

Bulletin of the
NATIVE PLANT SOCIETY of OREGON

To increase the knowledge of members and public in identification
and conservation of the native plants of the Pacific Northwest

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CHAPTER NEWS

IMPORTANT NOTE TO FIELD TRIP PARTICIPANTS

Field trips will take place rain or shine, so proper dress and footwear are essential. Trips may be strenuous and/or hazardous. Please contact the trip leader for information about difficulty, mileage, and terrain. Your participation is at your own risk. Bring water and lunch.

Blue Mountain

For information, contact Bruce Barnes (276-5547).

Corvallis

14 Nov., Mon.

Meeting. 7:30 pm at Rm. 4083 Cordley Hall, OSU, Corvallis. Ed Alvorsen of the OSU Botany Department will give a slide show and talk about his recent trip to china, entitled "A Botanical Excursion through China."

Emerald

14 Nov., Mon.

Meeting. 7:45 pm at Amazon Community Center, 2700 Hillyard St., Eugene. Program on Dwarf Grapefern of Oregon, by David Wagner.

12 Dec., Mon.

Meeting. 7:45 pm at Amazon Community Center, 2700 Hillyard St., Eugene. Holiday social and slide show. Bring a snack to share and ten or so of your slides.

High Desert

For information, contact Joyce Bork (389-5579).

Mid-Columbia

2 Nov., Wed.

Meeting. 7:30 pm at Pietro's Pizza Place, 3320 W 6th, The Dalles. Carolyn Wright and David Gross will relate their experience in the discovery of the previously presumed extinct Golden Buckwheat (*Eriogonum chrysops*). Come earlier, 6:30 pm, for a no-host pizza dinner.

North Coast

3 Nov., Thurs.

Meeting. 7 pm at State Office Building, 3600 3rd St., Tillamook.

20 Nov., Sun.

Field trip to Cape Lookout State Park for mushroom hunting. Meet at gazebo in day use area at 1 pm.

22 Nov., Tues.

Meeting with Nehalem Garden Club. 1:30 pm at Riversea Restaurant, Wheeler.

For information, contact Clarice Maxwell (842-7023).

Portland

8 Nov., Tues.

Meeting. 7 pm at First United Methodist Church, 1838 SW Jefferson St., Portland. Paula Brooks will give a program on "Wetland Habitats of Gifford Pinchot National Forest."

Siskiyou

10 Nov., Thurs.

Meeting. 7:30 pm at Rm. 171, Science Building, SOSC. Program by Mark Prchal, Rogue River National Forest Geologist: "A Geological History of the Siskiyou."

Willamette Valley

21 Nov., Mon.

Meeting. 7:30 pm at First United Methodist Church, corner of SE Church and State Sts., Salem (use the Church St. entrance). Catherine MacDonald, Land Steward for The Nature Conservancy, will present "Natural Area Management: Flowers, Fire, and Fences."

Wm. Cusick

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For information, contact Rachel Sines (963-0674).

HAS ANYONE SEEN HUMPED BLADDERWORT ?

by Peter Zika, Emerald Chapter

Utricularia gibba is an inconspicuous carnivorous aquatic plant. It was discovered in Oregon about 20 years ago by LaRea J. Dennis Johnston of OSU. She knows of two colonies in the Monroe region (Benton Co.), in the drainage of the Long Tom River, a tributary of the Willamette River.

A third colony of humped bladderwort was found this year near one of the headwaters of the Siuslaw River, in Horton Pond on Lake Creek (Lane Co.). It was growing with Potamogeton natans and Elodea nuttallii in less than three feet of water. Horton Pond was created by a dam, and was used as a log pond until 30 years ago. The rare Lycopodium inundatum (bog clubmoss) has colonized the peaty margins of some floating logs on the northern shore.

Can these really be the only three sites for U. gibba in Oregon? Waterfowl and boaters have the potential to spread it around between drainages, since it reproduces by fragmentation. It may be widespread and merely overlooked. I've never seen it flower in the west or the northeast. It tends to float just below the surface and imitate a small ball of fishing line. It remains identifiable through the summer and fall. If you've seen some, please contact me at:

PO Box 10226
Eugene, OR 97348

ROADSIDE "TEST PROJECT" PROPOSED FOR COLUMBIA GORGE FREEWAY

NPSO has long advocated a policy of beautifying and rehabilitating Columbia Gorge roadsides with native plants. A short time ago, State Highway Engineer Don Forbes asked NPSO members to propose plants and test sites for native trees. In response, an area alongside Interstate 84 just east of Hood River was proposed to the Oregon Department of Transportation as a "test project" for rehabilitation with native plants. Located near Milepost 68 (westbound), this flat area of 3.5 or 4 acres is at this time almost completely barren rock and rock fill, the way it was left when this part of the freeway was constructed. The only consistent use of the area is for parking by sturgeon fishermen needing access to the natural rock shoreline at the east end of the area.

A preliminary landscape design suggested by NPSO uses native trees (Ponderosa Pine & Oregon White Oak), shrubs (Mock Orange, Serviceberry, Black Hawthorn, and Deer Brush), about 25 herbaceous perennials such as Balsamroot and lupines, and including the listed species Penstemon barrettiae, and native bunchgrasses. The goal is to restore the area as a pine-oak savanna similar to natural plant communities found in this part of the Gorge. NPSO has offered help throughout the project, with acquisition of plants and seed and with aftercare items such as weeding. At this point there has been no word from the Department of Transportation, but if they accept the proposal in principle, we will have our work cut out for us and need for a strong corps of volunteers.

-- Russ Jolley, Portland Chapter

UPDATE Provides Information Exchange on Endangered Species

Published by the School of Natural Resources at the University of Michigan, the Endangered Species UPDATE is a monthly bulletin providing recent news and information on endangered species topics. It includes a reprint of the latest Endangered Species Technical Bulletin (published by the U.S. Fish and Wildlife Service) along with complementary articles and information about species conservation efforts outside the federal program. Originally titled the Endangered Species Technical Bulletin Reprint, the UPDATE was developed in 1983 to distribute endangered species information to the public after budget cuts forced the U.S. Fish and Wildlife Service to limit its distribution of the bulletin to only federal and state agencies and official contacts of the Endangered Species Program. With the recent name change, UPDATE has expanded to include feature articles, book reviews, technical notes, and a bulletin board of upcoming meetings and announcements. To subscribe to the Endangered Species UPDATE, send \$15 (\$18 outside the United States) to Endangered Species UPDATE, School of Natural Resources, The University of Michigan, Ann Arbor, Michigan 48109-1115. Make checks payable to the University of Michigan.

WILL NATIONAL SCENIC AREA (FOREST SERVICE) DUCK ITS RESPONSIBILITY?

