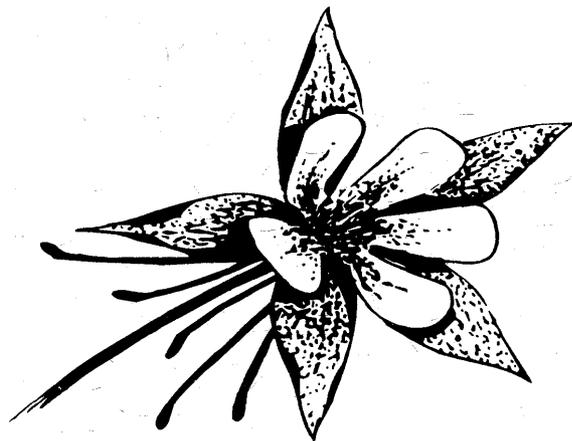


Aquilegia



Newsletter of the Colorado Native Plant Society

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

Volume 22 Number 6

November—December 1998

Strategic Planning

Eric Lane, CoNPS Board of Directors

For much of the past year, the officers and Board of Directors of the Colorado Native Plant Society have struggled to identify how best to gather, direct, and expend the Society's resources in order to carry out its mission. Our Society has a broad mission, one that is unique unto itself. For the sake of our members and the flora we cherish, the leadership of the Society has embarked upon a path to develop and implement a strategic plan that will enable the Society to pursue its mission in the most efficient and effective way possible.

Our Society has a broad mission, but one that is unique unto itself.

Six months ago, the Society hired Conservation Impact, a small Colorado consulting group that specializes in assisting environmental organizations, to meet with a randomly selected group of individuals from each chapter in order to identify what was on the minds of our Society's members. Will Murray and Shelli Bischoff also conducted interviews with other Colorado organizations and agencies to identify where our talents and collective voice could best be applied. The information gathered through this process has helped to form the foundation of the Society's strategic plan that will guide our actions and efforts during the next five years. As outlined in our draft strategic plan, the four primary goals we have developed thus far are:

Double membership by the 2001 annual meeting. It is clear to the membership that there are many Coloradoans that care for, or are interested to learn more about Colorado's spectacular native flora. It behooves us to expand the membership to attract and include these individuals not only to help them gain a more sophisticated appreciation for this flora, but also to help conserve it. While the Society's membership has grown in recent years, it has not kept pace with the overall rate of Colorado's population growth. Through more active efforts and "advertising," the Society will work to bring interested Coloradoans into the Society over the next three years.

Maintain and enhance the quality and quantity of core membership services. The Society would not exist without its membership and the services it provides, both tangible and intangible. To better serve you, the Board and elected officers will work to improve the reliability, quality, and

quantity of membership services including *Aquilegia*, field trips, workshops, Annual Meeting, and volunteer conservation activities. A significant portion of our membership enjoys these services and we hope to improve upon them.

Positively influence the protection and management of at least ten sites that harbor rare species or exemplary natural communities by January 1, 2001. Conservation is one portion of the Society's mission for which there exists great potential. In the next few years, the Society aims to provide its members, especially the chapters, with unique partnership opportunities to help protect and manage Colorado's special flora. Such opportunities may take the form of floristic surveys, weed-pulls, or any number of active efforts on behalf of our state's native plants and plant communities. Our potential partners are innumerable; they include local offices of state and federal land management agencies, as well as local

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chapters of other like-minded education and conservation organizations.

Undertake at least four educational opportunities that reach 500 non-members each year. There are many Coloradoans who do not recognize the importance or value of Colorado's native flora. Through the development of educational materials and presentations, we hope to educate specific audiences about Colorado's flora so that they can make better decisions about the actions that may positively or negatively affect our state's plants. Audiences may include environmental organizations, gardeners and their suppliers,

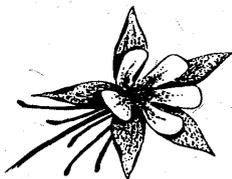
K-12 students, biology and other science teachers, and land management agencies.

We hope that this plan will help to assure that the Society's limited resources are maximized to achieve our goals, and address the needs and desires of our members. While this draft plan has not been formally adopted, time to comment on it is short. As emphasized at our Annual Meeting, the Society needs your input to make this plan the best that it can be. Please contact your local Chapter President, Society Officers, or any of the Directors. We will also need your help to reach the goals set in our ambitious new plan. Future issues of *Aquilegia* will let you know how you can help. We hope that

many of the ideas and thoughts expressed in this draft plan ring true in the minds and hearts of our members. Let us know what you think. Hope to hear from you soon!

