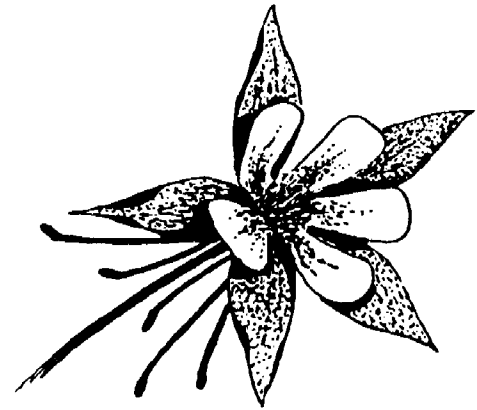


Aquilegia



Newsletter of the Colorado Native Plant Society

... dedicated to the appreciation and conservation of the Colorado native flora"

Volume 13, Number 2

March/April 1989

I Sought Isoetes

Loraine Yeatts

2 Sept. 1988. Armed with raft, rake, plant press and brand new hip-waders, Velma Richards, Jan Wingate and I advanced on Bierstadt Lake in Rocky Mountain National Park (RMNP). During our 1988 summer wetlands plant survey, we decided to document an F. J. Hermann collection of *Isoetes lacustris* plants which had washed ashore and are now enshrined in the University of Colorado herbarium (COLO). In its growth habit, this fern-related member of the Isoëtaceae resembles a miniature aquatic onion cluster, with bright green, slender, elongated cylindrical leaves (sporophylls) forming a rosette arising from corms rooted on lake bottoms or shorelines. The quill-like leaf form gives this plant its common name, quillwort. Megaspores and microspores, the asexual reproductive cells, are encased between dorsal and ventral leaf surfaces at their flattened bases and are arranged in alternating cycles in the rosette. The megaspore surface ornamentation characterizes each species but high-powered magnification is required to see this. A megaspore looks a little like a golf ball with an average diameter of 0.25 to 0.8 mm.

Undaunted by the stares of curious picnickers and ravenous, aggressive ducks who thought we should share our lunch with them, we proceeded to pump up the raft and feed pistachio shells to the ducks. With our knowledge of *Isoetes* limited to textbook images we spread out to maximize our search efforts. Velma, in her new hip boots, waded out into hip deep water. Jan patrolled the shoreline and I launched the raft, poling along with the rake. As I worked my way across the lake, I observed quantities of pondweed and masses of algae floating above the lake bottom ooze, but nothing recognizable as *Isoetes*. When Jan and I reconnoitered at the far end of the lake we realized that Velma had not moved from the spot where we left her and we wondered whether she was stuck in the ooze. But since *Isoetes* was our priority and Velma's head was above water, we continued our search.

continued on page 3

Calendar Overview

Additional information about calendar items will be found throughout this issue.

Workshops and Meetings

April 15 Pollination Ecology

Leader: Dr. Boyce Drummond

April 15 Rare Plant Volunteers

Leader: Betsy Neely, TNC

May 13 Board Meeting; 1:30 PM

At Gayle Weinstein's Home

Field Trips

May 20 - 21 Southeast Grasslands

Leader: Rick Brune

May 27 - 29 West Central Colorado

Leaders: Joanne Young and Jeff Dawson

June 10 Phantom Canyon

Leader: Alan Carpenter

June 18 Middle Park Endemics

John Anderson

June 20 - 23 Yampa River Trip

Leader: Tamara Naumann

July 8 Pueblo West/Arkansas Valley

Jim Borland

ANNOUNCEMENTS

Could it be . . . your LAST Newsletter?

Membership renewal time is running out if you wish to continue receiving *Aquilegia* on a timely basis. To determine your dues status, look at the mailing label on this issue. "Paid thru 1988" means your renewal has not been received (or credited, if sent in recently). The Society has many programs, field trips, and workshops planned for 1989, and welcomes your participation. Also, there will be important plant conservation issues to be addressed this year, and the Society needs your support to maintain and increase its effectiveness. We look forward to the publication this spring of the monograph on Colorado's rare plants. For all these activities, the Society needs your philosophical and financial support — please send your 1989 renewal NOW!! [See address on outside cover]

CONPS To Use A Liability Waiver

As we all are aware, we live in an increasingly litigious society—individuals and organizations have been sued for many reasons, some obvious and some less so. In addition, on occasion the Society has been asked by property owners for a release of liability for an activity to be conducted on their land. Your Society's Board of Directors has considered this situation, and has evaluated the choices available to protect the Society and its officers, directors, and members.

Purchase of liability insurance was investigated; it was found that the costs would have forced a significant dues increase, and would have covered only our members, and only under limited circumstances. After examining the practices of groups and organizations similar to ours in purpose and type of activities available to members, the Board has determined that our needs would best be served by use of a liability waiver. Accordingly, signing of the waiver has been established as a prerequisite for participation in Society field trips and workshops.

For your advance information, the waiver to be used is printed as an insert with field trip policies in this issue. Please review it carefully. You will be asked to sign a copy of the waiver for each field trip or workshop in the future. The Society is grateful to Mr. David Weinstein, attorney-at-law, for his advice and consultation regarding this procedure. The Society also thanks Tina Jones for investigating insurance options.