The Portland Chapter recently sent a letter to the Columbia River Gorge National Scenic Area (Forest Service) in Hood River, expressing our dismay at the destruction and discoloration of vegetation resulting from wholesale herbicide spraying carried out in the Gorge by the Union Pacific Railroad. The spraying also affected Forest Service and state lands outside the railroad right-of-way.

There is no doubt that the Forest Service was the proper recipient of our letter, since they are responsible for protecting the part of the Gorge where the spraying took place. Indeed, the interim guidelines developed by the Forest Service itself state that, "Proposed vegetation management projects...shall protect the scenic...or natural resources."

Nevertheless, shortly after the letter was sent, the Portland Chapter got a call from an NSA official who indicated that the Forest Service did not intend to pursue this matter or even make representations to the Union Pacific on behalf of the Native Plant Society. The excuse given for this policy of inaction was that railroad activities are considered to have been "grandfathered in" with passage of the National Scenic Area Act. So certain vegetation management projects are claimed by the Forest Service to be exempt from the guidelines, no matter how damaging they may be to the scenic and natural values of the Gorge. The official further recommended that, rather than expecting action or support from the Forest Service, we should complain directly to the Union Pacific Railroad.

We contend that all vegetation management projects should be subject to review, with a goal of minimizing damage to resources. Why can't the railroad be at least urged to cooperate. The problem cannot be avoided indefinitely; sooner or later it must be faced squarely. Will the Forest Service accept its responsibility?

-- Russ Jolley, Portland Chapter

SEARCHING FOR SUKSDORF'S HAWTHORNS

by Rhoda Love

As some readers may remember, I have been interested in our western hawthorns for a number of years. A few years ago, I wrote a short article for MADRONO describing hybridization between the native Douglas' hawthorn (*Crataegus douglasii*) and the English hawthorn (*C. monogyna*). My PhD thesis concerned insect feeding on native and introduced hawthorns in the Willamette Valley.

During the course of my research, I had occasion to examine, at the Marion Ownbey Herbarium at WSU in Pullman, the hawthorn collection of the pioneer northwest botanist, Wilhelm Nikolaus Suksdorf (1850-1932). Suksdorf, who was born in Germany, lived for nearly 60 years in the Columbia River town of Bingen in Klickitat County, Washington. Suksdorf was apparently enormously interested in the genus *Crataegus* and collected many hundreds of sheets of native hawthorns near Bingen. In 1907, Charles Sprague Sargent named a variety of Douglas' hawthorn with 20 stamens, *Crataegus douglasii suksdorfii* in Suksdorf's honor.

For the past several years, in collaboration with Dr. Timothy A. Dickinson of the Royal Ontario Museum, Toronto, Canada, I have been continuing my field collection of hawthorns — both the 20-stamen *C. douglasii suksdorfii* and the 10-stamen *C. d. douglasii* — providing material with which to test Dr. Dickinson's hypothesis that, in *Crataegus*, a reduction in stamen number from 20 to 10 is often related to an increase in ploidy and a tendency toward apomictic (asexual) reproduction. For this investigation, I have, during the past several seasons, collected hawthorns in Lane, Douglas and Multnomah Counties, Oregon as well as in Skamania, Klickitat and Whitman Counties, Washington.

Throughout several field seasons, I have frequently been reminded of the material collected by Suksdorf which I saw in the Herbarium at Pullman, especially the many sheets each of 10-stamen material and of 20-stamen material which Suksdorf had collected in the 1880's and had labeled "Falcon Valley — border of meadows" or "Falcon Valley — on my farm." I found that, more and more, I longed to see this remarkable valley and farm where the two hawthorn varieties apparently grow (or grew a hundred years ago) in close association with one another.

At this point, I'm sure the reader is thinking this is going to be an article describing the fantastic detective skills I employed to locate the Suksdorf farm. But not so, for that task was done in 1942 by William A. Weber in his WSU master's thesis, written under the direction of Marion Ownbey, entitled "The Botanical Collections of Wilhelm N. Suksdorf 1850-1932." Mr. Weber did all future researchers interested in the work of Suksdorf a favor of inestimable proportions when he carefully tracked down the true locations of all Suksdorf's collecting places.

You see, Suksdorf must have been something of a romantic and he clearly loved the country between the Columbia River and the southern slopes of Mt. Adams north of Bingen. He collected heavily all over that part of Klickitat and Skamania Counties for the better part of 60 years, all the while giving his own colorful names to the places where he collected. These names — and "Falcon Valley" was one — have never appeared on any official map! (Many of Suksdorf's private place names were in German, as well.) However, by interviewing a number of Suksdorf's relatives who were still living in the early 1940's and by working out this rather eccentric botanist's private codes and abbreviations, Mr. Weber located all these places for later workers such as myself. But even with the help of this remarkable piece of research, I am sorry to say that I still have not managed to set foot on the Suksdorf farm.

William Weber tells us in his thesis (page 118) that Suksdorf's "Falcon Valley" was "The fertile plateau near the southeastern base of Mt. Adams, in northwestern Klickitat County. It includes the towns of Fulda, Laurel, and Glenwood,

and is bounded on the northeast by the deep canyon of the Klickitat River. Suksdorf's farm was on the east half of the northeast quarter of section 12, near Fulda."

Armed with this information, Glen and I, on Sunday, August 28, having just waved goodby to our daughter Jenny as she flew off for her second year of college in Ohio, jumped in our van and headed north to see the hawthorns of "Falcon Valley."

We stopped at a hardware store in Bingen to purchase a map of Klickitat County and got our first surprise: Fulda has disappeared! Nevertheless we drove north up the White Salmon River to Troutlake, then east to Glenwood, then south again and convinced ourselves that Falcon Valley is, on today's maps, "Camas Prairie," and that much of it lies within the Conboy Lake National Wildlife Refuge.

