

KELSEYIA

NEWSLETTER of the MONTANA NATIVE PLANT SOCIETY

Revegetation on Montana's National Forests

— Peter Lesica and Scott Miles

The past 20 years has seen an increase in efforts to restore natural habitats degraded by human activities. Restoration projects vary from roads and trails to abandoned mines and overgrazed range. In some instances native plants are employed for revegetation, but exotic species are often used as well. In this way we are replacing native vegetation with exotics.

Federal land management agencies have been among the most active practitioners of revegetation. We conducted a survey of U.S. Forest Service ranger districts in Montana to gain an idea of what plant materials are being used. We randomly selected nine ranger districts, one from each national forest in the state, and requested information on revegetation projects in 1994-96. Over 80% of the total revegetated area was planted with mixtures of non-native or predominantly non-native species (Table 1).

This is a total of two square miles of exotics planted each year in numerous places throughout the state. Most revegetation (81% by area) was done for timber, watershed or wildlife projects. Nearly half (42%) of the watershed plantings used native mixes, but wildlife and timber projects used mainly (90%) exotics. Seed mixes varied greatly among ranger districts. Three districts used predominantly native seed mixes, while the other six used mainly exotic species. Three of the commonly used exotic grasses (Table 2) are considered invasive. Timothy (*Phleum pratense*)

Table 2. Species commonly used in forest service seed mixes. Acreage seeded in 1994-96 is shown in parentheses.

Exotic	Native
<i>Bromus inermis</i> (535)	<i>Festuca ovina</i> (355)
<i>Dactylis glomerata</i> (478)	<i>Bromus carinatus</i> (279)
<i>Phleum pratense</i> (445)	<i>Agropyron dasystachyum</i> (267)
<i>Lolium multiflorum</i> (329)	<i>Agropyron trachycaulum</i> (265)
<i>Agropyron cristatum</i> (317)	<i>Agropyron spicatum</i> (109)
<i>Festuca duriuscula</i> (235)	<i>Linum perenne</i> (12)
<i>Melilotus officinalis</i> (199)	
<i>Trifolium hybridum</i> (174)	

and smooth brome (*Bromus inermis*) are listed as invasive and aggressive in Glacier National Park, and the latter is considered one of the worst weeds by natural areas managers in Canada. Crested wheatgrass (*Agropyron cristatum*) is also reported to spread under some circumstances and can be a serious problem once established [see *Kelseyia* 9(3)]. Yellow sweetclover (*Melilotus officinalis*) has invaded many native plant communities and may disrupt natural systems by increasing soil fertility.

There are many reasons to use native plants for revegetation. Natives, especially if collected locally, are adapted to the soils and climate of the region.

Table 1. Land area (acres) revegetated with native, non-native and mixed seedings on nine Montana ranger districts in 1994-96.

Ranger District	Native	Mixed >50% Native	Mixed <50% Native	Non-native
Deer Lodge (Deer Lodge NF)	20	0	0	6
Hungry Horse (Flathead NF)	0	0	16	215
Lincoln (Helena NF)	0	0	120	0
Livingston (Gallatin NF)	59	55	0	0
Missoula (Lolo NF)	0	0	174	20
Musselshell (Lewis & Clark NF)	4	25	0	0
Rexford (Kootenai NF)	0	0	0	138
Stevensville (Bitterroot NF)	0	2	0	38
Wise River (Beaverhead NF)	0	0	35	0
TOTAL	83 9%	82 9%	345 37%	417 45%

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FROM THE PRESIDENT

Billings/Red Lodge News (another new chapter!)

At the request of Artemisia Chapter Representative, Clayton McCracken, I went to Billings November 10 and presented my "Botany of the Lewis and Clark Expedition" program at the Science Auditorium at MSU-Billings. The purpose of the meeting was to find plant folks in Billings who might like to join the MNPS /Artemisia Chapter, which has been having a slow time of it since Don Heinze left. One hundred enthusiastic plant folks showed up and received MNPS newsletters and a questionnaire. I hope that many of them do decide to join MNPS and support the Artemisia Chapter.

In the afternoon before the program Clayton and I had the distinct pleasure of meeting with former Artemisia Chapter Representative, Jean Radonski, who has moved to Red Lodge and formed a new chapter there (our seventh) which they are calling the Beartooth Mountain Chapter. Jean is the president of this new chapter and David Owen is vice-president. They have been having monthly meetings and are planning a native plant garden at the Carbon County News Office. Congratulations to Jean and welcome to the new Beartooth Mountain Chapter!

Howellia Chocolates Make Great Gifts!

At our annual Fall Board meeting in Helena November 4, the Board approved the presentation of an honorary MNPS life membership to Mary Gray of Aunty Shrew LTD. in Missoula for her outstanding contribution to Montana's first threatened plant species. Mary has designed and sold fine *Howellia* — since November, 1995. A portion of the profit of the sale of these chocolates goes to a fund for the research and protection of *Water Howellia*, the first Montana plant listed under the Endangered Species Act (see *Kelseya* Winter 1995). This fund is deposited with and managed by MNPS. To date the fund has accumulated \$1200. This summer \$628 was used to support a group of volunteers, headed by Shannon Kimball, in construction of a fence to exclude livestock grazing around *Howellia* habitat that was believed to be adversely affected by livestock grazing. Mary Gray not only raised the funds for this project but personally spent many hours working on the fence and rounding up volunteers.

Lately, however, *Howellia* chocolate sales have fallen off. Mary has lowered the price to \$3 for a 5 oz. box, and sent free samples out to MNPS members to boost sales. I encourage you to support this project by ordering your *Howellia* chocolates from Mary Gray at: Aunty Shrew Ltd., 1916 Brooks, Suite 125, Missoula, MT 59801, phone 406-549-0832.

