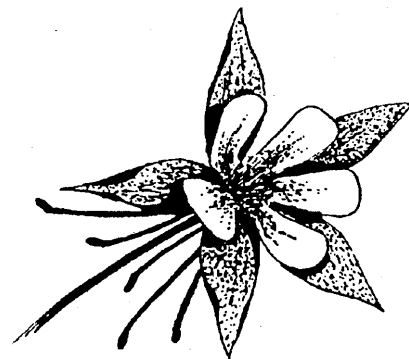


Aquilegia

Newsletter of the Colorado Native Plant Society



“... dedicated to the appreciation and conservation of the Colorado native flora”

Volume 14, Number 6

November/December 1990

Potamogeton diversifolius rediscovered

William A. Weber
University of Colorado Museum

Our knowledge of the distribution of Colorado pondweeds is still very incomplete. Thanks to David Cooper and his work in the fens of South Park, we are beginning to learn that getting wet feet is one of the requirements if we really want to know the flora. The rediscovery of *Potamogeton diversifolius* is a case in point.

Potamogeton diversifolius Rafinesque was recorded in Colorado, based on a single specimen collected by Francis Potter Daniels from Boulder County: south of Boulder, Daniels 486. Daniels published the classic catalog of the flora of Boulder County in Univ. of Missouri Studies, Science Series, 12:1-311, 1911. Daniels was a professor of romance languages at Wabash College. Ewan states (Rocky Mountain Naturalists) that he taught in the summer session at Boulder in 1906, but Daniels said that he was employed by the University of Missouri to collect plants in Colorado for the University of Missouri. Thus, a valuable set of Colorado plants is housed at Columbia. There being no herbarium at the University of Colorado at the time, we have none of the Daniels collections. However, when I first came to Boulder, I needed to see the Daniels plants for my catalog of the Boulder County Flora

(which later was expanded to the first edition of **Handbook of Plants of the Colorado Front Range**), so I borrowed everything that could be located of Daniels' collections.

In Daniels' flora, *P. diversifolius* was listed incorrectly as *P. spirillus*, a species not found in Colorado, but it was correctly cited by M. L. Fernald in his monumental monograph of the linear-leaved species of *Potamogeton* (1932). It is curious that the species had never been collected again, even in the Boulder area, which is unusually well covered. Enter Harold Dahnke, our "Privat Docent" at Herbarium COLO. Harold has been recovering from bypass surgery and, as part of his therapy, he has been taking long walks in the Boulder Open Space. On Sept. 20, he was walking along the Silver Lake Ditch just northwest of Wonderland

Lake and discovered that the ditch, now at low water, was clogged with a strange *Potamogeton*, along with *P. pectinatus* and *P. nodosus* in smaller quantities. Like many members of CONPS, Harold came to us (from Michigan) with little previous botanical experience, but he has a good eye and has developed a knowledge of the flora as well as a critical sense and awareness of the unusual.

Probably *Potamogeton diversifolius* has been around all the time, waiting for some sharp-eyed amateur to spot it. Botanizing in the fall, when only a few asters are still flowering, is not always a productive pursuit, but some of the best finds are made at the odd place, in the off season, and by amateur botanists who don't realize that certain areas are unproductive to the professional. Here is where we can use CONPS amateurs to the fullest. ♣

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Editorial Changes

Sally White

We're trying out some structural changes in the Editorial Committee. I've been enlisted as co-editor with Peter Root, and we have established a broader committee base to share the various tasks involved in this newsletter. With more people helping, from typing to mailing, perhaps we'll even be able to devote more time to EDITING, and *getting things right*.

The dedicated folks who have recently volunteered to help this committee are Peter Hensen, Gary Finstad, Julie Dulapa, and Gayle Weinstein. Thanks for joining us. Peter, Velma Richards, and I look forward to having their new perspectives as we work with *Aquilegia* and other editorial projects. Elizabeth

Otto, who long assisted this committee and should be taking a well-earned rest, is now heading the Conservation Committee, where her efforts will also be appreciated.

We know the newsletter is a valuable member service of the Society. We even know that some of you are reading it — in detail! How? We were recently taken to task by a careful reader on a grammatical error in our hastily constructed and poorly edited masthead. Although I have to take the blame for that one personally, I find some small defense in Webster's Abridged, and a pertinent warning in the fine print:

Although [the 'comprised of' usage] has been in use since the late 18th century, [it] is still attacked as wrong...until comparatively recent times it was found chiefly in scientific or technical writing...You should be aware, however, that...you may be subject to criticism...and you may want to choose a safer synonym.

I'm a strong believer in safer synonyms, and we have taken the correction to heart. Thanks to our correspondent for having the interest and taking the time to correct us, as well as for the gracious compliments accompanying his comments.

Now, as suggested by Peter on page 3, let's hear from the rest of you!

Aquilegia

Aquilegia is published six times per year by the Colorado Native Plant Society. This newsletter is available to members of the Society, and others with an interest in native plants. Contact the Society for subscription information.