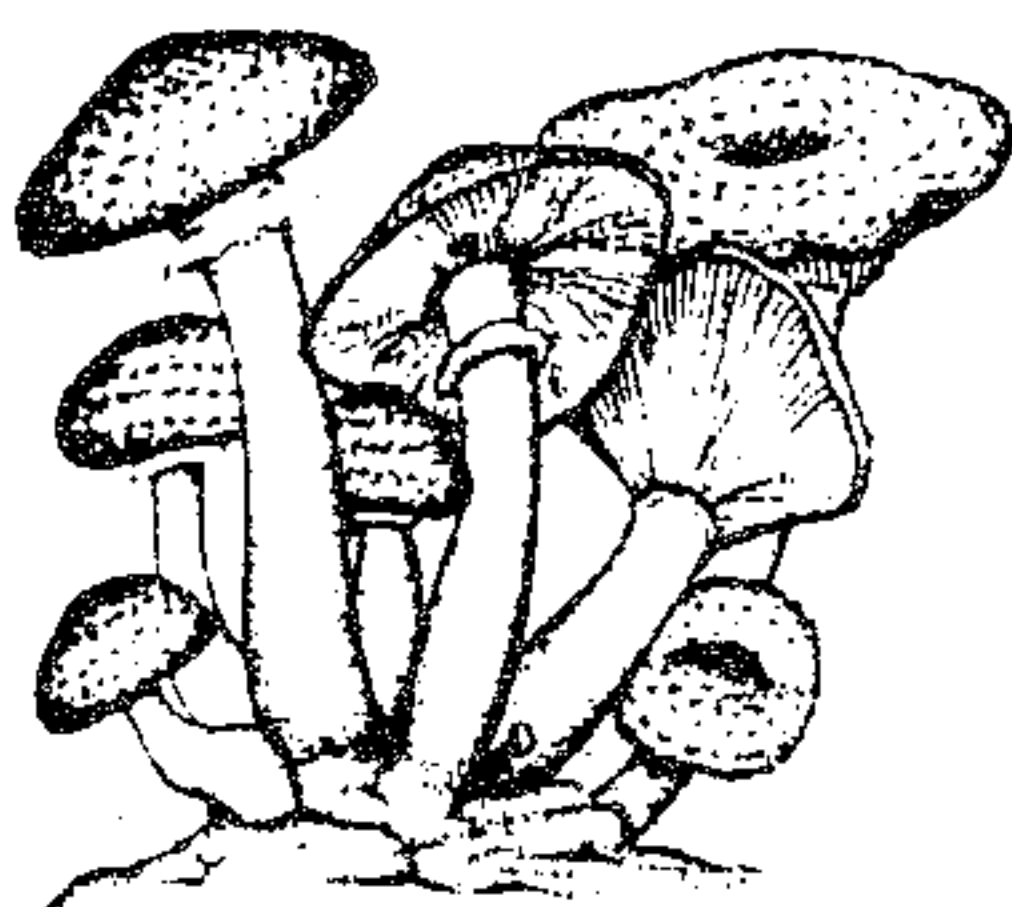
We found ourselves, by the way, in spectacular country. No wonder Suksdorf loved it! Mt. Adams from the south seems every bit as large and imposing as Mt. Rainier and the country, even at the end of August was lush and well-watered by many springs and creeks. And it was hawthorny! At a number of stops near Troutlake and Glenwood we were able to collect foliage from hawthorns growing in their favorite habitat: along the edges of pastures and near roadside ditches. (These were, of course, months past the flowering stage, so I could only estimate the stamen number from the fruit, however, most of the leaves we found looked like rather typical *C. d. suksdorfii* to me.)

Still, we had not found the farm. (Suksdorf lost his farm during World War I when the land returned to public ownership any land in that district not cultivated. Suksdorf used his farm to harvest the wild hay, and his petition to keep the land for this purpose was denied. Suksdorf seems to have been convinced that this happened because he was German at a time in history when Germans were unpopular in this country.)

At any rate, with Fulda no longer in existence, we could not be certain just which section 12 was the one referred to in the Weber thesis. We drove south of Glenwood along the eastern boundary of the Conboy Lake Refuge, but being then somewhat uncertain about the location of the vanished Fulda, we did not explore the dirt roads. I have since become convinced that the section 12 referred to must be that in Range 12 East, Township 5 North, outside the Conboy Lake Refuge and about 3 miles east of it. For those readers who know this part of Klickitat County, my calculations, if correct, would put the farm very close to the following features on my map: Dead Canyon, Kuhnhausen Spring, Fisher Hill Road and Canal Road.

So we did not actually reach the farm in August and it was not until I visited the University of Oregon map library and found an old map showing Fulda, that I was able to surmise that we were probably within 2 or 3 miles of the farm on the road from Glenwood to BZ Corner about 5 miles south of Glenwood.

And here is where I need your help. Can any reader familiar with Klickitat County and its history, or that of the Suksdorf family please let me know if my guess about the location of the farm is correct or incorrect? I hope to return to the area next May when the hawthorns are in bloom and try to locate some of Suksdorf's collecting sites. If you have information about the location or present ownership of the Suksdorf farm or the area, would you please write to me? I would very much like to hear from you. My address is 393 FulVue Drive, Eugene, Oregon 98405. Phone: (503) 345-6241. Many thanks for your help.



Portland Field Trips

The Portland Chapter of NPSO completed its Field Trip Season for 1988 on October 29 with a trip for fall color led by our President, Esther Kennedy. In 1989 we plan to begin the season with February Workshops followed by weekly Field Trips starting in March as usual.

As Field Trip Chairman it has been particularly gratifying to secure the able assistance of so many qualified people. Several people led more than one trip and I hope the membership appreciates their efforts on our behalf.

Hopefully, this list is complete for all the leaders involved. Thanks go to the following: Russ Jolley, John Davis, Julie Kierstead, Jimmy Kagon, George Lewis, Keith Chamberlain, Jan and Dave Dobak, Louise Godfrey, Rick Brown, Elizabeth Handler, Shep Wilson, Barbara Fox, George Jeffcott, Herb Armentrout, Bryan Boyce, Ed Robertson (WNPS), Florence Ebeling, Carroll Dubuar, Charlene Holzwarth, and Vance Terrall.