Increase in Membership Fees

Announced in this issue is the first increase in regular membership fees since the Society was formed in 1987. The cost of the production of our *Kelseya* newsletter has steadily risen during this period until the fees will no longer

support newsletter production. With the fee increase, the newsletter will again be fully supported by membership fees. The fee increase will also free up funds raised at the annual meeting, sale of notecards and other special fundraisers to be available for projects that promote the objectives of MNPS. Such projects include: 1) a botanical/Lewis and Clark trunk for school and public education, 2) a plant collection for Mt. Helena City Park to be available for public use at the Lewis and Clark County Library, 3) herbarium cabinets for the University of Montana Herbarium, 4) contribution to the publication of a *Flora of Glacier National Park*, and small research and educational grants. So, please support the fee increase with which we can continue to function as a Society that promotes native plant education and conservation!

Once forgotten...

I often worry about the loss of native plant diversity with the plowing of our native prairies, the residential development of our river bottoms, and the over-harvesting of our native medicinal plants. Recently, I picked up the current issue of *Northern Lights* with an article titled "The Forests of Forgetting" by Guy Hand, and read: "...ultimately it may be the forgetting, not the loss of forests, that breaks the connection between the wild world and ourselves. Once the look of mature woodland, the sweet resinous smells, the chirps and squeals, the sense of sanctuary fall from memory, we have no instrument of comparison, no place that we can confidently call uncorrupted, nowhere that hasn't been impoverished by our own limited grasp of the way the world works. And once forgotten, such wonders may be impossible to imagine back into being." Inspirational words that reminded me that while teaching wildflower classes at the Yellowstone Institute I am often asked "How did the Native Americans find out which plants were edible and which ones were poisonous?" My reply is usually "When Native Americans are asked this question, I am told their reply is often 'our grandmothers told us'...but, my question for you is 'how did we allow ourselves to forget (that which we had always known about plants)?"

Perhaps it is our responsibility, as the Montana Native Plant Society, to forever remind the people of Montana of the great beauty and tremendous diversity of the native species and plant communities found here, so that they will never fade from our landscape, much less our memory — so that our grandchildren will never have to try to "imagine it back into being".

—Wayne Phillips

REMEMBER, MEMBERS, IT'S
RENEWAL TIME!! WE'D LOVE TO
HEAR FROM YOU!!

Montana's Huckleberries: a new Montana crop?

—Robyn Klein

On Wednesday, December 3rd, Dr. Bob Gough, of the Horticulture Department at MSU-Bozeman, presented his latest research on the Montana huckleberry (*Vaccinium globulare*) to the Valley of the Flowers Chapter of MNPS. Dr. Gough got started on his cultivation project with a grant from MNPS's Small Grants Program in 1997, although he has been involved in *Vaccinium* research and the study of cultivating fruit for most of his career.

Montana's "huckleberry" is really a blueberry, a species in the genus *Vaccinium*. The real huckleberry is actually of the genus *Galyussacia*, has very pink flowers, leaves with undersides which look like they have been splashed with varnish, and fruits with large seeds which crunch like Rice Crispies when eaten. Additionally, *Galyussacia* is not native to Montana and is found only east of the Mississippi River.

Botanists disagree on which species exists in the Gallatin Valley of southwestern Montana — is it *Vaccinium globulare*, *V. membranaceum*, or *V. deliciosum*? Because the *Vaccinium*s crossbreed easily, keying the species is difficult. Whatever the species, blueberries are a very, very popular market item right now, which has caused great concern for wild populations among botanists and conservationists. The wild crop is now worth about \$4 million.

Although cultivation of Montana's "huckleberries" to satisfy demand while protecting wild populations is a goal of Dr. Gough's research, cultivation is fraught with difficulties. For starters, the species grows high in the mountains on well-drained acidic soils with a pH around 5. In contrast, most cultivation would occur in valleys where soil pH is usually 7-9. Since a pH higher than 5.5 induces iron chlorosis, many commercial blueberry crops suffer from iron deficiency. To lower the pH with soil amendments is not commercially feasible on a large scale.

Secondly, *Vaccinium*s grow under conifers and may require 40% shade. Sun-intolerant species in their native habitat are known to become stressed under full sun where downed trees created open space.

Another problem with cultivation on a commercial scale is the poor volume of fruit. There are not many fruits on the

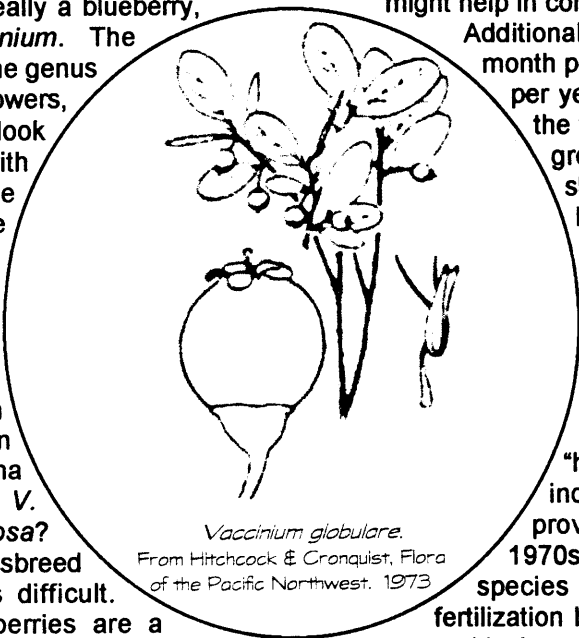
wild Montana "huckleberry." A typical bush might have 50-60 new shoots, but not every shoot produces a berry. The berries are usually borne singly at the bottom of a five-node shoot. In many cases, only two of the five shoots will develop into leaves, while the bottom three stay dormant. These buds remain viable for up to 15 years, when they are finally covered over by developing bark, but will sprout if the buds above them are damaged. Therefore, pruning might help in commercial propagation.

