

Aquilegia

Newsletter of the Colorado Native Plant Society



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

Carex Workshop and Field Trip with Dr. Tony Reznicek

by Pamela Smith (President), Northern Chapter

Last summer, Dr. Anton A. (Tony) Reznicek led two days of workshops which, coupled with a daylong field trip, provided tips for field identification of sedges, specifically those in the oft-intimidating genus *Carex*. Dr. Reznicek serves as the Assistant Director, Research Scientist, and Curator of the University of Michigan Herbarium in Ann Arbor.

The workshops, which were presented on consecutive days at the UC Denver Downtown Campus, included a slide presentation on the sedge family (Cyperaceae), including the evolutionary history of the perigynium, a distinctive and unusual structure that is diagnostic for the genus *Carex* (Note: *Kobresia* in our flora has a similar structure.). In *Carex*, the perigynium is a flask-shaped or sac-like structure that terminates in a pore through which the style and stigmas emerge. As such, the perigynium encloses the ovary and, later, the achene (fruit).

Dr. Reznicek also included a taxonomic overview of this genus with an emphasis on the Colorado flora. He provided living specimens to key in class and was there to help participants work through keys. Dr. Reznicek also provided a handout he made specifically for our workshop: *Colorado Carex with sections organized into groupings (based on Flora of North America nomenclature, with synonymy)*. The handout is quite helpful for

separating Colorado carices into groupings that greatly simplifies field identification. The handout is available from Leo P. Bruederle, who organized this event. This information also helps one to focus on particular characteristics of each species. In the field, we learned additional pointers and characters for identifying over 20 species of Colorado sedges that are included in this report.

A highlight of the field trip was finding a species that is new to Colorado. *Carex conoidea* is largely an eastern species, extending west to Minnesota, Iowa, and Missouri, with disjunct populations in Arizona, New Mexico, and now Colorado. However, it is never common and is listed as state threatened or endangered in five eastern states (USDA PLANTS Database).

With approximately 2,000 species of *Carex* in the world, this genus is among the largest of all plant genera. All carices are uni-

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sexual, perennial — there are no annuals, and very few are introduced. There are roughly 500 *Carex* species in North America and 116 species in the state of Colorado (well, at least until we let Dr. Reznicek loose for another *Carex* workshop!).

What follows is a summary of a few of the interesting and insightful tools Dr. Reznicek taught to simplify field identification of *Carex*. I hope these pointers are helpful and get you excited about sedges! Happy hunting!

Tips for Identifying Carices and other Sedges

The first thing to keep in mind is that not all “sedges have edges.” Many people believe that all sedges have triangular stems. This is not always the case — about 70 percent are triangular. Sedges have leaves that are at 60° angles from one another along the stem, while grasses, for example, have leaves at 180° spacing. Sedges also have a solid (not a hollow) stem. Sedges don’t have ligules (present in grasses), or they are fused to the leaves and less apparent. Sedges sometimes have leafy bracts, while grasses never do. Rushes can be confused with carices, but they lack perigynia and their floral organs look much like typical flowering plants.

Sedge keys and descriptions often require some knowledge of underground parts, which are not always available. All carices have rhizomes, albeit of varying length and, in some species, extremely short. If plants are caespitose (clump formers), one can conclude they do not have long creeping rhizomes and, conversely, if plants are widely spaced, one might conclude they have long creeping rhizomes.

Keys and descriptions also require that one knows how many stigmas are present. The carices are divided in most keys into two subgenera, *Vignea* and *Carex*, based on this feature. However, this character can be quite difficult to discern, as many of the stigmas are gone when the perigynia are mature, which is, of course, the best time for identification. The shape of the achene can be

helpful (that is, terete or rounded achenes have three stigmas, while lenticular or lens-shaped achenes have two), but this character can still prove to be confusing. The list of characteristics provided (Table 1) for the subgenera will allow one to assign a specimen to one of the two groups and determine the number of stigmas indirectly. Choose the subgenus where the majority of the characters match.

Another character that can be tricky to determine in some species is whether your specimen is gynecandrous (female flowers located above the male flowers at the top of the spike) or androgynous (male flowers located above the female flowers at the top of the spike). A helpful trick is to see if there is branching within a spike (compound spike). If so, one can conclude the males are apical or the spikes androgynous. Also, in plants where the males are on the bottom and the anthers have fallen off (which is often the case), one can find empty scales which seem to form a sort of distinctive base for the spike and, thereby, conclude it to be gynecandrous.

Measurements of many plant parts, from the leaves to the perigynium, can have overlapping ranges between species. One of the best ways to obtain measurements is to measure the widest examples, according to Dr. Reznicek. Many measurements stated in keys are based on averages. To get away from the overlap zone, measuring the widest parts on your specimen can be helpful.

Contributing to the confusion, some features are best observed on dry specimens, for example, perigynia with impressed nerves or “septate nodulose” leaves. Keep in mind, keys are typically written using dried herbarium specimens! In the field, you can dry plant parts on your dashboard or in the sun to make these features more readily observable. Of course, you want to follow proper property access, collecting and pressing techniques if making a formal specimen.

“In most *Carex*, the only aboveground stems are those bearing inflorescences” (Ball & Reznicek 2002). However, there are *Carex* species that produce vegetative shoots; that is, they have

Table 1. Characters used to identify carices to subgenus.

	<u>Subgenus <i>Vignea</i></u>	<u>Subgenus <i>Carex</i></u>
	1) two styles	1) three styles
	2) bisexual spikes (spikes all similar)	2) male and female spikes (spikes of two different kinds)
	3) spikes short	3) spikes elongated
	4) spikes sessile	4) spikes often with peduncles
	5) scale-like bracts subtending spikes	5) leafy bracts subtending spikes
	6) bracts not sheathing	6) bracts sheathing
	7) cataphylls (leaf bases) never reddish	7) cataphylls red-purple tinged



Carex conoidea
(Loraine Yeatts)

stems that may not produce sexual organs. Imagine having only leaves to identify a *Carex* specimen. However, sometimes these shoots may be all that one can find during certain parts of the growing season, as the vegetative stands may develop after the fruiting plants have matured (common in section *Ovales*). Characteristics of the vegetative shoots can be diagnostic, and have been largely overlooked by authors of keys, as well as other taxonomists, according to Dr. Reznicek. For example, vegetative shoots can be “pseudoculms,” comprised solely of leaves with no above-ground stem tissue, while other carices have vegetative shoots with true stems from which leaves arise. The latter is true for *Carex* section *Ovales*. Some of these vegetative shoots are annual and some are perennial, this characteristic can help distinguish between certain species. Vegetative shoots that have stem tissue will have leaves that do not peel down all the way to the base — they will stop peeling at a node. In contrast, the leafy vegetative shoots will have leaves that will peel back all the way to the base.

Plants for which the new year’s growth arises from the center of last year’s shoot will be clothed at the base by fresh or dead leaves. This condition is called “phyllopodic,” or “central.” An example is *Carex utriculata*. (Side note: Inuit peoples would eat the bases with the meristematic [true stem] tissue where there are lots of compressed nodes. Dr. Reznicek referred to them as “Michigan Palm Hearts”). *Carex atherodes*, which is common in Colorado and often forms monodominant stands, has vegetative shoots with true stems that die at the end of each season. Because the vegetative shoots will spread laterally from the original plant, there will be no dead leaves left from the previous season. These plants are said to be “aphyllopodic,” that is, they have “no leafy feet,” another diagnostic characteristic for some sedges.

The following is a quote by Ball and Reznicek (2002) from the *Flora of North America* that discusses in detail the terms phyllopodic and aphyllopodic.

“Shoots of sedges vary greatly in their longevity. In many species, all aboveground shoots are annual. In others, individual shoots may live more than one season. In such species, shoots may be vegetative in the first year and flower in a subsequent year. In species with annual flowering stems, only bladeless basal sheaths occur, clothing the base of the stem. Those stems are termed aphyllopodic (from the absence of leaf blades on the basal sheaths of the stem) or lateral (because they are formed lateral to previous year’s shoot). In species where the flowering stem is produced from the apical meristem of a vegetative shoot from the previous year, the base of the

stem is clothed in leaves of the previous year, in varying states of decay. Those stems are termed phyllopodic or central. This distinction is usually clear in regions with cold winters; it may be blurred in subtropical and tropical areas. In all cases, fertile stems die after fruiting.”

For a more detailed discussion on vegetative shoots in *Carex*, see “Vegetative shoots in the taxonomy of sedges (*Carex*, Cyperaceae)” by Reznicek and Catling (1986).

Additional notes on select *Carex* species:

Carex* subgenus *Vignea

Section *Dispermae*:

Carex disperma is a mat former with short-creeping rhizomes, as well as very fine leaves and a fairly distinctive delicate, few-flowered spike. It often grows in moist soils under conifers.

Section *Holarrhenae* (*Intermediae*):

Outside section *Ovales* (see below), *Carex sartwellii* is the only species that has annual true vegetative stems, as well as long, thick, dark-scaled rhizomes.

Section *Ammoglochin* (*Arenariae*):

Carex siccata (*C. foenea* misapplied) has a distinctive hooked shoot when one pulls it up. Otherwise, it looks very similar to *C. sartwellii*.

Section *Ovales*:

Section *Ovales* is considered to be one of the more difficult groups of sedges to identify. Many keys recommend taking measurements from the middle of a spike for most sedges. However, Dr. Reznicek recommends taking measurements from the lowest two or three perigynia of a spike for this group. All species in section *Ovales* are clump formers and have vegetative shoots with true stems comprising nodes and internodes. Furthermore, all members are gynecandrous with winged perigynia.

Carex brevior represents an eastern lineage that is paler in comparison to the closely related *C. microptera*, which represents a western lineage. The former is common at lower elevations and on the Great Plains.

Carex ebenea can be distinguished from *C. pachystachya* by the shape of the mature perigynia. In *C. ebenea* the perigynia, which are 5-7 mm long, look like fried eggs, while *C. pachystachya* has perigynia that are flat and plano convex.

Carex praticola is one of the early maturing carices and has an arching spike. It also has an elongated tubular non-serrulate beak and a scale that is as long and as wide as the perigynium.

“**Carex workshop**” continues on page 4

Carex subgenus Carex

Section *Phacocystis*: (stigmas two, perigynia often flattened)

Carex nebrascensis has a rosette of leaves on the ground, which is absent in the similar *C. aquatilis*. In addition, *C. aquatilis* is not as blue-green and the inflorescence is not as wide. *Carex nebrascensis* has a bidentate, cylindrical beak that is 0.3 - 0.5 mm long, while *C. aquatilis* has a vestigial beak <0.3 mm.

Section *Racemosae (Atratae)*: (perigynia +/- flattened, terminal spikes usually gynecandrous)

Carex buxbaumii often occupies wet seeps and meadows. It is rhizomatous and has purple cataphylls at the base of the plant. The sheaths are fibrous with a ladder-like weave similar to that of *C. pellita*. *Carex buxbaumii* has papillate perigynia with little swellings that appear as a "thousand points of light" using a hand lens in very good light. The dark red-purple scales against the green perigynia give this species a distinctive appearance. This species is often associated with *C. conoidea* in the east.

