.

The single Castilleja plants that were planted two years ago have now expanded to fairly large clumps of plants and are very bright mixed with Artemisia, lupine, and penstemon. I find that each spring I anxiously wait for the appearance of the first vivid bracts of *Castilleja linariaefolia.*

Good luck! If I can help you, my telephone number is 801-563-3654.

On Herbs and Conservation

Steven Foster

Over the past fifteen to twenty years there has been increasing worldwide interest in medicinal plants and medicinal plant research. The World Health Organization (WHO) estimates that as much as 80 percent of the world's population relies on traditional health care systems, especially herbal medicine, rather than modern Western medicine. For example, over 5000 plants species are used as medicine in China. As much as 60 percent of China's rural population relies on a 2000 year old medical system known as traditional Chinese medicine. The 1985 *Pharmacopeia of the People's Republic of China* lists 500 official plant-derived drugs.

What is less well-known to most Americans is the role of medicinal plants in developed countries. As many as 25 percent of all the prescription drugs sold in the U.S. contain at least one ingredient directly or indirectly derived from flowering plants. Over the past five years, the Japanese have held over 50 percent of new patents on plant-derived chemicals. In Germany, where herbal medicine (phytotherapy) is an accepted medical modality, well-defined pharmaceutical products derived from medicinal plants (phytopharmaceuticals) are widely available. For example, over 280 products which contain various species of the American genus *Echinacea* (purple coneflowers), source of the common garden perennial *Echinacea purpurea*, are registered for medicinal use. They are primarily used as non-specific stimulants to the immune system. Given the pending merger of the European Economic Community (EEC) all drugs laws will be "harmonized" in Western Europe. Since the German medicinal plant drug registration system is the most sophisticated in the Western world, it will serve as the model for development of new EEC regulations, creating a herbal product market of 320 million consumers. Even today, it appears that more indigenous American plant species are used in European medicinal plant products than in American-produced herbal products.

Concurrent with the worldwide interest in medicinal plants comes growing concern for conservation. In a 1989 meeting of countries participating in CITES (Convention in International Trade in Endangered Species of Wild Fauna and Flora), the Himalayan mayapple (*Podophyllum peltatum*), source of a modern anticancer drug, and the Indian snakeroot (*Rauvolfia serpentina*), source of the tranquilizer, reserpine, were added to CITES Appendix II listings. Species not allowed in international trade, such as elephant ivory, are placed in Appendix I. Appendix II listings, such as American ginseng (*Panax quinquefolius*), and now *Rauvolfia serpentina* and Himalayan mayapple, are controlled and monitored in trade, "in order to avoid utilization incompatible with their survival."

In March of 1978, a meeting jointly sponsored by WHO, the International Union for the Conservation of Nature and Natural Resources (IUCN), and the World Wildlife Fund (WWF), was held in Chiang Mai, Thailand, to deal with medicinal plant conservation issues. A result of the meeting was The Chiang Mai Declaration, "Saving Lives by Saving Plants," which recognized "the urgent need for international cooperation and coordination to establish programmes for conservation of medicinal plants to ensure that adequate quantities are available for future generations."

In May of 1988, The Forty-first World Health Assembly endorsed this declaration. According to WHO's Traditional Medicine Programme Manager Dr. O. Akerele, "This Declaration places medicinal plants, their rational and sustainable use, and their conservation, firmly in the arena of public health policy and concerns."

In the United States approximately 140 species of wild-harvested plants enter world botanical markets. About 60 species, many from the eastern deciduous forest, are traded in American health and natural food markets. With the exception of American ginseng (*Panax quinquefolius*), purple coneflower (*Echinacea purpurea*), and a handful of other species, few American medicinal plants are cultivated in appreciable quantities, and virtually nothing is known about how many plants of any given species can be taken each year as a sustainable yield. There are no regulations on the taking of plants, as there are for "harvesting" wild animals. Last year, the U.S. exported 2,359,510 pounds of cultivated ginseng root, as well as 203,440 pounds of wild-harvested root. Some have asked, "Why is it that there is not a legal season for ginseng harvest, as well as the issuance of licences for diggers, just as there is for hunting animals?"

The time has come for the development of scientific data on what constitutes sustainable yields of wild plant harvests (be it for nursery or medicinal use), or to develop propagated, cultivated supplies before once common plants join the fate of the American bison, or worse yet, the passenger pigeon.

Steven Foster, an Arkansas-based consultant, spoke on collection pressures from the herbal trade at the 1990 ENPA meeting. His special interests include medical botany and conservation issues relative to wild harvested medicinal plants.

Reprinted from Bulletin, a publication of the Virginia Native Plant Society, November, 1990.

MUSHROOMS IDENTIFIED ON THE AUGUST 1990 FIELD TRIP CEDAR BREAKS, UTAH

Scientific name	Common name
Agaricus crocodilinus	crocodile mushroom
Agaricus sp	field mushrooms
Amanita muscaria	fly agaric
Amanita pachycolea	
Amylocystis (Polyporus) lapponicus	
Arbitrellys orvinus	
Armillaria bulbosa	
Armillaria mellea	honey mushroom
Armillaria staminea	yellow bracelet
Auricularia auricula	brown ear fungus
Bolbitius vitellinus	manure mushroom
Boletus piperatus	pepper bolete
Catathelasma imperiale	commander
Claveriadelphus borealis	coral fungus
Clitocybe gibba	forest funnelcap
Clitocybe sp	
Collybia acervata	cluster coincap
Collybia maculata var scorzonerea	spotted coincap
Conocybe sp	
Coprinus atramentarius	inky cap
Coprinus micaceus	glistening inky cap
Coriolus abietinus	
Coriolus subchartaceous	
Cortinerius collinitis	greased webcap
Cortinerius glaucopus var alivaceous	bluefoot webcap
Cortinerius infractus	
Cortinerius laniger	hoary webcap
Cortinerius orchalceus	copper-red webcap
Cortinerius rufoolivaceus	
Cortinerius sp	webcap
Cortinerius sp sec telamonia	
Cortinerius trivialis	
Cystoderma sp	grainy caps
Daedalus sp	mazegill
Daeldinia concentrica	
Flammulina velutipes	velvet shank
Fomes igniarius	(bracket fungus)
Fomes pinicola	" "
Fomitopsis pinicola	redbelt
Fuligo sp	
Galerina sp	sculcaps
Geophylum lenzites	
Gymnopilus renidens	
Gymnopilus sp	flamecaps
Hebeloma crustulinaforme	poison pie
Hydnum repandum	spreading hedgehog
Hygorphorus chrysodon	golden-tooth waxycap

Scientific name	Common name
Hygrophorus discoideus	clay waxycap
Hygrophorus erubescens	pink waxycap
Hygorphorus pudorinus	blushing waxycap
Hygrophorus pudorinus var pallida	blushing waxycap
Hygrophorus purpurascens	
Hygrophorus subalpinus	subalpine waxycap
Hygrophorus tephroleucus	spotted stalk waxycap
Inocybe fastigiata	conic fiberhead
Inocybe geophylla	earthblade fiberhead
Inocybe leptophylla	
Inocybe sp	fiberhead
Lactarius areolatus	milkcap
Lactarius scrobiculatus	spotstalk
Leccinum insigne	aspen scaberstalk
Leucoagaricus naucina	smoothcap parasol
Leucpaxillus sp	false funnelcap
Lycoperdon pyriforme	pear puffball
Lyophyllum sp	false funnelcap
Mycena sp	fairy helmets
Oudemensiella longipes	
Pholiota squarosa	shaggy scalecap
Pholiota squarosoides	sharpscales
Pholiota vernalis	spring scalecap
Phyllotopsis nidulans	nestcap
Pluteus cervinus	deer mushroom
Polyporous elegans	
Polyporous sp	pore fungi
Poria sp	
Psathyrella sp	crumble caps
Rumaria largentii	
Russula adusta	
Russula albonigra	pepper-and-salt brittlegill
Russula brevipes	stubby brittlegill
Russula densifolia	dense brittlegill
Russula fragilis	fragile brittlegill
Russula quelatti	
Russula sp	brittlegills
Russula xerampelina	shellfish brittlegill
Sarcodon imbricatus	scaly hydnum
Scutellinia scutellata	eyelash cup
Stropharia ambigua	fringed ringstop
Tremella mesenterica	witches' butter
Tricholomopsis platyphylla	broadgill
Tricholomopsis rutilans	red rider
Tricholoma focale	
Tricholoma saponaceum	soapy cavalier
Tricholoma vaccinum	fuzztop
Tricholoma virgatum	silver streaks
Tuberia sp	
Xeraphalina cauticinalis	

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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PUBLICATIONS

Ornamental Water Gardening: How and What to Grow. The authors are members of the Colorado Water Gardens Society and knowledgeable about what grows well in the Rocky Mountain area. Books are $7.95 each plus $1.50 for postage and handling from The Shereth Group, P.O. Box 6492, Denver, CO 80206.

