



Vol. 12 No. 1

January/February 1989

CALENDAR EVENTS

January 23
Monday
7:00 pm

Cache Valley Chapter Meeting. "Water Development--Who Pays; Who Gains," a panel discussion of water development issues facing Northern Utah and the Bear River drainage. Bruce Pendery, Oliver Grah, Wally Jibson and Wayne Padgett will present their perceptions and answer questions about the impacts of proposed water development alternatives. Logan City Public Meeting Room, 255 North Main, Logan.

January 26
Thursday
7:30 pm

Salt Lake Chapter Meeting. "Landscaping with Native Plants," by Marv Poulson, long-time UNSS member and owner of Hortica Research and Design Company, specializing in native and specialty gardens.

January 28
Saturday
9:00-11:00 am

Arboretum Winter Workshop. "Vegetative Propagation," by the Arboretum Horticulture Department. Propagate your favorite woody plants through vegetative cuttings and rooting techniques and care of newly rooted woodies. Please bring pruning shears or scissors. Limit: 15. Register in advance. Phone 581-5322. Guild members: \$5.00, non-members: \$6.00. Room 324, Olpin Student Union, University of Utah.

January 31
Tuesday
6:30-8:30 pm

UNPS Executive Committee / Board of Directors Meeting under the direction of Pam Poulson, State President. Board Room, State Arboretum of Utah, Building 436, University of Utah. Any further questions, call Pam at 581-5322.

February 4
Saturday
9:00-12:00

UNPS Fieldtrip in conjunction with Utah Nature Study Society. "Ecology and Dynamics of the Jordan River Riparian Zone," by Margy Halpin, Wildlife Biologist for the Utah Division of Wildlife Resources. Meet in the DWR parking lot, 1596 West North Temple, at 9:00 am. Dress warmly, including boots, and bring a hot beverage and snacks if desired. Binoculars, hand lens, scopes, cameras, and assorted field guides will be useful. The trip will culminate with a look at the Jordan River's wintering bald eagles.

February 6
Monday
7:30 am

Greater Yellowstone Lecture Series. "The Newmark Warning: Island Biogeography and American National Parks," by David Quammen, sponsored by the Utah Museum of Natural History in cooperation with The Northern Lights Institute of Missoula, Montana. East High Auditorium, \$2.50 per person.

February 11
Saturday

Cache Valley Chapter Fieldtrip. "Winter Botany: Riparian and Wetland Plant Communities," by Wayne Padgett, Forest Service Botanist. For more information, call Swede Dahl, 563-5269; Ross Murdock, 752-8517; or Susan Crook, 753-3257.

- February 18**
Saturday
1:00-4:00 pm
Cache Valley Chapter Fieldtrip in conjunction with Bridgerland Audubon Society. "Identifying Trees and Shrubs in Winter." Meet at the University radio tower just south of Logan Cemetery. This will be a walk around campus to learn how to identify trees in winter.
- February 23**
Thursday
7:30 pm
Salt Lake Chapter Meeting. "Xeriscape and I-215 Landscaping," by Jan Striefel, Landscape Architect, and owner of LandMarks, Inc., prime contractor for the landscaping design of I-215 (nine miles from 3rd East to 45th South). Jan is also the landscape architect for Washington Square where the Salt Lake City and County Building is located. Room 323, Student Union, University of Utah.
- February 25**
Saturday
9:00-12:00
Arboretum Winter Workshop. "Herbal Folklore Crafts," by Jeannette Ryder, Herbal Folklorist. Herbs have been used for hundreds of years in wreaths, as incense, to bring luck, to enhance fertility and ward off evil spirits. Learn the intriguing folklore and create an herbal talisman that may bring you happiness in all your undertakings! All materials provided. Please bring a small knife and a mixing bowl. Limit: 20. Register before Feb. 17. Guild members: \$7.00, non-members, \$8.00. The Den, Student Union, University of Utah. For more information, call 581-5322.
- February 27**
Monday
Cache Valley Chapter Meeting. "Natives in Nurseries," by Steve Pendleton of Progressive Plants. Logan City Public Meeting Room, 255 North Main, Logan. Call Swede, Ross or Susan to verify speaker and topic.
- Ongoing through February 28**
9:00-5:00
Red Butte Gardens In Winter. Winter is a quiet and lovely time at Red Butte Gardens. The trees reveal their structural forms and birds and mammals are out and active. Open daily to guests on foot or snowshoes. For maps, directions, bird and mammal checklists or further information, stop by the Arboretum Office or call 581-5322. No registration required. Snowshoes can be rented from the U. of U. Outdoor Program, Building 430, 581-8516.

LOOKING AHEAD

- April 5-7**
Sixth Wildland Shrub Symposium sponsored by the Shrub Research Consortium, to be held at the Holiday Inn, Las Vegas, Nevada. The symposium will address topics in wildland shrub biology and management, including cheatgrass invasion, shrub die-off, and other aspects of shrub biology and management. A field trip is planned to the Nevada Test Site, U.S. Dept. of Energy. To receive pre-registration materials and information contact Keith McNeil, Division of Continuing Education, University of Nevada, Las Vegas, 4505 University Parkway, Las Vegas, NV 89154; (702) 739-3707.

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The Sego Lily is published nine times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Newsletters for 1989 will be published as follows: January/February, March, April, May, June, July, August, September/October, and November/December. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. 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. Copy deadline is the 20th of each month.

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Errata: Possibly of interest only to librarians, over the past three years the volume numbers of our newsletters got out of sync with the years they were published. To clarify, newsletters for 1986 should be Vol. 9; for 1987, Vol. 10; for 1988, Vol. 11, and for 1989, Vol. 12. UNPS is now in its 12th year!

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STATE MEMBER MEET

Andrew Boyack

The Annual UNPS State Member meeting was held in the lodge of the Wasatch Mountain Club in Brighton, October 28. It was a memorable meeting with a cozy fire in the huge fireplace and New World potluck food in abundance. Some members stayed overnight. Thanks to Dave Wallace for making the evening possible.

The members, during a short business meeting, voted to have tee-shirts and sweatshirts printed with a new UNPS logo featuring *Primula maguirei*. The Primula design was created by Lisa McClanahan. The shirts are available for purchase at UNPS chapter meetings.

Members also voted to mail flyers for the UNPS native flower poster.

Dave Okelberry told about the efforts of The Nature Conservancy to purchase a few acres of property near Panguitch which contain a rare plant which is nearly extinct. They may be calling on our society to help fence the area in the Spring.

The Board of Directors proposed by the Nominating Committee was approved. Directors and assignments are as follows:

Andrew Boyack	Chairman of Board
H 278-8596	and Field Trip Chair
Pam Poulson	State President
O 581-5322	
Bill Wagner	VicePres./Pres.Elect
H 942-1295	
David Wallace	Treasurer
H 466-2719	
Kathy Anderson	Secretary
H 277-4652	
Helen Burnett	Salt Lake ChapterPres.
H 484-7998	
Janet Williams	Newletter Chair/Editor
O 533-3015 ext. 38	
Dave Okelberry	Horticulture Chair
H 968-6190	
Dick Page	Seed Chair
H 255-7769	
Duane Atwood	Rare Plant Co- Chair
H 825-0868	
Sherel Goodrich	Rare Plant Co-Chair
O 789-0323	
Dave Gardner	Conservation Chair
H 649-3355	
Debbie Noel	Education Chair
H 322-0114	
Jo Stolhand	Posters Chair
H 521-0069	
Jennifer Harrington	Director at Large
H 532-6726	
Alice Hreha	Director at Large
H 484-2455	
Wayne Padgett	Director at Large
H 753-3854	



Leila Schultz	Honorary Member
John Schultz	Honorary Member
Kaye Thorne	Honorary Member
O 378-4955	
Richard Hildreth	Honorary Member
O 581-5322	

The Cache Valley Chapter is operating under the direction of an Executive Committee composed of the following members:

Swede Dahl	H 563-5269
Ross Murdock	H 752-8517
Susan Crook	H 753-3257

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A Story for Somebody

This is a story about four people: Everybody, Somebody, Anybody and Nobody. There was an important job to be done and Everybody was asked to do it. Everybody was sure Somebody would do it. Anybody could have done it, but Nobody did it. Somebody got angry about it because it was Everybody's job. Everybody thought Anybody would do it but Nobody realized that Everybody wouldn't do it. It ended up that Everybody blamed Somebody when actually Nobody asked Anybody.

Anybody out there? Want to be a Somebody? Call a member of the UNPS Board of Directors and volunteer your help on the Committee of your choice.

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Cache Valley Chapter reports on new project

EDITH BOWEN LABORATORY SCHOOL NATIVE GARDEN PROJECT

A Utah Native Plant Demonstration Garden will be planted Spring of 1989 on the grounds of Edith Bowen Laboratory School, Utah State University, Logan, Utah. Plans are underway to create a native plant garden on approximately one quarter acre of land along the newly remodeled Media Center. The Native Plant Garden will be accomplished through the combined efforts of students, teachers, state and federal natural resource agencies, community groups, and private businesses in Cache Valley and the Wasatch Front.

The prime objective of the Native Garden Project is to help teachers, students, and their families to develop a greater understanding of their natural

environment. Hopefully, the project will serve as a model to help students make informed decisions and to take constructive action to conserve our natural resources. The garden will also serve as a demonstration teaching area to acquaint students and the community with plant species native to Utah.

The Native Garden will serve as a "living laboratory" for Edith Bowen and University classes. Various "ecosystems" will be simulated in the garden beds to demonstrate natural plant communities found in Utah and the Intermountain region. Activities from Project Wild and Project Learning Tree will also be incorporated into garden projects integrated from the core curriculum. In-service workshops will be held for teachers from neighboring school districts to acquaint them with the garden as a local resource, and to provide related activities/lessons they can use in their own classrooms.

Edith Bowen has already gained extensive community and agency support for the project. The Utah Native Plant Society has taken the lead in providing volunteers, plant materials, and supplies needed for the project. We have also received generous support from Utah State University Landscape Architecture and Environmental Planning and Physical Plant departments for the initial garden design. The USDA Forest Service and the Utah Department of Natural Resources have also offered support throughout the project for plant material acquisition and volunteer labor support.

The garden project has obtained donations of plant materials from local nurseries, as well as a major contribution from Native Plants Incorporated, Salt Lake City.



No Longer Endangered

Plant, Once Thought Extinct, Found Alive and Well in Utah

Jim Woolf

For the first time in Utah's history, the U.S. Fish and Wildlife Service has recommended a plant be removed from the federal list of threatened and endangered species.

This is not a success story about botanists' last-ditch efforts to save a rare plant, however.

Instead, a plant once feared extinct has been discovered in recent years growing in at least 12 locations in south-central Utah with a total population of about 200,000 individuals.

"All populations are healthy with most having adequate protection from potential threats," said Larry England, an endangered species botanist for the Fish and Wildlife Service.

The plant is Rydberg milkvetch, a low-growing, leafy plant which grows most often in soils of volcanic gravel in high mountain areas.

Mr. England said the milkvetch was first collected in 1905 in the Tushar Mountains west of Marysville, Piute County. It wasn't recognized as an individual species until 1964, however.

Numerous attempts to relocate the plant in the Tushars were unsuccessful and botanists assumed it was extinct. But in 1976 the plant was rediscovered in the Tushars and a second population was found growing at the top of Mt. Dutton on the Sevier Plateau in Garfield County.

Because the total population of this plant was believed limited to these two small groups, the milkvetch was protected as a "threatened" species in 1978.

The outlook for this species improved in 1981 when scientists realized they had incorrectly identified plants collected in other parts of the state. What had been thought to be close cousins of the rare plant were actually individuals from previously unknown stands of the Rydberg milkvetch.

The realization prompted U.S. Forest Service botanists to launch a highly successful, three-year search for other stands of the milkvetch. They discovered twelve major population centers covering more than 2,000 acres on six major mountains and plateaus in south-central Utah. They're found in the Tushar Mountains, Sevier Plateau, Markagunt Plateau, Fish Lake Plateau, Mount Dutton, and Thousand Lake Mountain.

With so many healthy plants growing in so many areas, Mr. England said botanists believe the Rydberg milkvetch no longer requires the special protection offered by the Endangered Species Act.

Mr. England said it will take four to eight months to formally remove the plant from the endangered species list. Once it's off the list, new amendments to the Endangered Species Act require the Fish and Wildlife Service to continue monitoring the plant for another five years to assure no unexpected problems develop.

Utah will have 15 species of plants on the endangered species list after the Rydberg milkvetch has been removed.

Reprinted with permission from the Salt Lake Tribune, Nov. 9, 1988.

Jim Woolf is the Environmental Writer for the Salt Lake Tribune

WINTER TWIGS

Verne N. Rockcastle



"Most people consider themselves lucky to know the commonest trees during the growing season, recognizing them by their leaves, flowers, or fruit. But when winter comes they can hardly be sure of a maple, or even an elm...If people only knew that each species of tree has a characteristic winter signature, which is imprinted hundreds of times on each individual tree, they could transform many a dull winter day into hours of delight."

--Julia Ellen Rogers

To begin your study of twigs, look for some that are pencil size. Their features will be big enough for you to see clearly without a magnifier. Some of the largest and best are horsechestnut, tree-of-heaven and ash. The twigs of elm, maple, poplar, oak, basswood, hickory, walnut and catalpa are smaller, but still large enough so that all the main features are visible to your naked eye. Cut them cleanly with pruning shears or a pocket knife. Keep your sample in water when you are not examining them; they will provide some pleasant surprises as the buds swell and leaves or flowers make their appearance.

When you look closely at a twig for the first time, many features will seem new and strange. Most obvious, especially at the tip of the twig, are the *buds*. These are huge at the tip of hickory or a horsechestnut twig; smaller and pointed at the tip of a maple or poplar twig; rounded on basswood; scaly (like fish scales or overlapping shingles) on most twigs; fuzzy on magnolia and walnut; sticky or shiny and varnished-looking on poplar and horsechestnut; and of many different colors, depending on the kind of tree or shrub. Sometimes the buds will be clustered at the tip of the twig, as in the oaks, but most of the time there will be only one *terminal bud* on a twig.

In some woody plants such as the staghorn sumac, whose twigs are stout and very fuzzy, the twig keeps growing until mid- or late autumn. Then it dies back to the first sizable *lateral bud* growing out from the side of the twig. The lateral bud nearest the tip when the shoot dies may look like a terminal bud, but it really isn't. A true terminal bud forms at the very tip of the twig; the twig stops growing until the bud swells and begins to grow again in the spring.

You can tell a true terminal bud from a pseudo-terminal bud because the false one always has a tiny scar beside it. This is not a leaf scar, but the very tiny scar formed when the tender growing part of the twig died back.

With a single-edged razor make a clean cut across the middle of a terminal bud and look closely at the cut end through a magnifier.

Buds are really embryonic branches. They were formed last fall close to the place where each leaf was attached to the twig. In the buds were packed all the features necessary for new growth in the spring. When the leaves dropped off and the twigs looked bare, there were really many leaves still left on the tree, tightly wadded in definite patterns inside the buds.

In the spring, the new shoots inside push aside the *bud scales* that protected them through the winter. Each scale that breaks off leaves a tiny scar where it was attached. If a dozen scales drop off, a dozen *terminal bud scale scars* are left behind. These look like a series of fine wrinkles surrounding the twig. Look down the twig until you come to a place where there is a narrow band of fine markings all around the twig. Sometimes the color changes abruptly there. That is where the terminal bud used to be. Now look farther down the twig and see if you can find where it was the year before that, and the year before that. For as long as they go, the terminal bud scale scars will tell you how old your twig is, and how much it increased in length during each growing season. Some twigs will show an amazing amount of growth during the past year. Others seem to have grown almost not at all. Their terminal bud scale scars are a mere fraction of an inch behind this year's terminal bud.

Lateral buds often begin right at the base of the terminal bud and then are scattered for some distance down the twig. As you examine the lateral buds you will find a pattern in their arrangement. The pattern--opposite or alternate--is distinctive for each species of tree.

New shoots, mostly of leaves, grow from the lateral buds. These leaves make food for the tree, but they need light to do it. The arrangement of buds along the twig helps insure that the new leaves will have this light. See if you can see an arrangement of buds that permits a maximum number of leafy shoots on the twig without having one shade another. Twigs may grow in odd and unique fashion in order to get the most light, but still retain their species pattern of opposite or alternate.

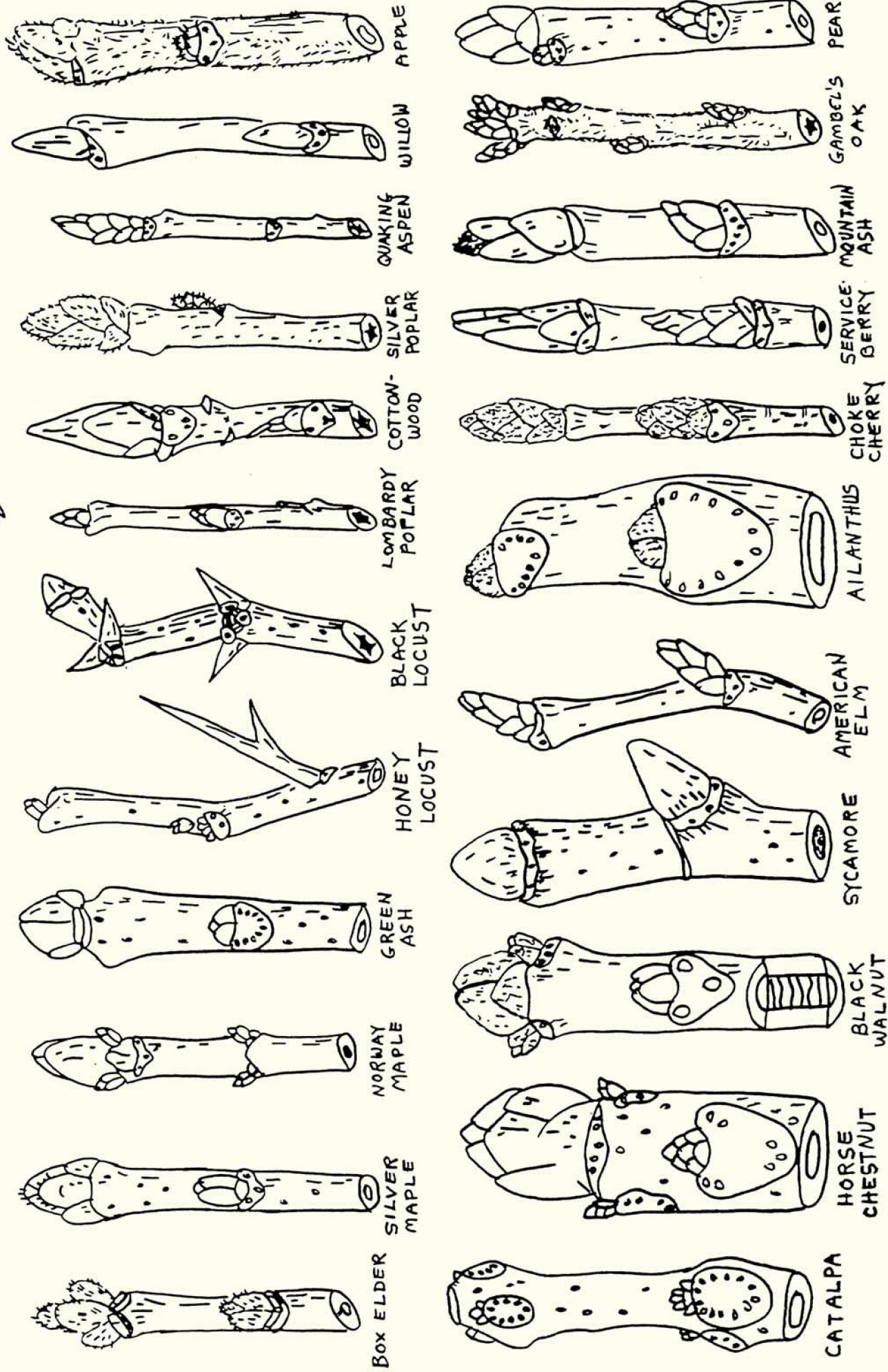
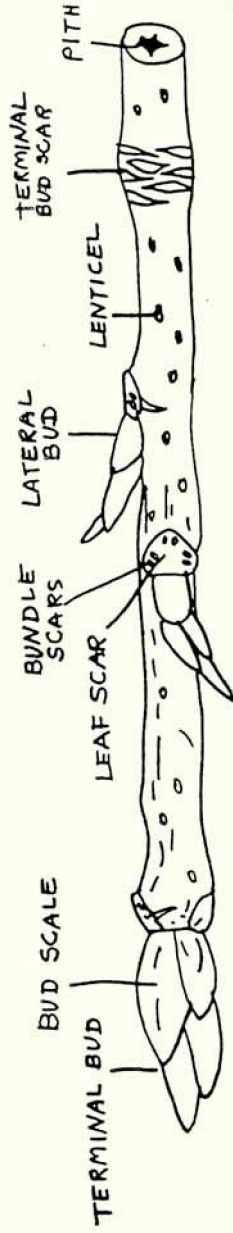
The *flower buds* of some trees and shrubs look so much like leaf buds that unless you section them you cannot tell the difference. Other flower buds resemble the leaf buds except that they are larger.

Sometimes the leaf and flower buds on a twig are invisible. In black locust, for example, the buds are hidden beneath the leaf scar through the winter, but in the spring they break out through the leaf scar and produce leaves and flowers just as any other buds do.

Some plants have lateral buds growing in pairs, one above the other; such buds are called *superposed*. You can see these on honeysuckle and black walnut. Put a twig with lateral buds in a jar of water, and see what comes from the two buds--leaves, flowers, or something else?

TWIGS OF COMMON TREES

by Dot K. Platt



The *color* of buds varies greatly, depending upon the species of plant. How many colors can you find? Can you see that there are almost as many color differences as there are kinds of twigs.

Another obvious characteristic of winter twigs is the *leaf scar*--the prominent brown mark directly below each bud. Last fall, when the leaves started to turn color, a layer of corky material began to grow across the place where the leaf was attached to the twig. This abscission layer, the corky material covering the place where the leaf was attached, forms the leaf scar.

Leaf scars are usually somewhat triangular, with a notch at the top where the leaf bud stands packed with new leaves and an embryonic stem. The shape of the leaf scar is the shape of the base of the leaf that fell from the twig.

Most leaf scars are limited to an oval or crescent or triangular shape with a notch in the upper side where the lateral bud grows. However, some leaf scars such as those of the sycamore and the staghorn sumac are almost circular and nearly enclose the lateral bud. The bud is invisible when the leaves are on the trees because it is buried in the swollen leaf stem. When the leaves fall, their place of attachment shows up as a narrow scar almost encircling the bud.

The leaf scars show the position and number of the fibro-vascular bundles by little dots called *bundle scars*.

Many of the leaf scars contain three bundle scars; others will have more. In the leaf scars of ashes the bundle scars are so small and numerous that they seem to form a tiny horseshoe line.

In some species of trees the leaves have tiny, wing-like growths called *stipules* near the base of the leaf stem. They, like bud scales, leave scars when they fall from the tree. Poplar trees have visible stipule scars that look like tiny slashes or extensions of the upper corners of the leaf scars. The sycamore twig has stipule scars that completely circle the twig at each leaf scar.

Some twigs such as birch, cherry and alder have warty marks called *lenticels* on the bark. Through these corky vents there is some exchange of gases between the tissues of the tree and the air outside the tree. On white birch trunks the lenticels show up as dark horizontal lines. On the twigs the bark is dark brown while the lenticels are much lighter in color. On cherry the horizontal lenticels are light in contrast to the shiny brown bark of young twigs, but do not show up well when the bark gets rough or scaly. On alder and maple twigs, the lenticels are light-colored dots that seem to disappear altogether on older, rougher bark.

The *color of twigs* varies as much as or more than the other characteristics. How many different colors can you find? See if the colors you find on one maple apply to other maples of the same species. Is the color of a twig a dependable characteristic to use in identifying the twig?

When you cut a twig, you must cut through the

bark, the wood, and the soft *pith*. In most twigs the pith is reduced to a mere thread of tissue at the center; in some, however, it is large and of various colors. The pith of staghorn sumac, for example, is large and brown in color. It is large and brown in red-berried elder, but white in blue-berried elder. The pith of black walnut is chambered--hollowed out in tiny cells.

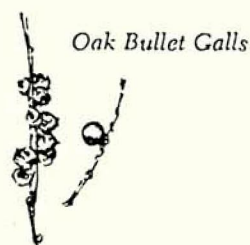
When you examine a twig from box elder you will find a whitish covering called *bloom*. Bloom is most often found on the young twigs of some trees and shrubs; it disappears with age.

Some twigs such as staghorn sumac are densely fuzzy or pubescent. Often the presence or absence of pubescence gives a quick clue to the kind of tree.

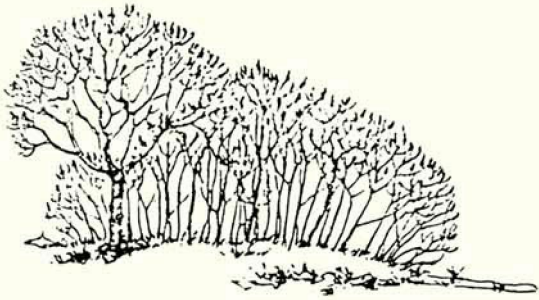
Prickles and *thorns* are another ornamentation to be found on many stems. In berry bushes the prickles grow all along the stem. Black locust trees have woody spines that are outgrowths of the twig and are very hard. They do not break off the way rose prickles do, but seem to be part of the wood itself. The spines are short and grow in pairs--on either side of the leaf scar. The thorns of honey-locust, however, are quite different. They are more than an inch long, often branched, and very stiff and sharp. When you examine the thorns or prickles on twigs, see if they are paired like those on black locust; growing all over the twig as on rose and berry bushes; branched as on honey locust and some barberry, or single and scattered as on some hawthornes.

Leaf buds, flower buds, leaf scars, bundle scars, stipule scars, pith, color, opposite or alternate, naked or scaly, fuzzy or smooth, bitter or aromatic, prickly or not--how many different ways there are for a twig to "sign its name" in winter.

Some of the twigs that you collect may have curious swellings on them. The oaks, for example are often visited by small wasps that lay eggs in the young tissues of the twig. When these eggs hatch into larvae, each one eats its way into the twig, causing the twig to swell around the larva producing a *gall*. In response to some larvae the twig produces a hard, marble-sized gall called an oak bullet gall. Some larvae, such as one that attacks rose stems, cause a gall that looks like



brown moss on the stem. The larva of a small fly causes the bud at the end of a willow twig to grow enormously until it resembles a pine cone. If you cut a twig with a gall and keep it in some kind of screened container, you may be able to watch the adult insect when it emerges.



In Memorium
DR. WALTER P. COTTAM



Maxine Martz

In the treetops each spring a battle goes on among the twigs. It is silent and you might not think of it as a battle, but a close examination of some twigs and a little mathematics will show you that it is a real battle, with few survivors.

Get a twig from a common tree and count the number of buds on the past year's growth. Suppose that each bud were to grow into a new twig just like the present one. If your twig has eight buds, then eight new twigs would grow, each with eight buds on it. The next year there would be eight times eight, or 64 new twigs each with eight buds. The third year there would be eight times eight times eight, or 512 twigs; the fourth year there would be 4096 twigs; the fifth year 32,768. Would there be room for all these twigs? Could the leaves get light? Could the stem even hold up this many twigs without breaking under the sheer weight of it all?

When spring comes, each bud must battle its neighbors for food and light and many buds must lose their struggle for existence. Only a few will survive and produce the twigs and buds of next year. By examining the twig downward from the tip, you can read the story of Nature's provision for thousands where only hundreds can find room. You can see this "wastefulness" not only in leafy shoots, but in blossoms (compare the number of apple blossoms on the branch with the number of apples). This is a battle that insures the success of the strongest, the survival of the fittest.

Occasionally even the fittest cannot survive; accidents take a toll of both fit and unfit. Birds and squirrels use buds for winter food. Insects damage buds by chewing away at the tissues inside. Deer browse some trees and shrubs so heavily that nearly all the lower buds are eaten away. Wind and ice storms often break off buds or whole branches. So the twigs not only battle each other; they must also survive the attacks of animals and the weather.

Take time to observe twigs carefully and try some of the things suggested here. Remember that trees and shrubs are not "dead" in winter. On the bark of their twigs may be the record of the past, but in their buds live the limbs and trees of years to come.

Excerpts from Winter Twigs, Cornell Science Leaflet, Vol. 58, No. 2.

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A book of local interest for winter plant identification is the Guide to the Woody Plants of the Mountain States by Treshow, Welsh and Moore. Published by BYU Press, this guide includes a winter key to the genera as well as a summer key and species keys for each family.

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"Why hurry through heaven?" Dr. Walter P. Cottam used to say when we'd suggest moving on to another spot on one of our Thursday outings.

He loved the land and wanted to learn everything he could about it. He didn't just use it for scientific study to enhance his own prestige, but he felt a kinship with it and marveled at its beauty and mystery. He once said, "I wouldn't mind dying, but I don't want to leave this earth."

We didn't meet Dr. Cottam, Professor Emeritus of Botany at the University of Utah, until he was 75 years old, long after he had made his name as an eminent ecologist and been honored with many awards for his outstanding work in conservation and contributions to his community. He was named "Man of the Year in Conservation" in 1957, "Eminent Ecologist for 1960," won the American Motors Conservation Award in 1963, a distinguished service award from the Utah Academy of Sciences, Arts and Letters, and the National Council of Garden Club's Gold Medal.

He helped establish the Salt Lake City Shade Tree Commission, was one of the founders of The Nature Conservancy, and a member of many scientific organizations. A native of St. George, he earned his bachelor's and master's degrees at Brigham Young University and his doctoral degree from the University of Chicago. He taught at BYU for twelve years, then went to the University of Utah in 1931.

Dr. Cottam retired from the University in 1962, but it didn't slow him down. He started an oak hybridization project that resulted in dozens of outstanding oak crosses and brought him additional acclaim. A three-acre plot of land above Fort Douglas now holds many of his best hybrid crosses. Dr. Cottam also planted many of the trees on the University campus, and one especially beautiful spot carries the name Cottam's Gulch.

Our meeting with Dr. Cottam came about in July of 1969 when I called and asked if he could tell us where to find a certain orchid in the Lake Blanche area. He said, "I could show you better than I can tell you." So Vard Jones and I, who had become interested in learning and photographing the wildflowers, picked him up on a Thursday, our day off work, and made a five-hour trek up to Lake Blanche.

It opened up a whole new world to us. We didn't find the orchid, but it was the start of twelve years of all-day Thursday outings with Dr. Cottam. As we came home from one of those first trips and let him out at his door, he commented on what a wonderful day it had been, adding, "I feel like this is my sabbath." Thereafter we called it the Thursday Sabbath Club.

Although we didn't get to take any formal classes from Doc, we had him as our own special tutor and friend for twelve years and we got to know him as a human being, as well as a teacher. He had his foibles,

and an impish, sometimes almost diabolical, sense of humor. But he was the soul of integrity and never compromised with the truth as he saw it.

The late Utah Supreme Court Justice A.H. Ellett joined the group in 1972 and added a new dimension of expertise. All four of us were photographers and we photographed wildflowers, sunsets, fall scenery, snowy landscapes, and each other eating, hiking, photographing, and sitting by campfires. Conversations covered everything from botany to the law, the weather, poetry, current events, death and taxes. It was a very special time with some very special people.

The onset of Alzheimer's disease halted work on Dr. Cottam's oak project and our association with him in 1981. Fate wasn't kind. The disease held him captive for eight years, his once brilliant mind slowly eroding away in a still strong body. He died Dec. 22, 1988 in Gresham, Oregon at the age of ninety-four.

We still go on our Thursday outings with new friends. But there's seldom a time that we don't recall something Doc said or told us about the area we're visiting. As long as our minds last, he will be going along with us, climbing the mountains and exploring the deserts of Utah.

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Maxine Martz is a retired staff writer for the Desert News.
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Walter Pace Cottam

Born of a pioneer family in 1894 in Saint George in the southwestern corner of Utah, Walter Cottam learned and loved the plants, scenic beauty, history and unique ecology of this desert region. He studied and obtained degrees at Brigham Young University, the University of Chicago (Ph.D., 1926), and the University of Utah (D.Sc. 1963), serving in academic positions at Brigham Young University (1919-1931), the University of Chicago (1930), and the University of Utah (1931-1962). He was appointed Professor of Botany at the University of Utah in 1935 and Chairman of the Botany Department (1948-1959). Travel and teaching opportunities took Cottam to the eastern United States; Canada and Mexico (1938); and stints at Shrivensham American University, the United States Army University Center, England (1945); and the Division of Information and Education, United States Army, Frankfurt, Germany (1946). Research efforts included floristics, ecology, and numerous range surveys in Utah and the landmark Reynolds Lecture (1947) "Is Utah Sahara bound?" Over 40 scientific and popular articles were published by Cottam in the fields of biology, ecology, conservation, and forestry. Twenty-six students received advanced degrees under Dr. Cottam's guidance at the University of Utah.

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COTTAM HYBRID OAK GROVE

State Arboretum of Utah

The historic Cottam Hybrid Oak Grove is a living collection of rare oak hybrids. In the spring of 1954 Rudy Drobnick, then a graduate student in the Botany Department at the University of Utah, found a unusual clump of oak growing in the Oquirrh Mountains. Drobnick brought the specimens to Dr. Walter P. Cottam for identification. Cottam and Drobnick sent the specimens to Dr. Cornelius H. Muller. He identified them as a hybrid between Gambel Oak (*Quercus gambelii*) and Live Oak (*Quercus turbinella*).

Extensive research by Cottam, Tucker, and Drobnick suggests that in very recent geologic time, 7000-7500 years ago, the Live Oaks of southwestern Utah migrated northward about 250 miles along the base of the mountain chains and crossed freely with Gambel Oak. Presumably this migration occurred during a warmer and drier climate than at present. Evidence indicates that the climate changed to the colder one we have today about 3000 years ago. The Live Oaks were unable to adapt to the colder climates. However, many of the relic hybrid clones with cold-resistant genes survived and are growing at the present time.

The presence of the natural hybrids inspired Drobnick and Dr. Cottam, then a professor emeriti, to begin the most extensive and productive oak hybridization of record, in this country or elsewhere. The Cottam grove is a living collection of forty-three interspecific combinations and three intersubgeneric hybrid combinations. Many of these hybrids have potential horticulture value.

The trees, planted in Red Butte Canyon, were officially dedicated by U. of U. President David P. Gardner on September 24, 1977 as the Cottam Hybrid Oak Grove of the State Arboretum of Utah. The dedicatory plaque reads: "The unique oak trees comprising this grove were hybridized, grown, and planted by Dr. Walter P. Cottam. This grove is dedicated in recognition of his ability as a distinguished

teacher and researcher for his accomplishments in fostering conservation and as an eminent ecologist and as founder of the State Arboretum."

For more information on the Cottam oaks read Oak Hybridization at the University of Utah, by W.P. Cottam, J.M. Tucker, and F.S. Santamour, Jr., State Arboretum of Utah Publication No. 1, 1982. It includes a summary of data from the oak hybridization project. Descriptions and illustrations of all bona fide hybrids are provided.



Figure 18. Left to right: *Quercus turbinella* (J.M.T. 2806-11), *Q. turbinella* x *Q. gambelii* (Taufe, July 5, 1978, No. 42), *Q. gambelii* (J.M.T. 2826-9).
Quercus turbinella Green x *Q. gambelii* Nutt.

A Garden of Earthly Delights

The concept of an arboretum and botanical garden for Utah originated with plantings made by Dr. Walter P. Cottam in a ravine on the western edge of the University of Utah campus. By 1961 when the Legislature established the campus landscape as the State Arboretum, the process of testing plants for their adaptability to horticulture had already been in place for thirty years. Since those farsighted beginnings in Cottam's Gulch, Arboretum campus collections have grown to more than 8,000 trees of over 300 species and varieties.

Over the years, Arboretum development was paralleled by rapid growth in student population. New buildings, roadways and parking lots expanded into ever dwindling greenspace. A permanent, secure home for Arboretum collections and educational and visitor facilities was needed. Consequently, on July 19, 1983 at a secluded streamside setting in University of Utah Research Park, ground was broken for Red Butte Gardens.

Dr. Cottam's vision continues to unfold for the people of Utah. That vision is Red Butte Gardens of the State Arboretum. Follow the growth and development

of the first established botanical garden in the Intermountain West. Come to Red Butte Gardens for education, recreation, entertainment or simple relaxation. ...Take a peek into the Red Butte Conservatory for a look at exotic orchids, bromeliads, cacti and economic and rare plants of the world. Over the coming years watch for the addition of an educational complex and new collections: a rose garden, an oriental garden, a water garden, a pharmacological and herb garden, a fruit and vegetable garden, a xerophytic garden, a woodland garden and an alpine garden.

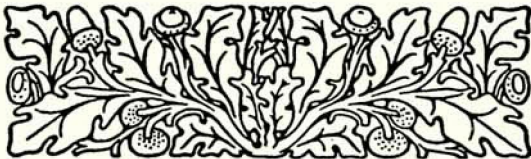
Design, development and maintenance of Red Butte Gardens is supported principally by private donations with minimal supplemental funding from the State Legislature and the University of Utah.

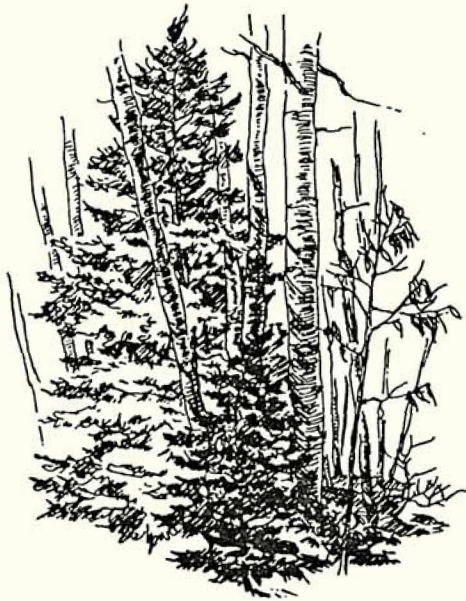
We earnestly ask for your input and support. Only then can the dream of Red Butte Gardens become a reality and be truly a garden for the people of Utah.

From "A Garden of Earthly Delights," State Arboretum of Utah mailer.



Unseen buds, infinite, hidden well,
Under the snow and ice, under the darkness,
in every square or cubic inch
Germinal, exquisite, in delicate lace,
microscopic, unborn,
Like babes in wombs, latent, folded, compact,
sleeping;
Billions of billions, and trillions of trillions
of them waiting...
Urging slowly, surely forward, forming endless,
And waiting ever more, forever more behind.
Walt Whitman





FOREST ON BOULDER MOUNTAIN

Boulder Mountain supports one of Utah's largest forests, including spectacular old growth pine trees, while also supporting one of the state's most important concentrations of wildlife. Elk, deer, cougar, black bear, wild turkey, antelope, prairie dogs, fish, eagles, ducks, peregrine falcons, and other animals abound on the mountain. Two large national forest roadless areas, Steep Creek at 70,000 acres and Boulder Top at 110,000 acres, hold the core of the mountain's wildlife and recreational values. The Steep Creek area is adjacent to 70,000 acres of wildlands in Capital Reef National Park and 30,000 acres of potential BLM wilderness. It is separated from the Boulder Top area only by Utah Highway 12.

Over 50,000 wild acres were lost to new road building and timber sales in the last decade on Boulder Mountain.

An area analysis with an environmental impact statement (EIS) for the spruce forest on Boulder Top is now being prepared by the Forest Service upon the request of the Utah Division of Wildlife Resources.

The Forest Service is requesting comments from the public on what issues should be analyzed in its area analysis and EIE for Boulder Mountain.

Geologist Clarence Dutton wrote over 100 years ago of Boulder Mountain: "The explorer who...stretches himself beneath its giant pines and spruces, forgets that he is a geologist and feels himself a poet...we are among forests of rare beauty and luxuriance." Please write to help protect them.

Send your letter to Jerald B. Shaw, District Ranger, Teasdale Ranger District, P.O. Box 99, Teasdale, Ut 84773.

Excerpts from "Boulder Mountain: Diversity vs. Tree Farming," Southern Utah Wilderness Alliance, Fall, 1988, reprinted with permission.

Issues to consider in writing your letter include:

How do you feel about development in the area? Is enough of the mountain included in the plan? The current plan is to look at 70 square miles on Boulder Top. Development activities on the sideslopes of the mountain will not be covered.

What is your position on "old growth" forests? The National Forest Management Act has provisions for protecting biological diversity. Current old growth ponderosa stands and planned timber sales need documentation with maps and acreages to insure that appropriate decisions are made regarding this protection. Current policy favors "even-aged management" in which every acre considered suitable for timber management (i.e. logging) is converted to stands with regularly-spaced trees of the same age. The process is accelerated by including aspen trees in the calculations for the allowable cut.

What is the effect of insect cycles in the Engelmann spruce forest on Boulder Top?

How do you feel about new road building in primitive areas?

What about ORVs in roadless areas?

Public comments on these and other issues are important to the Forest Service in their decision-making process.

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Utah Congressman Wayne Owens announced last fall that he will introduce a five million acre Utah wilderness bill sometime early in the next Congress.

The Bureau of Land Management has made a preliminary recommendation of 1.9 million acres of wilderness in Utah. The Utah Wilderness Association has recommended 3.8 million acres, and the Utah Wilderness Coalition wants 5.1 million acres.

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The Wilderness Society and Southern Utah Wilderness Alliance have appealed to the Interior Board of Land Appeals the BLM September 14 decision to chain over 4,000 acres in the Henry Mountains. An earlier proposed chaining--600 acres in the Ragged Mountain proposed wilderness--was removed from BLM's final decision due to public comment, but a 1,000 acre chaining in the Mt. Pennell proposed wilderness remains. The appeal seeks preparation of an environmental impact statement.

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UNPS Sego Lily

C/O Janet Williams

Utah Native Plant Society

P.O. Box 520041

Salt Lake City, Utah 84152-0041

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LONG AWAITED ATLAS OFF THE PRESS

The Utah Museum of Natural History is pleased to announce the publication of The Atlas of the Vascular Plants of Utah, by Beverly J. Albee, Leila M. Shultz, and Sherel Goodrich. For the first time, the distribution of each of 2,438 species of plants growing in Utah in more than one location and without benefit of cultivation is graphically represented in the form of dots on detailed relief maps 7 x 9 cm in size. The data for the publication were obtained by critical examination of some 400,000 specimens housed in the various herbaria in Utah.

Maps illustrating the distribution of the species are arranged alphabetically according to family and within the family alphabetically according to genus and species. Common names and alternate scientific names are provided in an index so that species may be located by means of more than one name. The status of each plant--whether native or introduced, annual or perennial, herb, shrub or tree--its common name, customary habitat, flowering time, and altitudinal range is provided below each map. A list of some 380 plants restricted to one general location is provided in an appendix.

Published by the Utah Museum of Natural History in cooperation with the Ecology Center of Utah State University; Salt Lake City; 685 pages, 2,438 distribution maps; Edition bound; cost \$26.00.

Order from and make checks payable to: Utah Museum of Natural History, University of Utah, Salt Lake City, Utah 84112. Shipping and handling, \$4.00. Utah residents add \$1.63 sales tax per copy. Can't wait? Pick up your copy in person at the Museum Gift Shop.

Membership Application

☐ New Member ☐ Renewal ☐ Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

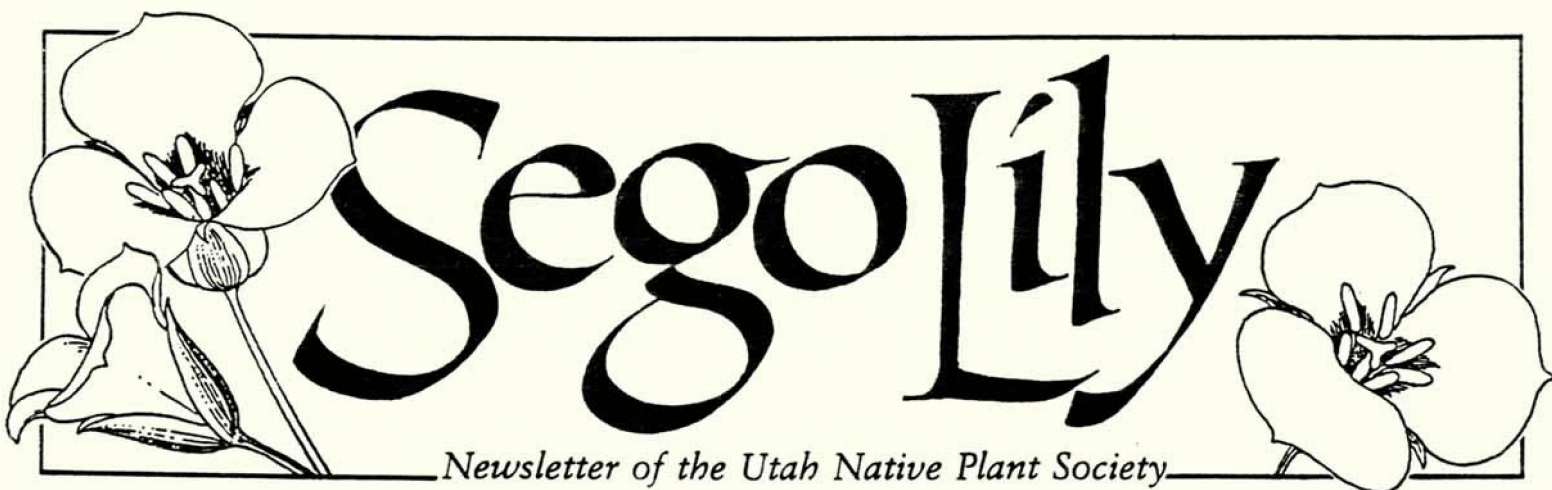
- ☐ Student/Senior\$ 5.00
☐ Individual\$ 10.00
☐ Family\$ 15.00
☐ Supporting\$ 30.00
☐ Corporate\$ 30.00 and up
☐ Life\$250.00

☐ 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:

David Wallace, 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. 12 No. 2

MARCH 1989

CALENDAR EVENTS

- March 7**
Tuesday
6:30-8:30
UNPS Exective Committee/Board of Directors Meeting under the direction of Pam Poulson, State President. Board Room, State Arboretum of Utah, Building 436, University of Utah. Call Pam at 581-5322 with agenda items.
- March 14-16**
Tues-Thurs
Forest ServiceThreatened, Endangered, and Sensitive (TES) Plant and Animal Workshop will be held in the 11th floor Banquet Room of the Radison Suite Hotel, 2510 Washington Blvd., Ogden, Utah. Contact Duane Atwood (801-5599) for further information.
- March 27**
7:00 pm
Cache Valley Chapter Meeting on the topic of Geology. Logan City Public Meeting Room, 255 North Main, Logan.
- Mar 28-Apr 25**
Tuesdays
7:00-9:00
Gymnosperms: From Alpine to Tropics. Museum of Natural History Class taught by W. Richard Hildreth, Director, State Arboretum of Utah. Learn characteristics, habits and evolution of the gymnosperms, including Ginkgos, Cycads, Ephedras, and Conifers. This is a hands-on workshop that is also available for University or Inservice credit. Limit 30. Register before March 24 by calling 581-4887. Museum and Arboretum members: \$23.00 Others: \$25.00.
- Mar 29-May 29**
Wednesdays
6:00-10:00
Beginning Botanical Illustration. U of U DCE class taught by Mary Lou Romney, botanical illustrator. Mary Lou approaches the art of botanical illustration by developing a sense of relaxed familiarity with the subject. A delightful class for beginners and intermediates, artists and botanists. No experience necessary. 3 hours credit, or \$89.00 non-credit. To register, contact DCE 581-8614.
- March 30**
Thursday
7:30 pm
Salt Lake Chapter Meeting. " Propagation of Native Plants," by Mike Alder, founder of Native Plants, Inc. and past president of UNPS. Mike has authored many articles on erosion control, revegetation, and reclamation, and has made numerous native plant surveys in western U.S. and Mexico. In 1987 he received the Governor's Medal for Science and Technology for his work with NPI. Mike also serves as Vice President for Research for the National Wildflower Research Center. Room 323, Olpin Student Union, University of Utah.

LOOKING AHEAD

- April 1-Oct 31**
Wildflower Hotline (801) 581-4969. Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00, Friday mornings from April through October.



April 5-7

Sixth Wildland Shrub Symposium sponsored by the Shrub Research Consortium, to be held at the Holiday Inn, Las Vegas, Nevada. The symposium will address topics in wildland shrub biology and management, including cheatgrass invasion, shrub die-off, and other aspects of shrub biology and management. A field trip is planned to the Nevada Test Site, U.S. Dept. of Energy. To receive pre-registration materials and information contact Keith McNeil, Division of Continuing Education, University of Nevada, Las Vegas, 4505 University Parkway, Las Vegas, NV 89154; (702) 739-3707.

April 8
Saturday
10:00-1:00

Gardening with Native Plants by W. Richard Hildreth, Director SAU. Learn the maintenance and water conservation advantages of gardening with native plants. Study design, plant selection, planting and maintenance. Limit 30. Register with the Utah Museum of Natural History, 581-4887. Museum and Arboretum members : \$8.00. Others: \$10.00.

April 20-23

1989 Institute of Desert Ecology. Participants camp at Catalina State Park and take part in camp and field sessions which focus on the relationships between plants, wildlife, and the desert environment. The intensive daily schedule begins at dawn and ends with owling, blacklighting for insects, and star talks. For more information contact Mary Ann Chapman, Director, Tucson Audubon Society, 300 East University Blvd., #120, Tucson, AZ 85705. Phone 602-881-1660.

April 23
Sunday

Desert Weather: Micro and Macro. From scorching temperatures of summer to winter's bitter cold, how do plants and animals cope with such extremes? Learn about weather patterns on the Colorado Plateau and the importance of microclimates in determining where organisms live. Morning classroom session and afternoon field work cover principles of heat and energy exchange, methods for meteorological measurements, short range forecasting and cloud identification. One grad credit available. Taught by Harvey Neuber, meteorologist. Fee: \$35.00 Canyonlands Field Institute, P.O. Box 68, Moab, Utah 84532; 801-259-7750.

April 29
Saturday

Spring at Red Butte Gardens with W. Richard Hildreth, Director, State Arboretum. Get a behind-the-scenes look at what it takes to keep a botanical garden functioning and healthy. Limit 25. Register before Apr. 21, 581-5322.

May 12-14
and
May 26-28
(1 eve and 2 days)

Desert Wildflowers Workshop: Identification and Illustration. Day outings in Arches National Park and nearby areas focus on wildflower identification with emphasis on adaptations and habitats. Optional sketching exercises help develop an eye for structure, function and beauty. Artistic talent not necessary! One undergrad credit available. Taught by Lee Goodman, botanist. Fee: \$85.00. Contact Canyonlands Field Institute (see above).

May 13
Saturday

Pothole Ecology. Potholes (pools of water in the sandstone) harbor tiny plants and animals. Field studies examine these fascinating lifeforms and their adaptive strategies and interactions. Physical and chemical influences that effect distribution of organisms in different pools are identified. Pothole succession, human impact and effects on larger desert systems are discussed. One grad credit available. Taught by Tim Graham, desert ecologist. Fee: \$35.00 Contact Canyonlands Field Institute (see above).



May 20 and 21

Utah Audubon Basin and Range Seminar at Joy, Utah, 30 miles northwest of Delta. This overnight camping trip offers presentations in the field by local experts in such diverse areas as geology, birds, nature, photography, native plants, insects and solar cooking. For more information, call Terry Sadler at 266-6152.

June 19-30

On being a Naturalist. Aspen Center for Environmental Studies Naturalist Field School, an intensive program for students interested in teaching or naturalist careers who need communication skills, information and field experience. Write P.O. box 8777, Aspen Colorado 81612 for more information. Phone 303-925-5756. Other courses include **Rocky Mountain Mushrooms**, July 10-12, **Rocky Mountain Ecology**, July 17-21, and **Tundra Ecology**, August 7-11.

June 24-27

Field Botany: Flora of the Tetons, taught by Dr. Leila Shultz. The easy accessibility of a diverse array of plant communities makes the Tetons an excellent place to teach the botany of the Rocky Mountain Region. Emphasis will be on the identification of grasses, wildflowers, shrubs and trees, combined with a thorough investigation of selected local plant communities. Write Teton Science School, P.O. Box 68, Kelly, WY 83011 for more information. 307-733-4765.

The Sego Lily is published nine times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Newsletters for 1989 will be published as follows: January/February, March, April, May, June, July, August, September/October, and November/December. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. 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. Copy deadline is the 20th of each month.

Membership in the Utah Native Plant Society Includes The Sego Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. ©1989 Utah Native Plant Society. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

Officers and Committee Chairs

Andrew Boyack, Chairman of Board	H 278-8596	Duane Atwood, Rare Plant Co-Chair	O 625-5599
Pam Poulson, State President	O 581-5322	Sherel Goodrich, Rare Plant Co-Chair	O 7890323
Bill Wagner, Vice Pres./Pres. Elect	H 942-1295	Dave Gardner, Conservation Chair	H 649-3355
Kathy Anderson, Secretary	H 277-4652	Debie Noel, Education Chair	H 322-0114
Dave Wallace, Treasurer	H 466-2719	Jo Stolhand, Posters Chair	H 521-0069
Helen Burnett, SL Chapter Pres.	H 484-7998	Janet Williams, Newsletter Chair	O 533-3015
Swede Dahl, Logan Chapter	H 563-5269	Dave Okelberry, Horticulture Chair	H 968-6190
Ross Murdock, Logan Chapter	H 752-8517	Dick Page, Seed Chair	H 255-7769
Susan Crook, Logan Chapter	H 753-3257		

1/31/89

Executive Committee Meeting

Pam Poulson
UNPS State President

The Executive Committee met to discuss some administrative matters of UNPS:

1. **UNPS Member Activities** - Helen Burnett told us of the exciting schedule for Salt Lake Chapter meetings already lined up through November! Swede Dahl sent us a tentative schedule for Logan Chapter meetings, field trips and projects. Details for summer state-sponsored field trips are being solidified. Ideas for the annual state business meeting, election and banquet were discussed. Looks like a full year for both statewide and chapter events. Watch The Sego Lily for further details.

2. UNPS Committees

a. **Newsletter Committee** - Janet Williams is enthusiastic about this year's Sego Lily and encourages submissions from all!

b. **Horticulture Committee** - Dave Okelberry gave a report on the "We the People" native plant garden that UNPS has been doing with the Community Housing people and Utah Power and Light. He said that what we need most is more involvement by the members in planting, watering and weeding. Watch The Sego Lily for ways you can help. Dave also discussed new ideas for the September Plant Sale, including moving the date to the last Saturday in April (to be declared "Native Plant Day" by the Governor?) and encouraging participation by more nurseries. Bill Wagner suggested obtaining space in a greenhouse where we can grow more of our own sale stock, which coincided with some of the concerns of the Seed Committee.

c. **Seed Committee** - Dick Page had similar thoughts about obtaining greenhouse space. He has received a query in this regard from Dale Hughs, a local Penstemon grower. Dick reminds us that seeds will be available for sale through The Sego Lily over the next few months. Dick would also like to see some germination testing done with our seeds. If you're interested in helping out, let him know.

d. **Rare Plant Committee** - Duane Atwood and Sherel Goodrich are planning the annual T&E meeting for either Capitol Reef National Park (in April) or Zion National Park (in May). As information becomes available, we will let you know.

e. **Conservation Committee** - Dave Gardner is revitalizing UNPS involvement in "public comment". He has been getting some good advice from Tony Frates and is formulating a plan of action for the year, including a "Conservation Alert" column for The Sego Lily.

f. **Education Committee** - Debie Noel is working on setting up a collaborative effort between UNPS and the Audubon Society. Together we would educate and promote the concept of water conservation.

g. **T-Shirt/Poster Committee** - Jo Stolhand tells us that the new Primula maguirei T-shirts and sweatshirts are almost sold out. Of course, our biggest market is in Logan! A new batch of them is currently being printed and should be available at our next meeting. Our Wildflower Posters are selling well (over 800 sold in 1988) and we have already paid off half the interest free money The Nature Conservancy loaned us to print the posters. We're negotiating with KUER to donate several posters to their twice-yearly fund raisers as incentives to their donors. Though these posters would be given at no charge, the television exposure would ultimately sell more posters and get more attention for UNPS. Other poster themes were briefly discussed, but it was decided that we will wait until more posters are sold and our loan is paid off before we consider producing another poster.

h. **Membership Committee** - Pam Poulson is in the process of updating and correcting membership records. If you have any changes, please contact her at 581-5322. The Executive Committee thought it would be interesting to publish a list of members in The Sego Lily (just names--no addresses, phone numbers, etc), so you might know who your fellow native plant enthusiasts are!