Section *Bicolores*: (small rhizomatous species)

Carex aurea is one of the exceptions to the rule that plants with two stigmas belong to subgenus *Vignea*. Its rounded fruit are orange, somewhat fleshy, and quite distinctive when mature.

Section *Griseae*:

Carex conoidea, a disjunct from the east, is a new state record. Impressed veins sunken into the perigynia are a distinguishing characteristic (images at http://utc.usu.edu/factsheets/CarexFSF/Carex_conoidea.htm). It is associated with *C. brevior* in Colorado.

Section *Hymenochlaenae*:

Carex sprengelii has pendulous spikes and a distinctive thready mass at the base of the plant.

Section *Paludosae*:

Carex pellita (*C. lanuginosa* misapplied) is a calciphile with hairy, thick-walled perigynia. It is rhizomatous, growing in widely spaced clumps.

Section *Vesicariae* (includes section *Pseudo-cypereae*):

Carex utriculata is a colony former and phyllopodic, with septate nodulose sheaths at the base.

Section *Acrocystis (Montanae)*: (upland species with hairy perigynia and red leaf bases)

Carex rossii can be hard to identify. It has elongate peduncles on the basal part of the plant that are quite hidden among the basal leaves. In addition, this plant has elaiosomes (lipid filled structures at the base of the perigynia that are attractive

to and utilized by ants). This species is easily confused with *C. deflexa*, *C. brevipes*, and *C. geophila*. *Carex geophila* ~~can~~ lacks a leafy bract. *Carex pensylvanica* is also an upland sedge with hairy perigynia, but the base of the plant is fibrous.

Section *Obtusatae*:

Carex obtusata is an upland sedge with bright red-purple bases. It is unispicate, with a single androgynous spike and hairy perigynia.

Notes on select *Eriophorum* species:

Eriophorum angustifolium has the widest leaves of the Colorado species (despite the Latin name!), with wine-red staining at the base of the vegetative shoots.

Eriophorum gracile has one bract and is brown at the base of the leaves; leaves are narrow.

Eriophorum altaicum has a single head. The taxonomy of this species is shaky according to Dr. Reznicek.

References

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Sunday field trip.

BOOK REVIEW

Spears, Priscilla. 2006. *A Tour of the Flowering Plants: Based on the Classification System of the Angiosperm Phylogeny Group*. Missouri Botanical Garden Press, St. Louis.

If you completed a course in plant taxonomy or systematics more than 10 years ago, *A Tour of the Flowering Plants* by local author and photographer, Priscilla Spears, will be an eye-opener. Published by the Missouri Botanical Garden Press, this noteworthy book illustrates, through color photographs, the revised classification system (APGII) of the international Angiosperm Phylogeny Group and Peter Stevens' *Angiosperm Phylogeny* website (www.mobot.org/MOBOT/research/APweb/). Based on phylogenetic analyses of molecular (DNA) evidence coupled with data deriving from anatomy, morphology, biochemistry, palynology, and development, the classification system groups plants by their evolutionary relationships. Convergence is a common theme in this book and, as noted by Spears, "relatives do not always look alike and look-alikes may not be related."

The photographic tour visits 109 families of flowering plants that occur primarily in the temperate United States and Canada. Flowering plants are organized into the basal angiosperms, which diverged early from within the flowering plant lineage, the monocots, and the eudicots or "true dicots." These categories are divided further into subgroups, which in turn include our more familiar orders, families, genera, and representative species. Family characteristics are described and photographs of flowers of several species are featured, as well as interesting gems of information.

In this phylogenetic system, you may find some surprises. For example, Class Magnolipsida, comprising the dicotyledons, is no longer recognized as a natural group — molecular evidence reveals that the Magnoliids and water lilies are no more closely related to the monocots, than they are to the eudicots. More than a few species that had been in the lily family (Liliaceae) have been placed in other, sometimes unfamiliar, families. The waterleaf family (Hydrophyllaceae) has been absorbed by the borage family (Boraginaceae), the Chenopodiaceae are now in the Amaranthaceae (so goosefoot and amaranth occupy the same family), and the milkweed family (Asclepiadaceae) has been absorbed into the dogbane family (Apocynaceae). Furthermore, members of the figwort family (Scrophulariaceae) have also been relocated; penstemons are now in the plantain family (Plantaginaceae), while *Castilleja* (paintbrushes) and *Pedicularis* (louseworts) have joined the broomrapes in the Orobanchaceae. And while these rearrange-

ments may seem uncomfortable, they are typically strongly supported by multiple sources of data; for example, all members of the Orobanchaceae are either true parasites or hemi-parasites.

In addition to these phylogenetic updates, Spears' also provides insights into the considerable ecological and economic importance of flowering plants. For example, the Malvaceae now include the Sterculiaceae, which means that the cacao tree or *Theobroma cacao* — think chocolate — is a member of the mallow family. Excellent photographs of the flowers and fruit of *T. cacao* growing directly from the trunk of the tree, accompany an interesting discussion of chocolate production.

A Tour of the Flowering Plants was a nominee for the 2007 Council on Botanical and Horticultural Libraries Annual Award for a Significant Work in Botanical or Horticultural Literature. The book includes a glossary, select references, index, tree diagrams, and a color CD. Appendices include an expanded index of flowering plant families and a chart listing representative genera, along with their common names, families, and orders. While this book will have broad appeal, it is best for those individuals who have some background in plant taxonomy. For a more extensive treatment of the topic, refer to *Plant Systematics: A Phylogenetic Approach*, 3rd edition, by Walter S. Judd, et al (2008.)

Priscilla Spears has a Ph.D. in microbiology from Colorado State University and is a gifted science educator who develops teaching material for Montessori schools. She has presented programs and workshops for CONPS on the classification system of the Angiosperm Phylogeny Group. Priscilla's presentation is available on the CONPS website (<http://conps.org/workshops.html#Spears>). Priscilla is an ardent advocate of science education and her work inspires a new generation of scientists. More information about her work and publications can be found on her Big Picture Science website, www.bigpicturescience.biz/.

A Tour of the Flowering Plants can be purchased at a discount from our online bookstore at www.conps.org/bookstore.html. And remember, whenever you enter Amazon by linking through a book in our online bookstore, the Society will receive a percentage of anything you purchase at no additional cost, be it books, electronic items, or anything else.

Jan Loechell Turner is Associate Professor at the Regis University Library and a Director on the CoNPS Board. Leo P. Bruederle is Chair of Integrative Biology on the University of Colorado Denver Downtown Campus and Editor of Aquilegia.

CONSERVATION CORNER

Oil and Natural Gas Production in Colorado — A Brief Overview

by Thomas A. Grant III

On 3 April 2009, the Colorado Natural Areas Program (CNAP) organized a seminar on oil and natural gas development and extraction processes in Colorado. Doug Dennison of Olsson Associates presented a brief summary of Colorado's geology as it relates to petroleum, an overview of the drilling process, and graciously answered numerous questions from the audience. The issue of oil and gas extraction from the public lands of Colorado's western slope has been contentious, especially within the past decade as oil prices skyrocketed and development of the resources reached new heights. The opportunity to learn about our state's geology and long history of oil and gas production provided valuable insight and may help to improve the dialogue between two groups whose communication has historically been strained and reactionary.

The mission of the Colorado Native Plant Society is to foster and support activities that relate to the study, enjoyment and protection of Colorado's native plants. Obviously, there is direct conflict between the expansive development of the Piceance Basin and Roan Plateau areas on the one hand, and the conservation of several rare species and pristine ecosystems on the other. In a complex society with a heavy dependence on petroleum products and continual economic growth, the dilemma of 'providing' for society or protecting natural ecosystems often becomes difficult and sides are rapidly drawn. Is it possible to protect rare plant species and extract petroleum from the western slope? Unfortunately, this column cannot answer that question, but it may help us learn about how petroleum resources are extracted and that our concerns are understood

and valued by some of the people and companies involved in the extraction of oil and natural gas. The vast majority of information reviewed is based on Doug Dennison's presentations, which are available online at the CNAP website. Any inaccuracies or misinformation are the fault of the author, a plant ecologist with little knowledge of geology or oil extraction, who is attempting to understand the process in order to cooperatively create a sustainable future.

A Little History and Geology

In 1881 the second oil field in the USA began producing from the Pierre shales near Florence, CO — our country's first oil field was in Pennsylvania. There are four major oil basins in Colorado: Denver-Julesberg, Raton, San Juan, and Piceance basins. Each basin has distinct geologic traits that affect the amount, cost, and feasibility of extracting the resources. The Denver-Julesberg basin is the largest in Colorado and extends eastward from the Dakota Ridge Hogback. It encompasses portions of NE Colorado, SE Wyoming, and SW Nebraska. The majority of oil and gas are produced from cretaceous formations and are found between 3000 and 8000 feet (ft.) below ground level. Since intensive production began in the 1950's, over 52,000 wells have been drilled in the basin and Weld County currently has the highest density of active wells in the state (nearly 14,000 and over twice the number of any other county). The Raton Basin in south-central Colorado is primarily a source of coalbed natural gas (also known as coalbed methane), but the potential for extraction of conventional gas exists. At the beginning of a coalbed natural gas well's life, a large amount of water is pro-

duced in order to reduce the pressure on the gas and facilitate its removal. Handling and storage of the potentially polluted water has become a major issue for this type of resource extraction. Surprisingly, no permits are required for the extraction of this water.

Development of the San Juan basin began in the 1920's and continues today with extraction of oil, gas, and coalbed methane. Conventional oil and gas wells extract the resources from the Mesa Verde and Dakota formations at depths between 3,000 and 10,000 ft, while coalbed methane is removed from the coal bearing and significantly shallower Fruitland formation (1,000 to 4,000 ft). The Piceance basin has become a focal point for the conflict between conservationists and resource extraction companies. Recent policy changes under the Bush administration expedited the review and authorization processes by federal land management agencies and fast-tracked development in the region. Drilling in the Piceance basin is difficult and expensive, especially on the Roan plateau, due to the greater depths required, although the availability of pipelines has encouraged development. Natural gas is the primary product from the region and is extracted from sandstone lenses consisting of 'tight' sands of the Williams Fork formation. This region also contains enormous amounts of oil rich shale from the Green River formation, although large-scale extraction has not begun due to high extraction costs and environmental concerns.