Additionally, shoot growth occurs only over a one-month period, with one "flush" of vegetative growth per year in wild populations. The fruit ripens in the first week of August. As soon as the shoot growth ends, the buds differentiate into a shoot and a flower for the next year, thus being adapted to short growing seasons. Although there has been some speculation that the seeds require scarification such as occurs when passing through the digestive tract of grizzlies, it doesn't seem to be of major importance to the continuation of the species.

Cultivation of wild Montana "huckleberries" may also require mycorrhizal inoculation of the soil, a procedure which proved unsuccessful when attempted in the 1970s. Since most Ericaceae (heath family) species have mycorrhizal associations, heavy fertilization by commercial growers may be required if mycorrhizal associations are not developed.

And then there is the problem of pollination. The pollinators are not known at this time, although the bumblebee is suspected. Propagation may be more commonly vegetative, via rhizomes. Grafting has not been tried with this species, but may prove feasible in the future. The roots are very fine and delicate, with several plants interconnected underground, although the rhizomes tend to occur in shallow soil at a depth of 4-6 inches below the surface. Because of these problems, Dr. Gough feels that hybridizing *Vaccinium globulare* with species such as *V. corymbosum* or *V. membranaceum* that have vigorous root systems and clusters of fruits, may be a possibility.

But maybe flavor will prove the most formidable problem to commercial propagation of Montana's "huckleberry." The best wild berries are small and varied in flavor. When collecting wild blueberries, one has to collect from many bushes, thus acquiring a variety of different flavors in one mouthful. To duplicate this distinctive flavor commercially may not be possible.



Vaccinium globulare.
From Hitchcock & Cronquist, Flora
of the Pacific Northwest. 1973

IT'S NOT TOO EARLY TO SET ASIDE THE DATE OF THE ANNUAL MNPS MEETING!!

Our annual meeting has been set for July 10-12, sponsored by Clark Fork Chapter, and will take place at Seeley Lake. Watch for details in the Spring edition of the *Kelseya*!!

MNPS 1997 SMALL GRANT PROJECT REPORT -- AN EDUCATIONAL TRUNK ON MONTANA NATIVE PLANTS

The following is a report submitted by MNPS member and 1997 small grant recipient Carla Wambach. This is the first of a two-part series reporting on accomplishments associated with the two funded 1997 small grant projects.

The Educational Trunk, *Montana Native Plants Interwoven through the Journey of Lewis and Clark*, was created by Carla Wambach of Helena, Montana. This was a matching grant project funded by the Montana Native Plant Society Small Grants Program and Montana Department of Fish, Wildlife and Parks. Following is a description of the educational trunk:

Experience a different perspective and adventure across Montana on the trail of Lewis and Clark as beginning botanists! Discover the native plants identified by Lewis and their use by the various early Indian peoples. A narrative accompanied by slides may serve as an introduction. A data base of identified plants by family, scientific and common

name is provided. Wildflowers, grasses and weeds are researched as well as edible and medicinal plants. Botany and history become interwoven through diverse support materials such as teaching curriculum, books, field guides, overhead transparencies, pressed and preserved species, games, a musical cassette, storytelling techniques and video. Internet sites are presented. The intent is to reach out to folks of all ages and interest levels — teachers, children, home schoolers, elder hostel, family and community groups, and to pique their interest in plants. The trunk is available for use by interested schools and groups.

Note: Carla has already shown the trunk to educators around the state. The MNPS Board of Directors is currently working on a plan for distributing this educational trunk throughout the state.



LAST CALL - 1998 SMALL GRANTS COMPETITION PROPOSALS DUE JANUARY 15TH

The deadline is nearing for the Montana Native Plant Society second annual small grants competition. The small grants program awards one or two grants of up to \$500 each for educational and research projects supporting conservation of Montana native plants. Information on the Small Grants Competition may be requested from the MNPS Small Grants Committee at (406) 542-4173 or c/o MNPS, P.O. 8783, Missoula, MT 59807-8783. The deadline for proposals is **January 15, 1998.**

NATIVE PLANT CONSERVATION INITIATIVE (NPCI) UPDATE

Angie Evenden continues to serve as the MNPS contact with the National Native Plant Conservation Initiative. She reports that the National Committee has been busy with several projects and publications. Please check out the Native Plant Conservation Initiative web site at <http://www.aqd.nps.gov/natnet/npci> for a summary of current projects. Also contact Angie at (406) 542-4173 if you are interested in more information on the Initiative.

The Native Plant Conservation Initiative, in cooperation with the National Fish and Wildlife Foundation, awarded 34 grants in 1997, worth more than \$500,000 in federal funds and non-federal matching contributions to be used for native plant conservation, education and restoration projects in 20 states and the District of Columbia. The projects include a survey and monitoring program for sensitive or rare native plants, development of an educational coloring book on rare native plants, restoration

of a variety of habitat types, continuation of a highly successful volunteer restoration program and development of an Internet-based invasive plant database on the World Wide Web. Designed to identify national priorities for native plant conservation and to fund conservation and restoration projects that address those priorities, the program partners federal agency natural resources staff with private organizations and groups to accomplish the projects. Grant recipients match the funds awarded by NFWF with private contributions of money or in-kind services such as technical assistance. Matches must be at least one to one, and most are greater than that. The Native Plant Conservation Initiative has been offering the grant program for three consecutive years, administering grants totaling \$1.5 million in federal and non-federal funds for a total of 71 projects in 31 states and the District of Columbia.