2. **Utah Natural Heritage Program** - UNPS has been contacted by the Utah Natural Heritage Program to become a co-collaborator in the protection of habitats of endangered species. They will make a presentation at the next meeting of the Executive Committee.

3. **Monitoring Primula maguirei** - The U.S. Forest Service has approached UNPS to monitor Primula maguirei in its native habitat for 1989. UNPS would be contracted to do this and it could possibly be a source of income for UNPS (if expenses do not exceed contract payment). Dave Wallace is investigating this further and will give a report at the next Executive Committee meeting.

The Executive Committee consists of the State Officers (Chairman of the Board, President, Vice President, Secretary, Treasurer) and Local Chapter Presidents (Salt Lake and Logan). These people represent the voting "quorum" of the Executive Committee. All other Committee Chairpeople are encouraged to attend, especially if they have presentations, requests or items on the agenda concerning the functioning of their Committees. Executive Board meetings are open to the membership as well.



Annual Board Meeting

Andy Boyack
UNPS Board Chair

The annual UNPS Board of Directors meeting was held January 18 at Lambs Restaurant in Salt Lake City.

Helen Burnett gave a report on plans for the monthly Salt Lake Chapter meetings and Susan Crooks and Swede Dahl reported plans for both meetings and field trips for the Cache Valley Chapter. Notices of these activities will be published in The Sego Lily calendar of events.

Janet Williams told about plans for the newsletter. In order to obtain pertinent information for the newsletter the Board decided that each officer and committee chairman will write or furnish at least one article in addition to news of their committee activities. The deadline for articles and news will be the twentieth of the month.

Pam Poulson sent a report on membership which now numbers over 300. She also sent copies of up-to-date lists of members and information on the first meeting of UNPS just over ten years ago, including its agenda, signature lists of attendance and Dr. Stanley Welsh's talk on UNPS's goals and objectives.

Jo Stolhand reported on the campaign for the sale of the UNPS wild flower poster which has shown good success. The Board applauded her efforts.

Dave Wallace commented on the UNPS finances which are in good shape after the large outlays of the past few years.

Dave Okelberry told of the neighborhood landscaping project at 9th South and 9th West. Help from many sources has contributed to the success of the project, including the city, various corporations, and local residents.

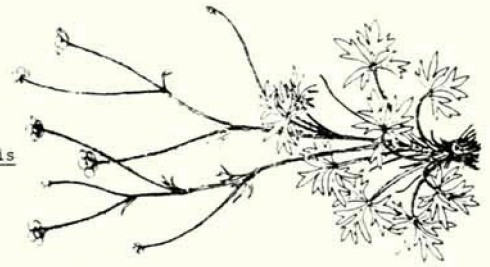
Larry England reported on the rare autumn buttercup near Panguitch and the land purchase of its habitat by the Nature Conservancy.*

*Editor's Note: Larry received national notoriety recently with his picture appearing in the National Enquirer along with news of the buttercup.

PRESERVATION OF RARE BUTTERCUP CLOSE AT HAND

Utah is home to a number of extremely rare plants and animals, some of them existing precariously in unprotected habitat on private lands. Utah's Autumn Buttercup (*Ranunculus acriformis* var. *aestivalis*) is just such an example. This wildflower is currently represented on the planet by 25 individuals, located in a Garfield County pasture, on a small, boggy mound barely 15 feet in diameter. Thought to be extinct for 35 years, a small population (450 plants) was dramatically rediscovered during a plant survey of the

Ranunculus acriformis
var. *aestivalis*



Sevier River Valley in 1982. The serious Autumn Buttercup population decline since then is attributed to intensive agricultural use of the 44-acre privately-owned pasture site.

Noting the disastrous decline, the U.S. Fish and Wildlife Service proposed the plant for inclusion on the federal list of endangered species and, in the spring of 1988, contacted The Nature Conservancy concerning acquisition of the site. After several months of negotiations, the Great Basin Field Office obtained an option agreement to purchase the Autumn Buttercup property.

Reprinted with permission from The Nature Conservancy Great Basin Newsletter, Fall 1988.

January Meeting LANDSCAPING WITH NATIVE PLANTS

Jo Stolhand

The January meeting of the Salt Lake Chapter of the UNPS was well attended. And while most seemed to be drawn by the topic, "Landscaping with Native Plants," one can't help but suspect that a slide presentation by Marv Poulson was part of the inducement. In any case, all who attended were well rewarded.

Preparation of the soil is the first and most important step in landscaping. Deep tilled, well drained soil is necessary for good root growth, and plants that require little water can often adapt to the volumes of water we put on our bluegrass lawns if they are well drained. Enhancing the soil with organic material to a 15-20% composition will improve conditions for all plants but especially those that require a more acid soil.

Next step. Look at the designs in nature. Study habitats. Copy an arrangement by Mother Nature: odd number groupings, Desert Buttercups set beneath a juniper, Western Anemone encircling an agave, or create a mountain meadow. If attracting birds or other wildlife is desirable observe which fruits and seeds attract your favorite animals, and which flowers entice pollinators you enjoy.

The following plants are a partial list of those Marv showed in slides and on which he commented. Marv's definition of "native" includes any plant of the Western U.S. and varieties developed from them.

Palmer Penstemon-- tolerates moisture, but must have well drained soil.

Wild Onion--durable, but takes a couple of

years to grow from seed.

Saltbush--there is a red-bracted species not yet available commercially.

Desert Willow--hardy in Salt Lake; new varieties with blossoms in many colors available--pink, lavender and now red.

Creosote--may need to be in protected sunny exposure in very well drained soil.

Western Redbud--small tree with intense spring bloom; may need to be in protected spot.

Mormon Tea (*Ephedra*)--adaptable, needs well drained soil.

Fremont Barberry--yellow blossoms, small bush with evergreen, holly-like leaves.

Serviceberry--hardy bush with round leaves and white flowers.

Apache Plume--after initial profusion, sparse white flowers blossom throughout the summer producing attractive puffy seed plumes.

Elderberry--blue fruit is edible, red is not; can be pruned and attracts birds.

Wood's Rose--hard to control spread; birds attracted to rose hips.

Rabbitbrush--available, can be controlled, has good autumn color.

Utah Penstemon--red flowered; available by seed from Plants of the Southwest.

Butterfly Weed (*Aeschlepias*)--one of our few orange-colored natives and widely available from local nurseries.

Single-leaf Ash--hardy, unique, small, upright tree.

Blanketflower (*Gaillardia*)--hardy, colorful; dwarf varieties available.

Evening Primrose (*Oenothera caespitosa*)--large night-blooming flowers attract hummingbird moths.

Spiderwort--tolerates dry to moist conditions in well drained soil.

Blue Flax--reseeds itself but is easily controllable; morning blossoms drop by midday.

Cardinal Flower--requires shade and rich soil.

Indian Paintbrush--generally requires association with another plant. Plants of the Southwest nursery sells it with gamma grass.

Bog Laurel (*Calmia*)--requires 50% organic material and extra iron. In our range for garden use, provide some shade.

Potentilla--available in selection of colors, sizes and shapes.

Penstemon--several varieties available.

Marsh Marigold--needs wet feet.

Ferns--Woods Fern and Maiden Hair will grow well here.

Columbine--Great Basin Columbine is resistant to powdery mildew and is long blooming.

Geranium--white and pink are available.

Kinnikinnik--low growing, sun or shade, rich soil; may need iron with heavy soils.

Glacier Lily/Dogtooth Violet--early bloom, flowers in yellow or white and available from several bulb suppliers.

Pearly Everlasting--can be used in dried flower arrangements.

Sources for native plants not found in local nurseries are listed below. All have catalogues.

The Siskiyou Rare Plant Nursery
2825 Cummings Road
Redford, OR 97501

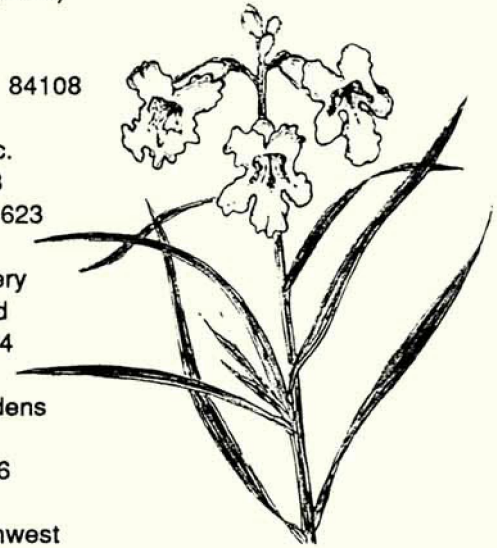
NPI (Native Plants, Inc.)
Nursery Division
417 Wakara Way
Salt Lake City, UT 84108

Aspen Nursery, Inc.
0905 Highway 133
Carbondale, CO 81623

Forest Farm Nursery
990 Tetherow Road
Williams, OR 97544

Weddle Native Gardens
3589 G Road
Palisade, CO 81526

Plants of the Southwest
1812 Second Street
Santa Fe, NM 87501



DESERTWILLOW

UPDATE FROM THE NATURE CONSERVANCY

UTAH HERITAGE PROGRAM ESTABLISHED

A cooperative agreement signed this July between The Nature Conservancy, the Utah Department of Natural Resources, and the State Arboretum of Utah marked the establishment of the Utah Heritage Program--a comprehensive, computer-based "inventory" of Utah's threatened ecosystems, habitat types and plant and animal species. Culminating several years of planning and negotiation, Utah has now become the 48th state to utilize the Conservancy-designed program to survey and track the rarest elements of Utah's unique biological landscape.

The computer database, which focuses on identifying the location of threatened plants, animals, and community types, is created and updated through extensive consultation with biologists and ecologists. The Utah Heritage Program will rank Utah plants, animals, and communities as to their global and state

rarity, the location of their populations, and the predicted status of growth or decline. This body of knowledge will be available not only to Conservancy staff, but to state and federal government entities, to the scientific community, to the general public and to industry and business interests--in short, anyone who might benefit from a complete and constantly updated source of information about ecological sites in Utah....Widespread use of the centralized information bank should help to reduce the level of litigation and conflict surrounding Utah land-use decisions by providing detailed factual data to all interested parties.

The Utah Heritage Program will require the efforts of a three person staff. Two members, Joel Tuhy, ecologist/coordinator, and Ben Franklin, botanist, have been hired and have received training by The Nature Conservancy national science staff. They are currently setting up a permanent Utah Heritage Program office housed within the Utah Division of State Lands and Forestry offices. A third member of the team, a zoologist/data manager, will be selected and trained shortly.

There are still many outstanding examples of pristine wildlife habitat throughout Utah that merit preservation --rich productive wetlands; unique desert ecosystems; untouched mountain terrain; and undisturbed riparian, streamside systems. These areas provide food and shelter to an astonishing variety of birds, fish, and animals. They also provide emotional and psychological sustenance to Utah's and our nation's human population.

ADDITIONAL STRAWBERRY RIVER ACREAGE PURCHASED

In September, the Great Basin Field Office completed the purchase of an additional 640 acres of critical wildlife habitat along the Strawberry River west of the Strawberry Pinnacles in Duchesne County. Wending its way through semi-arid north-central Utah, the Strawberry River is skirted by tawny, striated bluffs and extensive cottonwood, dogwood, and willow groves. The acquisition brings the total number of acres preserved on the wild Strawberry to 3,070 acres--approximately eight contiguous miles of river corridor. The ambitious long range plan is to protect 18 miles of the Strawberry River from Soldier Creek Dam to the Strawberry Pinnacles. The nearly \$2 million sale price represents the Conservancy's largest investment in Utah to date. The Division of Wildlife Resources will manage the area, providing stream access to sport-fishing and wildlife enthusiasts while safeguarding the waterway's unblemished character.

1400 ACRES PROTECTED ON UTAH FOREST LANDS

The Conservancy's Utah Public Lands Program continues to make steady progress in cooperative work with the federal land management agencies to protect important natural areas in the Great Basin. The latest

success stories are the establishment of two new Research Natural Areas (RNA's) on National Forest lands in Utah, designated by the Chief of the Forest Service in July of 1988.

Pollen Lake RNA (1100 acres)

Located on the Ashley National Forest, the Pollen Lake basin drains northward near the eastern end of the high Uintas. It contains virgin forests of Engelmann spruce and subalpine fir, plus small pristine meadows and wetlands surrounding the lake. The flanking ridges support ungrazed alpine communities typical of the Uinta Mountains, plus two endemic plant species: Uinta penstemon (*Penstemon uintahensis*) and Uinta parrya (*Parrya rydbergii*).

Jumpoff RNA (290 acres) The Jumpoff RNA encompasses a small basin and north-facing slope near Current Creek Reservoir on the Uinta National Forest. The area supports a diverse mix of vegetation in excellent condition, including subalpine fir, Douglas-fir, mountain brush, mountain big sagebrush, and climax and seral aspen communities.

Reprinted with permission from The Nature Conservancy Great Basin Newsletter, Fall, 1988.

Botanists Say 'Rare' Utah Cactus May Be Just Pedestrian Plant

A cactus in southwestern Utah would be dropped from the federal list of threatened and endangered species under a proposal from the U.S. Fish and Wildlife Service

Larry England, botanist for the federal agency, said new research indicated the purple-spined hedgehog cactus is not a rare species. Instead, scientists now believe it is "a very rare color phase of a very common cactus," he said.

The cactus (*Echinocereus engelmannii* var. *purpureus*) was first identified in 1949 by a botanist collecting plants in the St. George area. It was placed on the endangered species list on Oct. 11, 1979.

The barrel-shaped cactus grows to a height of about 8 inches to a foot. It has purple spines and flowers.

Because of federal protection, persons wanting to develop federal lands in the St. George area have been required to conduct surveys for the cactus before they could proceed with their projects.

Mr. England said those surveys failed to identify any of the rare cactus. However, they occasionally turned up individuals of a closely related but common cactus which had many of the characteristics of the rare cactus.

Subsequent studies demonstrated that the common cactus (*Echinocereus engelmannii* var. *chrysocentrus*) is highly variable. One of those variations is the cactus which had been thought to be endangered.

Reprinted from the Salt Lake Tribune, Feb. 12, 1989.

A Society by the Members and for the Members

Pam Poulson
Membership Committee Chair

The first meeting of the Utah Native Plant Society was held at the University of Utah on Saturday, September 30, 1978. Over 79 plant enthusiasts from every corner of the state were in attendance to hear the proposal for a Utah Native Plant Society, outlined by Dick Hildreth, Art Holmgren, Stan Welsh, Elizabeth Neese and Mike Alder. In addition to those five, fifteen others who are still members today were in attendance at that meeting: Duane Atwood, Helen Chindgren, Larry England, Glenn and Barbara Halliday, Noel and Patricia Holmgren, Bill McNulty, Dick Page, John and Leila Shultz, Bob Thompson, Kaye Thorne, Bill Varga and Janet Williams. All of these people have contributed greatly to the Society, serving as officers, speakers and hosts as well as devoting many hours and dollars to further the goals of the Society.

UNPS is on the leading edge of the rise in public concern over native floras ("wildflowers" to the general public). Today, memberships (whether paid, honorary or complimentary) hover around 300. Although the emphasis of the society has evolved from one of primarily professional interest to one of broad membership diversity and interest, the goals and objectives of UNPS remain the same: to promote enlightenment, enjoyment and conservation of Utah's native flora. This is the tie that binds our membership together--or should that be "envines"?

The folks that share your interest and enthusiasm for Utah's native flora are listed below. For the sake of confidentiality, only names and zip information are listed.

MA

Mark McDonough
 NE Wildflower Society
 Don Falk

NY

NY Botanical Garden
 Noel & Patricia Holmgren
 Clark T. Rogerson

VA

The Nature Conservancy
 Larry Morse
 Scott Peterson

WV

WV Native Plant Society

OH

Kate Dwire

IN

Maureen Wilson

MI

John Guidinger

WI

Jan Young

MT

Montana Native Plant Soc.
 Kathy Ahlenslager



Sherman J. Preece

IL

Joseph E. Leigh
 Robert H. Mohlenbrock
 CO

CO Native Plant Society

Donna House

James N. Borland

Kathy Mutz

William Romme

WY

Richard Campanella

Teton Science School

ID

ID Native Plant Society

UT Highland

Kathy Young

UT Bountiful

V. Brent Collett

James G. Coyner

Jim Dalglish

Ira D. Hatch Family

Billie Keele

Lynda Miner

Brent A. Stettler

Sandra Winans-Berkow

UT Centerville

Chuck & Kittie Wright

UT West Point

Paul B. Baker

UT Farmington

Utah Botanical Garden

Sandra J. Long

UT Layton

Terry Sue Freeman

Willard W. Higdon

Shelly B. Julander

Sharon Loomis

Gibbs M. Smith

UT Midvale

Leo & Mary Dahl

Ann Williams

Tom Sheehan

Sharon Coons

UT Midway

LaRee Hunt

Adalee Muse

Douglas & Carla Ulmer

UT North Salt Lake

Ron Nishijima

UT Orem

Bill Gappmayer

Dr. E. Durant McArthur

Stanley Welsh

Steven Briggs

UT Park City

David Gardner

Pat Lorenzo

Margaret McClelland

UT Pleasant Grove

Warren G. Eyre

UT South Jordan

Dale Hughes

UT West Jordan

Larry England

UT Riverton

Edda Williams

UT Sandy

A. Ty Harrison

Arvin R. Maxfield

Richard Page

John & Kay Allen

Nancy Blatt

Ronald B. Bolander

Alair Griffin

Connie Lundberg

Ann M. Rantanen-Lee

Joanna & Mike Shulsky

UT Vernal

Sherel Goodrich

UT Salt Lake City

Utah Historical Society

Rebecca Reheis

Pat, Russel & Danny Fish

Kurt Fisher

Dawn Hendry

Debra Noel

Charles & Mari Parsons

Danielle Paterson

Jeanne LeBer & Ray Smith

Lester D. Shields

Mr & Mrs Stan B. Mulaik

Sue Allard

Patricia S. Bernstrom

Dick Carman

Chuck & Elaine Clark

Leona Conn

Carolyn Dixon

Ben Franklin

Bobbie Frazier

Jennifer Harrington

Walter J. Horton

Mary Kiessling

Sharon Meross

Jeanne M. Moe

Janet Williams

Karen Wolkoff

Mary Ann Wright

Richard E. Carman

Fred & Ila Rose Fife

J.C. Ryburn

Elaine, Jerry & Chris

Christensen

Alyce Hreha

Irene Oliekan

Gordon W. Thiriot

David Wallace

Herbert A. Wright

Susan Linner

Daniel F. Baker

Helen R. Burnett

Bette Cook

Desma H. Galway

Jan Gisler

Kezia Neilsen-Snyder

Cheryl Parsons

Pam Poulson

Marv Poulson

Miles C. Labrum

Debbie Becher

Robert & Joyce Dustman

Greg Gochnoru

Ken Grundmann

Ruth C. Henson

Sylvester A. Kraft

Ann Reichman

Dr. & Mrs. David Richards

Marcus & Constance

Theodore

Audubon Society

Melissa Blackwell

Bobbi Brown

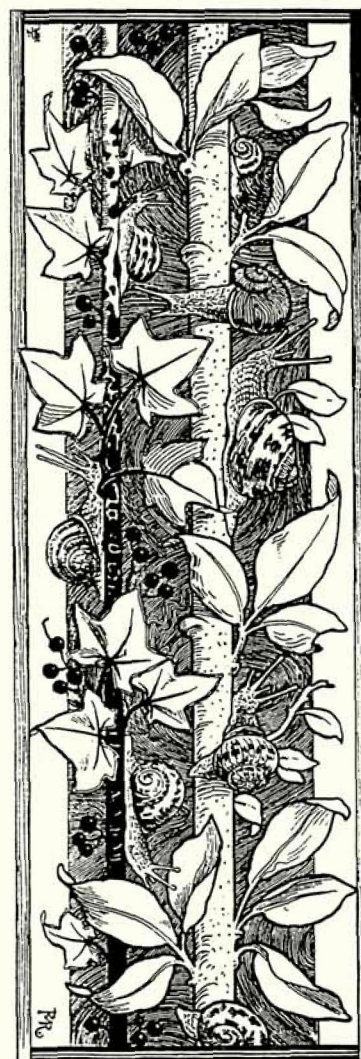
Deb Callister

Adolph H. Case

Franci & Matt De Long
 Richard Hildreth
 Esther Jensen
 O. Edward & Ruth M. Ogilvie
 John E. & Margaret B. Riley
 Keith J. & Kathy Wallentine
 Renate E. Westfall
 Anthony J. Frates
 Wasatch Mountain Club
 Sierra Club
 James Bach
 SLC Public Library
 Marjorie Stolhand
 Utah Wilderness Assoc.
 Marriott Library, U of U
 Dept. of Biology, U of U
 Donald P. Hartmann
 Garrett Herbarium, U of U
 State Arboretum
 Utah Wildlife Resources
 Margy Halpin, DWR
 Brenda Schussman, DWR
 Kathy Anderson
 Andrew M. Boyack
 Helen S. Chindgren
 James Ehleringer
 Scott E. Imber
 Thomas A. Kursar
 Cyrus M. McKell
 Ann O'Connell
 Rebecca Rusho
 Douglas O. Stark
 Frank Anderson
 Paula J. Graham
 Rebecca Ipson
 Dave & Kathleen Okelberry
 Tom Roberts
 Marilyn Woolstenhulme
 Ray K. Schugk
 Salt Lake County Library
 Michael Alder
 Sue Allen
 Lenore Allen
 Ruth E. Dissel
 Craig Fedderson
 Margery Graham
 Debra Hynn Hanni
 Sherrie Harbrecht
 M.B. & Frances B. Harris
 Tamara L. Hed
 Sandy Malone
 Terryann Nielsen
 Cindee Rigdon
 Robert G. Ruesink
 E.L. Talbot
 Patricia Legant & Tom Parks
 Bill Wagner
 Del Wiens
 Chad & Karen Milne
 Penny L. Thomas
 Robbee Brown
 Dorothy C. Egan
 Benjamin Everitt
 Robert Fitts
 Irving B. McNulty
 Betty Storrs
 John Veranth
 Sinclair Oil/Will Wagner
 Wasatch-Cache Nat. Forest
 Dave Livermore
 Nicholas S. Van Pelt
 Luci Malin

UT Garland
 Bill Varga
UT Hyrum
 Jim Graham
UT Logan
 Leanna Ballard
 Ellen Blee
 Scott D. Cheney
 Susan Crook
 John Ellerbeck
 Kern Ewing
 C. Christian Friess,
 Arthur H. Holmgren
 David Humphrey
 Rob Jackson
 Laura A. Kaye
 William A. Lewis
 Kirsten Marquart
 Richard Mueller
 Wayne Padgett
 Dr. Richard J. Shaw
 John & Leila Shultz
 Alice Stokes
 Dept of Botany, USU
 Susan Nordstrom
 Neil E. West
UT Providence
 Oliver & Karen Grah
 Madeline Mazurski
UT Richmond
 Rodd V. Hardy
UT Smithfield
 Swede Dahl
UT Wellsville
 Joel S. Tuhy
UT Ogden
 Duane Atwood
 Tammy Baird
 Standard Examiner
 Dept of Botany, Weber St.
 Glen Lyon
UT Pleasant View
 L.E. Horton
UT Price
 Botany Dept, College of E Ut.
 Robert M. Thompson
UT East Carbon
 Tommas Alleman
UT Lake Powell
 Caren Jones
UT Provo
 Neil Frisknecht
 Deanna Nelson
 Rose Marie Pendelton
 BYU Botany Dept.
 Kimball T. Harper
 Kaye Thorne
UT Fillmore
 Melanie Mendenhall
UT Springville
 Kathleen J. Swenson
UT Richfield
 Larry & Melinda Greenwood
UT Cedar City
 Dept of Biology, SUSC
 Kevin Carter
UT Kanab
 Sheila K. Alvord
UT Paragonah
 Catherine Jean
UT Springdale
 Lynn Carey Bornholdt

Margaret Malm
 Zion Nat. Park Naturalist
UT St. George
 Dept. of Biology, Dixie College
UT Torrey
 Nancy Warner, Capitol Reef
UT Clinton
 Bob O'Brien
AZ
 Arizona Native Plant Society
NM
 Native Plant Society of NM
 Debra Hand
 Tom & Eleanor Wooten
NV
 W. Kent Ostler
 Linda J. Gottschalk
 No. Nev. Native Plant Soc.
CA
 R. Mitchell Beauchamp
 Biserka Betty Ivanovich
 David Bramlet
 The Nature Conservancy
 Strybing Arboretum Lib.
 Alice Howard
 Berkeley Herbarium
 Phyllis Faber
 California Native Plant Soc.
OR
 Donald D. Barr
 Native Plant Soc. of Oregon
 Janet Anderson
 West National Plant Society
 Loretta Pickerell
 Glenn & Barbara Halliday
 Stuart Garrett
WA
 Washington Native Plant Soc.
 Nancy Newey



What good company you keep!

Time to Renew

Our membership year begins in March, and it is time for most UNPS members to renew. Check your mailing label. If it says 'March 1989' on the top line of the label, your membership is payable now. Please fill in the membership form on the back page and return it with your check.

Please don't delay. Do it today.



SNOW FLOWERS

Frank B. Salisbury

In the plant kingdom, there are few species that grow and bloom during the few weeks between the time when the snow melts and the time when other species begin to flourish. These plants are ephemeral, which means that they have a short lifetime, so they are properly called *spring ephemerals*. They occupy a special niche in seasonal time, drawing on resources of light, water, and nutrients that will be used later by taller, larger species.

Perhaps you have noticed the dogtooth violet (*Erythronium* sp.), sometimes called avalanche lily, or the spring beauty (*Claytonia* sp.), both of which occur in the early spring in many of the forested areas of North America where snow remains on the ground during several months in winter. Or you might have seen some of the snow buttercups that grow on the plains of western America. These and several other spring ephemerals are often overlooked because they put on their display during a time of year when many of us are not likely to be going into the mountains to hunt plants.

The winter cereals that are planted on dryfarms throughout the West represent a kind of commercial spring ephemeral on a large scale. The seeds are sown in the autumn, often germinating only after snowfall. Some of the serious weeds in these crops are also spring ephemerals that grow and flower even before the cereals, depleting the ground of its early moisture. Snow speedwell (*Veronica campylopoda*) introduced from Asia is a problem on many western dryfarms, and bur buttercup (*Ranunculus testiculatus*) from Europe has invaded ranges and alfalfa fields as well as winter wheat. Its burs damage the hides and tongues of animals as well as automobile tires. June grass (*Bromus tectorum*) is another introduced spring ephemeral that covers much of several western states and poses a serious fire hazard because it dries out so early in the season.

HOW DO THEY MANAGE?

Clearly, the spring ephemerals must possess several genetically controlled special features of anatomy and physiology. They must grow rapidly at temperatures well below those at which most plants can grow. They must withstand the sometimes severe frosts that are common in early spring. They must be able to "give up" when other larger plants have begun to flourish; that is, they must enter a summer dormancy. It would also be to their advantage if they could get a really early start by growing, if only a little bit, beneath the winter snow.

PLANTS GROW UNDER SNOW

Several plants, including most of those mentioned above, can be seen already developed and perhaps even flowering when they are first exposed by the melting snow. Another spectacular example is the alpine snow buttercup (*Ranunculus adoneus*), which is often seen in full and beautiful flower near the edge of melting alpine snowbanks. It is almost always possible to remove some nearby snow and find flowers that are fully developed and open, although solidly embedded in snow.

For several years, a number of graduate students and I have studied plants growing under snow. The approach at first was simply to go into the mountains or the foothills around Logan, Utah, at frequent intervals throughout the year to see what was going on. In the winter, this means digging down through as much as 2-3 m of snow.

In one such study, we constructed a metal "tunnel" that was set in a trench in the ground, so that the top was just level with the ground surface. Three portholes in the top of the tunnel allowed us to measure the light that penetrated the snow, and a balcony along one side of the tunnel allowed us to plant seeds or transplants in metal boxes that could be observed during the winter. Temperatures were measured with thermocouples placed at several depths in the soil and the snowpack.

In the course of several years observation, we found many species that do indeed grow actively throughout the winter under the snow. Many of these are summarized in Table 1. They fall readily into several categories. A few are not even true spring ephemerals but grow actively throughout the summer (e.g., wild hyacinth, *Brodiaea douglassii*); that is, they have obtained the ability to grow under snow without giving up the ability to grow all summer. A few perennials simply stay green all winter without any noticeable growth. *Brodiaea* and some other species elongate for only a few centimeters until they reach the soil-snow interface. After the snow melts, they rapidly grow and flower. Others, such as spring beauty or snow buttercup, actually penetrate the snowpack. Most that we studied are perennials that grow from an underground storage organ, but a few of the spring ephemerals are also annuals that germinate from seed under the snow. Among the most important of these are the winter cereals and their associated weeds, mentioned above. Nearly all the snow plants formed flowers under the snow, but only a few actually opened their flowers in the snow. Most enclose them in special bracts or protective scales that open only after snowmelt.

In addition to the many native plants that we observed in the mountains and foothills, we tested several dozen species on our snow tunnel balcony for seed germination under snow. Many of these germinated, as indicated in Table 2. Many were natives, but a few were from other areas, and some

Table 1. Plants That Grow Under Snow

Species Scientific Name Common Name		Observed to:						
		Grow only to soil-snow inter- face (usually form flowers)	Grow into snow (usually form flowers)	Open flowers in snow	Stays green under snow but does not grow	Perennials: grow from stor- age organ	Annuals: germinate each year under snow	Turn green under snow
* <i>Achillea millefolium</i>	Yarrow		X		X	X		
<i>Allium acuminatum</i>	Wild onion		X			X		
* <i>Broadiaea douglassii</i>	Wild hyacinth	X				X		
<i>Camassia quamash</i>	Camas	X				X		
<i>Claytonia lanceolata</i>	Spring beauty		X			X		X
<i>Descurainia richardsonii</i>	Tansy mustard		X				X	
<i>Erythronium grandiflorum</i>	Dogtooth violet	X				X		
<i>Erythronium grandiflorum</i>	Dogtooth violet (sometimes)		X	X		X		X
* <i>Fragaria vesca</i>	Strawberry				X	X		
* <i>Geum rossii</i>	Alpine avens		X			X		X
<i>Lithophragma glabra</i>	Woodland star	X				X		
<i>Nemophila breviflora</i>	Great Basin nemophila		X				X	X
<i>Orogenia linearifolia</i>	Indian potato	X				X		
* <i>Phacelia heterophylla</i>	Virgate phacelia				X	X		
<i>Ranunculus adoneus</i>	Snow buttercup		X	X		X		X
<i>Ranunculus jovis</i>	Sagebrush buttercup		X	X		X		X
<i>Ranunculus testiculatus</i>	Bur buttercup		X				X	X
* <i>Rudbeckia occidentalis</i>	Western coneflower		X		X	X		X
<i>Secale cereale</i>	Winter rye		X				X	X
* <i>Sedum debile</i>	Stonecrop				X	X		
<i>Triticum sativa</i>	Winter wheat		X				X	X
<i>Veronica campylopoda</i>	Snow speedwell		X				X	X

were cultivated species. Clearly, germination at freezing temperature is not uncommon when plants are given enough time (the several months of winter). It would almost seem to be the rule that plants in temperate regions get their start in life this way. Surely this would be true for the perennial spring ephemerals that we studied as well as for the annuals.

ENVIRONMENT UNDER THE SNOW

Obviously, the environment for these plants is cold, but we were surprised a bit when we made our temperature measurements. We had imagined that the ground was solidly frozen and that temperatures would drop well below the freezing point. Actually, the ground was only frozen during autumn before snowfall. Most of the plants that we studied went into dormancy as early as late May or June and remained dormant until late autumn at which time the ground was, indeed, often frozen and temperatures were a few degrees below

freezing. But snow is an excellent insulator, and once the snowpack builds up to 20-50 cm (depending upon how cold the air above is), soil just below the snow thaws and doesn't freeze again. Heat moves slowly by conduction upward from depths where the ground never does get cold. This not only thaws the soil after snowfall but melts some of the snow at the soil-snow interface during the entire winter. Thus, the soil remains saturated with melt water and close to or slightly above the freezing point. Of course the snow can never get above the freezing point, so the temperature right at the soil-snow interface is exactly 0 degrees C during most of the winter (Figure 1).

We were also in for some surprises when we studied the light that penetrates snow. We had thought that light would not penetrate very deeply, but in our snow tunnel we could see light penetrating up to 2 m of snow. We measured its intensity and spectral distribution (Figure 2).

RESPONSE TO UNDERSNOW ENVIRONMENT

Table 2.

Some Species That Germinated Under Snow
Franklin Basin Snow Tunnel

Species and Family*
1. <i>Agropyron cristatum</i> Wheatgrass
2. <i>Avena fatua</i> Oats
3. <i>Balsamorhiza macrophylla</i> Balsam root
4. <i>Brassica caber</i> Mustard
5. <i>Brassica nigra</i> Mustard
6. <i>Camelina microcarpa</i> False flax
7. <i>Chrysanthamnus nauseosus</i> Rabbit brush
8. <i>Chrysanthamnus viscidiflorus</i> Rabbit brush
9. <i>Cynoglossum officinale</i> Houndstongue
10. <i>Galium aparine</i> Bedstraw
11. <i>Isatis tintoria</i> Woad
12. <i>Lepidium perforliatum</i> Peppergrass
13. <i>Ranunculatus testiculatus</i> Bur buttercup
14. <i>Roemeria refracta</i> Field poppy
15. <i>Secale cereale</i> Rye
16. <i>Sysymbrium altissimum</i> Tumble mustard
17. <i>Veronica campylopoda</i> Speedwell
18. <i>Wyethia amplexicaulis</i> Mule ear

The depths to which light will penetrate snow depend upon several factors. When the snow is fresh and white, less light penetrates to a given depth, because more is reflected at the surface. Late in the season, when the snowpack has become dense and is beginning to melt, less light is reflected, so much more may penetrate to a given depth. Of course, the dirt that often collects on the snow decreases the amount of light that penetrates.

Foreign matter on and in the snow may also change the quality of the light that penetrates. When the snow is fresh, predominantly blue wavelengths penetrate; old, dirty snow may transmit more in the red portion of the spectrum. Of course the quantity as well as the quality of light penetrating snow will depend upon the light striking the surface. Richardson (1974) measured the light that penetrated the snow before and after a sunrise. An amazing amount of light did penetrate before sunrise, but the quality shifted toward more red wave-lengths as the sun rose higher in the sky. This is because rays from a higher sun strike the snow directly; with a lower sun, there is a greater portion of indirect, blue skylight.

We have not yet carefully studied factors besides light and temperature. Of course, there is much moisture, but we don't know how many nutrients and gases are dissolved in this moisture. Carbon dioxide and oxygen dissolved and also existing free in the gas phase could be especially important.

Obviously, the plants that grow under snow must be programmed to function suitably for that phase of their life cycles at close to the freezing point. So far, we know virtually nothing about the physiology of such plants, but one can imagine several possibilities. The configuration of their enzyme molecules must be suitable to the conditions, and there must be a high portion of unsaturated fatty acids in their membranes. So far, we have not been able to discover any special features in the enzymes, mitochondrial activities, or responses to hormones for plants that seem well adapted to low temperatures as contrasted to closely related varieties that may not be so well adapted.

It has become clear from our studies that snow plants respond to the light penetrating the snow. We have observed chlorophyll synthesis in response to this light on several occasions. In the simplest observation, we cover the ground with black plastic just before snowfall and observe that plants under this plastic have not synthesized chlorophyll when the snow melts in the spring, whereas plants receiving the light coming through snow do synthesize chlorophyll. In another observation, we have shown that the quantity of chlorophyll is inversely proportional to snow-depth; the less snow, the more light and hence the more chlorophyll. The light that penetrates the snow also overcomes the other symptoms of the etiolation syndrome; stem elongation is inhibited and leaves unfold and expand.

As indicated above, many seeds will germinate under snow. Richardson showed that the light penetrating almost 2 m of snow was sufficient to satisfy the light requirement for germination of lettuce (*Lactucus sativa* vr. Grand Rapids) as well as that of two mustards (*Brassica nigra* and *Brassica caber*). He

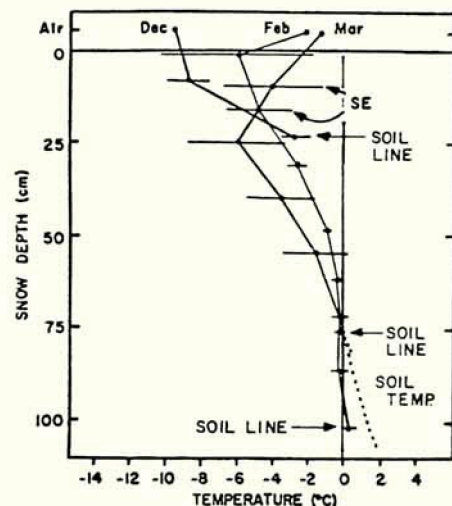


Figure 1 Snow depth temperature relationships at Beaver Mountain

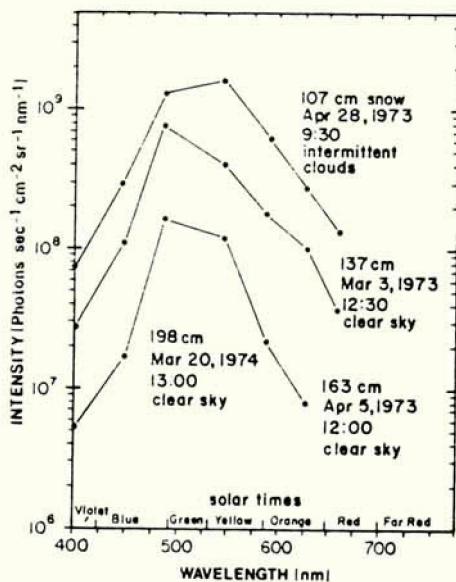


Figure 2 Spectral distribution of light penetrating up to 2 m of snow.

tried to test the light requirements under snow of several other species, but the uncovered ones were all eaten by rodents! Nevertheless, comparing data for two years, it appeared likely that mule ear (*Wyethia amplexicaulis*) required the light penetrating the snow for germination. It seems likely that several species might have this requirement.

Richardson also performed an experiment designed to detect phototropism under the snow: cans with a slit along one side were placed over camas plants (*Camassia quamash*) and covered with snow. He was unable to observe any phototropic bending.

We have wondered about photosynthesis under the snow. It seems likely that this must occur, since carbon dioxide levels are probably high (respiration of soil organisms may well proceed, and the snow cover would trap the carbon dioxide), and the light compensation point is considerably reduced at low temperatures. Lichens have been shown to photosynthesize under snow, even at temperatures several degrees below freezing.

It is evident that the spring ephemerals do have unique anatomical and physiological adaptations that allow them to occupy their special niche in space and time. The challenge is to understand as many of these as possible--both for this element of a given ecosystem as well as for others. We have gained some fascinating insights, but obviously there is much to learn

Reprinted with permission from *Utah Science*, June, 1976. Frank B. Salisbury is a Professor of Plant Science at Utah State University.

If you are aware of more recent research on this subject, please bring it to the attention of the editor.

PUBLICATIONS

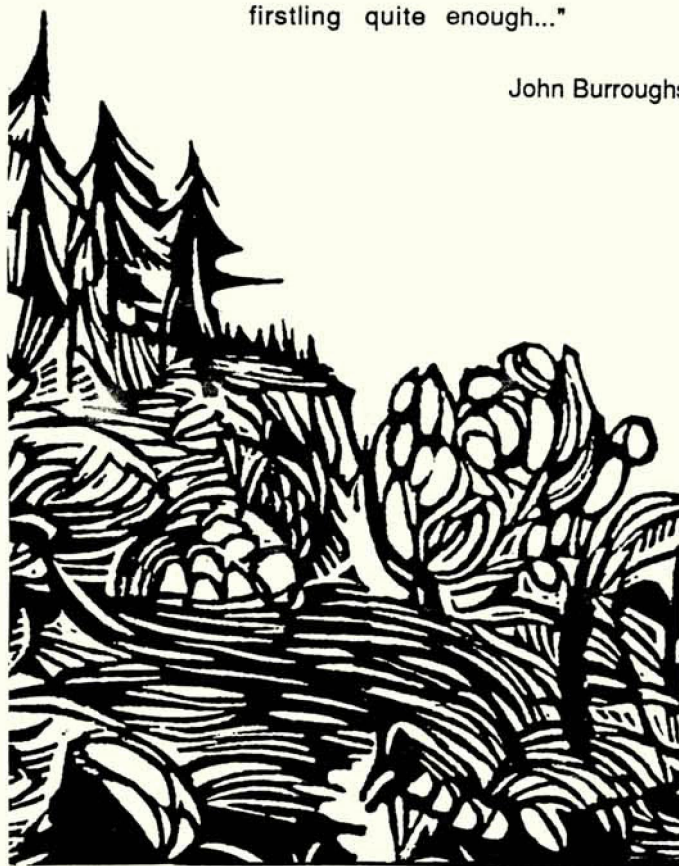
Yellowstone and the Fires of Change by George Wuerthner, Dream Garden Press, Box 27076, Salt Lake City, Utah 84127. 64 pp. \$8.75. This book is full of good pictures illustrating fire and its effects on Yellowstone Park. George presents the pro's of fire in a non-technical style. Fire as a part of the living natural community is presented in an up-to-date and timely manner.

Wetland and Riparian Ecosystems of the American West, K.M. Mutz and L.C. Lee, technical coordinators. Eighth Annual Meeting of the Society of Wetland Scientists. 1988. To obtain copies of the proceedings contact Kathryn Mutz, Planning Information Corporation, 1801 Broadway, Suite 920, Denver, CO 80202. No charge.

Index to Information on Insects Associated with Western Wildland Shrubs by A.B. Haws, A.H. Roe, and D.L. Nelson. 1988. Gen. Tech. Rep. INT-248. USDA, Forest Service, Intermountain Research Station, Ogden UT 84401. No charge.

"I find I have never admired this firstling quite enough..."

John Burroughs



UNPS Sego Lily

C/O Janet Williams
Utah Native Plant Society
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Salt Lake City, Utah 84152-0041

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Vol. 12 No. 3

APRIL 1989

CALENDAR OF EVENTS

April 1-Oct 31

Wildflower Hotline (801) 581-4969. Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. The report is also available by transcript. Send a self-addressed, stamped envelope for each week to Wildflower Hotline, State Arboretum of Utah, Building 436, University of Utah, Salt Lake City, UT 84112. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00, Friday mornings from April through October.

April 5-7
Wednesday-Friday

Sixth Wildland Shrub Symposium sponsored by the Shrub Research Consortium, to be held at the Holiday Inn, Las Vegas, Nevada. The symposium will address topics in wildland shrub biology and management, including cheatgrass invasion, shrub die-off, and other aspects of shrub biology and management. A field trip is planned to the Nevada Test Site, U.S. Dept. of Energy. To receive pre-registration materials and information contact Keith McNeil, Division of Continuing Education, University of Nevada, Las Vegas, 4505 University Parkway, Las Vegas, NV 89154; (702) 739-3707.

April 8
Saturday
9:00 am

Salt Lake Chapter Field Trip to Stockton bar in Tooele County to see the state's probable only population of *Sisyrinchium inflatum*, (purple-eyed grass or grass-widows) and other early bloomers, led by Vard Jones. Meet at the Division of Wildlife Resources parking lot, 1596 West North Temple. Bring a lunch and pertinent gear, i.e. hand lens, field guides and keys, etc. (and binoculars for the grebes on Rush Lake, if interested).

April 8
Saturday
10:00-1:00

Gardening with Native Plants by W. Richard Hildreth, Director SAU. Learn the maintenance and water conservation advantages of gardening with native plants. Study design, plant selection, planting and maintenance. Limit 30. Register with the Utah Museum of Natural History, 581-4887. Museum and Arboretum members : \$8.00. Others: \$10.00.

April 12
Wednesday
6:30-8:30

UNPS Executive Committee/Board of Directors Meeting under the direction of Pam Poulson, State President. Agenda items include a report to the board by Deanna Nelson on her study on *Arctomecon humilis* and a presentation on the new Utah Heritage Program by The Nature Conservancy's Ben Franklin. Call Pam at 581-5322 with additional agenda items.

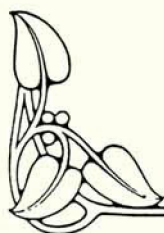
April 20-23
Thursday-Sunday

1989 Institute of Desert Ecology. For more information contact Mary Ann Chapman, Director, Tucson Audubon Society, 300 East University Blvd., #120, Tucson, AZ 85705. Phone (602) 881-1660.

- April 24**
Monday
7:00 pm
Cache Valley Chapter Meeting. "Why Not Native Trees?" by Carl Johnson, author of Common Native Trees of Utah. Logan City Public Meeting Room, 255 North Main, Logan.
- April 27**
Thursday
7:30 pm
Salt Lake Chapter Meeting. "Forest Fires of Yellowstone: The Good and the Bad," by Jim Cook of the Forest Service, Salt Lake District Rangers Office. U of U Union Building, the Den.
- April 28**
Friday
Arbor Day. You are invited to a memorial tree planting by the Arboretum at noon. For further information, call 581-3878.
- April 28-May 4**
Friday-Thursday
Cache Valley Environmental Awareness Week. Ground breaking and initial planting at the Edith Bowen Garden on Friday, plant sale on Saturday. Jimmie Grutzmacher, coordinator.
- April 29**
Saturday
Spring at Red Butte Gardens with W. Richard Hildreth, Director, State Arboretum. Get a behind-the-scenes look at what it takes to keep a botanical garden functioning and healthy. Limit 25. Register before Apr. 21, 581-5322.

LOOKING AHEAD

- May 4**
Thursday
Rare Plants, Hybridization, and Taxonomic Uncertainties; Options for Conservation and Management, a training workshop sponsored by the Desert Botanical Garden, Phoenix, AZ. See article, this issue.
- May 13**
Saturday
Salt Lake Chapter Fieldtrip to see what's blooming in the foothills. Details in next newsletter.
- May 12-14**
and
May 26-28
(1 eve and 2 days)
Desert Wildflowers Workshop: Identification and Illustration. Day outings in Arches National Park and nearby areas focus on wildflower identification with emphasis on adaptations and habitats. Optional sketching exercises help develop an eye for structure, function and beauty. Artistic talent not necessary! One undergrad credit available. Taught by Lee Goodman, botanist. Fee: \$85.00. Contact Canyonlands Field Institute (see above).
- May 20 and 21**
Saturday & Sunday
Utah Audubon Basin and Range Seminar at Joy, Utah, 30 miles northwest of Delta. This overnight camping trip offers presentations in the field by local experts in such diverse areas as geology, birds, nature, photography, native plants, insects and archaeology. For more information, call Terry Way, w-468-2599 or h-486-2150.
- May 27**
Saturday
Spring Wildflowers of the Wasatch Foothills. Arboretum sponsored field trip led by Dr. Ty Harrison, plant ecologist. Fee: Arboretum members, \$6.00 others, \$7.00. Call 581-5322 for more information.
- June 3**
Saturday
Salt Lake Chapter Fieldtrip to visit homes utilizing native plant landscaping. Details in next newsletter.
- June 17**
Saturday
Trees and Shrubs of the Wasatch. Arboretum sponsored field trip led by Alyce Hreha, field botanist. Fee as above. Call 581-5322.
- June 24-27**
Field Botany: Flora of the Tetons, taught by Dr. Leila Shultz. The easy accessibility of a diverse array of plant communities makes the Tetons an excellent place to teach the botany of the Rocky Mt. region. Emphasis will be on the identification of grasses, wildflowers, shrubs and trees, combined with a thorough investigation of selected local plant communities and plant ecology. Fee \$160.00. Write Teton Science School, P.O. Box 68, Kelly, WY 83011 for more information. (307) 733-4765.



June 24-27

Field Botany: Flora of the Tetons, taught by Dr. Leila Shultz. The easy accessibility of a diverse array of plant communities makes the Tetons an excellent place to teach the botany of the Rocky Mt. region. Emphasis will be on the identification of grasses, wildflowers, shrubs and trees, combined with a thorough investigation of selected local plant communities and plant ecology. Fee: \$160.00. Write Teton Science School, P.O. Box 68, Kelly, WY 83011 for more information. (307) 733-4765.

July 12-13

Edible and Medicinal Plants, taught by Clarissa Smith. An expert herbologist, Clarissa will give you a sense of the wide array of and uses for the edible and medicinal plants found in Jackson Hole and the Bridger-Teton National Forest. The field course will discuss both contemporary and traditional uses of native plants. Fee: \$80.00. Contact Teton Science School (data above).

The Sego Lily is published nine times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Newsletters for 1989 will be published as follows: January/February, March, April, May, June, July, August, September/October, and November/December. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. 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. Copy deadline is the 20th of each month.

Membership in the Utah Native Plant Society includes The Sego Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. c1989 Utah Native Plant Society. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

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Susan Crook, Logan Chapter	H 753-3257		

UTAH WILDFLOWER POSTER

Send flowers

Need a great idea for Mother's Day? UNPS' Utah Wildflower Poster featuring twenty-eight Utah native flowers in full color would make a beautiful gift from those of you who are looking for something unique and spring-like. The poster, with botanically accurate artwork created by David Gardner, measures 23" by 34" and is accented with calligraphic labeling. It is accompanied by a descriptive leaflet full of interesting information about each featured plant. We will ship

directly with a gift card included to that special person you wish to remember. Posters are \$10.00. Please include \$1.50 for postage and handling and send your order to: UNPS Poster Committee

P.O. Box 521141
Salt Lake City, UT 84152-0041

Correction: Larry England was featured with the endangered autumn buttercup in *Star*, Dec. 13, 1988, not *The National Enquirer* as previously reported.

"NO HUNTING, NO MILPA"

A Report from Belize

Jo Stolhand

"No Hunting, No Milpa," reads the sign at the entrance to the Cockscomb Jaguar Preserve in southern Belize. Milpa is an Aztec word for corn, but has now become a term for the slash and burn agriculture associated with the planting of corn. Originally, land would be planted for two or three years and then left fallow for two to twenty years to return to native vegetation and replenish the nutrients in the soil. A booming population, though, has changed from this practice to over-use to the point that natural vegetation does not return and, alas, desertification is increasing in these tropical areas.

Milpa is probably the greatest threat to the new world's rain forest, which experts predict may be gone by the turn of the century. Even the Cockscomb Jaguar Preserve is not a climatic rain forest. Logging has taken its toll of the old, large, primary growth which has been replaced by a dense understory. A virgin rain forest has high canopies that prevent light and thus growth at ground level.

What can be saved as the hungry of the third world descend on the tropical rain forest? A small brigade of ethnobotanists work urgently to collect and record data on medicinal plants throughout the world.

At Chaa Creek near the Guatemalan border in Belize, Dr. Rosita Arvigo learns from a 90-year-old Mayan herbal medicine man. The younger generations of this area, moving toward modern technology, have little interest in the traditions of herbal medicine. A vast store of herbal lore was about to be lost because this man had no students to whom to pass his knowledge. In 1986 the National Institute commissioned a study on plants with possible anti-tumor effects. Dr. Arvigo has sent over a hundred specimens for evaluation.

On Dr. Arvigo's farm is a nature trail with labeled, naturally growing trees and plants and a written guide describing the medicinal or economic value of each. The first tree one encounters on the trail is a wild palm, the Cohune. The Mayan make coconut oil from the meat of the nut, fuel their fires with the husks, and thatch the roofs of their homes with the leaves. Another tree, the Chicolero, is closely related to a tree from which strychnine is derived. It provides a strong medicine long used by the Mayans for a number of internal ailments. Dr. Arvigo also uses it in her Jungle Salve, a green ointment for taking the itch out of the bites caused by mosquitoes and botlas (a small black fly). The afflicted in our group found the Jungle Salve quite effective.

Over half of our drugs are derivatives of plants, most of them tropical. Aspirin, quinine, valium, codeine, reserpine, vinblastine, and steroids are just a few. How many thousands of plants have never been

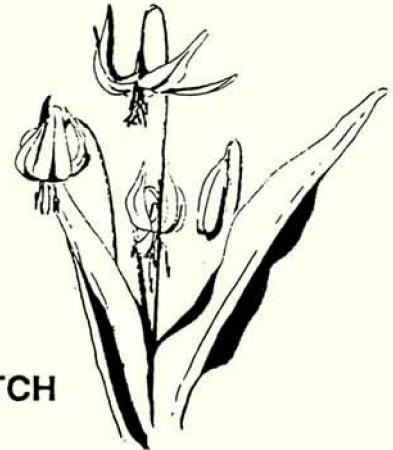
evaluated? How many are already exterminated? Is it not possible among the thousands lost or soon to be lost that there is a medicinal plant to curb AIDS, cure cancer, or curtail the next epidemic that will plague man?

Jo Stolhand, a microbiologist, has just returned from a Nature Conservancy tour to Belize. Jo serves as chair of the UNPS wildflower poster and T-shirt committee.

For more on the topic of identifying and saving medicinal plants, see "Prescriptions from a Rain Forest Pharmacy," by Donald Dale Jackson in Smithsonian, February, 1989. In Amazonia, ethnobotanist Mark Plotkin studies ways in which tribal peoples use plants as medication.

"This is the last generation of scientists who have the opportunity to study indigenous groups and their interactions with the rain forest," says Michael Balick of the New York Botanical Garden. If the jungle is a drugstore--as it is for forest Indians--the store's closing time is drawing dangerously near."

"The cultural dimension of this work--saving aboriginal societies by saving their eco-systems--is its most compelling. 'I go to sleep thinking about endangered palms and wake up thinking about how to raise money for an Indian tribe. It's a lifetime job. We have good data on maybe 10 percent of the Amazon plants now. In my lifetime we may get that up to, say, 40 percent,'" says Mark Plotkin.



WILDFLOWER WATCH

The peach trees are in bloom in the campground at Zion National Park!

Peak flowering times in Washington County are mid-April to the first of May.

Jennifer Harrington reported *Orogenia linearifolia*, Indian Potato, blooming in City Creek Canyon on March 14th.

Here's a rule of thumb for finding *Erythronium grandiflorum* in bloom. When apricot trees are blooming in the valley, glacier lilies will be in flower in Millcreek canyon and other similar elevations.

Report your "blooming sightings" to Pam Poulsen at 581-5322 for the Wildflower Hotline.

COMMEMORATE ARBOR DAY Honor Native Trees

PUBLICATIONS

Trees of the Great Basin: a Natural History, by Ronald M. Lanner; University of Nevada Press, 215 pp., illus., \$19.50.

From the cliff-clinging ancient bristlecone pines to the water-loving cottonwoods, birches and willows that trace the rivers and streams of the Great Basin, this book provides a fine library on western trees as well as fun reading to anyone interested in western natural history.

Not only has Mr. Lanner described the physical features of 47 native trees of the region, which stretches from California on the west to mid-Utah on the east and from Oregon and Idaho across almost all of Nevada, but he has captured the sometimes symbiotic relationship between many of these trees and the human and other biotic creatures with whom they are associated.

Following in the same vein of examination used in his first publication, **The Pinon Pine: a Natural and Cultural History**, Mr. Lanner addresses himself to broad ecological considerations rather than simply to matters of field identification. With excellent line drawings of the trees by Christine Rasmuss and 36 pages of full color, this publication successfully shows Great Basin trees as they truly exist in nature, "sometimes dominating the landscape; sometimes dwarfed by it, sometimes homely and unprepossessing; often lovely, even breathtaking."

Reviewed by Vard Jones, Salt Lake Tribune.

The Complete Trees of North America: Field Guide and Natural History, by Thomas S. Elias; Van Nostrand Reinhold, 948 pp., illus., \$19.95.

Field guides usually have the inherent flaw of attempting to be all things to all people. This is not the case with this key to the trees of North America. Not only are usable keys to all 652 native species given (as well as some 100 introduced species), but range maps, descriptions of typical growing sites, and excellent drawings, many of which are taken from **Sargent's Manual**, also aid the reader in identification. Beginner and expert alike will do well to read the descriptions of plant parts presented in the front of the book as well as the sections on wildlife and types of American forests since a clearer, more concise account is not likely to be found.

Trees are arranged into three large groups: Conifers, Hardwoods (dicots), and Yuccas and Palms (monocots). Once the major group has been determined, leaf and flower characteristics pinpoint the genus and species. Winter bud descriptions are given under each species. In addition, the table of contents makes it simple for more advanced readers to directly consult family or genera without having to thumb through the keys.

The only change I would make in this book is the addition of hardiness zones for each species; even with the excellent range maps I found myself wondering if a particular tree would be hardy in this area. That's a small criticism and if I had to choose from all the field guides on trees of North America, this would be the one I would want.

Reviewed by Bill Brumback and reprinted with permission from Wild Flower News and Notes, New England Wild Flower Society, Inc. Vol. 1, Spring 1982.