Creating Landscapes for Wildlife: a Guide for Backyards in Utah is a cooperative publication by the Utah Department of Natural Resources Divison of Wildlife Resources and Utah State University 7Cooperative Extension Service and Department of Landscape Architecture and Environmental Planning. Written by Sue Nordstrom and illustrated by Kathlyn Collins, we've been waiting for this one and it's free, too. Pick it up from the Extension Service, Utah Division of Wildlife, or the Red Butte Gardens Arboretum.

Desert Plants from the Arizona Native Plant Society is a series of publications describing decorative, low water-use plants with a record of good performance in desert southwest landscaping. 1) Ground Covers and Vines, 2) Shrubs, and 3) Trees are available at $2.00 each (includes shipping and handling) from Arizona Native Plant Society, P.O. Box 41206, Tucson, AZ 85717.

The Cooperative Extension Service, Utah State University has numerous publications at nominal prices in which our readers may be interested. The Salt Lake City office is at 2001 South State #S1200, and open weekdays from 8:00 am to 5:00 pm.

Membership Application

❑ New Member ❑ Renewal ❑ Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

- ❑ Student/Senior.....$ 5.00
- ❑ Individual.....$ 10.00
- ❑ Family.....$ 15.00
- ❑ Supporting.....$ 30.00
- ❑ Corporate.....$ 30.00 and up
- ❑ Life.....$250.00

❑ 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:

Pam Poulsen, treasurer,
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 information down and mail it with payment for the category of membership.)

VOL. 14 NO. 5 **SEPT/OCT 1991**

CALENDAR OF EVENTS

Aug. 31
Saturday
all day

Mushroom Hunt in the Uintas with Frank Anderson and Ardean Watts. Meet at the Regency Theatre (near the K-Mart) on Parley's Way at 8:00 am. Bring water lunch. For dinner, bring meat, a potluck contribution, cooking and eating utensils, and a Coleman stove, if you have one, for cooking all those mushrooms.

Sept. 9
Monday

Cache Chapter Meeting. Cache Chapter members will receive a mailing with details.

Sept. 14
Saturday
9:00-3:00

Plant Sale. Our annual plant sale is being held at Millcreek Gardens again this year. We should have a good selection. Just to mention a few...Trees: Mountain Mahogany, Bristlecone Pine, Aspen. Shrubs: Gambel's Oak, River Birchy, Red Osier Dogwood, Serviceberry, Shrubby Cinquefoil. Flowers: Geranium, Columbine, and a new, popular item, wildflower sod. If you have a special request call Dave Okelberry (968-6190) and we will try to get it for you.

Sept. 21
Saturday
3:00-6:00

Public Open House at Red Butte Gardens. There will be music, games, entertainment, and free drinks. Pack a picnic, bring the family and enjoy an afternoon in the gardens.

Sept. 25

Salt Lake Chapter. NO MEETING. This meeting is cancelled in lieu of the State Meeting Oct. 2.

Oct. 2
Wednesday
6:30 pm

UNPS Annual State Meeting. This is our yearly social and potluck to be held this year at Red Butte Gardens. Mike Alder will demonstrate "Food and Materials Found in Hogup Cave," a prehistoric site on the shores of Lake Bonneville. UNPS will provide meat and drinks. Please bring to share an appetizer, side dish or dessert made from a new world plant. See plant list in this issue if you need ideas.

Oct. 14
Monday

Cache Chapter Meeting. Cache Chapter members will receive a mailing with details.

Oct. 23
Wednesday
7:30

Salt Lake Chapter Meeting. To be announced. Meeting will be held at Granite Park Junior High School, 450 East 3700 South, Salt Lake City. Executive Board Meeting at 6:30 pm.

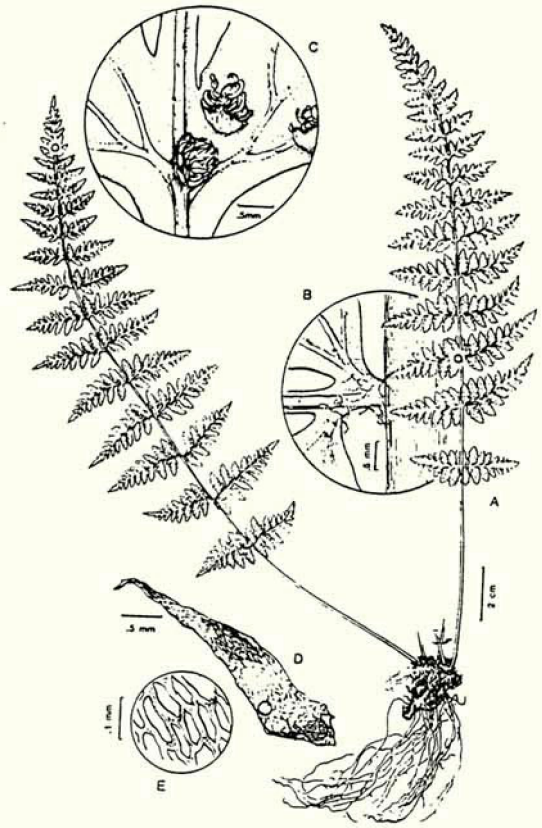
Nov. 21
Wednesday
7:30

Salt Lake Chapter "UFO" Meeting. " Unidentified Flowering Objects" will be the focus of our evening as we bring our photos and slides of flowers we snapped during the past year and haven't yet identified.

NEW UTAH PLANT SPECIES
Meet the Utah Bulblet Fern

Michael Windham
Curator, Garrett Herbarium
University of Utah

The most recent addition to Utah flora was published just last month in the American Fern Journal. Named *Cystopteris utahensis* (Utah Bulblet Fern), this new species was often confused in the past with the common Fragile Fern because of similarities in frond shape. But the Utah Bulblet Fern is distinguished by small glands and scaly bulblets near the tip of the frond (inset C) and dark scales on the underground stem made up of cells with very thick walls (inset E).



The two *Cystopteris* species differ in their habitat requirements and geographic distributions as well. The Utah Bulblet Fern occurs in seepage zones and hanging gardens on sandstone or limestone cliffs, often below 5000 feet elevation. The Fragile Fern is almost never found in such habitats, favoring instead moist, rocky slopes at higher elevations. The most common type of fern in Utah, it has been collected throughout the state but is most abundant in the northern counties. The Utah Bulblet Fern, on the other hand, is currently known only from Grand, San Juan, Kane, Washington, and Utah counties, plus a small number of localities in Arizona, Colorado, and Texas.

Although the Utah Bulblet Fern is uncommon, the failure to recognize it as a distinct species was not due to lack of collection. The species was collected as early as 1913, and most major museums and universities in the western U.S. have at least one example. Delayed recognition of the Utah Bulblet Fern is the result of a simple mathematical relationship. There are too few professional botanists and too many plants that require careful study. Most undiscovered species remain so due to lack of critical observation, not because they are inherently rare. The situation usually doesn't change until someone develops a special interest in that group of plants.

This is where the amateur botanist or weekend naturalist can make a valuable contribution to science. If you have an interest in a certain group of plants, carefully observe them on your outings and get to know all the local species and variations. When you find something unusual--something that doesn't fit in with your past observations--bring it to the attention of a plant taxonomist at a local university or college. This way, our knowledge of local natural history will improve and you may be the discoverer of Utah's newest plant species.

Reprinted from Utah Natural History, Vol. 23, No. 3, June 1991. Botanist Michael Windham is the co-discoverer,with Christopher Haufler of the University of Kansas, of the Utah Bulblet Fern.

TONY GROVE OUTING

UNSP would like to thank Leila Schultz and Brent Shipley for their contributions to the success of the fieldtrip July 12 and 13. Brent filled in "tastefully" at the last moment to prepare the dutch oven dinner on Friday night and the sourdough pancake breakfast on Saturday morning. Leila took one of her few Saturdays off this summer to identify and patiently re-identify the plants in the area for us.

Sharon Coons has agreed to write a report of this event including a partial list of the plants we saw which will be published in the next issue of Sego Lily.

