

PROFILE: MONTANA'S RARE AND
 ENDANGERED PLANTS

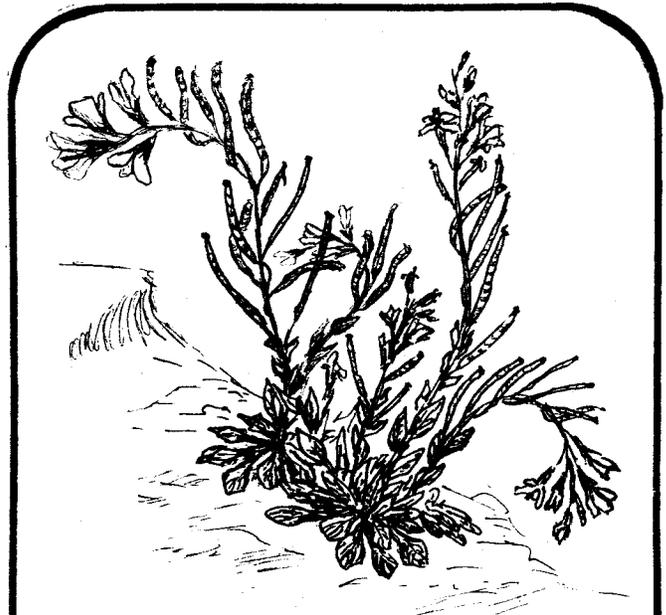
by Steve Shelly and Lisa Schassberger
 (Montana Natural Heritage Program, Helena)

Four of the eleven plants which are known to be strictly endemic to the state of Montana are members of the Mustard family (Brassicaceae). Three of these four, previously unknown to science, were just described in 1984. One of these - *Arabis fecunda* (Sapphire rockcress) - is surely one of Montana's most unusual endemic plant species.

The Sapphire rockcress is a small perennial plant with one to several clusters of basal leaves and flowering stems up to about 12 inches tall. The entire plant is greyish in appearance, owing to a dense covering of small silvery hairs. The flowers have four white petals and are about a quarter-inch across. They give rise to long, narrow fruits which extend upright along the stem. The stems produce flowers and fruit over much of their length, hence the scientific name *fecunda*.

One of the most peculiar features of this species is its virtually complete restriction to soils derived from a particular rock type. This parent material is very light in color, and is thought to be a metamorphosed calc-silicate rock similar to limestone, formed during the uplift of adjacent mountains. The resultant soils are calcareous in nature, and thus are chemically different from other nearby soil types. The restriction of the Sapphire rockcress to an unusual substrate is known as edaphic endemism, and this plant provides one of the best examples of such narrow ecological adaptation in Montana.

The Sapphire rockcress was first found in 1975 by Jaculyn Cory on the western lower slopes of the Sapphire Mountains near Corvallis, on the east side of the Bitterroot Valley. The plants were observed there once more in 1976, but it was not searched for again until after 1984, when Dr. Reed Rollins, an expert on the Mustard family, determined that the specimens represented a previously undescribed species.



Scientific name: *Arabis fecunda* Rollins
Common name: Sapphire rockcress
Family: Brassicaceae
Habitat: Metamorphosed calcareous slopes
Location: Beaverhead, Ravalli and Silver Bow
 Counties in southwestern Montana
Status: "Globally endangered" (The Nature
 Conservancy)

Additional field surveys were conducted in 1985 and 1986 by Peter Lesica along the west side of the Sapphire Mountains from Missoula to the south end of the Bitterroot Valley, and in Granite County east of the Sapphires. These searches revealed the existence of only three additional sites, all within a very small area in the Bitterroot Valley east of Corvallis and Hamilton.

Symbiosis: Plants and Their Fungal Partners

Frank Dugan

Many fungi are justifiably famous for causing plant disease, but other fungi make positive contributions to plants. Some of these plant-fungus partnerships are commonly known and quite visible, like the many different lichens we have all seen on our hikes through the woods. Each lichen species is a unique association of an



Typical fruiting bodies of fungi... "mushrooms"

alga, usually one of the green or blue-green algae, and a fungus, usually an ascomycete. These lichen fungi are distant relatives of the morel, but of course much different in size and shape.