IN SEARCH OF THE BIG TREES

Vard Jones

Our dear friend, the late Walter P. Cottam, botanist-ecologist, never saw a tree he didn't like. And in the nearly 95 years he lived, he saw, admired, measured and recorded some of the largest and oldest trees this state has ever known.

Doc was hiking down the Colorado River drainage with his friend, the late Dr. Dean Brimhall, the year the waters were first backing up behind Glen Canyon Dam, when his friend called out, "Doc, you've got to see this juniper!" And what the two saw that day in Bown Canyon was the largest Utah juniper (*Juniperus osteosperma*) they had ever seen.

Months and then years passed since that day of discovery and Dr. Cottam got to worrying about that tree. It had never been documented in any publication. He phoned his good friend and former student, Perry Plummer, in Ephraim. Perry was senior forest ecologist for the Great Basin Experiment Station, U.S. Forest Service.

"You guys are going to let me die without letting me show you that great juniper I've been telling you about for so many years," Dr. Cottam chided. "I want to show you the biggest Utah juniper in the world."

Perry accepted the challenge, and Doc asked me to join the excursion. A few days later Doc and I joined Perry in Ephraim and headed south to Bullfrog Basin, where we joined Vic Starostka, the marine biologist with the Utah Wildlife Resources Division, who boated us about 20 miles downlake to the hiking point.

After eating some cold chicken and a sandwich we began our climb. Doc took along a honeydew melon we had bought in Hanksville. We were going to feast on it if and when we found the tree--and not until.

With Doc leading the way, we found the trail and swung into Bown Canyon, crossing several seeps along the upper walls of the canyon--literally covered with Cardinal flowers and other blooms. Doc and Vic hiked along the bottom of the canyon and headed northward. Perry and I kept higher on the west-facing slope, exploring cove after cove. High in one were hundreds of plants--including several hybrid oaks of turbinella and gambel.

Doc called out occasionally to guide us to large groves of juniper he could see from the streambed. And although we found several giants, we hadn't found the great one we sought.

But a short time later Doc shouted. He had spotted it. When the rest of us arrived at the tree, Doc already had circled the trunk with a tape measure and was calling out the size.

"Nineteen feet, four inches," he shouted.

What a runt it made of a nine-footer in Nevada that had been the previous champ. Next came the rest of the measurements. The spread of the branches was 53 feet. And triangulation at 100 feet from the trunk--using the six-foot-even Vic as a measuring pole--showed the tree to be an even 50 feet tall.

As we sat in the shade of the great tree, dining on that delicious melon, Doc estimated the juniper's age at between 500 and 1,000 years. He pointed out the ideal location of the tree in deep sandy soil with good drainage and nearby seeps to provide abundant and constant water.

The tree was reported by Doc in 1975 to the National Register of Big Trees.

Almost everyone admires a big tree, so when our year-long weekly tour brought us in sight of one we always took note. And we always took measurements. The road that leads north out of Currant Creek and over to Heber displays a few very large quaking aspens (*Populus tremuloides*). One such giant caught our attention a few years ago so we had to measure it. But we couldn't find a string, rope or measuring tape. We did what anyone else might do--we strung a roll of toilet paper around the trunk at four and a half feet above the ground. And the measurement: 23 sheets--each at 4 1/2 inches. Our calculations gave us a total girth of eight feet, six-and-a-half inches.

But that giant was not as large as two other aspens Doc discovered a few years ago while hiking on the north-facing slope of Mt. Nebo in central Utah. Maxine Martz, the late Judge A.H. Ellett, Doc and I revisited these two grand trees a few times over the years, but none of us ever had them documented. The larger of the two, which measured 11 feet around the trunk, had been split by a lightning bolt which may have accounted for its size. This tree was felled by heavy snows or winds in the early 1970s. But standing alongside it was another solid specimen we believe still to be standing which measured nine feet, six-and-a-half inches. Doc estimated its age at several hundred years, but we took no core. The bark of these trees was as dark and furrowed as an ancient cottonwood might be. Access to this tree may be made off the Nebo Loop road and a hike of about a half-mile or less.

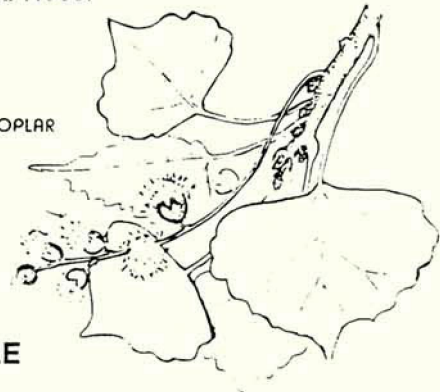
Measurements we've made of the trees have not always been as accurate as those of the juniper and the aspen. A huge cottonwood comprised of several fused trunks--but looking like one--had seven of us explorers standing belly-to-bark and arms outstretched finger-tip-to-finger-tip. And we still couldn't reach around this giant which was the centerpiece of the city park at Gunlock, Washington County.

Hanging out over a cliff in American Fork Canyon near Pittsburgh Lake one day found me trying to measure a limber pine (*Pinus flexilis*) using a rope. As close as we could tell it was 26 feet, four inches. Others who had discovered it earlier apparently came up with the same figure. But a larger specimen has been documented a couple of miles east of the Forest Service boundary in the North Fork of Little Willow Creek near the Granite area of Salt Lake County. It is 31 feet, six inches in circumference and forty-three feet high. These two both exceed total points for the giant limber pine near the top of Logan Canyon near the overlook of Bear Lake.

Utah's other registered big trees include the Jardine Juniper (*Juniperus scopulorum*) in Logan Canyon. It measures 20.48 feet in circumference, is 36 feet tall and an estimated 3,000 years old. A pinyon pine (*Pinus edulis*), circumference of 11 feet, three inches, 34 feet tall with a spread of 45 feet is situated in the La Sal National Forest. A Gambel oak (*Quercus gambelii*), 18 feet, six inches in circumference, 38 feet high is growing on the Kolob Plateau near Deep Creek in Washington County. And a Bigtooth maple (*Acer grandidentatum*), five feet, eight inches in circumference, 38 feet tall with a 30 foot spread is found in the Wasatch National Forest.

Vard Jones is a retired editor of the Salt Lake Tribune and a founding member of Doc Cottam's Thursday Club. He has agreed to lead a UNPS field trip about late July to the huge aspen on Mt. Nebo.

FREMONT POPLAR



EDWIN WAY TEALE

For a great tree death comes as a gradual transformation. Its vitality ebbs slowly. Even when life has abandoned it entirely it remains a majestic thing. On some hilltop a dead tree may dominate the landscape for miles around. Alone among living things it retains its character and dignity after death. Plants wither; animals disintegrate. But a dead tree may be as arresting, as filled with personality, in death as it is in life. Even in its final moments, when the massive trunk lies prone and it has moldered into a ridge covered with mosses and fungi, it arrives at a fitting and noble end. It enriches and refreshes the earth. And later, as part of other green and growing things, it rises again.

Excerpted from The Earth Speaks: an Acclimatization Journal, edited by Steve Van Matre and Bill Weiler. 1983.



The following article, while written with specific reference to the flora of Canada, is pertinent to the concerns of all native plant societies. It serves us here as an introduction to the subject of invading, introduced species which will be addressed in a number of articles to follow in succeeding issues of The Sego Lily.

ALIENS

Ronald D. Lawrence

On March 23, 1856, Henry David Thoreau made the following entry in his journal:

"I seek acquaintance with Nature,--to know her moods and manners. Primitive nature is the most interesting to me. I take infinite pains to know all the phenomena of spring, for instance, thinking that I have here the entire poem, and then, to my chagrin, I learn that it is but an imperfect copy that I possess and have read, that my ancestors have torn out many pages of the first leaves and grandest passages, and mutilated it in many places."

Since Thoreau penned that entry one hundred and thirty years ago, a great many more pages and grand passages have been torn out of the natural poem in Canada and elsewhere, while the mutilation continues at a rate that, according to *The Global 2000 Report* (commissioned by President Carter and handed to Ronald Reagan after the latter took office), some 500,000 species of animals and plants are expected to have become extinct world-wide by the end of the century.

For these reasons, it is now more than ever necessary to discuss conservation, a subject that has long been bandied about by politicians and the media, but which has so far failed to elicit any wide public reaction. In this regard, it is also time to examine the pros and cons relative to the propagation of wildflowers, a controversy that has been with us for many years and which appears to be no closer to resolution than it was when it first arose.



What is a wildflower?

Thinking about the argument recently, I asked myself: What is a wildflower? According to my dictionary, such a bloom is defined as "the flower of a plant that grows without deliberate cultivation." This answer failed to address the hub of the controversy because there are a great many domesticated species alien to Canada that are self-propagating, or wild if discarded. The subject to be addressed, therefore, is

not so much the question of wildflowers in general, but of native versus alien wildflowers. This conclusion has caused me to take a stand in favor of the continued conservation of native plants and in direct opposition to the propagation of alien species in natural habitats.

Matters came to a head for me last year when I read a seed catalogue advertisement for "wildflowers," the majority of which were alien to Canada. I was even more distressed to note that among the offered seeds there were several species that are classified as 'noxious' by the Canada Seed Act and the Ontario Weed Control Act. Prodded into action, I did some research and found that more than 200 alien flowering plants have colonized a great number of natural ecosystems in Canada. And this total does not take into account an unknown number of noxious plants that are considered pest species even in those countries where they have originated. Perhaps the best known of these is the fungus that causes Dutch elm disease (*Ceratocystis ulmi*), which first appeared in Canada in 1944. This fungus, spread by bark beetles, has already killed many thousands of native elms and is expected to eventually wipe out most of these trees.

Dutch elm disease

The relationship between Dutch elm disease and the propagation of alien flowers may at first blush seem far-fetched. It is not. The plant kingdom is divided into a number of large groups that represent ascending levels of elaboration in structure and organization and which include some bacteria, algae, and fungi. So, by examining the natural order of events in Canada (and elsewhere, of course), the connection becomes apparent.

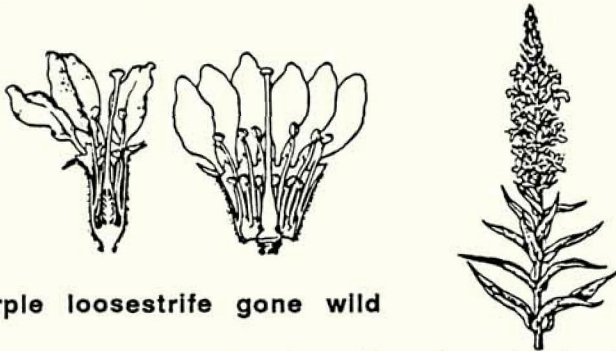
Apart from prairie grasslands, the sub-Arctic tundra, and alpine habitats, the predominant ecosystems found in Canada are supported by forests. At the same time, all plant life is directly influenced by the native fauna. Of the many native species of animals found in Canada, insects are by far the most numerous and the most botanically significant. Plants cannot survive without insects; and insects cannot survive without plants. Terrestrial flora and insects developed more or less mutually during the Silurian Period some 450 million years ago and about 350 million years before the first archaic mammals were to arise.

Dandelion a case in point

Insects apart, alien plants that have escaped cultivation, or have been accidentally propagated as seeds, frequently take over from native flora in the absence of those natural checks to which they are subjected in their countries of origin. The dandelion is a case in point. Three species have been introduced to Canada: the common dandelion *Taraxacum officinale*, the red-seeded dandelion *Taraxacum erythrospermum*, and the fall dandelion *Leontodon autumnalis*. The federal and provincial governments, municipal authorities and

legions of home gardeners have been fighting this tough plant since it first became established in Canada. All to no avail. It is here to stay, in waste places, untended fields, lawns and gardens. Then too, dandelions out-compete many native plants by choking them out.

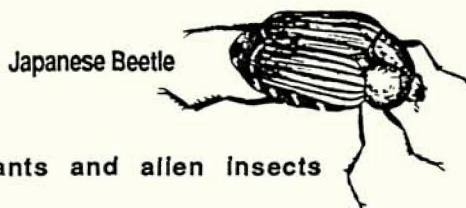
Cultivated flowering plants, the desirable kinds of imports favored by home gardeners can be classed as two major kinds: those that cannot survive the Canadian climate without supplementary winter protection, and those that can thrive on their own in our country. The former should obviously be given preference, the latter if not actually banned, should be cultivated with great care and contained.



Purple loosestrife gone wild

A good example of a cultivated species that has gone wild is purple loosestrife* (*Lythrum salicaria*) which is often advertised in garden catalogues. Introduced into the United States about fifty years ago, this plant is today being called "the purple tide" as it advances inexorably in many areas in the U.S.A., choking out native growth as it spreads. This alien has not yet become a major problem in Canada, but since it has already become well established in the wild, it may attain the status of 'noxious weed' in the near future, when it may be too late to halt its advance.

The introduction of any species of alien flora or fauna may destroy the steady state of a native ecosystem. In the absence of natural controls, the alien capable of prospering by self-propagation usually creates conditions unsuitable for traditional species. Introduced plants, in particular, can sometimes make the land unsuitable even for human cultivation, in which case it is often allowed to lie fallow, or used as a repository for industrial and other wastes.

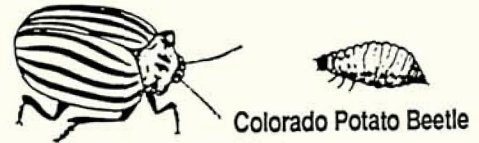


Japanese Beetle

Imported plants and alien insects

Besides feeding native insects and animals, imported plants can also encourage the spread of alien insects and birds. Conversely, the same plants can turn innocuous native insects into serious pests. An example of the former case is the Japanese beetle (*Popillia japonica*), which arrived on our continent from the Orient in 1916 and soon thereafter infested the land. The grubs of this pest feed on the roots of a variety of alien and native plants and the adults feed on the foliage,

flowers, and fruits of a variety of trees, shrubs and herbs. These, and similar insects, support alien birds, such as the starlings, which arrived in North America soon after the turn of the century and have since multiplied to the extent that they can now be considered a serious threat to many species of North American birds.



Colorado Potato Beetle

The Colorado beetle, on the other hand, is an example of a relatively harmless insect that fed on native plants of the potato family and which has now become a widespread pest following the introduction of the domestic potato. It was once confined to a narrow corridor on the borders of the Missouri River.

Alien food plants

There can be no doubt that the introduction of alien food plants to America helped Europeans to colonize the continent and to build the nations that we know today. These plants have become essential to the national economy and to the health of our people. They are here to stay; they cannot be eliminated if Canadians are to continue to survive. Nevertheless, these same plants have permanently altered southern ecosystems, the most dramatic changes having taken place on the Canadian prairies where only a few pockets of native flora and fauna (ducks and other birds excepted) continue to survive. From an anthropocentric standpoint, the benefits derived from imported food plants certainly outweigh the loss of native habitat. But what a pity that governments did not years ago set aside many more rural areas that were to remain in their natural state! This could still be done today in many locations outside of provincial and national parks, many of which have themselves been invaded by alien plants, insects and birds.

Garden plants

The garden plants transplanted to this country confer upon their growers and upon the public at large many esthetic rewards that contribute to the well-being of our people. I have no objections to their continued propagation provided they are contained either in urban areas, or in rural home gardens. I personally favour native wildflowers in my garden. They are equally beautiful, hardier, and require much less attention, even if they are not as spectacular as some of the cultivated aliens.

I live on a one-hundred acre property in an area that is still largely wilderness in which many native species continue to thrive. But mixing with such plants as sundews, orchids, asters, blueberries, trilliums, bog laurel, columbine, cardinal flowers and many others, I have to contend with the usual crop of dandelions, daisies, and other aliens that have become firmly

established in our small home-clearing and at the edges of the forest. Our "lawn" is composed of quack grass, dandelions, native violets, sorrels, trout lilies and isolated clumps of timothy, wheat, barley and oats, none of which have been planted by me or, as far as I have been able to determine, by any other human, at least during the last sixty years.



Pros and cons

Those individuals who argue in favor of the propagation of alien plants outside of the urban environments are, it seems to me, expressing a rather egocentric view. They would like to see and smell and touch many of the flowers that they or their ancestors left behind in the old countries. From an anthrocentric standpoint, this is understandable.

Conversely, those purists who would outlaw the growing of all alien plants, regardless of their usefulness or esthetic qualities, would appear to be carried away by the utopian wilderness philosophy. Staunch and much needed defenders of the natural environment, such individuals at times fail to realize that the ecological clock can no longer be fully turned back; that, in fact, vast areas of southern Canada can no longer sustain the native biota. Indeed, there are few ecosystems left in a pure, pre-European state. I greatly regret this, but, alas, it is a fact of life.

Pro-alien seed lobbyists, on the other hand, sometimes accuse native plant defenders of destroying the natural environment with their automobiles, roads, and a variety of mechanical contrivances. Such accusations are merited, of course, but they apply equally to most people almost everywhere in the world. Man's heavy industrialized hand is spreading pollution and habitat destruction on a global scale. Yet our technological society can no longer afford to exist without the "fruits" of industrialization. In any event, such accusations made against native plant proponents contain the suggestions that, in as much as pollution and habitat destruction are here to stay, it will not matter if more alien biota are set free to further aggravate an already imperilled environment.

Seek reasonable balance

While studying the economy of nature, I have come to realize that unless mankind learns to balance the negative and positive aspects of civilization, Canada and the world face a future in which there will be no room for nature in other than, perhaps, a few jealously-

guarded nature preserves. The controversy that exists over alien and native plants is only one of the many ecological problems that exist in Canada and elsewhere.

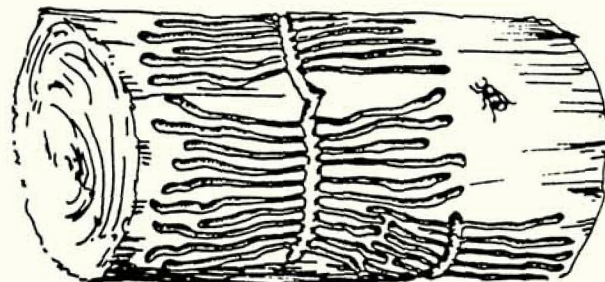
Reasoned alternatives to confrontation should be sought. I believe that alien plants have a place in home gardens and can serve to brighten our lives. But I also believe that rural environments, especially cottage country, should be guarded against the invasion of alien flora and fauna.

There are a great many people who feel compelled to experiment, to grow new, lovelier plants. I see no reason why such persons should not satisfy such very human desires. But they should do so in a responsible manner; they should guard against the escape of their plants. And these cautions should apply as much to individuals as those who maintain parks and conservation areas. Furthermore, prudent governments should prohibit the indiscriminate sale of alien "wildflower" seeds, a term that to the majority of laymen denotes native flowering plants. Governments should also encourage the propagation of native plants, just as they do for native trees.

Beneficial plant-insect relationships

Today, scientists are starting to realize that within undisturbed ecosystems, the relationship between native plants and native insects is in the long term beneficial to both, albeit that in the short term some insects at times do considerable damage to the plants that sustain them. But it is now evident that insects evolved as botanical regulators that excite plant's primary energy sites and, therefore, its biochemical synthesis. Such things strongly suggest that the plant-insect relationships are not haphazard, but rather that they are intricate and extensive and that plant systems are spurred into reacting and responding physiologically to variations in the numbers of insects, just as insects respond to variations in the numbers of plants.

Bearing in mind that I am still discussing events in *undisturbed* environments, it is to be noted that when insects respond to changed botanical conditions by increasing their numbers, they create a series of feedbacks that are in the long term beneficial to all those life-forms that live within the ecosystem.



When native insects severely defoliate a forest, for example, they also fertilize the soil with their excreta, their own bodies, pieces of leaf, and twigs.

Added to this form of natural fertilization, the more open canopy allows sunlight to reach previously shaded areas of the forest floor, so new plant growth is encouraged. And those trees that have been weakened by age or disease will fall sooner or later and will add their own matter to the forest duff, the decomposition of this material being accomplished by numerous species of insects, bacteria, fungi and slime molds. Meanwhile, increased numbers of birds and mammals are drawn to the habitat, the former consuming many insects and adding their own wastes to the soil, the latter preying on birds and on other mammals, or grazing on some of the new seedlings that respond to the stimulus of sunlight and richer soil. The year after defoliation, a forest responds more vigorously, building a fuller canopy and in the gaps created by deadfall trees, allowing seedlings and flowers to grow. The natural balance is therefore maintained by a complex series of actions and reactions.

Natural ecosystems altered

When a natural ecosystem is altered by man, however, the fine balance often becomes seriously disturbed. In such cases, and there are many to be observed in Canada, recognition of the chaos that has been created invariably occurs after the fact, at which time frantic measures are implemented in an attempt to "put matters right." Most often, plants are "protected" by the spraying of insecticides. This certainly reduces the number of insect pests after application, but it also kills many of the insects that prey on the pests and pollinate flowers, thus altering the balance still further. In any event, because insect populations recover quickly and develop resistance to the sprayed poisons, new outbreaks by hardier species occur the following year. This human-induced, see-sawing, ecological imbalance is harmful to the entire habitat.

When human interference is compounded by introduced species of plants and animals, further chaos ensues. In some instances, native insects that have not threatened the survival of the native species of plants on which they feed, because natural forces keep them in check, find that the introduced plant species offer a veritable food bonanza. In response, the insects begin to multiply, soon thereafter causing more damage to the native plants than to the aliens. The native elm bark beetle, *Hylurgopinus rufipes*, is a case in point. Before the introduction of the European fungus, the beetle damaged individual elm trees at a slow rate and was one of the many native checks that kept the trees in balance with the environment.

Elm Bark Beetle



When the fungus was introduced, the native beetle unwittingly spread the deadly agent from elm to elm. In addition, the European elm bark beetle was also imported, aggravating an already serious epidemic.

Nurseries and seed houses can do much to improve the ecology of our wild lands and gardens. Their staffs are experts in the cultivation and propagation of plants and, therefore, should be able to promote the spread of native wildflowers (and probably increase business while doing so), while at the same time promoting conservation. Similarly, naturalist clubs and horticultural societies should consider hosting native plant propagation programs conducted by knowledgeable volunteers. In addition, such groups or individuals could also pull and destroy rampant alien species wherever they are encountered outside of urban parks, and home gardens.

Weed control act

As has been noted, the federal government has passed a weed control act; so have all provincial governments. However, little, if any, enforcement is practiced. The Ontario Weed Control Act, for instance, which has classed twenty-seven species as 'noxious,' states: "Every person in possession of land shall destroy all 'noxious' weeds thereon."

I have spent thirty-two years in Canada without once having been visited by a noxious plant inspector.

Reprinted with permission from the Spring, 1986 issue of WILDFLOWER magazine, a quarterly devoted to the study, conservation and cultivation of North America's wild flora. \$20 U.S. per year, from 75 Ternhill Crescent, North York, Ontario, Canada, M3C 2E4.

Ronald Lawrence studied biology in England before turning to writing as a career. He is the author of eighteen books dealing with Canada's natural environment, including Canada's National Parks.

*According to A Utah Flora, *Lythrum salicaria* is escaping and established in moist sites at 1390 to 2070m in Cache, Davis, Emery, Salt Lake, Utah and Weber countries.

WHAT IS THIS THING CALLED 'WEED'?

Carol J. Morris



What is a weed? A plant, of course, but how does a "weed" differ from a plant?

Is weed to brat as plant is to child? Actually, a weed is many things to its viewers.

To a gardener, it's any plant growing where it isn't wanted.

To a rancher, it's any plant toxic to range animals or pesky to crops.

To a crafter, it's any plant that will look pretty in a dried arrangement.

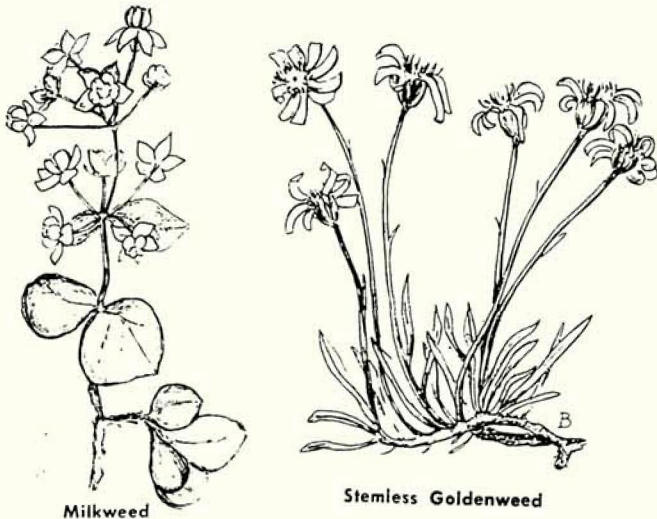
To a bee, there may be no weeds, for even spotted knapweed makes delicious honey.

To a naturalist, then, what is a weed? Perhaps it is any introduced species that is rapid spreading and invasive. It either crowds out native plants or creates unhealthy soil or water conditions so our wild flora and fauna cannot flourish. Therefore, in a pristine environment where foreign plants have not yet found their way, there should be no weeds--only plants native to the area.

In summary, "plants," like the human race, are made up of all kinds of specimens--the good, the bad, and the ugly. The immigrant renegades and thieves of the plant world are called weeds. They are akin to the starling and English sparrow of the bird world. Your comments? Let us have your definition of "plant" vs. "weed."

Reprinted with permission from *Heliseva*, newsletter of the Montana Native Plant Society, Vol. 1, No. 2, Winter 1988.

Carol J. Morris is a freelance writer, and serves as Secretary-Treasurer of the Clark Fork Chapter of MNPS.



**A rose is a rose is a rose
(thank you, Gertrude Stein)
but is a weed is a weed is a weed?**

Another View

Weeds have had all the abuse they can take. Although it's not likely they would ever become extinct, it's time they are recognized and appreciated as a valuable food. That determined dandelion is not ready to give up the fight. Let's face it, we should be eating such a hardy plant. You're saying, "You've got to be crazy if you think I would eat a weed." Being crazy helps, but that's not why we should eat them. They are highly nutritious and are put in capsules to make life easier.

Our feature this time is an herb that grows right here in the Truckee Meadows. I chose yellow dock root (*Rumex crispus*) because it is such a fantastic plant. It grows very fast in the moist meadows around here (and even in gardens as a weed) and is very high in easy-to-absorb iron. It has been used with success in cases of anemia for centuries. With its combination of vitamins C and A and calcium and phosphorus, it's no wonder the iron is easy to absorb. Yellow dock is especially effective for cleansing toxic blood which will clear up most skin problems. Other organs that will receive benefit from eating such a wonderful herb are the stomach, spleen, and the gallbladder. It can be made as a tea or taken in capsules.

From *The Weed Eater*, an occasional publication of Truckee Meadow Herbs, 304 Vassar St., Reno, NV. They have a large selection of fresh dried bulk herbs, and also carry herb seeds.

OUR VERSATILE WEEDS

Lois M. Cox



So you sometimes think you have problems! At least you can move into the shade if it becomes too hot in the sun. You can get a drink of water when you want it. And you can even decide to try a new state if you don't like where you are.

Plants, from trees to lichens, aren't so fortunate. Their problems all have to be solved on the spot. A plant either survives where it is, or it dies. And when "where it is" is in the desert or at high altitudes, a completed life cycle has to be a series of triumphs. Buttercups that germinate, grow, and blossom in the snow, desert plants that go from germination to seed production in a few days--these are among the extremes.

But most of us wouldn't have to travel out of our back yards to find plants that show amazing ingenuity in solving growth and reproduction survival problems. A botanist at Utah State University, Dr. Ivan Palmblad, and his graduate students are studying some of Utah's common plants. So far, they've been concentrating on the ecology of seed production. They have surveyed 105 species of plants in the state and have identified 15 that nature seems to have favored in a special way.

Curlyleaf dock (*Rumex crispus*) is one of these 15 which exhibit germination polymorphism. This simply means that the members of this group are not bound to a single pattern of germination. Cheatgrass and pigweed come into the same category, which helps account for their persistence.

The germination versatility of these plants depends upon their producing two kinds of seed. One type will germinate all at once, just as soon as it has the temperature, moisture, and light conditions that it

needs. The other will germinate only after considerable time (years, usually) has elapsed.

Occasionally one plant produces both kinds of seeds, which can rarely be told apart by looking at them. A given population may produce one or the other seed, or it may produce both within a single season.

For example, a population of curlyleaf dock around Franklin, Idaho, regularly produces both quick- and delayed-germinating seed. The delayed-action seed helps assure survival of the population regardless of a year or two of bad weather or herbicide treatment.

Another population of curlyleaf dock that is located west of Smithfield, however, produced only seed that will germinate as soon as conditions are favorable. This population, of course, could be wiped out in a single spring if all the just-germinating individuals were methodically destroyed.

Some plant species that do not produce two kinds of seeds compensate by putting forth tremendous numbers of the non-delayed type. Of the plants examined by Dr. Palmblad and his students, yellow allyssum, mullien, and foxglove follow this route. Others, such as the sunflower, sego lily, tall larkspur, and desert parsleys, also produce only one kind of seed. But their seeds are designed to survive adverse conditions and not to germinate until the environment is highly favorable.

Plants do not have the mobility of animals, but ecologists are continually amazed by the diverse ways they cope with their exceedingly complex worlds.

Reprinted from Utah Science, Sept., 1969. At the time of original publication Lois Cox was a Science Writer for the Utah Agricultural Experiment Station and Division of University Research.

Salt Lake Chapter Hears Plans for I-215 LANDSCAPING

Andy Boyack
UNPS Board Chair



Plans for landscaping a portion of I-215 with native plants was the subject of Jan Striefel's presentation at the February Salt Lake Chapter meeting. Her company is designing and will be planting a nine-mile stretch of the right-of-way of I-215 from 3rd East to 45th South with plants native to this region.

Studies were made of the many sections of right-of-way to determine site characteristics including soil type, top cover, ground slope, exposure, runoff, drainage and ground water. From this information planting designs were formulated. These envisioned four levels of design. The first level included the three interchanges which will receive the densest plantings and temporary watering for two years. These interchanges are 3rd East, 20th East, and Knudsen's Corner. They are considered gateways to

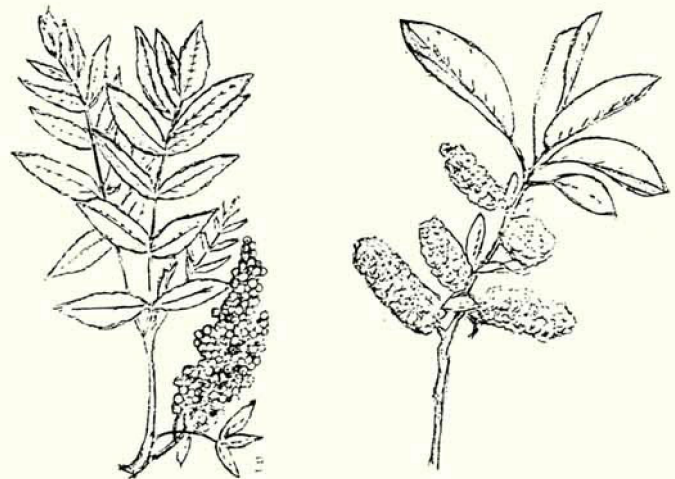
the surrounding communities and as such their appearance is vital. The other levels will be dry land planted with suitable plants. At all levels wet areas such as marshes, springs, ground-water and creeks will receive special treatment.

Plantings will include forbs such as trees, shrubs and perennial flowers. Featured trees will be juniper and curl-leaf mountain mahogany with maple and oak along the mountain. Shrubs will include sumac, rabbitbrush, cliffrose, chokecherry, and other natives. Wildflower mixes will be used in flat areas near the interchanges.

There was some discussion about native grasses. Although it was generally considered that grasses tend to crowd out other plants in competition for water, some native grasses might be appropriate in areas of low visibility or as quick growth for erosion control.

Eight years ago a bare hillside near Ensign School was planted with many of these native plants by school children. Its appearance today serves as an indication of what the landscaping may look like in future years.

This I-215 right-of-way landscaping with native plants is one of the first projects of this magnitude to be undertaken by the State of Utah.



WILDFLOWERS...Setting off to see nature's colors in the family car may soon involve less of an excursion than it used to. But a new federal law taking effect this month requires that 25 cents of every \$100 spent landscaping federal highways be used to plant native wildflowers. Fortunately, highway officials in a majority of states--Texas and Michigan are prime examples--have had experience over the last decade working with garden clubs that have donated wildflower seeds and plants. Their track-record should make the new job easier. They will doubtless get plenty of extra encouragement from motorists who prefer looking at bluebonnets and daisies rather than grass as they cruise the nation's highways.

Reprinted from Christian Science Monitor, Sept. 29, 1987.

Try this method for checking out native seed before planting.

Step-By-Step

Testing for Germination

Nancy Bubel

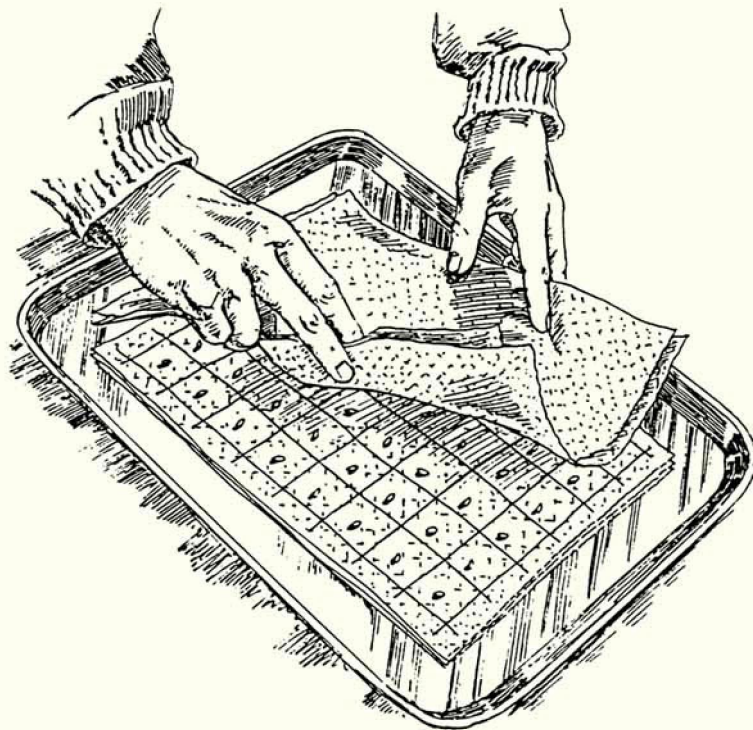
As the sun gradually grows stronger, we gardeners start to shuffle through our packets of seed. Sometimes we find ourselves with leftovers from other years, seeds of flowers, herbs, and vegetables that we never got around to trying. Except for the short-lived seeds of lettuce and parsnips, most year-old seed should still be fine for planting this year--if it has been stored in a cool, dry place. But what about older seeds, the envelopes that get shunted, once again, to the bottom of the pile because you're not sure they're still viable? What about the heirloom seeds you want to plant every few years to keep the strain alive? Or the undated seeds you've received free? With a new growing season quickly approaching, perhaps you would like to give some of these seeds a try.

You can avoid wasting time and garden space in spring (if the seeds are indeed duds) by testing them for germination now, while there's still time to replace them if necessary. Seed with a low germination rate can still produce a worthwhile stand of plants if you sow thickly. The following steps are a homegrown version of the test that seed companies use.

1. PREPARE A MOIST BASE. Professional testers often use a base of super-absorbent felt or blotting paper, but for home testing double layers of paper towels work fine. You'll also find scoring easier if you mark off the paper towel into one-inch squares with a ball-point pen. Then fit the paper towels into the bottom of a shallow pan or cookie sheet. Dampen the towels with warm water until they are moist but not soggy. [A squirt bottle works nicely.]

2. COUNT OUT THE SEEDS. Professionals usually test 100 seeds at a time, but 50 is plenty for the home gardener. If your seed supply is limited, as few as 20 should give you an adequate test, if not a completely accurate one. In any event, a good rule of thumb is to use less than 20 percent of your supply. Remember that it is easier to calculate germination percentages from round numbers. Now, place a seed in the center of each marked square. Seal the remaining seeds in their container or packet, and return them to storage in a cool, dry place.

3. INCUBATE THE SEEDS. For vegetables, herbs, and most flowers, cover the seeds with two layers of damp paper towel or newspaper and slide the whole arrangement into a large plastic bag. Some seeds --mostly flowers, need light to germinate. (For more information, see "The Light Touch," *Horticulture*, Jan., 1988.) Leave these seeds uncovered, and enclose the pan in a clear plastic bag. In either case, seeds need air as well as moisture to germinate, so don't close the bag tightly. Because the most rapid germination occurs when the seeds are in the 70- to 80-degree range, place the bagged tray in a consistently warm place--atop a hot-water heater or refrigerator, near a wood stove, or perhaps on a high shelf near a hot-air vent. For light-sensitive seeds, choose a place where they will receive indirect light, or they will get the life steamed out of them. For slower-germinating seeds, be sure the paper towels remain damp. Gently sprinkle warm water on the paper if it shows signs of drying.



4. CHECK FOR GERMINATION.

Take your first peek at the seeds after two or three days. Most viable seed will germinate within two or three weeks, and some will sprout much sooner. Seeds of plants in the cabbage family will often sprout in two days, cucumbers and zucchini in three or four. Seeds of parsley, carrots and related plants can take up to three weeks to germinate. Zinnias and marigolds are often up within a week; coleus two weeks, dusty miller and astilbe three weeks. Consult the seed-packet or a seed-starting guide so you know what to expect.

If 40 out of 50 seeds sprout, the seeds are definitely worth planting. Even a germination rate of 50 percent means there are still enough viable seeds for a decent stand. Jot down the test date and germination rate on the seed packet or label so you'll remember to plant them more thickly. A germination rate lower than 25 percent of any seed should persuade you to order fresh replacements.

Keep in mind also that these results were obtained under near-ideal conditions. If you have reservations about the germination rate of your seeds after this test you can stack the deck in your favor. Plant the seeds with a heavy hand, use only fine soil, and keep your flats or beds well-watered even before the seedlings appear. In other words, give the seeds every bit of encouragement.

Reprinted courtesy of *Horticulture*, *The Magazine of American Gardening*, 20 Park Plaza, Suite 1220, Boston, MA 02116. Copyright (c) 1989, Horticulture Partners. Illustration by Elayne Sears, and reprinted with her permission.

Nancy Bubel's new book, *The New Seed Starter's Handbook*, published Jan. 88 by Rodale Press, contains complete, general seed-starting directions, as well as specifics for wildflowers, herbs, shrubs, trees, vegetables and garden flowers. A section on saving seed at home is included.

UNPS Sego Lily
C/O Janet Williams
Utah Native Plant Society
P.O. Box 520041
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A treatment for breaking seed dormancy is discussed in the article "Hydrogen Peroxide and Thiourea Treatment of Bitterbrush Seed" by Richard L. Everett and Richard O. Meeuwig, U.S. Forest Service, Research Note INT-196, 1975. Although treatment of the seed with thiourea is effective, thiourea is toxic to people working with it. Bitterbrush seeds soaked in a 1% hydrogen peroxide solution for seven hours and then air-dried for seven days before planting were found to have about a 70% germination rate spread over 12 weeks. Better results were obtained by mechanically shaking the seeds as they were soaking, but for the average gardener this is impractical. This treatment has been found to be beneficial for other hard to germinate seeds, especially for other members of the Rose Family.

From the Nevada Native Plant Society Newsletter, Vol. 9, No. 9.

Time to Renew

Our membership year begins in March, and it is time for most UNPS members to renew. Check your mailing label. If it says 'March 1989' on the top line of the label, your membership is payable now. Please fill in the membership form on the back page and return it with your check.

Please don't delay. Do it today.

Membership Application

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

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

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. 12 No. 4

MAY 1989

CALENDAR OF EVENTS

May 4
Thursday

Rare Plants, Hybridization, and Taxonomic Uncertainties; Options for Conservation and Management, a training workshop sponsored by the Desert Botanical Garden, Phoenix, AZ.

May 6-7
Sat-Sun

Work Party to help The Nature Conservancy at endangered Clay Phacelia site. See article this issue, "UNPS Volunteers Needed", for details.

May 13
Saturday
9:00 am

Cache Valley Chapter Field Trip for a census of the endangered Maguire Primrose (*Primula Maguirei*). Meet at the Ladybird Park Rest Area, 4th North (Logan Canyon road) and about 15th East at 9:00. Bring a lunch and appropriate gear. Susan Crook, 753-3257 evenings, and Wayne Padgett, Forest Service Office, 752-1311, are in charge.

May 13
Saturday
9:00 am

Salt Lake Chapter Field Trip to see what is blooming in the foothills. Meet at 9:00 am in the Red Butte Gardens parking lot in the mouth of Red Butte Canyon. Everyone is welcome, UNPS member or not. Bring a lunch. Leader, Dave Wallace. 466-2719.

May 12-14
and
May 26-28
(1 eve and 2 days)

Desert Wildflowers Workshop: Identification and Illustration. Day outings in Arches National Park and nearby areas focus on wildflower identification with emphasis on adaptations and habitats. Optional sketching exercises help develop an eye for structure, function and beauty. Artistic talent not necessary! One undergrad credit available. Taught by Lee Goodman, botanist. Fee: \$85.00. Contact Canyonlands Field Institute (see above).

May 17
Wednesday
6:30-8:30

UNPS Executive Committee / Board of Directors Meeting under the direction of Pam Poulson, State President. Call Pam at 581-5322 with agenda items.

May 20 and 21

Utah Audubon Basin and Range Seminar at Joy, Utah, 30 miles northwest of Delta. This overnight camping trip offers presentations in the field by local experts in such diverse areas as geology, birds, nature, photography, native plants, insects and solar cooking. For more information, call Jeanne Le Ber, 532-7384.

May 22
Monday
7:00 pm

Cache Valley Chapter Meeting. "Cache National Forest Recreation Planning" by Chip Sibbersen. 7:00 pm, Logan City Public Meeting Room, 255 North Main, Logan.

May 25
Thursday
7:30

Salt Lake Chapter Meeting. "Dendrochronology in Utah", by Dr. Elaine Sutherland who analyzes tree rings to determine the effect of environmental disturbances, including fires, air pollution and insects, on tree growth. She is currently an adjunct asst. professor in the U of U Dept. of Geography.

May 27
Saturday

Spring Wildflowers of the Wasatch Foothills. Arboretum sponsored field trip led by Dr. Ty Harrison, plant ecologist. Fee: Arboretum members, \$6.00 others, \$7.00. Call 581-5322 for more information.

LOOKING AHEAD

June 3
Saturday
9:00 am

Salt Lake Chapter Fieldtrip to visit homes utilizing native plant landscaping. Meet at 9:00 am at Bill Wagner's home, 6722 South Lazy Bar Circle (2395 East). Leaders, Bill Wagner, 942-1295 and Dave Okelberry, 968-6190.

June 17
Saturday

Trees and Shrubs of the Wasatch. Arboretum sponsored field trip led by Alyce Hreha, field botanist. Fee as above. Call 581-5322.

June 24-27

Field Botany: Flora of the Tetons, taught by Dr. Leila Shultz. The easy accessibility of a diverse array of plant communities makes the Tetons an excellent place to teach the botany of the Rocky Mt. region. Emphasis will be on the identification of grasses, wildflowers, shrubs and trees, combined with a thorough investigation of selected local plant communities and plant ecology. Fee: \$160.00. Write Teton Science School, P.O. Box 68, Kelly, WY 83011 for more information. (307) 733-4765.

July 12-13

Edible and Medicinal Plants, taught by Clarissa Smith. An expert herbologist, Clarissa will give you a sense of the wide array of and uses for the edible and medicinal plants found in Jackson Hole and the Bridger-Teton National Forest. The field course will discuss both contemporary and traditional uses of native plants. Fee: \$80.00. Contact Teton Science School (data above).

August 18-23

Conference in the Rockies, "Working Together to Educate About the Environment," co-sponsored by The Conservation Education Association and The North American Association for Environmental Education, Estes Park Center, YMCA of the Rockies. For more information, write Conference Headquarters, P.O. Box 400, Troy, OH 45373. (513) 698-6493.

Through Oct. 31

Wildflower Hotline (801) 581-4969. Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00, Friday mornings from April through October.

Seasonal Bloom

St. George Wildflower Hotline (801-628-1365). A 30 second message, updated every two days, is recorded by Bart Anderson of St. George on what's blooming where in southwestern Utah.

The Sego Lily is published nine times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Newsletters for 1989 will be published as follows: January/February, March, April, May, June, July, August, September/October, and November/December. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. 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. Copy deadline is the 20th of each month.

Membership in the Utah Native Plant Society Includes The Sego Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. c1989 Utah Native Plant Society. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

Officers and Committee Chairs

Andrew Boyack, Chairman of Board	H 278-8596
Pam Poulson, State President	O 581-5322
Bill Wagner, Vice Pres./Pres. Elect	H 942-1295
Kathy Anderson, Secretary	H 277-4652
Dave Wallace, Treasurer	H 466-2719
Helen Burnett, SL Chapter Pres.	H 484-7998
Swede Dahl, Logan Chapter	H 563-5269
Ross Murdock, Logan Chapter	H 752-8517
Susan Crook, Logan Chapter	H 753-3257

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Sherel Goodrich, Rare Plant Co-Chair	O 7890323
Dave Gardner, Conservation Chair	H 649-3355
Debie Noel, Education Chair	H 322-0114
Jo Stolhand, Posters Chair	H 521-0069
Janet Williams, Newsletter Chair	H 364-4546
Dave Okelberry, Horticulture Chair	H 968-6190
Dick Page, Seed Chair	H 255-7769

What an opportunity!

Many UNPS members feel strongly about the conservation of native plants and often ask themselves, "What can I do to help?" "What can one person do to make a difference?" "What contribution can I make?" In this issue of the newsletter you will find many opportunities to respond to requests for YOUR help, YOUR input, YOUR participation. I hope you will give these requests your full and immediate consideration. **We need you! We need each other!**

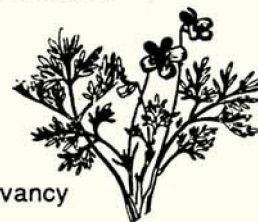
Wanted: An assistant to the editor of The Segoe Lily. Job Description: Pick up newsletter from print shop, fold, collate and staple, attach mailing labels and take to Redwood Post Office for mailing under bulk permit OR arrange monthly work parties to accomplish these ends. Call Janet at 364-4546 for further arm-twisting.

UTAH WILDFLOWER POSTER

Send flowers

Need a great idea for Mother's Day? UNPS' Utah Wildflower Poster featuring twenty-eight Utah native flowers in full color would make a beautiful gift from those of you who are looking for something unique and spring-like. The poster, with botanically accurate artwork created by David Gardner, measures 23" by 34" and is accented with calligraphic labeling. It is accompanied by a descriptive leaflet full of interesting information about each featured plant. We will ship directly with a gift card included to that special person you wish to remember. Posters are \$10.00. Please include \$1.50 for postage and handling and send your order to: UNPS Poster Committee, P.O. Box 521141, Salt Lake City, UT 84152-0041.

Have You Seen This Violet?



Ben Franklin

Botanist for UNHP, The Nature Conservancy

The goal of the Utah Natural Heritage Program is to locate and document rare species in the state of Utah. We would like to involve members of the Utah Native Plant Society who have been stricken with spring fever and are eager to get out into the field looking for blooming natives.

Our current target species is *Viola beckwithii*, the Beckwith violet. It is a species whose habitat is disappearing from along the Wasatch front. The last known collection was near Logan in 1968. It grows along the foothills in bluebunch wheatgrass, sagebrush, and mountain brush communities in Salt Lake and Utah Valleys and along the East Bench in Cache Valley. It is distinctive as the only native violet with divided leaves and petals of two colors. The upper pair of petals are red-purple while the lower three are violet. It is in bloom from late April into May.

If found, please DO NOT collect, but note the location carefully and call UNHP at 538-5524 to report your find with as many details as possible.

Welcome to New and Re-Newing Members

Judith J. Johnson, Logan
John R. Gibson, Tooele
Curtis Landgraf, Sandy
J. Lemanski, Magna
Kathlyn Collins, Logan
KMary Kiessling, SLC
Amy Allen Price, SLC
Helen A. Nielsen, SLC
Caitlin K. Kenny, SLC
Ray K. Schugk, West Valley City
John E. & Margaret B. Riley, SLC
Jimmie & Bob Grutzmacher, Mendon

Ken Jenner, Logan
James O. Morris, Newton
Carmen Reich, Logan
Ross Murdock, Logan
Reinhard A. Jockel, Logan
James O. Morris, Newton
Don Viers & Ellen Parker, Logan
Susan Grey & Bob Rissland, Richmond

TES WORKSHOP HELD



Dave Gardner
UNPS Conservation Chair

Last year an 18 member task force composed of Forest Service personnel, outside conservation agencies, and conservation organizations met to address issues relating to Forest Service responsibility in the TES arena.

The Region 4 TES Animal and Plant Workshop hosted by the Forest Service was convened March 14-16 this year to confront the issues identified by the task force. The problems essentially parallel the actions required for their solution, so it would be redundant to present them here, and it is, after all, action that is most important.

The underlying theme of this meeting was not only the specific need to protect threatened, endangered and sensitive species, but the wider need to protect biological diversity.

The Endangered Species Act is a far-sighted piece of legislation designed to prevent loss of species and their habitats, and thus loss of biological diversity. The general feeling among conservationists and agency personnel at this meeting was that stronger commitment to compliance with the ESA is in order.

Aggressive programs are needed for:

- 1) recovery of listed species (in many cases once a recovery plan has been written there is very little action toward its implementation);
- 2) maintaining viability of recovered species;
- 3) preventing sensitive species from slipping toward the federal listing abyss;
- 4) protection of rare and unique ecosystems and habitats;
- 5) protection of biodiversity across whole regions (not just in scenic or spectacular areas);
- 6) integration of TES goals with other agency goals (i.e. multiple use--from an ethical and certainly legal standpoint, management and recovery of TES species comes as a priority to multiple use);
- 7) building of political and economic support for the TES species program.

Ways to accomplish these programs were discussed at length. It was generally agreed that a great deal can be accomplished by expanding and strengthening partnerships among conservation organizations and government agencies on the state and federal levels. Conservation groups can aid in the process by invoking educational campaigns that generate public input and support for agency programs that are accomplishing TES goals. Conservation organizations can contribute to the data base on TES species. For instance, The Nature Conservancy is in the process of setting up files, maps, and computer data for a Utah Natural Heritage Program. A good deal of on-the-ground review of data and subsequent monitoring could be done by groups like the UNPS. (More on this

possibility in subsequent newsletters.)

Interagency cooperation can make more efficient use of limited budgets by preventing duplication in the work load for TES species and sharing of responsibilities. Again, conservationists could be helpful by encouraging elected officials to support greatly increased budgets for the TES program.

Continued training and education in identification, monitoring and management of rare species on the local level is valuable for increasing efficiency of implementation and will very likely enhance employee commitment to program objectives.

Methods of dealing with rare species were presented by several individuals that have worked on specific cases, such as Rocky Mountain Wolf recovery, integrated management of the Grizzly Bear, the effects of mining on the Lahontan Cutthroat Trout, a Spotted Owl update, and the demography of the Bearclaw Poppy (presented by Deanna Nelson--an excellent example of the kind of work needed to compose viable recovery plans).

The American people are more supportive of environmental protection and sustained yield management on public lands than ever before.

The Forest Service should be commended for its recent efforts to establish protection of rare species as a priority in its land management decisions. If the momentum felt at the March Workshop continues, perhaps we will soon begin to see more concrete, on-the-ground accomplishments.

Sensitive Plants Need Sensitive People



Dave Gardner
UNPS Conservation Chair

In light of the recent efforts of the Forest Service to bring protection of rare species out of the closet, it becomes critical that forest managers on the local level feel there is a constituency for such action.

As an organization we can give input that will help these programs gain momentum.

In 1986, Congress directed the Forest Service and Bureau of Land Management to implement TES (Threatened and Endangered Species) plant programs that are responsive to increasing public interest. In January 1989 the TES Plant Program Action Plan was published. This document established objectives, dates for their accomplishment, and management strategies for each species on the present plant list.

Included with this article is the TES plant list for the Wasatch/Cache National Forest. Other forest lists will be presented in subsequent newsletters.

Please take 10 minutes to write a letter stating your support for protection of rare plant species and their habitats. Indicate that rare species should be given priority over other forest uses. Ask

that interim management guidelines be followed to protect TES species until species-specific management plans are established.

Many areas of the West have not been well explored botanically--new species are being found almost yearly. It is important that field reconnaissance be performed prior to initiation of vegetation-altering projects in such areas. Request that qualified personnel continue to watch for occurrences of unknown populations throughout the growing season in areas slated for development or changes in use.

These are just a few ideas for composing letters--use your own areas of expertise. Perhaps pick a specific area, Forest District or species and become its watchdog. Request information on what is known of, or program development pertaining to, your subject. The idea here is to stimulate and foster continued rapport with Forest Service personnel.

Send copies of your letter to:

Dick Pine
Wasatch/Cache National Forest
125 So. State Street
Salt Lake City, UT 84111

Kenneth Bronson, District Ranger
Ogden Ranger District
507 25th Street
P.O. Box 1433
Ogden, UT 84402

District Ranger
Kamas Ranger District
50 Center St.
Kamas, UT 84036

Dave Baumgartner, District Ranger
Logan Ranger District
860 North 1200 East
Logan, UT 84321

District Ranger
Mountain View Ranger District
P.O. Box 129
Mountain View, WY 82939

District Ranger
Evanston Ranger District
P.O. Box 1880
Evanston, WY 82930

District Ranger
Salt Lake Ranger District
6944 So. 3000 East
Salt Lake City, UT 84121

A personal visit to these district offices would also be a very effective way of making contact in behalf of sensitive species. If you are in the vicinity of these offices, please make it a point to stop by and make your

request for information on what is being done in that district, and show your interest in rare plants, their habitats, and the preservation of biodiversity in general. Interest stimulates response.

Here is the list for inquiry for the
Wasatch National Forest

SENSITIVE PLANT SPECIES:

Cypripedium fasciculatum - Brownie lady slipper, E*, MV*, SL*.

Draba maguirei var. *burkei*, and var. *maguirei*
Maguire draba, L.*

Erigeron cronquistii - Cronquist daisy, L, SL.

Eriogonum eremicum - Limestone buckwheat, SL.

Eriogonum loganum - Logan buckwheat, L.

Lesquerella garrettii - Garrett bladder-pod, O*, SL.

Machaeranthera kingii var. *kingii* - King woody aster,
O, SL.

Musineon lineare - Cache musineon, L.

Papaver radicum var. *pygmae* - Arctic poppy, MV.

Parrya rydbergii - Rydberg parryi, E*, K*, MV.

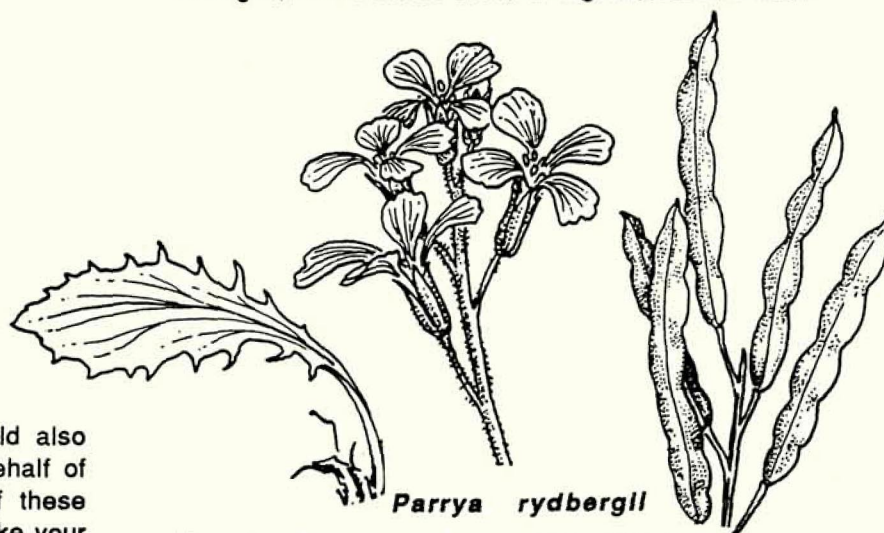
Penstemon compactus - Cache beardtongue, L, SL.

Penstemon tidestromii - Tidestrom beardtongue, E, K.

Penstemon uintahensis - Uinta beardtongue, E, MV.