Common Utah Willows

Wayne Padgett

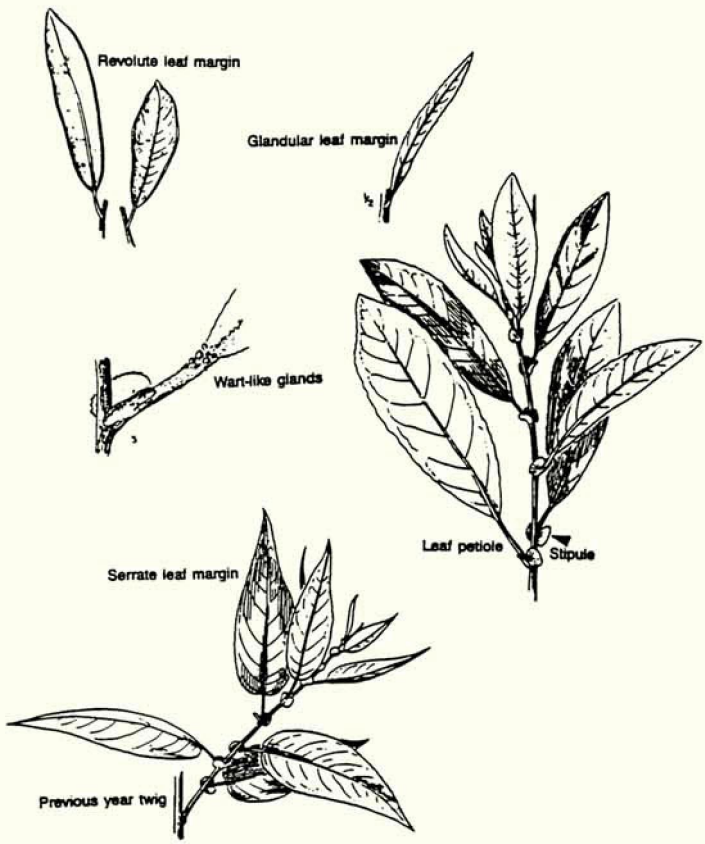
Often, while looking at willows, people cringe at the thought of trying to indentify them to species. Who cares? What difference does it make whether we identify them anyway? In the literature how often have we read about "*Salix* **species**" or "willows", assuming that it really doesn't matter what species it is? But, as land managers and ecologists, we can no longer afford to NOT identify them. With an ever-increasing interest in wetland and riparian ecology and the importance of these ecosystems to nearly all living creatures, we have suddenly found it necessary to begin to learn the taxonomy of willows. In our study of riparian plant communities in the Intermountain West, we have found that different willows occur on different sites. Knowing this, we now can do a better job of using the right species when we get involved in revegetation and rehabilitation projects. Planting a "valley" species of willow in a "mountain" setting will give us nothing but a sore back and a streamside full of dead twigs.

The following key to common willows was developed, with the help of Sherel Goodrich, author of the *Salicaceae* treatment in **A Utah Flora** (Welsh and others 1987), to help individuals identify willows long after the catkins have fallen. Willows typically flower for a short time in the spring and early summer. Because keys to willows are usually developed based on floral characteristics, it becomes nearly impossible to try to identify them when catkins are no longer available. Luckily, willows have vegetative characteristics that distinguish one species from another and one can almost always identify them with or without catkins.

The key was originally designed for use within the boundaries of Utah's National Forests and, while it can be used for adjacent areas, this should be done with the understanding that certain species are not be included. The key was developed primarily from information in **A Utah Flora**. For identifying willows throughout the state and for detailed species descriptions we suggest using this reference.

Not included in this key are three species related to *Salix lasiandra* (*Salix amygdaloides*, *S. gooddingii*, and *S. laevigata*); these species were not included because they rarely occur within the boundary of the Utah Forests. Of these, only *Salix amygdaloides* is widespread in Utah. In addition, some introduced tree species (*Salix alba* and *S. pentandra*) are not included in the key; an attempt was made to include others (*Salix fragilis*, *S. matsudana*, *S.* x *rubens*, and *S. babylonica*) which are more widespread and abundant in some portions of Utah.

Probably most common and the only introduce willow tree species that has naturalized in Utah is crack willow (*Salix fragilis* L.). It is a tall tree with erect, brownish stems and is abundant in some areas, especially in Cache Valley and along the Wasatch Front.



Common vegetative characteristics useful for the identification of willows.

Key Based on Vegetative Characteristics

-	Shrubs depressed, mostly 1-10 (20) cm tall, often forming mats; subalpine or alpine.	**Group I**
-	Mature shrubs typically less than 1 (1.5) m tall. Often of high montane, subalpine and alpine elevations.	**Group II**
-	Mature shrubs or small trees typically taller than 1.5 m at maturity. Low valleys to montane elevations, rarely subalpine.	**Group III**
-	Introduced and cultivated trees, sometimes escaping and widespread in some portions of Utah.	**Group IV**

GROUP I
Alpine Mat Willows
(Typically Less than 10 cm)

1	Leaves green above and glaucous beneath; blades ovate, obovate, orbicular or broadly elliptical; stongly reticulate veiny.	**Salix reticulata**
-	Leaves green above and beneath or slightly paler beneath, NOT glaucous.	**2**
2	Leaf blades linear to narrow elliptic, 6-18 mm long, 1.5-4 mm wide, petioles lacking or to 3 mm long.	**Salix cascadensis** (Cascade Willow)
-	Leaf blades elliptical, narrow elliptic, obovate, or oblanceolate, 11-47 mm long, 6-16 mm wide, petioles 2-12 mm long.	**Salix arctica** (Arctic Willow)

GROUP II
Low Willows
(Typically Less than 1.5 m)

1	Mature leaves permanently pubescent on both surfaces, 1.2-4.2 cm long, 5-13 mm wide, narrow elliptical to linear-lanceolate, entire; twigs yellow to orange when young, bark *not* exfoliating at the internodes; plants high montane to subalpine in the Wasatch Mountains, Uinta Mountains, and the Wasatch Plateau.	**Salix wolfii** (Wolf Willow)
-	Mature leaves not permanently pubescent on both surfaces, glabrous to glabrate, or moderately sericeous or pubescent only beneath; epidermis of bark exfoliating in translucent flakes; similar distribution.	2

-	Wart-like glands absent; leaves 2.5-6 cm long, 8-22 mm wide, elliptical, lanceolate, or occasionally somewhat linear, entire to serrulate, not shiny, often moderately pubescent on both surfaces when young; mid-sized shrubs, rarely over 3 m tall; lower to mid montane species, particularly common on the Utah Plateaus and in the Wasatch Mountains (including all ranges in southeastern Idaho) but also occurring throughout most of the state.	**Salix boothii** (Booth Willow)
4(2)	Twigs of the current or second season strongly prunose.	5
-	Twigs not prunose.	6
5(4)	Leaves dark green above, glaucous *and strongly pubescent* beneath, leaves 2.2-8 cm long, 13-20 mm wide, entire, lanceolate, narrow elliptical, or oblanceolate, often with revolute margins especially when young; rubbing the lower surface of the leaves does not result in a change in leaf color; at least some stems bright green or yellow; typically montane species, common in the Wasatch Mountains but also occurring throughout most of the state.	**Salix drummondiana** (Drummond Willow)
-	Lower leaf surface typically not strongly pubescent when mature; leaves 2-4.5 cm long, 8-12 mm wide, entire, narrow elliptical, elliptical to narrow lanceolate, margins not revolute; lower leaf surface darkens when glaucous bloom is rubbed; stems commonly dull gray-purple; typically lower montane to sagebrush zone species, occurring in most of the area but not known on the Monticello and Moab Districts (Grand and San Juan Counties) of the Manti-LaSal National Forest.	**Salix geyeriana** (Geyer Willow)
6(4)	Twigs lustrous black to purplish black with bark exfoliating in translucent strips; leaves dark green above, glaucous and glabrous below, 1.2-3.8 cm long, 4-13 mm wide, elliptical or narrow elliptical, typically entire; plants upper montane to subalpine; known from the Fishlake Plateau and at moderate elevations in the Uinta Mountains.	**Salix planifolia** var. **planifolia** (Plainleaf Willow)
-	Twigs not lustrous, color variable but bark not exfoliating in translucent strips; other characteristics variable. While each of the following species is unique, and with experience easily distinguished, they are difficult to separate based on descriptive vegetative characteristics; the following are strictly guides for identification.	7
7(6)	Leaves glabrous on both surfaces when mature, entire or serrulate, never crenate, crenate-serrulate, or undulate-crenate, margins never revolute; leaves lanceolate to elliptical; stipules often very well developed; older stems often grayish-white; widespread, typically lower montane to valley species throughout most of the state.	**Salix lutea** (Yellow Willow)