FRANCES ELLIOTT'S FLOWER WATERCOLORS

— Bill Elliott

What do you do with over 450 lovingly-executed watercolor paintings of wildflowers? This is the heritage my mother, Frances Elliott, left when she died in 1987. Born near Corvallis, Montana, in 1893, Frances grew and attended grade school and high school in the same community. Her unique high school experience featured four years with the same teacher for all classes. She and two classmates comprised the graduating class. This did not leave much room in the curriculum for art studies; however, at age 16 she did take lessons from a local woman, Mrs. Hull, who painted wildflowers on china.

Over the years, her responsibilities increased and, while she continued to paint an occasional bouquet of wildflowers in watercolor, Frances' budding interest in the subject lay relatively dormant until she and her husband, Howard, retired in 1956. She then had the time and opportunity to pursue her interest. In the winter months my parents would abandon their little retirement house in Deer Lodge and head south in their Airstream trailer for the warmer climes of California and Arizona.

During their time in the Southwest, Frances painted 229 desert flowers. When enjoying the summer months in Deer Lodge, she produced 184 watercolors of Northern Rocky Mountain flowers. Another set of 38 paintings called the Highway Group comprised their discoveries while on the move. This latter set includes desert, coastal and Northern Rocky Mountain flowers with the dates and localities often noted on the paintings. My father was a good photographer and Mother would sometimes paint from his colored slides, although she preferred to paint from life.

Self-taught in the knowledge of botany, Frances knew how to key plants; but she still liked to use the common names of the flowers. She preferred to call her paintings "studies" and they were indeed as detailed as she could paint them — with a certain artistic flair — all done for the sheer joy of it, with no profit motive in mind. The family would like to keep it that way. The painting

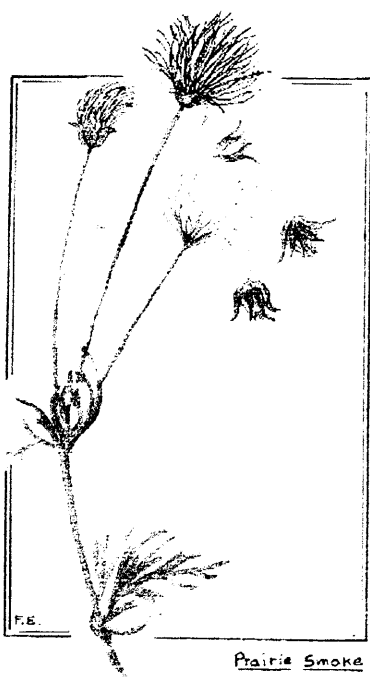
activity all but ceased after my father's death in 1967; however, Frances did write brief, folksy paragraphs for 159 of the Montana flowers. This is her paragraph on the Wild Flax:

This flower of "heavenly blue" grows on such a slender stalk that it seems to be swaying when there is no wind. Even though slender, the stalk is very tough, for it is closely related to the domestic flax, from which linen fibers are taken. The Indians used it for cordage and fish lines. It has a beautiful, delicate blossom that fades so fast, it is a shame to pick it. Craighead states that cattle get drowsy when they eat it. It is also called "Lewis flax" and "prairie flax."

In 1992 Lee Silliman, a teacher and photographer, became interested in the paintings and, through the cooperation of the Powell County Museum, arranged a small exhibit of a selection of her watercolors. A year ago members of our family and Mr. Silliman met several times to decide what would be the best way to create an awareness of the collection and to make it available for examination. All solutions require money, possibly in the form of grants. My brother Paul Roy and I are the legal heirs; but we are both in our 70s so we need to establish a form of trust or foundation in order to keep the collection together.

In the meantime, we are documenting the collection with colored slides and employing the use of computer-scanning for storage on a CD. We have purchased acid-free materials for archival storage. The Elliott family welcomes any suggestions on the most effective use of this collection.

Bill Elliott is a retired educator who spends a lot of time outdoors. He taught in Billings, was an elementary principal in Montana at Stanford and Whitefish. He wound up his career in the Montana Office of Public Instruction. Bill can be reached at 541 E. 6th Ave., Helena, MT 59601; phone 449-3096; e-mail jillbeanne@aol.com. Two of his mother's paintings have been reproduced below in black and white.



Prairie Smoke



Deer's Tongue

CALENDAR

MEETINGS

Maka Flora Chapter. Regular winter meeting is tentatively scheduled for the third Sunday of January. Notices will be sent to all Chapter members shortly after the first of the year.

Flathead Chapter. Due to the Postal Service's over-eager handling, the Chapter's schedule of meetings sent to the *Kelseya* editor arrived in a mangled condition! Therefore, notices will be sent to all Chapter members about the season's events. Sorry for the inconvenience!

Thursday, January 8, Clark Fork Chapter. 7:30 pm. Don Fawcett, photographer extraordinaire, has assembled all his "mystery" Montana wildflower slides. He and Dorothy invite us to their home to "Name That Wildflower." Intrigue and delightful hospitality at 1224 Lincoln Road. For more information call 549-1415.

Thursday, January 8, Beartooth Mtn Chapter. 7 pm, Pollard Hotel, Red Lodge. Jean Radonski will present a slide show of the Pryor Mountains.

Wednesday, January 21, Kelsey Chapter. 7 pm, Lewis & Clark Library, Helena. Dr. John E. Taylor, Professor Emeritus from Montana State University will present a program titled, "Reading Grassland Communities." The slide show and discussion will focus on using plants to determine the ecological status of grassland communities in Montana. Dr. Taylor is the author of "Range Plants of Montana" and co-author of "Lewis and Clark in the Three Rivers Valley."

Monday, January 26, Artemisia Chapter. Time and place TBA in early January. Bill Milton and Hal Vosen will teach us "How to talk grasses like a rancher." Bill and Hal will describe each species of grass and explain how that species was essential to their livelihood as ranchers.