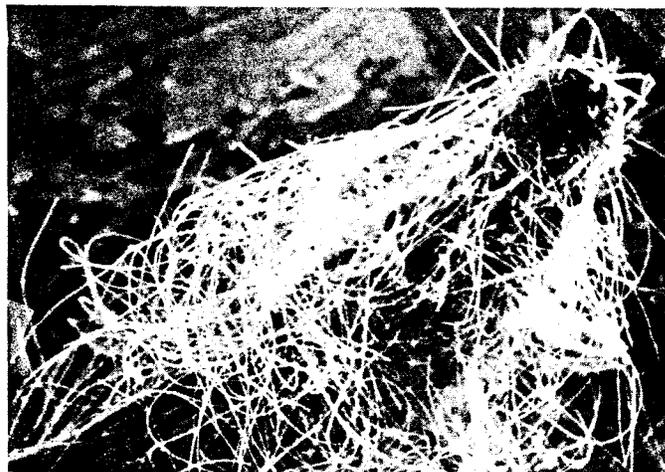
Some of the readily seen mushrooms are also plant partners. The Slippery Jack (*Suillus grevillei*) and the mock oyster (*Suillus cavipes*) and two bolete mushrooms which you can often find under larch trees (*Larix* spp) in the fall. These fungi are "mycorrhizal," (the term can be translated as "fungus-root"). Specifically, these fungi are called ectomycorrhizal, because their hyphae - the little threads of fungus below the mushroom - grow on the surface of the small roots of the larch tree. The tree gives the fungus some of the sugars that the tree has made from photosynthesis, and in return, the fungus channels essential minerals to the tree. Many such examples have been found involving trees and common mushrooms.

Other fungi, small to the point of being microscopic, form endomycorrhizae with

grasses and other plants. These mycorrhizae have no fungal covering on the outside of the root; the fungi grow inside the root and carry on the same sort of trade of minerals for sugars that occurs with the ectomycorrhizae. Other such groups include special mycorrhizal types for orchids and members of the heath family.

A final partnership that is worth mentioning is the symbiosis between many plants and microscopic fungi in their leaves. In these cases, the plant "feeds" the fungus, and in return, the fungus makes the plant distasteful or even poisonous to insects or grazing animals. These fungi are called endophytes, and are especially common in grasses where they "defend" the blades of grass from sheep and other animals. The endophytes are relatives of the ergot fungus, a disease of rye and other cereal crops, but here they work for the plant, not against it.

The partnerships between fungi and plants go back a long way. Fossil mycorrhizae have been found in coal beds. Some people even think it was the formation of a symbiosis between fungi



Scanning electron micrograph of ectomycorrhiza of *Pinus contorta* inoculated with *Cenococcum graniforme*.
From Salisbury & Ross. *Plant Physiology*

and plants that made it possible for plants to move out of the ancient seas and colonize the land! Whatever their evolutionary history, it's certain that today's plants have ancient and intimate connections with a variety of fungal friends.



MEETINGS

Wednesday, October 12, Valley of the Flowers

Chapter: Dan Gustafson will present a program on aquatic plants. Meetings are held at Leon Johnson Annex, Room 346, on the MSU campus, starting at 7:30 p.m.

Thursday, October 13, Clark Fork Chapter: Botany Bldg, Room 307, U of M Campus, 7:30 p.m.

Wednesday, October 19, Flathead Chapter: Montana Power meeting room, Kalispell. Program and slide show, starting at 7 p.m.

Saturday, October 22, Statewide Board of Directors' meeting: State Library, 1515 W 6th, Helena, starting at 11 a.m. See the "Message from the Pres" for details.



Wednesday, November 9, Valley of the Flowers Chapter: Leon Johnson Annex, Room 346, on the MSU campus, 7:30 p.m. Speaker will be Don Mathre, MSU, professor, will discuss fungi - especially mushrooms.

Thursday, November 10, Clark Fork Chapter, Botany Bldg, Room 307, U of M Campus, 7:30 p.m.

Wednesday, November 16, Flathead Chapter: Montana Power meeting room, Kalispell, 7 p.m.

Wednesday, December 14, Valley of the Flowers Chapter: Leon Johnson Annex, Room 346, on the MSU campus, 7:30 p.m. Dr. John Rumely, professor emeritus of botany and former curator of the MSU Herbarium, will speak.

Thursday, December 15, Clark Fork Chapter, Botany Bldg, Room 307, U of M Campus, 7:30 p.m.

December - date not set yet: Flathead Chapter Christmas Party at Pattie and Neal Brown's home in Bogfork; call 837-5018 for info.

biology students in a greenhouse over the winter, or (3) grown in pots or in mixtures in flats in Glacier's new Native Plant nursery.

Species collected were: *Aster* sp., *Carex spectabilis*, *C. haydeniana*, *Epilobium alpinum*, *Juncus mertensiana*, *Poa alpina* and *P. gracillima*. In addition, we assembled mixtures with a wide variety of species. As the group shared clear air, breathtaking views, sore backs - and satisfaction - there was some talk of making this an annual event!