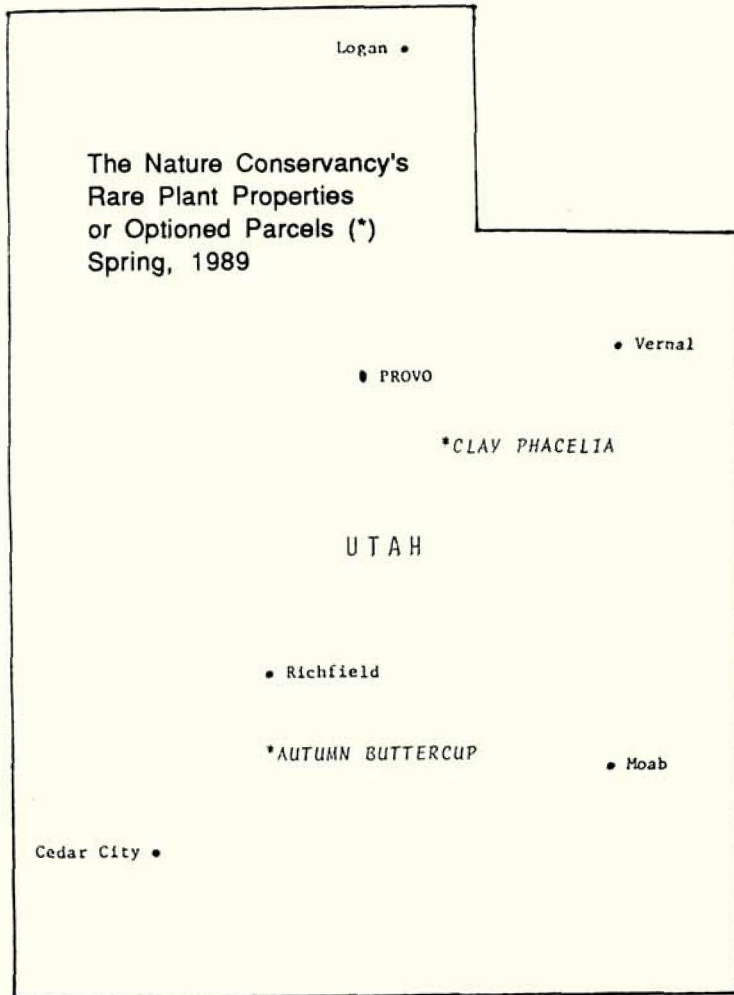
Primula maguirei - Maguire primrose, L.

*Code for Ranger Districts: E=Evanston, K=Kamas,
L=Logan, M=Mountain View, O=Ogden, SL=Salt Lake.



Botanical illustration by Kaye H. Thorne.

UNPS VOLUNTEERS NEEDED



Help Protect and Improve Rare-Plant Habitats!!

One of The Nature Conservancy's chief objectives in Utah is to protect critically small plant populations. The Great Basin Field Office has therefore bought, or gotten an option to buy, two restricted habitats for species with less than 50 known plants growing in the wild. The state outline map shows their common names and locations.

Our highest priority is building strong perimeter fences on the two properties. Later, the Conservancy will need help in cleaning up the properties and studying the plants as they begin to recover from grazing.

The UNPS Board resolved on April 12 to assist the Great Basin Field Office with the Clay Phacelia and Autumn Buttercup projects. The Conservancy would like to recruit UNPS volunteers for small work parties this spring, summer, and fall. There are also opportunities for individual members to help the U.S. Fish and Wildlife Service map and describe the remnant plants.

Here are our needs for the rest of 1989:

1. Five people to help lay out and clear a half-mile of fence line around the Clay Phacelia habitat, in preparation for professional fencebuilders. No extended post-hole digging, barbed-wire stretching, or power-equipment use are required. We do, however, need one experienced person with a chainsaw to lend. Expenses paid. Weekends of April 29-30, May 6-7.

2. One or two assistants to the botanist responsible for the Autumn Buttercup. Weekends or weekdays in May or June. Call Larry England, Fish and Wildlife Service, at 524-4430.

3. Three to four people to help "facelift" the Autumn Buttercup property in September or October (dates TBA). Tools and transportation provided. There will be opportunities to salvage wood for personal use.

Please call the Great Basin Field Office, 531-0999, if you are interested in volunteering. Along with reimbursement for expenses, you will receive our gratitude for your crucial help and free auto-shades and Conservancy shirts!

Permanent Volunteer Position Available

Rare-Plant Sanctuary in So. Utah

The Nature Conservancy's Great Basin Field Office needs a part-time, non-resident caretaker for its 44-acre Autumn Buttercup Preserve. Our sagebrush upland/meadow property is located in the upper Sevier River Valley near Panguitch, and about 30 miles northwest of Bryce Canyon National Park. We are looking for either one person or a couple who can devote 5 days per month in the spring and summer. Duties include watching the property, upgrading short sections of boundary fence, and performing other light- and medium-duty work (like helping visiting botanists and wildlife biologists). Most activity would occur between April 1 and August 1.

Desirable qualifications include: a strong interest and some experience in land stewardship; UNPS and/or Nature Conservancy membership; a personal pickup truck; residence no more than 75 miles from the preserve, and willingness to travel there on short notice. The Conservancy will provide tools and supplies, and reimburse the caretaker for all expenses, such as meals and travel (\$.24-.29/mile).

We would like the volunteer(s) to be present for orientation during our fall work party (see the preceding article), and to begin around April 1, 1990. Please direct questions and personal information to: Nick Van Pelt or Chris Montague, Great Basin Field Office, The Nature Conservancy, P.O. Box 11486, Salt Lake City 84147, (531-0999).

The **dwarf bearclaw poppy** is an endangered species that grows on less than a dozen remaining sites, all of which are within a few miles of St. George, Utah. Its cloak of beautiful white blossoms makes it one of our showiest desert natives. It blooms in early May and can best be seen on the gypsum hills near the Bloomington exit of I-15, just south of St. George. If you go for a look please walk carefully in the area and around the plants as the cryptomagic soil crust is easily damaged.

Dwarf Bearclaw Poppy RESEARCH UPDATE

Seedlings in 1988!

Deanna R. Nelson
Kimball T. Harper
Department of Botany and Range Science
Brigham Young University

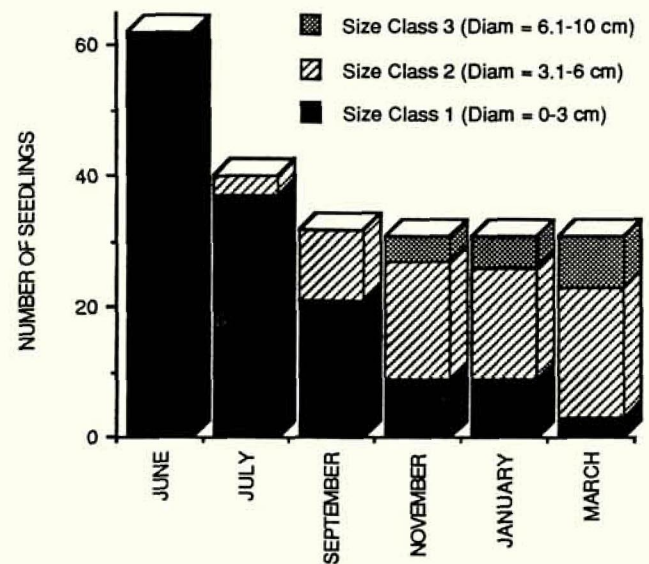


During March and April of 1987 a permanent plot for the study of *Arctomecon humilis* was established near Bloomington, Utah. The 2 hectare (5 acre) plot was overlaid with a 10-meter grid: grid corners were marked with steel reinforcing bars. All poppy plants within the plot were tagged and catalogued and their grid locations recorded. The sampling area includes 400 individuals, each of which is monitored every 6-8 weeks. Rosettes are measured and senescence and mortality are noted. At the time of flowering, reproductive output for each individual is also determined. This information will help us gain an understanding of the life history and population dynamics of the species.

Critical to this understanding is a knowledge of the success of seed germination and seedling establishment in natural populations. Much to our dismay, only a handful of seedlings emerged on the study plot during the first year of the study. Then in April, 1988, St. George experienced 12 consecutive days of rain--nearly 3 inches of precipitation--and in late May seedlings started to appear. By the beginning of July we had tagged over 75 new recruits. It appears that the seeds of *Arctomecon humilis* require either an extended wet period or precipitation combined with warm early summer temperatures, or both, in order to germinate.

Although 50% of the seedlings in this cohort have died, all of the mortality occurred before the plants reached 3 cm in diameter (Figure 1). High mortality of very young seedlings is typical in plants. There have been no deaths among this group of seedlings over the past six months and the survivors continue to grow rapidly. As can be seen in Figure 1 the seedlings grew slowly at first but picked up speed during the fall. Growth was nearly halted during the coldest months of the winter but has accelerated rapidly this spring.

FATE OF SEEDLINGS TAGGED IN JUNE, 1988



Several individuals are now more than 6 cm in diameter, and are represented as Size Class Three. In past years, plants of this size have been observed to bloom. We were surprised to find that seedlings grew so rapidly and became large enough to flower in less than one year.

These seedlings give us the opportunity to follow a group of individuals from "birth to death", allowing us to build an accurate life table for the population and to determine just how long plants actually live. This information can help to ensure that the populations of this species are managed properly and maintained for the enjoyment of future generations. We applaud UNPS for taking the initiative to "get the ball rolling" for the study of our endangered Utah plants!

Editor's Note: This study of the ecology of the endangered dwarf bearclaw poppy was initiated in 1987 by a two-year grant from UNPS. BLM has followed with additional funding which will allow the researchers to continue their critical study for the next several years. UNPS applauds the excellent work done by Deanna Nelson and her advisor, Dr. Harper. Our admiration and appreciation are extended to them for the countless hours, far beyond the grant remuneration, they have devoted to this landmark project.

You can help by writing letters of thanks for BLM support of this study and asking for protection of the dwarf bearclaw poppy and habitat, and requesting enforcement of current ORV closures on poppy habitat.

BLM Utah State Office
324 So. State
Salt Lake City, UT 84111

BLM Cedar City District Office
P.O. Box 724
Cedar City, UT 84720

BLM Dixie Resource Area Office
P.O. Box 726
St. George, UT 84770

Please also write Dick Klason,
State Division of Lands and Forestry
3 Triad Suite 400
Salt Lake City, UT 84180-1204
asking for state protection of the poppy.

Demography of the Endangered Dwarf Bearclaw Poppy

Deanna R. Nelson, graduate student
Dr. Kimball T. Harper, professor

ABSTRACT

The dwarf bearclaw poppy is an unusual perennial herb that is confined to gypsum outcrops of the Moenkopi Formation in the southwest corner of Utah. The plant is immediately threatened by the expansion of St. George, Utah. Our study of the population dynamics of the species is based upon the monitoring of over 500 marked individuals on a 5-acre plot, which are inventoried every 6-8 weeks. The results presented are from data collected over the past two years. Many of the very largest individuals in the population died after flowering in the first year of the study, and by the end of the second year over 65% of all individuals in the original population had died. During the first year of the study only three seedlings were observed on the study plot, but in 1988 over 125 seedlings were identified and added to the inventory. Growth of seedlings has been rapid, with many becoming large enough to flower this coming season. Growth and mortality rates suggest that the plant is short-lived, with a mean life expectancy of only five to eight years. A short life span coupled with irregular timing of germination events leads to large fluctuations in population size from year to year. Hand-pollinations show that the plant is a strict out-crosser, though pollen from neighboring plants and from plants in distant populations resulted in similar seed-set. Flowers are insect pollinated and seeds are dispersed by wind and by ants. Analysis of soil collected in the vicinity of *Arctomecon humilis* plants reveals a large reservoir of seed in the soil. Germination trials show that nearly two-thirds of the seeds collected from the soil are viable and seeds may remain viable for well over 10 years. This soil seed-bank could enable the species to recover from periods of low population size that might otherwise lead to extinction.



"WE THE PEOPLE" Garden

Leon Johnson
Member, Dev. & Rehab. Committee
Neighborhood Housing Service

In the spring of 1987, a group of concerned citizens from the Poplar Grove area met in the Chapman Library, under the sponsorship of Neighborhood Housing Services, to discuss a problem. The problem was an eyesore, a narrow strip of land, 35 feet wide and a city block long, on the south side of 9th South between 8th and 9th West. It was a piece of city property cut off by the railroad, too narrow for business or residential use. But it was a weed patch, an embarrassing blemish on the face of Poplar Grove, on a main thoroughfare where people first enter the area. The concerned citizens decided to transform this ugly spot into a "thing of beauty and a joy forever." Thus was the "We The People" Garden born.

"We The People" Garden is just what its name implies. It is a garden spot in the city which is to be maintained by we, the people. It is to be planted and watered and weeded and fertilized and tilled by we, the people. It is "of the people, by the people and for the people."

After we decided what to do with the land, we took steps to gain control of its use. The city offered to supply the water, but they could not do that until September, 1987. In the meantime, the local fire station on 8th South was kind enough to water and weed what was planted. Then in the fall of 1988 the city was generous enough to haul in 420 cubic yards of sand they dredged from the Jordan River. And we, the people went to work and leveled this sand. We, the people also planted trees against the fence that separates our garden from the railroad property to screen out the view of the railroad--pinion pine, red-berry juniper, mountain mahogany, serviceberry, alternating with each other every 10 feet.

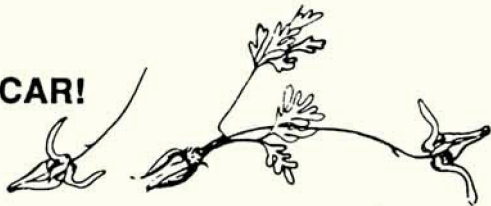
It is our policy that only native Utah plants shall be in this garden. A single person or group can have their own plot to care for, and they can grow one (count 'em, one!) plant in that plot. But they can grow any kind of plant--wildflower, cactus, bush or tree--as long as it is native to Utah.

At all our work parties, we the people had fun socializing, and we always had our sourdough pancake breakfasts.

On Sept. 17, 1987, the "We The People" Garden was officially dedicated. This date was the bicentennial of the signing of the U.S. Constitution. From the opening sentence of the preamble of the Constitution comes the title of this garden. We think it appropriate. We need more of "we, the people" to help make our garden grow so that it will be something Poplar Grove and Salt Lake City can be proud of. Our Grand Opening for 1989 was April 29th. Come see what we have done so far--and see how much more could be done with your help.

STOP THE CAR!

Vard Jones



There being about a third of a million species of plants on earth, it's quite unlikely that one person could ever know them all--or even come close. The same might be said of just the plants in our state.

And putting them all in their ecological niche might be deemed by some to be a botanical nightmare. So it was with some awe and enormous admiration that we watched the mind of our great friend, the late botanist-ecologist, Walter P. Cottam, at work.

Our Thursday Sabbath Club--as Doc called it--consisting of Maxine Martz, the late Justice A.H. Ellett, Doc and I, was on its weekly trip into the mountains or desert. We decided to drive up the Timpanogos Loop road and across the new Cascade Springs road that had just been completed when the snows of early winter had closed it for the season. It was May 13, 1979, and most of the snow had melted.

We had gone only a mile or so, but along a route that none of us had ever traveled. We all were looking for early-blooming flowers. The thought occurred to me that it had been a long time since we had seen any Steershead, *Dicentra uniflora*. So I put it to Doc, asking where we might see some soon.

"Stop the car," he ordered. It ought to be right here." (When I had asked 'soon' I hadn't meant NOW.)

We all clambered out. Maxine took about a half-dozen steps and called out, "It's here, it's here!"

"Now how did you know it would be right here and right now?" I asked Doc.

"Well, I guess I'd be a heck of a botanist if I didn't have some idea where it should be, and when," he replied.

It was something we thought about many times during the next few years on our travels, after Doc, with his great illness, had left us. And the judge had died. Others had joined with us for our Thursday trips and it was on one of these that Doc's great insight was recalled again.

Our friend Ken Fishler, who had retired from his pediatric practice, had joined Maxine and me for a ride up Santaquin Canyon. It was May 12, 1987, and the snow had mostly all melted. We decided to cut through the remaining snow patches up to the Nebo Loop road. We were about 9000 feet and as I steered along the muddy road it suddenly struck a chord in my memory. I slammed on the brake and declared, "We should see Steershead here now."

It was *deja vu*. Maxine stepped out of the Blazer and shouted, "It's here, it's here!"

Ken spoke the words I wanted to hear: "How did you know we'd find it here and now?"

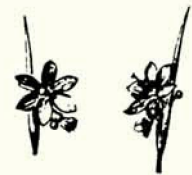
"Well," I drawled, "I'd be a heck of an amateur if I didn't know that."

Vard Jones is a retired editor of the Salt Lake Tribune.

April Field Trip

PURPLE-EYED GRASS

Andy Boyack
Fieldtrip Chair



On April 8th the Salt Lake Chapter found the rare stand of Purple-Eyed Grass, *Sisyrinchium inflatum*, in Tooele County under the able leadership of Vard Jones and Maxine Martz. Vard and Maxine are well-known for their participation in the Audubon Society and in the prestigious Thursday Club, an informal group devoted to the exploration of nature in Utah.

The Purple-Eyed Grass is a member of the Iris family, (Iridaceae). It is found in Oregon, Idaho, Montana and Wyoming, but is rare in Utah, having been found only in a single small area in Tooele County, about five acres. The plant is 6 to 8 inches high with a light purple flower 1/2 to 3/4 inches in diameter. The leaves grow in a tuft from the ground and are narrow and grass-like giving rise to the common name Purple-Eyed Grass, which is a misnomer. The Latin name is usually pronounced Sissy-RIN-key-um in-FLATE-um.

The flowers were growing on a north-facing, moderately steep, sagebrush covered slope. Flower density averaged one per 100 square feet, with a maximum of five per 100 square feet. The plants were in full bloom. Many small plants were just emerging from the ground indicating perhaps new growth and good reproduction. The area has been grazed by cattle but did not appear to be heavily overgrazed.

A number of flowering plants were found in the area but the only ones in bloom were a small, low-growing Phlox (*Phlox gracilis*), Burr Buttercup (*Ranunculus testiculatus*) and Oregon Grape (*Berberis* or *Mahonia repens*). Other plants in leaf or bud included *Streptanthus*, Paintbrush *Castilleja chromosa*, Foothill Death Camas (*Zigademon paniculatus*), Bitterroot *Lewisia rediviva*, Toadflax (*Comandra pallida*), Larkspur (*Delphinium* sp.) Spring Parsley (*Cymopterus longipes*), Lousewort (*Pedicularis* sp.), and Milkvetch (*Astragalus* sp.).

This area should be interesting in May and June when many of these plants bloom. We have not given the exact location of this area for two reasons; one, to protect the comparative rarity of this plant from too much human exposure and two, to give the reader the pleasure of finding it himself. In the words of Dr. Cottam, as quoted by Vard Jones, "Don't show me. Let me have the greater thrill of making my own discovery."

Several birds were seen in the vicinity, including Red Tailed, Swainson, and Ferruginous hawks, a turkey vulture, a prairie falcon, kestrels, and a number of cormorants and grebes.

BUR BUTTERCUP

A Weedy Immigrant

Mary E. Barkworth

It is early spring, with night-time temperatures dropping close to freezing, when you first notice a dense mat of tiny green plants growing beside a well-travelled road or driveway. This might well be your first introduction to Bur Buttercup, one of our earliest blooming plants. It is not restricted to roadsides, but also grows on sagebrush slopes and in open fields, where it is less noticeable.

If you examine the mat closely, you will find it is made up of hundreds of individual plants, with few of them being much over one inch tall, even those that are flowering (Figure 1). Each plant has a basal rosette of leaves, which are divided into narrow, linear segments. The solitary flowers are borne at the top of leafless, flowering stalks or "scapes," which grow from the axils of the leaves. These stalks have a conspicuous covering of white, somewhat woolly hairs, as do the leaves and sepals.

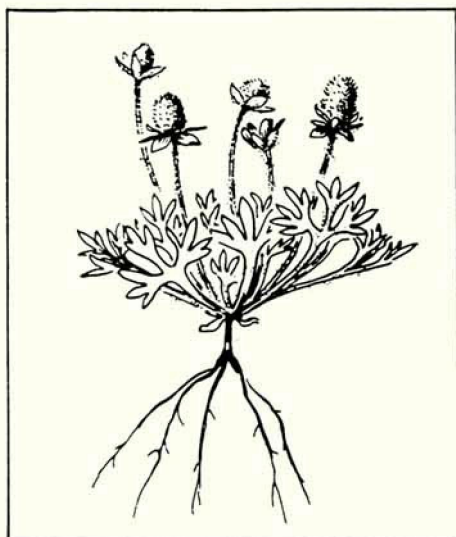


Figure 1. Overall aspect of Bur Buttercup.

The flowers themselves have five bright yellow petals about a quarter-inch long, surrounded by six to ten shorter and narrower green sepals. At the center of the flower there is a cluster of fifteen to thirty separate pistils, each with an ovary at the base. Each ovary contains a single ovule that develops into a seed after fertilization. Around the pistils and inside the petals are the stamens.

The most distinctive features of Bur Buttercup, however, are associated with its fruiting head. This prickly looking structure is far larger than the flower, often becoming more than one inch long and slightly less than one-half inch in diameter at maturity. The "prickles" are actually the elongated, enlarged, and hardened bases of the styles. Their resemblance to

horns may be the basis for the first part of Bur Buttercup's scientific name, *Ceratocephalus testiculatus*, for *ceratus* is Latin for horned and *cephalus* means head. A glance at an individual fruit (Figure 2) explains the second part of the name. The two "testicles" are hollow chambers. The single seed occupies a third chamber that lies between the other two and is directly in line with the style.

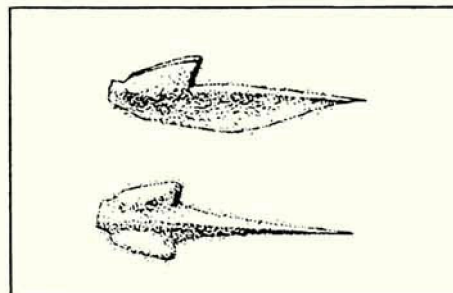


Figure 2. Individual fruits of Bur Buttercup.

Most North American references still cite Bur Buttercup as *Ranunculus testiculatus*, including it in the same genus as the true Buttercups. Bur Buttercup and other members of its genus differ from true Buttercups in many ways (Table 1), however, including their distinctive fruits. Consequently, taxonomists in other parts of the world now treat them as a separate genus, *Ceratocephalus*.

Table 1. Differences between *Ceratocephalus* ssp. and *Ranunculus* ssp.

	Bur Buttercups	True Buttercups
Longevity	Annuals	Mostly perennials
Leaves	All basal, none on stems	Both basal and on stems
Pubescence	Woolly-pubescent	Usually glabrous, not woolly
Stamens	5-15	Usually more than 15, often many more
Receptacle	Elongate, cylindric	Short, hemispheric
Fruit Heads	Remain intact at maturity	Disintegrate at maturity
Fruits	Style elongated hardened. Three chambers present.	Style short, not hardened. One chamber present.

Origins

Like many of our aggressive weeds, Bur Buttercup comes from the Mediterranean region, parts of which have soil and climatic conditions similar to those of Utah. The Mediterranean region also has a long history of human habitation and agriculture and hence, a long history of well-travelled roads and heavily grazed sites. Such sites put a premium on plants that can

germinate, flower, and set seed before the soil dries out. But Buttercup is one species that can do this. In Utah, it flowers in March or early April and has set seed by mid-May. When flowering it is very short, and presumably not particularly attractive to grazing animals. The fruiting heads are conspicuous, but their hard, prickly natures as well as their dried-up appearance must surely make them unappetizing to all but the hungriest animals. Thus, Bur Buttercup was well adapted to growing in Utah, long before it actually arrived.

Recent History

One of the most intriguing uses of herbarium collections is in trying to trace the introduction and spread of weeds such as Bur Buttercup. The first documented occurrence in the United States is a 1932 collection made at the mouth of Millcreek Canyon by A. O. Garrett, a high school teacher in Salt Lake (Arnow et al. 1980). The plant soon began to turn up in other parts of Utah (Figure 3). Because the map is based on actual herbarium specimens, it is reasonable to assume that Bur Buttercup occurs in more areas than are shown. It may even have been present in those that are shown a year or two before a collection was made. Nevertheless, the overall pattern of its distribution is probably correct. Its recent discovery in the Uintah Basin probably reflects both an increased collecting activity in that region (associated with environmental impact studies) and fairly recent introduction, possibly as seed inadvertently carried in by surveying crews or by those preparing the impact studies.

Bur Buttercup has also been collected in Oregon, Washington, Idaho, Montana, Wyoming, California, Nevada, Colorado, and Nebraska. Utah may have been the state where it was first recorded, but other western states were not far behind. A quick survey of a few major herbaria has revealed that Bur Buttercup was first found in Oregon in 1938, and in Washington in 1940. Dr. Weber, of the University of Colorado, states that the first collections for Colorado date from 1948 but that it was "undoubtedly here a long time before that" (personal communication).

Yet to Come

The story of its spread is obviously incomplete. In addition to finding new sites within its present range, Bur Buttercup seems to be extending that range eastward; it was discovered in Nebraska in 1970. By now it may well be further east.

You can help us document the further spread of Bur Buttercup! Weedy species are often easy to find. For instance, the Nebraskan collection was made at a public campsite. If you find some plants that you think might extend the known range of Bur Buttercup, please press and dry a specimen and send it to the Intermountain Herbarium, Department of Biology, UMC 45, Utah State University. We would need to know where you found it, the date you collected it, the kind of locality in which you found it (roadside, campsite,

etc.), and your name. If the map changes as a result of the specimens we receive, we shall send an updated version to those who have sent us specimens.

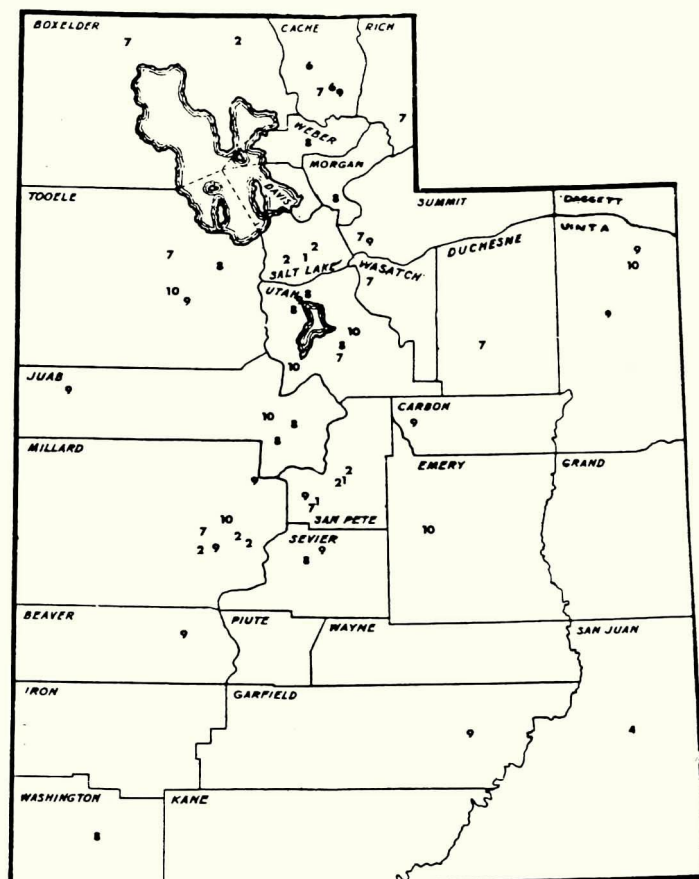


Figure 3. The documented distribution of Bur Buttercup in Utah. Numbers indicate the year of collection. 1: 1932-35, 2: 1936-40, 3: 1941-45, 4: 1946-50, 5: 1951-55, 6: 1956-60, 7: 1961-65, 8: 1971-75, 9: 1976-80, 10: 1981.

Reprinted from Utah Science, Spring, 1982.

Mary E. Barkworth is Director of the Intermountain Herbarium and Assistant Professor of Biology. She was first introduced to Bur Buttercup in March 1972 beside a gravel road in southeastern Washington as she was doing field work for her PhD.

This is the second article in our ongoing series on ALIENS.

Time to Renew

Our membership year begins in March, and it is time for most UNPS members to renew. Check your mailing label. If it says 'March 1989' on the top line of the label, your membership is payable now.

UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

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Request for Seed Collection

Jacy L. Gibbs
Plant Materials Specialist
Soil Conservation Service
Boise, Idaho

We need the UNPS membership's help to collect small amounts of seed. The Aberdeen Plant Materials Center, operated by the Soil Conservation Service in Aberdeen, Idaho, is beginning a project to select and develop an improved variety of Sandberg bluegrass, *Poa secunda*. We need native collections from as many ecotypes as possible from the Intermountain and Northwest regions. We are also interested in Sandberg's closest relatives, including Canby bluegrass, *Poa canbyi*; Nevada bluegrass, *Poa nevadensis*; and Big bluegrass, *Poa ampla*.

We want to select a high performance accession for the 8-13 inch precipitation zone for range seedings, vegetation, firebreaks (green-stripping), weed suppression, land retirement, erosion control and possibly low maintenance ground cover for landscaping. It would normally be seeded in mixture as an understory grass.

Any help the UNPS membership could provide will help in getting an improved cultivar on the commercial market. Dick Page has information on the species and collection information. Contact him at 255-7769 for details. Thanks in advance for your help.



Membership Application

☐ New Member ☐ Renewal ☐ Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

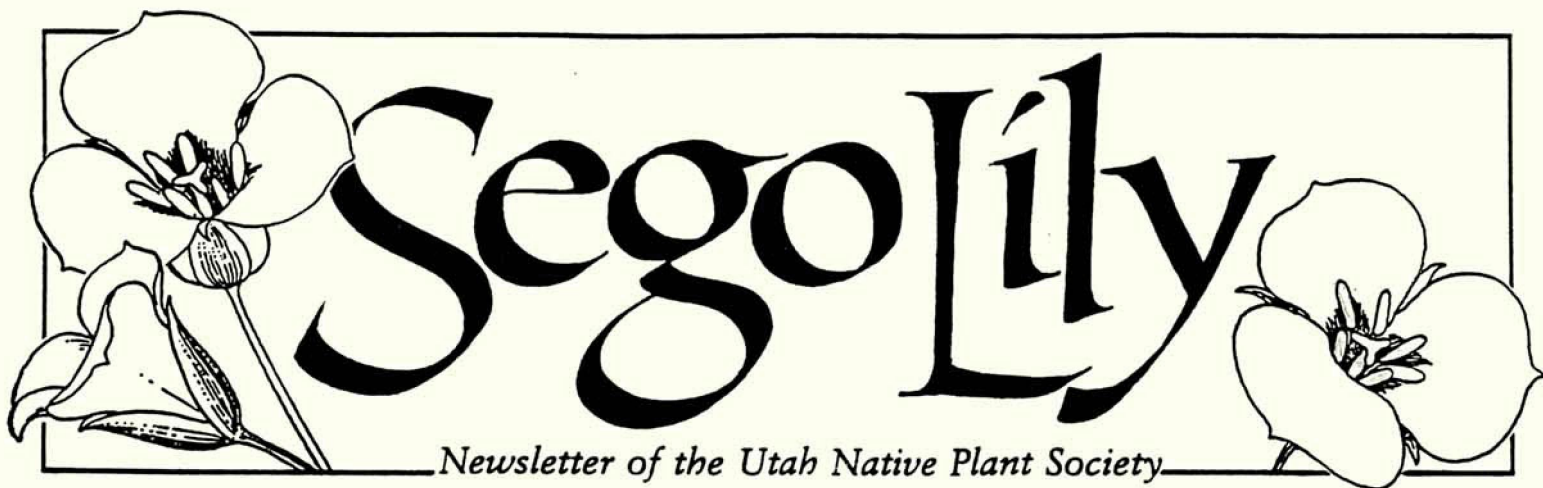
- ☐ Student/Senior\$ 5.00
☐ Individual\$ 10.00
☐ Family\$ 15.00
☐ Supporting\$ 30.00
☐ Corporate\$ 30.00 and up
☐ Life\$250.00

☐ 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. 12 No. 5

JUNE 1989

CALENDAR OF EVENTS

- June 3**
Saturday
9:00 am
Salt Lake Chapter Fieldtrip to visit homes utilizing native plant landscaping. Meet at 9:00 am at Bill Wagner's home, 6722 South Lazy Bar Circle (2395 East). Leaders, Bill Wagner, 942-1295 and Dave Okelberry, 968-6190. We will visit 4 or 5 homes and the trip will be about 3 hours.
- June 9-10**
Saturday
8:30 am
UNPS Fieldtrip to the Uintas in the Vernal area to see rare plants of the Ashley National Forest, led by Sherel Goodrich, UNPS Rare Plant co-chair and Forest Service Botanist. If possible, plan to camp in the Oaks Park Campground at the south end of Oaks Park Reservoir Friday night. The field trip will begin there Saturday morning. Map and detailed directions inside.
- June 17**
Saturday
Trees and Shrubs of the Wasatch. Arboretum sponsored field trip led by Alyce Hreha, field botanist. Fee: Arboretum members, \$6.00, others, \$7.00. Call 581-5322 for more information.
- June 24-27**
\$160.00.
Field Botany: Flora of the Tetons, taught by Dr. Leila Shultz. Fee: \$160. Write Teton Science School, P.O. Box 68, Kelly, WY 83011 for more information. (307) 733-4765.
- June 26**
Monday
7:00 pm
Cache Valley Chapter Meeting. Wildflower Walk Preview, with slides. "Responsible Collecting" by Mary Barkworth, Director of the Intermountain Herbarium. Logan City Public Meeting Room, 255 North Main, Logan.
- June 29**
Thursday
7:30 pm
Salt Lake Chapter Meeting. "Cactus and Succulents" by Laraine Miller, owner of Utah Cactus and Tropicals and an expert on the subject. The Den, U of U Union Building.
- Late June/Early July**
Mushroom trip to the Kolob area near Cedar City has been suggested. This would probably be a 2 or 3 day trip. We will pursue this if there is enough interest. This would be in addition to the annual mushroom trip to the Uintas in August. Call Andy Boyack at 278-8596 if you are interested.
- LOOKING AHEAD**
- July 12-13**
Edible and Medicinal Plants, taught by Clarissa Smith. Fee: \$80.00. Contact Teton Science School (data above).
- July 29**
Saturday
UNPS Fieldtrip to Mt. Nebo to see alpine and subalpine plant communities, and the giant aspen not far from the Nebo loop road, (see article "In Search of the Big Trees" in April newsletter), led by Vard Jones. Details in July issue.

August 18-23

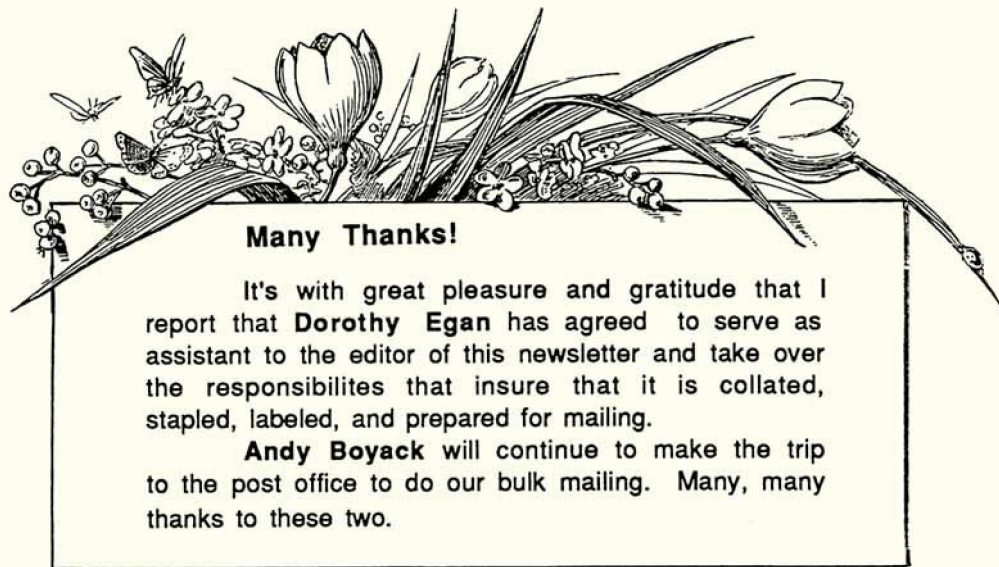
Conference in the Rockies, "Working Together to Educate About the Environment," co-sponsored by The Conservation Education Association and The North American Association for Environmental Education, Estes Park Center, YMCA of the Rockies. For more information, write Conference Headquarters, P.O. Box 400, Troy, OH 45373. (513) 698-6493.

Through Oct. 31

Wildflower Hotline (801) 581-4969. Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00, Friday mornings from April through October.

Seasonal Bloom

St. George Wildflower Hotline (801-628-1365). A 30 second message, updated every two days, is recorded by Bart Anderson of St. George on what's blooming where in southwestern Utah.



The Sego Lily is published nine times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Newsletters for 1989 will be published as follows: January/February, March, April, May, June, July, August, September/October, and November/December. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. 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. Copy deadline is the 20th of each month.

Membership in the Utah Native Plant Society Includes The Sego Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. c1989 Utah Native Plant Society. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

Officers and Committee Chairs

Andrew Boyack, Chairman of Board	H 278-8596	Duane Atwood, Rare Plant Co-Chair	O 625-5599
Pam Poulson, State President	O 581-5322	Sherel Goodrich, Rare Plant Co-Chair	O 7890323
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Swede Dahl, Logan Chapter	H 563-5269	Dave Okelberry, Horticulture Chair	H 968-6190
Ross Murdock, Logan Chapter	H 752-8517	Dick Page, Seed Chair	H 255-7769
Susan Crook, Logan Chapter	H 753-3257		

REPRODUCTION IN RARE PLANTS

Douglas O. Laursen

Extinction of many of our plant species, in the observation of this writer, could be laid at the door of the encroachment by man on the habitat of some of our exotic plant families.

But according to our speaker, Dr. Del Wiens, there are many other problems that have had a very active part to play.

Reproductive success in a small selection of these rare plants is very low. Plants do not produce to their capacity.

An example was given of plants that grow on the edge of Death Valley that have high genetic losses in wild plant seed. Comparison was made with the Cape flora of Africa where growth is lush and there are many species.

Protia, a plant with a large seeding head composed of many flowers, and pollinated by rodents and birds, has a low pollination rate.

You have variation with cross pollinators, while self-pollinated offspring are genetically the same. The seed to ovule ration of inbreeders is 82.8%, while with outcrossers it is 57.4%.

Fireweed, an outcropper species, has a strong loss of fruit where inbreeders have almost all seed viable.

With new technology many embryos can be studied. With some self-pollinators all seeds are viable, but the embryos die after about 12 days due to genetic defects.

An in-depth study of the rare plant *Dedeckera* discovered in 1976 at seven places in Inyo County, California, has been done by Dr. Wiens. The plant grows in steep scree slopes, a very harsh habitat. It grows to a height of about 3 feet and 6 feet in width. The bottom part of the plant dies and new shoots come from the adult plant. There are about 65,000 very tiny flowers, but only about 1.6% develop seed pods. The best seed set has been 2.4%.

Possible explanations for reproductive loss are inbreeding depression, resource limitation, pollination limitation, maternal control, genetic load, viruses, permanent translocation, and heterozygosity.

The age of the *Dedeckera* is determined to be about 140 years old. It has a very inadequate root system. The seed set in the plant is about 1 out of 10 per 100,000.

Many plant families are lost not by man's encroachment, but for generic reasons. Some are ecologically out of place. In some cases, past relatives are already extinct.

I hope my understanding of what Dr. Wiens tried to tell us is accurate. We thank him for sharing this study with us.

Canyon Named for Rare Plant

In 1983 the U.S. Board on Geographic Names approved an application to officially name the canyon connecting Saline and Eureka Valleys in the Northern Mojave Desert as "DeDeckera Canyon." *DeDeckera eurekaensis* is a rare shrub of the buckwheat family first discovered by botanist May DeDecker in the 1970's just east of the Eureka Dunes (the type locality). Recognizing that this canyon was unnamed on USGS topographic maps but had a name in common usage by botanists throughout the state, Susan Cochrane, botanist with the California Department of Fish and Game's Natural Diversity Data Base, decided to petition the board to add the name to all new maps. The process is not difficult, though it can be lengthy time-wise. As far as is known, this is the first time that a rare plant has been the reason for naming a geographic feature. It is encouraging to see that rare plants are being recognized as important natural features. Botanists throughout the state should consider submitting locally used names to the Board. Let's give more rare plants the official attention they deserve! You can write to the Board for applications at: U.S. Board on Geographic Names, 523 National Center, Reston, Virginia 22092.

Reported in the California Native Plant Society Bulletin, Vol. 13, No. 4.

Does Utah have any geographic sites named for plants?

Do you have any Utah candidates to suggest that merit a request to the U.S. Board on Geographic Names?

FOOTHILL FIELD TRIP

Andy Boyack
UNPS Fieldtrip Chair



Rain cut short our May 13th field trip but not before we had found a couple dozen plant species in bloom in the foothills adjacent to Red Butte Creek. The more colorful plants of this area were just beginning to bloom. By Memorial Day they should be in full bloom, (and possibly still in bloom when this newsletter reaches you) imparting a palette of color to the hills, particularly in the three primary colors, the red of Sweet Vetch, blue of Lupine and yellow of Hawksbeard and Butter and Eggs. Numerous Sego Lilies were found in bud but none in bloom. Meadow Death Camas, however, which is another species of lily and is found in the same area as the Sego Lily was in full bloom. One Fritillaria was found but it had gone to seed. Apparently its blooming time is April. We were disappointed to find only a few early blooms of the Pink Ladyslipper. I rate

this as one of Utah's most beautiful flowers and it is usually prominent in this area of the foothills. By late May or June it should be in full bloom together with the Sego Lily, Scarlet Globemallow, and the exquisite Rushpink.

The following is a list of species found in flower:

Arrowleaf Balsamroot, *Balsamorhiza sagittata*
 Yellow Salsify, *Tragopogon dubius*
 Western Hawksbeard, *Crepis occidentalis*
 Pink Ladyslipper, *Astragalus utahensis*
 Sweet Vetch, *Hedysarum boreale*
 Silvery Lupine, *Lupinus argentius*
 Fineleaf Astragalus, *Astragalus diversifolius*
 Meadow Death Camas, *Zigadenus venenosus*
 Sego Lily (in bud), *Calochortus nuttali*
 Tufted Evening Primrose, *Oenothera caespitosa*
 Pale Evening Primrose, *Oenothera pallida*
 Wild Phlox, *Phlox longifolia*
 Butter and Eggs, *Linaria* spp.
 Indian Parsnip, *Cymopterus longipes*
 Wild Carrot, *Lomatium dissectum*
 Desert Parsley, *Lomatium simplex*
 White Tickweed, *Hackelia patens*
 Dwarf Catseye, *Cryptantha humilis*
 Catchweed Bedstraw (Velcro plant), *Galium aparine*



Utah Native Plant Day Celebrated

Dave Okelberry
 UNPS Horticulture Chair

Utah Native PLant Day, Sat., Apr. 29, was celebrated at "We the People Garden" between 8th and 9th West on (th South. We started with a sourdough pancake breakfast followed by cleaning up the territory, pulling weeds, planting, etc., and ending with a dutch-oven dinner at 4 pm by Bob Kinney. The entire meal was cooked in Dutch ovens and included a 20 lb. turkey with dressing, potatoes and onions, mixed vegetables, spinach, and pineapple-upside-down cake for dessert. Everything was scrumptious.

Thanks to everyone who participated. There was a large turnout, but lots more has to be done. If you'd like to help call me at 968-6190.

Update from The Nature Conservancy

Exciting Progress for Rare Wildflower Site

After a 6-year period of negotiations, the Conservancy is close to obtaining a one-year purchase option which will protect an extremely rare and vulnerable Utah wildflower--Spanish Fork Canyon's Clay Phacelia (*Phacelia argillacea atwood*). Currently ranked "G1-S1," the highest globally-endangered Conservancy designation possible, the Clay Phacelia is also listed by the U.S. Fish and Wildlife Service as an Endangered Species. The fragile, privately owned site containing the last 15-20 individuals has long been of concern to botanists throughout the state who have watched the rare plant's population in recent years suffer a disastrous decline. The beautiful purple-blossomed wildflower has attracted some national attention as well. Its photograph has appear twice in *U.S. News and World Report* in the last decade as one of America's most endangered species. The remote site has received visits from botanists nationwide, including those from the Harvard-based Center for Plant Conservation.

The breakthrough in negotiations came recently when the private owners distributed lands supporting the Clay Phacelia habitat to individual family members as part of an estate settlement. **The Great Basin Field Office has initiated a campaign to raise \$50,000--a figure that will insure the purchase, protection, and stewardship needs of this rare Utah species.** Donations are now being accepted. For more information, contact the Field Office (801) 531-0999.

New RNA Established

Mount Peal RNA (2,380 acres)

Utah's newest Forest Service RNA (Research Natural Area) is located on the Manti-LaSal National Forest. It contains the above-timberline portion of Mounts Peale, Mellenthin, and Tukuhiwivatz. There are two sensitive plant species found in the LaSals: LaSal daisy (*Erigeron mancus*) and Rock-jasmine (*Androsace chamaejasme*). Below timberline there are excellent examples of alpine plant communities, including turf and fellfield.

Thanks to the U.S. Forest Service, Joel Tuhy, now the Director of the Utah Heritage Program, and Nick Van Pelt, new Nature Conservancy Public Lands Director in Utah for working on this important designation.

Reprinted from The Nature Conservancy Great Basin Newsletter, Spring 1989.

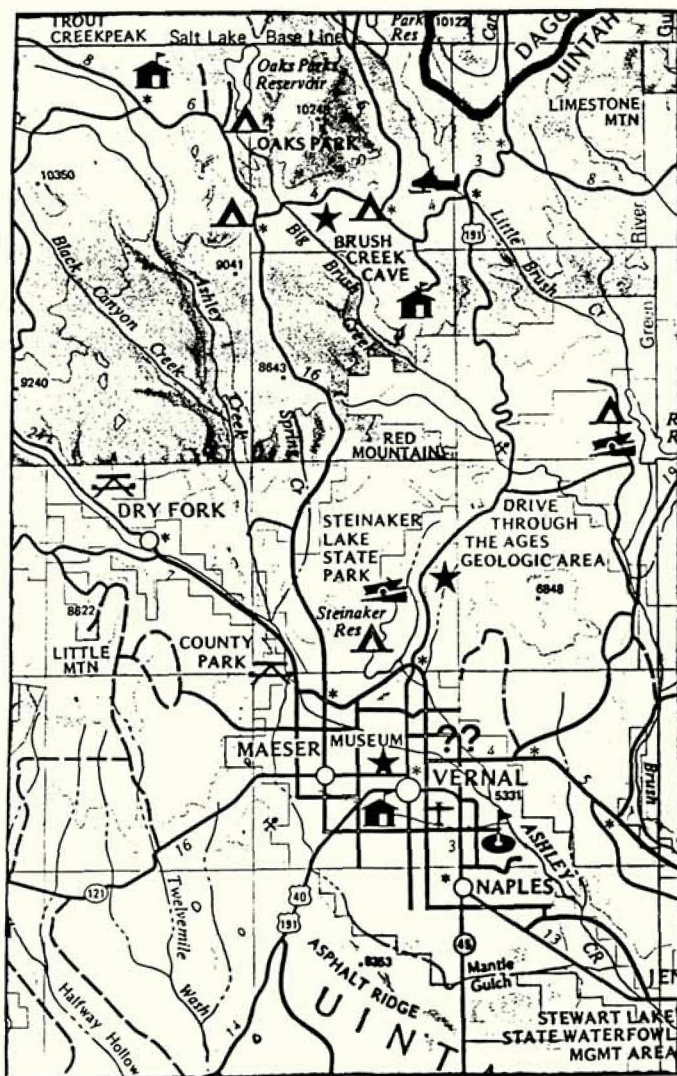


Uintah Fieldtrip

Sherel Goodrich will lead us on a search for rare plants of the Ashley Forest (see list on this page). If possible, camp overnight Friday in the Oaks Park Campground at the south end of Oaks Park Reservoir. The fieldtrip will begin from there at 8:30 Saturday morning. Post a paper plate with UNPS on it at your site and we'll find each other. It may be a dry camp so bring water. The fieldtrip Saturday will last until about 5 o'clock, so you can stay another night or return home that evening. Some directions for finding the Campground are as follows :

From Vernal, turn north on Highway 191 to Steinaker Lake Recreation Area. This is the "Drive Through the Ages's Geologic Tour". Continue on about 18 miles from the north end of Steinaker Lake to the Red Cloud Loop Road. Turn left onto this Loop Road. Go 4 miles to a junction and choose the left fork. Drive 4 miles to the next junction and turn right. Go 3 more miles to another junction where you will turn right into the Oaks Park Campground at the south end of Oaks Park Reservoir.

Hope to see you there!



Sensitive Plants Need Sensitive People



Dave Gardner

UNPS Conservation Chair

In light of recent efforts of the Forest Service to bring protection to rare species, it is imperative that forest managers at local levels feel there is a constituency for such action.

Since UNPS is making a fieldtrip to the Uintas this month to see rare plants in the Ashley National Forest, led by Forest Service Botanist and UNPS Rare Plant Co-chair Sherel Goodrich, it seems appropriate to feature the rare plants found in the Ashley. Some of these are plants we will see on this trip.

SENSITIVE PLANT SPECIES

Ashley National Forest

Aquilegia barnebyi--Barneby columbine, D, maybe R.
Astragalus lutosus--Dragon milkvetch, D.
Carex leptalea--Bristle stalked sedge, R.
Cypripedium fasciculatum--Brownie ladyslipper, FG.
Cryptantha caespitosa-- FG.
Erigeron untermannii-- D, R.
Gilia spicata-- FG.
Oenothera acutissima-- FG.
Papaver radicum, var. *pygmae*-- Arctic poppy, V.
Parrya rydbergii--Rydberg parrya, FG, R, V.
Penstemon acaulis--Stemless beardtongue, D, R, V.
Penstemon uintahensis-- Uinta beardtongue, D, R, V.
Potentilla palustris-- V.

Code for Ranger Districts: D=Duchesne, FG=Flaming Gorge, R=Roosevelt, V=Vernal.

Please take 10 minutes to write a letter stating your support for protection of rare plant species and their habitats. Indicate that rare species should be given priority over other forest uses. Ask that interim management guidelines be followed to protect TES species until species-specific management plans are established.

Many areas of the West have not been well explored botanically--new species are being found regularly. It is important that field reconnaissance be performed prior to initiation of vegetation-altering projects in such areas. Request that qualified personnel continue to watch for occurrences of unknown populations throughout the growing season in areas slated for development or changes in use.

These are just a few ideas for composing your letters. The idea here is to stimulate and foster continued rapport with Forest Service personnel. Let them know of your interest and concern regarding rare plants, their habitats, and the preservation of biodiversity in general. Send copies of your letter to:

Sherel Goodrich
Ashton Energy Center
Ashley National Forest
1680 W. Highway 40, Suite 1150
Vernal, UT 84078

Roosevelt Ranger District
244 West
Highway 40 (333-6)
Roosevelt, UT 84066

Duchesne Ranger District
85 West Main
P.O. Box 1
Duchesne, UT 84021

Vernal Ranger District
1680 W. Highway 40, Suite 1150
Vernal, UT 84078

Flaming Gorge Ranger District
Dutch John Office
P.O. Box 157
Dutch John 84023

Byron Tolman
BLM
170 So. 500 East
Vernal, UT 84078

Salt Lake Chapter March Meeting

PROPAGATING NATIVE PLANTS

Kathy Okelberry

Mike Alder, President of Native Plants, Inc., presented an overview for producing native plants from seed and other methods.

The advantages of producing natives from seed are:

- 1) preserves genetic variability of a plant,
- 2) costs less
- 3) through seed storage, a ready supply of plants can be grown and on short notice.

Disadvantages are:

- 1) if genetic variability exists, uniformity is limited.
- 2) seed availability from year to year is erratic.
- 3) dormancy factors may complicate production cycles.

Artificial methods for breaking dormancy require finding the right combination of treatments, (freezing-thawing, fire, etc.)



Tissue culture has been devised to rapidly multiply selected clones of native plants. This has been extremely useful in propagating endangered natives.

Mr. Alder also explained the Tubepak system that NPI developed, featuring containers which prevent root spiraling and air pruning of tap roots, and provide easy inspection of root systems and extraction of seedlings for planting.

The remainder of the meeting was open for questions. Stan Akagi, NPI Seed Specialist, was most helpful.

Salt Lake Chapter April Meeting

RARE PLANT REPRODUCTION

Andy Boyack
Chairman, UNPS Board

Do rare plants contain variations from ordinary plants in their means of reproduction? If so, are these variations the cause of their rarity? Or are they a last ditch effort by the plant to fight off final extinction? These are questions suggested by Dr. Del Weins in his talk at the Salt Lake Chapter meeting on April 27, questions that for the most part went unanswered.

The generation of new plants from a parent plant can be described as having several steps: pollination, embryo development, seed germination, and seedling survival. Lack of success in any of these steps results in a dearth of new plants. Pollination can be either self-pollination resulting in inbreeding and lack of variability needed for plant adaptability or out-crossing pollination which gives variability but results in a lower rate of fertilization.

Dr. Weins described three rare plants, one in South Africa, one in Australia and one in California. All of them showed a very low success rate of embryo development. The cause was not obvious. Was the problem pollination, genetic defects or something else?

The plant in California, *Dedeckera angustifolium*, in the POLYGONACEAE family, was studied exhaustively. It grows as a bush on the scree slopes of a valley north of Death Valley. Embryo development is poor, maybe 1%, seed germination low, maybe another 1%, and seedling growth almost nil. The plants there are old, 100 to 300 years, and no seedlings could be found.

The question was then raised by Del. Is this plant using a mechanism to develop what botanists call "hybrid vigor"--very few plants but plants with a super vigor to meet a harsh environment--or is its low rate of reproduction merely a failure to adapt to a changing climate or other conditions?

The question raised in the mind of us naive non-botanists was "Can rare plants in general sense their danger and develop mechanisms to stave off their imminent extinction?"

WILDERNESS BILL INTRODUCED

Utah's wild lands won historic recognition on March 16 when U.S. Representative Wayne Owens placed a bill before Congress proposing designation of 5.1 million acres as legally protected wilderness. Owens' bill assures that Congress in its deliberations of a final bill will have before it all public lands which should be protected.

In stark contrast is a bill introduced by Representative James V. Hansen for 1.4 million acres--only 4 percent of all federal lands in Utah and barely 2.6 percent of one of the wildest, most rugged, and most beautiful states in the country. (Utah currently has only 1.5% designated.)

Today--as the result of the 8 year campaign for passage of the Wilderness Act in 1964 and the six-year campaign for passage of the Federal Land Policy and Management Act in 1976--we have 3.2 million acres of wilderness study areas in Utah with temporary protection pending Congress' final decision. This gives us an opportunity to begin an equally arduous but hopeful legislative campaign for real protection of the canyon lands.

The Owens and Hansen bills only signal the beginning of that campaign. The divergent futures these bills hold for southern Utah's canyons will be the focus of a several-year-long debate in Congress.

Excerpted from Southern Utah Wilderness Alliance, Vol. VI, No. 1, Spring 1989.

Fire Ecology at Jackson Hole Summer Courses Offered

Teton Science School in Jackson Hole, Wyoming, will offer two 4-week long college-level courses this summer. The Fire Ecology course will examine the effects of last summer's Greater Yellowstone Ecosystem fires, including fire in relationship to weather, topography, soils, vegetation, wildlife and people. The Hoofed Mammal course will focus on the ecology, management, status and research of hoofed mammals in the GYE. Both courses run from June 12 to July 7. Academic credit is available. The courses each cost \$1350, including meals, accommodations, instruction and transportation during the course. Financial aid is available.

Also this summer, TSS will have 46 separate non-residential courses for adults. Adult Seminar topics include animal behavior, outdoor photography, birds, mammals, geology and meteorology. There are over 15 new courses this year including Wildflowers, Wolf Recovery in Yellowstone, Fall Bird Migration, Rocky Mountain Raptors, and interpreting Tracks and Sign. Many courses can be taken for academic credit.

For more information contact Beth Dilley,

Registrar, Teton Science School, PO Box 68, Kelly, Wyoming 83011 or call (307) 733-4765.

Yellowstone Fires

Interested in learning about the Yellowstone fires? Yellowstone National Park has produced an information packet which can be obtained by writing to:

Fire Information
Division of Interpretation
National Park Service
P.O. Box 168
Yellowstone National Park, WY 82190

Preserve Flowers With Microwave

Microwave drying is an easy method for preserving flowers, according to Fred Widmoyer, an Extension horticulturist at New Mexico State University.