Tuesday, January 27, Clark Fork Chapter, Herbarium Night. 7:30 pm. Rm 303, Botany Bldg, UM Campus. Everyone wants to know more about lichens. UM graduate student Andrea Pip will introduce us to some of our common species and their unusual anatomy. Then the following weekend we'll go out and see them in the wild (see below).

Saturday, January 31, Clark Fork Chapter. 9:00 am. Rm 303, Botany Bldg, UM Campus. We'll meet in the herbarium for a short course on moss identification with Joe Elliott and then go out into the Hellgate Canyon to look for lichens and mosses with Joe and Andrea (see above). Dress warm and bring a hand lens.

Wednesday, February 4. Valley of the Flowers Chapter. 7:30 p.m., 306 Lewis Hall, MSU campus. Dr. Alfonso

Delgado from Mexico will present some of his research on wild and cultivated beans (*Phaseolis* spp).

Thursday, February 5, Beartooth Mtn Chapter. 7 pm, Red Lodge Library. Program to be announced.

Thursday, February 12, Clark Fork Chapter. 7:30 pm. Rm 131, Science Complex, UM Campus. If you're studying seed catalogues for spring planting ideas, tonight's speaker can help. Biologist Byron Weber will present "Butterfly Gardening," advising us which plants (including natives) we can get to attract butterflies.

Tuesday, February 24, Clark Fork Chapter, Herbarium Night. 7:30 pm. Rm 303, Botany Bldg, UM Campus. Peter Stickney will begin to enlighten us on one of his favorite families, Montana Liliaceae: Mariposa and Sego Lilies, The Genus *Calochortus*.

Thursday, February 26, Kelsey Chapter. 7 pm, Lewis & Clark Library, Helena. Brian Martin, Director of Stewardship for the Nature Conservancy will present a program called, "Rare Biodiversity and the Status of Conservation in the Northern Great Plains." The slide show and discussion will update us on the Nature Conservancy project in the Northern Great Plains that focuses on species that are targeted for conservation, where they are found, and the special habitats that support them.

Wednesday, March 3, Valley of the Flowers Chapter. 7:30 p.m., 306 Lewis Hall, MSU campus. Roger Sheley introduces us to integrated weed management of noxious weeds.

Thursday, March 5, Beartooth Mtn Chapter. 7 pm, Red Lodge Library. Photographer Ann Larid will make a slide presentation of wildflowers.

Thursday, March 12, Clark Fork Chapter. 7:30 pm. Rm 131, Science Complex, UM Campus. Joe Elliott, raconteur, bon vivant and botanist will entertain and instruct with a presentation on "African Alpine Plant Ecology: Weird Plants of Mt Kenya and Mt. Kilimanjaro."

Tuesday, March 31, Clark Fork Chapter, Herbarium Night. 7:30 pm. Rm 303, Botany Bldg, UM Campus. What's so great about *Astragalus*? It's Montana's second largest plant genus, that's what. Come learn about our locoweeds and milkvetches with Peter Lesica. Bring your hand lens and copy of Dorn if you have them.

Wednesday, April 1, Valley of the Flowers Chapter. 7:30 p.m., 306 Lewis Hall, MSU campus. Barring any spring snowstorms, Jerry DeSanto will be in Bozeman to discuss gardening with native alpine wildflowers.

CALENDAR

EVENTS

Artemisia Chapter. One hundred people filled the Billings auditorium in November to hear Wayne Phillips' "Botany of the Lewis and Clark Expedition." This was the first of four events planned for this winter to rejuvenate the Artemisia Chapter. What a way to start! Wayne put in an intense and full day in Billings during his November visit. He held productive meetings with Jean Radonski from Red Lodge and with Hal Vosen of Miles City. He also listened, empathically and somewhat patiently, to Clayton McCracken's harangue about the washout of the Lamar River last June — a stark example of loss of stream banks where the woody riparian vegetation has been destroyed.

Calypso Chapter. Five field trips were held this summer by this newly formed chapter: two in the Butte-Anaconda area led by Chapter President Paul Sawyer, Pipestone Pass, led by Paul Sawyer; Vipond Park, led by Sheila Thompson; Tobacco Root Mountains, led by Chapter Secretary-Treasurer Kevin Suzuki; and Gravelly Range, led by Kevin Suzuki, Sheila Thompson, and Vice-President Annie Greene.

Great Falls area "non-Chapter". Although no one has volunteered to become chapter officers, the Great Falls area members continue to be active. There was a good turnout for the Smoke-in-the-Hole Botanical Walk near Monarch on October 5 — a splendid day for 20 plant lovers to study mosses, lichens, and liverworts. We were accompanied by Dr. Won S. Hong of the University of Great Falls, a nationally recognized expert on liverworts and mosses, along with several of his students. Geologists Gwen McBride and Dr. Dave Baker shared their knowledge of the geology of the area with us also. A *Marchantia polymorpha* (lung liverwort) was found, complete with gemma cup — a small body of a few cells that is involved in the plant's vegetative reproduction. We also learned to recognize the female and male sex organs: the archegonium and antheridium.

We ate our lunches at the spring creek's source, where crystal water came rolling out of a rock wall, spreading over a green carpet of mosses, as Wayne Phillips recited the

poem "Iversnaid" by Gerard Manley Hopkins. We were even treated to the last blooms of the *Mimulus guttatus* (yellow monkeyflower) along the streambanks.

After lunch the participants split into two groups. The first group went with Dr. Hong and his students to Paine Gulch Research Natural Area. The second group went with Wayne Phillips to Blankenship Gulch where the sensitive orchid, *Goodyera repens* (northern rattlesnake-plantain), was found among the feather mosses *Hylocomium splendens* (step moss), *Ptilium crista-castrensis*, and *Pleurozium schreberi* (red-stemmed moss). Dr. Hong and his students made a list of all the mosses they observed and collected on the trip. The specimens are deposited at U. of Great Falls herbarium.