Denver Chapter Activities

March 22: Chapter Meeting, 7:30 PM, Denver Botanic Gardens, Classroom A. Bill Jennings will present the "Rarest of the Rare", his slide show featuring some of Colorado's most unusual plant species. Using the state "Plant Species of Special Concern", Bill has photographed 55 rare plants in recent years. His talents in wildflower photography ensure that this will be a spectacular evening.

April 26: Chapter Meeting, 7:30 PM, Denver Botanic Gardens, Classroom A. Rod Mitchell, Denver Audubon Society, will discuss the new wildlife habitat maps prepared by the Society. He is also interested in hearing about your favorite places.

Elections for new officers will also take place at this meeting, so please plan to attend. Call Carol Dawson at 722-6758 if you would like to nominate someone (or yourself!).

May 24: Final chapter meeting of the year and potluck dinner, at Jim and Dorothy Borland's house, 320 Adams, Denver; phone 329-9198. Plan to arrive early (around 6 PM) for a tour of Jim's garden, followed by a potluck dinner.

June 3: Mt. Falcon hike and potluck lunch. We'll meet at 8:00 AM at the east parking lot (south of Morrison on Colo. 8, follow brown and white park signs) and carpool to the top. After hiking down, we'll regroup at the Morrison Cabin for a tour and potluck lunch. More information will be provided at chapter meetings.

The Denver Chapter usually meets on the fourth Wednesday of each month (except summer). Contact Carol Dawson (722-6758) for information on chapter activities.

Editorial Gratitude . . .

to those who were able to submit articles to *Aquilegia* on diskette. Thanks to Betsy Neely, Elizabeth Otto, Ann Cooper and Sue Martin for articles in this issue, and to Brian Geils (unpublished trip report). This is very helpful to the newsletter compiler, and enhances our ability to get *Aquilegia* to you promptly.

And our apologies . . .

to Jim Borland, for neglecting to associate his name with his intriguing article on *Leucocrinum montanum* [Instant Experts; Vol. 13. No. 1.] We thought we had that problem solved, and promise to do better from now on.

Isoetes Adventures, continued from page 1

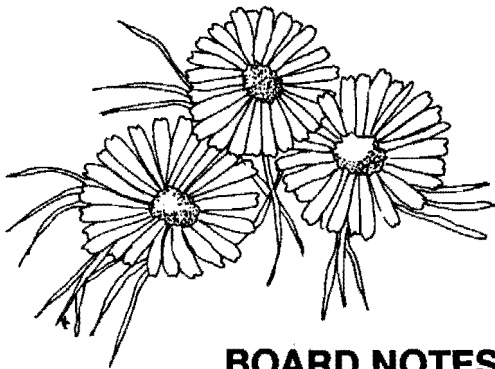
Within a few minutes I saw my first *Isoetes* in an area of the lake with a firm gravelly bottom and under about two feet of clear water. At this point Jan was finding floating leaves along the shoreline. As I poled my way back toward Velma I discovered that most of the lake bottom was carpeted with *Isoetes* caked with and hiding under the mud colored mass of algae, in water one to three feet deep. Velma with book in hand was trying to identify the *Isoetes* she had found almost as soon as she entered the water. She wasn't stuck in the mud, just in concentration. Having thoroughly amused the tourists, the ducks and ourselves, we pressed some plants, deflated the raft and sloshed down the trail eager to identify our find.

My tentative identification of our specimens as *Isoetes setacea* ssp. *muricata* (*I. echinospora* ssp. *muricata*) was confirmed when Peter Root carried some samples to Pennsylvania fern expert Jim Montgomery. The Hermann specimen at COLO is also this species, and a new record for Rocky Mountain National Park and Larimer Co.

3 Sept. 1988. I headed up the East Inlet trail on the west side of RMNP. My heightened awareness of *Isoetes* contributed to my realization that the green hue extending from the shoreline of Lone Pine Lake out into waist deep water was a total carpet of *Isoetes*. The plants here were amphibious, with some totally emerged in shore mud and most submersed, ringing the deep central portion of the

lake. The bright green leaves were not algae encrusted making them much easier to recognize. These plants appeared at least superficially different from those in Bierstadt Lake, with smaller, firmer more spreading leaves. I carried a few plants home in baggies so they could be studied while fresh. After spending two months in my refrigerator in a jar of water, one plant is happily growing under tap water rooted in bentonite clay from my yard. The adaptability of this species, *Isoetes bolanderi*, amazes me and raises questions of culture and habitat requirements (including effects of water levels and motion, temperature, nutrients), modes of propagation and dispersal, abundance, etc. With my curiosity aroused I continued up the East Inlet trail to Lake Verna, finding *Isoetes bolanderi* in the stream between the lakes and abundantly blanketing the shallow water lake bottom along the shore of Lake Verna.

Library research shows that *I. setacea* ssp. *muricata* is frequent over most of North America with its southern limit in Colorado. *Isoetes bolanderi*, also frequent, is found west of the continental divide in Colorado and western North America. It is apparent that these plants are anything but rare, and I am anxious to continue the search next year to determine if *Isoetes* species are merely overlooked/undercollected or truly localized but abundant in a few areas. If any CONPS members are intrigued by these curious plants, don't hip boots, join in the hunt, and share any insights you may gain with the rest of us.