As a general rule, flowers that have thin, delicate petals do not usually dry successfully. Widmoyer says white, yellow and orange flowers produce the best results. Red, pink and blue flowers often change color.

To dry flowers in a microwave, pour into a glass container one-half to one inch of any of the following: silica gel, borax, sand, two parts borax to one part fine sand, or cat litter. Leave one inch of the stem on the flower. Place the flower in the medium, face up. Carefully cover the petals with the medium.

Place a cup of water in the microwave oven to prevent the flowers from completely drying out. The drying time varies, so experimentation is needed. To begin, try periods of time from one to eight minutes. The trick is to remove the moisture from the flower rapidly while the flower is being held in the medium.

Do not be in a hurry to view your results. Let the flowers remain in the medium for a few hours. Next, pour off the medium carefully. If some of it remains on the flowers, use a soft brush or gently blow off the material with a dry spray bottle.

When ready to use the flowers, substitute wire stems. Wrap them in green floral tape which is available at most craft stores. Now you can create your own permanent arrangement. A glue gun can be an effective way in which to attach the flowers to a substitute stem.

Excerpted from a release from the Cooperative Extension Service, NMSU.

Reprinted from the newsletter of the Native Plant Society of New Mexico, Vol. IX, No. 6.

NPSNM editor notes: If you find a flower can't identify, wouldn't this be a fine way to preserve the blossom and its foliage until you find someone who can give you the proper name for it?

Ancient Forest Rescue Expedition

In the Pacific Northwest, conservationists are losing the struggle to protect what remains of the greatest temperate forests on earth. After a century of timber cutting, only ten percent is left of the natural Douglas fir forests of Washington and Oregon. There is only four percent of California's original redwoods remaining. Southeast Alaska's Sitka spruce forests are also disappearing. Worse yet, the rate of destruction is increasing.

About eighty percent of the remaining Douglas fir ancient forest is on public land. There is a common misunderstanding that these forests are protected. In fact, the U.S. Forest Service and the Bureau of Land Management are selling the old growth trees to the timber industry. At the present rate, the integrity of this unique ecosystem is being irreversibly disrupted. Many resident animal species, such as the northern spotted owl, are already in danger of extinction due to habitat loss.

Where lies hope? In public awareness. For years, environmentalists in the Pacific Northwest have tried to protect these lands from the timber industry by enlisting the help of the U.S. Congress. But the industry has prevailed, because the public--whose woods these are--is largely unaware of their destruction.

Enter the Rescue Expedition. During the Spring of 1989, from April 22 to May 20, the Expedition has sounded the alarm like Paul Revere to millions of people. They have taken a seven foot diameter, thirty foot long, five hundred year old Douglas fir tree log on a truck from Washington State to Washington D.C. and back again, holding news conferences, public presentations and rallies along the way, including a presentation in Salt Lake City on May 17.

The ancient forests can be saved, but we must act now. The Rescue Expedition calls for a complete and immediate moratorium on all logging in the ancient forest. Until the destruction is stopped, our mission will continue.

THINK GLOBALLY...

Global deforestation is threatening all life on Earth. Deforestation contributes as much CO₂ into the atmosphere as the burning of all fossil fuels. This is causing the "greenhouse effect"--global warming. The irreversible climate changes caused by this are being felt by all life on the planet. In addition, forest destruction kills far more than trees. Entire living systems, and whole species of our fellow inhabitants on this planet are being exterminated. Forever. Where once lived complex systems millions of years in the making, which thrived and hummed with the force of life in all its diversity, now stand impoverished landscapes unable to support any life at all. The destruction of Earth's forest systems is akin to the rape and murder of our human elders. We would not condone that amongst humans, and should not allow it to be done to beings whose ancient lineage and individual lifespans demand veneration, not despoilation. The destruction of Earth's forests, both temperate and tropical, is nothing less than an all-out war on life. Forests are essential to the health and viability of Earth. The rainforests in particular have been called the "lungs of the Earth." Life cannot continue without them. Saving the forests is saving ourselves.

ACT LOCALLY...

Americans can and should be leaders in the global effort to stop deforestation. But it is hypocritical to preach against tropical rainforest destruction while ignoring the devastation taking place here at home. The temperate rainforest of the Pacific Northwest was once the greatest forest on earth. Now with 90% gone, the remnants are being cleared at the rate of over 1000 acres each week. And the U.S. Forest Service is planning to cut most of what is left. Please support an immediate and permanent halt to the destruction of ancient forests on public lands.

Ancient Forest Rescue Expedition
P.O. Box 2962
Bellingham, WA 98227



Invaders at Home on the Range

Richard N. Mack

The 1893 World Exposition was North America's *fin-de-siecle* event. Held in Chicago to commemorate the quadricentenary of the landing of Columbus in the New World, the exposition seemed to encompass all of human endeavor, from technology and commerce to archeology and religion. Taking an ostentatious interpretation of the exposition's theme, the American exhibitors trumpeted the achievements of the many immigrants and their descendants who in "four centuries of unexampled prosperity" had transformed a largely uninhabited land into an energetic nation more than sixty-three million strong.

Immigrant Plants

Unknown to exposition visitors, events were beginning to unfold two thousand miles to the west that would illustrate some of the deleterious effects of this 400-year-old age of discovery and settlement. There another immigrant, this time a plant, was entering a region where it would flourish and spread. As a result, immense tracts of native perennial bunchgrasses from southern British Columbia to central Nevada would be converted in little more than forty years to monotonous swards of the invader, cheatgrass, or downy brome (*Bromus tectorum*). The consequences were profound for both plants and people.

The evolutionary steps leading to this ecological invasion had been set in motion long before. With the rise of the Cascade Range and the Sierra Nevada about six million years ago, maritime air streams, which had previously moved inland unimpeded for hundreds of miles, were depleted of much of their moisture upon encountering the mountains. The climate in the region between the newly risen mountains and the older Rocky Mountains, known as the Intermountain West, became increasingly arid, and forests of temperate broad-leaved species were eventually replaced by more xerophytic vegetation, including grassland.

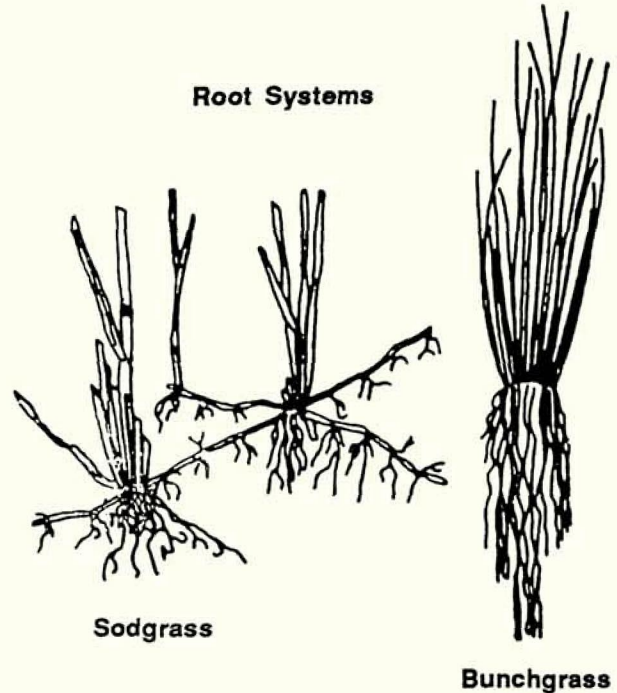
These new grasslands were quite different from those in the middle of the continent, the Great Plains, which had formed millions of years earlier when the emerging Rockies blocked moisture-laden winds from the west. Although the Cascades and the Sierra Nevada lowered the amount of precipitation received in the Intermountain West, they did not alter the annual distribution of rainfall. In much of this region rain falls mainly in autumn and winter; summers are dry and may be rain-free for thirty days at a time. In contrast, rainfall in the Great Plains is concentrated in spring and summer and is characterized by a "June bulge" of precipitation.

Bunchgrasses in the West

Furthermore, the intermountain grasslands are dominated by bunchgrasses, that is, plants that grow in

groups of erect stems, each tuft appearing as if held in a bunch. In the Great Plains, the prominent grasses are rhizomatous, meaning that they form a sod, a continuous dense mat of stems and roots. This major difference in the morphology of dominant grasses of the two regions may be related in part to the differences in the seasonal distribution of precipitation. The rhizomatous species of the Great Plains appear to require a growing season that extends into the summer months, and they may be excluded from the Intermountain West by its summer aridity. The western bunchgrasses avoid seasonal drought by becoming dormant in summer. Growth, including production of seeds, is mostly over by mid-July.

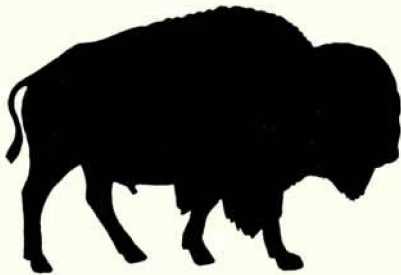
Root Systems



The Intermountain West's lack of photosynthetically active grasses throughout the summer may explain a distinction between the two regions that was noted by the first European explorers. Enormous herds of bison roamed the mid-continent, but the grasslands west of the Rockies supported few of these animals even prior to settlement by Europeans. With intermountain grasses staying green throughout the summer only along stream courses and valley bottoms, green forage was sparse. The paucity of actively growing grasses may have severely restricted calving, for large native ruminants in northerly latitudes need green forage for several months after spring calving to support milk production. It may be more than a coincidence that all the bison remains found on the Columbia Plateau, the northern sector of these intermountain grasslands, have been in valleys.

Thus, the grass communities of the Intermountain West, unlike those of the Great Plains, evolved largely in the absence of large, hooved herbivores. This factor, like the difference in climate between the two regions, had great significance for grasses that persisted in each region. Bison cannot be

likened simply to large lawn mowers; these animals have additional impact through their trampling, wallowing, and defecating. Trampling may be especially important, as is indicated by the very different ways plants may respond to it. If a piece is kicked away from the mat of a rhizomatous grass, for example, it may be replaced by propagation from the sides of the hole; the dislodged piece may even reroot. On the Great Plains, bison have long been agents of natural selection, encouraging the evolution of plant features, such as the production of prostrate rhizomes, that enable the grasses to tolerate the animals' activities. And as is characteristic of coevolution, cause and effect have looped back on each other. Through their disturbance of these grasslands, the bison selected for certain features in the grasses. The summer-active grasses that persisted then maintained the bison, insuring further disturbance.



In contrast, many bunchgrasses, including those of the Intermountain West, are intolerant of trampling. If heavily trampled, the plants may die because further propagation from the damaged stems is unlikely. Some of the western bunchgrasses also show little ability to replace leaf area if grazed. Without bison, coevolution as seen in the Great Plains was never a possibility in these western grasslands. Antelope, elk, and deer were present, but their smaller numbers and, probably more important, their lower body weight prevented them from being as strong a selective force as bison.

Against this evolutionary backdrop, European settlers entered the Intermountain West in the mid-nineteenth century. By the 1850's, semi-feral cattle were being routinely maintained on open range in the Columbia Plateau to supply beef for mining camps as far away as Montana and British Columbia. Use of these grasslands for cattle expanded with the influx of settlers after the Civil War. Wheat farming was also attempted, but after several crop failures, it was deemed a risky enterprise except in a few isolated settlements, such as near Walla Walla, Washington, and the new Mormon settlements in Utah. The northern part of the region witnessed a land boom when farmers discovered that they could improve crop success by planting wheat on the upland soils rather than on the heavy valley soils and by sowing autumn germinating "winter" wheat, which is attuned to the annual cycle of precipitation in the region, rather than spring-germinating varieties.

Settlers had little difficulty tilling the soils of the Intermountain West, which lack the matted sod of the rhizomatous grasses to the east. Once plowed, a field required little maintenance because, in contrast to the sod-forming grasses, the native bunchgrasses do not readily propagate. By 1890, farm acreage in the Columbia Plain of Washington was in excess of two million acres.

Damage to rangelands

The plowed fields and grazed, trampled rangelands brought a level of disturbance to these grasslands that they had not experienced before. The damage to the rangelands went beyond the cattle's direct impact on the bunchgrass, for another feature of these grasslands is a prominent, fragile layer of mosses and lichens. This thin crust of slow-growing and very small organisms forms a matrix of vegetation about the vascular plants. Bunchgrasses and other higher plants native to the region, such as sagebrushes, often occupy less than half of the area in an undisturbed community, so the mosses and lichens are conspicuous. Even minimal use of the community by large animals can destroy this living crust, providing sites for colonization by weeds. In the early settlement days, such disturbed sites were colonized mostly by native annuals. But to an ever increasing extent, species foreign to the region brought accidentally by the settlers, came to occupy these sites to the virtual exclusion of the native colonizers. While chance events influenced which weeds arrived, the expansion of cattle ranching and widespread adoption of a cereal agriculture, based mainly on the cultivation of wheat, largely determined which among this list of aliens would become prominent in their new environment.

Wheat has been cultivated for millennia, time enough for strong selection to operate among weedy invaders of wheat fields. Many weeds, particularly some Old World representatives of the large grass genus *Bromus*, exhibit seasonal cycles, dispersal mechanisms, seed sizes, and environmental tolerances similar to those of wheat. Unhappily for farmers, these features mean that once in a field, the aggressive bromes may usurp water, nutrients, and space, thereby drastically reducing crop yield. As acreage in wheat expanded in the Intermountain West, entry via adulterated seed lots of the weeds of wheat, including bromes, was inevitable. The first specimens of *Bromus tectorum* were collected between 1889 and 1894 in wheat-growing districts of British Columbia, Washington, and Utah. While we will probably never know the precise time of its first entry, the absence of cheatgrass from comprehensive pre-1889 collections suggests that it probably did not arrive much before then.

Enter cheatgrass

During the years bracketing the World Exposition in Chicago, some settlers of the Intermountain West began to fear that the burgeoning

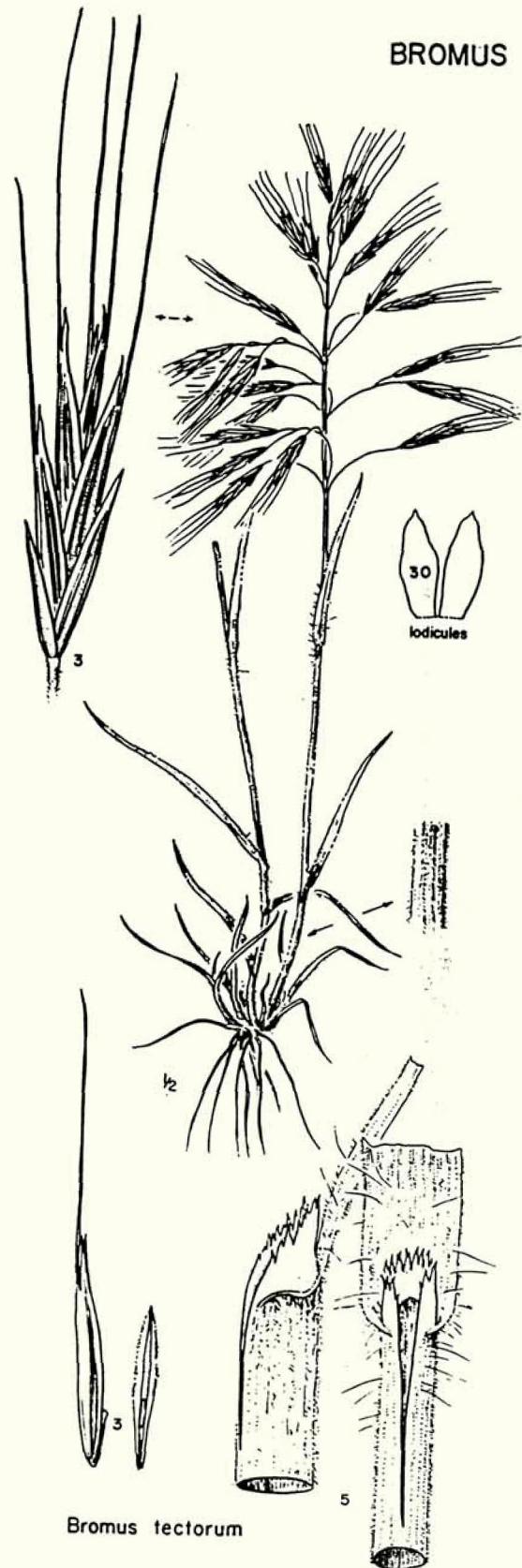
livestock industry was in jeopardy. The palatable and once dominant bunchgrasses were found to be intolerant of livestock and to have irregular and low seed production, low germination rate, and poor competitive ability. Repeatedly, doomsayers forecast that the native grasses would be completely lost. With ill-founded enthusiasm, the region's promoters claimed that "another class of vegetation, no less nutritious, has succeeded it." This other class of vegetation, in fact marginally nutritious herbs and grasses, included cheatgrass.

Cheatgrass originated in the arid steppes of Eurasia, where it acquired a number of features that pre-adapted it for the climate of the Intermountain West. Like many annuals native to the region, cheatgrass is able to survive the prolonged seasonal drought by passing the summer as a seed. With the resumption of rain in autumn, seeds germinate readily. The early autumn rains, however, may be highly irregular, with rainless periods of more than a month, and cheatgrass seedlings may die during such droughts. But this immigrant, unlike many native species, is not confined to one germination season. Instead, seeds may germinate in a series of "pulses" throughout autumn and even winter, each pulse occurring within a few days after rain. Late winter and spring rains may cause additional seeds on the same site to germinate.

We do not know yet why one seed germinates in early autumn while a seed nearby remains dormant until spring, but such responses in other species are known to be caused by heritable variation among seeds. These pulses in germination are probably also a result of the different rates at which seeds fall through the straw of plants produced the previous year and land on a site conducive to germination. Desiccation, frost heaving, and frost injury may each kill some plants, but the variety of germinating times assures that at least some plants will survive until June to produce seeds. Competition from other species is withstood by rapid establishment of the root system in autumn. Even within a sward of cheatgrass, plants may be slowed in their rate of growth by competition, but they seldom die.

In its native Eurasian habitats, cheatgrass evolved in continual association with large herbivores, including horses and camels. This gave it several additional advantages in the new environments created by settlement of the Intermountain West. Cheatgrass can withstand repeated grazing, often regrowing from the meristem at the soil surface. Losses through trampling are less serious for an annual than for a perennial (assuming the annual has time to set seed) since there is no advantage in prolonged parental life. Furthermore, frequent disturbance by large, trampling animals would have selected for rapid germination and growth. Not only were the native perennial bunchgrasses unable to tolerate the accelerated rate of destruction by livestock, but also the native annuals and the seedlings of native perennial grasses were unable to withstand competition from cheatgrass in disturbed

JRJ



sites.

About the turn of the century, cheatgrass was detected with increasing frequency in the Intermountain West, although it was not yet abundant. Collectors, both government range workers and professional plant collectors, repeatedly found the plant in cultivated

fields, in towns, and along railroad sidings. Besides entering the region in adulterated seed lots, cheatgrass accelerated its expansion by hitching rides on the extensive railroad system along which wheat and cattle were shipped. Livestock fur provided an obvious (and perhaps overstated) mode of dispersal for the bristly cheatgrass seeds. Additional seeds were probably spread along with cattle bedstraw discarded along railroad sidings.

Occasionally, well-intentioned research may have hastened the spread. In response to public concern, the newly established Washington Agricultural College and School of Science actually investigated *Bromus tectorum* as a possible replacement for native bunchgrasses, which were proving so vulnerable to grazing. Seeds sent from the U.S. Department of Agriculture in Washington, D.C. were sown at the college's experimental farm in Pullman on April 15, 1897. The seeds germinated and grew vigorously, but the investigators apparently abandoned the experiment when the plants died later that spring. Some seeds from this deliberate introduction probably germinated unnoticed the following autumn, and as a result, Pullman may have become another early point of entry for the grass.

"Cheated" of crop

Cheatgrass became widespread and locally abundant during the first decade of the twentieth century as the last of the native grasslands were settled. Plotted in terms of the area occupied through time, a sigmoidal, or S-shaped, pattern of invasion emerges, slow initial spread limited by small populations and the number of points of entry, later a rush or range expansion limited only by the reproductive rate of the annual grass, and eventually, complete exploitation of suitable habitat. The initial spread did not cause widespread concern, for there was no indication of the coming meteoric increase in the grass's range. The 1914 annual report of the county agent for Okanogan County, Washington, reflects the rapid changes that followed. He reported that "thousands of acres are being almost taken by this 'cheat'. Everyone is alive to the seriousness of the problem." Contemporary accounts from north-central Oregon and northern Utah were much the same. Fallow fields sown with wheat seeds in the autumn were dominated by cheatgrass the following spring. Bewildered farmers in the Intermountain West and elsewhere surmised that the wheat had somehow changed into this unwelcome weed, "cheating" them of their crop, hence the origin of the term cheatgrass.

Events after about 1915 moved swiftly. More and more of the grazed rangeland was occupied by cheatgrass while the weed continued to occur in grain fields. By the 1930s, county agents were referring to "cheatgrass lands," often whole counties in which the alien had become the most prominent grass. In *A Sand*

County Almanac, Aldo Leopold best expressed the extent and seeming suddenness of this transformation: "one woke up one fine spring to find the range dominated by a new weed."

The assemblage of features that allowed cheatgrass to invade this area have also largely prevented its eradication. A grass capable of germinating over an eight-month span is almost impossible to eradicate completely in the seedling stage. Mowing a field after early spring, for example, makes little difference since the developing seeds are already viable and capable of germinating the following autumn. Even if fire or disease destroys all vegetative plants, new plants will emerge from seed reserves in the soil. Furthermore, reentry is always possible, for the original avenues of transport are still available to the weed. And this grass, pre-adapted to the two main ecosystems that emerged with settlement, has little trouble adjusting as land is converted from rangeland to cultivated field and back again.

"Great historical convulsions"

Not having seen this continent before European settlement, we cannot easily comprehend the extent and the permanence of ecological change. For example, the appellation Bluegrass Country conveys to most of us an image of pastoral scenes in Kentucky. To ecologists it also denotes the replacement of the natural vegetation by the introduced bluegrass *Poa pratensis*. The transformation of the vegetation in the interior valley of California as a result of Spanish settlement parallels the events in the Intermountain West. Some of the same native grasses were displaced by aliens, including bromes, in a region with few large native herbivores. Species replacement was so complete in Kentucky and interior California that we have only a sketchy picture of the pre-settlement vegetation. Even in the Intermountain West our knowledge of the native colonizers is incomplete. These "great historical convulsions" of the earth's biota, as they were called by ecologist Charles Elton, undeniably have adverse consequences for native species and, often, for human activities, but they can be of immense value to ecologists. They provide opportunities for eyewitness accounts of population change, rather than just retrospective views. Unlike a native, which may show little year-to-year change in population dynamics, a successful invader is an anomaly in nature. In its new home, the alien species is free from many of the constraints that limited its population size in its native environment, and it may undergo a boom. The freedom is temporary, however, and eventually the species encounters constraints to its expansion. Ecologists are then able to document the influence of these constraints over time on each stage in the invader's life cycle.

Happily, the study of alien species can have practical applications. The more precisely we learn which constraints limit the distribution and abundance

of an alien plant, the more we will understand how these and similar factors act on native species as well. As a result, our ability to control the fate of those species we wish to cultivate, as well as those we choose to eradicate, will be improved.

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Richard N. Mack is a professor of botany at Washington State University in Pullman.

Botanical illustration by Jeanne R. Janish from Intermountain Flora, Vol. 6, The Monocotyledons, by Cronquist, et. al., Columbia University Press, c1977.

*This article is the third in our ongoing series on **ALIENS**.*



PUBLICATIONS

Wildflower, North America's only magazine devoted entirely to the study, conservation and cultivation of our continent's wild flora. From the tropical rainforests of Panama to the micro mosses of the Arctic tundra, the art and science of our botanical heritage is explored. In each quarterly issue, emphasis is given to the conservation and horticulture of our native plants. **Wildflower** is a forum and catalyst for gardeners, field-botanists, naturalists, teachers and all who share the vision to comprehend and preserve our green planet. Order from WILDFLOWER--Subscriptions, Canadian Wildflower Society, 75 Ternhill Crescent, North York, Ontario, Canada M3C 2E4. 1 year for \$20, 2 years for \$35.

Wildflowers of the Tallgrass Prairie by Sy Runkel and Dean Roosa. Iowa State University Press, Ames, IA 50010, 1988. \$19.95.

Flora of the Great Plains, published by the Kansas Wildflower Society, Mulvane Art Center, 17th and Jewell, Washburn University, Topeka, KS 66621. 1329 pages, 2 maps, \$55.00. This is a manual of the plants that occur spontaneously in the region extending from the eastern flank of the Rocky Mountain uplift, eastward to the potential beginning of continuous woodland, and from the Canadian border south through the Texas panhandle. This is the only up-to-date floristic treatment of this area which includes parts of 13 states. The flora includes general keys, descriptions, statements of range, flowering times, ecological data, and synonymies for all the plants in this area.

The Plant Book: A Portable Dictionary of the Higher Plants, by D. J. Mabberly. New York: Cambridge University Press, 1987. 700 p. \$34.50. "This 'portable dictionary of the higher plants' (i.e., ferns and fern allies, gymnosperms, and flowering plants) is the single best cross-referenced reference to scientific and common names of the plants, and contains much interesting information and citations to other literature about them." (Dale Johnson, Missouri Botanical Garden Library, St. Louis, *Wilson Library Bulletin*, January 1989.)

Vascular Plants of Northern Utah: an Identification Manual by Richard J. Shaw, Professor Emeritus and Emeritus Director of the Intermountain Herbarium at Utah State University, and author of seven books on the wildflowers and plants of Utah, Wyoming, and Montana. Major contributions by Mary E. Barkworth, Director of the Intermountain Herbarium, and Sherel Goodrich, USDA Forest Service, Vernal, Utah. Utah State University Press, Logan, Utah 84322-7800, 1989. Available for \$27.95. Please enclose check or money order, including \$2.00 postage and handling. MasterCard and VISA orders accepted. (801) 750-1362.

The desert and mountain landscape of northern Utah supports a great diversity of plant life. This volume identifies 1,935 indigenous, alien, and cultivated species found in the nine northern counties of Utah in an easy-to-use, illustrated format. Common names, recent synonymy, habitat, comments on poisonous plants, and flowering data are included, as well as an illustrated glossary and index.

Seed Propagation of Native California Plants, by Dara E. Emery. Santa Barbara: Santa Barbara Botanic Garden, 1988. \$12.50 paperback. Tax and shipping are included when ordered from Santa Barbara Botanic Garden Bookstore, 1212 Mission Canyon Road, Santa Barbara, CA 93105.

"This is an excellent book that gives good coverage of many topics related to getting wildflowers and native plants to grow and thrive. Emery, who is on the staff of Santa Barbara Botanic Garden, has successfully propagated and grown all the species in this 115 page book and here shares his knowledge and that of other researchers in propagating native plants. Emery's book includes more difficult species and ways of breaking seed dormancy: treating seeds with scarification, hot water, fire, acid and other chemicals. Although some modern uses of chemical treatments to break seed dormancy are given, in actual use the only chemical treatment he uses at the Botanic Garden is sulfuric acid. Not only are the procedures described, but the reader will have a better understanding of why the procedures work and what is really being attempted. The difference between seed coat dormancy and internal dormancy is explained. 'After-ripening' is required in some seeds, for instance, and is a physiological condition that may delay germination.

UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

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Since internal dormancy is often found in desert species, strategies for dealing with it need to be understood by desert gardeners.

After the introductory chapters, the remainder of the book is a series of charts which show the names of the plant species in alphabetical order with a common name for each and important propagation information. Just in case this is not enough, the book also has four pages of references to give authority to his information and an index." (Jane B. Cole, excerpted from *The Plant Press*, newsletter of the Arizona Native Plant Society, Vol. 13, No. 1, 1989.)

"I will be the gladdest thing
under the sun!
I will touch a hundred flowers
and not pick one."

Edna St. Vincent Millay



"There are some who can live without
wild things and some who cannot...Like winds and
sunsets, wild things were taken for granted until
progress began to do away with them. Now we face the
question whether a still 'higher standard of living' is
worth its cost in things natural, wild and free. For us
of the minority, the opportunity to see geese is more
important than television, and the chance to find a
pasque-flower is a right as inalienable as free
speech..."

Aldo Leopold

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the membership form or simply write the information down and
mail it with payment for the category of membership.)



Vol. 12 No. 6

JULY 1989

CALENDAR OF EVENTS

July 12-13

Edible and Medicinal Plants, taught by Clarissa Smith. Fee: \$80.00. Contact Teton Science School, P.O. Box 68, Kelly, WY 83011 for more information. (307) 733-4765.

July 13
Thursday
11:30-1:00

Red Butte Garden Master Plan and Tours, presented by the State Arboretum staff, W. Richard Hildreth, Director. Meet at Red Butte Gardens. If directions needed, call the Arboretum at 581-5322.

July
Saturday

Cache Valley Chapter Fieldtrip to Tony Grove in conjunction with Bridgerland Audubon. Call Al Stokes in Logan at 752-2702 for date and details.

July 27
Thursday
11:30-1:00

Poisonous Plants of the Intermountain West presented by University Poison Control Center, Dr. Joseph Veltri, Director. Sponsored by the State Arboretum. Red Butte Gardens.

July 29
Saturday
8:00 am

UNPS Fieldtrip to Mt. Nebo to see alpine and subalpine plant communities, and the giant aspen not far from the Nebo loop road, (see article "In Search of the Big Trees" in April newsletter), led by Vard Jones and Maxine Martz. Meet at 8:00 am in the parking lot of the Sugarhouse Garden Center on 21st South, at the east end of Sugarhouse Park. Bring a lunch and water. This will be an all-day trip.

July and August

No Salt Lake Chapter meetings are scheduled for these months. No Cache Valley Chapter meeting for July.

July 31-August 6

Ecology of the Colorado Plateau. This intensive course examines plant and animal adaptations to desert climates and the effects of physical processes on land and life. Designed for science teachers or serious ecology students, the course uses day trips by vehicle and short hikes during morning and evening hours to explore Arches and Canyonlands National Parks, the Colorado River and "island" mountains. Plant identification, small mammal live trapping, scientific readings, sampling methods and field projects are employed. Five grad credits available. Taught by Dr. Tim Graham, desert ecologist with the National Park Service in Canyonlands. Canyonlands Field Institute, P.O. Box 68, Moab, UT 84532 (801) 259-7750.

July 31-August 4

An Island Ecosystem: Conserving Biological Diversity in the Greater Yellowstone. This largely field oriented class looks at the ways in which the Yellowstone ecosystem resembles an island ecosystem. A review of the biology of threatened and endangered species will reveal why isolated

plants and animals get into trouble. Taught by Dr. Tim Clark. Fee: \$200.00.
Academic credit available. Teton Science School, P.O. Box 68 Kelly, WY 83011.

LOOKING AHEAD

August 2 (one day) or August 2-4 (3) **Wildfire: Fire Ecology of the Greater Yellowstone.** In recent years the role and necessity of fire in maintaining healthy forest and grassland ecosystems has been widely acknowledged. The fires of 1988 will be a focus of discussion and fieldwork. The recent Hunter fire behind Teton Science School alongside a series of older burns in Grand Teton National Park provide an ideal teaching opportunity. One day : \$70.00. Three days: \$200.00. Taught by Dr. Penny Morgan and Dr. Stephen Bunting. Academic credit available. Teton Science School.

August 18-23 **Conference in the Rockies, "Working Together to Educate About the Environment,"** co-sponsored by The Conservation Education Association and The North American Association for Environmental Education, Estes Park Center, YMCA of the Rockies. For more information, write Conference Headquarters, P.O. Box 400, Troy, OH 45373. (513) 698-6493.

August 26 Saturday **Tentative date for UNPS Annual Mushroom Hunt in the Uintas.** This trip is contingent on weather conditions (enough rainfall at the right times for mushroom production) and booking a skilled leader. Further details in the August issue of this newsletter.

Through Oct. 31 **Wildflower Hotline (801) 581-4969.** Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00, Friday mornings from April through October.

Seasonal Bloom **St. George Wildflower Hotline (801-628-1365).** A 30 second message, updated every two days, is recorded by Bart Anderson of St. George on what's blooming where in southwestern Utah.

The Sego Lily is published nine times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Newsletters for 1989 will be published as follows: January/February, March, April, May, June, July, August, September/October, and November/December. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. 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. Copy deadline is the 20th of each month.

Membership in the Utah Native Plant Society Includes The Sego Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. c1989 Utah Native Plant Society. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

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NATIVE PLANT LANDSCAPING

Andy Boyack

UNPS Fieldtrip Chair

Landscaping with native plants can create a variety of appearances ranging from the lush greenery of high mountain meadows to the fragile beauty of Utah's foothill sagebrush communities. This was vividly illustrated on the UNPS fieldtrip tour of four homesites on June 3rd.

Bill Wagner's home had a wide variety of plants generally arranged in banks of short to tall plants around the periphery of the yard under partial shade. Bill is constantly trying to grow new native plants to add to his collections.

The Alder home had a more open yard with native trees and shrubs around the edges and a striking centerpiece of bedded flowering plants and shrubs along one side of the drive and in front of the house. Of particular note was the Emerald Queen Manzanita.

The Kessler yard is several feet below street level. The Kesslers have taken full advantage of this to create a steep slope on one side of their beautiful level yard leading up to the street level. The slope is completely carpeted with flowering plants in masses of color, yellow, pink and blue. The front yard contains an island of aspen. Among the understory plants are slopes of kinnikinnik.

These yards all have blue grass lawns and are well watered, resulting in a lushness of foliage typical of alpine meadows that receive a comparable amount of moisture.

The fourth home we visited, the Allen home in Sandy, was different. The Allens have landscaped their yard with drought resistant plants which require no watering. The grass is Buffalo Grass which does not need to be watered or mowed. The curb area is planted with Oakleaf Sumac and the yard is set off with the evanescent beauty of Smoke Trees and Tamarix among the nearly one hundred species of xerophilous plants that the Allens have planted.

The Society appreciates the kindness and generosity of these people that showed us their homesites: Mr. and Mrs. Bill Wagner, Mr. and Mrs. Mike Alder, Mr. and Mrs. Tom Kessler, and Mr. and Mrs. John Allen.

Many Thanks!



As editor, I want to thank **Jo Stolhand** for her generous offer to help with collating and preparing the Sego Lily for mailing. Jo already puts in many hours of service to the Society as Poster and T-Shirt Chair, including numerous trips to the post office and acting as a sort of central clearinghouse for Society business. Many thanks to you, Jo.

DENDROCHRONOLOGY IN UTAH

Andy Boyack

Chairman, UNPS Board

"Tree rings." Most of us have heard of dating by means of tree rings but have known little about it. This evening we had a unique opportunity to learn about tree ring dating, the science of dendrochronology, from an expert, Elaine Sutherland, a graduate of the University of Arizona majoring in dendrology and botany, now employed by NPI on forest studies.

According to Elaine, dendrochronology was first studied by Dr. A. E. Douglass, an astronomer who hoped to establish a pattern of climatic variation in the past that would parallel the cycles of sunspot activity. His astronomical comparisons were not markedly successful but he discovered that the science of tree ring dating had many other uses, notably in archeology in determining the age of wood preserved in ancient Southwest Indian habitations.

The study of tree rings has yielded a wealth of information. In addition to its usefulness in archeology it has been a guide to past climates, seasonal variations, history of past forest fires, insect infestations and diseases, floods, geological data, air pollution and acid rain. Bristle cone pines, still living, in California and Arizona have yielded tree ring data as far back as 4000 years.

Elaine has been actively involved in studying the damage to the Oquirrh mountain vegetation by the Garfield copper smelter. The smelter was started in 1906 and the SO₂ emissions killed vegetation for miles around, peaking in the war years of 1917-18 and 1942-43. Subsequent improvements in the reduction of smelter emissions, notably installation of electrostatic precipitators and SO₂ recovery equipment, together with reforestation efforts by individuals and the smelter company (formerly Kennecott) have brought about a striking improvement in the Oquirrh mountain forest growth.

In answer to questions from the floor Elaine commented on the Yellowstone Park fires of last summer. Forest fires are a part of natural ecology, a necessary and beneficial part, she said. The long term benefit of those fires will far outweigh the short term destruction.



SEARCH FOR THE PARRYA

Andy Boyack
UNPS Fieldtrip Chair



The *Parrya* is a flower of the Uinta mountains growing only above 11,000 ft. elevation. On the weekend of June 9 we set out to find it. We set up our base camp in a Lodgepole pine forest at 9000 ft. Friday night. The next morning under the leadership of Sherel Goodrich, botanist for the Ashley Forest and UNPS Rare Plant Co-chair, we climbed to the 11,000 ft. level above timberline on the east slope of Leidy Peak. The route led upward through stands of spruce and at timberline, spruce krumholtz and snowbanks. Here we found a rare sight, the *Parrya rydgergii* in bloom, a small lavender flower growing in dense tufts on the scree slope. It is a member of the BRASSICACEAE family. An approaching thunderstorm forced us off the mountain but not before we discovered Sky Pilot, *Polemonium viscosum*, and Alpine Forget-Me-Not, *Eritrichium elongatum*, in the alpine tundra above timberline.

Extensive stands of Lodgepole pine are found in the higher Uintas. Sherel described a bit of the ecology of these trees explaining that the areas of dead trees that we had observed were caused by forest fires or by periodic attacks of the pine beetle. Sherel's description of the adaptation of the forest to these natural disasters was a fascinating story.

On our second night out we again set up camp in a Lodgepole pine forest, this time on the Flaming Gorge highway. In the nearby woods Sherel showed us Fairy Slipper, *Calypso bulbosa*, and growing in a burned over area, the rare orchid Brownie Ladyslipper, *Cypripedium fasciculatum*, and Spotted Coralroot, *Corallorhiza maculata*. Earlier, the Wallentines had found Spring Coralroot, *Corallorhiza wisteriana*. Lower down, just above Flaming Gorge Lodge, Sherel led us to an unusual, large yellow Evening Primrose, *Oenothera acutissima*.

At the high elevations of our campsites, Spring was just beginning and few plants were in full bloom. One of our number, however, was able to find and identify over 40 species in bud or bloom, a few of which include: Marsh Marigold, *Caltha leptosepala*, Spring Beauty, *Claytonia lanceolata*, *Potentilla*, both shrubby and herbaceous, Valerian, *Valeriana occidentalis*, Blue Bells, *Mertensia brevistyla*, Pussytoes, *Antennaria microphylla*, Wallflower, *Erysimum asperum*, Prairie Smoke, *Geum triflorum*, Golden Smoke, *Corydalis aurea*, Meadowrue, *Thalictrum sparsifolia*, and Globeflower, *Trollius laxus*.

The next morning two of our number were fortunate in sighting a Three-toed Woodpecker.

We take this opportunity to express our appreciation to Sherel Goodrich for taking us on this

unique fieldtrip. Incidentally, he has made a limited number of copies of the book Uinta Basin Flora available free to the Society. We will have them at the next Chapter meeting.

Botanical Salmagundi: CALYPSO POLLINATION

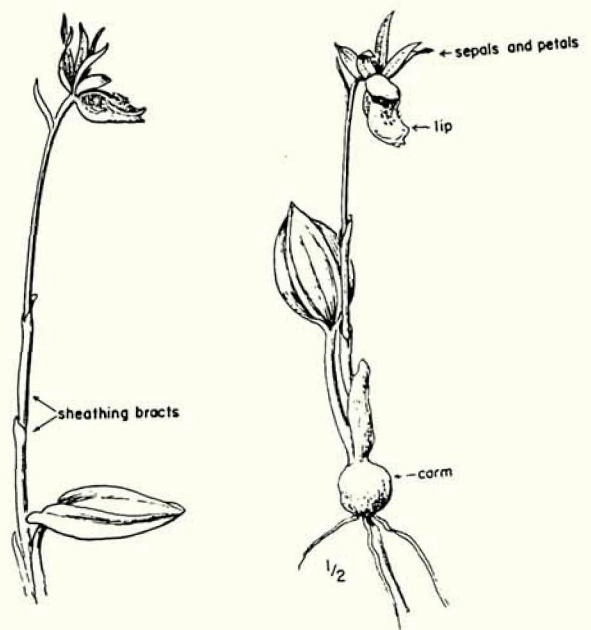
Art Kruckeberg
Editor, Douglasia
Washington Native Plant Society



Pollination of *Calypso bulbosa* (taken from Ackerman, J.D., 1981, Madrono California Botanical Society Journal), 28: 101-110.

Our exquisite woodland orchid, *Calypso bulbosa*, captures the eye with its startlingly beautiful color and form, so daintily perched at ground level. The Calypso orchid (fairy-slipper, Venus-slipper), though rarely very common, can be expected most anywhere in lowland open coniferous woods. Its elegant flower surely was contrived for some purpose: insect pollination has usually been assumed. And indeed that is the case. But! The story of Calypso's collusion with bumblebees has a strange and wonderful twist; a tale of deception has been told by James Ackerman who observed the plant in its native haunts in coastal northwestern California. We can assume that the story holds as well for Calypsos in Washington state. [And hopefully for Utah as well. Ed.]

Our fairy-slipper is *Calypso bulbosa* var. *occidentalis*, a western North American phase of this widespread circumboreal orchid. The present study



Illustrations by Jeanne R. Janish from Intermountain Flora, Vol. VI by Cronquist, et. al.

was done on populations in Humboldt County, California. Here and elsewhere in the west, Calypso "grows in the thick litter of coniferous forests. The plants are perennial and in the fall produce a single ovate leaf from an underground corm. The plants remain in this condition over winter. In early spring a single-flowered inflorescence emerges. The sole nodding flower has rose-pink sepals and petals. The lamina (= blade) of the lip is white with reddish-brown spots and is adorned with several rows of hairs. The saccate portion of the lip has numerous dark, reddish-brown stripes. The very broad, slightly arched column (joined male and female organs) is also rose-pink and forms a hood over the lip. During the summer, the plants become dormant: the leaf withers, the fruits dehisce, and the many thousands of seeds are dispersed." (Askerman, 1981)

Ackerman's objective was to discover how effective insect pollination can be in an orchid which produces no nectar, yet has such an alluring flower. First he established that no seed can set in the absence of either artificial self-pollination or insect visits: caged plants produced seed only if artificially pollinated; hence the tiny orchid is self-compatible but not autogamous (automatically self-pollinated like some *habenarias* and coral-root orchids).

Ackerman confirmed the earlier observation that Calypso produces no nectar. The big question then becomes: how is pollination achieved if the insect visitor is given no reward? Ackerman casts the dilemma in terms of a food-deception system, a syndrome known to work in other plants that attract insects. Some nectarless orchids simply mimic the insect visitor. The real insect, in attempting to mate with the deceiving flower, picks up and transfers the pollen load.

But Calypso flowers attract visitors without mimicking insects or offering nectar. Calypso deception seems to work for the species, even though fruit and seed set is low, and it depends on naivety. Bumblebees in their first visits are "naive" but soon they learn to avoid Calypso flowers. Since flowering may continue over some time, a second flush of newly hatched (and "naive") bees makes exploratory visits to Calypso only to turn to other plants (e.g. *Vaccinium ovatum*) that do have a food reward. These successive flushes of exploratory visits by naive bees are sufficient to assure some pollination. The deception works!

But why not reward the visitor? Some botanists would argue that making nectar is costly; it takes energy to make nectar goes the argument. Hence if nectarless flowers do work, natural selection would favor this stratagem and conserve its hereditary basis. Speculation, indeed! But the curious success of Calypso as a food-deception orchid remains a fact, no matter how the system got that way.

Reprinted with permission from *Douglasia*, newsletter of the Washington Native Plant Society, Vol. V, No. 3.

BEETLE KILL IN THE LODGEPOLE PINE

Richard G. Ballard
Michael A. Walsh
Walter E. Cole

Vacationers in National Forests of the western United States now routinely see thousands of lodgepole pines standing as mausoleums of death. The beetle that is responsible for the devastation is called the mountain pine beetle (*Dendroctonus ponderosae* Hopk.)

The mountain pine beetle and the lodgepole pine (*Pinus contorta* Douglas var. *latifolia* Engelman) have evolved an unprecedented relationship over eons of time. Despite all our information about the insect, its life history, preference for *P. contorta* and dynamics of attack, little can be done directly to save vigorous pine specimens from devastation.

Beetle Biology

Each year around the last week in July young adult beetles chew their way out of trees that were attacked the previous year. They fly to other healthy, uninfested trees where they begin boring into the bark. Here they mate, beginning the next year's generation of beetles. Female beetles bore vertical tunnels called egg galleries into the inner bark (phloem). The eggs deposited on alternate sides of the tunnel soon hatch, and larvae begin their own feeding activities by chewing horizontal larval galleries around the circumference of the trunk.

As they work, the adult beetles bring the blue stain fungi into the tree with them and thus inoculate the tree. These blue stain fungi include possibly three species of *Europhium* and at least three species of *Ceratocystis*: *C. montia*, *C. minuta*, and *C. minor* isolated from, or associated with, mountain pine beetle attacks. The *Ceratocystis* fungi are similar to fungi associated with Dutch Elm Disease and a disease of pines in the southeastern United States. Because the fungi are consistently observed in association with the beetles, it is presumed a mutualistic relationship exists.

Local Research Scene

How the fungi function in the deaths of lodgepole pines is of major concern to investigators at the Plant Anatomy Research Laboratories of Utah State University. A research site has been established at the head of Logan Canyon and cooperative study is underway with scientists at the USDA Forest Service in Ogden, Utah.

To facilitate study, beetles are attracted to designated trees by using a "bait." Tygon tubing, impregnated with an attractant chemical (pheromone) is tied to selected trees. After beetles attack a tree, tissues obtained from the tree are subjected to preliminary treatment at the study site. They are then

transported to the laboratory for further processing and microscopical analysis.

Following beetle infestation of a tree, fungal hyphae grow into the sapwood via living cells of the wood rays. The "blue-stain" discoloration of the sapwood is caused by a metabolic by-product of fungal enzyme action on phenolic substances of host tissue. The stain marks the limits of inward fungal growth. The blue stained wood is rendered nonfunctional and as discoloration proceeds inward toward the pith, the tree shows signs of increased stress until finally its transpiration stream is totally disrupted and the tree dies.

A Fungus Among Us

It has been reported that the fungi are confined to living cells of the wood, namely the ray parenchyma cells. In our laboratory, however, we have obtained evidence that the growth and distribution of fungal hyphae are greater than reported, especially in tissues attacked the previous year. This is especially significant because trees do not succumb until spring or early summer in the year following a beetle attack. Upon close inspection, we have seen hyphae throughout axial water conducting cells (tracheids) of the xylem. In many cases, the hyphae have occluded the bordered pits through which water must pass in its ascent up the tree. In short, the fungi plug the tree's plumbing.

Such physical blockage, however, may only account for part of the observed disruption of water flow and subsequent tree death. For example, hyphal growth may affect resin ducts and induce a release of resins and gums into the water conducting pathway. Fungal spores and large molecules may also occlude bordered pits to some extent.

It is also possible that ray parenchyma cells, which are destroyed by the fungi, are somehow essential to normal sap ascent. Uninfested pine trees store great quantities of chemical energy in living ray cells. The energy (sugar) is mobilized in the spring and is essential to renewed growth each year. If the tree is deprived of this material by the fungus, it would certainly be weakened and hence susceptible to stress for other reasons. We have also wondered if structures called tyloses (wall ingrowths of neighboring parenchyma cells) are formed because of blue stain fungi. Potentially damaging embolisms or tiny gas bubbles in tracheids might be associated with fungi respiration. Also, production of toxin(s) by the fungi cannot be discounted. And finally, one cannot overemphasize the devastating effect of phloem girdling by beetles. This not only increases the potential for water loss, but also interrupts the flow of sugars to roots. In other words, we are still groping among unknowns that must be solved.

Future Prospects

Since the beetle is the indispensable vector in fungal inoculation, numerous attempts have been made to control the insect. Spraying, clear cutting, selective

harvesting, burning, and even breeding programs have been implemented. However, successes have been only occasional, mainly due to environmental variables, the vastness of the area occupied by susceptible trees, the short time when beetles are vulnerable, and the total numbers of trees involved. Although one population of beetles can sometimes be eliminated, the trees remain highly susceptible to a new invasion.

In our laboratory, we are seeking data that will relate the physiological events of increased water stress to temporal aspects of radial growth of fungi into host trees. Our continuing studies of the seasonal development of xylem and phloem in lodgepole pines should help clarify fungal growth and development processes. We are now fairly sure of how to answer the question, "What's killing the lodgepole pines?" Now we must define the mechanism that actually causes death. Only then can we hope to stop the devastation.

Reprinted with permission from Utah Science, Fall, 1980, Vol. 41, No. 3, pp. 78-80.

Illustration from Manual of the Trees of North America by Charles S. Sargent, Dover, c1965.

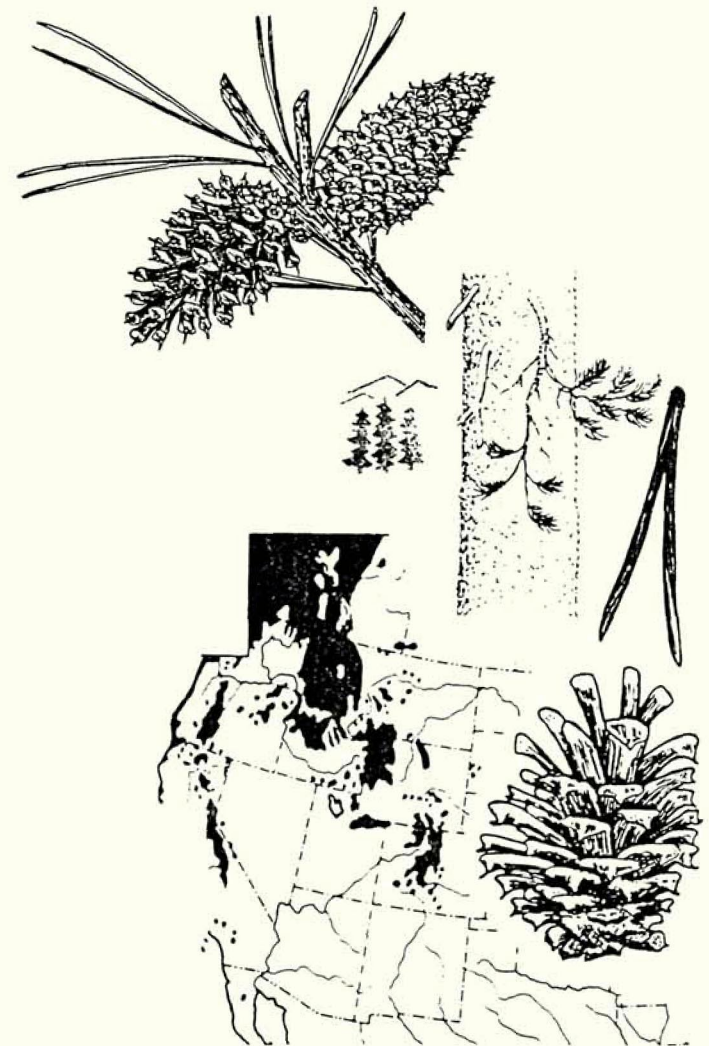


Illustration by Tom Watts from Rocky Mountain Tree Finder, Nature Study Guild, c1972.

Sensitive Plants Need Sensitive People

Dave Gardner
UNPS Conservation Chair



In light of recent efforts of the Forest Service to bring protection to rare species, it is imperative that forest managers at local levels feel there is a constituency for such action.

In order to give you a basis for responding to this need, we have been featuring in this column lists of sensitive plants species on National Forests in Utah. With our up-coming fieldtrip to Mt. Nebo this month it seems appropriate to feature the Uinta National Forest, which encompasses this area.

SENSITIVE PLANT SPECIES Uinta National Forest

Astragalus desereticus--Desert milkvetch, SF
Astragalus lutosus--Dragon milkvetch, H.
Festuca dasyclada--Sedge fescue, H.
Lesquerella garrettii--Garrett bladderpod, PG, SF.
Machaeranthera kingii--King woody aster, PG, SF.
Penstemon tidestromii--Tidestrom beardtongue, SF.
Phacelia agrillacea--Clay phacelia, officially listed, SF

Code for Ranger Districts: H=Heber, PG= Pleasant Grove, SF=Spanish Fork.

Please take 10 minutes to write a letter stating your support for protection of rare plant species and their habitats. Indicate that rare species should be given priority over other forest uses. Ask that interim management guidelines be followed to protect TES species until species-specific management plans are established. Request that qualified personnel continue to watch for occurrences of unknown populations throughout the growing season in areas slated for development or changes in use.

The idea here is to stimulate and foster continued rapport with Forest Service personnel. Let them know of your interest and concern regarding rare plants, their habitats, and the preservation of biodiversity. Send copies of your letter to:

Uinta National Forest
88 West 100 North
P.O. Box 1428
Provo, UT 84603

Heber Ranger District
P.O. Box 190
Heber City, UT 84032

Pleasant Grove Ranger District
P.O. Box 228
Pleasant Grove, UT 84062

Spanish Fork Ranger District
44 West 400 North
Spanish Fork, UT 84660

BLM Pony Express Resource Area
2370 South 2300 West
Salt Lake City, UT 84119

ALIEN PLANTS DRAIN WESTERN WATERS

Stephen Johnson
Director of Science and Stewardship
California Field Office
The Nature Conservancy

What uses five million acre-feet of water per year and has disrupted or destroyed more than a million acres of riparian vegetation? What threatens to eradicate the West's last remaining habitat for yellow-billed cuckoos and elf owls? What pulls water out of desert springs thereby eliminating water supplies for bighorn sheep, rare pupfish and salamanders, and desert palm groves? Answer: the tamarisk.

In the arid West, where water is life, the tamarisk tree has made few friends. Bill Neill, California's "one-man war" on this plant, describes the problem in uncharacteristically dispassionate terms: "Tamarisk is a virulent pest in desert riparian areas because it aggressively displaces native trees and shrubs...and it is a poor source of food and shelter for desert wildlife." What's more, according to Neill, the plant extracts water from the ground at a high rate and transpires it at an equally high rate. All told this little tree has wrought a major economic and ecological disaster that must be reversed or an essential component of the West's natural diversity will be lost.

Sometimes called salt cedar, tamarisk is not native to the North American continent. The nursery trade brought several deciduous species of the genus *Tamarix* to this country from Eurasia in the 1850s for use as an ornamental, as a windbreak, and as a means of erosion control. This slight, feathery tree or large shrub with its stunning sprays of pink to almost white flowers was extolled for its hardiness in certain climates. Those claims weren't exaggerated. Virtually unknown in the wild at the turn of the century, by 1920 tamarisk had spread, on its own, to some 10,000 acres of streamside and floodplain. Today it covers well over a million acres in 15 states and is still spreading. In California it lays claim to roughly 16,000 acres.

The tamarisk has a bag of survival tricks unequalled by any of the West's native vegetation. One single plant can produce hundreds of thousands of pollen-sized seeds that are easily scattered by wind and water. They also cling to fur and feathers. As a result

they are carried upstream, downstream, and even to entirely new watersheds. Too small to be eaten by birds or rodents, the seeds germinate in a wide variety of conditions and sprout like lawn grass--especially on freshly flood-scoured stream banks or along receding lake margins.

Once established, salt cedar seedlings grow faster than native plants--thereby crowding and "out-competing" them for sunlight--and mature trees will sprout back after fires that kill many of the native species. Tamarisk does not succumb to insect pests in this country, it can't be killed by foliar applications of herbicide, and its scale-like leaves are unpalatable to grazing animals. Moreover, removing the trees by cutting can result in regrowth of more than four feet in one month's time.

The tamarisk is a phreatophyte, a plant that survives in dry climates by extending its roots all the way down to the water table. With this virtually unlimited supply of moisture, the phreatophytes have never developed the water-conserving adaptations of other desert vegetation. But the exotic tamarisk uses far more water than do the native phreatophytes--more so than any other plant in this group. One large tree can absorb 200 gallons of water per day. That's about the amount a small family uses. Given a conservative estimate of a million acres of tamarisk, this plant species consumes nearly twice as much water as do the major cities of southern California. The dollar value of this lost resource is huge, but the cost to natural diversity--which is concentrated in or near water in the arid West--is even higher.

For example, native riparian vegetation in western states provides habitat for the greatest concentration of non-colonial nesting birds in all of North America. Springs and small desert pools support the West's rarest species, from pupfish to desert fan palms. But because of its prodigious water consumption, the tamarisk can desiccate springs, drain pools, and even dry up perennial streams. In the California Desert, hundreds of fragile oases are affected. The loss of wildlife owing to this depletion of water has not been systematically assessed, but it must be enormous.

The damage caused by salt cedar is not limited to stilling the flow of western waters; it also poisons soil and ground water. Through "glands" in its leaves, tamarisk secretes salt, which falls to the ground in the form of crystals and creates an environment that few native plant species can tolerate. Caught between the more vigorous tamarisk and the salt-laden soils, the native trees and shrubs rapidly disappear. In fact, a tamarisk-infested site soon becomes a single species thicket--poor habitat for native fauna as well.