Articles from *Aquilegia* may be used by other native plant societies if fully cited to author and attributed to *Aquilegia*.

The Colorado Native Plant Society is a non-profit organization dedicated to the appreciation and conservation of the Colorado native flora. Membership is open to all with an interest in our native plants, and is composed of plant enthusiasts, both professional and non-professional.

Please join us in helping to encourage interest in enjoying and protecting the variety of native plants in Colorado. The Society sponsors field trips, workshops and other activities through local chapters and statewide. Contact the Society or a chapter representative or committee chair for more information.

Schedule of Membership Fees

Life	\$250.00
Family or Dual	\$ 12.00
Supporting	\$ 50.00
Individual	\$ 8.00
Organization	\$ 25.00
Student or Senior	\$ 4.00

Membership Renewals/Information

Please direct all membership applications, renewals and address changes to the Membership chairperson, in care of the Society's mailing address.

Please direct all other inquiries regarding the Society to the Secretary in care of the Society's mailing address.

Newsletter Contributions

Please direct all contributions to the newsletter to:

Peter Root
4915 West 31st Avenue
Denver, CO 80212

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

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Workshops	Bill Jennings	666-8348

Announcements

We Want to Hear from You

Late News:

High Creek Fen option
see page 4

Floras Still Available

With the recent publication of Weber's **Colorado Flora: East Slope** and the earlier publication of its counterpart for the West Slope, we now can make field guides for the entire state available to members. The soft-cover versions of both volumes **Colorado Flora: West Slope** (1987) and **Colorado Flora: East Slope** (1990) are offered for purchase through CONPS for \$15.00 per volume. Add \$2.00 for postage and handling if your order needs to be mailed.

Checks payable to the Colorado Native Plant Society may be sent with your order to Velma Richards, 3125 W. Monmouth Ave., Englewood, CO 80110 or call Velma at (303) 794-5432 to reserve your copy. ♣

Peter Root

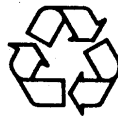
As the year ends we would like to express our appreciation to our contributors. Without their efforts *Aquilegia* would not have become the fine newsletter it is. We would, however like to hear from more of you. *Aquilegia* is not a professional journal. We are pleased to print reports on the search for obscure and seldom seen plants, but we also like to see field trip and workshop reports and other items of general interest.

Many of you express an interest in using native plants in your landscaping, but only a few ever report on their results. Plants can be used in a variety of craft projects such as wreaths and dried arrangements. Let us know what you do with them.

Have you watched the arrival and spread of a new weed in your area or observed the deterioration of a good wild flower area because of abuse? These could be the subjects of short articles.

Have you thought of doing a small plant study project? You don't have to be a professional botanist to do one. The professionals are all busy teaching and working on big lucrative projects. They don't have time to do everything. For a long time the plants of the plains and foothills have received little attention while everyone looked at the alpine flora. You could make a valuable contribution by carefully studying the plants of a small wetland or a foothills canyon. Start a project and tell us about it. ♣

Aquilegia is printed on



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Grazing Booklet

"Livestock Grazing On Western Riparian Areas" is a new publication which many CONPS members will find interesting. The 45-page booklet was produced for the U.S. Environmental Protection Agency by the Northwest Resource Information Center, Inc., Eagle, Idaho. It provides the reader with an overview of the functions and values of western riparian areas; causes and effects of riparian area degradation; numerous case studies; and a discussion of the opportunities for, and obstacles to, improving the condition of these fragile areas.

A limited second printing is anticipated by early 1991. Until then, it will be difficult to obtain a free copy. The publication is available for public inspection, however, at any Soil Conservation Service Field Office and at many U.S. Forest Service and Bureau of Land Management offices. Call the nearest office before making a trip. ♣

Conservation Help Needed!!

The Conservation Committee is looking for a few good botanists to monitor and help prepare comments on proposed activities of the Forest Service, Bureau of Land Management, Colorado Department of Natural Resources, Highway Department, State Assembly, etc. We are developing an Adopt-an-Agency program whereby Society members would "adopt" a Forest Service Ranger District, BLM Resource Management Area, etc., monitor the agency's activities, and prepare comments on behalf of the Society when appropriate.

All those interested in helping out, please attend the organizational meeting and training session on Saturday, January 19 from 10 am to 1 pm. The meeting will be held at the Morrison Natural History Museum located at the south edge of Morrison on Hwy. 8.

If you are unable to attend this meeting, but want to adopt an Agency, please call Elizabeth Otto at 567-2384 (Idaho Springs, evenings). ♣

A Chance to Save High Creek Fen

Betsy Neely

The Nature Conservancy has obtained an option to purchase High Creek Fen, a unique thousand-acre wetland near the headwaters of the South Platte River in South Park. Unless we are able to raise by April 1, 1991, the \$700 thousand required to purchase and endow this preserve, it will be lost to mining and residential development. High Creek stands out because of its large size, high-quality wetland plant communities, series of shallow pools, isolated stands of Colorado blue spruce, and unusual abundance of rare plant species.