BOARD NOTES

Elizabeth Otto

The Colorado Native Plant Society Board of Directors met on January 21 at Tina Jones' house in Denver. Members of the Board and Committees have been very active over the past several months. Miriam Denham, chair of the Education Committee, has been organizing the CONPS display for the annual Garden and Home Show starting February 3rd in Denver. The theme for this year's show is "Everything Is Coming Up Roses" so our display will focus on the Rosaceae. Miriam, along with Carol Dawson and Tina Jones, has put together a display on edible rose species as well as species of that family that can be used in xeriscaping.

A committee of the Board has also been exploring the possibility of establishing a cooperative agreement with the National Park Service at the Rocky Mountain National Park to facilitate CONPS members participating in research projects in the Park. If you are interested in this project, contact Dorothy Udall or Brian Geils.

The Board also agreed to donate \$250 for the publication of an educational brochure for the Pawnee National Grasslands. CONPS will be listed in the brochure as a supporter and we will review the brochure before it is published.

Speaking of publishing, our own Rare Plant Monograph is coming along. We have raised over \$8000 for the publication and hope to have it available by summer. If you have not yet sent a donation for this special project, it's still not too late. We need additional money for up-front expenses.

And one final note, CONPS will again participate in a special summer program at the Denver Botanic Gardens. This year, rather than special activities during the extended evening hours, the Gardens will be offering weekend programs. We have been given the weekend of July 15 and 16 to coordinate workshops, slide shows, field trips or tours of the Gardens. If you would like to help out on this project, contact Gayle Weinstein or Tina Jones.

A Message from the Field Trip Chairman

This edition of *Aquilegia* provides descriptions for field trips through early July. Additional trips in July and early August have not yet been finalized and will be announced in the next newsletter.

Some new procedures will be used on field trips this year. First, all participants will be required to sign a waiver to protect the society from liability. The trip leader will have the forms and signing will occur when the group gathers to begin the trip. Second, we want to standardize the method of recording species lists from field trips. A new form has been prepared and will be available from the trip leader. As before, a volunteer on each trip will be asked to record a list of all species observed in flower for Society records. Other participants are encouraged to help with this. Third, to ensure a better record of field trip reports, the field trip chairman will do more follow-up this year. As before, the trip leader will ask for a volunteer to write an article describing the trip and its highlights for the newsletter. Please be willing to share your experience with those who were not able to be there. Reports should be thorough enough to convey the experience, but stop short of providing a complete substitute for the trip. Other procedures and policies will remain the same. Please be sure to re-read the field trip policies printed in this issue.

We are trying a new type of trip this year, a raft trip down the Yampa River. If people are interested, we can have trips of this sort in subsequent years. Other suggestions for different types of trips, such as backpacking trips to more remote areas, have been made recently. If you have ideas for future trips, or comments on the selection for this year, call Jeff Dawson, the field trip chairman, at 722-6758.

Jeff Dawson

Volunteers Needed

The Denver Museum of Natural History's Zoology Dept. needs assistance in developing their herbarium. Volunteers would be involved in the following possibilities: collecting and mounting Colorado plants, labeling plant folders and herbarium sheets, typing collector's data into a computer, and various other herbarium jobs. If interested call Tina Jones (759-9701) or Elaine Smith (447-9641). Inquiries may be addressed to: Attention Herbarium, Denver Museum of Natural History, Zoology Dept., 2001 Colorado Blvd., Denver, CO 80205.

Enviroscope

Those interested in more thorough coverage of environmental issues will welcome the recent announcement by *The Colorado Daily* of a new weekly column, **Enviroscope**, designed to provide environmental thinkers and the public "a chance to say something about the profound environmental crises facing us". In an introductory column, Dale Bailey, **Enviroscope** coordinator, comments that "news coverage of the environmental crisis should reach beyond the latest environmental mistake. It needs to be long-range; it must have a vision."

Articles are being sought from bureaucrats, private sector leaders, environmentalists across the spectrum, elected officials – and anyone with a concern to address and a solution to propose. Criteria for articles submitted are: Articles should be about a single environmental topic, authors should offer a solution to a problem and defend that solution in a coherent and to-the-point style of writing, and submissions should be 400 to 500 words long, typed double-space. For more information or to submit articles: **Enviroscope**, Colorado Daily, Attn: Dale Bailey, PO Box 1719, Boulder, CO 80306; or phone 443-6272.



Leucocrocinum montanum

Roxborough Seminars

Roxborough State Park and the Rocky Mountain Nature Association will offer a series of field seminars this year. One which may interest CONPS members is on **Identifying Spring Wildflowers – Keys to Using Plant Keys** to be held April 29th at the Park's O'Malley Visitor Center. Each seminar runs from 9 AM to 4 PM and has a \$4 registration fee which includes instruction, materials, morning coffee and a snack. If you find yourself searching through plant guides each spring wishing you could remember the names of your favorite wildflowers, this seminar is for you. Vickey Trammell will share the basics of wildflower identification providing a better understanding of plant structure and family characteristics to improve your skills in using plant keys. For additional information, please contact Roxborough State Park at (303)973-3959.