2(1)	Twigs black to purplish-black, glabrous and lustrous (rarely glaucous); leaves dark green and glabrous above, 1.2-3.8 cm long, 4-13 mm wide, elliptical or narrow elliptical; upper montane to subalpine, often of very wet soils in the southern Wasatch Mountains, Uinta Mountains, and Wasatch Plateau.	**Salix planifolia** var. **monica** (Plainleaf Willow)
-	Twigs often reddish or dark beneath moderate to dense pubescence, never lustrous, sometimes glaucous; leaves pubescent to glabrous; other characteristics variable.	3
3(2)	Leaf glaucescence variable; leaves elliptical, entire or occasionally serrate, pubescent when young becoming glabrous to glabrate in age; branchlets occasionally glaucous often with a tuft of pilose hairs at the nodes; plants of supalpine to alpine slopes, often on well drained sites in the Wasatch and Uinta Mountains on acidic and calcareous soils.	**Salix glauca** (Glaucous Willow)
-	Leaves strongly glaucous beneath; leaves elliptical, broadly lanceolate, or almost linear, entire, thinly to moderately sericeous on both sides; branchlets dark or reddish (lighter than **S. planifolia**) beneath dense pubescence; typically of calcareous soils in the Wasatch Mountains, Uinta Mountains, and Wasatch Plateau.	**Salix brachycarpa** (Barren-ground Willow)

GROUP III
Shrubs or Low Trees
(Typically Greater than 1.5 m)

1	Leaves linear, 10 to 30 times longer than wide, glabrous to densely pubescent (varietal differences), entire to minutely toothed; strongly colonial species (stems arise individually from underground root systems); typical at lower elevations throughout the state.	**Salix exigua** (Coyote or Narrowleaf Willow)
-	Leaves otherwise; stems many from a large root crown; low to moderately high elevations.	2
2(1)	Leaves *not* glaucous beneath, glabrous to somewhat pubescent on both surfaces; more or less green on both surfaces.	3
-	Leaves glaucous and/or strongly pubescent beneath; upper leaf surface variable but typically glabrous to glabrate at maturity.	4
3(2)	Wart-like glands on the upper side of leaves near the base of the blade, occasionally extending to the upper portion of the petiole; leaves 5.5-11 cm long, 12-21 mm wide, lanceolate, serrate, **often shiny**, with a distinctly narrowing tip; large shrubs or small trees, commonly over 3 m tall; typically lower montane to valley species throughout much of the state.	**Salix lasiandra** (Caudate or Whiplash Willow)

-	Leaves variously pubescent on at least the lower surface when mature, crenate, crenate-serrulate, or undulate-crenate, some species with revolute margins, especially when young; stipules often less conspicuous (except some specimens of **Salix monticola**); distribution either limited to certain areas or plants occur at higher elevations.	8
8(7)	Plants of low elevations in counties of the Great Basin in western Utah; lower leaf surface more or less pubescent at maturity; leaf margins often revolute, especially when young.	**Salix lasiolepis** (Arroyo Willow)
-	Plants more widely distributed, typically at higher elevations; leaf margins sometimes revolute, but then other characteristics differ.	9
9(8)	Veins not prominent and raised on lower leaf surface; midsized willow rarely over 5 m tall; lower stems typically less than 4 cm thick; plants very uncommon in Utah (much more common in the mountains of western Colorado) and apparently restricted to the Sevier and Paunsaugunt Plateaus and the Abajo Mountains; this species is closely related to **Salix boothii** and **Salix lutea** and often resembles either - reproductive characteristics are likely necessary to positively separate these species.	**Salix monticola**
-	Veins often prominent and raised on lower leaf surface; mature plants often over 5 m tall or with lower stems over 4 cm thick; plants widespread at mid to moderately high elevations.	10
10(9)	Plants typically highly branched, often rounded and more or less tree-like in appearance; often growing from a thick, highly furrowed basal trunk; leaves 1-4 cm long, 1.2-2 cm wide, dark green above, glaucous beneath, pubescent when young on both sides becomming glabrous above with few hairs beneath on midrib (not rusty color); bark of plants, when crushed or stripped, never with skunk-like odor; plants of riparian ecosystems or if present on a well drained site then typically not as an understory component of aspen and conifer communities; widespread montane species but commonly not forming distinct communities except on the southern plateaus (especially the Aquarius Plateau) and in the Abajo Mountains.	**Salix bebbiana** (Bebb Willow)
-	Plants not highly branched though often fairly tall; rarely growing from an individual, deeply furrowed basal trunk; leaves 2-6 cm long, 1-3 cm wide, dark green and glabrous above, strongly glaucous beneath, sparsely puberulent with translucent whitish or *rusty* minute hairs, or occasionally densely felty-villous; bark of plants, when crushed or stripped, often has a faint skunk-like odor; montane species of well-drained slopes, most often in aspen and conifer communities or occasionally roadside ditches.	**Salix scouleriana** (Scouler Willow)

GROUP IV
Introduced Tree Willows
(Typically Greater than 5 m)

1	Branches "weeping", long pendulous.	**Salix babylonica** (Weeping Willow) or **Salix** x **blanda** (Wisconsin or Niobe Weeping Willow)
-	Branches not weeping, more or less erect.	2
2	Branches with orange to orangish-yellow twigs.	**Salix x rubens** (Golden Willow)
-	Branches with twigs colored otherwise.	3
3	Trees with conspicuously semi-globose or umbrella-shaped canopies. - branches twisted and contorted. - branches not twisted or contorted.	**Salix matsudana** (Corkscrew Willow) (Umbrella Willow)
-	Trees without the above shaped canopies; branches very fragile and easily broken.	**Salix fragilis** (Crack Willow)

Literature Cited

Welsh, S.L., N.D. Atwood, L.C. Higgins, S. Goodrich. 1987. A Utah flora. Great Basin Naturalist Memoir No. 9. Provo, UT: Brigham Young University, 894 p.

NEW WORLD PLANT LIST

Pam Poulsen
UNPS State President

Let's take a closer look at some of the food gifts of the New World to help you decide what to bring to the UNPS State Meeting at Sugarhouse Park on Thursday, Oct. 5. (See the Calendar of Events for details.) Be imaginative in your selection. We'll have a Taster's Choice prize for the winning cook. Below is a list of some of the plants you can choose from. Uncommonly eaten items are not included below, but are fair game as admission (i.e., Cattail shoots, Camas lily bulbs, Miner's lettuce, etc.)

Pineapple (*Ananas* spp.) - Tropical South America
Potato (*Solanum tuberosum*) - Andes
Pottowattamie plums (*Prunus americana*) - North America
Tobacco (*Nicotiana tabacum*) - Tropical America
(If you like to chew)
Tomato (*Lycopericon* spp.) - South America
(What did the Romans use on pasta?)
Sunflower (*Helianthus annuus*) - Ubiquitous!
Jerusalem artichoke (*H. tuberosa)* - ditto
Cranberry (*Vaccinium macrocarpon*) - North America
Pumpkin (*Cucurbita pepo*) - North America
Winter squash (*C. mixta*) - North America
Crookneck squash (*C. moschata*) - North America
Banana squash (*C. maxima)* - South America
Corn (*Zea mays*) - Central America
(How about some popcorn?)
Cocoa (*Theobroma cacao*) - Mexico, Central America, Brazil (Chocolate always welcome)
Coca(ine) (*Erythroxylon coca*) - Peru and Bolivia
(Not allowed)
Prickley pear cuctus (*Opuntia* spp.) - Throughout
Chili peppers (*Capsicum* spp.) - Central America
Red and green peppers (*Capsicum* spp.) - Central America
Cashew (*Anacardia occidentale*) - Tropical America
Tapioca (*Manihot* spp.) - South America
Guava (*Psidium* spp.) - South America
Avocado (*Persea americana*) - Tropical America
(A party without guacamole?)
Tequilla (*Agave* spp.) - Central America
Mescal(ine) (*Agave* spp.) - Central America
(Don't you dare!)
Sarsaparilla (*Smilax* spp.) - Central America
Sassafras (*Sassafras* ssp.) - North American
(Native American beer)
Blackberry/Dewberry (*Rubus* spp.) - North America
Blueberry/Huckleberry (*Vaccinium* spp.) - North America
Chokecherry (*Prunus virginiana*) - North America

UNPS THREATENED AND ENDANGERED SPECIES CONFERENCE

Brent Shipley
UNPS Conservation Chair

UNPS sponsored the Threatened and Endangered Species Conference held 20-22 July, 1991. The conference opened at noon on Thursday at Panguitch High School in Panguitch, Utah. Ben Franklin, co-chair for the conference, welcomed the attendees and gave an overview of the planned conference activities. Pam Poulsen, the other co-chair, had assisted with the arrangements for the conference but was unable to attend due to other commitments.