-- Vance Terrall, Field Trip Chairman, Portland Chapter

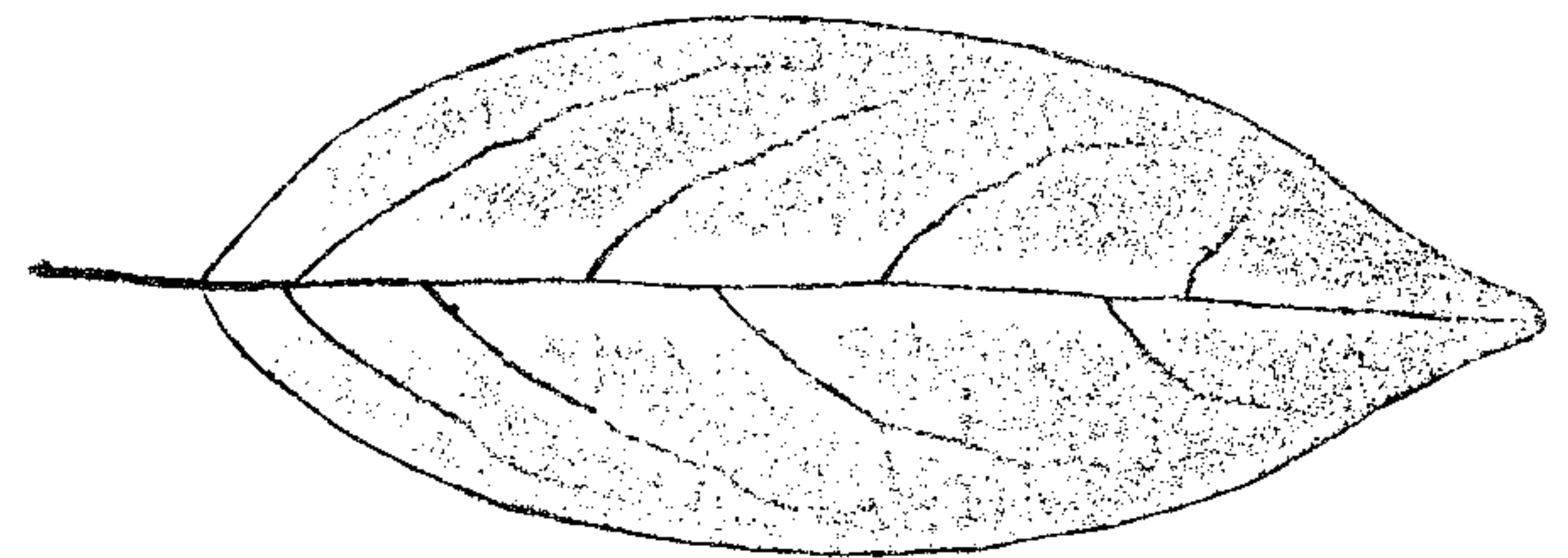
PLANT PUZZLE

Sponsored by the Emerald Chapter

Can you name this plant? The first person to give the correct scientific name will win a prize. The leaf illustration is from a woody plant growing wild in Oregon.

Send your guess on a postcard to:

Peter Zika
PO Box 10226
Eugene, OR 97440



1
cm

The October Plant Puzzle, *Physocarpus capitatus* (Pacific ninebark), was identified by Julie Kierstead of Portland. She wins a box of NPSO notecards, compliments of the Emerald Chapter.

Endangered Plant Conservation Managing for Diversity

Donald A. Falk and Linda R. McMahan

Editor's Note: The following article is an extension of the remarks by Donald Falk at the Annual Threatened and Endangered Species Conference held earlier this year. It is reprinted by permission of the author from the *Natural Areas Journal*, April 1988; Volume 8, Number 2.

Introduction: The past century is vivid evidence of the human tendency to "live as if tomorrow will never come." We are awakening from the pleasant dream of unlimited resources to find our wildlands disappearing along with the animals and plants inhabiting them. Only slowly are we making the necessary societal commitment to set aside natural areas and to learn how to manage them. At the species level the problem is no less formidable; about 3000 of the approximately 25,000 species, subspecies, or varieties of plants native to the United States are at risk of extinction in the wild. For an estimated 200 species, we are too late; they are already extinct. Other species survive in cultivation, but their native habitats are gone.

It is under these circumstances that botanic gardens find themselves becoming partners with those who conserve our natural heritage. Botanic gardens have many skills to lend to the effort including knowledge of plant propagation and growth, research facilities, and dedicated staff. Techniques such as cryogenic seed storage, tissue culture micropropagation, and isoenzyme analysis may seem like methods of the future, but such tools will be an essential part of the conservation repertoire if we are to ensure the survival of rare plants and plant communities in the United States. As conservationist, we believe that tomorrow really will come.

An overview of cooperation between onsite and offsite natural resource management is given in an earlier article in the *Natural Areas Journal*. This article provides specific examples of how botanic gardens are helping to conserve rare plants, especially through the auspices of the Center for Plant Conservation (CPC). The CPC's program is aimed at encouraging botanic gardens to develop cohesive conservation projects. The program is part of an overall goal of integrated conservation strategies, which incorporate site protection, habitat management, and offsite backup and research. We believe that such integrated strategies are ultimately the most effective approach to preventing extinction.

The Center for Plant Conservation: Founded in 1984, the CPC is the first private conservation organization in the world dedicated to offsite germplasm conservation of the nation's rare flora. Its network includes nineteen regional botanical gardens and arboreta, each with a strong commitment to plant conservation. The CPC's objective is to create offsite germplasm collections (collections of seeds, living plants, tissue culture, pollen, and other plant material containing genetic information) of rare and endangered native plants in each region of the United States, so that there will be at least one site where any endangered species can be safely grown to ensure survival. Methods include collection and propagation, seed storage, maintenance of living plants in cultivation, and research on reproduction and growth. Collections are designed to represent the genetic composition of the wild populations to the greatest extent feasible. The collections thus act as a resource for the future, specifically for research into the plants' reproduction and biology or for carefully planned reintroductions into

native habitats. Throughout the process the CPC works closely with other plant conservation professionals, both in identifying the highest priority taxa for offsite conservation and in developing strategy for offsite germplasm collection.

A basic part of the CPC's mission is to cooperate with agencies managing wild populations and their habitat. The old dichotomy of "in situ versus ex situ" is dissolving gradually as evidence accumulates that cooperative programs can be more successful than any single method applied alone. This trend toward integrated conservation strategies may represent one of the most significant developments in conservation methodology.

Current Cooperations in Endangered Species

Management: Following are examples of how botanic gardens and arboreta are carrying out plant conservation efforts in the United States today. Activities range from active management of natural areas to seeking information on conservation priorities. Many of the examples cited in this article predate the CPC or have proceeded independently of its efforts; no implication is made that all the cited projects are associated with CPC at the present time.

Management of Natural Areas: Botanical gardens often manage large tracts of land. It is not surprising, therefore, to learn that rare species have been identified on land owned by several botanical gardens. Other gardens have contracts to managelands or species not under their direct control.

Bok Tower Gardens in central Florida discovered two rare species on their 12-ha (30-acre) nature preserve while conducting a survey in 1985. The extremely rare clasping warea, *Warea amplexifolia*, occurs in only a few other locations. Additionally, botanists found nearly twenty scrub plums, *Prunus geniculata*. Both species are found only in central Florida's scrub pine habitats. As part of the CPC's program, Bok Tower collected seeds from the natural populations and is maintaining cultivated populations. The CPC's scientific Advisory Council approved the plans for maintaining separate collections but cautioned against growing plants from other populations of either species at Bok Tower so as not to affect the genetics of the wild populations found close by. In addition to land owned directly, Bok Tower Gardens manages the nearby Tiger Creek Preserve for the Florida Field Office of The Nature Conservancy, which is habitat to several rare Florida species.

Another example is the Pacific Tropical Botanical Garden in Kauai, Hawaii, which owns several natural areas on Kauai and other islands. One area near Kona on the island of Hawaii is home to several rare plants, including *Kokia drynarioides*, *Nothocestrum breviflorum*, *Dracaena hawaiiensis*, and *Colubrina oppositifolia*.