A fen is a nutrient-rich peatland dominated by sedges and grasses. Shallow pools fed by calcareous spring water occur within the extensive sedge and willow fen, interspersed with hummocks of *Kobresia simplicifolia* and little bulrush. Dr. David Cooper discovered the

fen in 1989 during a study of peatlands in Park County, and quickly contacted Dr. William Weber. Together they botanized the site and documented the presence of at least 10 state rare species, including the endemic pale blue-eyed grass (*Sisyrinchium pallidum*), and the disjuncts hoary willow (*Salix candida*), green sedge (*Carex viridula*), *C. scirpoidea*, Greenland primrose (*Primula egalikensis*), and little bulrush (*Trichophorum pumilum*). The latter was rediscovered here after having not been seen in Colorado for more than a century. Myrtleleaf willow (*S. myrtillifolia*) was discovered here for the first time in Colorado. In **Colorado Flora: Eastern Slope**, Dr. Weber wrote that the fen contains "a remarkably rich assemblage of rare boreal disjunctive species". Dr. Cooper says

"High Creek Fen is the best example of a rich fen that we know of in the Southern Rocky Mountains. Many of these species have their main range in the boreal forest and arctic tundra regions of Alaska and Canada. Our populations of these species are tiny and isolated and are very susceptible to local extirpation by peat mining and water diversion projects."

This will be a valuable addition to the Conservancy's system of preserves in Colorado and an opportunity to preserve a fine example of Colorado's unprotected wetland flora for the future. Tax-deductible contributions can be sent to The Nature Conservancy, 1244 Pine St., Boulder, CO 80302. ♣

Note: We hope to have a full article (and long-awaited field trip report) on High Creek Fen in the next issue of *Aquilegia*.

CONPS Workshops for 1990 – 1991

Bill Jennings

The Colorado Native Plant Society workshop series was established with the objective of having something to do during the winter when field trips are impossible. Since the first workshop in January 1985, 44 have been held.

Our concept of a workshop means bringing together plant lovers and a well-informed instructor who has photographs, herbarium specimens and live plants for the attendees to study hands-on, with opportunities for one-on-one interaction with the instructor as well as lectures to the group as a whole. No special skills or requirements, other than a love of plants and a desire to learn, are necessary for attending a workshop. Even though the descriptions may make these workshops sound highly technical, the case is exactly the opposite. The objective is to demystify plant identification and to allow the confused but sincere plant lover to better enjoy and understand our native plants.

Registration for Workshops

Enrollment in workshops is always limited, usually due to room constraints, so you must register in advance. Contact CONPS workshop coordinator for registration and workshop information: **Bill Jennings, PO Box 952, Louisville, CO 80027; phone 303-666-8348**. Be sure to include your mailing address and phone number if you mail in your registration. Registrants will be notified by mail about two weeks prior to the workshop regarding final location, time, lunch, suggested references, etc.

Please register promptly, as workshops tend to fill up fast. However, cancellations sometimes create openings, so you might want to check with Bill up to the night before the workshop if you want to try to register at the last minute.

Unless otherwise noted, the fee for each full-day workshop is \$8 for members and \$16 for non-members. If you plan to attend more than one workshop per year as a non-member, it is cheaper to join CONPS as an individual member (\$8 per year) and come to workshops as a member. Please hold payments until the day of the workshop.

It takes considerable time and effort for the instructors to plan and develop workshops and field trips. Please let us know how you like the workshops and field trips offered by CONPS. We need your suggestions for other workshops and trips, as well as your feedback on whether you found them informative and exciting or dull and uninteresting. We need to know whether we are serving you, our members, the way you wish

CONPS Workshops for 1991

Grasses of the Eastern Colorado Plains Saturday, January 12, 1991

Leader: Dr. Alan Carpenter

Grasses are avoided by wildflower lovers because the flowers are not photogenic and the terminology used for floral parts is unique. However, considering both their economic and ecological significance, all Colorado botanists should have a working knowledge of the grasses.

Dr. Carpenter will help us understand the species in this important family that are found on the eastern plains. This workshop complements our prior workshops on common grasses and high-altitude grasses.

To be held at the Foothills Nature Center, Boulder.



Hawaiian Ferns and Fern Allies Saturday, February 9, 1991

Leader: Dr. Tom Ranker

If you ever wanted to go to Hawaii, now is your chance (sort of). Dr. Tom Ranker, curator of botany at the University of Colorado and successor to Dr. William Weber, is fresh from Hawaii and will introduce us to the Hawaiian flora, with an emphasis on the ferns and fern allies.

He will discuss the colonization, speciation, and evolution of Hawaiian pteridophytes; fern genetics and mating systems; and how the study of these plants relates to conservation biology of Hawaii's endangered flora. Specimens and keys for the ferns will be provided.

To be held at the Foothills Nature Center, Boulder.