Alice Hreha, a Ph.D. candidate at the University of Utah, presented a synopsis of her studies of endemics and the environmental conditions which contribute to their limited distribution. Endemics are typically rare plants of very limited distribution found only at one to a few locations where unique environmental conditions seem to favor their growth and reproduction. It was noted that endemics are often small and inconspicuous and generally occur on sites which are relatively inhospitable to other plants and that the endemics seem to enjoy some competitive advantage on these sites. However, the nature of the competitive advantage is not understood in many instances. Following Alice's presentation, the conference attendees traveled to her study site southeast of Panguitch at Red Canyon, along Highway 12, in Dixie National Forest.

After Alice's study area, the tour moved further east to another site where endemics occur on soils which have developed from red limestone beds of the Claron Member of the Wasatch Formation. Conference attendees received a brief introduction to this site on Thursday afternoon, then returned to the site on Friday morning to survey the local area for endemics, and lay out boundaries to be included in a proposal for a botanical area. The group participated in selecting a name for the site. It was decided to call it the Claron Botanical Area. This name will be used by Nick Van Pelt of The Nature Conservancy in a proposal to the U.S. Forest Service to designate and manage the site as a special botanical area. Conference attendees were assisted in the identification of 14 sensitive and/or endemic, or otherwise seldom seen plants. Narrow endemics (those found only on the Claron member of the Wasatch Formation) include Castilleja parvula var. revealii, Cryptantha ochroleuca, Eriogonum aretioides, Oxytropis jonesii, and Penstemon

Penstemon bracteatus

bracheatus. Endemics found on the Claron and other members of the Wasatch Formation include Cymopterus minimus, Eriogonum panguicense, Lomatium minimum, Penstemon caespitosa, and Townsendia minima. Others of interest were Aquilegia scopulorum, Phlox gladiformis, Lesquerella rubicundula, Linum kingii and Silene petersonii.

Following the official tours on Thursday evening, five adventure-seekers from the group were led by Ben Franklin on a daring challenge of the elements and a very steep mountain in a quest to find a new plant species. Fortunately, and thanks to the combined skill and cunning of the group, not one of the adventurers fell off the side of the mountain.

Following the survey of the proposed Claron Botanical Area on Friday, conference attendees were conducted by Duane Atwood, Regional Botanist for the Forest Service and Ben Franklin, Botanist for the Natural Heritage Program, on a botanical tour of endemics and other special interest areas. Neophytes on the tour were gifted with the experiences and plant knowledge shared by some of the best botanists in the state. The group examined Artemisia pygmaea near the Cannonville junction, Lesquerella tumulosa south of Cannonville, Primula incana near Henrieville, and Sphaeromeria capitata somewhere in no-man's-land. They got excited over a penstemon growing along the side of the road which was thought to be a new species. They visited Grosvenor Arch (in another no-man's-land) and were treated to a stunning vista looking across a third no-man's-land towards the Kaiparowits Plateau and a distant Lake Powell.

Some of the most durable and persevering conference attendees joined forces with Ben again on Saturday and toured additional areas and discovered more delightful plants as they circled back to northern Utah and home.

The conference was a great success and the only sad part of the whole weekend was that more of you weren't there to enjoy it with us. But then, of course, we didn't let that stop us from enjoying it to the max!

Phlox gladiformis

UNPS HOLDS INTERIM THREATENED AND ENDANGERED CONFERENCE

Andy Boyack
UNPS Fieldtrip Chair

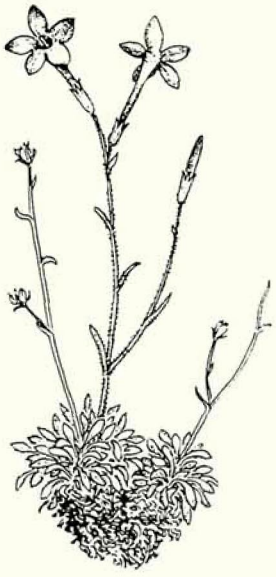
The Native Plant Society spent most of its time at the scheduled Panguitch T/E conference June 20 and 21 helping the Forest Service select a site for a botanical area in the Bryce Canyon vicinity. The work of the conference on recommendations for the Federal listing of T/E plants was postponed until fall when more summer study information and more key personnel would be available.

The Red Canyon area contains many endemic and rare plants. It has been proposed that an area be selected containing as many of these plants as possible and be designated a botanical area. The Forest Service people in our group knew of several sites for

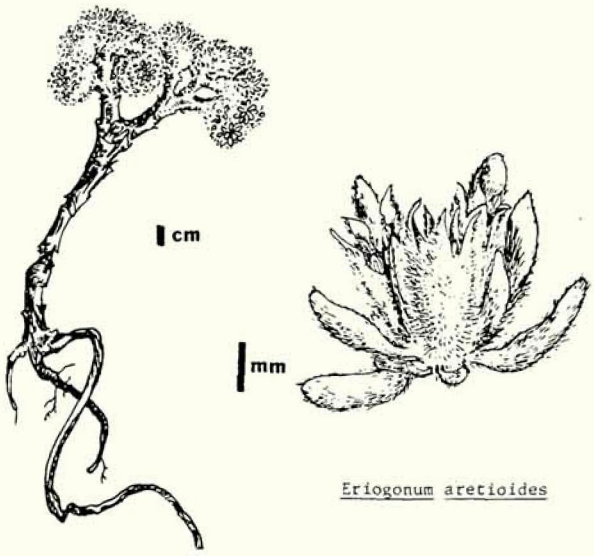
consideration and suggested that as a UNPS group we help in selecting the best site. A ridge in the Red Canyon watershed north of Wilson Peak proved to be the favorite and we spent the better part of two days exploring it. The area consisted of a rocky ridge and adjacent slopes in an open forest predominently Ponderosa Pine but interspersed with Limber Pine, Bristlecone Pine, Rocky Mountain Juniper and Subalpine Fir. The understory at an elevation of 7500 feet was mainly Manzanita. We found nearly 30 different species of plants and shrubs in the area, some of which were endemic. Of particular interest was the Buckwheat *(Eriogonum aretoides)* dotting the top of the ridge with pincushion-like mounts of plants 1 to 8 inches in diameter.

Friday night we had a memorable dutch oven dinner at the Red Canyon campground cooked by the Forest Service people. The menu included chicken, scalloped potatoes, scones, and peach and cherry cobbler. Jo Stolhand furnished a green salad.

We returned to Salt Lake by way of the Box-Death Hollow Primitive Area and the Aquarius Plateau. In the Primitive Area two endemics were found, the Jones Goldenaster *(Heterotheca jonesii)* and *Lepidium montanum* var. *neeseae.* The Aquarius Plateau contained extensive areas of flat grassland dotted with fir spruce woods at an elevation above 9000 feet. *Townsendia minima* was in bloom near an enclosure where we stopped to look for *Castilleja aquariensis* , Aquarius Plateau Paintbrush. The final find of our trip was the beautiful *Gilia caespitosa* in full bloom, to which Ben Franklin led us, on cliffs near Bicknell. Dr. Welsh tells us that this species was first discovered by the Powell survey in 1875 but remained obscure until it was rediscovered in 1947.



Gilia caespitosa



Eriogonum aretioides

Many of the plants mentioned in this report were photographed by members of the expedition and it is expected that slides of these will be available at our UFO meeting in November.

SL CHAPTER REVISITS ALBION BASIN

Andy Boyack
UNPS Fieldtrip Chair

The Nature Study Society joined our UNPS Salt Lake Chapter on Saturday, July 27, for the annual Albion Basin fieldtrip. Kaye Thorne, curator of the herbarium at Monte L. Bean Museum, BYU, did a wonderful job as a guide. Although she had never been in Albion Basin she was conversant with all the plants there.

Albion Basin was a veritable garden of wild flowers in bloom. The predominant flowers were Polemonium (Polemonium foliosissimum, Indian Paint Brush (Castilleja sp.), Colorado Columbine (Aquilegia caerulea), Blue Stickseed (Hackelia floribunda), and on south-facing slopes, Lupine (Lupinus argenteus) and Ivesia (Ivesia gordonii). More than 50 different species were in bloom.