A Very Basic Overview of Drilling

Drilling an oil or natural gas well has become a highly technical and computerized process based on extensive geologic

data. Most of the environmental concerns are focused on the destruction of habitat for the well pads and network of roads and pipelines, but the potential degradation of ground water and air quality is also of concern. The destruction of plant communities has direct negative impacts on native vegetation and animal communities or their migratory routes. Additionally, the revegetation or restoration of well pads has had limited success and many are infested with invasive plants. Following site selection and permitting by the Colorado Oil and Gas Conservation Committee, a drill rig is temporarily installed at a site. The well pad is the total area disturbed by the well and must be large enough to accommodate all of the drilling equipment, power generators, and reserve pit, which is a reservoir for the water and mud removed by the drill. Most well pads are three to four acres in size. Thirty-foot sections of drill pipe with a drill bit attached to the end are rotated by the drill rig and slowly proceed through the earth. 'Mud' is circulated through the drill pipe to maintain hydrostatic pressure and remove particulates. Eventually, the 'mud' and particulates end up in the reserve pit, although new pit-less systems exist that use a closed-loop system to recirculate and reuse the mud. This advancement reduces the potential for pollution and the footprint of the well pad, since the reserve pit is smaller or no longer necessary. The borehole is layered with three types of cement casing to reinforce the hole and prevent contamination of groundwater or soil by the petroleum products and chemicals used to induce extraction. Usually, the oil or gas is extracted at depths greater than the groundwater and the production casing (cement conduit) should prevent the interaction of extracted hydrocarbons and groundwater.

Directional drilling has recently been highlighted as a technology to reduce the

surface disturbance and overall footprint of oil and gas wells. Basically, directional drilling allows the installation of multiple wells from one well pad by allowing horizontal deviation of the borehole from the well pad. In the Piceance basin, as many as 22 wells have been drilled from one pad and the wells can reach approximately 2500 ft horizontal distance from the well pad. Directional drilling increases the cost of well installation, but it reduces the overall footprint of the oil field and centralizes the operations of multiple wells onto one location. Once a well has been drilled and the cement casings installed, it is often necessary to stimulate the well to induce production. Hydraulic fracturing, or 'fracing,' is used to create fractures in the rock and facilitate movement and removal of the natural gas. Essentially, fracing uses multiple pressure trucks to inject water and chemicals into the ground at high pressure (up to 10,000 psi). A major issue with fracing has been centered on the chemicals included in the fracing mixture, which is often proprietary and the information is not available to the public. The final stages of well installation include the installation of the wellhead and several aboveground condensers and separators to 'clean' up the natural gas before entering the main pipeline.

The presentation by Doug Dennison provided basic information about Colorado's major petroleum basins and the process of extracting oil, natural gas, and coalbed methane. Plant conservationists and resource extractors each have misconceptions about the other and the processes or values that each group holds dear. Only by understanding the processes and potential consequences of oil and gas development on the environment do we have a chance to work effectively with resource extractors to conserve natural plant communities. In an era where development and economic growth often trample envi-

ronmental concerns, learning about extraction processes provides us with a common place to converse and discuss plant conservation with the corporations and policy makers involved. Although it may be easier to simply reject oil and gas development, the resources it supplies are integral to our lives and, until alternative options are implemented, we must work to reduce the impacts and find progressive options for our environment and economy.

Thomas (Tom) A. Grant III is a Ph.D. Candidate in the Graduate Degree Program in Ecology at Colorado State University and the new chair of the society's Conservation Committee.



New Book: *Wildflowers of Red Rocks Park*

Wildflowers of Red Rocks Park, by local authors Jan and Charlie Turner, is a color photographic field guide to over 70 plants commonly found along the trails in the Park. For easy identification, a full page is devoted to each plant with a close-up photo of relevant diagnostic features, such as the flowers, fruits, and/or leaves, as well as a photo of the entire plant. Flowers are grouped by color and each page has a place for various field notes.

Plant profiles typically include a brief description of the plant, flowering time, Native American uses, ecological information, and landscaping uses. Symbols indicate whether each species is a native plant or an invasive weed. A map of the Trading Post Trail with locations of a number of the plants, an index, and a bibliography are also contained in the book. *Wildflowers of Red Rocks Park* is the third book in the Rabbitbrush Publishing Wildflower Series and is available for purchase from the CoNPS online bookstore.

WHO'S IN THAT NAME?

John Charles Fremont (Part 2)

by Al Schneider

Fremont's botanical ventures followed the same path as his life — a roller coaster of success and failure. Prior to his first expedition in 1842, Fremont was unknown in the botanical world. On 18 November 1842, John Torrey wrote to Asa Gray that “a Lt. Fremont,” who writes “like a foreigner,” was sending Torrey “some plants collected towards the Rocky Mountains.” When Torrey received the plants, he sent the Compositae to Gray and, on 5 December after looking at the plants, Gray wrote in great excitement:

“*Tetradymias* [horsebrush] this side of the Rocky Mts.!! Some new senecios.... How I would like to botanize up there! Is the Lieutenant's name Fremont? I wish we had a collector to go with Fremont. It is a great chance. If none are to be had, Lieut. F. must be indoctrinated, & taught to collect both dried spec. & seeds. Tell him he shall be immortalized by having the 999th *Senecio* called *S. fremontii*.” (From *The Expeditions of John Charles Fremont* by M.L. Spence)

Over the next eight years, Fremont continued to correspond frequently with Torrey, who received and, with Gray, described Fremont's collections. Fremont, thus, had the best guidance and assistance; however, he was headstrong and often did not listen to the expert botanical advice given him. For instance, although his expeditions did produce many significant botanical results — Torrey said of the 1842 collection, “[It is] a very interesting contribution to North American botany” — much more could have come from his expeditions, if a botanist had been taken on the trips. Fremont finally did take a botanist, Creutzfeldt, on the fourth expedition.

Torrey did get Fremont to study under George Engelmann for a few days, but Engelmann wrote Gray on 6 December 1844:

“[Fremont] appears to me rather selfish — I speak confidentially — and disinclined to let anybody share in his discoveries, anxious to reap all the honour, as well as undertake all the labour himself. He objected to taking any botanist or geologist along with him... even though he himself cannot claim any knowledge of [botany]....” (M.L. Spence)

In his second expedition from 1843-1844, Fremont's collection from his westward leg of the journey through the Rockies and Great Basin was lost when the mule carrying the botanical specimens went

over a precipice on the final westward descent out of the Sierras following an unbelievably heroic, fool-hardy, and life-threatening crossing of the Sierras in the winter. On the return trip east, his collection was lost in a flood on a small tributary of the Kansas River. Yet, Fremont did bring back enough specimens to exhilarate Torrey and Gray. Specimens included the first records of *Eriogonum inflatum*, *Coleogyne ramosissima*, and *Populus fremontii*.

On his third expedition, Fremont shipped Torrey a treasure chest of over a thousand specimens. On the fourth expedition, some of the collection were ruined by rains and some perished in the snows of the Colorado San Juan Mountains, when he and his men fought for their lives — ten men died. By the fifth Expedition (1853-1854), Fremont and Torrey had almost no communication.

According to Stanley Welsh, expert on Fremont as botanist (see Welsh's book, *John Charles Fremont, Botanical Explorer*), Fremont's 1842 expedition yielded 22 new species of plants, his 1843-1844 expedition yielded 70, his 1845-1846 expedition yielded 52, his 1848-1849 yielded ten, and his final 1853-1854 yielded one, “with three more of unknown date for a total of 167” new species discovered by Fremont. Welsh further indicates that, “Collections of the first expedition were identified as representing 371 [species]; the second some 379 [species], the third 458, the fourth 60, and the fifth 8.” Welsh notes that there were at least an additional 52 species for a total of well over 1,000 species collected on all the expeditions. This is certainly a major collection, but had Fremont taken a trained botanist with him — and been a bit



John Fremont. From Library of Congress.

more careful in handling the plant specimens — his expeditions would have produced an even more impressive collection.

It was common practice to take a botanist on such expeditions; for instance, Charles Geyer had accompanied Nicollet on expeditions that Fremont had also been on. However, no one knows why Fremont did not. A good guess would be his ego; as Engelmann said, Fremont wanted to do everything and get credit for everything.

In the late 1840's and early 1850's, Torrey and Gray described many of the plants Fremont collected and honored him in the names of quite a few of these: *Senecio fremontii*, *Mahonia fremontii*, *Populus fremontii* (now *Populus deltoides* subsp. *fremontii*). Many of us know as common "plant friends" a number of other species that Fremont was the first to collect: *Senecio spartioides*, *Rydbergia grandiflora*, *Coleogyne ramosissima*, *Senecio multilobatus*, *Atriplex confertifolia*, *Lycium pallidum*, *Eriogonum inflatum*, *Astragalus preussii*, and *Castilleja linariifolia*.

The plants that John Charles Fremont collected will ensure that we remember his name; the details of his life will ensure that we remember how complex human beings are and that great success is sometimes accompanied by monumental failure.

NOTE: Much of the above is common knowledge that can be found in the many resources about Fremont. A key source for information about Fremont is *The Expeditions of John Charles Fremont* by Mary Lee Spence. The primary text for the botanical accomplishments of Fremont is *John Charles Fremont, Botanical Explorer* by Stanley Welsh, who also wrote *A Utah Flora*.

Al Schneider is the Vice President of CONPS and contributes regularly to Aquilegia.



Comandra umbellatum
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown.
1913. An illustrated flora of the northern United States, Canada
and the British Possessions. Vol. 1: 640.

2009 Marr & Steinkamp Research Grant Recipients

by Jan Loechell Turner (Chair), Research Grants Committee.

John W. Marr

Colin Quinn (Graduate Student, Botany, Colorado State University). Pollination ecology of prince's plume (*Stanleya pinnata*), a selenium hyperaccumulating plant. **\$1,000**

Boyce Drummond (Visiting Associate Professor of Biology, Colorado College) and Jessica Rhode (Paraprofessional in Biology, Colorado College). Role of Plant Community Dynamics in the Reproductive Success of a Federally Listed Butterfly. **\$700**

Christina Alba-Lynn (PhD student, Ecology, Colorado State University). Herbivore response to *Verbascum thapsus* (Common Mullein) populations with different defense phenotypes. **\$671**

Neil Snow (Bishop Museum, Hawaii), Pamela Smith (Ft. Collins, CO), and Leslie Stewart (Dolores, CO). Digital Enhancements for an Interactive Key to Grasses of the Southern Rocky Mountain Region. **\$500.**

Myrna P. Steinkamp

Michelle DePrenger-Levin (Research Associate, Denver Botanic Gardens). Analysis of a taxonomically difficult narrow endemic: *Corispermum navicula* Mosyakin. **\$1,000**

Seema Sheth (PhD candidate, Biology, Colorado State University). Determinants of geographic range size in western North American *Mimulus*. **\$1,000.**

John Lovell (PhD student, Ecology, Colorado State University). What factors limit endemic species' distributions? Genetic, physiological, and ecological investigations into the population structure, dynamics, and history of endemic and widespread *Boechera* species. **\$500**

The Society is grateful to those of you who choose to make donations to the John W. Marr and Myrna P. Steinkamp funds. Your donations make possible many research projects dealing with the plants of Colorado. This research contributes to a better understanding of our native plants and is integral for conservation. Numerous projects funded by CONPS grants have resulted in publications in scholarly journals. If you are interested in contributing to the Marr or Steinkamp fund, please contact CONPS Treasurer Mo Ewing (moewing@q.com). And, as always, thanks for your support!