Bertin Anderson and Robert Ohmart of Arizona State University conducted a major comparative study along the lower Colorado River to evaluate the extent to which birds use native vegetation versus tamarisk trees. They stated that "the value of salt cedar to birds was found to be minimal when compared with

other vegetation." The problem was particularly acute in the winter, at which time Anderson and Ohmart discovered that the portion of the study site bearing native flora sustained a density of 154 birds per 100 acres, while the rate for the tamarisk-dominated area was 4 birds per 100 acres. If you consider that at least a million acres are overrun by salt cedar, it is understandable why the yellow-billed cuckoo has declined from a population of tens of thousands of pairs on the lower Colorado to the tens of pairs currently found there.

Tamarisk is not solely responsible for the West's dwindling water supplies and the destruction of native riparian vegetation. Dams, levees, diversion projects, and agriculture have taken massive tolls on land and water. But what "progress" has left untouched, tamarisk is claiming. However, it's not winning everywhere.

Because of invading salt cedar, many of the desert pools at Death Valley National Monument had disappeared. After experimenting with numerous eradication techniques, the U.S. Park Service found the best method: crews using hand or chain saws cut the plants down to ground level and then applied a herbicide directly to the stumps to inhibit resprouting. Although labor-intensive, this is the only technique currently known to be suitable for use in ecologically sensitive areas. The pools in Death Valley are back.

In California and other states, volunteers led by dedicated conservationists like Bill Neill also are using the above method to eliminate tamarisk from key sites on Nature Conservancy, state, and BLM holdings. Nonetheless, while it is effective in fragile areas, hand removal can be done only on a small scale. It can't be used to clear or even control a million acres of undesirable vegetation.

On major western rivers where tamarisk totally has replaced native vegetation, conservationists face a double challenge. First, how do they eradicate the trees? Second, how do they ensure the return of native flora? Working with the Bureau of Reclamation, Ohmart and Anderson have restored an area on the lower Colorado River. Here, an impenetrable thicket of tamarisk was bulldozed, and the roots were cut below the soil's surface using a massive root ripper pulled behind a bulldozer. The site was then carefully planted with appropriate native vegetation, and each plant was irrigated until its survival was assured. This project was most successful, but the price tag was high: more than \$2,000 per acre, not including the cost of the clearing.

Although biological control is risky, it may offer the greatest potential for a large scale solution to salt cedar. Fortunately, the genus *Tamarix* belongs to a small family of plants (the Tamaraceae) of which there are no native species in the U.S. and no significant agricultural products. Thus, with nothing botanically related to tamarisk, it may be possible to import a pest that will attack only salt cedar--not crops or plants native to this country. But the research to find such an

salt-"cedar," tamarisco, tamariz, pino salado

Another Viewpoint

The History of the "Tamarisk"

Finn Bayles

In the southwestern part of the U.S. is a species of flora known to local residents as tamarack. This willowy bush, somehow misnamed in its travel to the western region, is correctly named tamarisk. The tamarisk grows wild in the desert regions along riverbanks and ponds, gracing the desert with signs of green vegetation.

Tradition tells us that the tamarisk is a relative newcomer. Supposedly the tamarisk got its start in this country when an 18th century lady of means and position visiting Egypt was taken by the beauty of the tamarisk's blue-green bush with its pink tassels. As the story goes, she found these Nile river bushes more impressive than the Pyramids themselves and subsequently had some specimens potted and returned to the States for transplanting. Being extremely prolific, they began immediately encroaching upon the waterways of North America, arriving in the region only shortly before the settlers.

In an arid land where green vegetation is rare, the presence of the tamarisk suggests the possibility of a drink of water and a short shady rest from your journey. For this reason, early travelers of the high desert regions sought eagerly for the distant view of the willowy tamarisk bush. While the tamarisk is a welcome sight to some, it has been a source of irritation to others. The cowboy, for instance, has extracted a high tax in saddle leather, horseflesh, and hats from the tamarisk's thick, wirey branches while searching for lost cattle along river banks. As many a cowpuncher might candidly testify, "It's a hell of a place to lose a cow."

It is unfortunate that the harried cowpoke didn't know as much about partaking of the offerings of the tamarisk as did his cows. One simply shouldn't hurry. One should rest and repose and enjoy the shade and tranquility of the tamarisk in the spirit of reflection and gratitude, but never, never hurry! It is in this same spirit that "The Tamarisk Restaurant" of Green River welcomes you. May your moments here with us be moments of comfort, relaxation and regeneration. And in your pursued journey may we say, "Good luck, good hunting, and may it never be necessary that you drink down stream from your horse."

Reprinted from the menu of the Tamarisk Restaurant, Green River, Utah.

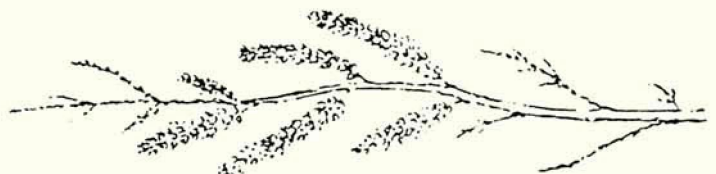
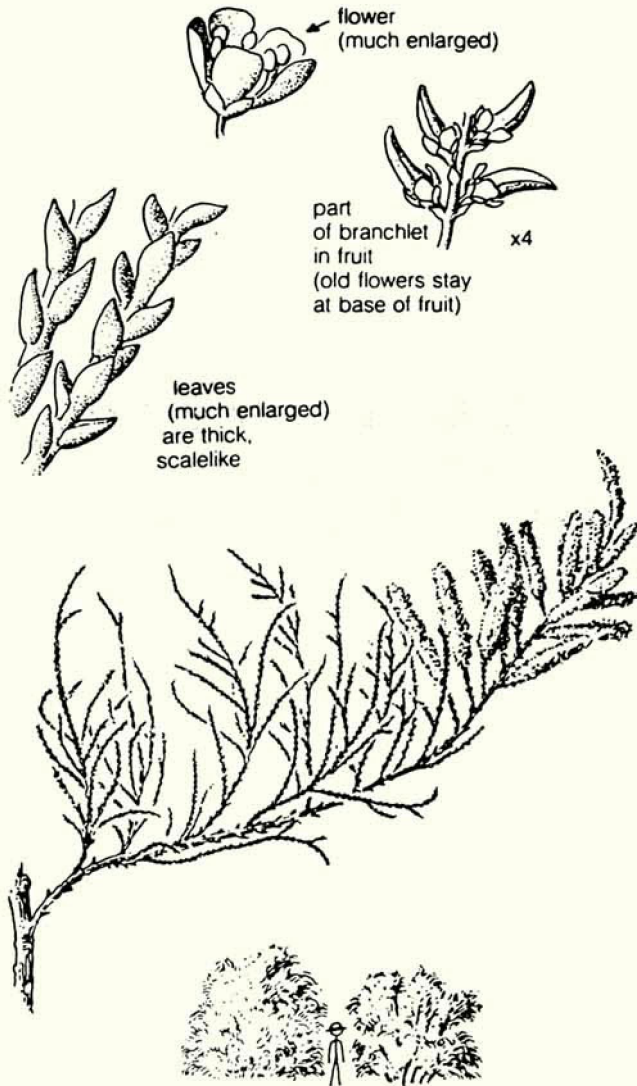
Illustration by Jeanne R. Janish from Shrubs and Trees of the Southwest Uplands by Francis H. Elmore.

insect or pathogen has not yet been seriously undertaken.

The balance of natural diversity in the West cannot be restored unless tamarisk is controlled, and you can take steps to help. Recognize and encourage the already fine efforts of the Bureaus of Reclamation and Land Management, various state agencies, and the National Park Service. Urge the U.S. Department of Agriculture to accelerate its search for a means of biological control. And, if you can, join a volunteer eradication crew.

Reprinted with permission from The Nature Conservancy News, Oct/Nov, 1986.

*This article is the fourth in our ongoing series on **ALIENS**.*



UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

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☐ 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
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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.)

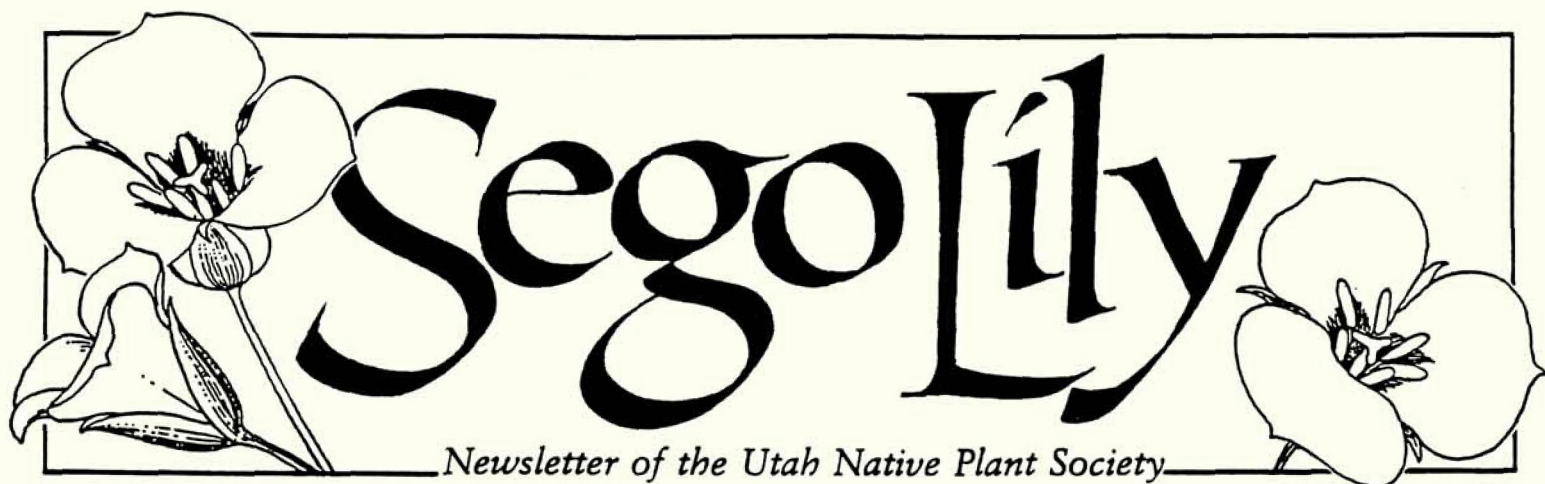
Everything has Latin Names

do you know what scientists call daisies?
carablanthemum lousyanabum pinetafitidum
how about that!
I know lots more
the professor he makes us learn them
for example how about the good old bobolink
i bet you don't know what his name is
dollychewinx crandawhifforus!
and heres a easy one for you to remember
roos trosickcocacoladon
that theres poison ivy
next time youre out picking
carablanthemum lousyanabum pinetafitidum
listen to the
dollychewinx crandawhifforus
but dont walk in the roos troxickcocacoladon!
the professor says we got to have these names
or else scientists everywhere would get confused
and not know what each other was talking about.

Norman H. Russell
Central State College
Edmund, OK

Reprinted from Douglasia, newsletter of the Washington
Native Plant Society, XII (3):19.

Speaking of scientilfc names, my aunt, Betty Hall
of Tooele, Utah, told me a couple of winners. She calls
Wild Morning Glory, or Bindweed, *Frustrata*
cussalotta, and Crab Grass is *Nuisancla*
canwreckalawna.



Vol. 12 No. 7

AUGUST 1989

CALENDAR OF EVENTS

August 2 (1 day)
or
August 2-4 (3)

Wildfire: Fire Ecology of the Greater Yellowstone. In recent years the role and necessity of fire in maintaining healthy forest and grassland ecosystems has been widely acknowledged. The fires of 1988 will be a focus of discussion and fieldwork. The recent Hunter fire behind Teton Science School alongside a series of older burns in Grand Teton National Park provide an ideal teaching opportunity. One day : \$70.00. Three days: \$200.00. Taught by Dr. Penny Morgan and Dr. Stephen Bunting. Academic credit available. Teton Science School.

August 18-23

Conference in the Rockies, "Working Together to Educate About the Environment," co-sponsored by The Conservation Education Association and The North American Association for Environmental Education, Estes Park Center, YMCA of the Rockies. For more information, write Conference Headquarters, P.O. Box 400, Troy, OH 45373. (513) 698-6493.

August 26

Tentative date for UNPS Annual Mushroom Hunt in the Uintas. CANCELLED. Regrettably, we have been unable to secure a qualified leader for this fieldtrip.

August 28
Monday

Cache Valley Chapter Meeting. "Wild & Woolly--Weeds or Wildflowers?" 7:00 pm, Logan City Public Meeting Room, 255 North Main, Logan.

LOOKING AHEAD

Sept. 28
Thursday
7:30 pm

Salt Lake Chapter Meeting with Ben Franklin of The Nature Conservancy to introduce us to the Utah Natural Heritage Program. The Den, University of Utah Union Building.

Through Oct. 31

Wildflower Hotline (801) 581-4969. Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00, Friday mornings from April through October.

Seasonal Bloom

St. George Wildflower Hotline (801-628-1365). A 30 second message, updated every two days, is recorded by Bart Anderson of St. George on what's blooming where in southwestern Utah.

RAISING CACTUS

Andy Boyack

Chairman, UNPS Board

Loraine Miller, owner of Cactus and Tropicals of Utah, and Henry Mieremet discussed the difficulties and benefits of raising cacti at our June Chapter meeting. Their remarks were applicable in particular to the cultivated cacti available in nurseries and stores for retail sale. Most of these are raised from seed from South American plants.

Like many house plants, these cacti require their own particular kind of care--watering, for instance. They require regular watering during their growing season, but not overwatering. During their dormant season, less water. They like lightly shaded locations. Direct sunlight can burn them. A wide range of daily temperatures will help induce flowering. When they are dormant they should be kept cool, at 40 to 60 degrees. Loraine went on to give many more tips on their care.

Cactus enthusiasts like Henry Mieremet use a greenhouse for their plants to maintain optimum temperatures. Henry showed us many slides of the brilliant displays of color shown by the plants in his greenhouse. The various species and hybrids produce flowers of all colors except blue, according to Henry.

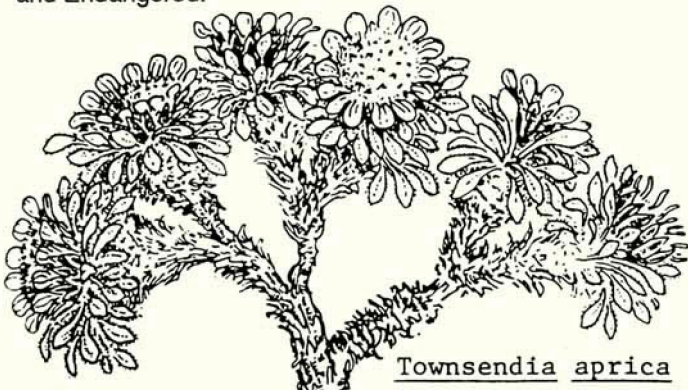
SENSITIVE PLANTS NEED SENSITIVE PEOPLE

Dave Gardner

UNPS Conservation Chair

Due to recent efforts of the Forest Service to bring protection to rare species, it is imperative that forest managers at local levels feel there is a constituency for such action.

In order to give you a basis for responding to this need, we have been featuring in this column lists of sensitive plant species on National Forests in Utah. This month we are featuring the Fish Lake National Forest. Of these plants, *Astragalus perianus* and *Townsendia aprica* are officially listed as Threatened and Endangered.



Townsendia aprica

SENSITIVE PLANT SPECIES

Fish Lake National Forest

Astragalus consobrinus--B

Astragalus perianus--Rydberg milkvetch, B, L

Castilleja parvula var. *parvula*--Tushar paintbrush, B

Cymopterus coulteri--Coulter biscuitroot, B

Draba ramulosa--B

Draba sobolifera--Subalpine whitlowgrass, B

Epilobium nevadense--Nevada willowherb, F

Eriogonum ostlundii--Ostlund buckwheat, B, F, R

Hymenoxys helenioides--Helenium hymenoxys, R

Machaeranthera kingii var. *barnebyana*--Barneby woody aster, F

Mentzelia argillosa--L

Najas caespitosa--Fish Lake Naiad, L

Penstemon concinnus--Tunnel Springs beardtongue, F

Penstemon parvus--Small beardtongue, L

Penstemon wardii--Ward beardtongue, B, F

Sclerocactus pubispinus--Gt. Basin fishhook cactus, F

Senecia dimorphophyllus var. *intermedius*--Intermediate groundsel, L

Silene petersonii--Plateau catchfly, L

Townsendia aprica--Last chance townsendia, L

Code for Ranger Districts: B=Beaver, F= Fillmore, L=Loa, R=Richfield.

Please take 10 minutes to write a letter stating your support for protection of rare plant species and their habitats. Indicate that rare species should be given priority over other forest uses. Ask that interim management guidelines be followed to protect TES species until species-specific management plans are established. Request that qualified personnel continue to watch for occurrences of unknown populations throughout the growing season in areas slated for development or changes in use.

The idea here is to stimulate and foster continued rapport with Forest Service personnel. Let them know of your interest and concern regarding rare plants, their habitats, and the preservation of biodiversity. Send copies of your letter to:

Fishlake National Forest

115 East 900 North

Richfield, UT 84701

Beaver Ranger District

P.O. Box E

Beaver, UT 84713

Fillmore Ranger District

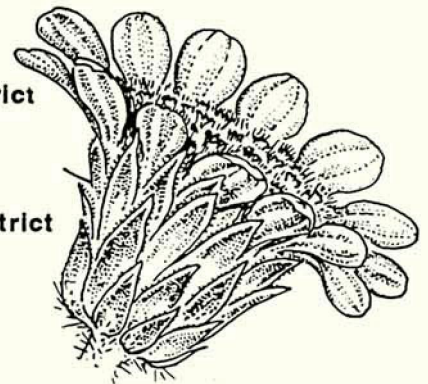
P.O. Box 265

Fillmore, UT 84631

Loa Ranger District

P.O. Box 128

Loa, UT 84747



Richfield Ranger District
115 East 900 North
Richfield, UT 84701

BLM Offices in this area:
(bordering forest lands)

Richfield District Office
P.O. Box 768,
Richfield UT 84701

Henry Mountain Resource Area
P.O. Box 99
Hanksville, UT 84734

House Range Resource Area
P.O. Box 778
Fillmore, UT 84631

Warm Springs Resource Area
P.O. Box 778
Fillmore, UT 84631

Sevier River Resource Area
180 North 100 East
Richfield, UT 84701

If you are in the area, a personal visit to these offices to express your interest and concern would be an important contribution to the cause of sensitive species.



Mentzelia argillosa

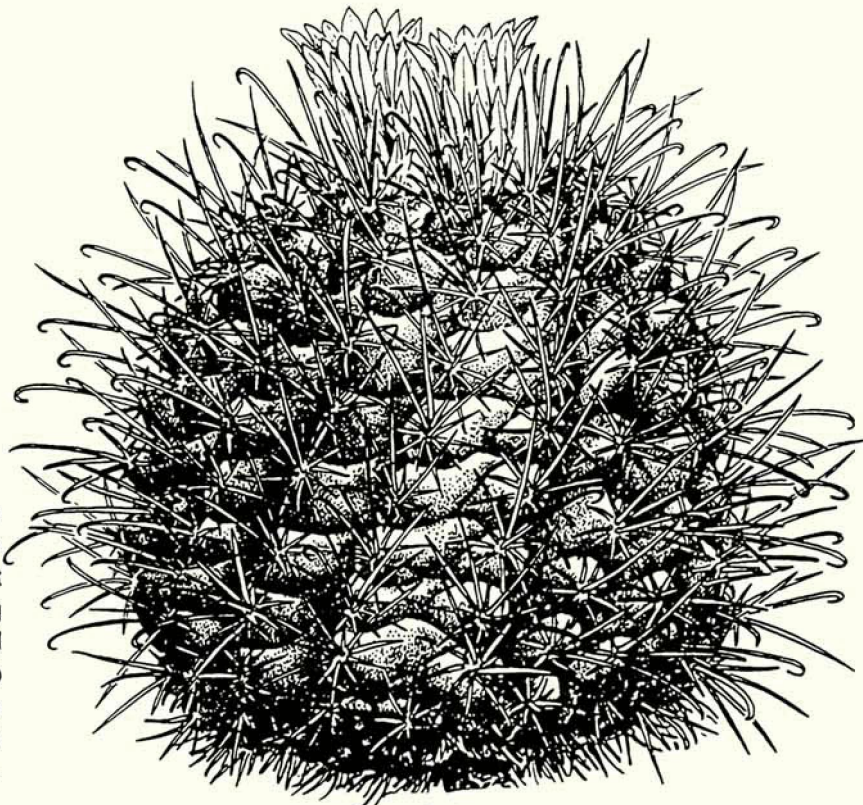
Forest Service Review

The US Forest Service is initiating a review of its land management planning policy and processes. The review could be completed by April 1990. It will result in recommendations for future planning and is being conducted prior to a formal review of the land management planning regulations scheduled to begin in spring. If you want to participate you must notify the Forest Service in writing: F. Dale Robertson, Chief, USFS, USDA, POB 96090, Washington, DC 20090-6090.

DESERT RANGE EXPERIMENT STATION

Have you visited the Desert Range Experiment Station? It is located in Pine Valley on the west side of the Wah Wah Mountains. You can get to it on Highway 21 between Milford and Garrison, Utah, about 52 miles west of Milford. A junction and a not-well-marked loop road to the north takes you in about 3 1/2 miles to a group of now-deserted green-roofed, white frame buildings. It was established as a U.S. Department of Agriculture project for experimentation with desert plants. Twenty-four paddocks were used for observation before and after grazing to determine the effect on various types of desert forage. The site now also has a United Nations designation as a world habitat type locality. It is an interesting place to visit. Raptors frequent the area, and owls are an especially interesting feature. Long-eared owls roost in the juniper trees behind the houses and a great horned owl is often seen in the large trees in the circle around which the houses are grouped. Antelope graze on the abandoned lawns, and seem to have little fear of humans. They will approach quite closely. And **sensitive plant species** are found on the Experiment Station lands. These include:

Cryptantha compacta--Compact catseye
Eriogonum ammophilum--Sand-loving buckwheat
Penstemon concinnus--Tunnel Springs beardtongue
Penstemon nanus--Low beardtongue
Sclerocactus pubispinus--Fishhook cactus
Sphaeralcea caespitosa--Jones globemallow



Sclerocactus pubispinus

Repelling Green Invaders: NOXIOUS WEEDS IN UTAH

Rick Chase

Utah may not be the weed capitol of the western states, but we have our fair share. The weeds that are already robbing us of agricultural production may never be totally controlled, much less eliminated. But with recent invaders, we have a chance to refuse them room inside our boundaries. The trick is to catch them early, while they are few in number. If this had been done with musk thistle and dyers woad, they wouldn't be the problem that they are today.

Before such unwelcome guests can be banished, however, we must find their beachheads. A 1980 survey (funded by the USDA) allowed us to do just that. We identified twenty weeds that pose a serious threat to Utah agriculture. Twelve of the twenty are highlighted in this article. Although not yet widespread through the state, these twelve pose serious threats.

The recently organized Utah Weed Control Association (UWCA) is committed to trying to stop the spread of several of these weeds. Each county has also set weed control priorities depending on which of these weeds are most prevalent within their boundaries. With diligence, we may be able to contain these invaders and possibly eradicate one or two. Since each of the twelve has already proved its noxious potentials in other states, that is a worthy goal.

Please notify your county agent or county weed supervisor of any infestations you know of that are not being treated.

BUFFALOBUR (*Solanum rostratum*) plants are scattered up and down the state, but the only major infestation is in San Juan County. We are very concerned about Buffalobur and do not want it to become stabilized in the state. A good control program could curb its spread. Eradication in San Juan County, however, where it infests large acreages along the San Juan River, would be difficult.

DYERS WOAD (*Isatis tinctoria*) is an annual, but can act as a biennial, and possibly even as a perennial. It is a mustard, quite difficult to control, and spreads very rapidly. This weed infests northern Utah as well as southern Idaho and southwest Wyoming. Woad was first discovered in the state in the 1920s.

JOINTED GOATGRASS (*Triticum cylindricum*) is proving much more prolific than we had anticipated. It has spread throughout the state and can be a serious problem in winter wheat areas. Its close relationship to wheat makes it very difficult to control.

DALMATION TOADFLAX (*Linaria dalmatica*) qualifies as an escaped ornamental in Utah. The two

major sites of infestation are around the town of Magna and along the Provo River in Utah County. Three other counties have small infestations. Dalmation Toadflax is a perennial and is difficult to control, especially where it occurs along the Provo River. We are concerned about its spread into other areas.

GOATS RUE (*Galega officinalis*) a perennial legume, managed to escape cultivation. It was brought in as a forage plant and now inhabits a large portion of Cache County. A Goatsrue eradication program has been funded through federal, USU, and county dollars.

VELVETLEAF (*Abutilon theophrasti*) is a serious weed problem in the Midwest. It is believed that seed of this weed is coming into Utah with turkey feed. Without immediate action, this weed definitely will spread and become an extremely serious problem. Velvetleaf has a top eradication priority.

BLACK HENBANE (*Hyocymus niger*) is localized mainly in northern Utah. It is a very serious problem in Rich County where it occurs mainly as a roadside weed, but it has a potential to spread widely. This is one weed that, with a good control program, we could largely confine to the northern part of the state and possibly almost eradicate.

LEAFY SPURGE (*Euphorbia esula*) is one of Utah's 11 noxious weeds. It grows exclusively in the northern part of the state and infests only a small acreage. This perennial is difficult to control, and has a high potential for spreading out of control. Wyoming has nearly 34,000 acres supporting leafy spurge and is spending a million dollars a year on this weed.

SPOTTED KNAPWEED (*Centaurea maculosa*) is not now a serious problem in the state. There are only three counties in which infestations were found, and those were quite small.

MUSK THISTLE (*Carduus thoermeri*) is one of Utah's most serious weed problems because it is so widespread. In many counties, however, the infestation is not severe. To successfully control musk thistle, spraying must be effective, with follow-ups several times a year.

YELLOW STAR THISTLE (*Centaurea solstitialis*) poses a serious threat to Utah. An annual, with spines radiating from its seed heads, this thistle can spread rapidly and infest large areas. Although not yet a serious problem in Utah it is in neighboring states, and will become so here unless we prevent its spread. Yellow star thistle is poisonous to horses, causing "chewing disease," from which horses can die shortly after eating the plant.

SILVERLEAF NIGHTSHADE (*Solanum elaeagnifolium*) is a real threat to Utah, probably brought in with

turkey feed. At present it is a serious problem in Washington County and has been found in two other counties. It is a perennial and very prolific.

Other troublesome weeds include:

BARBWIRE RUSSIAN THISTLE (*Salsola paulsenii*) is about as tough as the name "barbwire" implies. Even in the early stage, spines are very sharp. This plant is fast becoming established in the state.

TALL WHITETOP (*Lepidium latifolium*), one of the state's noxious weeds, is found in 11 counties and is especially prevalent along the Green and Colorado Rivers. It is a deep-rooted perennial and difficult to control.

PARROTFEATHER (*Myriophyllum exalbescens*) is an aquatic weed found in reservoirs and canals. Another name is watermilfoil. This weed interferes with fish habitat, water sports, and recreation.

WATERHEMLOCK (*Cicuta douglasii*), an extremely poisonous plant, both to humans and cattle, infests irrigation ditches, stream banks, and wet meadows.

POISON MILKWEED (*Asclepias subverticillata*) is a perennial, also called whorled milkweed. It is poisonous to sheep and cattle, and occasionally horses. This plant is found in the southern portion of the state.

SQUARROSE KNAPWEED (*Centaurea virgata* var. *squarrosa*), a perennial, has become firmly established in the area around Tintic and Eureka in Juab County, but has also spread into Utah and Tooele Counties.

TELEGRAPH PLANT (*Heterotheca grandiflora*) is found only in Washington County and the infestation is limited to a few plants every year. This plant is a serious weed problem in California.

YELLOW NUTSEDGE (*Cyperus esculentus*) is a serious problem wherever it exists. It reproduces primarily by tubers that form on the rhizomes on underground stems. Control is very difficult.

Reprinted with permission from Utah Science, Spring, 1982.

Dr. Rick Chase was Extension Weed Specialist and head of the State Weed Committee at the time of this article. He died about 2 year later in a tragic helicopter crash.

Dr. Steven A. Dewey is now Extension Weed Specialist, Plant Science Department, Utah State University.

This article is the flfth in our ongoing series on **ALIENS**.

INVADING WEEDS OF UTAH 1986 Survey Update

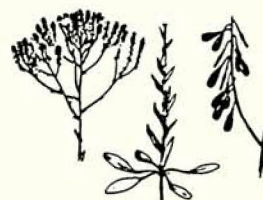
Steven A. Dewey

State-wide field surveys conducted in 1980 and repeated in 1986, show an alarming increase in the incidence of many noxious and invading weeds on private and public lands in Utah. Several of these invading species have spread at very high rates, and over great distances. Spotted knapweed appears to be spreading at the most rapid rate, increasing from 3 infestations in 3 counties in 1980, to 28 infestations in 10 counties in 1986. The number of counties infested by specific invading weed species in 1980 and 1986 shown in the following table:

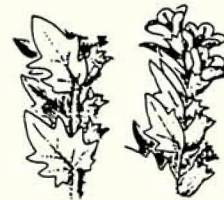
COUNTIES INFESTED

	1980	1986
Barbwire Russian Thistle	6	-
Black Henbane	6	7
Buffalobur	9	12
Dalmation Toadflax	5	-
Diffuse & Squarrose Knapweeds	4	10
Dyers Woad	9	18
Goatsrue	2	2
Johnson Grass	2	5
Jointed Goatgrass	16	21
Leafy Spurge	11	12
Musk Thistle	22	26
Parrotfeather	6	-
Russian Knapweed	-	15
Scotch Thistle	-	16
Spotted Knapweed	3	10
Tall Whitetop	13	18
Telegraph Plant	1	-
Velvetleaf	3	6
Yellow Nutsedge	6	8
Yellow Starthistle	4	8
Water Hemlock	19	22

- = Species not surveyed that year.



I. tinctoria



H. niger



S. rostratum

UTAH NOXIOUS WEED ACT

Paul Baker

Seed Analyst

Utah State Department of Agriculture

The following weeds are officially designated and published as noxious for the State of Utah:

Burmudagrass (*Cynodon dactylon*)*

Bindweed/Wild Morning-glory (*Convolvulus* spp.)

Broad-leaved Peppergrass/Tall Whitetop (*Lepidium latifolium*)

Canada Thistle (*Cirsium arvense*)

Dyers Woad (*Isatis tinctoria*)

Johnson Grass (*Sorghum halepense*)

Leafy Spurge (*Euphorbia esula*)

Musk Thistle (*Carduus nutans*)

Quackgrass (*Agropyron repens*)

Russian Knapweed (*Centaurea repens*)

Scotch Thistle/Cotton Thistle (*Onopordium acanthium*)

Whitetop (*Cardaria* spp.)

*Not noxious in Washington County

In addition to the prohibited noxious weeds, the Utah Seed Act lists four restricted noxious weeds:

Dodder (*Cuscuta* spp.)

Halogeton (*Halogeton glomeratus*)

Wild Oats (*Avena fatua*)

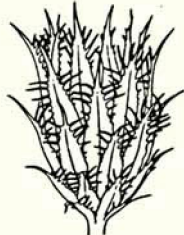
Poverty Weed (*Iva axillaris*)

These are limited in seed to 27 per pound.

Some changes in these laws have been proposed, but they are not final. Some of the changes include adding Spotted Knapweed, *Centaurea maculosa*, Diffuse Knapweed, *C. Diffusa*, and Yellow Star Thistle, *C. solstitialis* to the list of noxious weeds; changing *Sorghum halepense* to include all perennial *Sorghum* spp.; and making Quackgrass, *Agropyron repens*, a restricted weed. I emphasize that these are only proposals.



C. maculosa



C. diffusa



C. solstitialis

"It is fortunate, perhaps, that no matter how intently one studies the hundred little dramas of the woods and meadows, one can never learn all of the salient facts about any one of them."

Aldo Leopold

RELICT PLANTS PREVAIL

Lissa Leege

Intern, SUWA

In 1847, the early pioneers arrived in Utah to find a land of wealth and diversity. Seas of waving bunch grasses and fields of waist high needle-and-thread grass covered the ground and blurred the edges of the horizon. The arrival of domestic livestock in the mid 1800's, however, initiated a transformation that has left Utah with vast expanses of sagebrush, Russian thistle, and barren ground vulnerable to erosion.

Until the passage of the 1934 Taylor Grazing Act, domestic livestock were completely unregulated on the public domain. Cows and sheep found their way into almost every nook and cranny of the state accessible by foot. Only a few pristine mountaintops, mesas, and canyons remain, cut off from the impacts of human society by virtue of their location. Known as relict plant communities, these few undisturbed sites are the only remnants of Utah's original plant communities.

Currently The Nature Conservancy is working to locate relict communities in the state and to afford them some administrative protection. Much has been done on both Forest Service and National Park Service land; however, identification of truly pristine communities on BLM lands has been somewhat slower. To date, twenty relict or near relict communities totalling about 50,700 acres have been identified on Utah BLM lands. Fourteen of these areas (45,400 acres) are included for wilderness designation in the Utah Wilderness Coalition's 5.1 million acres wilderness proposal, while the BLM has included only half as many (25,000) in its 1.9 million acres wilderness recommendation. Judging from the percentage of relict communities currently listed in the UWC proposal, the areas as yet undiscovered are most likely located in the rugged, roadless land of the 5.1 million acres. **The few remaining relict communities were once protected from human intrusion because of their inaccessibility.** Today, human impact can and does occur even in the least likely places. The species composition of these few pristine areas is not completely different from those that are grazed. What differs so dramatically, however, is the dominance and density of particular species.

In upland relict areas of deep soil, green perennial grasses prevail. Indian rice grass, needle-and-thread grass, and other palatable grasses grow tall and help to retain the topsoil rich in nutrients and organic matter. In a study done by Brotherson and Brotherson, (1981, Great Basin Naturalist, 41(3):335-340) grasses in such areas were found to make up 51 percent of the total vegetative cover. In grazed communities of similar elevations and soil types, however, grasses composed only 10 percent of the total living cover. Sagebrush is present in relict communities as well, but

represents only 18 percent of the plant cover as compared to 31 percent in communities grazed by domestic livestock. Thus in the relict community, perennial grasses are abundant, while shrubs take a less dominant role.

An important, yet often unacknowledged component in desert systems is cryptogam, a soil covering composed of fungus, algae and moss. Cryptogam appears as small blackish mounds in the soil. In relict areas, thick layers of cryptogam slow the rush of torrential summer rains. Cryptogamic soil crusts have been shown to lessen soil erosion, to reduce drought by retarding evaporation, and to increase water penetration by slowing water movement over the surface microtopography. They also trap silt, fix nitrogen, and hold in the phosphorous, potassium, and organic matter that in disturbed sites is removed by slow sheet erosion. The undisturbed cryptogam of relict communities plays an essential role in the proper performance of the whole system.

This then, is the relict community: lush, tall grasses, a variety of shrubs, and thick cryptogamic cover. Millions of years of evolution have produced the natural community which functions in dynamic equilibrium. It can recover from the stress of drought or flood because climactic pressures are random and variable. Constant pressures upon the same element in the community, however, will eventually upset the balance and ultimately topple the whole system. Because livestock prefer some plant species over others, grazing is an example of a continual pressure on a selected portion of the system--a stress from which the community may not recover. Relict communities show us how a natural system functions properly. Comparative research reveals that the side effects of domestic livestock grazing are numerous and often irreversible.

Domestic livestock are picky eaters. Cattle prefer the native perennial grasses such as needle-and-thread grass and Indian ricegrass, while sheep will choose broad leaved plants. With the depletion of these palatable species, hence termed decreaseers, the ungrazed and less desirable plants formerly held in check by the grasses are given the competitive advantage. Sagebrush and rabbitbrush, both woody species that the grazers dislike, are examples of increaseers which have taken over normally grassy sagebrush communities.

Once the decreaseers are reduced, the unbalanced community is opened up to plants which commonly thrive on disturbed sites. Alien plants which have been brought to this country from elsewhere spread rapidly through growth of underground rhizomes and invade the niche once filled by the palatable decreaseers. They establish themselves firmly and quickly, and even if grazing is discontinued, they will persist. The original vegetation may never be able to reestablish itself. Because most invaders are annuals, they provide cover for the nutrient rich topsoil during the growing season, but by summer or fall, they die back, "leaving large

bare areas of uncovered soil." (Brotherson and Brotherson, 1981) Vulnerable to wind and rain, the topsoil is eroded away until the next season of growth. The valuable nutrients then silt up streams and rivers, upsetting the balance of the aquatic systems, and degrading yet another habitat.

An essential component in the desert ecosystems, cryptogam is badly impacted by grazing. According to a study done by David Anderson et. al (1982, Journal of Range Management: 35(3):355-359), "both the number of cryptogamic species and their contribution to the total cover suffer under the hooves of grazing animals." Disturbance of the seemingly insignificant cryptogam increases erosion, depletes the topsoil containing essential nutrients, and increases drought and water loss.

Domestic livestock grazing has had profound effects upon the natural vegetation of Utah. It is important to realize that because of the serious and irreparable effects of erosion as well as the presence and competitive edge of alien annuals, the land may never return to its former undisturbed state. Kleiner and Harper compared the relict community of Virginia Park to the lightly grazed Chesler Park in Canyonlands National Park in 1972 (1972, Ecology 53(2):299-309). At that time Chesler Park had not been grazed for ten years, yet the study revealed that it was in a state of decline. Its cryptogamic cover was only one-sixth that of the relict park. The result was erosion and loss of important nutrients from the system, rather than slow recovery and return to original community structure. These stark findings give us good reason to protect the undisturbed lands that remain.

The value of relict plant communities seems obvious. Apart from their intrinsic value as places of beauty and balance shaped over millions of years of trial and error, these vanishing associations are also of great scientific importance. We learn from studying these communities how a balanced system operates and can begin to apply the wisdom of nature to our own attempts at restoration. Relict communities are alarmingly rare, and are not a renewable resource. In order to protect a variety of plant and animal species and the genetic diversity they harbor, we must work to protect the communities upon which they depend for their existence.

The inaccessibility that once kept Utah's relict communities safe from disturbance is no longer a form of protection. We must choose to protect the land with the law, or we may lose the last remnants of a natural and balanced ecosystem to our foolishness.

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RAPID EVOLUTION IN WESTERN SHRUBS

Howard C. Stutz

Because shrubby plants have attributes of herbaceous plants as well as of trees, they are able to respond to a broader spectrum of evolutionary forces than can either of the others. It is probably their evolutionary heterosis more than anything else that has permitted shrubs to be so successful in so many different habitats of the world. In the extensive heterogeneous habitats of the Intermountain West, they dominate most of the entire landscape from the deserts to the tops of the mountains. Hundreds of thousands of acres have little of anything else growing on them.

Although many different families are represented among the shrubs of the Intermountain West, the *Rosaceae*, *Chenopodiaceae* and *Compositae* are, by far, the most successful. The *Rosaceous* shrubs include such important dominants as blackbrush (*Coleogyne*), bitterbrush (*Purshia*), chokecherry (*Prunus*), mahogany (*Cercocarpus*), and serviceberry (*Amelanchier*). *Chenopod* shrubs include saltbush (*Atriplex*), winterfat (*Eurotia*), greasewood (*Sarcobatus*), and hopsage (*Grayia*). The two most important *Compositae* shrubs are sagebrush (*Artemisia*) and rabbitbrush (*Chrysothamnus*).

Each of the major evolutionary processes is well exemplified among these highly successful groups. This can probably be best illustrated by describing the evolutionary sequences which are, even now, bringing forth new species.

New species originate by three major avenues:

- (1) through the accumulation of new mutations;
 - (2) as products of sexual recombination; and
 - (3) via polyploidy.
- Each process can be well illustrated among our common shrubs.

NEW MUTATIONS

1. *Speciation through the accumulation of new mutations.* [Illustrated by speciation in mountain mahogany (*Cercocarpus*).]

There are three distinct species of *Cercocarpus*: (1) mountain mahogany (*C. montanus*), (2) leather-leaf mountain mahogany (*C. ledifolius*) and (3) narrow-leaf mountain mahogany (*C. intricatus*). They are morphologically and ecologically quite distinct.

C. montanus is the most abundant of the three. This very valuable range plant is common in the lower mountain brush zone, along with scrub oak, chokecherry, snowberry and serviceberry. It has broad deciduous leaves.

C. ledifolius grows at higher elevations (6,000-9,000 feet) in association with ninebark, big tooth maple and aspen. It forms a small tree under which

there is very little understory growth and provides, consequently, a favorite bedding ground for deer and elk.

C. intricatus is most common on exposed limestone cliffs. It is restricted in distribution, being confined almost entirely to Utah and the borders of neighboring states. It is rather short in stature and has small needle-like leaves.

Hybrids between all three species occur in nature. However, the hybrids between *C. ledifolius* and *C. intricatus* are much more common than hybrids between *C. intricatus* and *C. montanus*.

This, together with other evidence, suggests that *C. ledifolius* is ancestral to each of the other species as shown in figure 1.

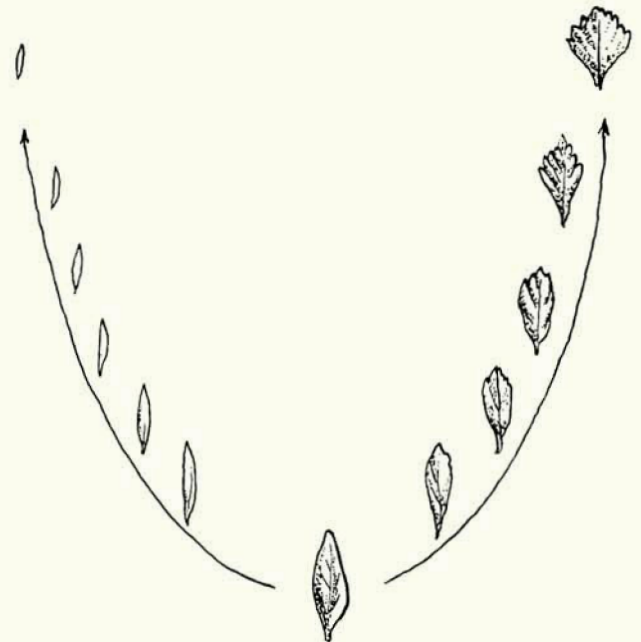


Figure 1. The origin of species in *Cercocarpus*, *C. intricatus* and *C. montanus* may have each been derived from *C. ledifolius* by "genetic assimilation."

Leaf size on *C. ledifolius* plants is highly plastic, with some leaves being much longer and broader than others, even on the same plant (figure 2). Under severe water stress, some leaves on a shrub will be very short and narrow; under more favorable conditions, leaves all tend to be large and broad. Such plasticity permits *C. ledifolius* to accommodate a wide range of climatic variations.

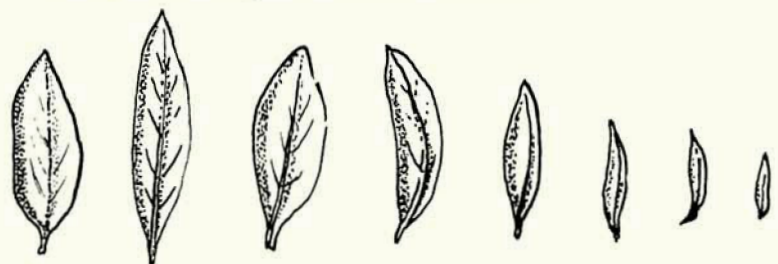


Figure 2. Variation in leaves on a single plant of *Cercocarpus ledifolius*.

Laboratory experiments have shown that a characteristic that is normally expressed only under certain environmental situations may attain regular genetically controlled expression, even in normal environments, if it is severely selected for whenever expressed. Such a shift from being a solely environmentally induced characteristic to being under total genetic control is termed *genetic assimilation*. Waddington (1953), Bateman (1956), and others, have demonstrated this in a peculiar "cross-veinless" characteristic in wings of fruit flies which can be induced with heat shocks. If such induced "cross-veinless" flies are severely selected, in just a few generations the character becomes completely "genetically assimilated" and shows up *without* the heat shock. Lysenko several years ago (1935) also showed this in wheat, where he changed "winter wheat" to "spring wheat" by selecting "spring-like" behavior in winter wheat after it had received cold shocks.

This same phenomenon appears to have been responsible for the origin of *C. intricatus* from *C. ledifolius*. Under consistently dry conditions, *C. ledifolius* plants that develop the most small, narrow leaves would be expected to be highly favored over the broader-leaved forms. Such intense selection would be expected, as with the cross-veinless fruit flies, to eventually lead to regular expression of narrow leaves without the environmental stress. Such genetic assimilation has apparently yielded *C. intricatus* which now genetically produces small, narrow leaves even when growing in very moist conditions. Even plants which sometimes aberrantly grow right along streambanks have leaves almost as small and narrow as plants growing in crevices of adjacent rocky cliffs.

The prerequisites for speciation by genetic assimilation include both plasticity and a rich supply of mutations. *C. ledifolius* contains both. Variations between plants indicate a rich supply of genetic variation and variations in leaf size on single plants indicate wide plasticity.

C. montanus may have also been derived from *C. ledifolius* by selection, although the evidence is much more obscure that it is for the origin of *C. intricatus*. The broad leaves of *C. montanus*, which are required for successful competition with oak and chokecherry and serviceberry in moist sites, could have been derived by long term selection from the narrower parental *C. ledifolius* forms. Successful utilization of the broad leaves, however, would require that they drop off each autumn to allow survival through the drought of winter months. *C. montanus* could have acquired this simple, but distinguishing, genetic attribute from new mutations.

New mutations can provide a rich source of variation from which natural selection can derive many new alternative themes. Sometimes mutations add direct valuable attributes; at other times, they provide the opportunity for genetic assimilation of valuable plastic characters. The numerous races of big sagebrush, rabbitbrush, serviceberry, scrub oak and

saltbush indicate that speciation through selection from new mutations is and has been highly significant, probably among all of our native shrubs.

SEXUAL RECOMBINATION

II. *New species as products of sexual recombination.* [Illustrated by speciation in cliffrose (*Cowania*) and bitterbrush (*Purshia*).]

Although cliffrose and bitterbrush belong to separate genera and differ in many, many characteristics, they hybridize quite commonly in nature (figure 3). The hybrid is highly fertile and numerous segregating progeny are formed annually throughout the hills of Utah and Nevada.

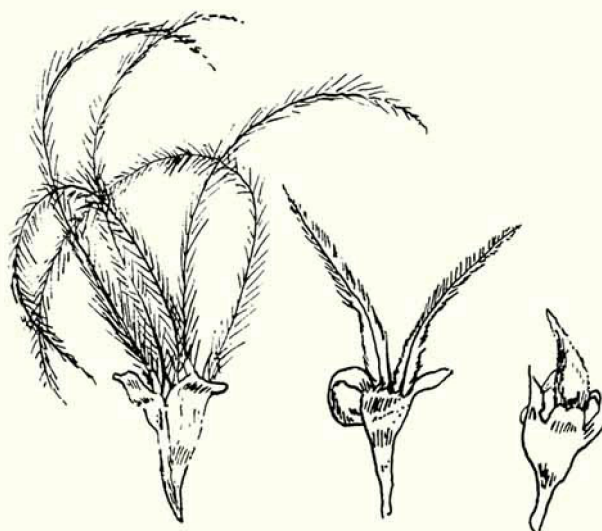


Figure 3. Figures of *Cowania stansburyana* (left), *Purshia tridentata* (right) and the F1 hybrid between them.

Cliffrose is a small tree (8-12 feet) confined to dry hillsides at elevations of about 5,000 to 7,000 feet. It grows from northern Utah to central Mexico. It is eaten sparingly by sheep and big game but is otherwise of little economic significance.

Bitterbrush is a very valuable low-growing shrub (2-4 feet), somewhat moist, common on sites from southern Utah and Nevada north into Idaho, Washington, Oregon and British Columbia. Some range specialists rate it as the number one browse plant for sheep and deer.

Since cliffrose ranges from northern Utah southward into Old Mexico, while bitterbrush ranges from southern Utah northward into Canada, the entire state of Utah is an overlap area for the two shrubs. Throughout Utah, hybridization between them is so common that no population of bitterbrush can be found which is free of cliffrose genes. However, although many F2 and backcross segregants are common, none appear to be as well adapted to the currently available habitats in Utah as are the parents themselves. The phenomenal array of new combinations produced every year from these hybrids are exposed to many diverse

habitats throughout Utah; nevertheless, none appear to have found a habitat conducive to major reproductive success.

Immediately south of Utah, however, an unusual environmental niche has provided just the right situation for one of the hybrid segregants. This has been identified as a distinct "species," commonly known as "glandular bitterbrush" and scientifically designated *Purshia glandulosa* (figure 4). That it is, indeed, a derivative from the interspecific hybrid is clearly indicated by its intermediate characteristics, which match those of some of the known segments in other parts of Utah. In addition, each population of *Purshia glandulosa*, although characterized by the particular features that define it, possesses a unique collection of other parental characteristics. These, as expected, occur as fortuitous segregants in each isolated population but apparently do not offer any specific adaptive value.

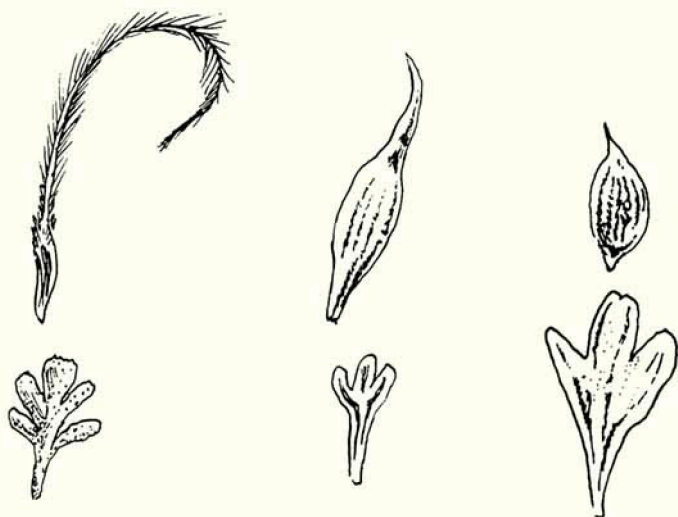


Figure 4. Fruits and leaves of *Cowanlia stansburyana* (left), *Purshia tridentata* (right), and *Purshia glandulosa* in the middle. *P. glandulosa* is a new species derived from the hybrid *G. stansburyana* x *P. tridentata*.

North of Utah another "species" is in the making. The environment being invaded by this potential "species" is the heavily grazed rangelands of Idaho, Oregon and Washington. Exposure to hordes of sheep gives a unique advantage to any bitterbrush population containing lowered palatability genes from cliffrose. Consequently, cliffrose characteristics are present in almost every population of bitterbrush north of Utah. Even as far north as British Columbia one of two plants in each population show evidence of introgression from cliffrose.

So, although cliffrose does not grow north of Utah, its genes are spreading like wildfire because of the intense selective advantage of its lowered palatability. When and if a new, distinct species emerges, depends primarily on the intensity and steadiness of the "environment" being created by the sheep industry.

Similar interspecific hybridization is common among many of our other native shrubs. Natural fertile hybrids have been found between scrub oak of northern Utah (*Quercus gambelli*) and live oak of southern Utah (*Quercus turbinella*); between shadscale (*Atriplex confertifolia*) and Castle Valley clover (*Atriplex cuneata*); between big sagebrush (*Artemisia tridentata*) and black sage (*Artemisia nova*); and as noted above, between the various species of *Cercocarpus*. From such hybrids come a host of new recombinations, many of which have already found environmental niches to which they are successfully adaptive. Many others can be expected from such a rich gene pool. Some of them will arise naturally, but with our current knowledge of genetics and plant breeding, we should be able to accelerate the process and obtain a host of new themes specifically adapted to particular habitats, much as we have already done with our domesticated pasture and garden plants.

POLYPLOIDY

III. New Species via polyploidy. [Illustrated by speciation in saltbush (*Atriplex*).]

The genus *Atriplex* is a remarkable genus that includes annuals, herbaceous perennials, and several shrubs. The plants are mostly confined to highly alkaline, heavy soils, probably more because competition is low in such places than because they particularly enjoy it.

Atriplex canescens (fourwing saltbush) is one of the more important shrubby species with a wide distribution throughout western North America from southern Alberta to central Mexico and from the Dakotas to the Pacific Ocean. It is a variable species but is generally about 2-3 feet high and about 3-4 feet in diameter. It usually grows on better drained and sandier soils than do other *Atriplex* species. It is typically dioecious although monoecious plants are not uncommon.

All in all, it is a bit surprising to find that this widespread, highly successful species is an *autotetraploid*. A few natural autotetraploid species have been described, but none are as widespread and successful as *A. canescens*. Just as remarkable is that such a successful autopolyploid derivative occurs in a dioecious species. Almost all other known polyploids have come from highly self-fertilized parentage.

Several lines of evidence prove that *A. canescens* is indeed an autotetraploid. First, at meiosis there is a high frequency of chromosomal multivalents, typical of and almost unique to autotetraploids. Furthermore, fourwing saltbush plants are low in pollen and seed fertility, also characteristic of autopolyploids. Probably the most definitive, as well as the most exciting, evidence is the discovery of a still existing relic diploid population. Although closely similar to its tetraploid derivative, the diploid differs in a few expected characteristics such as higher pollen and seed fertility and regular meiosis, and in several other

unexpected characteristics. It has much more plant to plant variation than is found within any population of the tetraploids.

The diploid population is confined to a tiny sand dune island in central Utah occupying only about 300 square miles. Most of the morphological characteristics that distinguish it from its tetraploid neighbors appear to make it uniquely adapted to the sand dune habitat (table I). Its growth rate is nearly double that of tetraploid plants. Mature plants are giants up to 12 feet tall and 15 to 20 feet in diameter. The diploids have larger fruits, larger leaves, and longer, although more slender stems. They have an unusual propensity for forming adventitious roots and shoots, which probably is of considerable value in habitats characterized by drifting sands.

Character	Diploid	Tetraploid
1. Stature	giant	normal
2. Seed germination	high	low
3. Growth rate of seedlings	high	low
4. Growth rate of new twigs	high	low
5. Distribution	restricted	wide
6. Polysomaty	common	rare
7. Root sprouting	common	rare
8. Time of flowering	late	early
9. Pollen fertility	higher	lower
10. Pollen size	dimorphic	one size
11. Sexuality	always bisexual	often unisexual
12. Meiotic chromosomes	bivalents only	multivalents
13. Fruit size	larger	smaller

Table I. Contrasting features of Diploid and Tetraploid *Atriplex canescens*.

The origin of tetraploid *A. canescens* from the strictly dioecious diploid parent is puzzling. Although tetraploid plants are often monoecious, diploids are strictly unisexual. Characteristically, dioecious plants and animals "never" give rise to polyploid derivatives. This is because, even though polyploid progeny are produced, as unisexuals they would need to be fertilized by sex cells from a diploid (the only source available) and their progeny would be completely sterile triploids. (This is the principal reason why polyploidy is so rare among animals.)

So, to find a tetraploid *Atriplex canescens* species derived from a strictly dioecious diploid parent is indeed unusual. Although an explanation has not yet been firmly established, a plausible one seems to be a possible disturbance of the sex-determining mechanisms upon polyploidization. If, for instance, sexuality in the diploid should be determined by X-Y chromosomes, as occurs in many other organisms, then XX = one sex and XY = the other sex. If one such XY plant should form polyploid tissue, it would then be XXYY. If such polyploid tissue grew into reproductive structures, they might, in some situations, be of the same sex that

was dictated by the XX in the diploid progenitors. Or, they might be of the other sex, which was determined by the 1:1 X-Y ratio in the diploid. Consequently, XXYY tetraploid tissue might form both male and female reproductive structures depending on subtle environmental variables during its development. In this circumstance, a monoecious tetraploid product derived from a strictly dioecious diploid progenitor would be able to self-fertilize, leaving fertile monoecious tetraploid off-spring and thus escaping the usual dead-end encountered by autotetraploids derived from strictly dioecious parents. Much credence is given this hypothesis by the common occurrence of monoecious plants among tetraploid populations. But regardless of whether or not this interpretation proves valid, the successful autotetraploid derivative is a reality. How many others have been formed or how many can yet be formed or how many *allopolyploids* have been and can even yet be formed from diploid *Atriplex* species are all exciting questions still awaiting answers.