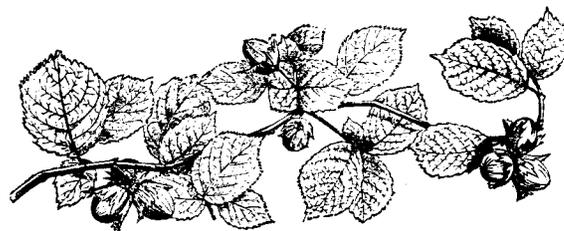


The Saturday after Labor Day, the Clark Fork and Flathead Chapters of MNPS held their second annual canoe trip. After what seemed like an endless summer of perfect canoeing weather, we managed to pick a day gifted with cold, rain and wind. Eighteen people in six canoes and two kayaks put into the Flathead River at Dixon to do battle with the 20 mph wind and small whitecaps. After about three miles we stopped in a small bay to scout around, look at the plants and eat lunch. Our sandwiches but not our spirits were dampened by the light rain falling. Canoeing a mile further we portaged to a large bay, at the south end of which - separated by a railroad bed - lay our destination, an old river channel the locals call Sinkhole Slough.

A large culvert under the railroad tracks is usually passable by canoe, but this year the water was low. Most of us hiked over the tracks to the Slough, while a few of the stubborn ones lined two canoes through the culvert. We spent the next hour looking at plants on the gravelly banks and trying to remember what it felt like to be warm. Sinkhole Slough is home to two plants that are rare in Montana: water star-grass (*Heteranthera dubia*) and sharp-pointed flatsedge (*Cyperus acuminatus*). After a little searching, we found the flatsedge growing in the gravel along shore, and an abundance of water star-grass in the shallows. Still in bloom on the banks, in spite of the late date, were obedient plant (*Physostegia parviflora*), Colombia tickseed (*Coreopsis atkinsoniana*) and pigmy-weed (*Tillaea aquatica*).

FIELD TRIP REPORTS

August 27 found MNPS members at Logan Pass atop the Continental Divide in Glacier Park. We talked about subalpine restoration and collected seed that will be (1) seeded in mixtures at Logan Pass, Sperry or Granite Park Chalets, (2) propagated by Whitefish





ANNOUNCEMENTS

ARE YOU AN ARTIST?

MNPS is looking for an artist among its members to design a logo for the Society based on our "mascot" plant, *Kelseya uniflora*. This logo would be used as part of our KELSEYA masthead, on the MNPS informational brochure (currently in preparation), as letterhead on our stationery - and down the line, who knows? maybe on T-shirts, notepaper or other items.

Don't let the fact that you've never seen *Kelseya* deter you - Kathy Ahlenslager has a number of slides of various views of the plant. Contact her if you're interested: 542-0522, Missoula.

UTAH WILDFLOWER POSTER

The Utah Native Plant Society and The Nature Conservancy invite you to "pick a Wild Bunch." This 23"x24" wildflower poster features 28 full color, botanically accurate illustrations of Utah wildflowers. It's \$10.50 plus \$1.50 postage from the Utah Native Plant Society, P O Box 520041, Salt Lake City, UT 84152.

REAUTHORIZATION OF
ENDANGERED SPECIES ACT

In late July the Senate passed S.675, reauthorizing the Endangered Species Act for four years and increasing spending from \$39 million to \$56 million. Although some of the ESA's provisions were weakened in negotiations to enable passage, the bill includes stiffer penalties for violations, a new conservation fund and early protections for declining species, as well as a new species-recovery program. Final language is being worked out between the Senate and House versions of the bill, but it is anticipated that the final form will progress smoothly through both houses for approval, ending nearly four years of stalemate on this issue.

WHERE TO WRITE FOR
CONSERVATION INFORMATION

Many different organizations are involved in the fight to save this country's rare and endangered native plants. The Spring issue of **KELSEYA** listed some of the national organizations to which you may write; here are additional ones:

The American Horticultural Society: PO Box 0105, Mt. Vernon, VA 22121. Through publication of the Endangered Wildflower Calendar, the AHS is working to increase public awareness of the plight of America's

'native plants. Sales support a Rediscovery Project, awarding individuals who rediscover populations of species thought extinct in the wild.

The Center for Plant Conservation: The Arnold Arboretum, Harvard University, The Arborway, Jamaica Plain, MA 02130. A non-profit organization building a living collection of American's most endangered plants for basic research. They provide education and display besides researching how to care for those plants in the wild.

Federal Wildlife Permit Office: U.S. Fish and Wildlife Service, 1000 N. Gleve Road, Room 611, Arlington, VA 22201. Issues permits under the Endangered Species Act, etc., for "removing and reducing to possession" listed plants from lands under federal jurisdiction. Administers CITES and interstate commerce permits.