Marr and Steinkamp Report

Effects of Habitat and Mycorrhizal Associations on the Exotic Dandelion, *Taraxacum officinale*, in the Alpine

by Katie M. Becklin

Introduction

Identifying and understanding factors that influence invasibility is important to conservation efforts. Species 'gaps' associated with reduced biodiversity in novel habitats are hypothesized to facilitate biological invasions (Elton 1958). Mycorrhizal associations — mutualistic relationships between root-colonizing fungi and host plants — have also been predicted to influence the success of invasive species (Richardson *et al.* 2000). This study describes the effects of potential species gaps and mycorrhizal colonization on the success of an alpine invader, *Taraxacum officinale*.



Taraxacum officinale, the common dandelion, in a Colorado alpine habitat (Katie Becklin).

Native biodiversity has been shown to correlate negatively with invasibility in some studies (Levine and D'Antonio 1999). Ecological communities with fewer native species are predicted to have more open niches, and thus less competition. If exotic species can take advantage of these species gaps, then communities or habitats in which biodiversity is low may be vulnerable to the spread of exotic species.

Mycorrhizal associations are thought to influence plant invasions through their effects on plant survival and reproduction (Richardson *et al.* 2000). In these relationships, the symbiotic fungi can enhance nutrient uptake and stress tolerance in their host plants. Through these effects mycorrhizal associations may increase the realized niche or competitive ability of exotic species, thereby facilitating the invasion process.

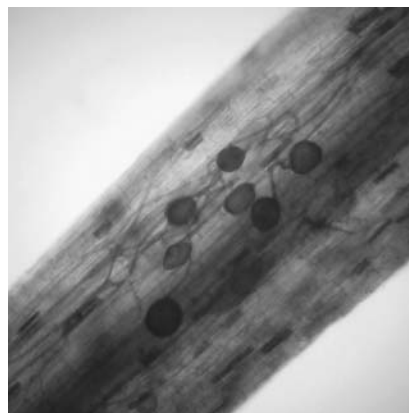
In alpine systems plant growth is often limited by abiotic conditions and nutrient availability (Körner 1999). Given the role of mycorrhizal associations in nutrient acquisition and stress tolerance, these associations may be particularly important to plant survival in alpine habitats. If mycorrhizal associations enable exotic plants to tolerate a wider range of environmental conditions, they could facilitate the spread of new species into alpine plant communities.

Both mycorrhizal associations and native plant diversity vary across the landscape in alpine krummholz communities. Krummholz, or 'twisted wood' habitat, consists of a mosaic of small stunted tree or willow islands and alpine meadows. Research indicates that mycorrhizal abundance and native plant diversity are reduced in willow understory habitats compared to the surrounding alpine meadow (Becklin and Galen, *in press*; Becklin *unpubl. data*). If mycorrhizal associations or species gaps are important to plant invasions, then alpine meadow and willow understory habitats may differ in their relative invasibility.

By evaluating the success of *T. officinale* in alpine meadow and willow understory habitats, this research explores the hypotheses that mycorrhizal associations and species gaps facilitate plant invasions. Specifically, this research addressed the following questions: 1) Does exotic plant fitness differ in alpine meadow and willow understory habitats? 2) Does mycorrhizal abundance correlate with these fitness effects? Answering these questions will provide insight into how variation in biodiversity and mycorrhizal associations might affect the invasibility of alpine communities.

Materials and Methods

Study System. The study was conducted in 2007 and 2008 on Pennsylvania Mountain (Park County, CO). At this site the alpine krummholz region extends from approximately 3600 to 3700 m in



Arbuscular mycorrhizal fungi in *Taraxacum ceratophorum* (Katie Becklin).

elevation. Alpine willows (*Salix glauca* and *S. brachycarpa*) are dominant species in these communities. They are known for their role in altering light, nutrient, and water availability to understory plants (Körner 1999). These effects have been shown to influence plant survival and growth (e.g., Dona 2007). Research also indicates that willows may negatively affect native plant diversity and the abundance of arbuscular mycorrhizae (AM) in the understory (Becklin unpubl. data; Becklin and Galen, *in press*).

Taraxacum officinale, the common dandelion, was introduced to North America during European settlement (Mack 2003). It has since spread across the continent and is found in lower alpine communities. *Taraxacum ceratophorum*, the alpine dandelion, is a close relative of the exotic species (Scott 1995). Both species form associations with AM fungi and can be found in alpine meadow and understory habitats (Becklin and Galen, *in press*). Consequently, I used these two species to compare native and exotic performance in each habitat.

Experimental Design. To evaluate plant performance in alpine meadow and willow understory habitats, I transplanted *Taraxacum* seedlings and adults into 15 plots representative of each habitat. The alpine meadow plots were at least 3 m away from the nearest willow. *Taraxacum officinale* and *T. ceratophorum* seedlings were propagated in a greenhouse prior to the 2007 growing season (Columbia, MO). Adults of each species were collected from resident populations on Pennsylvania Mountain in mid June. Two seedlings and one adult of each species were transplanted into the experimental plots in late June. To minimize transplant shock the plants were covered with plastic shields and watered daily for two weeks.

I monitored plant survival, growth, and flowering throughout the 2007 and 2008 growing seasons. Seedling survival and total leaf length were monitored every 3d. Seedling performance was not measured in 2008 due to low survival in 2007. Adult survival, total leaf length, and flowering were monitored every week from June until August in both 2007 and 2008. At the end of the second growing season I harvested the surviving adult plants and measured shoot biomass after drying the plant material at 60 °C for 3d.

A subsample of roots from each adult plant was cleared in 10% KOH, rinsed with 0.1N HCl, and then stained for AM fungi with 0.05% trypan blue in a lactoglycerol solution. Using a magnification of 450x, I scanned 100 points along ten root fragments for arbuscules, vesicles, or coils produced by AM fungi. The abundance of AM fungi was calculated as the proportion of root length containing those structures.

Results

Effect of habitat on plant performance

Seedling survival was slightly greater in the willow understory compared to the alpine meadow, particularly for *T. officinale* seedlings (Table 1). *Taraxacum officinale* seedlings also had a slightly higher survival rate compared to *T. ceratophorum* seedlings regardless of habitat (Table 1). Adult survival rates did not differ significantly between habitats (Table 2); however, *T. ceratophorum* transplants had a slightly higher survival rate than *T. officinale* adults over the course of the experiment (Table 2).

Seedling size decreased from June to August in 2007 (Fig. 1). In general, *T. officinale* seedlings were larger than *T. ceratophorum* seedlings. By August, *T. officinale* seedlings growing in the alpine meadow were significantly smaller than those growing in the willow understory (Fig. 1A). There was no difference due to habitat in the size of *T. ceratophorum* seedlings (Fig. 1B).

Adult size increased over time in 2007 and 2008 (Fig. 2). However, there was no difference in total leaf length due to habitat or species. Final shoot biomass also did not differ between habitats or species (data not shown).

Table 1. Percent survival of seedling transplant after 2 months.

Species	Treatment	August 2007
<i>T. officinale</i>	Alpine Meadow	0.10b
	Willow Understory	0.37a
<i>T. ceratophorum</i>	Alpine Meadow	0.00b
	Willow Understory	0.10b

*Seedlings were not monitored in 2008 due to low survival.

Table 2. Percent survival of adult transplant after 2 and 14 months.

Species	Treatment	August 2007	August 2008
<i>T. officinale</i>	Alpine Meadow	0.60a	0.33c
	Willow Understory	0.53a	0.20c
<i>T. ceratophorum</i>	Alpine Meadow	0.53a	0.49b
	Willow Understory	0.80a	0.53b

Table 3. Proportion of root length in adult transplants colonized by AM fungi.

Species	Treatment	June 2007	August 2008
<i>T. officinale</i>	Alpine Meadow	0.73a	0.33c
	Willow Understory	0.74a	0.50bc
<i>T. ceratophorum</i>	Alpine Meadow	0.67a	0.61b
	Willow Understory	0.79a	0.50bc

"Mycorrhizal Associations" continues on page 12

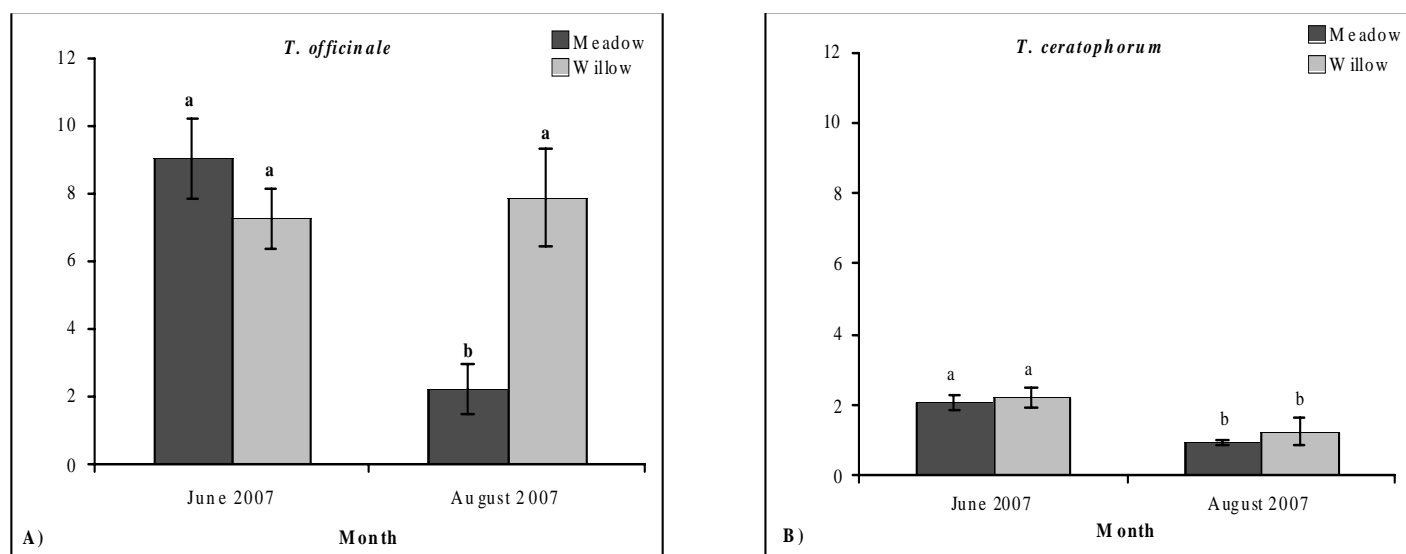


Figure 1. Mean total leaf length of *T. officinale* (A) and *T. ceratophorum* (B) seedlings growing in alpine meadow and willow understory