Atriplex is an unusually rich genus. Nowhere else do so many species and varieties occur as right here in the Intermountain West. *Atriplex* thus is one of the most rapidly evolving groups in the world. Almost every valley contains unique ecotypes, some of which appear to be segregants from interspecific hybridization, while others seem to have accumulated unique batteries of adaptive mutations, and still others were probably derived as polyploid themes.

This dynamic panorama of rapidly evolving *Atriplex*, *Purshia* and *Cercocarpus* is merely illustrative of the extant evolution occurring in most of our native shrubs. The heterogeneous habitats of the Intermountain West provide maximum evolutionary opportunity. The rich gene pools constitute an extensive evolutionary potential. The unique half-tree-half-herb shrubby growth habit permits utilization of almost all evolutionary pathways. In combination these factors lead to evolutionary tempos of cataclysmic proportions. Given these circumstances, the explosive evolution we are witnessing among our native shrubs in the Intermountain West was virtually inevitable. With our current understanding of evolutionary processes and our present expertise in genetic manipulation, we should be able to extract and also concoct almost untold permutations to suit our future economic and esthetic needs.

Reprinted with permission from *Utah Science*, March, 1974.

Dr. Stutz, now retired, was Professor of Botany in the Department of Botany and Range Science, Brigham Young University, Provo, Utah. His genial manner and extensive knowledge have made his lectures and the Great Basin field trips he has led for UNPS great favorites.

Botanical drawings by Dave Gardner, UNPS Conservation Chair and Utah Wildflower Poster artist.

DYEING FOR SOME NATIVE COLOR

Frances Szeman, Albuquerque Chapter president [of the Native Plant Society of New Mexico], is a weaver and as such has an eye for color and an alchemist's soul. Dotting her backyard garden are gallon jars with liquids of various hues, soaking up the sun. The jars contain combinations of water, wool, mordant and plant parts--sun tea of another sort.

Colors have always fascinated man and he has tried to reproduce them in paint and dye. Much has been discovered by accident. Solar dyeing is an example of a process that works, but no one knows quite how. Dyeing is a time consuming process made more carefree using solar dyeing techniques. Time spent over the dyepot is reduced, while the color intensity seems to bloom in the sunlight.

Getting the colors you want is a fine balance between the components. Water and mordant can both affect the type of color you finally get. Rainwater is the preferred water source (the pH and mineral content can affect the color). Mordants are metallic salts and/or acids and alkalis; they include alum, chrome, tin, iron, acetic, tannic & tartanic acids, ammonia, blue vitriol (copper sulfate), caustic soda and lime. Mordanting agents are added to 'fix' the color. This is essential for the dye to take properly and remain permanent, sometimes enriching the color. For example, tin often 'brightens' while iron 'saddens' or darkens the hue. Different mordants can produce different colors from the same plant material: juniper needles produce an orange-gold with alum, but a dark gray-green with iron.

Many different plants can be used as dye plants. Both fresh and dried materials can be used, often producing very different colors. Often a plant seems to have no worthwhile value, but the dyer discovers that it produces a particular hue. Such is the case of bindweed. In the dyepot, (probably the only place it won't take root), bindweed and various mordants produce shades of chartreuse, gold, gray-green, green and yellow-green. A gardener's pest is a weaver's delight.

Cochineal, a traditional red dye, is produced by an insect parasite of the prickly pear cactus. In New Mexico, the Cochids which coat the pad resemble cotton and 'bleed' a deep magenta when crushed. They can be found on many *Opuntia* species, especially those having large soft surface areas, like *O. engelmannii* and *O. phaeacantha*.

Since varying the 'recipe' and temperature can cause considerable changes in color, it is advisable to dye enough fiber to complete a project in the same dye lot. However, this variation in shading between dye lots can be a plus, giving you a wide series of hues. This can add depth to textile projects not possible with commercially dyed fibers.

Collecting plants for dyeing requires the same care and consideration as for other projects. Never use a

rare plant, and always select a few plants from a large population. This insures that the surrounding habitat won't suffer as a result of your collecting.

Albuquerque is home to Las Aranas, a spinners and weavers guild. They publish an informative booklet entitled Dyeing with Natural Materials that gives general dyeing instructions, recipes, a list of useful books and a source list for non-native materials. The booklet is available for \$2.50 from Las Aranas, c/o Rose Holte, 2317 Ada Place, NE, Albuquerque, NM 87106.

Reprinted with permission from the Native Plant Society of New Mexico Newsletter, Vol VII, No. 4, July-August, 1982.



Opuntia phaeacantha

PUBLICATIONS

Vascular Plants of Northern Utah: an Identification Manual by Richard D. Shaw, with major contributions by Mary E. Barkworth and Sherel Goodrich. The desert and mountain landscape of northern Utah supports a great diversity of plant life. This volume identifies 1,935 indigenous, alien, and cultivated species found in the nine northern counties of Utah in an easy to use, illustrated format. Common names, recent synonymy, habitat, comments on poisonous plants, and flowering data are included, as well as an illustrated glossary and index. 1989. Utah State University Press, Logan, UT 84322-7800. \$27.95 plus \$2.00 postage and \$1.68 tax for Utah residents.

Medicinal Plants of North America by D. E. Moerman. 1986. Publications Office, Museum of Anthropology, University of Michigan, Ann Arbor, MI 48109. 2 vol. 960 pp. \$30.00.

Deserts on the March, 4th edition, by Paul B. Sears. Professor Sears, one of America's best known botanists, asks "Is the human race digging its own grave in North America?" He discusses the destruction of virgin prairie, the despoiling of natural waterways, the heing down of great forests, the indiscriminate killing of wildlife. "Man has become the sponsor of a biological experiment without known parallel in the history of the earth...He no longer accepts...the pattern in which he finds himself, but has destroyed that pattern and from the wreck is attempting to create a new one. That, of course, is cataclysmic revolution." 264 pp. \$20.00

Conservation Biology: An Evolutionary-Ecological Perspective, edited by Michael E. Soule and Bruce A. Wilcox. An anthology of important papers by leading researchers in four parts: Ecological Principles of Conservation, Consequences of Insularization, Captive Propagation and Conservation, and Exploitation and Preservation. 395 pp. \$26.50.

Conservation Biology: The Science of Scarcity and Diversity, edited by Michael E. Soule. In this follow-up, 25 chapters by leading experts cover Fitness & Viability of Populations, Patterns of Diversity and Rarity, The Effects of Fragmentation, Community Processes, Threats and Management of Sensitive Habitats and Systems, and Dealing with the Real World. 584 pp. \$30.50.

On the Brink of Extinction: Conserving the Diversity of Life by Edward C. Wolf. Worldwatch Institute (Paper #78). An excellent summary of biodiversity and conservation biology. 54 pp. \$4.00.

Floristic Inventory of Tropical Countries, edited by D.G. Campbell and H.D. Hammond. 1989. New York Botanical Garden, Bronx, NY 10458. 545 pp. \$90.00. (Includes regional reports on Central America and the Caribbean.)

Tropical Rainforests: Diversity and Conservation, Frank Almeda and Catherine M. Pringle, eds. Proceedings of a symposium at the California Academy of Sciences, Sept. 1985. Papers address tropical forest diversity, potential value of tropical biology, and important information to be learned from ethnobotanical studies. Publications Office, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118. \$30.00 plus \$2.25 postage.

Public Policies and the Misuse of Forest Resources, Robert Repetto and Malcolm Gillis, eds. Presents the findings of an international research team that studied the role of public policies in accelerating deforestation in ten countries: Brazil, China, Gabon, Ghana, Indonesia, Ivory Coast, Liberia, Malaysia, Philippines, and United States. 1987. Cambridge University Press.

Wildflowers: Nature Stories for Children by Gloria Keleher, illustrated by Sandra Buhrt. 1985. 40 pp. Hyperion Press, Winnipeg, Manitoba.

The Sego Lily is published nine times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Newsletters for 1989 will be published as follows: January/February, March, April, May, June, July, August, September/October, and November/December. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. 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. Copy deadline is the 20th of each month.

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As of May 31, 1989, Salt Lake City's Patagonia outlet at 3267 Highland Drive has been collecting items for recycling. They can accept glass (containers should be clean), aluminum (please flatten cans), newspapers, tin cans (please cut out the ends, place inside of can and flatten can), computer paper, cardboard, and plastic (household containers). The contractor who collects the items is Berry Winburn of Fiber Recovery in Salt Lake City. Patagonia's staff have been pleased with the excellent response to the recycling opportunity. All proceeds will be donated to environmental causes. If you have questions, please call (801) 466-2226.

The Center for Plant Conservation Survey reveals that 680 native U.S. plants may become extinct before the year 2000. A survey was made of 89 local and regional authorities on rare plants. The survey respondents identified 253 plant taxa that may become extinct within the next five years, and 427 additional taxa that may become extinct in 10 years. Nearly three-fourths of these occur in five states and territories--California, Florida, Hawaii, Puerto Rico, and Texas. With concerted activity focused on the plants in greatest danger, it is hoped that the otherwise rapidly accelerating rate of extinctions can be dramatically slowed, and perhaps halted altogether.

From NNNPS Newsletter, Vol. 15, No. 3.

Membership Application

☐ New Member ☐ Renewal ☐ Gift

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Check membership category desired:

- ☐ Student/Senior.....\$ 5.00
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(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. 12 No. 8

SEPT/OCT 1989

CALENDAR OF EVENTS

- Sept. 9**
Saturday
UNPS Native Plant Sale at Millcreek Gardens, 3500 So. 900 East. Native plants and seeds available from 9 am to 3 pm.
- Sept. 14**
Thursday
6:30-8:30 pm
UNPS Executive/ Board Meeting. Topics for discussion include nominations for 1990, reprinting of the Utah Wildflowers poster, the plant sale, and the upcoming state meeting. Call Pam at 581-5322 with additional agenda items. State Arboretum Board Room, Building 436, University of Utah.
- Sept. 28**
Thursday
7:30 pm
Salt Lake Chapter Meeting with Ben Franklin of The Nature Conservancy to introduce us to the Utah Natural Heritage Program. The Den, University of Utah Union Building.
- Oct. 5**
Thursday
6:30 pm
UNPS State Meeting at Sugarhouse Park, Southeast Bowery. Signs will be posted to guide you once you are in the SE corner of the Park. Price of admission is your "New World" contribution to an old fashioned New World Turkey Dinner. Bring a menu item prepared from foods on the New World Foods List (see List inside.) There will be a Taster's Choice prize for the best food "entry." Bob Kinney will bake turkeys in dutch ovens. Call Pam at 581-5322 with questions.
- Oct. 7**
Saturday
7:00 pm
Fourth Annual Archdruid Lecture will feature both the noted photographer Tom Till and Governor of Arizona Bruce Babbitt. The lecture will be held at East High School in the Bradford Bowman Auditorium. Tickets are \$5.00 in advance and \$6.00 at the door. A reception at the Unitarian Church, 569 South 1300 East will follow the lecture at 9:00 pm. Light refreshments will be served, cost is \$5.00. This is a benefit for the Utah Chapter of the Sierra Club.
- Oct. 26**
Thursday
Salt Lake Chapter Meeting with Alice Hreha on "Endemics of Red Canyon" near Bryce National Park. U of U Union Building, the Den. 7:30 pm.
- Through Oct. 31**
Wildflower Hotline (801) 581-4969. Receive current information on the best wildflower blooming displays reported from throughout the state. Call for a four-minute recorded message, updated weekly. Hear additional weekly wildflower information with Pam Poulson and Gene Pack on **KUER** public radio **FM 90.1** at 11:00, Friday mornings from April through October.
- Seasonal Bloom**
St. George Wildflower Hotline (801-628-1365). A 30 second message, updated every two days, is recorded by Bart Anderson of St. George on what's blooming where in southwestern Utah.

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 (*Lycopersicon* 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)

Prickly pear cactus (*Opuntia* spp.) - Throughout

Chili peppers (*Capsicum* spp.) - Central America

Red and green peppers (*Capsicum* spp.) - Central America

Cashew (*Anacardium occidentale*) - Tropical America

Tapioca (*Manihot* spp.) - South America

Guava (*Psidium* spp.) - South America

Avocado (*Persea americana*) - Tropical America
(A party without guacamole?)

Tequila (*Agave* spp.) - Central America

Mescal(ine) (*Agave* spp.) - Central America
(Don't you dare!)

Sarsaparilla (*Smilax* spp.) - Central America

Sassafras (*Sassafras* spp.) - North American
(Native American beer)

Blackberry/Dewberry (*Rubus* spp.) - North America

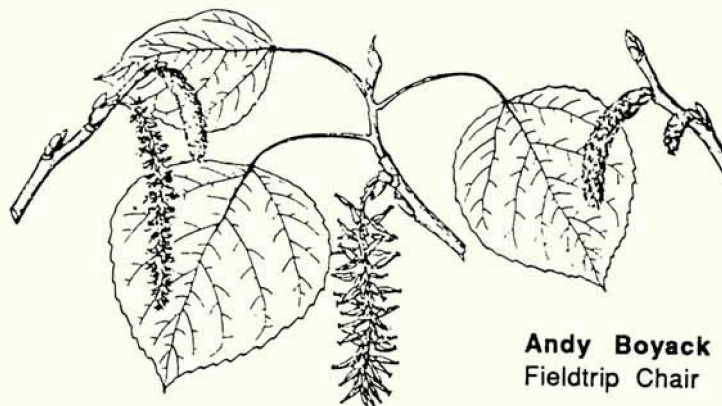
Blueberry/Huckleberry (*Vaccinium* spp.) - North America

Chokecherry (*Prunus virginiana*) - North America

Turkeys roasted in dutch ovens will be on hand for the carnivores among us.

Salt Lake Chapter Fieldtrip

MT. NEBO ASPENS



Andy Boyack
Fieldtrip Chair

Twenty years ago Vard Jones found an aspen tree that measured 11 feet, 9 1/2 inches in circumference located two miles off the Mt. Nebo Loop road. On July 29, 1989, he and Maxine Martz led a UNPS expedition to rediscover this huge aspen tree. This was not the first big tree Vard had found. He was with Dr. Cottam in rediscovering one of the largest junipers known, a tree 19 feet, 4 inches in circumference in Bown Canyon in the Lake Powell area. Last spring Vard again found the juniper, still living.

After some search the UNPS expedition found the aspen grove. A number of trees more than 9 feet in circumference were found, and one dead tree measured nearly the circumference Vard remember. He was not sure, however, that it was the tree he had found twenty years ago.

The aspen grove was quite extensive. The shaded understory was lush with False Solomon Seal (*Smilacena racemosa*), Starry Solomon Seal (*Smilacena stellata*), Cow Parsnip (*Heracleum lanatum*), and Gooseberry Currant (*Ribes montigenum*). In nearby meadows Western Larkspur (*Delphinium occidentale*), Orange Sneezeweed (*Helenium hoopesii*) and an unidentified ASTERACEAE were found. Interspersed through the aspen grove were isolated White Fir (*Abies concolor*) and Blue Spruce (*Picea pungens*).

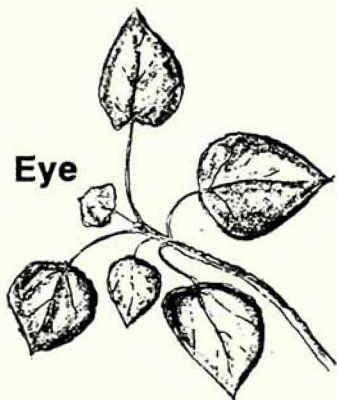
The size and age of the trees in this aspen forest made us wonder if this was perhaps a climax community of aspen. Botanists tell us that aspen represent a stage in the evolution of a forest. Often they are among the first trees to populate a forest area denuded by forest fire, insect kill, slides, logging or other causes. Eventually the aspens are replaced with other trees. On a north-facing slope such as this one at this elevation, they would probably be fir and spruce which might form a climax community. It would be interesting to guess at the evolution of this particular aspen community.

For the many members who were disappointed in not being able to make it to this fieldtrip, the Society is considering repeating the same trip next year. And Vard Jones has agreed to lead it.

ASPEN : More than Meets the Eye

Pam Poulson

Assistant to the Director
State Arboretum of Utah



Autumn gold kindles amid the bluegreen conifers. The ubiquitous Quaking Aspen (*Populus tremuloides*) presents us with a spectacle of blazing color as it prepares for the cold months ahead. Throughout the growing season, the trembling leaves have served as food factories, absorbing sunlight energy, converting carbon dioxide and water into carbohydrates--photosynthesizing. With the lengthening and cooling of nights, photosynthesis slows down and stops. The green pigment chlorophyll breaks down and dissipates, revealing the yellow pigment carotene. The extravaganza of color begins.

Quaking Aspen, or Quakies, comprise the most widespread forest type in North America. Preferring moister, cooler sites, they range from the Atlantic to the Pacific across Canada and into the western United States mountain ranges above 6,000 feet. Utah boasts over one million aspen forest acres.

No other tree can be confused with aspen, even from a distance. Straight white trunks grow tall, tapering to a height of 30-40 feet and a diameter of 8-15 inches (DBH). At the southern end of the Skyline Drive above Mayfield Canyon, a bold grove of aspen giants with trunk diameters averaging greater than 4 feet stand as sentinel to Moosene Peak. Perhaps the greatest Utah collection of exceptionally tall aspen grows on the LaSal Mountains near Moab, where heights average 70-80 feet.

White aspen bark is smooth, breaking into rough black ridges and furrows with age. Dark calloused patches reinforce support of the slender, alternating and scattered branches. Black, wart-like scars or "eyes" mark the site of lost branches. Blackened marks of claw, teeth and antler indicate the presence of porcupine, beaver, elk, moose and even bear.

Beautiful as a contrast to the dark unmoving conifers, aspen, green or gold, can be recognized from a distance by the fluttering "twinkle" of the two-toned leaves--dark and lustrous above, light and dull beneath. Early French fur trappers attributed the trembling leaves to a superstition that aspen furnished the wood for the cross of Jesus of Nazareth. Since then the aspen trembles in shame. The true explanation for the trembling is purely physical. The broad, heart-shaped leaves are hinged to perpendicularly flattened leafstalks longer than the blade. The connection acts as a pivot. The foliage trembles at the slightest breeze. Aspen can be distinguished by sound alone, in the soft rustle of trembling leaves.

The leaves are thin and translucent. Sunlight

beneath aspen in spring and summer is cool green. Autumn gold filters a warm glow.

Aspen reproduce in nature almost exclusively by root-sprouting suckers. The seeds are dispersed in windblown puffs of cotton in early spring and are short lived. The seeds have precise moisture requirements and must germinate with 48 hours of lodgement or die. One theory suggests that climatic conditions have not been generally favorable for aspen seed germination for over 10,000 years.

Because of suckering, aspen do not grow as individual trees. They occur as groves that range from a few clumped stems to many thousands of stems covering a hundred acres or more. Trees in a particular grove are usually similarly aged and are joined together by a common root system, in what is referred to as a clone. Each new stem, reproduced rapidly by root sprouts, is called a ramet. Ramets are fast growing and short lived, dying from old age between 100 and 200 years, while the root system lives on.

An interconnected root system has advantages. Aspen are susceptible to forest fire, but even when trees above ground are killed by crown fires, the root system will soon regenerate by suckers. Aspen thrive in the intense sunlight of a tract cleared by fire or logging. It is obvious why aspen are sometimes called Pioneer or Phoenix trees, rising vigorously from the ashes within two years. Years later, aspen populations still mark sites of historic forest fires.

Aspen form a major link in the chain of forest succession. They provide a canopy over nurseries of fir and spruce, which eventually grow taller than the aspen nursemaids, shading them out and becoming the climax forest type. Observation of a mountain landscape over 1000 years would show a cycle of aspen groves moving from site to site, replacing burned conifers, nurturing them, and in turn, being overgrown and overwhelmed by them.

Ramets in any clone are genetically identical--in essence, one plant. This is seen on a hillside expanse of aspen. Watch for striking "patchwork" groves. In spring, trees close together will flower or leaf simultaneously. In autumn, connected trees will turn from green to gold at the same time and even display the same hue of yellow. Resistance to diseases and insects is also directly passed to the ramet. Unfortunately, this means susceptibility is passed on as well.

Aspen hold their niche in the animal world, serving as food and lodging for many. Buds and bark are eaten by snowshoe hare, cottontail rabbit, porcupine, moose, black bear, mule deer and grouse. Shoots and sprouts are grazed by sheep, cattle, mule deer and elk. Because of the tender palatability of aspen shoots, areas open to heavy grazing are slow to produce mature aspen. Crooks in the branches serve as nesting sites for warblers, hummingbirds, robins, house wrens, peewees, juncos and thrushes. Dead snags are drilled by Downy woodpeckers and flickers.

The most efficient user of aspen is the beaver. Buds and inner bark are favorite foods and a beaver will store a winter supply in aspen log lodges or anchored to the bottom of the pond near his aspen log dam. To the mountain man trapper, aspen was a sure sign of beaver territory.

Native Americans used the aspen for medicinal purposes and burned the non-smoking wood while in enemy territory, but the characteristics of aspen wood make it a little-used wood by modern man. It is soft and brittle, and light in color, except the heartwood which is light brown and decays easily. Although aspen wood is lightweight and shrinks little when dried, it is prone to warp and twist. Its wood fibers are short and aspen board splints when nailed. The two most common uses for aspen today are for high grade excelsior (shredded packing material), and as a supplemental fiber to spruce pulp in the manufacture of middle grade paper. Other reported uses include aspen logs as mine props, pioneer furniture and household utensils, fence posts, shake shingles, door sashes, veneer paneling and log cabins.

Aspen cut in the spring and allowed to age for six months makes fair firewood. It burns quickly, but is not hot and is best burned when mixed with other wood.

The inner bark of aspen contains salicin, an ingredient in an aspirin-like compound called salicylic acid. Even though early man used and prescribed aspen bark for the treatment of fevers, as an ingredient in tonics, to promote sweating and to act as a diuretic, salicylic acid was not isolated until just 170 years ago.

Aspen as landscape trees are growing in popularity. In the past, only trees collected in the wild were available. Weakened by transplanting, these aspen were most susceptible to disease and usually tended to stunt, remaining more an aspen bush than the desired tall, slender tree. For thirteen years a Utah firm, Native Plants, Inc., has been cultivating aspen from seed and by tissue culture. A parent tree for cloning was selected from the Kaibab Plateau of northern Arizona for its very white bark and graceful shape.

Aspen grown from seed or tissue culture have the health advantage of having a well developed and complete root system, up to five times greater than a collected "root chopped" tree. Seedlings are vigorous, will grow tall and can increase in height as much as six feet in one year. The vital characteristic of suckering, so important in a natural Aspen grove, can be a detriment in a well manicured garden. Aspen are best planted where suckering will not cause problems.

Quaking Aspen is a special tree. Its unique white trunks and fluttering leaves fascinate and delight. Its autumn splashes of gold among the conifer blues and greens inspire sight-seers, poets, artists and photographers. The ageless beauty of aspen, and its niche in the environment, make it an enduring symbol of the West.

Reprinted with permission from The Cultivator, State Arboretum of Utah, Fall, 1984.

Aspen Art by "Mountain Picassos," the Basques

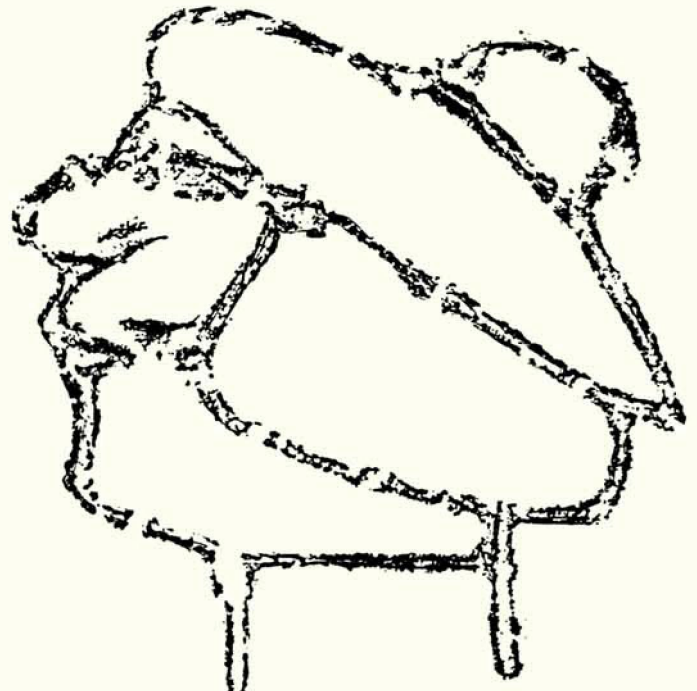
Margaret Barthel

Northern Nevada Native Plant Society

A meeting of NNNPS focused on an unusual feature of aspens: the carvings done by Basque sheepherders to pass the time during the summer months. Jean Earl gave a very interesting presentation using slides, photographs, and rubbings taken from the carvings themselves to show us the amazing variety and artistry of the Basque aspen art. These carvings have been done over the past century and constitute a living record of the Basque experience in the American West.

According to Mrs. Earl, "The Basques are a people of obscure European origins whose homeland lies in the rugged Pyrenees or northern Spain and southern France, and have a long and varied history in America, but are best known for their association with the sheep industry. Those who took up sheepling worked with other herders on winter ranges, but summer brought almost complete physical and social isolation as the flocks were trailed to the high meadows. To assuage their boredom, many herders wove horse hair ornaments, whittled, read or puttered around the camp, but others took to carving. Once carved upon, the exposed sapwood forms a black scar tissue which makes the carving a permanent feature of the living tree and makes it possible to raise an image without harming the tree itself.

"The shepherd usually chose a campsite under large aspens near a high meadow where there was plenty of water. While he would only stay in one camp as long as the forage lasted, he would come back to the same campsite year after year. 1932 and 1933 were banner years for carvings in the Sierra. The carvings fall into several thematic categories: anthropomorphic forms, usually large nude females or males and females



in erotic positions, zoomorphic forms such as animals, fish or birds, and geometric forms, six-pointed stars, crosses, swastikas, etc. The trees only live from 60 - 80 years. Many of them are decaying and dying and with them will go the original carvings.

Mrs. Earl showed photographs of some trees from which she and her family had taken rubbings and which have rotted and fallen. Mrs. Earl pointed out that "Improving economic conditions in the Basque homeland and increasingly restrictive American immigration policies have almost put an end to Basque immigration. The rise of synthetic fabrics has significantly lessened the demand for wool and the grazing policies of the United States Forest Service severely restrict herding activities, thus bringing an end to the carving tradition."

The Earls are to be commended for their efforts to preserve Basque aspen art. They offer a portfolio of reproductions of some of their rubbings. For more information, write to Earl Enterprises, PO Box 13994, Reno, NV 89507.

Reprinted with permission from Northern Nevada Native Plant Society Newsletter, Vol. 8, No. 2, March 1982.

SCROUNGERS NOTEBOOK

Pat Packard
Idaho Native Plant Society



QUAKING ASPEN. *Populus Tremuloides* Michx.

The cambium of aspen has been used as famine food and is regarded as an antiscorbutic; it may be eaten raw or cooked. The bark contains an aspirin like molecule and was used by Indians and settlers to treat intermittent fevers. During the winter it would require the bark from about 17 feet of aspen branches 1 inch in diameter to equal two aspirin. A tea of the boiled bark was used widely for venereal disease.

In fall this species makes up about 5% of the Owyhee mule deer diet, increasing to 20 percent in November. Its main value in the diet is apparently its crude fat content which goes up to 15% when the leaves fall--higher than any other plant eaten at this season. Calcium content is high in October and November, being exceeded only by that of current (*Ribes*).

Calcium/phosphate ratio is about 14:1 which is high enough to interfere with assimilation of phosphate if the ratio of the total diet weren't narrowed by consumption of other plants.

Shoshone names were sing-gah-ve or sung-up.

Reprinted with permission from Sage Notes, the Idaho Native Plant Society Newsletter, Vol. 11, No. 4, July/August 1988.

PROBLEMS IN ASPEN

Duane Hatch and Larry Sagers
USU Extension Horticulturists

Aspen are subject to many different problems. The four most common are:

Twig galls. These small marble sized galls are caused by a fly. We recommend you watch the galls that are there and spray when you see new holes appear in them. That means the maggot has left the gall and will soon repeat the cycle. Spray with dursban. This insect does mostly cosmetic damage.

Aspen borers. There are over 30 different boring insects that affect aspens including wasps, moths and beetles. Holes in the tree will be from 1/16 to 1/2 inch in diameter. Because preventive sprays to control all of these are not possible, you should treat the holes when you see them with ethylene dichloride (Fertilome Borer Killer or Dexol Boresol). These insects often kill the trees.

Aspen leaf spot. This fungal disease causes dark brown or black spots to appear on the leaves in mid summer. These spots enlarge until the entire leaf may be blackened. Control the disease by raking and disposing of affected leaves and keeping sprinklers from hitting the trees. Spray at bud break with benomyl, daconil or copper. Repeat sprays every two weeks as long as rains persist. Control is not possible after leaves turn black.

Cankers. These are fungal diseases which cause dead bark and stems and often bleeding. Aspens are susceptible to many cankers. Preventive measures (as outlined below) will reduce stress which will help trees survive. A healthy, well cared for tree will have far fewer problems than damaged, stressed trees.

ASPEN CARE POINTERS

Tree damage and injury is often the direct or indirect result of human activity. The most common causes are:

Building and landscape construction. Be careful to avoid physical damage to roots. Adding too much fill dirt may deprive roots or needed oxygen.

Soil compaction. Compacted soil from foot traffic, animals, or vehicles reduces water penetration and eliminates small air pockets needed for healthy roots. Avoid heavy clay soils.

Air pollution. Aspen is relatively sensitive to common air pollutants. This is a problem near major traffic corridors.

Lawn and garden equipment misuse. Grass should not be planted directly against the tree trunk. A circle of soil around the base will reduce the risk of wounding. "Lawn-moweritis" and "weed eater blight" can be especially harmful! Keep all equipment away from the tree trunk.

Lawn and garden chemical misuse. In the quest for weed-free lawns, trees often suffer the consequences. Herbicide drift or uptake via roots will often kill a tree. Avoid using weed killers within the tree's drip-line. Follow label recommendations precisely and avoid spraying on hot, windy days. Aspen sprouts which are a problem in the lawn should be treated by mowing or digging as spraying sprouts could harm the parent tree.

Misuse of de-icing chemicals (salt). Avoid or minimize use of salt around your trees. Dry, reddish-brown, brittle leaf edges may indicate salt injury.

Wounding. People can wound the roots, trunk and limbs of trees. Remove torn and dead bark tissues. Shape the wound into a vertical oval so that maximum tree healing can occur. Avoid the temptation to carve on aspen bark!

Improper pruning. Improper pruning can often lead to tree decay and disease and is best done when trees are dormant. Remove injured and diseased branches promptly. Limbs should be pruned close but not flush to the trunk or connecting branch. Do not apply wound dressings.

Improper planting. It is best to see a professional for specific advice. First, be sure aspen is an appropriate tree for the site. Heavy human activity and aspen do not go together. Ornamental aspen plantings often suffer from problems harbored in nearby wild aspen stands.

Remember aspen are sensitive to many pest control products. Additional information is available by requesting our fact sheet on Aspen. Enclose 10 cents plus a stamped, self addressed envelope and send to Cooperative Extension Service, Utah State University, Salt Lake County Office, 2001 S. State St. #S 1200, Salt Lake City, UT 84190-3350.

Reprinted from Gardener's Grapevine, April, 1989. This newsletter is available free upon request from the above address. Phone (801) 468-3170.

REQUEST FOR HELP 2

Environmental Impact Statement for a Program of Vegetation Management

U.S. Forest Service

The Intermountain Region of the Forest Service is revising its program to manage the growth of certain trees, brush and grasses on the National Forests. A Vegetation Management Environmental Impact Statement (EIS) is being written to establish new policies.

This is the second Request for Help. In January 1989, the Intermountain Region issued its first request. Information was sent to more than 3,000 people, 263 of whom responded with comments. Their concerns are summarized in this document. We welcome participation from anyone who would still like to become involved. We anticipate releasing our final EIS early in 1991.

Vegetation can be managed by a variety of methods, including controlled fire, herbicides, mechanical or manual labor, biological controls or a combination of these methods. Any type of management has some effect on the surrounding environment. We are trying to formulate a vegetation management program that can be used to control vegetation in specific situations while remaining sensitive to the environment.

Some examples of unwanted and unproductive plants in achieving specific objectives in Forest Services Resources management are:

Plants that compete with forage for deer, elk and other wildlife species. The objective is to replace plants and mature trees with fresh growth of forage species. The primary unwanted species are:

1. **Overly-mature or dead aspen stands.** The subsequent sprouts after removing the old and dead trees make excellent browse and cover

2. **Heavy conifer stands** that are crowding out aspen

3. **Mature juniper forests**, which provide little forage and reduce undergrowth

4. **Mature willow stands**, because new growth is better moose forage and it reduces moose competition with other species.

Plants that are hazardous to human or vehicle travel, either on trails, at recreation facilities or roads adjacent to them



Plants that reduce the desirable grasses and forbs for cattle and wildlife may also reduce the watershed capabilities. Unwanted vegetation may include high densities of sagebrush, rabbitbrush, pinyon and juniper trees, mules ear, tarweed and cheatgrass. These plants compete for soil nutrients, water, sunlight and space and often leave the watershed open to soil erosion.

Grasses and brush that prevent the re-establishment of tree seedlings where timber has been harvested.

In our Request for Help we stated that noxious weeds would not be covered in this EIS. Noxious weeds have been covered under a previous EIS which was approved in December of 1986 by Regional Forester Stan Tixier.

Currently, no Intermountain Region program deals with this variety of control practices. The Vegetation Management program will fill that void. An EIS must be written to consider the effects of vegetation control on the environment. This second Request for Help is a continuing part of the public involvement process.

THE ISSUES

From the response we received the following issues have been developed. We will continue accepting public input and additional issues may be identified.

I. Environmental Issues.

A. Should the forest environment be left alone without the influence of vegetation management?

B. Is the Forest Service view of vegetation management primarily directed to support commodity uses?

C. What are the effects on water quality?

D. What are the effects on soils?

E. What are the effects on air quality?

F. What are the effects on vegetation, e.g. protection of endangered and sensitive plant species and protection of old growth?

G. What are the effects on wildlife and fisheries?

H. What are the effects on recreation and Wilderness?

I. What are the effects on scientific and cultural values?

J. Will management activities result in the loss of biodiversity?

K. What are the cumulative and long-term effects?

II. Human Health and Safety Issues

A. What are the health and safety risks associated with vegetation management?

III. Social and Economic Issues

A. Will the vegetation management program be economically beneficial and productive to local communities and users?

B. What are the real costs of vegetation management?

IV. Program Development Issues

A. Can we adequately define and identify unwanted and unproductive (competing) vegetation?

B. Can we effectively bring diverse opinions and values into the vegetation management program?

C. Can we provide the on-the-ground manager with sufficient flexibility and authority to make appropriate vegetation management decisions?

D. How do we adequately coordinate vegetation management activities with other federal, state and local agencies?

E. Are we doing sufficient research and monitoring to know the results of vegetation management activities?

F. Should transportation and utility corridors be handled separately?

G. How do we deal with fuel loading problems (excessive dead trees and brush which can be a fire hazard)?

H. How should we conduct the NEPA process (the process described in the National Environmental Policy Act)?

Editor's Note: If you wish to comment on any of these issues (and I hope you do), send your response to:

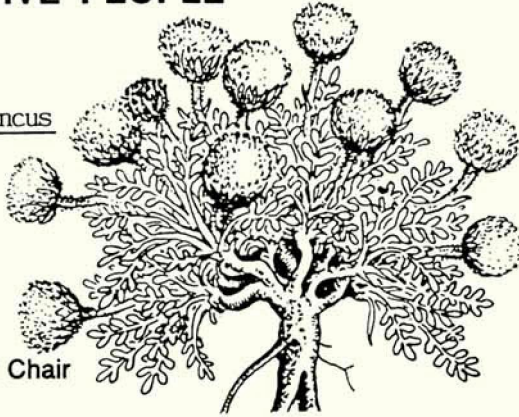
**Vegetation Management EIS Team
USDA Forest Service
324 25th Street
Ogden, Utah 84401**

I would like to call your attention to the probability that the giant, old growth aspen referred to in several articles in this issue could be drastically impacted by this management program. Let the Forest Service know how you feel about it.



SENSITIVE PLANTS NEED SENSITIVE PEOPLE

Erigeron mancus



Dave Gardner
UNPS Conservation Chair

Due to the efforts of the Forest Service to bring protection to rare species, it is imperative that forest managers at local levels feel there is a constituency for such action.

In order to give you a basis for responding to this need, we have been featuring in this column lists of sensitive plant species on National Forests in Utah. In this issue we are reviewing the Manti-LaSal National Forest.

SENSITIVE PLANT SPECIES Manti-LaSal National Forest

Asclepias cutleri--Cutler milkweed, Mb, Mo
Astragalus desereticus--Desert milkvetch, S
Astragalus iselyi--Isley milkvetch, Mb
Astragalus montii--Heliotrope milkvetch, F
 (officially listed as Threatened and Endangered)
Astragalus monumentalis--Monument milkvetch, Mo
Carex scirpoidea var. *curatorum*--F, P
Cryptantha creutzfeldii--Creutzfeld catseye, F
Cryptantha jonesiana--Jones catseye, F
Cymopterus beckii--Beck biscuitroot, Mb, Mo
Echinocereus triglochidiatus inermis--Spineless hedgehog cactus, Mb
Erigeron humilis--Mb
Erigeron kachiensis--Cave daisy, Mo
Erigeron mancus--LaSal daisy, Mb
Festuca dasyclada--Sedge fescue, F
Happlopappus zionis--Mb
Hedysarum occidentale var. *canone*--Canyon sweetvetch, F, S
Hymenoxys depressa--Low hymenoxys, F
Hymenoxys helenioides--Helenium hymenoxys, F, P
Lomatium latilobum--Broad-leaved biscuitroot, Mb, Mo
Lupinus crassus--Thick-leaved lupine, Mb
Penstemon tidestromii--Tidestrom beardtongue, S
Physalis lobata--Lobed groundcherry, Mb
Podistera eastwoodiae--Mb
Senecio dimorphophyllus var. *intermedius*--Intermediate groundsel, F, Mb
Silene petersonii--Plateau catchfly, F

Code for Ranger Districts: F=Ferron, Mb=Moab, Mo=Monticello, P=Price, S=Sanpete

Please take 10 minutes to write a letter stating your support for protection of rare plant species and their habitats. Indicate that rare species should be given priority over other forest uses. Ask that interim management guidelines be followed to protect TES species until species-specific management plans are established. Request that qualified personnel continue to watch for occurrences of unknown populations throughout the growing season in areas slated for development or changes in use.

The idea here is to stimulate and foster continued rapport with Forest Service personnel. Let them know of your interest and concern regarding rare plants, their habitats, and the preservation of biodiversity. Send copies of your letter to:

Manti-LaSal National Forest
599 West Price River Drive
Price, Utah 84501

Sanpete Ranger District
P.O. Box 692
Ephraim, Utah 84627

Ferron Ranger District
P.O. Box 310
Ferron, Utah 84523

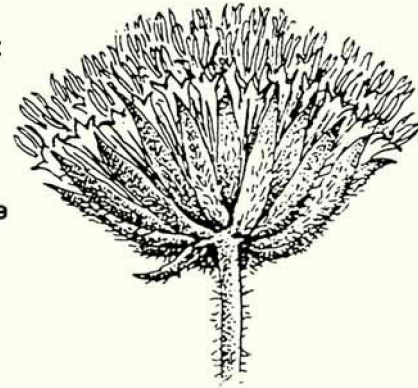
Price Ranger District
599 West Price River Drive
Price, Utah 84501

Moab Ranger District
125 W. 200 So.
Moab, Utah 84532

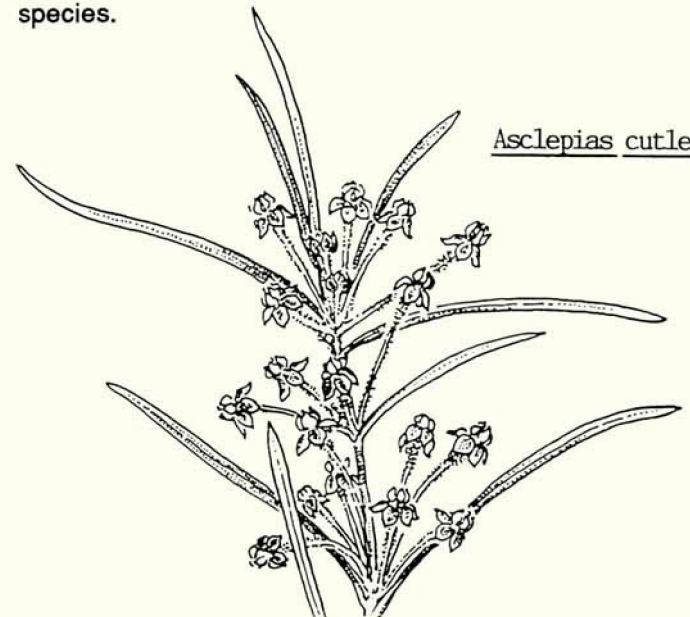
Monticello Ranger District
P.O. Box 820
Monticello, Utah 84535

If you are in the area, a personal visit to these offices to express your interest and concern would be an important contribution to the cause of sensitive species.

Erigeron mancus



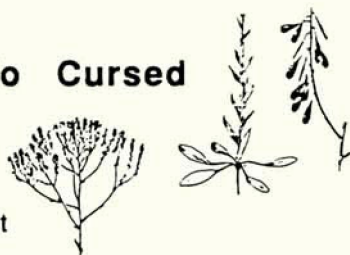
Asclepias cutleri



Have you noticed bright yellow blooms lining the freeway and filling the center median strip north from Salt Lake along the Wasatch Front? Chances are you were looking at Woad.

DYER'S WOAD: From Cultivated--To Cursed

William A. Varga
John O. Evans
USU Plant Science Department



Through no fault of its own, Dyer's woad (*Isatis tinctoria*) has fallen from grace with human beings. Well before the Christian era, the plant was valued as a medicinal herb. When the Romans invaded Britain, they were confronted by warriors painted with dye extracted from the Woad (or wad, as it was called in 13th century England) plant. In the 13th century, Woad was actually being cultivated in both Continental Europe and England as a source of blue dye.

Indigotine, a chemical which produces the blue coloration, is located in the leaves of Woad. The leaves were hand-picked, crushed, and kneaded into balls before drying. The dried leaves were stored until a need for dye making arose. They were then taken to couching houses where they were ground, piled, sprinkled with water, and allowed to ferment for approximately one month. During this time, an obnoxious odor issued from the pile, and in 16th century England, Queen Elizabeth forbade any Woad growing or processing to take place within five miles of any one of her residences.

Fermentation developed the insoluble indigotine, and the material could again be stored until further fermentation was induced to produce as much of the dye powder as was wanted. Cloth would be dipped in a solution made from the powder and hung to dry. As it dried, the cloth took on the blue coloration. Indigo from the Far East eventually replaced Woad, but Woad was still cultivated until 1930 in England.

In the United States, its cultivation was probably limited to Virginia in colonial times.

It is generally accepted that Woad is a native of southeastern Russia and that it spread throughout the eastern hemisphere in pre-historic times. It occurs in the wild and under cultivation in China, western Tibet, and Afghanistan.

Woad tends to form a rosette in spring or fall. Early in the following spring and summer it appears as a conspicuous, yellow-flowering plant and in late summer its stalk is ornamented with black fruits.

Woad leaves are blue-green and slightly pubescent. They are of two types: upper leaves without petioles that clasp the stalk and lower leaves with petioles that do not. All leaves have a cream colored midrib from base to tip. The large, woody stalks are purplish-blue and topped by a compound panicle that has an umbrella-like shape. Approximately

twenty stalks begin to develop from each rosette in the spring, but usually seven or fewer mature.

The fruits of Woad are black silicles. They hang like ornaments from the umbrella-shaped branches and may hitch rides in hikers' pant cuffs, any other passing traffic, or the wind. The fruits are three-fourths inch long and one-fourth inch wide at their widest part.

The large, fleshy taproots of Woad plants may exceed five feet in depth in loose, gravelly soils. Asexual reproduction may occur from this underground root system. In Utah, Woad prefers loose, alkaline, bench soils. In England, it is often located in old lime pits and chalk quarries.

The weed scene

Now, although still doing only what it has always done, Dyer's Woad has entered the ranks of plants we call weeds. In Cache and Box Elder counties, it has even been tagged as noxious. And there are those rangeland experts (Evans and Young, at the University of Nevada/Reno) who warn of its remarkably aggressive ability to displace desirable forage plants.

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 northeastern California, southeastern Oregon, Montana, Wyoming, and Idaho. Montana ranchers call it Utah mustard. Idahoans tend to use less polite descriptive terminology (as we do when speaking of their yellow toadflax, butter and eggs plant, which is invading Utah).

Woad is a persistent weed, and its rosette is thought to inhibit the growth of other plants. Its related mustard plants are known to take up to twice as much nitrogen and phosphorous, four times as much potassium, and four times as much water as a well-developed oat plant. Dyer's Woad may be as or more destructive in competitive situations. In northern California's Scott Valley, Dyer's Woad has been replacing annual grasses which were thought to be the culmination of plant succession in the weed community. On the other hand, on exceptionally steep hillsides where few plants can be counted on for reliable anti-erosion action, total elimination of Woad may be ill-advised.

Young and Evans found a germination depressant in the fruits of Woad. The substance inhibits germination of other mustards and also, to some extent, that of other plants. In many cases, root elongation following germination was stunted in plants adjacent to Woad. The seeds within the fruits of Dyer's Woad contain no inhibitor, and the inhibitor can be removed from the fruits by leaching.

Reprinted from Utah Science, Sept. 1978.

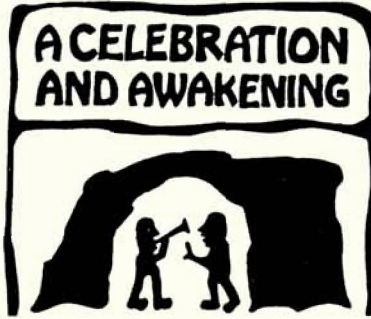
This article is the sixth in our ongoing series on ALIENS.

KEEPING THE DESERT:

Two

Approaches

Brooke Williams



By desert, I don't necessarily mean the Gobi or Sahara, although all deserts need keeping. I'm talking about the places here in the Southwest that are part of the reason many of us have made it our home: places that challenge us, dare us to see all dimensions; places that are testy and full of grit, where you can rarely lay down without a rock in your back; places that they keep telling you have no value to anyone important yet will make your eyes tired trying to take in the beauty of it all; places where the sun can be hot enough to burn a hole in your head and the wind cold enough to freeze your blood, in the same day; places where life and death and black and white are all separated by good, hard edges; places that make you shake and give you chills when you think about them; places where you swear God hangs out regularly.

Keeping the desert is the problem. Keeping it full of ticks and snakes and unexpected floods and rocks so red and raw that they bend the light and scare away anything civilized left in us. It's not only what we want, it's what we need.

For every person who loves the desert there is a different idea about how to keep it. Some work better than others.

Bruce Babbitt has one approach.

It's been said that some people are wired for change. Bruce Babbitt is one of those people. His approach to keeping the desert is not just a recent idea, it is a process he has been developing throughout his life. Babbitt started in the fields of Latin American and the workcamps of Peru. He went into the streets of Selma, Alabama during the civil rights movement. He joined the federal anti-poverty effort, then community action projects that included migrant worker programs, school desegregation, and the creation of a legal service program for Native Americans. He has always been able to recognize wrong and become part of the change towards right. After being elected Attorney General of Arizona he suddenly became governor in 1978, with the death of his predecessor, Governor Wesley Bolin. Babbitt was re-elected that same year and ended up serving until 1987 when he became a candidate for the Democratic presidential nomination.

The people of Arizona kept Babbitt as their governor for almost 10 years because they trusted his ability to differentiate what needed keeping from what didn't, and to make the necessary changes. While in

office he worked hard to protect Arizona wilderness and wildlife through creative land trades and a reformation of the state land department which more than doubled the deeded land in the state parks system. He systematically closed down two copper smelters which were major contributors to the acid rain problem in Arizona. He spoke out early against the Sagebrush Rebels who were out to gain control of western lands owned by all of us. And he increased funding for all the environmental agencies. Babbitt's approach has been to take what he feels about change, what he knows about the west and the system, and steer the beast in a direction that will keep what we have real and the way we want it.

Tom Till has another approach.

Tom is a smallish man who doesn't talk much, as if he knows his eyes will work better if he doesn't use his mouth. He smiles wider than any one I know. But wouldn't you, if you'd seen what he has, been where he's been? Personally, his pictures make me do things I don't have time for. Every summer, about the time I begin to wonder what I am going to do if the morning glory decides to come inside, I see a new Till photo of the desert and before I know it I'm making plans. It's as if the images sneak past the part of my brain where my responsibility lives and go directly to my bones, where I react. I start gathering gear and head off to the land where the rocks stand up straight and only the ravens know why.

I've been with Tom in the desert. One day, walking along a ledge on Cedar Mesa, five of us, Tom in his natty new ball cap with ears and silver hair sticking out, we come to a place where the ledge all but disappears. There is an Anasazi bridge that is too old to be trusted. One by one we inch ourselves along on a rock wide only enough for toes. It is a place where falling means dying. As Tom starts across, we all gasp.

"Oh no, Till is bringing his tripod!" He has to crawl, one hand wrapped around the tripod, the other holding his body on the skinny ledge. I don't remember the picture he took, but I am practically sure no other picture had ever been taken of that place. The risk was worth it. The world needed that picture just like it needs all of Tom Till's pictures. While many photographers are busy trying to take a prettier picture of a place they've seen a million times before, Till is off exploring, looking for the new place, the new picture. People who see them, like me, want to find those places. And each time that happens the desert has one more person behind it who can't stand to let anything happen to it. One more person who wants to keep the desert just the way it is.

Moab photographer Tom Till and former governor of Arizona Bruce Babbitt will be the Archdruids for the 4th Annual Archdruid Lecture on October 7. See Calendar of Events for details.

PUBLICATIONS

Rare Plants of Colorado by The Colorado Native Plant Society, a just-completed three-year project to produce this attractive and informative book. Eleanor von Bargen, president of CNPS says, "In recent years we have come to understand the importance of biological diversity--now we must realize that loss is diversity is not just a process occurring as the Amazon rain forest is cleared, but that a similar process is occurring right here at home." It is hoped that land managers, policy makers, and the general public will become aware of many treasures of nature often overlooked. The preservation of such beautiful rare plants should concern everyone.

Described here are 92 rare and endangered species. Only a few of these are listed for protection under the federal Endangered Species Act. Many have been identified by the Colorado Natural Areas program on a list of "Colorado Plant Species of Special Concern."

Species included are presented by natural habitats, i.e. the alpine tundra, barrens, cliffs and canyons, forests, grasslands, shrublands, wetlands, and woodlands. Each of the 8 chapters offers a general description of habitat with information included about geology, hydrology, plant communities, and history. An index includes both scientific and common names.

Each species description is accompanied either by a color photograph or a line drawing, as well as a Colorado county location map.

The volume's conclusion is cautionary if not pessimistic. The final two-page color photo is a breathtaking scene of a sunset over wetlands at the foot of the Sangre de Cristos. Its caption reads, "This rare plant habitat in the San Luis Valley no longer exists as pictured." A powerful message to all of us to stop habitat destruction. 75 p., pbk, \$7.95. Available through Rocky Mountain Nature Association, Rocky Mountain National Park, Estes Park, CO 80517.

Wild Plants of America: A Select Guide for the Naturalist and Traveler by Richard M. Smith. This book is an exploration of the incredible diversity of America's flora welcomed by everyone with an interest in nature. Travelers will find it an invaluable aid in planning trips to new areas, and it will be equally enjoyed by those engaging in field activity or indulging in armchair nostalgia. In each locale readers receive a wealth of non-technical information concerning wildflowers, trees, shrubs, vines, ferns, and other plants they may expect to find in their natural surroundings. Along with specific details, there are discussions of widely varied habitats, descriptions of unusual plants, and personal observations by the author. Precise directions are given for every trail, and all are accessible by car and easily negotiated on foot. Includes a comprehensive index, arrangement by geographical region, beautiful illustrations of 100

plants, and a directory of botanic gardens and arboreturns featuring native flora. John Wiley & Sons, 288 pages, pbk. \$12.95, cloth ed. \$22.95.

Wildflowers of the Southern Interior of British Columbia and Adjacent Parts of Washington, Idaho, and Montana by Joan Burbridge. This guide, covering a region from the Cascades in the west to the Alberta border in the east, and from the Trans-Canada Highway in the north to the 45th parallel in the south, is lavishly illustrated with 355 color photos. Flowers are listed by color for quick and accurate identification. Each page contains a photograph of a single plant, its scientific and common names, and detailed, but easy-to-read descriptions. A glossary is provided. University of British Columbia Press, 400 p., \$19.95 pbk, \$29.95 cloth ed.

New Members

UNPS welcomes new members:

Paul C. Fife, Salt Lake City
Bonnie Matthews, Park City
Vincent J. Tepedino, Logan
Graham Hunter, Logan
Susan M. Geer, Logan.



Recycle at Patagonia Outlet

As of May 31, 1989, Salt Lake City's Patagonia outlet at 3267 Highland Drive has been collecting items for recycling. They can accept glass (containers should be clean), aluminum (please flatten cans), newspapers, tin cans (please cut out the ends, place inside of can and flatten can), computer paper, cardboard, and plastic (household containers). The contractor who collects the items is Berry Winburn of Fiber Recovery in Salt Lake City. Patagonia's staff have been pleased with the excellent response to the recycling opportunity. All proceeds will be donated to environmental causes. If you have questions, please call (801) 466-2226.

The Taxonomist's Prayer

Donald Fisher

Our Linnaeus, who art in homonymy, available by thy name, thy kingdom taxonomic, thy will be done in accordance with the ICZN, on Earth as it is in synonymy. Give us this day our binomial bread, and forgive us our nomen nudums as we forgive those who misidentify us. Lead us not into invalidation but deliver us from syntypification, for thine is the Kingdom and the Phylum, and thy name be abbreviated forever. Amen.

UNPS Sego Lily
c/o Janet Williams
Utah Native Plant Society
P.O. Box 520041
Salt Lake City, Utah 84152-0041

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WILDERNESS- a precious heritage



UTAH'S CELEBRATION

"There are some who can live without wild things and some who cannot...Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question whether a still 'higher standard of living' is worth its cost in things natural, wild and free. For us of the minority, the opportunity to see geese is more important than television, and the chance to find a pasque-flower is a right as inalienable as free speech..."

Aldo Leopold

Membership Application

☐ New Member ☐ Renewal ☐ Gift

Name _____

Street _____

City/State _____

Zip _____ Phone _____

If Gift, from: _____

Check membership category desired:

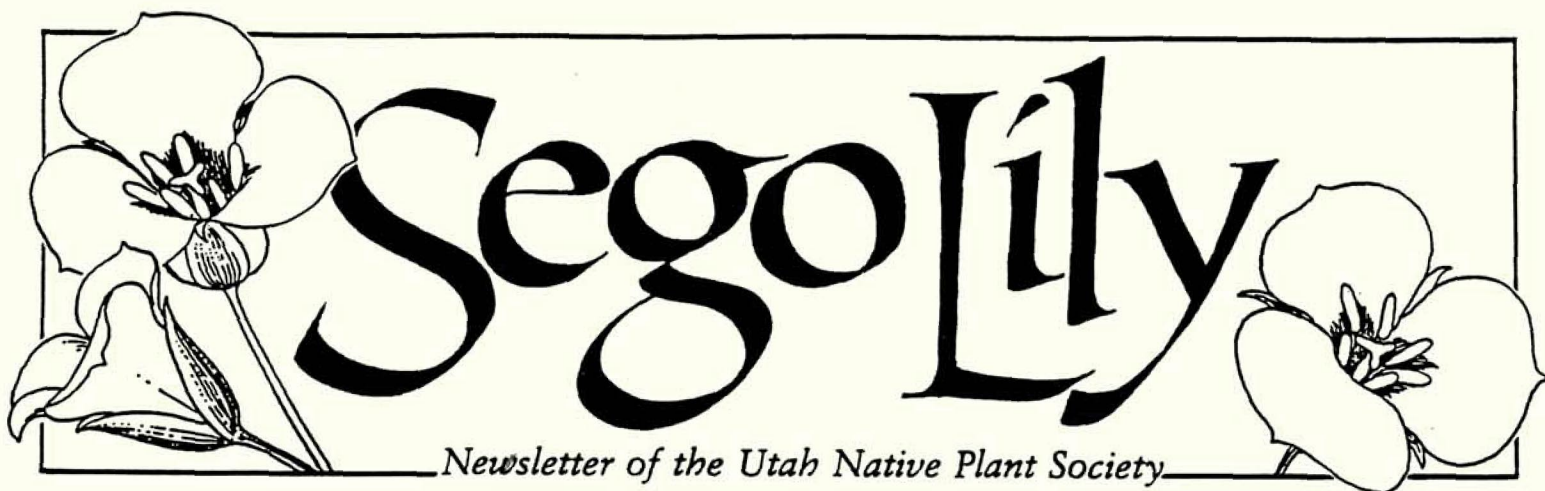
- ☐ Student/Senior\$ 5.00
- ☐ Individual\$ 10.00
- ☐ Family\$ 15.00
- ☐ Supporting\$ 30.00
- ☐ Corporate\$ 30.00 and up
- ☐ Life\$250.00

☐ 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:

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. 12 No. 9

NOV / DEC 1989

CALENDAR OF EVENTS

November 23
Thursday

Happy Thanksgiving! Many of the foods in your Thanksgiving feast are native plants.