The Denver Botanic Gardens manages three off-site properties, including the 8-ha (20-acre) Walter S. Reed site in the montane zone of Upper Bear Creek Canyon in the Front Range, the 65-ha (160-acre) Mt. Goliath Alpine Unit on the slopes of Mount Evans, and the 283-ha (700-acre) Chatfield Arboretum in Jefferson County, southwest of Denver. Together these three sites provide opportunities for field research and education, in addition to being significant natural areas in their own right.

Recommending Target Species: Developing a program involves establishment of priorities. Since the CPC's program has a national scope, it is important to determine clear criteria for selecting target projects in any given year. The CPC's approach has been to integrate existing national endangerment rankings with other data collected specifically for and by the center. The published listings of the U.S. Fish and Wildlife Service in the Federal Register are a basic source, as are the global ranks assigned by The Nature Conservancy. The question is how to select the most important plants for collection and research in any given year from this data set of more than 5100 listings. To aid answering this question, the CPC has been conducting a national survey of 120 regional botanists, asking them to identify species that may be facing extinction in ten years or less. More than 200 plants have been identified as this close to extinction; these taxa naturally will have the highest priority for the CPC program in the coming years.

Conservation Collections : Several examples in this article describe conservation efforts that could proceed only because plants had been collected previously and established in a permanent living collection (see the descriptions of projects for *Kokia cookei*, and *Arctostaphylos uva-ursi* var. *leobreweri*). For this reason, the establishment of offsite conservation collections is the primary focus of the CPC's efforts.

Conservation collections that provide some insurance against total extinction may now be found at botanic gardens in all parts of the United States. Extremely rare plants such as Peter's mountain mallow (*Liamna corei*), running buffalo clover (*Trifolium stoloniferum*), Texas snowbells (*Styrax texana*), Knowlton's cactus (*Pediocactus knowltonii*), Tennessee purple coneflower (*Echinacea tennesseensis*), Florida torreya (*Torreya taxifolia*), and the blowout penstemon (*Penstemon haydenii*) are protected in permanent living collections or in seed banks. Such collections are most effective when they are maintained as part of a coordinated, comprehensive program such as that of the Center for Plant Conservation.

Endangered species can be maintained at botanic gardens or in seedbanks for long periods of time, although long-term maintenance can present formidable technical, scientific, and institutional difficulties. One of the basic roles of the Center for Plant Conservation is to encourage institutional commitment to conservation programs, along with providing technical and financial assistance.

The first instance of an American species saved from extinction through conservation collection was the Franklin tree, *Franklinia alatamaha*. The tree was extirpated from its only known wild location in Georgia in the late nineteenth century but exists today in many cultivated collections. One such collection is at The Arnold Arboretum of Harvard University; the large shrubs in the collection are probably genetically close to those once occurring in the wild.

Several plants face imminent extinction in the wild with little or no hope of saving their natural habitats. In such cases offsite conservation collections may offer the only hope for perpetuation of many species. Conserved germplasm will be available for reestablishment into the wild if and when suitable circumstances develop. Following are examples of three Hawaiian conservation collections.

A single tree in a degraded habitat is all that remains of the palm, *Pritchardia murroii*. Although the plant produces seeds prolifically, both the seeds and seedlings are consumed by domestic and wild animals, preventing

seedling establishment. Seeds from this lone survivor have been collected and are being grown at the Waimea Arboretum and Botanical Garden.

Also grown at Waimea is a rare mallow, *Hibiscus brackenridgei* var. *mokuleina*. Most wild plants in this taxon already have disappeared from known sites. The one remaining population is in such poor condition that Waimea's director, Keith Woolliams, estimates that it will only survive for one or two more years. Botanists are searching for additional populations but so far have been unsuccessful. Meanwhile, Waimea has collected propagules from the current site and already has material from another location, now extirpated.

Another plant grown at Waimea is Cookei kokia, *Kokia cookei*. This tree, now extinct in the wild, bears beautiful large red flowers. Before the tree became extinct in the wild, Waimea collected cuttings and established a cultivated population. Only seven trees remain of the species, all in cultivation at the arboretum.

Rescue and Mitigation: When efforts to save a population in the wild fail, salvage of the plants is sometimes still possible. Few biologists feel that salvage efforts are likely to conserve a species in the wild, since specific habitat requirements may be lacking in the sites to which they are moved. The shock of transplantation and establishment can further threaten the survival of individual plants. Nonetheless, where extremely rare species are concerned it is better to retain living plants if at all possible. Several recent examples of salvage and transplantation will show how the process works.

Barrett's penstemon, *Penstemon barrettiae*, is a beautiful rare plant endemic to the Columbia River Gorge. One recently discovered population grew on a cliff near the Bonneville Dam. The Corps of Engineers (COE) had scheduled a new navigation lock before the plants were discovered, and no site alternative for the lock existed. Since the species is not listed under the U.S. Endangered Species Act, the COE was under no obligation to protect the site or the species. But the Corps of Engineers proposed that cuttings of the plants be taken for incorporation into garden beds on the dam property. The Berry Botanic Garden in Portland, Oregon, undertook the projects, which was paid for by the COE and aided by volunteers). In May 1987 and March 1988 the plants (progeny by cuttings from the original population) were transplanted into the prepared beds. Additionally, plants were reestablished on one natural rock face that had been spared blasting. Backup cuttings and seeds also are maintained at the Berry Garden to help preserve the gene pool of this particular population. Another example is the Florida goldenaster, *Chrysopsis floridana*. In 1987 Bok Tower Gardens in central Florida collected seed of this species from a site that was slated for residential development. The parks departments for several nearby counties were interested in the species. Bok Tower Gardens supplied more than a thousand seedlings of this attractive species for planting into natural sites not far from the original site. The plants are being monitored to determine the success of the program.

The plant rescue project at the North Carolina Botanical Garden in Chapel Hill has been operating for more than sixteen years and is probably the most established garden-based rescue program in the country. Using staff and volunteers, the garden has rescued plants on dozens of sites scheduled for destruction. Garden collectors obtain the permission and cooperation of the landowner, often removing blocks of soil or sod for replanting. Rescue projects have included the white wicky (*Kalmia cuneata*), least trillium (*Trillium pusillum*), and Oconee bells (*Shortia galacifolia*). One rescue of the latter species

involved relocation of more than 2500 plants to a protected site at the garden. Ironically, the population was threatened by expansion of a recreational hiking trail by a local utility.