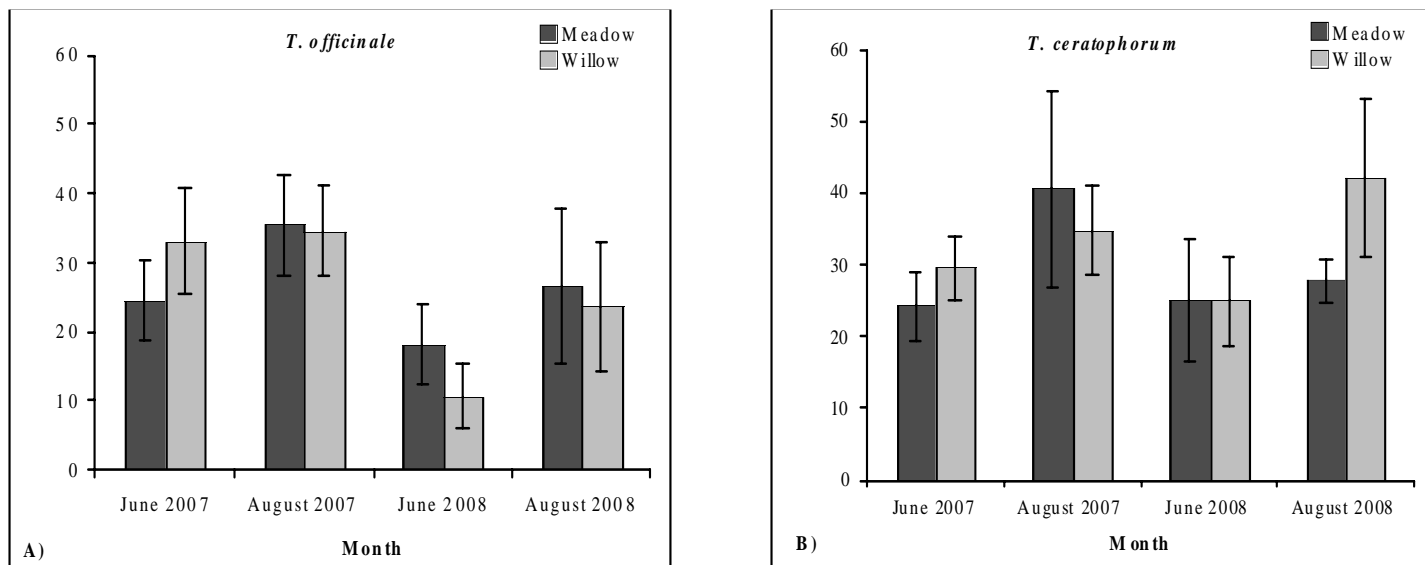


Figure 2. Mean total leaf length of *T. officinale* (A) and *T. ceratophorum* (B) adults growing in alpine meadow and willow understory habitats in 2007 and 2008.

The probability of flowering did not differ between species; however, a greater number of adult plants flowered in the alpine meadow plots compared to the willow understory. Within each plant species the probability of flowering did not differ between habitats.

Effects of mycorrhizae on plant performance

Mycorrhizal colonization did not differ between habitats (Table 3) or host species (Table 3) at the start of the experiment in 2007. At the end of the experiment in 2008, AM abundance depended on the combination of habitat and host species. In particular, AM fungi were more abundant in *T. ceratophorum* compared to *T. officinale* when the plants were growing in the alpine mead-

ow (Table 3). Mycorrhizal colonization was not correlated with plant growth or final shoot biomass in either species or habitat.

Discussion

These results indicate that mycorrhizal associations may not be particularly important to the success of *T. officinale* in alpine communities. However, these results also indicate that habitat can influence plant fitness at key life stages. In this study *T. officinale* seedlings had a higher probability of survival and a higher growth rate when they were growing in the willow understory. This suggests that willow habitats may actually provide a refuge for exotic dandelions during the establishment stage. Once established

habitat did not seem to affect plant fitness, as indicated by the similar growth rates and overall size of *T. officinale* adults growing in alpine meadow and willow understory plots.

This study supports the hypothesis that habitats in which native plant diversity is reduced may be susceptible to biological invasions. However, I did not manipulate plant diversity in this experiment. Other factors associated with willow and alpine meadow habitats could have influenced plant fitness and my results. Thus, further manipulative experiments need to be conducted in order to tease apart potential explanations.

Invasive species can significantly impact native communities by altering ecosystem properties and biodiversity (e.g. D'Antonio and Vitousek 1992). The Colorado Department of Agriculture has identified 71 species of noxious or invasive weeds in the state as of 2008. Some of these invasive plants have become dominant competitors in key habitats (e.g., Egan and Irwin 2008). Identifying factors that promote the spread of these exotic species will inform conservation and management efforts by increasing our understanding of biological invasions.

Acknowledgements

This research was supported by the John W. Marr Fund and the University of Missouri. I thank E. Hilpman, T. Cornell, J. Han, A. Michels, M. Pallo, and B. Uelk for their assistance in the field.

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- Katie M. Becklin is a PhD candidate in the Division of Biological Sciences at the University of Missouri.



WORKSHOP AVAILABILITY!

Spots are still available in the following, including a **new workshop** on botanical photography. Registration details can be found at www.conps.org or by contacting Linda Smith at 719-574-6250 or conpsoffice@aol.com.

BOTANICAL PHOTOGRAPHY USING DIGITAL SINGLE LENS REFLEX CAMERAS

Leader: Jacobe Rogers
Location: Walker Ranch, Boulder County. Open Space Picnic Shelter at Meyer's Gulch parking lot
Time: 8:00AM to 3:00PM
Date: Saturday, 20 June 2009

Improve your wildflower photography skills with Jacobe Rogers. We will first consider the pros and cons of lenses, lighting methods, and other odds and ends. Then, spend up to four hours photographing plants using various techniques. We will end the day by looking at what techniques work best for varying situations. If you choose to bring a laptop computer, this time at the end of the day will be most beneficial. Attendees should be familiar with their camera equipment. The class is not limited to single lens reflex cameras; however, if you bring a point and shoot or a film camera, please keep in mind the class structure is primarily digital single lens reflex. Regardless, you will still learn some tricks for your camera type. Attendance limited to eight people.

2009 Native Plant Society Field Trips

by Brian Kurzel, Field Trips Committee

It's time to get outside and see some of Colorado's wildflowers! Below you will find a myriad of trips available through the chapters of the Colorado Native Plant Society: from Picketwire to Four Corners and giant onions to lichens, there is something for everyone. Our goal is to get as many people outside as possible, and there is no shortage of opportunities! Here are a couple of tips as you seek to venture out this field season:

- There may be limits to the number of participants on an individual trip due to logistical constraints or sensitive features; please sign up for trips early. If full, many trips will also have waiting lists; so even if a trip is full now, get your name on the list and don't give up hope!
- Details on where and when to meet are available on the each chapter's website at www.conps.org and by contacting trip leaders.
- When attending a trip, be sure to bring a lunch, plenty of water, sun protection, bug spray, your favorite plant identification guides, a 10X magnifying glass, and packable rain gear.
- Unless otherwise stated, all trips listed are free and open to members and non-members.
- No pets are allowed on trips.
- Please check each chapter's webpage on www.conps.org for trip details and to see if any new trips have been added.
- Have fun!

Field Trip Lists

Trip Leaders and Participants: Plant lists are of great value. Consider keeping a list for each trip and submitting it to Loraine Yeatts, 1395 Nile Street, Golden, CO 80401. The lists will be posted at: www.conps.org/plant_lists_keys.html

Boulder Chapter

Olde Stage Road Fire

Thursday, 28 May 2009

6:00-8:00 PM

Take an evening hike up into the Olde Stage Road Fire area with city of Boulder Open Space and Mountain Parks ecologist **Lynn Riedel** to botanize and share stories about the Olde Stage Fire, which burned along the foothills north of Boulder on 7 January 2009. We will observe the recovery of the mixedgrass and xeric tallgrass plant communities, shrublands, and ponderosa pine savannas, and discuss the fire's effects on plants and wildlife. If time allows, we will take a look at shale barrens that provide habitat for

the northern Front Range endemic, Bell's twinpod. Meet at the North Foothills Trailhead, on the east side of Hwy. 36, just north of Boulder. This is a moderately difficult walk. Contact: Lynn at riedell@bouldercolorado.gov or 720-564-2098

Boulder Mountain Park Natural Area

Monday, 22 June 2009

6:00-8:30 PM

Join **Megan Bowes** for a hike through the Colorado Natural Areas Program's newest State Natural Area, OSMP's Boulder Mountain Park. We'll see typical foothills communities common to other areas of OSMP, as well as rare or unusual plant species left over from the cooler and wetter conditions prevalent during the last ice age. Among the plant relicts are a stand of paper birch and disjunct populations of boreal and subalpine plants. There are also several rare birds, mammals, and insects that call this area home. Do to sensitivity of habitat, space is limited to 20. Contact: Megan at 720-564-2084 or bowesm@bouldercolorado.gov.

Liken' Lichens in the Forest Field Trip

Friday, 26 June 2009

Meet **Ann Henson** at 9:00 PM in the parking lot at Heil Ranch Open Space. From there, we will carpool to the St. Ceran trailhead off Overland Rd east of Hwy. 72, where parking is limited. We will begin from here at 9:30 AM. Bring your magnifier or hand lens, lunch, and the usual layers for all kinds of weather. We will explore the various growth forms of lichens and review the structures that make them unique. Walking will be relatively easy over relatively short distances at 9500' elevation. This trip is limited to eight participants. Please contact Ann Henson at 2henson@Kwabena.us to register.

Keying Alpine Wildflowers

Friday, 24 July 2009

Join **Megan Bowes** and **Elizabeth Drozda-Freeman** for a hike to the alpine flora above Lake Isabelle. We'll key out plants of the upper montane, subalpine, and alpine communities in the Indian Peaks Wilderness Area around Lake Isabelle. The hiking on this field trip will be strenuous, and the weather can be unpredictable. Pack appropriately clothing, water, snacks, and a lunch. Meet for car-pooling at 7:30 AM in the parking lot of the Boulder County Justice Center on 6th and Canyon Blvd. Contact: Elizabeth at elizabeth.wildflower@yahoo.com or 303-586-1810.

Denver Chapter

2nd Annual Metro-Denver Native Plant Garden Tour

Saturday, 6 June 2009

Visit Metro-Denver area gardens, as well as the Gardens at Kendrick Lake. This year's tour features local author and dryland gardener, **Bob Nold**, showcasing regionally native plants that haven't been watered since 1987! **Mollie Fendley**, horticulturist with Lakewood Urban Parks, will lead two tours at the one acre Gardens at Kendrick Lake. Mollie will highlight the variety of color, textures, and shapes that native plants can add to the Colorado landscape. And **Jan and Charlie Turner** will open up their lawn-free yard with all sorts of jewels, including a number of natives salvaged near their home and a couple of rare plants. Contact: Megan Bowes at 303-561-4883 or Bowesm@bouldercolorado.gov.