Identification of the Seeds of Weedy Plant Species Saturday, March 2, 1991

Leader: Dr. Arnold Larsen

As a follow-up to the topic of our annual meeting (Barbarians at the Gate: Exotic and Weedy Plants of Colorado), Dr. Arnold Larsen, president of Front Range Seed Analysts, will present this unique workshop on identification of the seeds of weedy plant species. He will explain the process of collecting, identifying, cleaning, and storing seeds. Viability

testing and pre-germination and germination processes will be discussed. He will help each participant prepare a seed reference collection for future use. A study guide to the seeds of Colorado will be available for purchase.

To be held in Fort Collins at a location to be determined.



... and More Workshops

Mentzelias: the Blazing Stars Saturday, March 23, 1991

Leader: Dr. Barry Prigge

The Native Plant Society is proud to be able to bring Dr. Prigge to Colorado for this workshop. He is affiliated with the University of California at Los Angeles, where his primary research has been the annual species of *Mentzelia* from the American southwest. He will bring us up-to-date on research in the genus in

general, and will also cover the *Mentzelias* of Colorado. Specimens to examine or dissect, keys, photos, and references will be provided.

To be held at Denver Botanic Gardens.



Adopt-a-Rare-Plant Program Saturday, April 13, 1991

Leaders: Betsy Neely, Tamara Naumann, Bill Jennings

The Colorado Field Office of the Nature Conservancy is developing a volunteer-based "Adopt a Rare Plant" program to update information on selected rare plant species for the Colorado Natural Areas Program database and to help with the Nature Conservancy project selection process. At this training session, participants will see photographs and specimens of some of Colorado's rare plants; other topics to be covered are how to use an herbarium effectively, when to take and

when not to take a specimen and how to press it if you do take it, how to take good photographs, how to use topographic and geologic maps, and what kind of information is important when a rare plant is found.

After lunch, we will visit sites north of Boulder where *Physaria bellii* (a rare crucifer) is found. Even if you do not plan to adopt a plant, many will find this workshop a useful outline of the techniques that Betsy, Tamara, and Bill use

when they search for rare plants. Looking for rare plants is the world's most frustrating occupation, making the search for the proverbial needle in a haystack seem simple by comparison, so find out what you need in your information arsenal before venturing into the wilderness.

To be held at the Foothills Nature Center, Boulder.



Botanical Illustration Saturday, April 27, 1991

Leader: Carolyn Crawford

Well-known botanical artist Carolyn Crawford will present the techniques of botanical illustration, with an emphasis on making sketches in the field as an aid to plant identification. She will demonstrate the necessary equipment and supplies, and discuss plant dissection procedures and how to make a useable drawing when using a hand lens or microscope. We will have the opportunity to make drawings of our own from photographs, pressed material, and

potted plants. After lunch, we will practice in the field. Even if you have no artistic talent, the regimen of drawing plant parts will cause you to look at them with a more critical eye, and plant identification will become easier. A list of suggested supplies will be provided to each registrant prior to the workshop.

To be held at the Foothills Nature Center, Boulder.

Justifying Existence

Gary Finstad
Soil Conservation Service

Natural resource conservation is not very glamorous, unless one is working with rain forests, whales or pandas. It's unlikely that the public's heart strings will ever be plucked by *Physaria bellii*. And I doubt that we'll be seeing appeals on MTV for the preservation of prairie chicken habitat or the Colorado squawfish anytime soon.

There are those among us who feel that all species should be accorded a basic "right-to-exist." While some species have more complex or interesting evolutionary histories than others, the fact that a species exists *now* should be regarded with at least a bit of reverence, if not amazement. It hasn't been easy to get to *now*.

Most Americans, unfortunately, are disconnected from the land. Few can read a landscape, and *Manifest Destiny* still makes perfect sense, especially in an oil pinch. So how do conservationists get ecologically important jobs done in the absence of public awareness and concern?

We normally must sell projects and programs using economic benefits (including tax advantages). That's often not an easy task. In many cases, there are no economic benefits—or, at least, none discernible in the short term. Can a species without economic benefit have *value*? The answer should be obvious; but most of us realize that the "bottom-line mentality" usually prevails. Until *Homo sapiens* evolves a bit further (or disappears), an economic benefit argument must usually be won to safeguard a wild species or to get a conservation project funded.

Happily, there are some plants—and, we hope, habitats—which may survive because someone has discovered a characteristic which may economically justify their existence and perpetuation.

One such person is James Duke, a scientist with the U.S. Department of Agriculture's Agricultural Research Service (ARS). He's an economic

botanist working at the ARS National Germplasm Resources Laboratory in Beltsville, Maryland. Some of Duke's associates collect wild relatives of existing crops—wheat, corn, potatoes, soybeans—which may be useful in improving our overly manipulated crop varieties. But Duke is most concerned with the "odd crops" He works at finding and salvaging germplasm from species which have some potential to be grown commercially, at least on a limited basis.