In a similar case, Holden Arboretum in Mentor, Ohio, recently undertook the rescue of plants from a doomed population of the lake iris, *Iris lacustris*. The population was being destroyed by a highway-widening project of the state of Michigan, and all efforts to protect the population had failed. With the help of the Michigan Department of Natural Resources, the arboretum obtained bulbs to establish a permanent germplasm collection.

Reintroduction: Reintroduction, as defined in part one of this series, refers to returning a taxon to a habitat where it was once known to occur but from which it has been extirpated. One recent reintroduction for *Stephanomeria malheurensis* was described in the first article in this series.

The Center for Plant Conservation does not undertake reintroductions on its own but does provide material to natural resource agencies managing natural areas or restoring endangered plant species. Reintroduction to a documented site is unlikely to cause genetic contamination of wild populations if done correctly, although proper precautions need to be taken.

A striking example of the reintroduction of a species extinct in the wild is the work of Tilden Regional Botanical Garden in Berkeley, California, with *Arctostaphylos uva-ursi* var. *leobreweri*. The only remaining population of this species, on San Bruno Mountain south of San Francisco, was destroyed by fire in the 1960's. Fortunately the garden had collected material from the site previously and maintained it in cultivation, thus preventing total extinction. In 1987 the garden began propagating plants for reintroduction near the original site, in cooperation with the state/county park in which the plants originally were found. The project will continue as a cooperative effort until the population is reestablished and requires only ongoing monitoring by the land managing agency.

Introductions Introductions into new habitats are undertaken when there are only a few extant populations or individuals left in the wild. Botanists use introductions to increase the chances of the species' survival in the wild. All such introductions must be considered experimental at present; until we have completed many years of monitoring, we cannot declare them successful.

An introduction into a new habitat recently was undertaken for Texas snowbells, *Styrax texana*. The project was proposed and funded by the U.S. Fish and Wildlife Service, and much of the work was carried out by the San Antonio Botanical Gardens. Texas snowbells are one of Texas' rarest plants. The shrub, bearing attractive bell-shaped white flowers each spring, is known from fewer than thirty individual plants in the wild, which grow along cliffs of spring-fed streams of the Texas hill country. The existing populations, all on private land, are out of reach of the native and exotic herbivores that threaten their survival. In 1986 and 1987 staff at the San Antonio Botanical Gardens collected seed from wild plants. Germination proved to be extremely successful, and twenty-five plants were introduced into each of two new sites in fall 1987. These new populations, introduced into sites where the species was not known to occur previously, are being monitored closely by a botanist. Survival was high in the first few months after transplantation, but monitoring will continue for many years. In related efforts the landowner of the largest natural population of Texas

snowbells recently agreed with The Nature Conservancy to allow fencing of the population to protect it from grazing herbivores.

An experimental introduction of the tiny endangered Knowlton's cactus, *Pediocactus knowltonii*, is showing marked success after two years. The species is now known from only one site in New Mexico, a location well-known to commercial and private collectors interested in the species. Since the land is under the management of The Nature Conservancy, the major threat at present is from collectors. In 1984 the U.S. Fish and Wildlife Service and the New Mexico Natural Resources Survey teamed up to introduce the cactus into a new location with geography, soils, and climate nearly identical to the known habitat. Cuttings were taken from plants at the known locality and rooted in small pots. Although the propagation was done under contract with a private nursery, techniques were similar to those employed by botanic gardens. After a season in the greenhouse the plants were transplanted into the new site in a grid pattern set up to facilitate monitoring of the new population. After two years, survival is over 80 percent, leading to guarded optimism about the survival of the introduced population. Botanists will continue to monitor the population for survival and seedling production.

Revegetation and Enhancement of Existing

Populations: In many cases a conservation strategy focuses on enhancement of a population that has been damaged, often by grazing or off-road-vehicle use. Plants in naturally unstable environments such as dunes or talus slopes may be particularly prone to disruption. In such cases material (seeds or cuttings) may be taken from the site, propagated, and replanted onsite to help reestablish the population.

A case in point is the restoration of a Vermont population of *Hudsonia tomentosa*, a state endangered species found on land owned by The Nature Conservancy (TNC). Off-road-vehicles had nearly destroyed the population when TNC arranged for propagation of cuttings taken from the remaining plants. The rooted cuttings later were transplanted back to the original location, helping to reestablish the population. Such efforts are especially reliable because the propagated material is genetically consistent with the site's genome. This is an important consideration in cases where there is genetic variability between populations. Whenever possible, revegetation projects should use material taken from the site itself.

Population enhancement often relies on research to guide project design. A particularly cogent example is presented by the Catalina mahogany (*Cercocarpus traskiae*). The Catalina mahogany is known from only seven plants confined to a single canyon on the southwest side of Santa Catalina Island off the coast of southern California. Once consisting of forty trees, the population declined through overgrazing and soil loss caused by large herds of sheep and feral pigs. Active management of the seven remaining individuals began with fencing of two trees in the late 1970's by the Santa Catalina Conservancy. More extensive fencing was added in 1985. In 1987 the Rancho Santa Ana Botanic Garden began working closely with the Santa Catalina Conservancy to perpetuate the species. Using isoenzyme studies, they determined that only five of the seven trees were truly *C. traskiae*. The other two were hybrids with the more common mountain mahogany, *C. betuloides* ssp. *blanchae*. The chemical study confirmed what biologists had suspected from examining the trees morphologically. Armed with this knowledge of the trees' parentage, the Santa Catalina Conservancy will reintroduce rooted cuttings of the five true trees to help

build back the population. If they had used cuttings from all seven trees, Rieseberg believes that "Catalina mahogany might be lost . . . and that our management efforts might actually be speeding up the loss."

Enhancement projects also can involve transplanting common species to stabilize or revegetate a site, making it more hospitable for rare species. Such projects more correctly fall into the category of habitat restoration.

Restoration: The field of habitat restoration, or restoration ecology, is attaining increasing importance in plant protection efforts, for it is on a restored habitat that the survival of many rare species may depend. Restoration was recently the subject of a national conference and may represent one of the most synthetic conservation disciplines. Its original focus on severely degraded sites may find applications in endangered species preservation. For instance, a West Virginia site that had been destroyed by coal mining underwent a restoration that included establishment of the rare *Marshalkia grandiflora*. Plants were collected, propagated in a greenhouse, and grown in a nursery to a size suitable for reintroduction.

Management Research: As important participants in integrated conservation strategies, botanic gardens have a responsibility to assist in the management and preservation of wild populations as well as maintain their own cultivated collections. One of the most useful contributions is to conduct rare plant research specifically designed to aid preserve managers.