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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It is interesting to compare Albion Basin with Tony Grove Lake which the UNPS visited on a field trip two weeks ago. Both are glacier cirques and both contain contact zones between limestone and quartzite which may partially account for the wide range of plant species found in them.

Our trip started at the base of the Basin and led upward onto the steeper north-facing slopes to Secret Lake. Kaye pointed out that several plant species that were normal size at the lower elevations became progressively shorter and smaller at the higher elevations. Yarrow (Achillea millefolium), for instance, normally 20 to 24 inches tall, was only 4 inches high. Penstemon caerulea, normally 20 inches was also 4 inches, and one speciman at the lake was only 2 inches tall. We found an Evening Primrose (Oenethera sp.) that was only 1 1/2 inches high with lavender flowers less than 1/8 inch in diameter. These north facing slopes are covered with snowbanks into late spring and early summer so the growing season is short, which may account for the smaller plants.

Many plant species were found on the rocky slopes, including Flaxflower (Linanthus nuttallii), Prince's Pine or Pipsissewa (Chimaphila umbellata), Buttercups (Ranunculus sp.) and Sibbaldia. In a wet location was a patch of blue Polemonium, possibly Polemonium pulcherrimum, and we found one Coralroot Orchid, (Corallorhiza maculata) in a grove of Spruce trees.

Oops. Apologies to Jim Morris. He is the author of "Propagation and Use of *Castilleja linariaefolia* in Native Plant Landscaping" published in the July/Aug. 1991 issue of Sego Lily. He was incorrectly identified as Jim Harris. His phone number as given in the article is correct.

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Sego Lily

Newsletter of the Utah Native Plant Society

VOL. 14 NO. 6 **NOV / DEC 1991**

CALENDAR OF EVENTS

Nov. 4
Monday
7:00 pm

Cache Chapter Meeting. Leila Shultz will speak on "The Flora of North America Project." Meet at the Intermountain Herbarium, Utah State University, Logan, Utah.

Nov. 13
6:30 pm

UNPS Executive Board Meeting. Granite Park Jr. High, Room B-17.

Nov. 13
Wednesday
7:30 pm

Salt Lake Chapter "UFO" Meeting. " Unidentified Flowering Objects" will be the focus of our evening as we bring our photos and slides of flowers we snapped during the past year and haven't yet identified. Bring your pictures and let our experts identify them for you. Granite Park Jr. High, Room B-17, 450 East 3700 South, Salt Lake City.

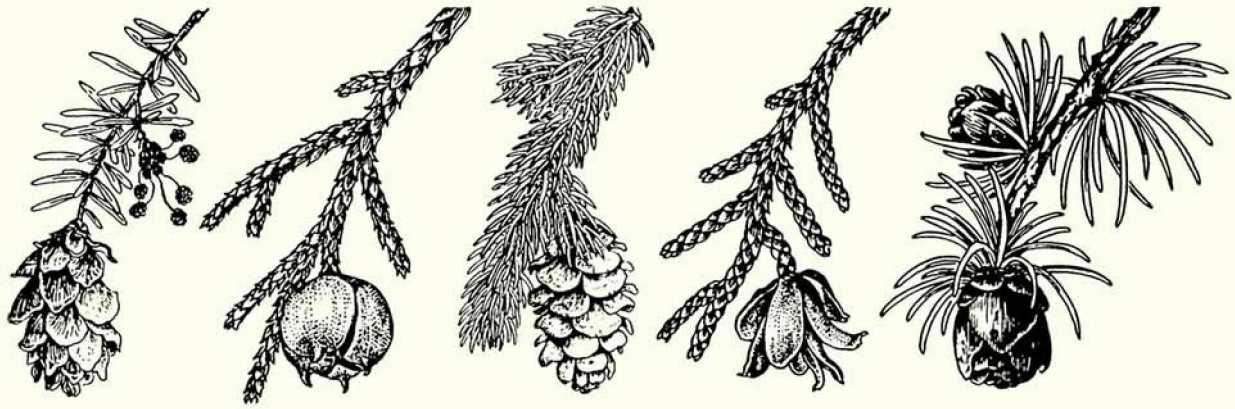
Dec. 13
Friday, 6:00

Cache Chapter Christmas Potluck at Robert Fitts' house, 368 East 300 North, Logan, Utah.

Dec. 25

Seasons Greetings. No meeting this month for Salt Lake Chapter.

The Sego Lily is published six times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Contributions to the newsletter are welcomed and should be sent to the editor, Jo Stolhand, P.O. Box 520041, Salt Lake City, UT 84152-0041. Please state whether articles have been published elsewhere and require publisher's permission. The editor reserves the right to edit as needed and to select suitable articles for publication. Calendar items of interest to our membership are requested.



S E A S O N S G R E E T I N G S

PROPOSED CLARON BOTANICAL AREA

Nick Van Pelt
Utah Public Lands Coordinator
The Nature Conservancy

Introduction

The Red Canyon area of southwestern Utah, not far from Bryce Canyon National Park, is renowned for its botanical rarities. Here are a dozen or more herbaceous, endemic species or varieties growing on very exposed soils. These are derived from the white or red limestone beds of the Claron Member of the Wasatch Formation. The themes of plant endemism and adaptation to harsh conditions (intense sunlight, freeze/thaw cycles, torrential rains, and rapid erosion) are especially well-displayed in Red Canyon. This is a beautiful part of the Dixie National Forest, through which thousands of visitors pass enroute to and from Bryce Canyon.

During surveys of Claron Member endemics and other relatively rare plants, personnel of the Dixie's Powell Ranger District identified an oval-shaped, unnamed area that harbors nearly all of these special plants (endemic, officially Sensitive, or otherwise noteworthy in this setting). This discovery prompted surveys of the site, just north of Wilson Peak, as a potential Special Interest (Botanical) Area.

According to the Forest Service Manual, a Botanical Area "...is a unit of land that contains plant specimens, plant groups, or plant communities that are significant because of their form, color, occurrence, habitat, location, life history, arrangement, ecology, rarity, or other features". The Regional Forester has the authority to designate Botanical Areas nominated by forest or district personnel, the scientific community, or native plant societies. The Powell District has encouraged the Conservancy and the Native Plant Society to inspect the area and help designate it if it qualifies.

The purpose of a Claron Botanical Area (CBA), the first of its kind in Utah, would be to highlight its rare plants, habitats, and forests for public enjoyment and education, while protecting these features from impacts originating on adjacent lands. The only other administratively protected site nearby, the Red Canyon Research Natural Area, has rare plants and similar habitats. However, public use is discouraged because it is a strict scientific preserve.

Location and Access

The proposed CBA is located in western Garfield County, Utah, southeast of Panguitch. Its northern edge lies southeast of the Red Canyon Visitor Center, a prominent stopover on the highway to Bryce Canyon. To reach the area, one drives to the summit of Red Canyon, and takes Forest Road 113 to the south. After proceeding from 1.7 to 2.0 miles on this logging and firewood-cutting access road, the area can be reached via a short walk westward through ponderosa pine. The vegetation suddenly becomes more open, affording easy walking and full views northward of the area's ridge and ravines. The area's openness and colorful beauty invite year-round exploration and contemplation. Both access into and through the area are possible for visitors with a wide range of physical abilities, and involves a short detour from the major tourist byways.

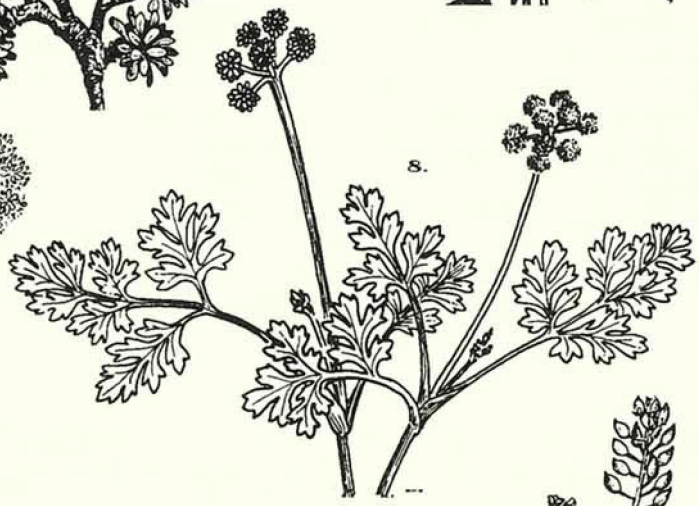
Land Status, Uses, and Management

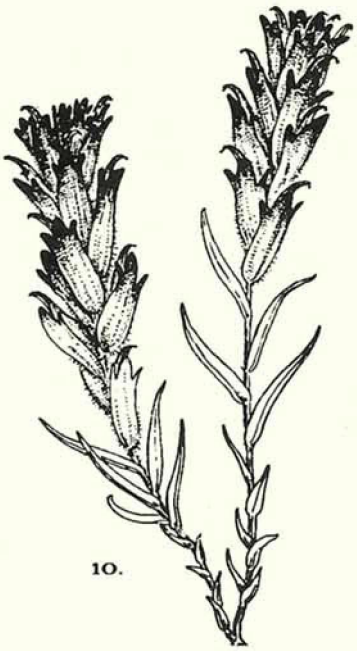
The proposed CBA is entirely Dixie National Forest land. The area appears to be more or less evenly divided between Management Areas 2A ("Semiprimitive Recreation") and 7A ("Wood Production and Utilization"). However, no timberland suitable for silviculture and harvest occurs within the area, which is also unused by firewood cutters. The "2A" designation in Red Canyon carried a No Surface Occupancy restriction on exploration for and development of leasable minerals.