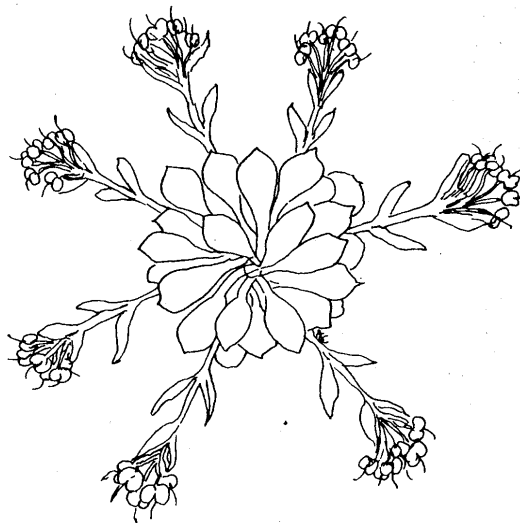
Duke has files on nearly 1,000 different plants which could be profitably grown as crops. Alternative crops are becoming attractive to farmers mired in monocultures of wheat or corn, whose productivity only adds to an already glutted market. For example, he suggests that every major city could support a basil grower, although probably only one. Some day there might even be farmers profitably raising a plant that is now considered a weed—St. Johnswort (*Hypericum* spp.). This may compel us to question the wisdom of eradication campaigns against any species.

About two years ago, the National Cancer Institute came to Duke for assistance because it was interested in St. Johnswort (a.k.a. Klamathweed), which has a long history in folk medicine as an antidepressant and for treating nervous

disorders, burns, and urinary infections. Two compounds in the weed have been found to strongly inhibit the AIDS virus. Although species are native to Europe, West Asia and North Africa, and naturalized in North America and Australia, no germplasm had ever been systematically collected for inclusion in the germplasm bank. Since then, Duke has collected five different species growing along a highway near his Maryland home. The species appear to vary in the concentrations of the active chemicals, so collecting them is important to improving its potential as a pharmaceutical crop.

Another potential AIDS fighter is the Moreton Bay chestnut, an evergreen legume that grows in the rain forests and along streambanks in northeastern Australia. It's one of the best sources of castanospermine, a compound that appears to halt reproduction of the AIDS virus. If the compound proves useful against AIDS, the plant could be a lucrative alternative crop, possibly suited to Texas, Arizona, Florida, California and Hawaii. In 1987, before its potential anti-AIDS activity was announced, castanospermine was priced at \$23 per milligram. (That's about \$9 million per pound...) The seeds yield 0.2 to 0.3 % of the compound.

— continued on page 9



Physaria bellii

Moonwort Update

Peter Root

For several years I have been studying the moonworts, *Botrychium*, subgen. *Botrychium* of Colorado. The mountains of the western United States are a center of speciation of these elusive ferns and there have been many discoveries relating to their distribution and taxonomy in recent years. Most of these have resulted from the work of Florence and Herb Wagner of the University of Michigan who have studied the genus for decades. My work has been at the serious amateur level since there are many aspects of botany that I have had little training in.

In Colorado we have about nine species of moonworts and most of them occur in the subalpine zone at about 10,000 feet. They have a reputation for being hard to see, but perhaps a more important factor in their apparent rarity is the fact that they often grow in places that aren't very attractive to botanists. These include the edges of roads, trails, and places disturbed by mining.

Some of the Wagner's new species are plants that have been confused with *Botrychium minganense*. The classic moonwort, *B. lunaria*, is relatively easy to recognize with its half-moon-shaped leaf segments. There have been problems with plants that do not quite look right. *B. minganense* was described in Quebec based on plants with more wedge- or axe-head-shaped leaf segments. Over the years it became a convenient category for everything that didn't quite look like *B. lunaria*.

Less than ten years ago some plants resembling *B. minganense* were found growing in loess prairies in Iowa and on sand dunes in Michigan. These were found to be a different species and have been called the prairie moonwort, *B. campestre*. Field and herbarium studies have since shown it to occur as far north as Alberta, Canada, and as far west as the Black Hills region of Wyoming. Last spring I decided that it might be found in the loess prairies of eastern Colorado. I went to Bonny State Recreation Area with Dave Kuntz of the Natural Areas

Program and we found three plants in a hail-battered loess prairie natural area. It will be interesting to see if this species is found farther west in the state. It could have gone undetected until now because it grows among dense grasses early in the spring and dries up before other plants attract botanists to the prairie.

Colorado floras list *B. minganense* as occurring in the state but for quite a while specialists have suspected that the plants here differed from that species. Now it is apparent that we have two *minganense*-like entities. One is small, pale in color, and quite succulent. I have found it from Cameron Pass to Pikes Peak. The Wagners have found it around the Great Lakes and there are herbarium specimens from Quebec along the St. Lawrence River. The other form, which has been called the Colorado type *B. minganense*, is probably more common and may be a Colorado endemic. A few years ago the Wagners found it growing abundantly at

Monarch Pass. It has also been found in Larimer, Boulder, Clear Creek and Park Counties.