An interesting current example involved the rare Peter's Mountain mallow (*Liamna corei*), known from only one site with four plants in Giles County, Virginia. In cooperation with the Virginia Chapter of The Nature Conservancy, botanists at the Virginia Polytechnic Institute (Blacksburg, Virginia) and the North Carolina Botanic Garden (Chapel Hill, North Carolina) are studying seed germination, seedling establishment, flowering, and seed set in an effort to understand how the habitat should be managed to allow the population to regenerate naturally. The flowers presently abort before producing viable seed, indicating possible inbreeding sterility. In addition there are some indications that leaf litter at the site is inhibiting growth of the population, since there are substantial numbers of seeds in the duff layer that are not germinating.

The Plymouth gentian (*Sabatia kennedyana*) is another example being studied at the Garden in the Woods of the New England Wild Flower Society (Framingham, Massachusetts). The plant occurs naturally on pond edges in coastal Massachusetts, in what NEWFS propagator William Brumback describes as "alternating flood/bake conditions." Brumback found a way to germinate seeds in the garden and in so doing determined that the plant is monocarpic. This discovery has significant management implications because the soil seed bank therefore must constitute a large proportion of the species' total genome.

Management-related offsite research is being conducted on several other species such as *Lilium grayi* (North Carolina Botanic Garden), and *Aconitum noveboracense* (Cornell Plantations).

Basic Research: Botanic gardens and arboreta also conduct basic plant science research. Several United States gardens working with rare plants in the CPC's network are university-affiliated, including The Arnold Arboretum of Harvard University, the North Carolina Botanic Garden (University of North Carolina), the

Rancho Santa Ana Botanic Garden (Claremont Colleges), the Nebraska Statewide Arboretum (University of Nebraska), the University of California Botanical Garden (University of California, Berkeley), and the Utah Statewide Arboretum (University of Utah). Others, such as the Missouri Botanic Garden and the New York Botanic Garden, are independent but have a strong institutional tie to a university for teaching and research. And several gardens, notably the Fairchild Tropical Garden and the Pacific Tropical Botanical Garden, maintain research programs that are entirely internally managed. All of these have the potential to develop plant research programs that can significantly contribute to biologically sound conservation.

Research into the basic biology of rare plants includes studies in systematics, physiology, reproductive systems, and autoecology, as well as horticulture. An excellent example is work carried out at The Arboretum at Flagstaff, Arizona, on mycorrhizal associations in several members of the genus *Pediocactus*. Arboretum staff have undertaken field collecting and propagation in cooperation with the regional office of the U.S. Fish and Wildlife Service, the state of New Mexico, The Nature Conservancy, and a private nursery. In 1985 the roots of Peeble's Navajo Cactus (*Pediocactus peeblesianus* var. *peeblesianus*) were observed to be heavily colonized by the fungus *Glomus deserticola*. Since then the arboretum has been conducting cultivation studies to determine the fungal symbiont's effect on the cactus' germination and growth rate. This previously undocumented symbiosis thus may have both basic and applied research interest. Related research by Barbara Phillips at the Museum of Northern Arizona with *P. peeblesianus* var. *peeblesianus* has demonstrated that the species is an obligate outcrosser, a formerly unrecognized characteristic.

From a conservation perspective, however, the most promising -- and vital -- realm of research concerns the distribution of genetic variation in populations of rare plants. For example, in species that typically self-fertilize it has been shown that genetic differences between populations are characteristically greater than for outcrossing taxa. Such patterns of genetic variation have enormous implications for the design of representative offsite germplasm collections, since they have a direct bearing on the number of sites that should be sampled and the size of the collections to be made. The problem in designing such strategies for rare plants is that, at the present time, so little data are available regarding genetic variation in rare plants that it is nearly impossible to construct a biologically sound program.

To address this need the Center for Plant Conservation is undertaking a one-year study program in genetic variation in rare plant species; to be concluded by a conference on the subject in March 1989. The purpose of the conference will be to bring the current state of knowledge in population biology and genetics to bear on conservation strategy and to advance the level of understanding in the conservation community.

Economic Research: Of the more than 1000 genera represented in the CPC's data base, more than two-thirds are congeners of plants with current or near-term economic potential. This includes crop genera (*Trifolium*, *Amaranthus*, *Zizania*); fruits, seeds, and nuts (*Vaccinium*, *Helianthus*, *Prunus*); forest products (*Pinus*, *Abies*, *Picea*, *Betula*, *Quercus*); and industrial products and pharmaceuticals (*Lesquerella*, *Limnanthes*, *Astragalus*). There are also hundreds of endangered plants in horticulturally popular genera (*Iris*, *Lilium*, *Rosa*, *Rhododendron*, *Penstemon*, *Magnolia*, *Fremontodendron*, *Carpenteria*) and families (*Cactaceae*, *Ochidaceae*). Botanic gardens can play a key role by providing

research-quality germplasm collections for screening programs.

In part to advance the systematic assessment of rare native plants for economic potential, the CPC has signed a cooperative agreement with the U.S. Department of Agriculture, National Plant Germplasm System (NPGS). Under this agreement the CPC and the NPGS will work jointly to store seeds of endangered native species and to develop material for USDA research in economic botany.

Conclusion: The conservation community is changing dramatically. Not only new institutions, but new kinds of institutions are becoming involved at a basic level. The entry of botanic gardens and arboreta into conservation in the mid-1980's has opened up new possibilities for cooperative projects in introduction, enhancement, restoration, and research into the dynamics of plant communities and endangerment.

Until recently such projects in botanical gardens were scattered, with no means to develop and apply consistent standards. As the Center for Plant Conservation and the botanical garden network gain experience in this area, they will become stronger allies in the fight against plant species extinction.

New Officers of Emerald Chapter

Officers of the Emerald Chapter, elected in August, are:

Diane English, President
Stephanie Schulz, Vice-president
Charlene Simpson, Secretary
Nadine Smith, Treasurer.

Indian Heaven Field Trip Report

Carroll Dubuar and Elizabeth Handler led the field trip on September 10 to the Placid Lake area in Indian Heaven, southeast of Mt. St. Helens. Approximately 21 of us enjoyed the delightful fall hike through woods and meadows, and past numerous lakes.

The peak of the flower season had definitely passed, but we were not too disappointed since it had coincided with the peak of the mosquito season. Most notably we saw Mock azalea (*Menziesia ferruginea*), White rhododendron (*Rhododendron albiflorum*), and seeds of Pipsissewa (*Chimaphila umbellata*) and heather, but the plentiful and ripe huckleberries proved to be the most popular plant to inspect.

The Placid Lake Loop is described in Don and Roberta Lowe's *33 Hiking Trails --Southern Washington Cascades*, but we discovered that a section of trail had been completely relocated near the end of the loop. Since there are many interconnecting and unsigned trails, hikers would be well advised to check their maps and compasses carefully or go with an experienced guide.