Improving Wildflower Photography

Workshop Report by Gwen Kittel

Loraine Yeatts and Bill Jennings led this highly instructive and interesting workshop last April 23rd at the Foothills Nature Center in Boulder. As any of you who have seen Loraine and Bill's slide presentations know, their photos are exquisite! From landscapes to the most up-close-and-personal photos of individual flowers, their photos have that "Sierra Club Calendar — Oooo ahhh! quality to them. "How did she capture that light? "Gee, the composition of this slide is simply perfect! With these thoughts in mind, I went to this workshop to learn some of Loraine and Bill's secrets to excellent wildflower photography.

First we reviewed the hardware. This gave us the opportunity to ask "What's this button for?" and other questions to become more familiar with our cameras. We learned about different lenses and what types are best for close ups. There seems to be a trade-off between magnification and optical quality. The best advice given for hardware was to practice and get to know your equipment well.

Loraine talked about composition and aesthetics. A few of the basic rules, she said, are to never divide the picture directly in half, but divide it into thirds horizontally and vertically. Then place the focal point at the intersections of these imaginary lines. Other tips were to "garden" the area in the field, removing blades of grass, rocks, etc. A blurred object in the background or foreground of a close-up shot can distract from the main subject and ruin a photograph.

The highlight of the workshop for me was viewing slides. It was an opportunity to take a critical look at one another's best and worst shots with our new knowledge. One thing we did was cropping. By holding a magazine in front of the projector, we could view the slide in its new cropped form. It was surprising to see what a difference it made to a close-up of a flower to crop out a small but distracting out-of-focus blob in the bottom of the picture. Cropping can really make a so-so shot a fabulous one!

Bill Jennings took comparative photos of the same subject under identical lighting with five different types of film (Fujicolor, Kodachrome, Ektachrome, etc.) A conclusion was reached that some films are good for reds, some for

grays, and some for low light, but none was best in all areas. What to do? For me, still learning to get the exposure right, I stick with one kind of film. But Loraine just carries several cameras with a different type of film in each one!

Other pointers were if you're worried about getting the correct exposure, bracket the f-stop, one up, one down, and you'll be sure to get at least one well-exposed shot. When taking photographs at very slow shutter speeds, place your forefinger on the shutter and a thumb under the camera, and squeeze with equal pressure from above and below. This gives a little less movement. For the afternoon we went out and tried some high tech hardware in the field. I took a close-up of *Mertensia*, with two extension tubes, a tripod, and a cylindrical windbreak Loraine had made. My photos didn't turn out quite as spectacular as Loraine's, but maybe with a little more practice . . .

This workshop was well-organized and provided a wealth of information. Thank you, Loraine Yeatts and Bill Jennings!

Ed. Note: We would like to thank Gwen for contributing this report and hope it will inspire some of you to report on this year's workshops and field trips! P.G.R.

Parry Oatgrass

Danthonia parryi



CONPS Field Trips for 1989

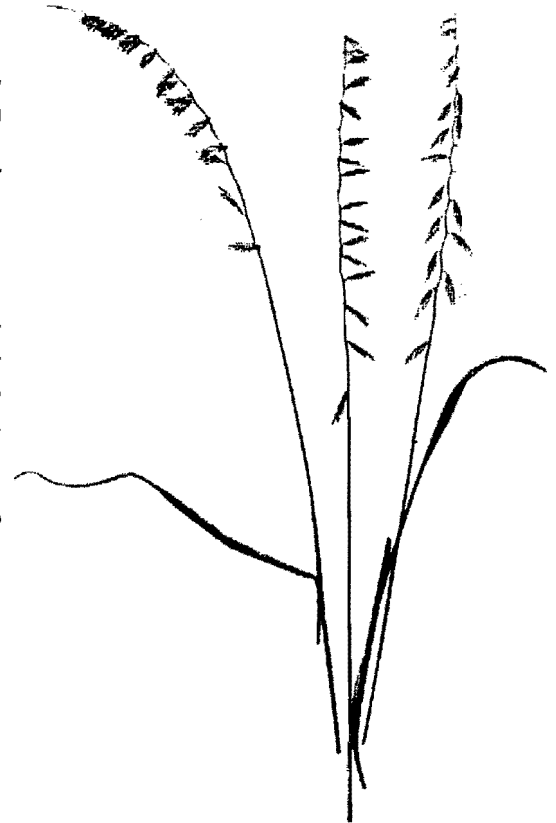
Southeast Grasslands and Canyons May 20-21

Rick Brune

Bring curiosity and expertise to explore this seldom visited part of Colorado. We'll visit the rim of the Purgatoire Canyon, along Van Bremer arroyo on the west side of Ft. Carson, and a rare plunge pool community in Pearly Canyon on the east side. Other possibilities include Picture Canyon, Carrizo Canyon, and Comanche National Grassland. Roadrunners, tarantulas, and other Chihuahuan desert species occur here. There are also many archaeological sites, petroglyphs and pictographs. Something for everyone.

The itinerary has not been finalized and will depend partly on weather and road conditions. Muddy roads could make some areas inaccessible. Regular cars should be alright, but 4WD vehicles are helpful. We will camp Saturday night, probably on Ft. Carson or at Comanche National Grassland. Either site would provide primitive camping, with no motels nearby. The trip involves visits to several locations using vehicles and moderate walking.