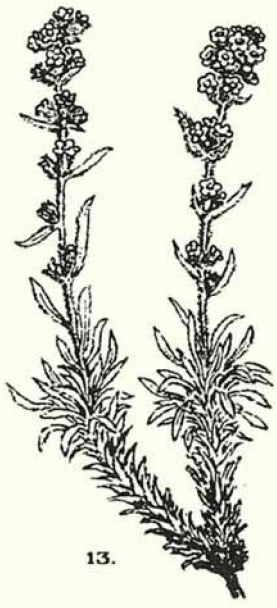
The area supports negligible forage resources and has no cattle, horse or sheep grazing. Current recreational use is very light and transient, as no trails pass through the area and it is seemingly not game habitat. Campgrounds, landing strips, utility corridors, signs or administrative sites are absent. No mining claim markers or prospecting evidence was seen. Evidence of past, largely healed, human disturbance takes the form of very scattered stumps in the area's uplands and selective cutting at its lower, northern end. Off-road vehicle travel is prohibited, and no tire tracks are evident.

Significance of Specimens, Groups, or Communities of Plants or Animals

The area's significance and candidacy as a botanical area are based on the presence, in some abundance and in a striking environment, of fourteen plant species or varieties of species (see Plant Quiz). These are endemic to the Claron Formation, considered Sensitive by the Regional Office, and/or rare in Utah. Collectively they are herein termed "special".







____ Aquilegia scopulorum (no picture)
____ Castilleja parvula var. revealii
____ Cryptantha ochroleuca
____ Cymopterus minimus
____ Draba subalpina
____ Eriogonum aretioides
____ Eriogonum panguicense
____ Lesquerella rubicundula
____ Lomatium minimum
____ Oxytropis jonesii
____ Penstemon bracteatus
____ Phlox gladiformis
____ Silene petersonii
____ Townsendia minima

Special plants of the Claron Formation and their occurrence in the proposed Botanical Area.

Scientific Name	Generalized Habitat
Aquilegia scopulorus	BW
Castilleja parvula var. revealiii	P/MF, BW
Cryptantha ochroleuca	BW
Cymopterus minimus	BW
Draba subalpina	P/MF, BW
Eriogonum aretioides	BW
Eriogonum panguicense var. panguicense	BW
Lesquerella rubicundula	absent in area
Lomatium minimum	BW
Oxytropis jonesii	BW
Penstemon bracteatus	P/MF, BW
Penstemon caespitosa	BW
Silene petersonii	BW
Townsendia minima	P/MF, BW

KEY: BW = Bristlecone Woodland
P/MF = Ponderosa/Manzanita Forest

A list of "ordinary" plant species observed within the proposed Botanical Area on June 21-22, 1991.

Common names are supplied for trees and shrubs only. A (t) means that just one or a very few individuals of the species were noted.

Trees

Abies concolor (t)	White fir
Pinus ponderosa	Ponderosa pine
Pinus flexilis	Limber pine
Pinus longaeva	Great Basin bristlecone pine
Pinus edulis (t)	Rocky Mtn. pinyon pine
Pseudotsuga menziesii (t)	Douglas-fir
Juniperus scopulorum	Rocky Mtn. juniper
Juniperus osteosperma	Utah juniper
Picea pungens	Blue spruce

Shrubs

Amelanchier utahensis	Utah serviceberry
Cercocarpus ledifolius (t)	Curlleaf mtn. mahogany
Holodiscus dumosus	Mountain spray
Potentilla fruticosa	Shrubby cinquefoil
Tetradymia canescens (t)	Spiny horsebrush
Arctostaphylos patula	Greenleaf manzanita
Juniperus communis	Common juniper
Purshia tridentata (t)	Antelope bitterbrush
Rosa sp. (t)	Native rose

Forbs

Hymenoxys acaulis
Haplopappus armeroides
Berberis repens
Senecio cana
Linum kingii
Phlox gladiformis
Linum lewisii
Arenaria sp.
Erigeron vagus
Colanthus crassicaulis
Apocynum cannibinum
Lithospermum ruderale
Hymenopappus filifolius
Pedicularis centranthera
Machaeranthera grindeloides
Euphoria glyptosperma
Euphorbia brachycereus
Swertia radiata
Senecio multilobatus
Eriogonum alatum
Cirsium arizonicum
Oenothera caespitosa
Symphoricarpos oreophilus
Chrysothamnus sp.
Cryptantha sp.
Zigadenus paniculatus

Graminoids

Carex rossii (t)
Elymus scribneri (t)
Bouteloua gracilis (t)
Stipa comata (t)

Occurrence, Habitat and Location

Although present, the special taxa display quite different abundances and distributation patterns. Some occur in profusion, but only in a part of the area, whereas others are always sparse yet can be found discontinuously throughout the site. Thus, the taxa takes various "forms of rarity", such as "locally abundant in a specific habitat but restricted geographically", or constantly sparse and geographically restricted to a specific habitat".

The bristlecone pine woodland has all of the taxa, but the forest with which it intergrades also has some. No populations have yet been mapped, but Widtsoe buckwheat has probably the most obvious and sharply delimited distribution--the southern ridgelines, knolls and bowl. Reveal paintbrush and rock columbine are two other colorful species for which a vivid picture of distributional habits is easily gained. The remaining special species and varieties are more cryptic in form and scattered in occurrence, necessitating closer searches. Penstemon bracteatus appears to be the only endemic or Sensitive plant growing in places of past logging disturbance, at the north end.

The "ordinary" flora of the area is fairly rich, with additional species to be discovered at other times of the year. Some of these plants, both woody and herbaceous, can augment the "story" told by the endemics. For example, Linum kingii and Phlox gladiformis (Cedar Canyon phlox) are quite abundant all throughout the area, perhaps more so than elsewhere in their range. They may be responding to competitive release in the sparse, duff-free understory communities here.

Suitability for Special Interest Area Status

We propose three kinds of criteria for assessing the area's candidacy. The first is based on demonstrable botanical and ecological significance; the second on accessibility and interest to recreational and educational publics; and the third in harmony with land uses, management plans, and public (particularly local) sentiment regarding administrative setasides. The Forest Service Manual requires fulfilling the first two of these in particular, and it is the Dixie's policy to consult and involve county interests before making restrictive zoning decisions.

The area appears to qualify very well on all three counts. The special plants exhibit attributes of "occurrence", "habitat", "arrangement" and "rarity" that are outstanding. Furthermore, the bristlecone woodland has "form" and "ecology" characteristics worthy of preservation and interpretation. Forests like these are exceedingly slow-growing, and comparatively limited in extent in North America. They typically harbor many endemic plant species while demonstrating how trees can colonize and ameliorate very unproductive soils.

Although an access road was built for timber harvest and firewood cutting, it is easily traveled by passenger cars in dry weather. The short drive and hike to the area mean that it is highly accessible to a very broad gamut of visitors. A parking area and overall interpretive display could be easily sited on the level, well-drained terrain outside the boundary. In addition to the richness and adaptations the plants display, there is an opportunity to explain the Forest Service's Sensitive species program and the steps agencies and plant lovers can take to perpetuate rarities without necessarily invoking the Endangered Species Act. Designation and publicization of the area could draw, inspire, and educate hundreds of visitors annually.

Impacts and Possible Conflicts

We detected no impediments to designation. The area appears entirely free of economic resources, Forest improvements, hunter camps, or recreational attractions other than natural history. Livestock permittees, loggers, ORV enthusiasts and firewood cutters would not be inconvenienced by designation. There is no forage here, the forests are already classified as unsuitable, cross-country vehicle travel is prohibited and firewood cutters can find abundant down wood in harvest areas nearby and much closer to roads. Both living and dead bristlecone pines are protected from cutting, as well.