Last spring David Cooper spoke to the Denver chapter of CONPS about the wetlands in South Park. He mentioned that they are calcareous because they receive water from the limestone mountains of the Mosquito Range. Limestone often supports a rich fern flora, so I decided to look for moonworts there. In August I went up Fourmile Creek, southwest of Fairplay. I stopped by an area where some old mining buildings had once stood. It was obviously disturbed with a little bit of grass, some dandelions, and patches of small *Heterotheca*. There were a few old boards and pieces of metal roofing on the ground. This spot looked ideal for moonworts. After a few minutes I found one, then a few more, and finally a lawn of them. There were probably hundreds of *B. lunaria* and Colorado-type *B. min-*

— continued on next page



B. minganense

- a. from Michigan
b. Colorado-type

B. lunaria

Moonworts, continued from page 8

ganense with smaller numbers of *B. lanceolatum* and *B. echo*. A short distance up the road, above the tree line, I found a similar assortment of moonworts which also included a few plants of the pale *B. minganense*-like form growing among the clumps of low willows. This was the first time I found moonworts above the tree line. It was a typical August day in the mountains and thunder storms began forming on all sides just when things were getting interesting. I plan to go back and look more closely at this and similar areas nearby.

Another development in the Colorado moonwort story still needs more work. In July 1988 a Kansas botanist stopped along the Pikes Peak Highway. He had seen the prairie moonwort so he looked closely among grasses on a slope near the road. He found some moonworts with very narrow leaf segments and collected some for biochemical studies. Later he sent photocopies to Herb Wagner who was quite surprised. These plants were a form which the Wagners have seen only a few times in years of careful study of moonworts in the West. I have visited the location in May and June in the past two years and have found only one plant. The grassy slope doesn't look unusual in any way. There must be hundreds of similar habitats in the large area underlain by Pikes Peak granite. Careful searching among grasses in the early spring and summer might yield valuable discoveries.

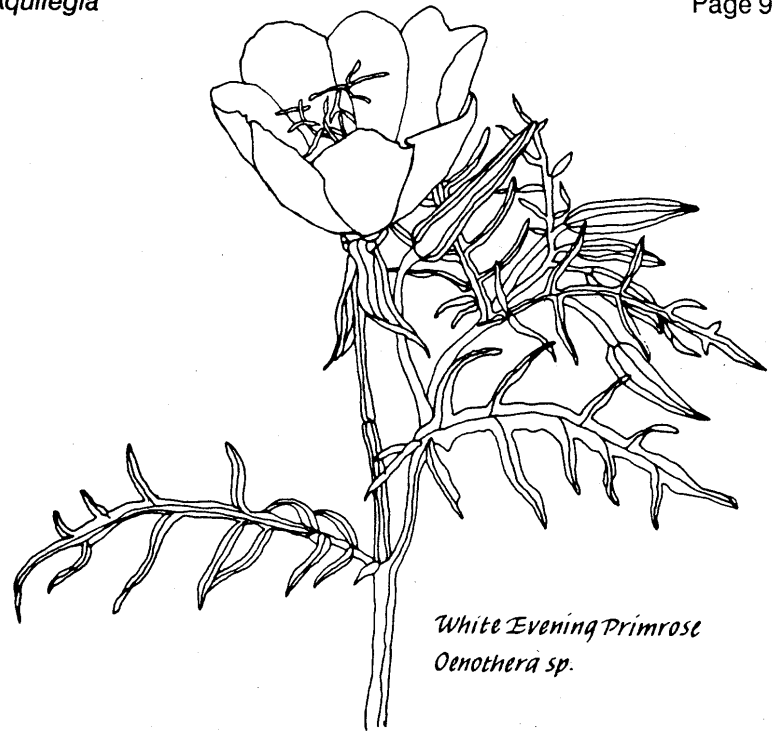
Colorado is a center of moonwort distribution. Much needs to be done to determine the relationships and ecology of these plants. There must be hundreds of potentially productive habitats in the state and there may be still more undiscovered species to be found. Amateurs who are willing to spend some time carefully searching can make a real contribution to our understanding of moonworts. ♣

Existence, continued from page 7

Duke has been collecting varieties of evening-primrose for use as an alternative to tobacco production in North Carolina. Oil from the flower is a major source of gammalinolenic acid—a fatty acid which is the precursor of prostaglandin E1 and is thought to abate symptoms of several illnesses. It is best known as a treatment for atopic eczema. Evening-primrose oil is sold in health food stores. The plant is grown commercially in 15 countries, but the U.S. and Canada account for only a small share of total production. With a sales price of \$22 per ounce of oil, evening-primrose could be a profitable alternative crop. Currently about 400 acres is devoted to evening-primrose production in North Carolina.

Recently he submitted wild-harvested *Huperzia lucidula** for alkaloid analysis as a possible treatment for Alzheimer's disease. Plants in the *Huperzia* family (clubmosses) have been used as medicine in China for centuries for such diverse ailments as muscle cramps, hemorrhoids, and pneumonia.

A wild mountain mint he's collected may be the best source of pulegone, the major ingredient in pennyroyal oil. This highly pungent compound has been found to repel fleas and birds and is being evaluated as a tick repellent.



White Evening Primrose
Oenothera sp.