November 27
Monday

Cache Chapter Meeting. Leila Shultz will inform the group about her most recent work. Election of new officers will be addressed.

November 30
Thursday
7:30 pm

Salt Lake Chapter Meeting. Annual UFO night. Bring your slides of "Unidentified Flowering Objects" for identification by our panel of experts, i.e., those present, and enjoy an evening of fun together. The Den, University of Utah Union Building.

December

Cache Chapter Christmas Social. To be announced.

December

Salt Lake Chapter. No meeting this month. Seasons greetings to all.

The Sego Lily is published nine times a year by the Utah Native Plant Society, Incorporated, as a non-profit organization under the laws of the State of Utah. Newsletters for 1989 have been published as follows: January/February, March, April, May, June, July, August, September/October, and November/December. Contributions to the newsletter are welcomed and should be sent to the editor, Janet Williams, 415 North Main, Salt Lake City, Utah 84103. 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. Copy deadline is the 20th of each month.

Membership in the Utah Native Plant Society includes The Sego Lily subscription. Please use the form provided in the newsletter for membership applications or change of address. c1989 Utah Native Plant Society. Members and non-members are invited to participate in the activities of the Utah Native Plant Society.

1989 Officers and Committee Chairs

Andrew Boyack, Chairman of Board	H 278-8596	Duane Atwood, Rare Plant Co-Chair	O 625-5599
Pam Poulson, State President	O 581-5322	Sherel Goodrich, Rare Plant Co-Chair	O 789-0323
Bill Wagner, Vice Pres./Pres. Elect	H 942-1295	Dave Gardner, Conservation Chair	H 649-3355
Kathy Anderson, Secretary	H 277-4652	Debie Noel, Education Chair	H 322-0114
Dave Wallace, Treasurer	H 466-2719	Jo Stolhand, Posters Chair	H 521-0069
Helen Burnett, SL Chapter Pres.	H 484-7998	Janet Williams, Newsletter Chair	H 364-4546
Swede Dahl, Logan Chapter	H 563-5269	Dave Okelberry, Horticulture Chair	H 968-6190
Ross Murdock, Logan Chapter	H 752-8517	Dick Page, Seed Chair	H 255-7769
Susan Crook, Logan Chapter	H 753-3257		

UNPS HOLDS STATE MEETING

Andy Boyack
Chairman, UNPS Board



The Society's annual State Meeting was held October 5th as a picnic/dutch-oven dinner in Sugar House Park. All the arrangements were made by President Pam Poulson. Despite the coolness of the evening, a good fire in the fireplace kept everyone warm. In accordance with tradition the theme of the picnic was New World food. Outstanding were two roast turkeys furnished by Bob Kinney. They were served piping hot from the dutch ovens in which they had been cooked. Bob is an outdoorsman who has received several awards for his dutch oven cooking. A wide variety of pot luck food complemented the roast turkey. There were pumpkin pies, cranberry and spice cakes, several corn dishes and salads, dutch oven string beans and bean casseroles, to name just a few of the dishes.

After dinner a business meeting was held and a slate of new officers were elected for the new year, 1990:

Pam Poulson	Chairman of the Board
Bill Wagner	State President
Jo Stolhand	State Vice-president
Andrew Boyack	Treasurer
Kathy Anderson	Salt Lake Chapter President

Committee Chairmen elected were:

Duane Atwood	Rare Plant Co-chair
Sherrel Goodrich	Rare Plant Co-chair
Dave Gardner	Conservation Chair
Dick Page	Seed Chair
Dave Okelberry	Fieldtrip Chair
Janet Williams	Newsletter Chair
R2D2*	Newsletter Committee

*The members voted to buy a Macintosh Plus computer system dubbed R2D2 to serve the newsletter editor.

Editor's Note: Many thanks!

CACHE CHAPTER HOLDS FIRST ANNUAL AWARD BANQUET

Susan Crook
Cache Executive Committee

The Cache Chapter of the UNPS held its first annual awards banquet Monday, October 23, at the historic Bluebird Cafe in Logan. Four of the eight awards went to supporters of the Edith Bowen School Native Plant Demonstration Garden that was initiated last spring with an Arbor Day "Plant-in."

The school's students, faculty, and staff were honored with a plaque giving special recognition to Prent Klag, Principal, for his enthusiastic endorsement of the project. Karen Matsumoto-Grah, Dissemination Specialist at the school, and the initiator of the Garden, was given a separate plaque thanking her for her untiring efforts to promote the concept and organize activities to plan, design, install, and maintain the garden.

Two USU Grounds Department staff, Ellen Newell and Craig R. Johnson, were honored for their commitment to maintaining the garden. They were awarded certificates of appreciation and wildflower posters to thank them for their work.

Next was an award of a \$20.00 gift certificate from White Pine Nursery and a certificate of thanks to Jim Morris for his use of natives in his home landscape, which he graciously opens to community groups. He also runs a small nursery business specializing in natives.

Leila Shultz was awarded a lifetime membership in the Utah Native Plant Society for her work in identifying, documenting, and teaching about the indigenous flora of the Intermountain Region.

The Cache Executive Committee recognized Wayne Padgett's leadership in the founding and continuing activity of the chapter with a certificate and Tom Till's beautiful book of Utah landscape photography. Swede Dahl surprised Susan Crook with presentation of a copy of Till's book as a token of appreciation for Susan's work on the Executive Committee during the past year.

Door prizes donated by the U.S. Forest Service, White Pine Nursery, and Anderson Seed and Feed were distributed following the awards presentation.

Among the guests at the banquet were Andy and Alice Boyack representing the state organization, and Allen Stokes from the Cache Audubon Society. Al also serves as chair of the Logan City Urban Forestry Board, and was welling with enthusiasm at the banquet, having just returned from an urban forestry conference in St. Louis.

The evening was capped off perfectly with music by folksinger Tom May, who accompanied himself on guitar and penny-whistle.

Cache Chapter

TAKING A STAND ON WATER ISSUES



The Cache UNPS has officially gone on record as opposed to unnecessary water development in northern Utah. The chapter has joined a coalition of environmental groups and clubs that presented arguments against further damming of the Bear River to the governor's Bear River Task Force on Monday, October 2, 1989.

We are also opposed to the formation of a Water

Conservancy District in Cache Valley because of its power to tax without representation, the prospect of over-development at public expense, and the lack of evidence supporting a need to further water development in Cache Valley at this time. We concur with these, and other arguments presented by the organization, People for Wise Water Planning.

EDITH BOWEN GARDEN STATUS

The Edith Bowen Native Plant Demonstration Garden was initiated last spring with a Plant-in on Arbor Day involving school children, faculty, UNPS members, U.S. Forest Service representatives, Logan City representatives, and interested community members.

Since that initial planting, further progress has been limited by delays in release of the irrigation system by the contractor who installed it as part of the Edith Bowen Media Center remodeling. This project was tied to the contract for the new Education Building still under construction west of Edith Bowen School. With the irrigation system unavailable, the plants installed on Arbor Day have been kept alive by hand watering with a hose by Craig Johnson of the USU Grounds Department. Weeding has been shared by Edith Bowen students, UNPS members, and Ellen Newell of the USU Grounds Department.

Even though the date of release of the irrigation system to the Grounds Department is still uncertain, planting is continuing this fall. Edith Bowen students under the direction of Karen Matsumoto-Grah, assisted by Leila Shultz and Wayne Padgett installed more plants in the garden on October 4th and 10th. Edith Bowen students will water the plants, with monitoring by the Grounds Department, until the irrigation system is released, or until the onset of winter, whichever comes first.

Cache Chapter

CALL FOR LEADERS



It has been a year since Susan Crook, Swede Dahl, and Ross Murdock took over the trowel of leadership of the Cache UNPS from Wayne Padgett. Our year has been rewarding, and hopefully, influential in keeping our chapter active and interested in community involvement. We encourage other chapter members to now step forward to fill the leadership positions, or to recommend others who should be considered for these roles. We recommend that the work of administering the Chapter be divided among more members. We suggest that these positions be staffed to spread the workload around: President, V.P., Treasurer, Sego Lily Correspondent, Publicity Chair, Fieldtrip Chair, Project Chair. Other suggestions are welcome. Staffing will be addressed at our November meeting.

Salt Lake Chapter Meeting

HERITAGE PROGRAM DESCRIBED TO SALT LAKE CHAPTER



Andy Boyack
Chairman, UNPS Board

The term "Heritage Program" has been mentioned frequently in our Chapter meetings but many of us may not have known precisely what it was. At our September meeting Ben Franklin of The Nature Conservancy gave us the best and most detailed description of the Heritage Program that we have heard. His talk outlined what the Program is, its purpose, history, operation and uses.

As Ben explained, the Heritage Program is a means for creating an information bank of rare species, both plant and animal, nation-wide, and eventually world-wide. He described it as a data base on the biological and ecological characteristics of species. However, as he described the operation, the Program is apparently not meant to be a study of species in the zoological or botanical sense, nor is it a taxonomic study. It would appear to be primarily a listing of rare species, specifically including geographical location and detailed habitat description together with the necessary organizational facilities to store information, to continuously update it and to make the information available.

The uniqueness of the Program is not in its listing of rare species. Various federal listings have been around for some time. It is in the mapping of rare species with pinpoint accuracy that it is unique, information which would be of particular importance for The Nature Conservancy in its conservation work, and the rating of species in terms of their global status and status in the state.

The Program was set up by the Nature Conservancy and consists, in the United States, of an organization in each state funded either by the Conservancy or preferably a state agency. The organization gathers information and records it on computer records. In Utah the Program is directed by The Nature Conservancy under contract from the State Department of Natural Resources and consists of three men, one a zoologist and two botanists.

The Program, which was only recently established in Utah, has concentrated its efforts on only the rarer plants and animals. Data on rare species discoveries is collected, either from existing records or from field studies, including accurate location and ecological information. Each discovery is then mapped, recorded on file cards, and computer-stored using a specially developed software. This stored information can be accessed and recovered in a wide variety of categories.

This categorization is probably one of the most useful features of the Program.

Any organization desiring particular information on native wildlife may obtain it from the Heritage Program. Various federal, state and local agencies could use this information for land management planning, as well as private organizations such as conservation and recreation groups, ranching and mining interests or private individuals.

Update from The Nature Conservancy

GOOD NEWS FOR UTAH'S RAREST WILDFLOWER

ANN RILLING



Clay Phacelia

This past May the Great Basin Field Office obtained an option to purchase one of Utah's rarest biological sites--a steep, shale hillside in Spanish Fork Canyon containing the only population of the clay phacelia, *Phacelia argillacea atwood*. The fragile site, currently threatened by domestic sheep grazing and deer foraging, contains only 20 adult plants and a number of younger rosettes which occur here and nowhere else in the world. The clay phacelia is federally listed as an endangered species and as a G1S1 by the Utah Heritage Program--the rarest and most threatened global and state ranking possible.

The Conservancy has been busy at the site since obtaining the option. A local volunteer caretaker has been found to monitor activity in the area. Grant G. Williams, of Spanish Fork, Utah, has a cabin near the clay phacelia property. From his hillside enclave, Grant

USDA BEE BIOLOGY AND SYSTEMATICS LAB



The endangered clay phacelia is pollinated by an equally rare bee, Hylaeus granulatus. The USDA Bee Biology and Systematics Lab in Logan, Utah reports that the first documented female bee was found at the clay phacelia site.

is not far from the site and will track livestock and wildlife activity. His keen interest is a tremendous asset to the survival and recovery of the clay phacelia. A formal mapping and plant surveying has been initiated by the Utah Heritage Program and plans are in place to erect a seven foot high deer and elk proof fence around the critical population.

With option in hand, the Great Basin Field Office has initiated a fundraising campaign to purchase the privately owned site. The campaign goal is \$50,000--a figure that includes purchasing, fencing and monitoring this unique preserve. The Conservancy has received commitments totaling \$19,000 thus far, with major commitments from the Dr. Ezekiel R. and Edna Wattis Dumke Foundation, the Goodhill Foundation and the U.S. Fish and Wildlife Service. Those wishing to contribute to this important project should contact the field office, P.O. Box 11485, Salt Lake City, UT 84147, phone (801) 531-0999.

LENDING A HAND TO THE AUTUMN BUTTERCUP



Since March, Great Basin Field Office staff member Nick Van Pelt and volunteers have spent many days at the 44-acre autumn buttercup preserve in southwestern Utah. A major cleanup of the property was necessary, including rebuilding the old boundary fence, removing miscellaneous debris and posting Conservancy preserve signs along property boundaries.

Conservancy stewards and U.S. Fish and Wildlife Service scientists are now working on recovery of the autumn buttercup, *Ranunculus acriflorus* var. *aestivalis*, which was officially listed as an endangered species in July. The small but thriving wildflower population will be mapped and monitored regularly. This fall, the Conservancy will commission a "biological profile for management" to guide expansion of the buttercup population onto suitable new habitats within the preserve and elsewhere in the upper Sevier River Valley. Information will also be gathered on the threatened Utah prairie dog, *Cynomys parvidens*, which occupies a small, self-sufficient colony on the autumn buttercup preserve.

The Conservancy welcomes the new volunteer preserve caretakers, George and Linda Chappell of Redmond, Utah. They also thank H&R Building Supply in Panguitch, the Utah Division of Wildlife Resources, Mary Ann Wright and the U.S. Fish and Wildlife Service's Salt Lake City staff for assistance and cooperation.

Reprinted from The Nature Conservancy Great Basin Newsletter, Fall 1989.

ON SAVING FLORA AND FAUNA

J. Stan Rowe

Department of Crop Science & Plant Ecology
University of Saskatchewan
Saskatoon, Canada



Marshall McLuhan is credited with the insight that environment tends to be invisible until transcended in time or in space. "We don't know who discovered water," he said, "but we're pretty sure it wasn't a fish."

Humans discovered their environment with the first outer-space photos that revealed the Ecosphere as a blue cloud-swathed globe in whose watery skin a marvelous variety of protoplasmic bits and pieces are enclosed and sustained. Suddenly we were given a new perspective, seeing ourselves as self-conscious deep-air animals, a dependent and integral part of it all.

Suppose that this vision, this reality, had preceded the development of today's science. Suppose we had been given the outside perspective to see the Earth Whole before, immersed in it and feeling around like the blind men, we had decided what was real, what was important.

ECOSPHERE

Had we been granted such transcendent insight we would undoubtedly have recognized the Ecosphere, the home-sphere, as the unitary thing to be valued above all else. Only then would we have studied and analyzed it, dissecting it into its components--atmosphere, water bodies, continental platforms, plants and animals in their communities and as individuals--in order to better understand its miraculous functional integrity.

Unfortunately, being submerged in it we were unaware of the whole. So we took the parts to be autonomous entities, things-in-themselves, starting with humans and working out from there, identifying as most important the objects with properties similar to our own; animals, and plants.

Later it was forced on our attention that various peripheral odds and ends were somehow important too: the aerial climate, soils, sediments, salt water, fresh water, surface and subsurface geological rocks, ores,

strata. These we called "raw materials" and "resources" when we perceived immediate human uses for them, while to those dimly perceived to be indispensable we gave the vague name "environment", meaning that which surrounds objects of greater importance: namely, organic things like us.

The view from outside came too late. The unsensed Ecosphere had already been dissected from the inside out. Philosophers and theologians with tunnel-vision had pronounced their final Truths about its parts. Disciplines had been defined and disciplinary knowledge set in cement. Universities and governments were departmentalized to deal with the fragments, their adherents assured of certain certainties. In millions of books and learned treatises the components of the ecosphere were confirmed by the savants to be self-standing entities.

"The proper study of mankind is man," we have been taught. "Soils are natural bodies at the surface of the earth." "Rare and endangered plants and animals can be saved." All part-truths and all misleading.

Today, ecologically educated, we know intellectually that the segments we study in the disciplines are indeed segments, that evolutionarily and functionally what we call atmosphere, lithosphere, hydrosphere and biosphere have no separate reality except in thought. But these facts have not yet been assimilated. We do not know them in the way that counts: in our hearts and affections as well as in our heads.

How difficult it is to accept that the authentic thing, the important thing, the primary reality, is the Ecosphere, one of whose attributes is the phenomenon called life. Life is not a property of bundles of protoplasm nor of complex protein molecules. Life is a property of the skin of the planet and of the ecological systems that the marvelous skin comprises.

One-eyed biology, lacking depth perception, has mislead us into conceiving a world divided into the biotic and the abiotic, the organic and the inorganic, the animate and the inanimate, the living and the dead. The divisions are false and mischievous. For what would qualify as animate, living, organic and biotic without sunlight, water, soil, air? These latter components are as vital and as important as the organisms whose life-giving environment they are.

THE REAL THING

The Ecosphere, the world, is The Unit, the Real Thing, the most perfect ecological system, evolving, adjusting, self-repairing. It is a three-dimensional layered being, consisting of an air stratum lying on a water-earth stratum with organisms mostly sandwiched at the solar energized interfaces. Not just a super-organism, it is Supra-organismic, transcending the organic.

One of the tools of human understanding is analysis or reduction, anatomizing an object of interest into its parts. Into what parts should the Ecosphere be dissected to aid comprehension? The answer, the wrong one, has

already been provided: primarily important are organisms and secondly their nebulous environments or habitats. But that is the myopic view from inside the system, not the comprehensive view from outside.

If it be accepted that the three-dimensional Ecosphere is the unit of importance, and that life is not a phenomenon that exists apart from it, then anatomizing the Ecosphere into three-dimensional sectoral ecosystems whose components include plants and animals along with atmosphere, soil and water, will provide simplified but almost complete homologues of the Real Thing. Volumetric ecosystems, chunks of the ecosphere, can very nearly exist on their own, like large terraria and aquaria. Plants and animals, individually or in their populations and communities, cannot do that!

It follows that endangered organisms *per se* cannot be preserved. Ecosystems of which organisms are interesting ingredients can, however, be preserved--as long as the Ecosphere of which they are parts continues to function in the old natural and healthy way.

ENDANGERED SPACES

This realization turns attention more and more to the absolute necessity of preserving wildernesses and natural areas, ecological reserves and sanctuaries, endangered spaces before endangered species. Unless natural ecological systems are preserved the native flora and fauna will not be preserved. Organisms will still exist in the truncated environments fashioned by well-meaning people but only as cultivars, zoo freaks, the living dead.

What does this mean in practical terms? That we never deal just with organisms but always and necessarily with ecological systems of which organisms are notable parts. That preserving a rare plant population in any but a temporary sense means preserving the rare ecosystem of which it is one component among others of equal importance. That taking a threatened species on board an ark to save it from the human deluge is to immerse it in a tame ecosystem from which--if kept there for more than a generation--it will emerge as something else, on its way to becoming a tame species, a cultivar.

Unless our various arks--zoos, arboreta, seed banks and propagation gardens--are looked on as temporary conveyances whose occupants are to be landed as speedily as possible on whatever Mount Ararats, whatever sanctuaries, protrude above the humanizing flood, all fine talk about preservation will turn out to be fine talk only. The survival of some threads of biological history that we knew to be valuable will have been secured but their texture will no longer be that which drew us to them in the first place. Somewhere along the way, full of good intentions, we will have killed the things we love.

In this there is also a lesson for ourselves. We make our environments and then they make us, as Churchill argued in proposing full restoration of the

bombed Houses of Parliament.

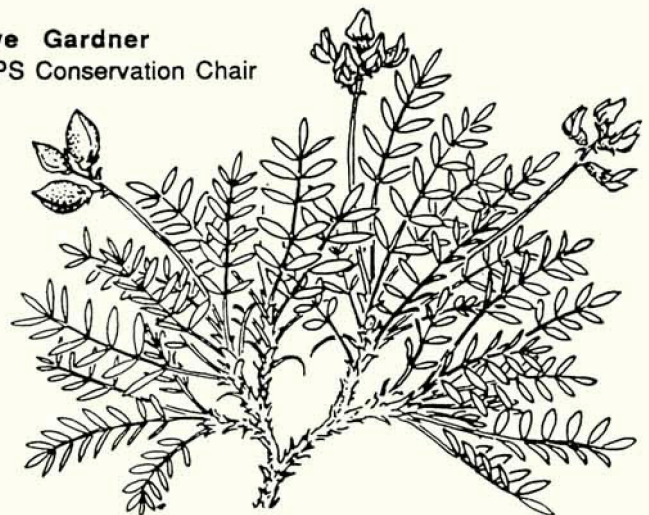
Today humanity suffers from having been on board its particular monospecific ark too long, from solitary confinement in the plastic environment, too little spongy turf underfoot. The human species is out of touch with nature, too citified, at risk from its own seed-bank environment--rows and rows of boxes in which we have voluntarily imprisoned ourselves and where with less and less success we attempt to bring up good and natural progeny.

We will not save the riverine forests without protecting the floodplains, nor will the orchids be preserved without preserving the marshes. Our own fate is linked to the limits we set on domestication of the world around us, and to the offsetting effort we devote to maintaining the natural beauty and health of the creative, sustaining, enveloping Ecosphere.

*The first version of this article appeared in Canadian Plant Conservation Programme Newsletter 3 (2), the first revision in Wildflower, Summer 1989. Permission to print this second revision was given by J. Stan Rowe, who is, as well as the editors of the CPCP Newsletter and Wildflower, interested in getting as many people as possible thinking about problems of preservation of the natural world.**

SENSITIVE PLANTS NEED SENSITIVE PEOPLE

Dave Gardner
UNPS Conservation Chair



Astragalus limnocharis

Due to the efforts of the Forest Service to bring protection to rare species, it is imperative that forest managers at local levels feel there is a constituency for such action.

In order to give you a basis for responding to this need, we have been featuring in this column lists of sensitive plant species on National Forests in Utah. In this issue we are reviewing the Dixie National Forest.

SENSITIVE PLANT SPECIES

Dixie National Forest

Astragalus henrimontanensis--E
Astragalus lentiginos var. *ursinus*--Bear Valley
milkvetch, CC
Astragalus limnocharis--Navajo Lake milkvetch, CC, P
Astragalus perianus--Rydberg milkvetch, P
Castilleja aquariensis--Aquarius paintbrush, E, T
Castilleja parvula var. *parvula*--Tushar paintbrush, CC,
P
Castilleja parvula var. *revealii*--Reveal paintbrush--CC,
E, P, T
Coryphantha missouriensis var. *marstonii*--P
Cryptantha ochroleuca--Yellow-white catseye, P
Draba sobolifera--Subalpine whitlowgrass--CC, P
Erigeron proselyticus--Cliff daisy, CC, P
Eriogonum aretioides--Widtsoe buckwheat, #, P
Festuca dasyclada--Sedge fescue, E
Gilia caespitosa--Rabbit Valley gilia, T
Haplopappus crispus--PV
Haplopappus zionis--E, P
Heterotheca jonesii--Jones golden aster, E, T
Hymenoxys helenioides--Helenium hymenoxys, E
Lepidium montanum var. *neeseae*--Neese peppergrass,
E, T
Penstemon bracteatus--Red canyon beardtongue, E, P
Penstemon parvus--Small beardtongue, E, T
Penstemon pinorum--Pine Valley Mountain beardtongue,
T
Psoralea pariensis--Paria breadroot, E, P
Silene petersonii--Red Canyon catchfly, CC, P
Sphaeromeria capitata--P

Code for Ranger Districts: CC=Cedar City, E=Escalante, PV=Pine Valley, P=Powell, T=Teasdale

Please take 10 minutes to write a letter stating your support for protection of rare plant species and their habitats. Indicate that rare species should be given priority over other forest uses. Ask that interim management guidelines be followed to protect TES species until species-specific management plans are established. Request that qualified personnel continue to watch for occurrences of unknown populations throughout the growing season in areas slated for development or changes in use.

The idea here is to stimulate and foster continued rapport with Forest Service personnel. Let them know of your interest and concern regarding rare plants, their habitats, and the preservation of biodiversity. Send copies of your letter to:

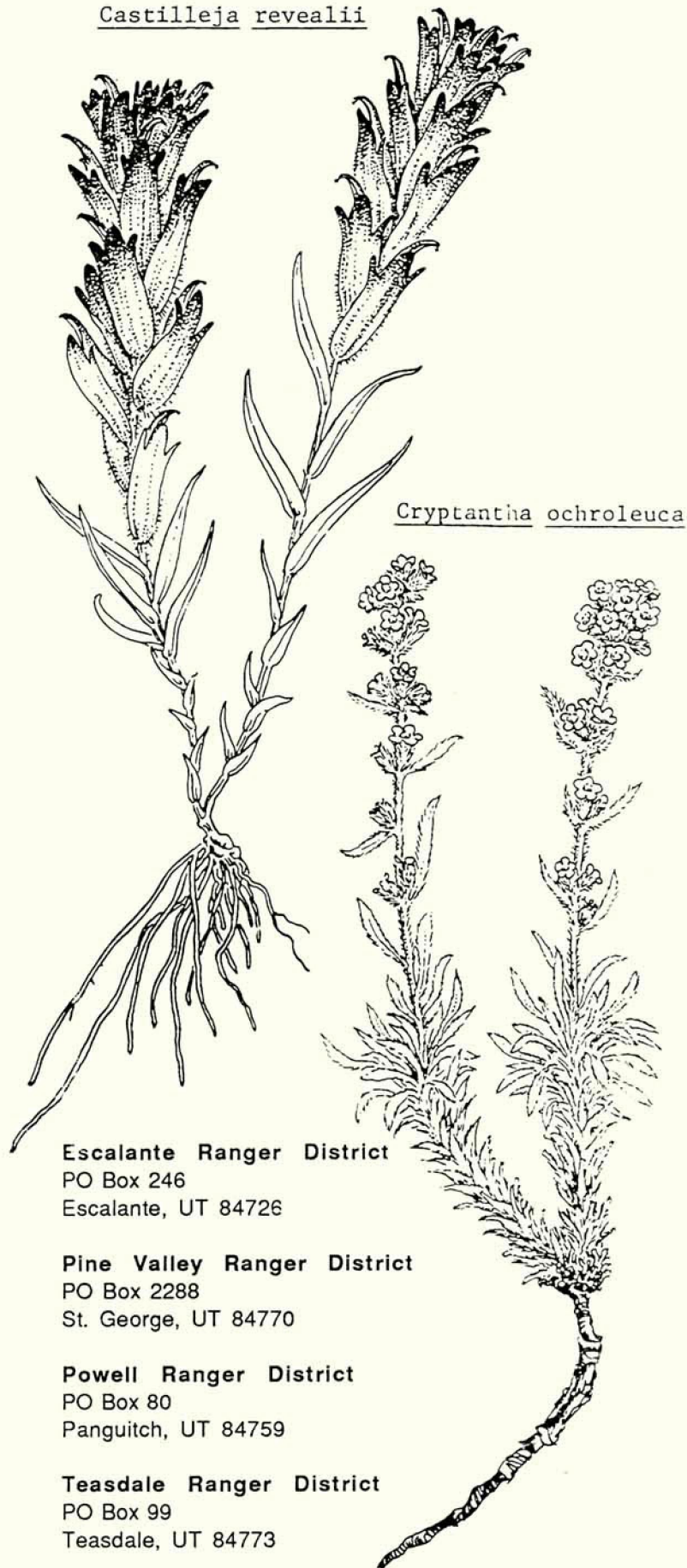
Dixie National Forest

PO Box 580
Cedar City, UT 84720

Cedar City Ranger District

PO Box 627
Cedar City, UT 84720

Castilleja revealii



Escalante Ranger District

PO Box 246
Escalante, UT 84726

Pine Valley Ranger District

PO Box 2288
St. George, UT 84770

Powell Ranger District

PO Box 80
Panguitch, UT 84759

Teasdale Ranger District

PO Box 99
Teasdale, UT 84773

If you are in the area, a personal visit to these offices to express your interest and concern would be an important contribution to the cause of sensitive species.

Seeding B L M Wilderness Study Areas



Dick Page

BLM Watershed Program Leader; UNPS Seed Chair

Maintaining the natural character of BLM's Wilderness Study Areas (WSA's) is presenting some challenges. Since wildfires and ensuing changes to the affected landscape are part of the natural process, burned areas must be carefully evaluated before rehabilitation actions are taken. This year extremely dry soils and low humidities have resulted in significant acreages being burned that traditionally burn very little. The hardest hit were the Flume Canyon and Rattlesnake WSA's (9,600 and 1,900 acres burned, respectively).

Where the potential for high soil erosion and limited vegetative regrowth exists, seeding burned-over areas becomes a management option. However, producing a successful seeding requires careful planning and is often expensive.

Seeding proposals must consist of native species. However, seed germination, seedling vigor, and resulting seedling establishment are usually not good with natives, and these values need to be checked before proposing use of a native species.

Finding sufficient quantities of the desired native species at a reasonable cost is also a problem. While guidelines indicate seed cost is not to be the controlling factor in selecting the species to be seeded, the anticipated success using native seed must be weighed against cost.

The acquired seed must be tested for germination and undesirable seed before it is planted. It is critical that no weed seeds or non-native species be introduced.

Application of native seed must be done in a manner that will preserve natural values, particularly visual resources and vegetative composition. Seed drilling which creates rows and chaining which disturbs natural vegetation are generally not allowable practices. Aerial seeding and subsequent light chaining, harrowing, or livestock trampling are usually acceptable.

Grazing management following burning to promote establishment of the native vegetation is extremely important, especially in riparian areas. All burned areas must be deferred from grazing for at least two growing seasons. This often requires the livestock operator to find other range for his livestock.

Close coordination with wilderness groups, livestock producers, wildlife interests, and other user groups early in the planning stages is important.

Minimizing Browsing Damage by Deer: LANDSCAPE PLANNING FOR WILDLIFE

Mule Deer



D.D. AUSTIN AND A.B. HASH
Utah Division of Wildlife Resources

When mule deer browse expensive nursery plants on foothill benches during the winter, they often destroy or reshape trees, shrubs and flowers. However, with proper planning, homeowners can assist wildlife and create attractive landscapes. Information in this article can help homeowners, nursery operators and landscape architects plan home landscapes that are compatible with plant utilization patterns of mule deer on winter ranges.

Preventing Deer Use

The most effective way to eliminate browsing by deer is to enclose the area with a fence that is at least 7'6" high (Roberson 1985). Entrances must be closed at all times, particularly at night. Lower fences, such as 4' high chain-link, and decorative wood or metal fences will reduce, but not eliminate, use. Repellents such as systemic insecticides, human hair, soap and other chemicals, as well as outdoor lighting and artificial noise, are unreliable in preventing deer use. Protective plant adaptations, such as thorns on rosebushes, are also generally ineffective. Hungry deer tend to ignore repellents and browse available plants. Individual plants that are highly susceptible to deer damage can be protected by thoroughly wrapping with burlap or several layers of plastic.

Extent of the Deer Winter Range

Almost all foothill bench areas as well as many valley floors are traditional wintering and foraging areas for mule deer. For example, Old Main Hill on the USU campus was once a rocky slope covered by big sagebrush, a primary winter food of mule deer. In the predawn hours, deer still browse cultivated ornamental plants that have replaced the native rangeland species.

During the day deer usually stay in the thickest vegetative cover available and as far as possible from homes and people. At night, deer leave the security of daytime cover and venture out in search of forage. Plants around homes closest to good deer habitat, such as streamsides, brushy draws, juniper patches, and Gambel oak stands, will generally be the most heavily browsed. Although deer use of landscaped plants usually decreases as distance to daytime cover increases, noticeable browsing often occurs within 1 mile of cover areas.

Factors Affecting Plant Use by Deer

Deer typically begin using traditional winter ranges, with or without housing developments, soon after the end of the deer hunt in early November. They eat the most preferred plants first, which may be the only plants browsed during mild winters. During severe winters almost all available plants are browsed to some degree. Deer usually continue browsing until spring green-up in March or April but can continue browsing until May or later when early spring flowers such as crocus and tulips are abundant.

The number of deer on the range, which is primarily determined by hunting regulations, alternate food sources, including native and urban foraging areas, winter weather conditions, and plant preferences, also influence the degree of plant use by deer. Browsing of ornamental plants typically increases after heavy snowfalls limit the mobility of deer and the availability of native plants. Deep snow forces deer to move to lower elevations where plants are most accessible. However, deep snow cover may also prevent deer from browsing low-growing and small ornamental plants. Deer will generally dig down through only about 8 inches of snow to obtain forage (Austin and Urness 1983). Snow depth must be deeper to protect taller plants. Mule deer generally browse no higher than 6' but often reach higher when standing on snow. Browsing of landscaped plants is likely to increase during severe, long winters when snow cover is deep and extensive. As forage supplies dwindle, deer will reach higher and dig deeper for food. Plants in secluded locations and those grown under the best conditions tend to be more susceptible to browsing. The presence of household pets may discourage use.

Plant Recovery From Deer Use

Many plants that are heavily browsed recover vigorously during spring and summer, especially when regularly watered, fertilized and weeded. Indeed, many native plants are ecologically adapted to annual moderate or heavy browsing (Shephard 1971). Winter browsing stimulates new vegetative growth in spring, even on dry rangelands. Although regrowth of many ornamental plants may increase if browsed during the growing season, some do not recover from heavy winter use and others may require two or more growing seasons to recover. Two growing seasons are often required to replace the vegetative and fruiting buds of apple trees browsed during the winter. Evergreen conifers, junipers, pines, firs and spruces are the most susceptible plants to permanent damage by deer. In addition to direct browsing damage, occasionally heavy use exposes plant tissues and can lead to frost damage.

Observation of Plant Use

Deer use of ornamental plants was studied during the winters of 1979-81 in 12 landscaped yards on foothill benches near Layton and Bountiful, Utah. Utilization of all plant species in each yard was evaluated in late winter by estimating the proportion of

the current annual growth removed by mule deer. Plant species were categorized by the degree of deer use: no use (0 percent), light (1-40 percent), moderate (41-70 percent) and heavy use (71+ percent).

The results of these and other observations were used to evaluate the likelihood that ornamental plants would be utilized by deer (Tables 1-3). The lists are not inclusive and should serve only as guidelines. Additional research is needed. Deer will probably exhibit similar preferences for related plants. The recommended list of native shrubs (Table 4) was based on the field research and home landscaping experiences of the authors and reviewers. A similar list was developed using white-tailed deer in Connecticut (Conover and Kania 1988).



Big Sagebrush



Golden Currant

TABLE 1. Ornamental plants highly preferred by mule deer (generally not recommended for landscaping on deer winter range areas).

Common Name	Scientific Name
Trees	
Balsam Fir	<i>Abies balsamea</i>
Hazelnut	<i>Corylus</i> spp.
Swiss Mountain Pine	<i>Pinus mugo</i>
Austrian Pine	<i>Pinus nigra</i>
Scotch Pine	<i>Pinus sylvestris</i>
Shrubs/Small Trees	
Japanese Barberry	<i>Berberis thunbergii</i>
Japanese Quince	<i>Chaenomeles japonica</i>
Bearberry cotoneaster	<i>Cotoneaster dammeri</i>
Euonymus	<i>Euonymus</i> spp.
Forsythia	<i>Forsythia</i> spp.
Elkweed	<i>Frasera</i> spp.
Juniper	<i>Juniperus</i> spp.
Pfitzer Juniper	<i>Juniperus chinensis</i>
Tam Juniper	<i>Juniperus tamariscifolia</i>
Laurel	<i>Laurus</i> spp.
Firethorn	<i>Pyracantha</i> spp.
Japanese yew	<i>Taxus cuspidata</i>
Arbor-vitae	<i>Thuja</i> spp.
Viburnum	<i>Viburnum</i> spp.
Flowers/Vines	
Bugleweed	<i>Ajuga</i> spp.
Crocus	<i>Crocus</i> spp.
Sweet Williams	<i>Dianthus barbatus</i>
Hyacinth	<i>Hyacinthus</i> spp.
Lavender	<i>Lavendula</i> spp.
Daffodil	<i>Narcissus</i> spp.
Phlox	<i>Phlox</i> spp.
Stonecrop	<i>Sedum</i> spp.
Tulip	<i>Tulipa</i> spp.
Pansy (Violet)	<i>Viola</i> spp.

Landscape Planning on Deer Winter Ranges

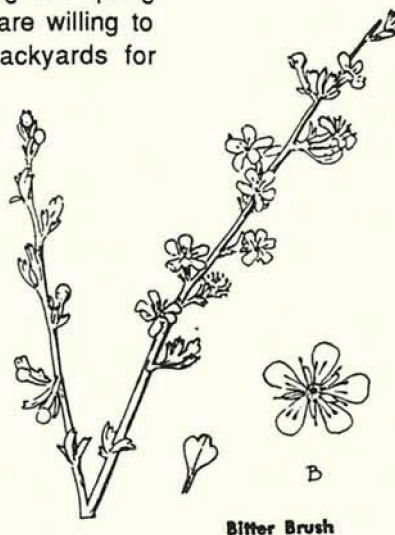
Ornamental plants, which may be expected to receive heavy use by deer and are often permanently damaged, should not be planted unless they are completely protected. These plants, although generally highly preferred by and useful to deer, are less likely to survive and more likely to acquire an unattractive appearance due to browsing (Table 1).

Deer will eat most ornamental plants, many of which can recover from moderate use during the spring and summer (Table 2). Many homeowners are willing to trade the opportunity to view wildlife in backyards for moderate browsing.

TABLE 2. Ornamental plants moderately preferred by mule deer (generally recommended for landscaping on deer winter range areas).

Common Name	Scientific Name
Trees	
Japanese Maple	<i>Acer palmatum</i>
Water Birch*	<i>Betula occidentalis</i>
European White Birch	<i>Betula pendula</i>
Catalpa	<i>Catalpa</i> spp.
Locust	<i>Gleditsia</i> spp.
Magnolia	<i>Magnolia</i> spp.
Apple	<i>Malus</i> spp.
Lombardy Poplar	<i>Populus nigra</i>
Quaking Aspen*	<i>Populus tremuloides</i>
American Plum	<i>Prunus americana</i>
Almond	<i>Prunus amygdalus</i>
Apricot	<i>Prunus armeniaca</i>
Sweet Cherry	<i>Prunus avium</i>
Sour Cherry	<i>Prunus cerasus</i>
Peach	<i>Prunus persica</i>
Pear	<i>Pyrus</i> spp.
Shrubs/Small Trees	
Oldman Wormwood	<i>Artemisia abrotanum</i>
Red Barberry	<i>Berberis haematocarpa</i>
Siberian Peashrub	<i>Caragana arborescens</i>
Peking Cotoneaster	<i>Cotoneaster acutifolia</i>
Cranberry Cotoneaster	<i>Cotoneaster apiculata</i>
Rock Cotoneaster	<i>Cotoneaster horizontalis</i>
Arizona Cypress	<i>Cupressus arizonica</i>
Russian Olive	<i>Elaeagnus angustifolia</i>
Privet	<i>Ligustrum</i> spp.
Purple Flower Honeysuckle	<i>Lonicera conjugialis</i>
Tatarian Honeysuckle	<i>Lonicera tatarica</i>
Mock Orange	<i>Philadelphus inodorus</i>
Common Red Current	<i>Ribes sativum</i>
Rose (cultivated)	<i>Rosa</i> spp.
Blackberry	<i>Rubus</i> spp.
Raspberry	<i>Rubus</i> spp.
Pussy Willow	<i>Salix discolor</i>
Bridal Wreath	<i>Spirea vanhoutii</i>
Coralberry	<i>Symphoricarpos orbiculatis</i>
Lilac	<i>Syringa</i> spp.
English Yew	<i>Taxus baccata</i>
Snowball Bush	<i>Viburnum opulus</i>
Flowers/Vines	
Snapdragon	<i>Antirrhinum</i> spp.
Strawberry	<i>Fragaria</i> spp.
Cinquefoil	<i>Potentilla</i> spp.

*Plant species native to Utah.



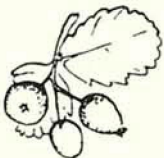
Bitter Brush



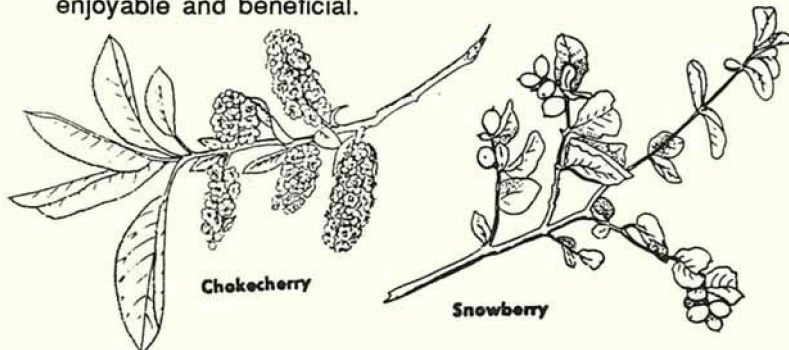
Nootka Rose



Serviceberry



Chokecherry



Snowberry

TABLE 3. Ornamental plants seldom preferred by mule deer (recommended for landscaping on deer winter range areas).

Common Name	Scientific Name
Trees	
Norway Maple	<i>Acer platanoides</i>
Silver Maple	<i>Acer saccharinum</i>
Birch	<i>Betula</i> spp.
Hawthorne	<i>Crataegus</i> spp.
White Ash	<i>Fraxinus american</i>
Engelmann Spruce	<i>Picea engelmanni</i>
Blue Spruce	<i>Picea pungens</i>
Bristle Cone Pine*	<i>Pinus aristida</i>
Japanese Black Pine	<i>Pines thunbergi</i>
Narrowleaf Cottonwood*	<i>Populus angustifolia</i>
Douglas Fir*	<i>Pseudotsuga menziesii</i>
Shrubs/Small Trees	
Bamboo	<i>Bambusa</i> spp.
Red-Osier Dogwood*	<i>Cornus stolonifera</i>
Singleleaf Ash*	<i>Fraxinus anomala</i>
English Holly	<i>Ilex aquifolium</i>
Shrubby Cinquefoil*	<i>Potentilla fruticosa</i>
Gooseberry	<i>Ribes grossularia</i>
Yucca	<i>Yucca</i> spp.
Flowers/Vines	
Daisy	<i>Bellis</i> spp.
Tiger Lily*	<i>Lilium tigrinum</i>
Myrtle	<i>Myrtus</i> spp.
Buttercup	<i>Ranunculus</i> spp.
Wisteria	<i>Wisteria</i> spp.

*Plant species native to Utah.

Many of the native shrubs (Table 4) provide forage for mule deer on winter ranges and are also attractive for landscape purposes. Table 4 also lists some of the characteristics of these plants that may be useful in landscape design. Seeds and plant materials for some of these native shrubs may be available from commercial nurseries. The best sources are nurseries that specialize in native plants.

Blending a variety of native and ornamental plants into a home landscape can create a highly attractive environment for family, friends, mule deer and other wildlife species. Enhancing the home environment and replacing some of the lost wildlife habitat can be enjoyable and beneficial.

Fortunately, some plants (Table 3) are seldom browsed by deer except during harsh weather when other forages are not available.

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TABLE 4. Native shrubs used by deer in winter that generally recover during the growing season. (Most are also highly attractive to birds and other wildlife species.)

Common name	Scientific name	Height (feet)	Flowers	Fruit
Saskatoon Serviceberry	<i>Amelanchier alnifolia</i>	10'+	Pink and white	Pome-edible
Black Sagebrush	<i>Artemisia nova</i>	2'	Small	Seed
Big Sagebrush	<i>Artemisia tridentata</i>	5'	Yellow-small	Seed
Fourwing Saltbush	<i>Atriplex canescens</i>	5'	Small	4-wing seed
Creeping Barberry	<i>Berberis repens</i>	1'	Yellow	Berry-edible
Douglas Rabbitbrush	<i>Chrysothamnus vicidiflorus</i>	3'	Yellow	Seed
Common Blackbrush	<i>Coleogyne ramosissima</i>	6'	Yellow or green	Seed
Mexican Cliffrose	<i>Cowania mexicana</i>	6'	Yellow and white	Seed
Douglas Hawthorn	<i>Crateagus douglasii</i>	10'+	White-showy	Pome-crab apple
Common Winterfat	<i>Eurotia lanata</i>	3'	Small	Seed
Apache Plume	<i>Fallugia paradoxa</i>	7'	White-showy	Seed
Myrtle Pachistima	<i>Pachistima myrsinites</i>	2'	Small-red	Seed
Desert Peachbrush	<i>Prunus fasciculata</i>	5'	Yellow	Berry
Choke Cherry	<i>Prunus virginiana</i>	10'+	White-fragrant	Berry-edible
Antelope Bitterbrush	<i>Purshia tridentata</i>	6'	Yellow	Seed
Gambel Oak	<i>Quercus gambelii</i>	10'+	White	Acorn
Smooth Sumac	<i>Rhus glabra</i>	6'	Yellow	Berry-red
Skunkbush Sumac	<i>Rhus trilobata</i>	6'	Yellow	Berry-red
Golden Current	<i>Ribes aureum</i>	4'	Yellow and pink	Currents-edible
Nootka Rose	<i>Rosa nutkana</i>	3'	Red-large	Rose hips
Woods Rose	<i>Rosa woodsii</i>	8'	Red-large	Rose hips
Western Red Raspberry	<i>Rubus strigosus</i>	3'	White	Small raspberry
Blueberry Elder	<i>Sambucus caerulea</i>	8'	White	Berry-edible
Black Greasewood	<i>Sarcobatus vermiculatus</i>	8'	Small	Seed
Mountain Snowberry	<i>Symphoricarpos oreophilus</i>	4'	Pink	Berry-white

ALIENS



Halogeton glomeratus is featured this issue, in excerpts from two articles from Utah Science. Stan Welch, in A Utah Flora, provides this introduction.

Halogeton glomeratus. Mainly disturbed sites in cheatgrass, Russian thistle, salt grass, mixed desert shrub, salt desert shrub, and pinyon-juniper communities at 1220 to 1985 m in most, if not all, Utah counties; widely distributed in in western U.S.; adventive from Eurasia. This plant was introduced into northern Nevada in the early 1930's (first collected in 1934), possibly for use in grazing experiments. It spread quickly into the desert lands of Nevada and western Utah, and subsequently into eastern Utah and other states. The plant is rich in oxalates and poses a serious threat to grazing animals, especially sheep, which have suffered heavy death losses for several decades.

DESERT BIOME RESEARCH PROGRAM MAPPING AN ECOSYSTEM

Frederic H. Wagner



As the glaciers receded from the last Ice Age of North America some 10,000 years ago, a huge lake of melted water was left in the Intermountain West that

covered parts of Utah, Nevada and Idaho. Lake Bonneville eventually drained northward into the Snake River system. It left behind broad valleys with deep, fairly rich soils that were formed by centuries of sedimentation in the lake. Ecologists now call the shrubby vegetation which developed in these valleys the North American "Cold" Desert or the Great Basin Desert.

Because the climate of the region is semi-arid, the vegetation is not highly productive. But [the existing capacity] may be in permanent jeopardy. The weed halogeton, a native of Russia, has inadvertently been introduced into the region and has spread like wildfire. It is an annual plant that grows up each year from seed, flowers and sets seed, and then dies. Many people know halogeton as a plant poisonous to sheep, and the concern over this is great. But the most important, far-reaching hazard of halogeton is subtle and not evident to casual observation.

Halogeton, like other members of the chenopod family to which it belongs, builds up high concentrations of salt in its leaves and stems--salt which it extracts from the soil with its roots. When the plants die each year, those salt-laden leaves and stems are deposited on the surface of the ground and salt is thereby added to the surface layers of the soil. The result, after several years of halogeton growth, is a progressive increase in soil salinity.

For most plants, the most delicate stage in their lives is the newly germinated, seedling stage. Most

seedlings are very sensitive to temperature, moisture, and soil chemistry. Few can grow in high salt concentrations, and halogeton is one of the few. The result is that few, if any, plant species can seed into a halogeton stand and crowd it out. Once it has gained a hold, it may be there indefinitely, increasing soil salinity all the while.

Contrary to what most people think, weeds are not highly competitive plants--that is, they cannot compete with healthy, undisturbed native vegetation. We think of them as being highly competitive because they invade where we don't want them: in gardens, pastures, agricultural crops, and lawns. But these are areas where we have removed or disturbed the natural vegetation and substituted domestic plants that, too, are not very competitive. The result is that weeds can survive in these disturbed or altered situations.

Halogeton is not different. It does not flourish in healthy sagebrush or other desert vegetation. [But] sagebrush seems to be having its problems. A moth, the larve of which is called the sagebrush defoliator, feeds on sagebrush leaves. In recent years, large patches of sagebrush have been dying out, apparently because of the excessive numbers and feeding by the defoliator. Prior to the arrival of halogeton, death of a sagebrush patch would have been followed by reversion to grass and gray molly, *Kochia americana*, or young sagebrush plants which germinated from the abundant seed supply produced by the shrub. With an abundance of halogeton seeds everywhere, however, their seedlings spring up in a carpet as soon as the shrubs die, and light and moisture fall on bare soil. And we are on our way.



Halogeton glomeratus

UTAH'S TOO SALTY EARTH



Lois M. Cox

Technical Writer for the Utah Agricultural Experiment Station and the Division of University Research

Utah has 11 million acres of so-called salt desert land. This amounts to about 21 percent of the state. Most of Utah's salt desert is publicly owned. Which means that all of us have a stake in what happens to it. Scientists in USU's Ecology Center are trying to find out more about the nature of these lands.

One project, led by Dr. Neil West, has centered in Curlew Valley, an area aabout 20 miles southwest of Snowville, Utah. The saltiness of the soil there is caused primarily by the presence of large quantities (several thousand parts per million) of sodium, potassium and calcium chlorides, sulfates, carbonates, and bicarbonates. The main plants growing in the bottom of Curlew Valley are shadscale, greasewood, saltsage, gray molly, winterfat, and halogeton.

Winterfat and gray molly, which are nutritious and well-liked by domestic and wild animals, are least able to compete. For example, winterfat seeds must germinate within a year, or have a slim chance of ever

germinating at all. Germination has to occur in the spring, immediately after the snow melt has removed much of the salt from the top few inches of soil. If the salt isn't removed, the seedling will die because its salt tolerance is very low for 3 to 4 months.

On the other hand, halogeton may produce either or both of two kinds of seed at the rate of 75 seeds/inch of stem.* One, black in color, appears late in the growing season. These seeds have the same time requirements (within 1 year) for germinating as do the winterfat seeds. But many halogeton plants insure their propagation by developing a second seed crop. These are brown and remain viable almost indefinitely (at least 10 years). They thus can germinate in whichever year provides favorable conditions.

The anatomy and physiology of the mature plants show the same pattern. Winterfat and gray molly are gradually being crowded out of the salt deserts because all of their growth is soft and palatable. Shadscale and greasewood, however, are spiny enough to prevent better than one-half of each year's new growth from being grazed. In addition, halogeton as well as greasewood not only survive on unusually salty soil, they prosper most when the salt concentration is 5800 parts per million, or higher.

Halogeton has a further advantage because its seedlings can tolerate salt levels that would be fatal to most other young plants. Even when dead, halogeton contributes to continued success. The dead plants return large quantities of sodium to upper soil levels. The area's low precipitation levels then allow most of this salt to accumulate year by year until seeds from other plants simply can't germinate.

USU's ecological studies of Utah's salt deserts are giving new insights into the precarious balance that exists between such land and its plants. They are also calling attention to the major disruption of that balance that could follow any relatively minor changes in precipitation patterns.

*One of the first observations of seed ecology of *Halogeton glomeratus* was the discovery of black and brown seeds (Tisdale and Zappettini 1953). Black seeds were found to be highly germinable immediately after seed cast while brown seeds were almost entirely dormant in laboratory trials.

Black seeds of *H. glomeratus* placed on moist filter paper absorb water so rapidly that the ovary wall may rupture and expel the embryo within an hour (Williams 1960). The embryos of black seeds uncoil at once and frequently can be planted within 9 to 10 hours. The embryos of brown seeds only swell slightly when placed on moist filter paper and appear unable to penetrate the protective ovary walls. Excised embryos from brown seeds rarely uncoil within 48 hours. When they uncoil, a green pigment appears in the cotyledons. The embryos of black seeds contain chlorophyll before emergence.

Williams (1960) discovered that in black seeds of *H. glomeratus* the major portion of resources is stored as sucrose, while storage in brown seeds is starch. Williams also showed that production of the dormant brown seeds is controlled by photoperiod. The brown or dormant form of *H. glomeratus* seeds is produced first, under long-day photoperiods. The germinable or black seed is produced later, under shorter photoperiods. Late germinating and flowering plants produce only black seeds.



SALT LAKER'S RECYCLE AT KATHY'S

Bring your newspapers, aluminum cans and bottles to Kathy's recycling center in the northeast parking lot, Kathy's Ranch Market, 4695 Holladay Boulevard. You can make a difference! Start by recycling your daily newspaper. A year from now you can pat yourself on the back for saving 4 trees, 2,200 gallons of water, and eliminating 15 lbs. of air pollutants. All proceeds from Kathy's recycling center are donated to UTAHNS AGAINST HUNGER.

PUBLICATIONS

LIFE IN THE COLD: An introduction to Winter Ecology by Peter J. Marchand, University Press of New England, 1987, 176 pp.

This book is a study of the plants and animals (including humans) in areas of the North that have at least two months of snow cover. To some creatures..."winter means staying and enduring, facing the rigors...and resisting its stresses." In order to survive, certain acclimatizations have evolved. Physical adaptations, such as the paddy feet of the caribou, or the digging claw of the lemming aid in survival. Physiological change, such as increase in brown fat, takes place for some animals such as the voles, deer mice, and short-tailed deer. For birds, acclimatization can take several forms--lowering of body temperature, shivering, or burying in the snow. Humans of the North use the snow for refuge, too. The Athapaskan people creat snow houses. They make a big pile of snow, let it set for an hour or so while ice crystals bond, and then clear out a space within the pack.

Plants have developed many physiological adaptations which help them survive periods of cold. Chapter Three, entitled "Plants and the Winter Environment," details experiments and observations of winter acclimitization mechanisms.

Plants' resistance to temperature changes vary greatly. We know that a light frost at the wrong time can cause great damage to plants. Yet it has been found that the same species of trees can endure great variations in temperatures. For instance, the killing temperature for Douglas Fir in Oregon is -20 degrees Celsius; the same tree in the Colorado Rockies can endure cold to about -50 degrees Celsius.

This is a fascinating book. It includes experiments, calculations, graphs, drawings, notes, sources, glossary and index. Such a book can heighten our awareness and deepen our respect for the survival techniques of animals and plants that live in the cold.

Reviewed by Ruthanna W. Worrell. Reprinted from the newsletter of the New England Wild Flower Society, Vol. 4, No. 4, Winter 1988.



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CACHE CHAPTER SUPPORTS CACHE RECYCLING COALITION

The Cache UNPS supports plans to coordinate recycling efforts in Cache Valley. A number of groups and individuals have been recycling, mainly newspapers and cans, or have been making plans to do so.

The Associated Students of Utah State University has taken a leadership role in organizing community recycling efforts by holding planning meetings. Word of the meetings has spread to other campus and community groups, and initial assignments for assessing feasibility of recycling various commodities and coordinating work have been made.

Susan Crook, Cache UNPS Executive Committee member, is serving on a steering committee that is drafting a position statement to present to the administration of USU for official endorsement. Preliminary contacts with President Stanford Cazier, Provost Karen Morse, and Assistant Provost Blythe Ahlstrom indicate that the administrators will support a recycling program.

Members of the Cache Recycling Coalition are preparing a recycling awareness campaign with a media blitz to encourage individual responsibility and to warn of the price of apathy.

The diversity of people attending the recycling meetings is extremely encouraging. Elmer Kingsford, Logan City Assistant Solid Waste Manager was at the meeting held Tuesday, Oct. 24, with sound advice and keen interest in any grassroots efforts. He has just completed a recycling feasibility study for the city of Logan, the results of which are not encouraging at this time because of economics. The city is promoting volunteer recycling efforts.

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