Maka Flora Chapter. To begin, a belated thank you to everyone who put so much of their time, energy, and resources into the annual meeting at Makoshika last June. In addition to Chapter members who went above and beyond the call, there were individuals from across the state who helped out a great deal. We couldn't have done it without you. Also, thanks to all of you who "visited the colonies"! Please try to come out again, perhaps join us for a regular summer outing?

Other chapter activities this past year included two late-season plant walks. The first was in late August at a place known as the Garden of the Gods, which is located in the breaks along the north side of the Missouri River near Culbertson. We had our largest turnout ever, which included Brian and Jo from Helena! Although it was late in the year, we still were able to find good numbers of Blazing Star (*Liatris punctata*) in bloom as well as several species of sunflower (*Helianthus* spp) and some other scattered specimens. The scenery along the bluffs was spectacular. Afterward we adjourned to a riverside site on the Carlisle ranch and had a picnic and campfire. We ended our season by spending the afternoon of September 14th at Kane's grove south of Culbertson. This was a repeat visit to the site but because it is such a diverse area, there are always new places to explore. We used our time to walk the surrounding native grassland and concentrated our efforts on identifying grass species.

Beartooth Mountain Chapter forms in Red Lodge.

On November 6, a group of plant lovers from the Red Lodge area held the first official meeting of the Beartooth Mountain Chapter of MNPS. Jean Radonski, who headed the Billings-based Artemesia Chapter before moving to Red Lodge last summer, was elected President. "With a range of ecosystems from arctic tundra on the Beartooth Plateau down through forest and riparian communities to the sagebrush plains, there are a huge number of native plant

species in the Red Lodge area," Radonski notes. "We have a good group of dedicated people in the chapter, and are already working on plans for a small park landscaped with native plants to be built on a vacant piece of land right in the center of town."

Initial response to the new chapter has been gratifying, with over a dozen paid members attending the first meeting.

***Astragalus lackschewitzii*: Montana's newest endemic!**

Though one of the largest genera of flowering plants with around 2500 species, the genus *Astragalus* is diverse in only three regions of the world: the highlands of central Asia, arid regions of western North America, and the Andes in southern South America. In North America, where about 500 of the species occur, the diversity of *Astragalus* is attributed to indigenous origin and concentrated in desert regions. But within the North American species, *Astragalus molybdenus* was known essentially from a few localities restricted to high alpine tundra in the central Colorado Rockies. It differed from most other North American *Astragalus* in both morphology and its alpine habitat.

A novel collection from Wyoming that was most similar to *A. molybdenus* was described by Barneby in 1981 as *A. shultziorum*. It was most similar to *A. molybdenus* but with sufficient vegetative and fruiting distinctions to consider it a new species, according to Barneby. However, the recent editions of *The Vascular Plants of Wyoming* by Dorn place this species as a taxonomic synonym of *A. molybdenus*. To compound the situation, collections were being made of plants from the Rockies in west-central Montana, all of which Barneby annotated as *A. molybdenus*. Like the Colorado and Wyoming populations, the Montana plants were of alpine to subalpine tundra habitat and of calcic (mostly limestone) substrate. The Montana plants mixed morphologies of the Wyoming and Colorado populations, but with a distinctive petal color. Uncertainty therefore developed as to whether the discovery of the Montana populations supported Dorn's taxonomy or whether a third species from Montana should be recognized.

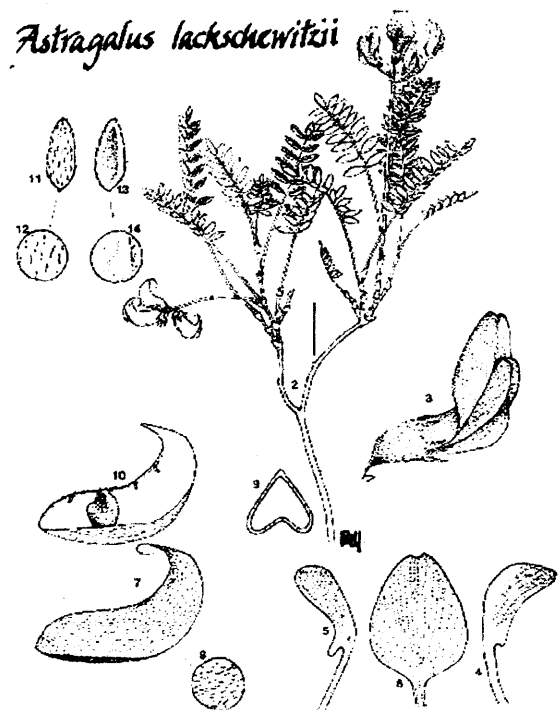
A study of the Colorado, Wyoming, and Montana populations ascribed to *A. molybdenus* was undertaken by Dr. Matt Lavin of MSU-Bozeman and Hollis Marriott of the Wyoming Nature Conservancy to determine whether these populations were actually the same species. The study involved chromosome counts and DNA analyses as well as examination of morphological characters. Results of their study indicated strong genetic and morphological divergence among the three groups of *A. molybdenus*, which suggested long historical barriers to gene flow. Lavin and Marriott proposed that the Colorado, Montana, and Wyoming entities be circumscribed as separate species.

The Colorado populations retain the name of *A. molybdenus*, where the species is endemic to a relatively small region in central Colorado and inhabits strictly alpine tundra at 3625-3960 m (11,890-12,989 ft). *Astragalus shultziorum* retains the name applied to it by Barneby, is endemic to Wyoming, inhabits primarily the subalpine zone, and rarely reaches the lowest limits of the alpine zone at 2680-3200m (8790-10,496 ft).