Duke also has files on a fast-growing tree species which may be grown for firewood in Third World countries and a plant that has a resin which may be used as a fuel in diesel engines.

Economic justification will save relatively few species, of course; but *the process* may help foster more thoughtful and sustainable approaches to managing land and natural resources. Until we produce a video featuring the "*Physaria bellii* rap," what else are we to do?

Note: The information about the work of James Duke was taken from an article written by J. Kim Kaplan in the September issue of *Agricultural Research*, a magazine published monthly by ARS. Anyone interested in more information about Duke may write to him at: USDA-ARS Germplasm Resources Laboratory, Room 133, Bldg., 001, Beltsville Agricultural Research Center, Beltsville, MD 20705. ♣

* Perhaps more familiar to some as *Lycopodium lucidulum*, shining clubmoss. Also known as ground pines, the clubmosses are valued for holiday decorations, and some species are threatened by over-collecting. [Ed.]

The Prairie Garden, Part V: Plant Selection

Rick Brune

What should a prairie re-creation look like? I know of no good definitive description of eastern Colorado prior to settlement. Descriptions in early journals need to be viewed in the context of the authors previous experiences. For example, early westbound travelers described the lush, tallgrass prairies of the midwest as barren and unsuitable for use—because they lacked trees! How they would describe eastern Colorado isn't hard to imagine. Other people marveled at the numbers and beauty of prairie wildflowers.

Serious prairie research began about 1920. Unfortunately, much of the prairie in Colorado was described as overgrazed as long ago as the 1880's. Most of these studies ignore the diversity of prairie types in Colorado and lump everything under "shortgrass plains".

In 1984, Bill Baker (1) tried to make sense of all the literature describing the natural vegetation of Colorado. The result is that very few articles quantitatively describe pure prairie types in eastern Colorado. Species densities are non-existent except for a few of the most common plants.

The species list which follows (Table 1, next page) is far from perfect and is in no way complete. Planting densities are poorly documented and some are based on unscientific observations (i.e. near guesses). Increasers and early succession species such as snakeweed (*Gutierrezia sarothrae*) and tansy aster (*Machaeranthera tanacetifolia*) are probably too heavily weighted. Highly palatable decreasers such as groundplum (*Astragalus crassicaarpus*) are likely underweighted. I've seen a reference to groundplums growing so abundantly that they gave the prairie a rose tint. A density of 0.1/ square yard certainly won't do this. All of these densities can easily be adjusted by a factor of ten either way and not be far wrong.

Although a species is often essentially the same in appearance over its entire range, genetically it can be quite different. Genetic differences associated with geographical distributions may show themselves as lack of hardiness. For example, seeds of a species which grows in New Mexico may not produce plants hardy in Colorado even though the same species grows here. Likewise, species growing at widely different elevations, on different soil types, or different moisture conditions may not thrive when any of these conditions are drastically changed. For maximum hardiness in the prairie garden, local genotypes should be grown. Indeed, there is serious concern that the mixing of genotypes now occurring when species from other areas are grown may be reducing the genetic variation in species which is so important for their survival.

As mentioned earlier, the following species list is not all-inclusive. All of the species listed can be successfully grown in the prairie garden. Add to the list

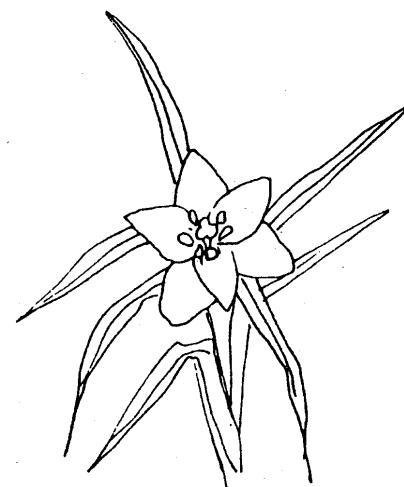
from your own observations. Species in parentheses are usually not found in shortgrass prairie or if they do occur, it is on a soil type usually associated with another prairie type. They are attractive additions to any prairie garden, however.

I have included species lists for two different, but in many ways similar, shortgrass prairies. The blue grama *Bouteloua gracilis* shortgrass prairie occurs on slightly lighter textured soils than the blue grama/buffalo grass *Buchloe dactyloides* shortgrass prairie. Under propagation, I have tried to indicate if any pre-treatment of the seed is needed for germination: D = direct sow, no treatment; MS = moist stratification; S = scarify; T = transplant or division.

(1) Baker, W.L. 1984, "A Preliminary Classification of Natural Vegetation of Colorado", GREAT BASIN NATURALIST, 44 (4): 647-676.

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— continued on next page



Leucocrinum montanum

continued from previous page

Table 1. Suggested plant densities by prairie type for Blue grama-Buffalograss prairie (column 1) and Blue grama prairie (column 2). Propagation methods indicated are D = direct sow, no treatment; MS = moist stratification; S = scarify; T = transplant or division.