National Council of State Garden Clubs, Operation WildFlower: 4401 Magnolia Avenue, St. Louis, MO 63110. Their program is dedicated to beautification of roadsides and public education on propagation, application, and preservation of native plants.

The Nature Conservancy: 1800 N. Kent St., Arlington, VA 22209. Uses a variety of strategies to protect native plants, including acquisition of land, protection through easements, management agreements, and participation in public lands protection.

Office of Endangered Species: U.S. Fish and Wildlife Service, Washington, D.C. 20240. Evaluates species of flora and fauna for federal listing as endangered or threatened. Works with federal agencies, states, private groups and individuals regarding listed species. At least two brochures are free: write Publications Unit, 148 Matomic, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

Plant Conservation Project, Natural Resource Defense Council: 1350 New York Avenue NW, Washington, D.C. 20005. NRDC monitors horticultural trade in wild plants and actively supports enactment of plant-related legislation.

TRAFFIC (USA): World Wildlife Fund-U.S.: 1601 Connecticut Avenue NW, Washington, D.C. 20009. They monitor trade in CITES and endangered species and publish a newsletter.

WILDFLOWERS SOUGHT FOR USE IN LOW-COST, LOW-CARE LANDSCAPING

(Excerpted from UND Alumni Review, November, 1987). Jean Pfeiffer, Clark Fork Chapter.

He calls it his "labor of love" project. Since the spring of 1986, Dr. John LaDuke, an associate professor of biology at the University of North Dakota in Grand Forks, has maintained one of six wildflower research projects coordinated by the National



Wildflower Research Center in Austin, Texas, growing wildflowers which are native to the Midwest.

Fifteen-foot-square plots located in Grand Forks harbor the fiery red petals of *Gaillardia* and bright yellow and black of black-eyed Susans, as well as other varieties. "They actually border on what people

would call weeds, but they're attractive weeds," LaDuke says. "Once you develop an appreciation for them, you start calling them wildflowers."

The purpose of his research is to find native vegetation that could be used for landscaping. The advantage of using native vegetation is its low maintenance factor. For example, buffalograss, which grows to only six inches in height, does not require frequent mowing and is also fairly drought tolerant.

Another advantage of native plants is their relative inexpensiveness. Some wildflowers are perennial, and seeding isn't necessary every year. Even some of the annual species may reseed themselves. However, initial seeding can be expensive because of limited availability of certain varieties, LaDuke adds.

Major corporations and golf courses are planting wildflowers as attractive yet maintenance-free border areas. LaDuke says that around the country, especially in the Southwest, landowners are realizing the advantages of native vegetation. It is expensive to plant and maintain vegetation that really doesn't belong to a certain area.

"The concept of growing native plants has really taken off since the National Wildflower Research Center was established by Lady Bird Johnson in 1982." LaDuke comments. This Center is a clearinghouse for information on wildflowers and supports research projects like his northern-most one at UND. LaDuke tries spring and fall plantings, with mixed and single variety plots. Seed, manpower, and equipment have been donated.



LARRY THOMPSON, IN MEMORIAM

We are all greatly saddened by the recent loss of one of Montana's finest naturalists and conservationists, Larry Thompson. Larry accomplished more in 39 years than most of us hope to in 80. As a writer, he contributed numerous scientific and popular articles, as well as a book on Montana's early naturalists. He was also a gifted portrayer of the natural world in drawings and paintings, a musician, and jovial friend to people all over this state. Larry was a long-time supporter of The Nature Conservancy, as well as many other conservation groups, and was instrumental in getting the Montana Natural Heritage Program started. Larry's

outstanding contribution to the knowledge and conservation of Montana's biological resources deserves nothing less than a natural area preserve in honor of this remarkable man. TNC is currently investigating some of Larry's favorite places, and will announce a site for a memorial preserve in the near future. Tax deductible contributions earmarked for this purpose should be sent directly to The Nature Conservancy's Big Sky Field Office, PO Box 258, Helena, Montana 59624.