For the Montana populations Lavin and Marriott proposed the name *A. lackschewitzii* in honor of the late Klaus Lackschewitz from Missoula. *Astragalus lackschewitzii* is endemic to the Rocky Mountain front range in west-central Montana, specifically Teton County. This species inhabits the subalpine to alpine zone at 2210-2475 m (7249-8118 ft), and predominates in vegetative mats, often composed mostly of *Dryas octopetala* (but also other alpine species such as *Aquilegia jonesii*, *Claytonia megarhiza*, and *Erigeron lackschewitzii*), that can form up to 100% plant cover. *Astragalus lackschewitzii* may also inhabit sites with less cover, even on bare ground, such as scree slopes. The substrate of all sites is composed primarily of limestone. Flowering occurs from July to the beginning of August, and mature fruits disperse during August.

Reference

Lavin, M., and H. Marriott (in press). *Astragalus molybdenus* s.l. (Leguminosae): higher taxonomic relationships and identity of constituent species. *Systematic Botany*.



SECOND EDITION OF THE NATIVE PLANT SOURCE GUIDE NOW AVAILABLE!!

At long last, the newest edition of the "Source Guide for Native Plants of Montana" is available. The MNPS Landscape/Reveg Committee revised the first guide into a new, easier-to-use format. This edition is a detailed source list for bareroot and containerized plants and/or seeds of 583 native trees, shrubs, forbs, ferns, grasses, sedges, and rushes. Guidelines for collecting native plants are also included. For further information, call Linda Iverson at 406-932-5840. Guides will be available at local chapter meetings or by mail. The cost (includes postage and handling) is \$6 for MNPS members, \$8 for non-members, with checks payable to MNPS. Send checks and order information to: MNPS Source Guide/Linda Iverson, HC 88 Box 3733, Big Timber, MT 59011.

LINNAEUS' GARDEN

Restored in 1920 from its state of neglect and with renovations currently continuing, Linnaeus' garden is a green oasis in central Uppsala, Sweden. The history of this garden begins a half-century before the birth of Linnaeus in 1707. It was founded in 1655 by Olof [Olaus] Rudbeck the older, appointed professor of medicine and botany at Uppsala University in 1658. He had just returned from a journey to Holland, England, and France where he was impressed by the botanical gardens at the universities of Leiden and Utrecht. Rudbeck wanted to create something similar in Uppsala. He brought bulbs and seeds of rare plants from Holland. He introduced plants such as tulips, hyacinths, and the Peruvian nightshade – today called the common potato – to Sweden. The garden was soon bought by the University of Uppsala. The plant catalog, published in 1658, mentioned approximately 1000 different species; by 1685 the publication included more than 1800 different plants.

In 1702 a great fire devastated three-fourths of the city of Uppsala, and the botanical garden was partly ruined. Both Uppsala city and the university had suffered considerable losses in the fire and Sweden was a country involved in endless and costly wars. The garden was not restored to its old splendor until Linnaeus was appointed professor in the spring of 1742. The first thing he did was to prepare for a total reconstruction of the garden. Once completed, Linnaeus wrote to all his friends abroad, who responded by sending seeds and bulbs. In 1748 the number of species had grown to approximately 3000. In the orangery (a glass-walled enclosure for growing oranges in cool climates), he grew coffee, cocoa, rice, ginger, different kinds of cacti, and many other plants. He also kept a tea bush and a banana plant.

The garden, however, not only contained plants but also animals, e.g., raccoons, New and Old World monkeys, pigeons, and parrots.

Linnaeus worked in his garden, taught botany, and wrote books, among which was *Species Plantarum* (*Species of Plants*) – the basis of our present-day system of binomial nomenclature – written in 1753. Five years later, the same system of binomial nomenclature was applied to animals in the 10th edition of his *Systema naturae*. He continued working eagerly in his garden until 1774 when he had his first stroke. In 1776 he had another one, more severe. His movements became unsteady and his talk and thoughts started to become unclear. He died on January 10, 1778. Linnaeus' son Carol von Linne' the younger, continued as professor and keeper of the botanical garden, but the university administration showed no interest in the garden and it started to decline. When the 200th anniversary of Linnaeus' birth was celebrated in 1907, all that the university could show the visiting scientists from foreign countries were open spaces covered with grass and surrounded by hedges.



Ten years later, the Swedish Linnean Society was founded with the aim of restoring Linnaeus' botanical garden, collecting items that had belonged to him, and publishing papers about him and his students. Today, the Society has renovated Linnaeus' home and converted it to a museum. The garden has been cultivated since 1918 and is continuously evolving to more closely approximate Linnaeus' original garden, and includes the 1300 different plants that formed the basis of his "library."

—Condensed from "Linnaeus' Garden," by Håkan Tunón, PhD,
Uppsala University, Uppsala, Sweden, *HerbalGram* No. 40.
Illus. of Linnaeus from Cronquist, *Introductory Botany*, 1961.