Further details, including meeting time and place, will be provided to trip registrants. For information and to register, call Rick Brune, 238-5078 (Dnv).



West Central Colorado

May 27-29

Leaders: Joanne Young and Jeff Dawson

This three-day trip will explore several areas in the Grand Junction region, including Grand Valley, Unaweep Canyon, Gateway, Naturita and Douglas Pass, with each day having a different focus. We will travel primarily by car, with frequent stops along the way.

On Saturday, May 27th, a field trip will go to Black Ridge and the edge of Rattlesnake Canyon, west of Colorado National Monument. This area has been proposed as an addition to the existing monument. A 2- or 4-wheel drive vehicle with good clearance will be necessary. Meet at 10 AM at the Colorado National Monument Visitors Center; bring lunch. We will return by 4 PM or 5 PM.

On Sunday, May 28th, we will drive through Unaweep Canyon to Gateway, and then explore along the Dolores and San Miguel River Valleys as far as Naturita. We will see species such as *Penstemon utahensis*, *Gilia subnuda* and the local endemic *Lygodesmia dolorensis*, as well as spectacular scenery and interesting geology.

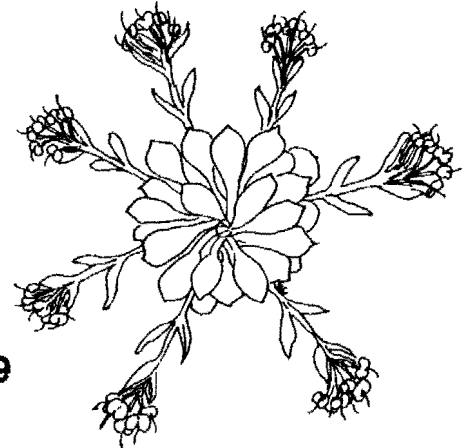
Phantom Canyon Preserve

Saturday, June 10

Alan Carpenter

The Nature Conservancy's Phantom Canyon Preserve is located northwest of Fort Collins at an elevation of 6000 to 6800 feet. It consists of a striking canyon system formed by the North Fork of the Cache la Poudre River. A variety of plant associations occurs in upland parklands, rocky canyon rims, cliffs, riparian bottoms, side canyons, and moderate to steep side slopes. The Nature Conservancy acquired the Phantom Canyon Preserve in December, 1987. Since that time, staff members in TNC's Colorado Field Office have been developing a management plan to guide visitor use and biological studies. An important part of the biological inventory is a complete checklist of plants at the preserve. We have made a start, but more inventory work needs to be done. The purpose of this field trip is to explore portions of the preserve and add new species to the checklist. This trip is scheduled to coincide with peak flowering. One rare species, the Larimer aletes, occurs in the preserve and will be in fruit at this time.

The meeting time and place will be 10:00 AM sharp at a locked silver-colored gate on the west side of US Highway 287, 4.7 miles north of the intersection of US 287 and the Cherokee Park Rd.; the locked gate is about 35 miles north of Fort Collins and about 8 miles north of Livermore. We will car-pool in a van from here to the preserve, will head for home about 5:00 PM. Please bring the usual botanizing tools (hand lens, flora, etc.), a lunch, water and rain gear. No fishing or plant collecting will be allowed on this trip. For more information and to sign up, please call Alan Carpenter at 444-2950 (W) or 443-8094 (H) (Boulder). Trip limit is 14 people.

*Astragalus Lindleyanus**Physaria bellii*

Middle Park Endemics

June 18, 1989

John Anderson

We will visit sites of the recently proposed endangered species, *Astragalus osterhoutii* (Osterhout milkvetch) and *Penstemon penlandii* (Penland beardtongue), as well as other rare state species such as *Aletes nuttallii*. These are species whose nearest relatives or occurrences are in Wyoming and which represent a southern extension of an arid Wyoming floristic element. They grow on shale badlands around the town of Kremmling. Another Middle Park endemic, *Physaria osterhoutii* Payson, which is a form of *P. floribunda* with pendant siliques, can also be investigated. In addition, we will look at the site of the proposed Muddy Creek Reservoir which will inundate some areas of the Osterhout milkvetch.

Participants will meet at 10 AM at the Hot Sulphur Springs State Wildlife Area Campground 2 miles west of Hot Sulphur Springs along Highway 40 at the west end of Byer's Canyon in T1N R78W S16 NE. Those arriving the night before, on the 17th, can camp there or stay at a motel in Hot Sulphur Springs (a recommendation is the Riverside Hotel; phone 303/725-3589). Reservations are required: call Jeff Dawson at 722-6758 (Denver) to sign up. In accordance with CONPS policy, there will be no collecting on this trip.