Species	#/sq.	#/sq.	Propa- yard yard gation
<i>Amorpha canescens</i>	0.01	0.02	S, MS
<i>Antennaria parviflora</i>	--	0.05	T
<i>Artemisia filifolia</i>	0.01	0.01	D
<i>Astragalus crassicaarpus</i>	0.1	0.1	S
<i>A. drummondii</i>	?	?	S
<i>A. mollisimus</i>	0.03	0.05	S
<i>A. missouriensis</i>	0.03	---	S
<i>A. bisulcatus</i>	?	--	S
<i>A. pectinatus</i>	0.1	0.05	S
<i>Bouteloua curtipendula</i>	0.03	0.2	D, MS
<i>Callirrhoe involucrata</i>	0.02	0.04	MS
<i>Chrysopsis villosa</i>	0.02	?	MS
<i>(Dalea purpurea</i>	---	---	S)
<i>(D. candida</i>	---	---	S)
<i>Delphinium geyeri</i>	---	0.01	MS?
<i>D. virescens</i>	0.05	---	MS
<i>Eriogonum effusum</i>	2	?	MS
<i>Eurotia lanata</i>	0.03	?	D
<i>Gaura coccinea</i>	0.03	0.3	T
<i>Gutierrezia sarothrae</i>	0.02	0.02	D
<i>Haplopappus spinulosus</i>	0.02	0.02	D
<i>(Ipomoea leptophylla</i>	---	---	S)
<i>Leucocrinum montanum</i>	0.06	0.06	MS?, T
<i>Liatris punctata</i>	0.01	0.03	D, MS
<i>Machaeranthera tanacetifolia</i>	0.6	0.6	D
<i>Oenothera albicaulis</i>	0.2	?	D?
<i>(O. brachycarpa</i>	---	---	S, MS)
<i>O. coronopifolia</i>	0.1	?	T
<i>(O. nuttallii</i>	---	---	MS, T)
<i>O. serrulata</i>	0.02	0.02	T?, MS
<i>Oxytropis lambertii</i>	0.1	?	S
<i>O. sericea</i>	?	?	S
<i>Penstemon albidus</i>	0.2	?	MS
<i>P. angustifolius</i>	?	?	MS
<i>Psoralea tenuiflora</i>	0.1	0.1	S
<i>Ratibida columnifera</i>	0.2	?	D
<i>Scutellaria brittonii</i>	?	?	T
<i>Senecio tridenticulatus</i>	0.02	0.05	MS,T
<i>Sophora nuttalliana</i>	?	?	S
<i>Sphaeralcea coccinea</i>	2.5	2.5	T,S
<i>Thelesperma filifolia</i>	---	0.5	MS
<i>(T. megapotamica</i>	---	---	MS)
<i>(Thermopsis rhombifolia</i>	---	---	S)
<i>Townsendia exscapa</i>	0.2	---	D, MS
<i>T. grandiflora</i>	---	0.03	D
<i>Tradescantia occidentalis</i>	---	0.05	MS,T, cuttings
<i>Viola nuttallii</i>	0.05	---	MS,T

Natives Elsewhere

Here's a brief review of activities reported by Native Plant Societies from other states:

The **California Native Plant Society** conducted a youth poster contest with the theme "Wildflowers of my favorite plant community" – a good way to encourage young people's interest in plants, and to promote a conservation ethic, by helping them recognize native plants grouped as natural communities.

The **Native Plant Society of Oregon** reports that The Nature Conservancy is using heavy equipment to create a "mounded prairie" site in Mayer State Park for wildflower and shrub planting. Origins of the Strange mounds, a.k.a. 'biscuit scablands' or 'mima mounds', have been debated for more than 100 years, but all agree the mounds provide habitat for deep soil plants.

The **Kansas Wildflower Society** encourages its members to earn an embroidered violet logo patch by completing a plant self-study program. Step 1, identifying and recording 30 wild plants, is required; members complete seven of the remaining twelve steps to receive the badge of botanical honor. The optional steps include such educational opportunities as illustrating five of the 30 plants listed during step 1; researching a family, listing local species and those not represented in the state's flora; listing 25 edible plants and five to avoid, naming the edible/toxic parts; naming three species of medicinal or dye plants, citing details of their use. Sounds as though the research results would make good newsletter articles!

Identifying rare plant sites on private land and encouraging protection by the private landowners helps conserve the native flora, the **California Native Plant Society** reports. The Virginia Nature Conservancy has been using a registry system for private lands, and the **Virginia Native Plant Society** has recently begun a similar effort. ♣



Woodsia

Calendar Overview

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

1990 Workshops

December 8th **Salix: the Willows**

David Cooper

January 12th **Eastern Plains Grasses**

Leader: Alan Carpenter

February 9th **Hawaiian Ferns**

Leader: Tom Ranker

March 2nd **Weedy Plant Seeds**

Leader: Arnold Larsen

March 23rd

Leader: Barry Prigge

April 13

Leaders: Neely, Naumann, Jennings

April 27th

Leader: Carolyn Crawford

The Mentzelias

Adopt-a-Rare-Plant

Botanical Illustration

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