-- Roxy Rochat, Portland Chapter

Our Gift to Youth

I look at the barren hillsides,
that were forest covered land
and walk the river channel,
that is now just drifting sand.
I wonder if man's vision,
has all gone out to sea.
It would be nice if some were saved,
just for you and me.

-- Jesse T. Martin, Willamette Valley Chapter



Cornus canadensis
Drawing by Julie Kierstead

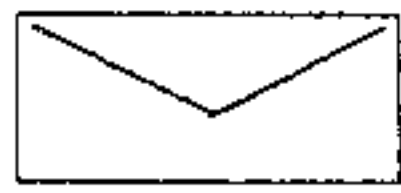
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Letters v. Phone Calls?

Is it better to write a letter or will a phone call suffice?

ONRC's experience has shown both to be equally effective. Ideally, you will do both. But some are too busy for (or ago-



nize over) writing letters. For those who prefer the next

best thing to writing, action is just a phone call away. You can call



a local Oregon office (some have toll-free 800 numbers) or can call Washington, D.C. Calling during off-peak hours (usually before 8 a.m., but you should check with your long-distance carrier to be sure) is attractively cheap—especially if you hate writing letters.

When you call, ask to talk to the legislative aide who handles natural resources issues. If they aren't there you may request that they return your call, or you may leave a simple message, stating your desires (see above). All phone calls are carefully logged and summarized for the boss.

(You can also ask directly for the officeholder, expecting to be fended off to the aide. Be careful though, some have been put through immediately, so be prepared!)

If you write a letter, please keep it to one page and legible (typed is preferred). A postcard is better than nothing. While you may receive a computer-generated form response, rest assured that a real human read yours and all other letters and summarized them for the boss.



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 2584 NW Savier St., Portland, OR 97210; 248-9242
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 photos, drawings, and non-copyrighted materials are welcome.

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DEADLINE: 10th of each month

FORMAT: Copy should be typed in 4½ inch wide columns, of any length. Author's name & chapter affiliation (or other organization) are typed at the end of the article. There is no standard paragraph treatment; one of these is suggested:

* for long articles, double space between paragraphs, but do not indent the first word of the paragraph

* for short articles or short paragraphs, when double spacing looks odd, indent the first word of the paragraph instead

Type your own headline, centered, all caps. In case of special formats, e.g. plant keys, you are free to choose the layout.

CREDITS: For each submission, provide

* title

* author--specify whether byline is desired for news items

* instructions as to whether item is to be used in entirety or excerpted at editor's discretion

* source & date if item is not original

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SCIENTIFIC NAMES should follow Hitchcock & Cronquist's *Flora of the Pacific Northwest* where possible. Use of both scientific & common names is encouraged. Genus & species names are underlined or italicized.

RETURN OF ORIGINALS: Manuscripts & illustrations will not be returned unless it is requested.

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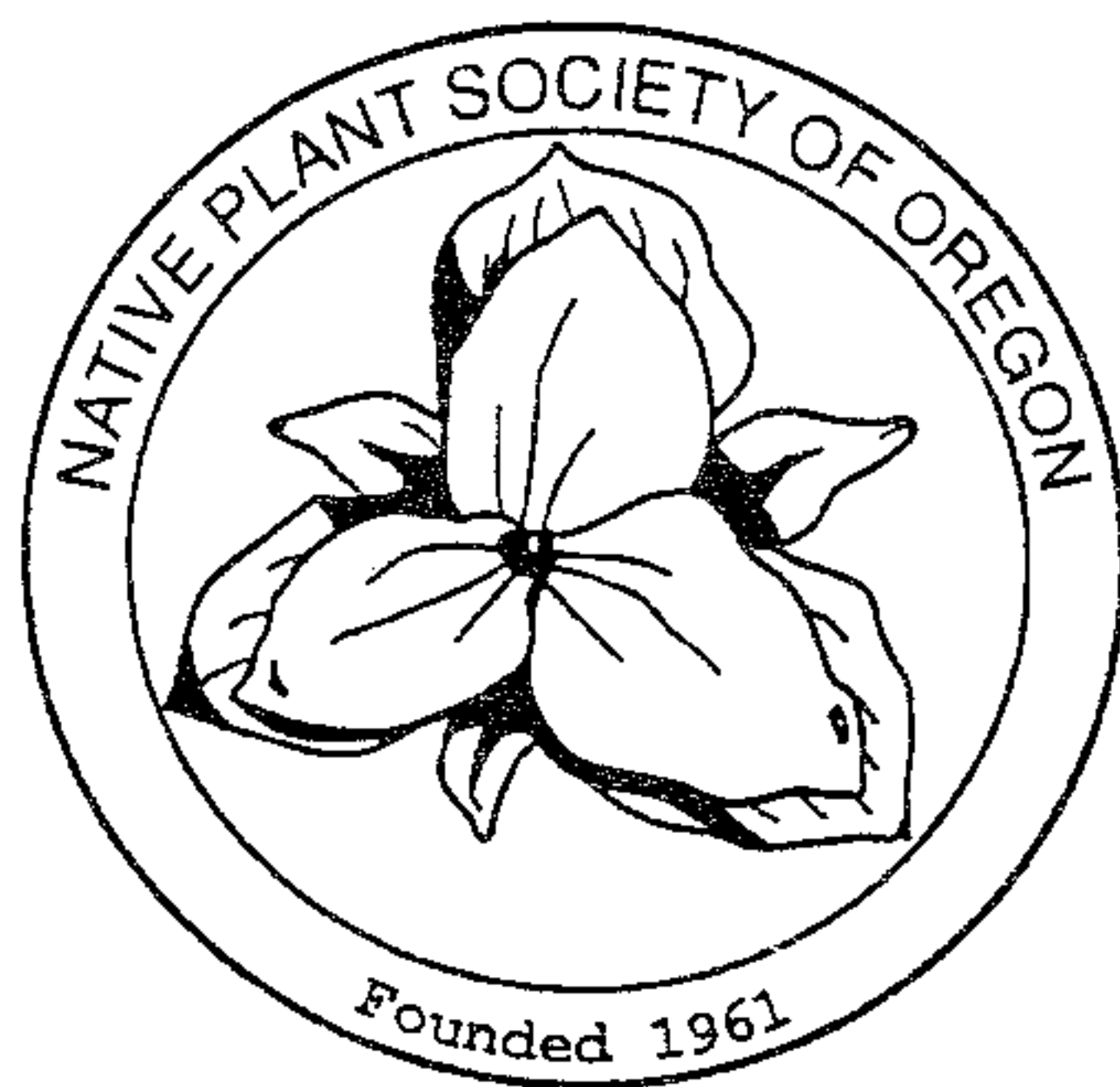
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