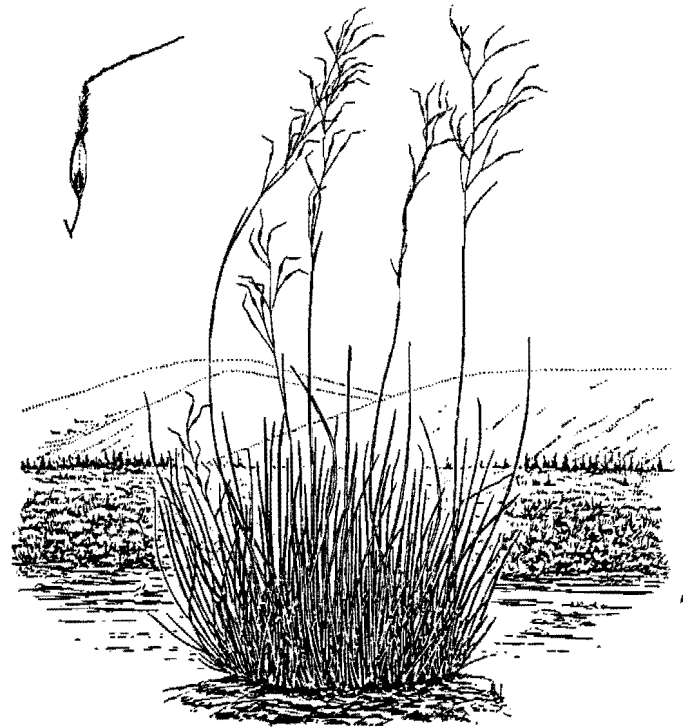
Field Trips, continued

Pueblo West/Arkansas Valley July 8 -9?

Jim Borland

Travel part of the Arkansas River route that Pike, Long and Fremont took in the early to mid-1800's. Explore the outcrops of the Niobrara Formation and its unique collection of endemic plants. Expect to see the rare *Parthenium tetraeuris* and the elusive and troublesome *Mirabilis rotundifolius* which has been confused with its neighbors *Oxybaphus hirsutus* and the beautiful *M. multiflora*. Plants indicative of calcium, sulfur, salt and selenium soils abound alongside rafts of choice pulvinate rock garden species. Common dryland and riparian species that will be seen include: *Zinnia grandiflora*, *Melampodium leucanthum*, *Sphaeralcea angustifolia*, *Hofmanseggia drepanocarpa*, *Artemisia arbuscula*, *Atriplex confertifolia*, *Frankenina jamesii*, *Sarcobatus vermiculatus* and perhaps *Baccharis*.

The trip will begin in the vicinity of Pueblo Reservoir at 9:00 AM on Saturday July 8th. Walking sidetrips from vehicles will be mostly on level ground and be 1/2 mile or less. Arrangements for overnight camping and the possibility of extending this field trip another day to see the rare *Mentzelia densa* and additional botanical investigations up the road to Cripple Creek are being explored. Reservations required, trip limit 25. To register, call Jim Borland, 329-9198 (Denver).



Ptilagrostis porteri

Institute of River Ecology

July 9 – 14 at Bailey, Colorado

The Denver Audubon Society invites you to experience the Institute of River Ecology, now in its third year. Explore the ecological diversity, wildlife, and colorful history of the South Platte, one of Colorado's major rivers. Consider the management of Rocky Mountain water resources, the use of bottomland habitat by livestock, protection of wildlife, birds, fisheries, and many other uses. Use advanced sampling methods to discover how many fish inhabit secluded stretches of the river. Observe birds in streamside habitat of the mountains and on the plains. Join us, and share these experiences with top experts on all sides of the is-

sues. This is an exciting learning opportunity that you will remember for many years to come.

Registration is limited; the fee is \$350, covering all the week's expenses. University credit is available at the option of the participant. Dr. John Emerick of Colorado School of Mines is the principal instructor. Please address inquiries concerning the Institute to: Susan Q. Foster, Director; Institute of River Ecology; c/o Thorne Ecological Institute, 5370 Manhattan Circle, #104; Boulder, CO 80303 (303)499-3647.

FLORAL TRIBUTES

Ann Cooper

I had a close encounter of an unfriendly kind last weekend. I was, at the time, in hot pursuit of a brown thrasher who lurked in a tangle of hackberry and wild plum. As I clambered up the wintry gully I stumbled into the largest and most vicious patch of *Opuntia phaeacantha* I have chanced to meet. For 'phae', read dark. For 'acantha' read spines--those dark spines jabbed through my soft-sided hiking boots and into my feet. I might as well have been barefoot! And as I dealt with my problem, I had time to think about the family Cactaceae!

My early acquaintance with cacti began with a meager and miserable collection of pot-plants. They never grew. They never flowered. They merely collected dust. They rejected the cool, humid climate of my English window-ledge. What I didn't know then was the thievery that took place in Arizona and New Mexico, as well as Central and South America, to provide the nursery stock for much of the European collectors market.

I knew cacti came from the desert, thrived in the heat. My concept of desert back then was Sahara-ish. I had no appreciation of Sonoran, or Mohave, or Great Basin. Now that I have felt the midday heat of Tucson, when only the cactus wren and the quails sing of life, I understand the remarkable adaptations the cacti have developed to prevent heat stress and water loss; the thickened, waxy cuticle; the lack of persistent, functional leaves; the sunken stomata that open to admit carbon dioxide at night, (storing it as malic acid until it is needed for photosynthesis once the sun comes out), and close to prevent water loss by day; the various spines which cast shadows; the barrel bodies that provide the most inside for the least surface area, but that can concertina to accommodate more, or less, water supply when necessary; the network of shallow roots to sop up the brief desert rainfall; the down-curved 'drip-tips', spines which direct the droplets of condensing dew to the roots of the plant; the mucilaginous cell-sap that becomes more and more viscous as water reserves are used, binding the dwindling water ever more tightly.