REPRINTED FROM THE NATURE CONSERVANCY



RARE AND ENDANGERED PLANT PROFILE

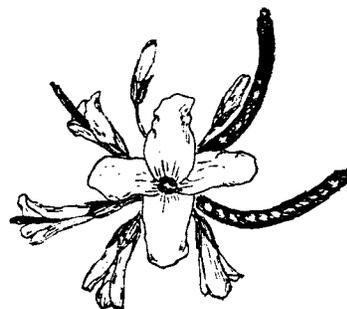
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This was thought to be the entire global range of the plant until 1988, when additional searches were conducted by the authors. The discovery of additional locations was quite serendipitous, however. We had worked together for three days in the Bitterroot Valley and Phillipsburg areas to obtain final information for a status-report update. Finding no new populations, Lisa moved on to look for another rare plant (*Claytonia lanceolata* var. *flava*, the yellow springbeauty) in the Pioneer Mountains. While searching the maps for a route to a possible survey location, she noticed a side canyon called Limekiln Gulch. Thinking of the habitat of Sapphire rockcress recently observed in Ravalli County, she thought "...no, not likely, but maybe...."

Her hunch was correct. After turning off the highway along the Big Hole River near Dewey, she noticed that the hillside to the east looked remarkably similar to the areas we had searched in the Bitterroot. Scrambling up the hill, Lisa was amazed to find what most certainly looked like Sapphire rockcress. Careful checking in the keys and comparison with a specimen in her plant press convinced her of the find. She continued up the canyon into the Pioneer Mountains as high as 7,500 feet, and discovered additional populations. Further searching along the Big Hole River revealed other sites. Eight new populations in all

were found in Beaverhead and Silver Bow Counties. The moral of the story, then, is always to follow a hunch, remain curious, and hike to likely-looking places at the slightest provocation.

The Sapphire rockcress had actually been proposed for listing under the federal Endangered Species Act, owing to its small geographic range and invasion of its habitat by spotted knapweed. The new discoveries led to a retraction of the listing proposal for the time being, to allow for additional surveys and an assessment of the threats in the newly discovered areas. However, the species is still known from only



twelve sites in a relatively small geographic area, and will continue to be a high priority on the list of rare plants in Montana.



WORD SEARCH

Search for 20 words used to describe members of the Brassicaceae family. Includes common names, specific names and terms used in descriptions.

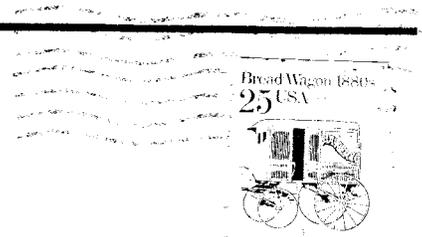
Words to look for are Alyssum, Arabis, basal, Brassica, Capsella, dehiscent, Draba, herb, mustard, Lepidium, Physaria, raceme, septum, silicle, silique, Stanleya, superior, wallflower, water-cress, and whitlowgrass.

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reprinted from SAGE NOTES, the newsletter of the Idaho Native Plant Society, Sept/Oct '88

KELSEYA

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FLORAS OF OTHER STATES

VASCULAR PLANTS OF WYOMING by Robert Dorn is now available in a revised edition. The 340 pages include keys to 3100 species, subspecies and varieties with over 250 illustrations. Cost is \$11.50 plus \$1.50 for shipping. Wyoming residents add appropriate sales tax for your county (3% = \$.16; 4% = \$.21; 5% = \$.26). Order from Mountain West Publishing, Box 1471, Cheyenne, WY 82003.



SHORT REVIEW

Technologies to Maintain Biological Diversity
Office of Technology Assessment
Congress of the United States, 1987
U.S. Government Printing Office
Superintendent of Documents
Washington, D.C. 20402
GPO #052-003-01057-7 \$15.00

The Earth's biological diversity - variety and variability among living organisms as well as the ecological complexes in which they occur - is being significantly reduced, and losses will probably accelerate over the next several decades, according to a report prepared by the congressional Office of Technology Assessment (OTA). These losses may impair future options to develop new products and processes in agriculture, medicine, and industry. They also undermine the potential of populations and species to respond or adapt to changing conditions.

Two complementary approaches are necessary to conserve diversity, according to OTA. On-site maintenance would preserve parks and other natural areas in an undisturbed condition. Off-site maintenance would preserve diversity in places apart from natural habitats, such as in seed banks.

The report also states that international cooperation in conservation efforts is needed. Present

programs are uncoordinated, underfunded, and too narrow. Progress depends on encouraging the synthesis of research results and on expanded communication among resource managers.

Review reprinted from the *Journal of Forestry*, 86(1): 44-45.



MONTANA NATIVE PLANT SOCIETY
DIVISION OF BIOLOGY
UNIVERSITY OF MONTANA
MISSOULA, MT 59812

Membership categories:

- \$8 Individual
- \$25 Business/Corporation
- \$250 Lifetime

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All contributions to the Montana Native Plant Society, a non-profit organization, are tax-deductible. Please make checks payable to the Montana Native Plant Society.

- Will you help with Membership;
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 Field trips; Other _____