Gentians along the Lady Moon Trail, Red Feather Lakes

Saturday, 29 August 2009

Take an easy stroll through tawny grasses in open meadows surrounded by Ponderosa forest. This could be the hot, glorious end of summer or the aspen trees could be turning with a kiss of frost. The last time we did this hike, *Gentianopsis thermalis*, *Lomatogonium rotatum*, and *Orthocarpus luteus* were blooming. This is prime mushroom hunting country and the Shambhala Mountain Center is just down the road should you care to visit their garden on your way back to Denver. **Lee and Buzz Curtis** will provide a light supper in Red Feather at their cabin afterward; bring a dish to share. Contact: Lee Curtis, 303-985-5749 or e-mail buzz.curtis@netscape.com.

Northern Chapter

Wildflowers and Butterflies!!

Sunday, 12 July 2009

Join Colorado Natural Heritage Program Botanist **Susan Spackman Panjabi**, Soapstone Prairie Educator **Pam Smith**, and a special guest on a wildflower and butterfly walk at Horsetooth Mountain Open Space. Horsetooth Mountain is owned by Larimer County (fee required). Contact: Pam Smith at 970-223-3453.

Plateau Chapter

Pyramid Rock Natural Area

Tuesday, 26 May 2009

Steve Wenger (CoNPS) will lead a trip to Pyramid Rock, which is an adobe badlands formation near DeBeque. It is designated a State Natural Area to protect populations of several rare plants. You'll have a chance to see some of the rarest plants in Colorado! Contact: Steve at 970-256-9227 or stweandjaw@acsol.net.



Pyramid Rock Natural Area (Steve Wenger)

Sheep Mountain Wildflower and Rare Plant Survey

Saturday, 20 June 2009

Jeanne Wenger (CoNPS) and **Gay Austin** (CoNPS) will lead a trip to survey for rare plants and identify wildflowers. This trip will include a vigorous hike that is fairly strenuous to high elevation alpine plant communities. Contact: Gay Austin at 970-641-6264 or austinaceae@frontier.net.

Crystal River Orchids

Saturday, 18 July 2009

Lisa Tasker (CoNPS) will lead this half day trip of easy but rocky walking along a river and two other spots where we will see gorgeous displays of orchids and other shade-loving wildflowers. Please wear long pants and a long-sleeved shirt. Contact: Gay Austin at 970-641-6264 or austinaceae@frontier.net.

Edible Plants Workshop

18-19 and 25-26 July 2009

Dr. Keith Longpre (Professor Emeritus, Western State College) will lead indoor laboratory sessions and field trips on the topic of edible plants. Contact: Gay Austin at 970-641-6264 or austinaceae@frontier.net.

Grand Mesa Geology Field Trip

Saturday, 8 August 2009

Dr. Rex Cole (Professor of Geology, Mesa State College) will lead us on a field trip to learn how Grand Mesa was formed through landslide and glaciation processes. The trip will have short, easy hikes plus roadside talks. Contact: Gay Austin at 970-641-6264 or austinaceae@frontier.net.

"Field Trips" continues on page 16

Paleobotany Field Trip

Saturday, 29 August 2009

Jim Barkley (CoNPS) will lead this field trip to view plant fossils in the Grand Junction area. Easy walking. Contact: Gay Austin at 970-641-6264 or austinaceae@frontier.net.

San Luis Valley Chapter

Check the San Luis Valley chapter webpage on www.conps.org for trip details and to see if any new trips have been added.

Southeast Chapter

***Note:** To sign up for any SouthEast Chapter field trip put your name, the trip date, and your phone number in the subject line of an email to SEtrips@gmail.com.*

PicketWire Canyon

Sunday, 17 May 2009

Steve Olson (Botanist, USFS Comanche Grasslands) will lead a 3-4 mile strenuous round trip hike across both prairie and steep sandstone outcroppings as we descend into the canyon of the Purgatoire River. This is an opportunity to view numerous plant species of the juniper woodlands, open prairie, and riparian canyon. This trip is for avid botanists and novice hobbyists. Contact: Steve Olson at 719-647-9453 (PM).

Sangre de Cristo Mountains:

Rainbow Trail near Gibson Creek Trailhead

Sunday, 7 June 2009

Christina MacLeod (Naturalist, Native Plants Master Trainer) will lead a 2-3 mile roundtrip hike through a variety of forest, riparian, and mountain meadow habitats on two sections of the Rainbow Trail, with an opportunity to see a number of native orchids plus numerous other species. This trip is for avid botanists and novice hobbyists. Contact: Christina at 719-783-0465.

Greenhorn Mountains: Apache Creek and Falls

Saturday, 20 June 2009

Steve Olson (Botanist, USFS Comanche Grasslands) will lead a hike of five strenuous miles round trip. This is an exceptional opportunity to hike the "easy way" across private land to the falls. We will hike through douglas fir, white fir, and cottonwoods and will see many herbaceous species including marsh marigold, virgin's bower, twinflower, and osha, as well as woodland grasses and sedges. This trip is for avid botanists and novice hobbyists alike. Contact: Steve Olson at 719-647-9453 (PM).

Pikes Peak: Elk Park

Sunday, 21 June 2009

Botanist **Doris Drisgill** will lead a 1-2 mile roundtrip hike starting from 12,000 ft elevation. We will look for alpine plants, such as dwarf alpine columbine, alpine bluebells, mountain dryad, and many others. This trip is for avid botanists and novice hobbyists alike. Contact: Doris at 719-578-1091 or ddrisgill@cs.com.

Cheyenne Canyon: Emerald Valley

Tuesday, 23 June 2009

Botanist **Doris Drisgill** will lead a moderate round trip hike of 3-4 miles at 9,000 ft elevation. We expect to see yellow ladyslip-pers and other woodland species in this exceptional area. This trip is for avid botanists and novice hobbyists alike. Contact: Doris at 719-578-1091 or ddrisgill@cs.com.

Wet Mountains: San Isabel Lake

Saturday, 27 June 2009

Dr. Neal Osborn (Professor Emeritus, Biology CSU) will lead a moderate four mile round trip hike through aspen and conifer forest to the montane meadow at the Marion Mines. Species we expect to observe include delphinium, monk's hood, columbine, and many other species typical of the montane meadow. This trip is for avid botanists and novice hobbyists alike. Contact: SEtrips@gmail.com.

Brush Creek Fen Natural Area

July 2009

Christina MacLeod (Naturalist, Native Plants Master Trainer) will lead a working field trip to the Brush Creek Fen in Custer County. This unique wetland on private property is a State Natural Area and is in need of hand-powered weed treatments to protect the rare species of the fen. This is a chance to see a unique flora and help protect it! Dates to be determined. Contact: Christina at 719-783-0465.

Pueblo Mountain Park

Saturday, 11 July 2009

Rich Rhoades (District Conservationist, NRCS) will lead an easy round trip hike of less than two miles. We will start off in the environmental center for an ecosystem orientation, followed by an introduction to grass identification and discussion of grass (Poaceae) taxonomy. This "classroom" session will be followed by a field trip in the park to identify grasses of the foothills and montane zones. This trip is for avid botanists and novice hobbyists alike. Contact: SEtrips@gmail.com.

Spanish Peaks: Cordova Pass

Saturday, 18 July 2009

Dr. Neal Osborn (Professor Emeritus, Biology CSU) will lead a moderate hike of 2-3 miles, unless you should decide to attempt the strenuous climb of West Peak. Our hike will start at about 11,000 ft. elevation, so we expect to see many alpine species, such as sky pilot, king's crown, and yellow paintbrush. This trip is for avid botanists and novice hobbyists alike. Contact: SEtrips@gmail.com.

Pueblo Mountain Park: South Creek Trail/Basin

Sunday, 9 August 2009

Biologist and educator **Jeff Thompson** will lead a moderate 2-3 mile round trip hike to South Creek basin. We will hike through diverse ecosystems — ponderosa pine to douglas fir — to the persistent riparian area along South Creek. Typical species in this area include calypso lady slippers, mountain clematis, columbines, false solomon seal, star solomon plume, heartleaf arnica, and a variety of violets. This trip is for avid botanists and novice hobbyists alike. Contact: SEtrips@gmail.com.

Southwest Chapter

Beautiful Mountain, Navajo Reservation

Saturday, 23 May 2009

Join **Arnold Clifford** for unique flora and long views on Beautiful Mountain on the Navajo Reservation. This trip is for **budding botanists** and avid *botanists*. Contact: Al Schneider at webmaster@conps.org or 970-882-4647.

Magnificent Wildflowers of Mesa Verde National Park

Sunday, 14 June 2009

Mid-June on the Prater Ridge Trail near the entrance of Mesa Verde National Park provides a superb wildflower display. Depending on the weather and the group, we will walk 3 1/2 or 4 1/2 miles. This trip is for ***wildflower enthusiasts*** who want to do some walking. Contact: Al Schneider at webmaster@conps.org or 970-882-4647.

In Search of the Giant Onions

Saturday, 20 June 2009

With the help of **Cara MacMillan** (Ecologist, BLM), we will be searching out *Triteleia grandiflora*, a huge and lovely onion commonly found in the northwest, but found in Colorado only in a small area of Ponderosas north of Dolores — hundreds of miles from the northwest locations. This trip is for ***wildflower enthusiasts***. Contact: Cara MacMillan at cgildar@gmail.com or 970-882-6854.

Saturday, 18 July 2009

Alpine Wildflowers

We will carpool in 4-wheel drive SUVs to a high alpine destination to enjoy mid-summer displays of a myriad of flowers covering vast meadows. We will be above tree-line, so the views will be long and spectacular. This trip is for **budding botanists** and *avid botanists*. Contact: John Bregar (CONPS) at jbgregar@durango.net or 970-385-1814.

Annual Pilgrimage to Worship the Wildflowers on the Pass Creek Trail

Saturday, 25 July 2009

About 80 species of wildflowers will be blooming in abundance along the two miles of trail (four miles round trip) covered on this trip from subalpine forest to alpine meadows. Our focus will be on enjoying the overall mass of flowers, not on identifying every species or looking at them in great detail. This trip is moderately paced for ***wildflower enthusiasts*** who want to do some walking. Contact: Travis Ward (CONPS) tlward@frontier.net or 970-247-1310.

Stroll Through the Wildflowers at the Lone Mesa State Park

Saturday, 1 August 2009

As we wander wide open meadows and rolling hills of ponderosa pines, we will find dozens of species in bloom, including the newly discovered species, *Gutierrezia elegans*. At times, we will be moving very slowly as we examine some plants in detail and at other times we will walk more continuously. Lone Mesa State Park is under development and will not be open to the public for a number of years, so this is a special chance for you to see it. This trip is moderately paced for ***wildflower enthusiasts*** and **budding botanists**. Contact: Al Schneider at webmaster@conps.org or 970-882-4647.



Lone Mesa (CNAP staff)

“Field Trips” continued on page 18

Mushroom Hunting

Friday, 28 August 2009

Join recently retired Fort Lewis College Professor of Biology, **Page Lindsey**, as we hunt for and then eat wild mushrooms. This trip is slow paced for ***wildflower enthusiasts*** and **budding botanists**. Contact: Al Schneider at webmaster@conps.org or 970-882-4647.