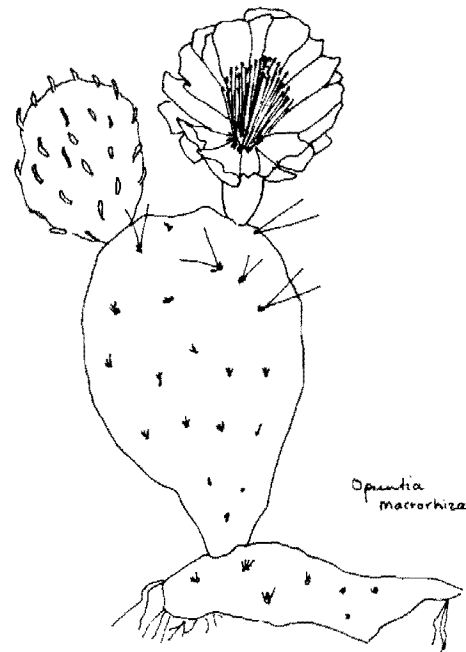
All that is fine for the heat of summer. But some members of the cactus family manage cold-weather survival too. Our own *Pediocactus simpsonii* grows up to around 9,000' in Rocky Mountain National Park. In winter it hunkers down into the ground and is protected by the snow-cover. Opuntias are found up into British Columbia, Alberta and Ontario--as far north as the 60th parallel. I read also of *Tephrocactus* species that are "the only taller plants to have penetrated as far as the edges of glaciers in the Andes, where white *Tephrocactus* looks like snowfields or flocks of sheep from a distance". Does that mucilaginous cell-sap have some anti-freeze properties too, I wonder?

Our Colorado species are average as cacti go, not setting any records. I am most familiar with the Front Range species.

Coryphantha vivipara I think of as a vivid blotch of magenta among the prairie grasses. The first I saw were at Crow Creek, in the Pawnee grasslands. It is named from the greek *koryphe*, a cluster, and *anthos*, flower. The mound I photographed was a huge cluster of flowers covered with pollinating insects.

Echinocereus viridiflorus, hen and chickens or green pitaya, is almost invisible in winter, grey and withdrawn. Come spring it plumps up and by flowering time is very attractive, though not showy, with its greenish flowers. The name derives from *echinus*, hedgehog or urchin, and *cereus*, waxy. As far as common names go, I prefer green pitaya. Hen and chickens still brings to mind a common succulent sempervivum I remember from my English days!

Opuntias are by far the most common of the Colorado cacti. They include *Opuntia imbricata*, (or *Cylindropuntia imbricata*), the candelabra cactus. The tree form is supported by a woody, reticulated skeleton. We have *O. macrorhiza*, the prickly pear and *O. phaeacantha*, the New Mexican prickly pear. *O. polyacantha*, the starvation cactus, has very prickly pads and dry fruits. *O. fragilis*, the brittle cactus, which breaks easily, is the one you are likely to find travelling with you, or your dog. Does it ever flower? Or is it so successful as a vegetative reproducer that flowers have become almost superfluous? -- next page