Northwest Penstemons

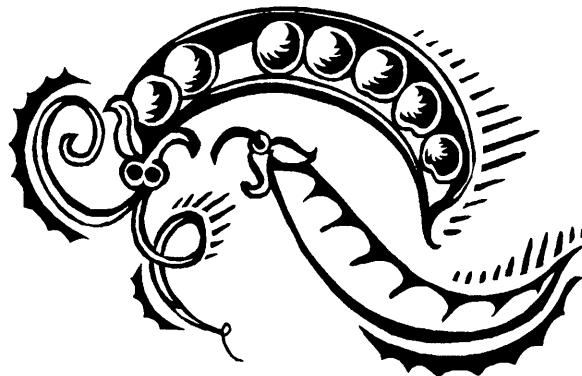
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NEW VOLUME OF THE INTERMOUNTAIN FLORA SERIES NOW AVAILABLE

Volume 3A in the Intermountain Flora series was published in the summer of 1997. With the publication of this volume, there are now six volumes of the series in press. Volume 3A covers the subclass Rosidae and includes 40 western families. Among these are the Rose (Rosaceae), Saxifrage (Saxifragaceae), Evening Primrose (Onagraceae), Maple (Aceraceae), Geranium (Geraniaceae), and Carrot (Apiaceae) families. Omitted from this volume is the legume family (Fabaceae), which was covered in Volume 3B previously published in 1989 (the volumes are not issued in numerical order).

The volume features extensive line drawings, in-depth species and habitat descriptions, excellent keys, and a thorough synonymy. Although technically this volume does not cover Montana, the line drawings, species descriptions and habitat data will provide invaluable information on taxa which do occur both in Montana and the Intermountain region.

Volumes of the Intermountain Flora (IMF) can be ordered from The New York Botanical Garden, Scientific Publications Department, Bronx, NY 10458-5126, phone 718-817-87221. Include \$3.50 + 5% of subtotal for postage and handling.

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IMF 5 – The Asterales, \$75.

IMF 6 – The Monocotyledons, \$40.

REVEGETATION (Continued from page 1)

Having evolved as members of the indigenous plant communities, they are not likely to become invasive or form monotypic stands. Perhaps the most important reason for using natives in revegetation is to maintain biological diversity. Both plants and animals are more diverse in native vegetation compared to exotic plantations. Many species of insects have evolved to live on one or only a few species of plant. One study in an English forest found that each species of native woody plant had an average of five species of leaf-eating insect restricted to it. Native grasslands have more diverse bird assemblages than exotic pastures. The higher diversity of native communities may result in higher long-term productivity and stability.

Many intentionally introduced exotic species have become some of our worst and most costly weeds. Tamarisk, purple loosestrife, African lovegrass and smooth brome are examples. Since there is often a lag period between the time most exotics are introduced and when they are recognized as invasive, some of the species we are introducing now for short-term gain may become serious liabilities to future generations. Nonetheless, using exotic species for revegetation may be desirable in some instances. Stands of exotic grasses such as smooth brome will often resist invasion by noxious weeds like knapweed (*Centaurea maculosa*). Smooth brome requires ample light, so plantings along forest roads will not escape into adjacent native communities but may help control the spread of knapweed. Some non-invasive, short-lived, exotic grasses (e.g., annual ryegrass) establish quickly to help prevent erosion but disappear as long-lived, native species establish. Exotics may be the only species capable of establishing on some highly degraded sites such as mine spoils.

Not only is it often desirable to use native species, but it may be just as important to use local races of natives. Cultivars of native species are often derived from non-local sources and may be poorly adapted to the local climate,

BOTANY ANYONE?

(Title supplied)

There should be no monotony
In studying your botany.
It helps to train and spur the brain
Unless you haven't got any.

It teaches you – does botany
To know the plants and spot any
And learn just why they live and die,
In case you plant or pot any.

You learn from reading botany
Of woolly plants or cottony
That grow on earth and what they're worth
And why some spots have not any.

You sketch the plants in botany.
You learn to chart and pot any
Like corn or oats, you jot down notes
If you know how to jot any.

Your time, if you'll allot any
Will teach you how and what any
Odd plant or tree can do or be
And what's the use of botany!!

(By Berton Braley, appeared in *Science News Letter*,
March 9, 1929. Reprinted from *Bulletin of the Native Plant
Society of Oregon*, Volume 30, Number 12, December 1997)

soil, or plant community. Furthermore, native cultivars selected for vegetative or reproductive vigor may be able to replace local races at first but then do poorly when extreme conditions occur. On the other hand, native cultivars are more readily obtained than local seed, and their vigor and quick establishment may help exclude weeds and prevent soil erosion.

National forests within the Northern Region are encouraged to use native seed in revegetation by the USFS Regional Native Revegetation Committee, and many of the forests appear to be headed in that direction. Since 1994 Lewis & Clark N.F. has been collecting and propagating locally collected native grasses. Kootenai N.F. and Beaverhead-Deerlodge N.F. are beginning to collect local, native seed for nursery propagation. Both Missoula and Stevensville ranger districts believe they will be using more native seed in the future. If these native seed programs continue and expand, it should result in a significant decrease in the amount of exotics being introduced onto public land.

[We are grateful to Forest Service personnel who provided us with information for this article.]

Selected references

Northern Region Native Revegetation Committee. 1995. Northern Region Native Plant Handbook. USDA Forest Service, Missoula, MT.

Linhardt, Y. B. 1995. Restoration, revegetation, and the importance of genetic and evolutionary perspectives. Pages 271-287 in B. A. Roundy, E. D. McArthur, J.S. Haley, and D. K. Mann, editors, Proceedings: wildland shrub and arid land restoration symposium. USDA Forest Service General Technical Report INT-GTR-315, Ogden, Utah.



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Your yearly membership fee includes a subscription to *KELSEYA*, the newsletter of MNPS, published quarterly. We welcome your articles, clippings, field trip reports, meeting notices, book reviews — almost anything, in fact, that relates to our native plants or the society. Please include a line or two of "bio" information with each article. Drawings should be in black ink or good-quality photocopy. If you send clippings, please note the source, volume/issue, and date. All meeting and field trip notices, field trip reports or announcements should be mailed to *KELSEYA* CALENDAR, P.O. BOX 6444, BOZEMAN MT 59771. All items should be typed and on 3.5" diskette in Microsoft Word for Windows or in a generic ASCII file.

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