Fire Ecology in Ponderosa Forests: The Story Told by Fire Scars

Saturday, 29 August 2009

Fire expert **Roz Wu** will take us into the forest north of Pagosa to learn about the tales that fire scars tell and to learn about all aspects of fire in the forest. This trip is moderately paced for all levels of botanical interest. Contact: Charlie King at 970-731-4794.

Brian Kurzel is a Director on the Board of the Colorado Native Plant Society and Coordinator for the Colorado Natural Areas Program.

Request for Nominations for the Board of Directors

Nominations are now being accepted for four at-large positions on the Board of Directors. Each person elected will serve a three-year term.

The Colorado Native Plant Society Board of Directors is made up of the seven chapter presidents and ten at-large members elected by the Society as a whole, as well as the president, vice-president, treasurer, and secretary of the Board, who are elected from the Society by the Board.

Each candidate for an at-large position is asked to submit a brief statement of no more than 300 words providing the following:

- 1) Give a general statement about yourself.
- 2) How many years have you been a Society member?
- 3) With which chapter are you affiliated?
- 4) What have you done in the Society?
- 5) With what key issues do you think the Board should be concerned in the future?
- 6) What other relevant plant related information would you like folks to know about you?

If you are willing to serve on the Board or would like to submit the name of another candidate, email CoNPS Vice-President Al Schneider at webmaster@conps.org. All information should be submitted to Al no later than 21 July 2009.

Explore your Big Backyard with Denver Botanic Gardens

by Celia Curtis, Denver Botanic Gardens

Cutting back on travel this year? Instead of a trip across country or overseas, enjoy a vacation with Denver Botanic Gardens to explore our region's unique plant communities and local culture. All the planning, driving, lodging, and meals are taken care of — all you do is sit back and enjoy the witty and wise repartee of your expert guides.

Tipis and Tundra: Wyoming's Bighorn Mountains 8-12 July 2009

In July, head into Wyoming's Bighorn Mountains to see gorgeous views, unique alpine plants, and the powerful Medicine Wheel. Spend a full day hiking and botanizing in the beautiful Bighorns with the Gardens' alpine plant expert, Mike Kintgen. After this mountain adventure, enjoy a side trip to Cody for a slice of the "real" West, with a detour into the Pryor Mountains to look for Spanish mustangs and more native plants. Enjoy a curator-led tour of the newly re-installed Plains Indian Museum at the renowned Buffalo Bill Historical Center and spend an evening at the Cody Nite Rodeo. Our trip will conclude with a stop in Thermopolis at the mouth of the breathtaking Wind River Canyon, home of the largest dinosaur dig in the United States. Cost: \$995 member, \$1085 non-member.

Peaches and Paonia: Local Food and Agriculture in Colorado 16-20 September 2009

Rounding out our menu is an exploration of Colorado's North Fork Valley: a veritable feast of local food and flavors. Guided by expert herbalist and connoisseur Debbie Whittaker, get to know firsthand the rural mountain haven of Hotchkiss-Crawford-Paonia. Stay in the beautiful Fresh & Wyld B&B owned by Chef Dava Parr, eat home-cooked meals prepared directly from her kitchen garden, enjoy a cooking class with Chef Dava herself, and visit organic farms, Colorado wineries, cherry and peach orchards, farmer's markets, and art galleries. A Sunday morning brunch in Dava's garden with live local music wraps up your trip. Cost: \$1080 member, \$1170 non-member, double occupancy (single rate: \$1280/\$1370).

For details and to register, visit www.botanicgardens.org or call 720-865-3580. Trip fees include van transportation from Denver, lodging, and three meals a day.

Discovering *Gutierrezia elegans*

By Al Schneider

In the Summer 2008 issue of *Aquilegia*, Neil Snow and Steve O’Kane urged CoNPS members to search for new plants and publicize our findings to “enhance public support of native plants.” We should search, they suggested, in “seldom visited or unvisited areas... some of the larger private ranches... areas with unusual geologic substrates....”

In June 2008, I unknowingly did just what Neil and Steve suggested when I volunteered to do a floristic survey for the new Lone Mesa State Park near Dolores, Colorado. The Park had never been “botanized,” for it had been three private cattle ranches; furthermore, it has large areas of Mancos Shale, noted for fostering unusual species. I quickly found that these characteristics produce a surprising diversity of plants and many unusual species, including at least two dozen county records.

On 4 August, Peggy Lyon and I teamed up to continue the Park survey. We began the day keying a few plants, and then I wandered off to find a plant in which Steve O’Kane was interested. When I sat back on the ground after photographing the plant, I noticed that I had been crouching over a lovely member of the Asteraceae covered in tiny, brilliant yellow flowers: “Well now, who are you? You certainly appear to be a *Gutierrezia*” (pronounced Goo-tee-air-RAYS-ee-uh and commonly called “Broom Snake Weed”). But Weber’s key to *Gutierrezia* in *Colorado Flora: Western Slope* led me to a dead end. I backed up to the beginning of the key to the Asteraceae and tried again to identify the plant, but I had no better success. I asked Peggy if her expertise could crack the puzzle, but she went through the same fruitless search. We both were stumped.

Our examination of Art Cronquist’s *Intermountain Flora* (Vol. 5) and Stanley Welsh’s *A Utah Flora* still did not lead us to a species, so we sent details and photographs to Guy Nesom, expert on Asteraceae for *Flora of North America*. His immediate reply surprised us: “Compared to *Gutierrezia pomariensis*, the decumbent habit is very distinctive. The leaves are differently shaped, and the heads are much more congested. I’d give it 95% confidence



Gutierrezia elegans (Al Schneider).

that it’s an undescribed species.”

Gutierrezia pomariensis, discovered by Stanley Welsh, is a species of northeastern Utah that Peggy and I had realized came as close as anything to matching our mystery species. But now Guy Nesom agreed with us that our species was really distinct from *G. pomariensis*. We sent Guy specimens of our mystery plant, which raised his certainty to 100%. Peggy and I were smiling.

Stanley Welsh was to be a speaker at the CoNPS Annual Meeting in September, and I thought it would be interesting to get his reaction to the plant that Peggy and I had found. He held up the specimen I brought him and quietly examined it: “This is certainly not *Gutierrezia pomariensis*.” He looked at the specimen again, “This is

a new species.” Didn’t Peggy and I glow!

Our new species, *Gutierrezia elegans*, was subsequently published in the December 2008 issue of the *Journal of the Botanical Research Institute of Texas* (www.brit.org/brit-press/jbrit/).

Most of us believe that discovering new species or accumulating plant lists are made only in far-away places by professional botanists, never near home and “certainly not by amateur me.” But there are plenty of discoveries to be made right here in Colorado, and one does not need a Ph.D. to make them. Peggy started as an English major her first time around, returned to college when she was 50, and obtained an M.A. in botany; she now works for the Colorado Natural Heritage Program. I am a retired English Professor with no formal training in botany, but a life-long interest in plants. Eventually my interest became a passion and led me in 2001 to create my own flora web site where you can find even more details and photos for *Gutierrezia elegans* (www.swcoloradowildflowers.com).

Our plant list for Lone Mesa now numbers 209, and we look forward to many more hours in the Park enjoying the beauty of the plants and the pleasure of cataloging them.

NOTE: Neil Snow is Bishop Museum Botanist, Honolulu, and author of a new plant list for the Southern Rockies. Steve O’Kane is Associate Professor of Botany, University of Northern Iowa, and co-author of *Catalog of the Four Corners Flora*.



Chapter News and Announcements

Boulder Chapter

Boulder Chapter meetings are typically held on the second Thursday of each month (October through May) at 7:00 PM. All meetings will be held in the Community Room at the Boulder REI Store at 1789 28th Street, between Canyon and Pearl. For more information, visit www.conps.org or contact Elizabeth Drozda-Freeman at elizabeth.wildflower@gmail.com or 303-586-1810.

Metro-Denver Chapter

Monthly meetings of the Metro-Denver Chapter are typically held on the fourth Tuesday of the month (September through May, except November). Beginning January 2009, Chapter meetings are being hosted by the Department of Biological Sciences at the University of Denver (DU), where we will meet in Olin Hall located at 2190 E. Iliff Ave. For more information, visit www.conps.org, or contact Vickey Trammell at jrtrambo@q.com or 303-795-5843.

Northern Colorado Chapter

Chapter meetings are held on the first Wednesday of the month (October through April) at 7:00 PM. Meet at the Gardens on Spring Creek, 2145 Centre Ave., Fort Collins. Prior to meetings, members meet at 5:30 PM for dinner with the speaker at Café Vino, 1200 S. College Ave. If you would like to join us for dinner, please contact Chapter President Pam Smith at 970-223-3453 or pamelas4824@earthlink.net. For more information, visit www.conps.org.

Plateau Chapter

Chapter activities are scheduled throughout the year. For more information, visit www.conps.org or contact Chapter President Gay Austin at austinaceae@frontier.net or 970-641-6244.

Southeast Chapter

Activities for the Southeast Chapter are scheduled throughout the year and are often held in Colorado Springs at the Beidleman Environmental Center on Caramillo Street, north of Uintah, off Chestnut. For more information, visit www.conps.org or contact Ed Roland at 719-676-2179 or edwardrroland@gmail.com. For more information, visit www.conps.org.

San Luis Valley Chapter

Chapter activities are scheduled throughout the year. For

more information, visit www.conps.org or contact Chapter President Hobey Dixon at 719-589-3813 or pixies@amigo.net

Southwest Chapter

The Southwest Chapter explores, preserves, and enjoys the flora of the Four Corners area through activities that are scheduled throughout the year. We welcome new ideas for field trips, activities, and programs, and we especially welcome new members from Colorado, New Mexico, Arizona, and Utah. For more information, visit www.conps.org or contact Chapter President Al Schneider at 970-882-4647 or webmaster@conps.org. See www.conps.org for details.

All meetings and field trips are free and open to everyone. Bring a friend. We always have homemade refreshments.

CoNPS Web Site News Al Schneider, Webmaster

The Colorado Native Plant Society web site continues to publish the latest information on chapter programs, field trips, field studies, and botanical news (including job information). Check each chapter's web page, as well as the Calendar for an overall view of all Society activities. Check the web site for the latest information on the September Annual Meeting, details about grants, education, and horticulture. Enjoy the botanical photo shows. And on the Membership page you will find the membership form for bringing new folks into the Society.

As always, if you have suggestions or information for the Society web site or if you notice any errors on the web site, please contact Webmaster Al Schneider at webmaster@conps.org.

Amazing Amazon

Whenever you buy anything through Amazon, be sure to enter Amazon from our CoNPS bookstore: <http://www.conps.org/bookstore.html>. CoNPS will then receive 5-7% of your purchase price from Amazon. You do not pay anything extra — not a penny — nor do you fill out forms. You simply enter Amazon by clicking on any book on our Bookstore page. If every member did this, the Society would receive several thousand dollars from Amazon each year. For details, see the Bookstore page.