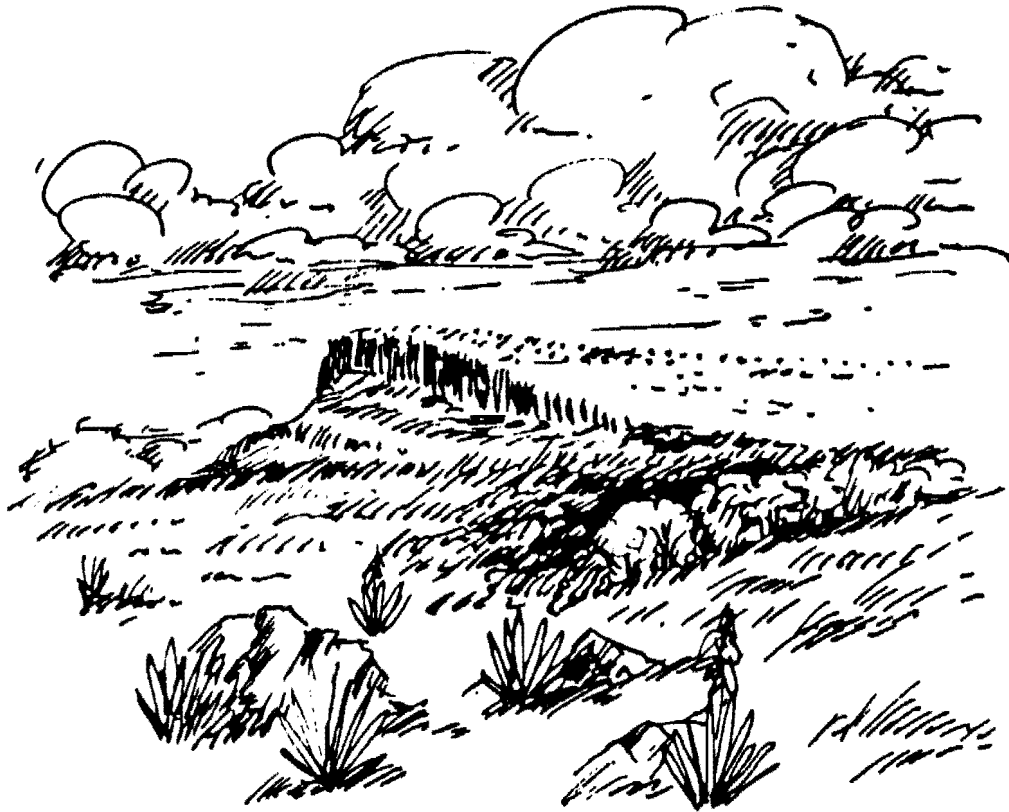
Floral Tributes, continued from page 9

In general the flowers of the prickly pears have numerous stamens, petals, sepals and bracts, spirally arranged and somewhat intergrading. The stamens are sensitive to insect movement, and will curve around the back of an incoming bee.

The Opuntias are all edible, some more so than others. The seeds can be dried and ground up into a flour, or soup thickening. The more pulpy of the prickly pear fruits can be peeled and eaten raw, or cooked into a basic syrup to make jelly—once you have got past the glochids that is! Those little tufts of barbed hairs are usually much more painful to encounter than the more vicious looking spines. They break off in the skin, leaving stubs to become inflamed. The spines just poke! (I've wondered about the potency of that stab, however. Do the spines bear some poison? I can find no mention of it in the literature.) Amazing that glochids turn up in 90% of the human fecal remains examined from excavations at Mesa Verde!

And talking of the past, the only fossil cacti known are a Pleistocene *Opuntia* from Arizona and a much more ancient prickly-pear look-alike from Utah, dating back some 50 million years.

One odd suggestion from my reading I am unable to verify. Do prickly pears align themselves with their flat sides east-west, so that the midday sun strikes the narrow blade-edge? As usual, I sign off with more questions than answers.



WANTED: ADOPT A RARE PLANT VOLUNTEERS

Betsy Neely

The Nature Conservancy's mission is to find, protect and maintain the best examples of natural communities and populations of rare plant species. To date, the Conservancy has helped to secure 5 preserves protecting rare plant species (on the Species of Special Concern list, Colorado Natural Areas Program) in Colorado. These include:

*Black spleenwort, *Asplenium andrewsii* (Polypodiaceae), known from 3 widely disjunct populations in Utah, Arizona and Colorado (Category 2, State list 1), is protected at White Rocks in Boulder Co., a cooperative effort with the City of Boulder Open Space.

**Braya humilis* (Brassicaceae), a small white-flowered mustard restricted to calcareous substrates above treeline, is protected at the West Hoosier Preserve along the Park/Summit Co. line on a 4-acre mining claim (Category 2, State list 1). *Braya* is also known from Chaffee, Lake and Gunnison Cos.

*Larimer aletes, *Aletes humilis* (Apiaceae), is protected at the Phantom Canyon Preserve in Larimer Co. NW of Ft. Collins. *Aletes* is currently known from only Larimer and Boulder Cos. (Category 2, State list 1).

*Rockloving aletes, *Neoparrya lithophila*, (Apiaceae) (Category 2, State list 1) is protected at its type locality, Farisita Dike, a volcanic dike north of the Spanish Peaks in Huerfano Co. with a five year lease. This species is also known from Rio Grande, Chaffee, Saguache and Conejos Cos.

*Dwarf rattlesnake plantain, *Goodyera repens* (Orchidaceae) (State list 2=rare in Colorado but relatively common elsewhere within its range) is protected at Bar NI Ranch, southwest of the Spanish Peaks, in Las Animas and Costilla Cos.

We are currently working on projects to protect species such as *Eriogonum brandegei*, *Astragalus osterhoutii*, *Penstemon penlandii*, *Lesquerella congesta*, and

Physaria obcordata. And there are so many more rare species waiting for our attention! We would like to at least double the number of rare plant projects in Colorado in 1989. If we are to preserve the natural diversity of a state as large and complex as Colorado, each and every conservation decision must be a sound one! To select sites wisely, we need precise biological information not only on the presumed best sites, but also for the full array of alternate sites.

We are developing the Adopt a Rare Plant Program to help update information on rare plant species (for the CNAP data base) and to help the Conservancy's project selection process. The primary objective of the program is to assess the current status of selected rare species, and to determine which population sites are the most outstanding, thus qualifying for Conservancy projects.

You could help us by joining our Adopt a Rare Plant Volunteer Program this summer. You would gather information on one rare plant species. Equipped with maps and information, you would:

- visit known populations of rare species
- search for new populations in similar habitat
- evaluate sites in terms of set criteria for potential preserves

We are having a training workshop for volunteers interested in "adopting" a rare plant on Saturday, April 15 at The Nature Conservancy office in Boulder. Come learn the details of this exciting program! We will cover everything you need to know to get started to become a rare plant "parent", such as map reading, inventory techniques, and completing field forms. Weather permitting, we will conduct a short field evaluation at a rare plant site close to Boulder. For more information, contact Betsy Neely at 444-2950, 1244 Pine St., Boulder, CO 80302.



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Deadlines for newsletter materials are February 15, April 15, June 15, August 15, October 15 and December 15.

There is a special need for short items such as unusual information about a plant, a little known botanical term, etc. Please include author's name and address, although items will be printed anonymously if requested.

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