The Forest Service will need to ascertain the area's oil and gas lease status, the presence of an valid mining claims, and whether utility-corridor or communications-facility proposals would affect the area. It is quite unlikely that any of these conflicts or encroachments would materialize or that a specific individual or firm will object to Botanical Area designation. Garfield County representatives will scrutinize the proposal, but will probably concur with it if the acreage remains small and the area's purposes are clearly explained.

Management Prescription

When the area is designated, we recommend that the Forest Service and interested parties:

1) Develop guidelines for the area's stewardship, and a public brochure.
2) Not fence the boundary.

3) Consider parking-area, trail and sign installation
4) Allow the area to remain shaped by natural forces only.
5) Withdraw the CBA from mineral entry.
6) Patrol the area to prevent vehicular entry, plant collecting, and woodcutting.
7) Have information and directions available at the Red Canyon Visitors Center.

Editor's Note: The UNPS Board of Directors voted unanimously to support with funding the designation process for the Claron Botanical Area.

Illustrations in this issue are by Kaye Thorne.

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ANNUAL STATE MEETING

Jo Stolhand
UNPS State President

Now, if Mike Alder had gotten us started earlier in the day making nets from the baste fiber of milkweed or if Brent Shipley had knapped out an arrowhead before nightfall, we might not have had to resort to eating the domesticated descendant of Meleagris gallopavo. As it was, the annual New World Potluck was easier, and of greater abundance and variety than prehistoric native Americans ever dream. Set in the fading light of Red Butte Gardens, everyone enjoyed an evening of feating, fun and friendship.

By lantern light after dinner, Mike Alder, ecologist, businessman and founding member of UNPS, demonstrated net making. Large nets have been found in caves that would have looked over Lake Bonneville. It is speculated that a net was strung across a narrow canyon and game was chased through the canyon and into the net. Mike also spoke of other foods gathered by prehistoric Americans as evidenced by remnants in caves.

Brent Shipley demonstrated the art of knapping arrowheads. Brent used obsidian, leather protective gear, and a deer antler to chip out a point. A rather sharp point it was, too.

The annual state meeting is also the time we ratify next year's officers and board members. The following people have accepted and were approved by the attending membership to hold office in 1992.

Thanks are extended to all who shared favorite recipes, who helped with set-up and clean-up, and each of you whose presence added to the enjoyment of the evening.

MUSHROOM HUNT 1991

Dave Okelberry
UNPS Education Chair

On the morning of August 31, sixty-six faithful souls headed for the mountains for the mushroom hunt led by Dr. Frank Anderson. We were also accompanied by three Forest Service people. Dr. Anderson guided us through the same country he had in the past, showing us where to find all kinds of mushrooms. Midafternoon we stopped above Trail Lake for a potluck dinner/steakfry. Everyone had all the mushrooms they could eat. There were many species to try.

The weather was perfect and all had an enjoyable time hunting the mushroom. As we headed for home many trunks were full of mushrooms to dry for winter feasts.

We are still hoping to go to Boulder Mountain next year. See you there.

PINYON PENSTEMON

Ben Franklin
Utah Natural Heritage Program

(Portions of the following are condensed from a report prepared as an end product of a 1990 point agreement entered into between the Dixie National Forest [DNF] and the Utah Natural Heritage Program [UTHP]).

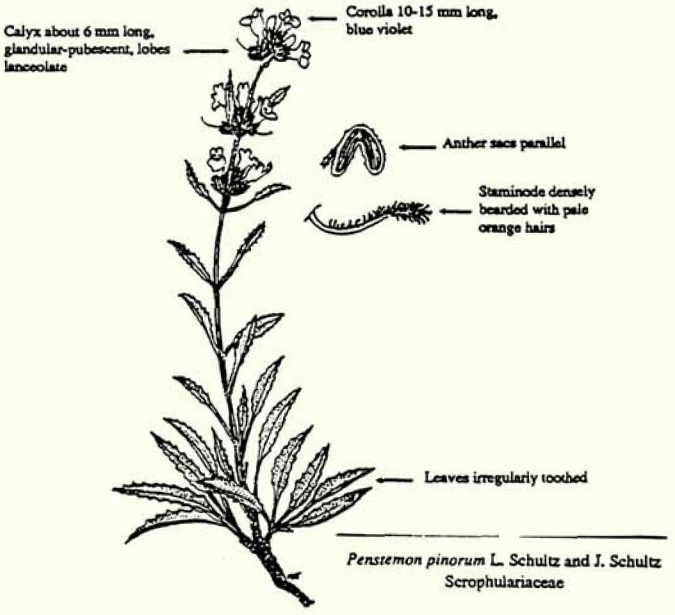
Penstemon pinorum L. Shultz & J. Shultz (pinyon penstemon), a Utah endemic and a federal candidate (category 2) and Forest Service Region 4 Sensitive plant species, was first collected in "...Iron Co.: 0.3 mi (0.5 km) due N of Dixie National Forest Boundary, 5 Mi (8 km) SW of Newcastle, at 5600 feet..." by John S. Shultz. This type location is one of several scattered occurrences, on both private and DNF land, in the hills south-southwest of Newcastle. It occurs again, on DNF land, east of Old Irontown in one two-mile-long occurrence.

Pinyon penstemon occurs on the Claron Formation, "...a sequence of freshwater limestones with subordinate calcareous sandstone and shale, above a basal quartzite cobble conglomerate. The general color of the unweathered limestone is pale red, yellow, or gray, but weathering produces a strong pink tone especially in the lower part of the formation..." Pinyon penstemon occurs on various soils from this substrate: 1) sandy-gravelly soils along wash bottoms, 2) reddish gravelly soils from weathered conglomerate, and 3) directly on conglomerate outcrops. At the Old Irontown location pinyon penstemon also occurs on the volcanic rubble weathered from tuff or tuff-breccia of the Quichapa group.

P. pinorum grows on steep north and east, rarely south facing slopes in a mountain brush and Pinus monophylla-Juniperus osteosperma community associated with Cercocarpus montanus, Quercus gambelii, Mahonia fremontii, Ephedra viridus, Forsellesia nevadensis, Peraphyllum ramosissimum, Artemisia tridentata, Penstemon confusus, and Cryptantha sp. It most often occurs under trees and brush but is also found well into the open.

The 1990 survey was begun by first visiting and determining the extent of the population at the type locality and then surveying out from that point. New occurrences of pinyon penstemon were located by looking for it growing along wash bottoms; its presence along a wash bottom indicated the presence of habitat within that drainage.

During early survey it was observed that pinyon penstemon was occurring on the pink soil and cobble



conglomerate of the Claron Formation yet was not occurring on adjacent formations. The apparent specificity to this formation led to the focusing of the survey upon it (a geologic map of the area was obtained). This assumption held true at first. However, east of Old Irontown, as well as occurring on the Claron Formation, pinyon penstemon occurred, in plentiful numbers, along the lower north facing slope of an adjacent ridge of the Quichapa group. It occurred on roughly the lower 1/3 of the slope but did not continue beyond this close proximity to the Claron Formation onto the main body of the Quichapa group. The survey, therefore, continued to be focused on the Claron Formation.

The survey resulted in the location of five occurrences (populations) of pinyon penstemon with a total number of plants of approximately 30,000-35,000. Four of these occurrences are south of Newcastle and one is near Old IronTown. The four occurrences south of Newcastle, due to lack of water, are probably little grazed by cattle. The nearest water, which is transported into Holt Historical Site, is approximately two miles west of the nearest occurrence. The occurrence near Old Iron Town (the largest at approximately 20,000-25,000 plants), due to the presence of water, is apparently more heavily grazed. Though there appeared to be no impact by cattle at the time of this survey it is noted that cattle did not enter the allotments until after the survey was complete.

No change in protective status was recommended until after 1) several potential (though unlikely) locations on both private and BLM lands are surveyed and 2) the affects of land use and potential threats at presently know locations are evaluated.

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Claron Botanical Area

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10 Castilleja parvula var. revealii
13 Cryptantha ochroleuca
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2 Lomatium minimum
4 Oxytropis jonesii
5 Penstemon bracteatus
11 Phlox gladiformis
1 Silene petersonii
3 Townsendia minima

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Continuing thanks to Dorothy Egan for collating the newsletter every issue. We couldn't do it without you, Dorothy.

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Check membership category desired:

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

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P.O. Box 520041
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