Society News and Announcements

Call for New Workshops

Do you have an interest in a particular species, group of species, or genus? The Workshops Committee is seeking topics for the **2009-2010 Workshop Program**. Your ideas have led to interesting presentations in the past and members are invited to submit topics, with or without suggestions for a presenter. Volunteering to give a presentation of your choice is readily welcomed! All of our presenters can attest to the benefits of leading a workshop. Our goal is one workshop per month offered as two identical sessions. We can help you refine the idea, find a venue, and support the logistics. A great benefit, a *free* workshop, is available to any member who helps by hosting the two sessions! Please contact Ann Henson at ahenson@kwabena.us or 303-772-8962.

Award Nominations Requested

The CONPS Board of Directors desires to honor contributions to Colorado botany and the Colorado Native Plant Society. Service to the Society takes many forms, from an occasional event to significant contributions over a span of five years or more. Do you know someone who deserves recognition for their time and effort given to CoNPS? Perhaps you know an individual who has contributed over a lifetime to enhance Colorado botany?

Recognition Gifts: non-members who provide a one-time service to the society.

Certificate of Appreciation: members and non-members who provide occasional services to the society.

Certificate of Merit: members who have made a significant contribution to the Society in a short period of time (less than five years).

Special Merit Award: non-members for short-term contributions to Colorado botany and/or significant contributions to the Society's goals.

Honorary Lifetime Membership: CONPS member for long-term, high quality service to the Society (over ten years).

Lifetime Achievement Award: members and non-members for long-term (30+ years) contributions to Colorado botany.

Nominations are accepted at any time of the year and may be submitted to President Boyce Drummond at 970-690-7455 or bdrummond3@msn.com. The Directors will review the nomination and supporting materials and vote upon your nomination at their next meeting. For details of award criteria, contact any Director or visit our website: www.conps.org.

Planning well underway for CoNPS Annual Meeting: "Plants without Borders"

Mark your calendar! From 11-13 September 2009, the Northern Chapter will be proudly hosting the Annual Meeting at "The Ranch," just east of Loveland. Easily accessible, "The Ranch" is directly adjacent to I-25, just North of Highway 34. Special thanks to Larimer County for helping sponsor this event.

Preliminary Schedule of Events:

Friday, 11 September: Rare Plant Symposium, Board Meeting, and Evening Social

Saturday, 12 September: Registration, Speakers, and Poster Social

Sunday, 13 September: Field trips

This year's speakers will include: Dr. William Weber (Professor Emeritus, UC Boulder), who will present several programs, including "63 years with the Colorado Flora: the Last Hurrah." Dr. Dennis Woodland (Professor and Curator, Department of Biology, Andrews University), author of *Contemporary Plant Systematics*, will present "Forensic Botany: Understanding the Mystery of Otzi, the Ice Man of the Alps" and "Will Botanists Become Dinosaurs in the 21st Century?" Dr. Ron Hartman (Professor of Botany and Curator of the Rocky Mountain Herbarium, University of Wyoming) will present "Inventory of the Flora of the Rockies." Ben Legler (M.S. Candidate, Department of Botany, University of Wyoming) will present a summary of his two-year inventory of the Vermejo Park Ranch, a private land that straddles the Colorado-New Mexico border. Ethnobotanist, taxonomist, and ecologist Donald Hazlett, Ph.D., will present "Current Hispanic and Native American Plant Uses." David Theodoropoulos, author of *Invasion Biology: Critique of a Pseudoscience*, will present "Invasion Biology or Integration Biology?" Tim D'Amato (Land Stewardship Manager, Larimer County Department of Natural Resources) will present an "Overview of Invasive Plant Issues in the Western United States." Tony Knight will present "Beautiful but Deadly" poisonous plants. Jim Tolstrup (Executive Director, High Plains Environmental Center) will present an update on native plant conservation and environmental education in urban settings.

Field trips are being finalized, but will include an all day trip to Soapstone Prairie Natural Area and a half-day trip to High Plains Environmental Center.

Look for a special Annual Meeting edition of *Aquilegia* with more detailed information this summer and, as always, watch the CoNPS website for up to the minute details.

Welcome New Members

Mary Porter Abrahams
Amy Angert
Ehud & Dina Ben-Hur
Ben Berlinger
Michele Bobyn
Vikki Bradach
Ron & Irene Briggs
Liz Catt
Batiste Deluca
Ellen Dudek
Greg Fischer

Janice Fisher
Karen Fuller
Seth & Marjorie Goldstein
Alison Graff
Stephen Hauptli
Kathy Herbener
Irene Horn
Jeff Jones
Priscilla Kimble
Connie Kogler
Alyssa Kohlman

The McKay Lab at CSU
Ashlee V. Lane
Andrew Mackie
Jessica Nash
Orla O'Callaghan
Elizabeth Pilon-Smits
Helen Pruski
Colin Quinn
Alan Richardson
Jessica Rohde
Kenton J. Seth

Don Settle
Seema Sheth
Donna Shorrock
Elizabeth Singer
Lorraine Stepenske
Valerie Stone
Kimberly Tamkun
Margaret E. Vorndam
Jeff & Lisa Wagner
Bruce Wahle
Ali Zvada

Society News and Announcements

Aquilegia Deadline Approaches Submit Contributions by 15 July

Aquilegia is the newsletter of the Colorado Native Plant Society. Submissions to *Aquilegia* are accepted throughout the year, although deadlines for publication are 15 January for the Winter edition, 15 April for the Spring edition, 15 July for the Summer edition, and 15 October for the Fall edition.

Announcements, news, articles, book reviews, poems, botanical illustrations, and other contributions are requested for publication. Articles not exceeding 750-1500 words in length are especially welcome. Consider contributing to a column or submitting a book review. Include your name, address, and affiliation, as well as credit for images. Previously published articles submitted for reprinting require permission.

Please refer to a previous edition of *Aquilegia* for guidelines. However, do not worry about formatting — your text will be formatted during editing and layout. Use Wm. Weber's nomenclature for the scientific names of plants, which should be italicized and capitalized properly. Proofread all material carefully and "spell check." All contributions are subject to editing for brevity and consistency, with final approval by the author.

Manuscripts should be submitted as Word attachments to leo.bruederle@ucdenver.edu.

Changes in Field Trips and Workshops

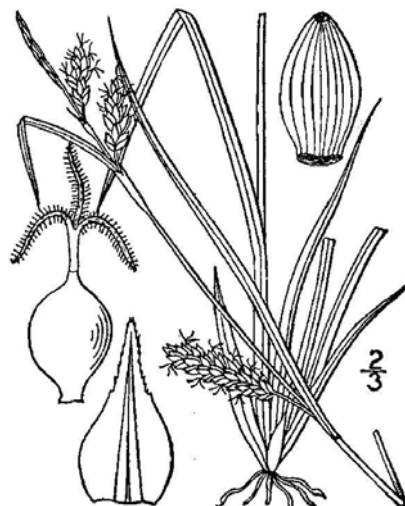
Life sometimes changes the most well laid plans. In spite of their best efforts, field trip and workshop leaders must sometimes change the arrangements and other details for a field trip or workshop. Efforts are made to contact participants, if changes occur. Updates are posted on our web site, which is www.conps.org, so remember to check there.

Newsletter Available by Email

Did you know that *Aquilegia* is available electronically? You could receive your issue of *Aquilegia* as a pdf file by email. This saves the Society postage, as well as paper. The Membership Chair, not the newsletter editor, makes this possible for you. Please submit your request (to change from paper to electronic) to **Eric Lane** at ericmlane@yahoo.com or 303-239-4182. Be sure to include your email address!

Microscope Fund

Members continue to pay off the purchase of the dissecting microscopes with \$8 of the \$20 workshop registration fee going directly to this Fund. We have collected approximately 50% of the purchase price in two seasons. You can also contribute directly to the Fund. Mail contributions payable to CONPS at P.O. Box 200, Ft. Collins, CO 80522.



Carex conoidea
USDA-NRCS PLANTS
Database / Britton, N.L.,
and A. Brown. 1913. An
illustrated flora of the
northern United States,
Canada and the British
Possessions. Vol. 1: 405.

Colorado Native Plant Society

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 Colorado's native plants. The Society sponsors field trips, workshops, and other activities through local chapters and statewide. Contact the Society, a chapter representative, or committee chair for more information.



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MEMBERSHIP APPLICATION AND RENEWAL FORM

Name(s) _____

Address _____

City _____

State _____

Zip _____

Phone _____

E-mail _____

Chapter: _____ Boulder _____ Metro-Denver _____ Northern _____ Plateau

_____ San Luis Valley _____ Southeast _____ Southwest

DONATION

\$ _____ General Fund

Endowments in support of small grants-in-aid of research:

\$ _____ John Marr Fund: research on the biology and natural history of Colorado native plants.

\$ _____ Myrna P. Steinkamp Memorial Fund: research and other activities that will benefit the rare plants of Colorado.

Mail to: Eric Lane, PO Box 200, Ft. Collins, CO 80522

DUES AND CONTRIBUTIONS ARE TAX-DEDUCTIBLE

MEMBERSHIP CLASS

Dues cover a 12-month period

___ Individual, \$20.00

___ Family/dual, \$30.00

___ Senior, \$12.00

___ Student, \$12.00

___ Organization, \$30.00

___ Supporting, \$50.00

___ Lifetime, \$300.00



Colorado Native Plant Society

P.O. Box 200
Fort Collins, Colorado 80522
<http://www.conps.org>



TIME SENSITIVE MATERIAL

CALENDAR 2008

CHAPTER Field Trips

Boulder Chapter

May 28 Olde Stage Road Fire
June 22 Boulder Mountain Park Natural Area
June 26 Liken' Lichens in the Forest Field Trip
July 24 Keying Alpine Wildflowers

Metro-Denver Chapter

May 26 Second Annual Denver Chapter Spring Hike
June 6 Metro-Denver Native Plant Garden Tour

Northern Colorado Chapter

July 12 Wildflowers and Butterflies!!

Plateau Chapter

May 26 Pyramid Rock Natural Area
June 20 Sheep Mountain
July 18 Crystal River Orchids
July 18-19, 25-26 Edible Plants Workshop
August 8 Grand Mesa Geology Field Trip

Southeast Chapter

May 17 PicketWire Canyon
June 7 Rainbow Trail
June 20 Greenhorn Mountains
June 21 Pikes Peak: Elk Park

June 23 Emerald Valley
June 27 Wet Mountains: San Isabel Lake
July Brush Creek Fen Natural Area
July 11 Pueblo Mountain Park
July 18 Spanish Peaks: Cordova Pass
August 9 Pueblo Mountain Park

Southwest Colorado Chapter

May 23 Beautiful Mountain, Navajo Reservation
June 14 Mesa Verde National Park
June 20 In Search of the Giant Onions
July 18 Alpine Wildflowers
July 25 Pass Creek Trail
August 1 New Lone Mesa State Park

SOCIETY WORKSHOPS

June 20 Botanical Photography

BOARD MEETINGS

Sep. 11 6:00 PM Larimer Cty Fairgrounds
Nov. 14 9:00 AM Regis University

See <http://www.conps.org/conps.html> for details.