A note of appreciation and thanks from the Board and Officers of the Society to Alice Guthrie, Bob Clarke, Carolyn Crawford, Sandy Friedley, Jill Handwerk, Denise Larson, and Gretchen Van Reyper. Each did a fantastic job organizing focus groups around the state. Also, a special thank you to all the members who volunteered their time to participate in the focus groups for the Society's strategic planning efforts. Your efforts have helped to lay the foundation for the Society's work for years to come!

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.

Schedule of Membership Fees

Life	\$250
Supporting	\$50
Organization	\$30
Family or Dual	\$15
Individual	\$12
Student or Senior	\$.8

Membership Renewal/Information

Please direct all membership applications, renewals, and address changes to the Membership Chairperson, Colorado Native Plant Society, P.O. Box 200, Fort Collins, CO 80522. Please direct all other inquiries regarding the Society to the Secretary at the same address.

Aquilegia

Aquilegia is published four to six times per year by the Colorado Native Plant Society. This newsletter is available to members of the Society and to others with an interest in native plants. Contact the Society for subscription information. Articles for *Aquilegia* may be used by other native plant societies or non-profit groups if fully cited to author and attributed to *Aquilegia*.

Please direct all contributions to the newsletter to:
Leo P. Bruederle
Biology, Campus Box 171
University of Colorado at Denver
P.O. Box 173364
Denver, CO 80217-3364
E-Mail: lbrueder@carbon.cudenver.edu

Short items such as unusual information about a plant, a little known botanical term, etc., are especially welcome. Previously published articles submitted for reprinting require permission. Camera-ready line art or other illustrations are also solicited.

Please include author's name and address, although anonymity may be requested. Articles submitted via e-mail or on disks (MAC preferably, or IBM) are appreciated. Please indicate word processing software and version.

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Education	Rob Reinsvold	970-351-2716
.	and Joyce Gellhorn	303-442-8123
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Hort/Restoration	Lisa Tasker	303-447-9431
Legislative Affairs	VACANT	
Membership	Myrna Steinkamp	
.	and Sue Martin	970-226-3371
Publications	Rick Brune	303-238-5078
.	and Velma Richards	303-794-5432
Publicity	VACANT	
Rare Plant	Eleanor	
Monograph	Von Bargaen	303-756-1406
Workshops	Bill Jennings	303-666-834

*Clematis alpina*

Artist: Nicola Ripley

1998 CoNPS Annual Meeting: Sagebrush Ecosystems

Alice Guthrie, CoNPS Secretary

The 1998 Annual Meeting was held September 19-20, at the Aspinall-Wilson Center on the campus of Western State College in Gunnison. What a great facility for a meeting like ours! We had plenty of room for coffee and bagels, book sales, educational displays, and t-shirt sales (one of the most popular

austin_gay/r2_gmug@fs.fed.us.

Kathy Warren next presented some lovely slides of common and uncommon wildflowers of the sagebrush, and shared details about the medicinal uses of some of them. Sandy Hayes, an ecologist with the BLM, presented information about the Gunnison sagegrouse, including habitat requirements, current and historical ranges, population densities, and current threats to the birds and their habitat. The Gunnison sagegrouse is recognized as a subspecies distinct from the sagegrouse that is common in North and Middle Parks. It is dependent on big sagebrush, with the amount of exposed vegetation over the winter particularly important for its survival.

tables), as well as a meeting room well-suited for the speakers. There were over 120 members and/or guests at this meeting — clearly a success! Gay Austin and Paula Lehr did an excellent job planning and organizing the meeting. The Board would like to recognize all of their hard work over the past year. Tony Hoag (along with his son Jasper) was the moderator for the sessions on Saturday. Thank you, Tony, for keeping us on track. Sheila Thompson organized a Plant Identification Contest along a trail just up the hill from the Center. It provided an incentive to get outside, enjoy the sunshine, and try our hand at identifying the local flora. The winner of the Professional Division was Steven Wenger; Jeanne Wenger won the Amateur Division. Plant prizes were donated by Gary Ludwig (Pleasant Avenue Nursery).

Dr. Roger Rosentreter spoke about the role of microbiotic soil crusts in sagebrush ecosystems. He provided background information for those who did not attend the workshop preceding the meeting. He explained that microbiotic crusts are composed of cyanobacteria, mosses and lichens. He discussed their functions, the different morphological types (structure), and the benefits they provide, such as retaining moisture, capturing wind-blown soil, and increasing biodiversity.

Congratulations to newly elected or re-elected Board Members Leo Bruederle, Jeff Dawson, Christine Leahy, Susan Spackman, and co-directors Gay Austin and Peggy Lyon, the first time a directorship has been shared. Their two-year term will end in 2000. Dr. Janet Wingate of the Denver Botanic Garden was presented with a Lifetime Membership Award. She received a certificate with original artwork by Carolyn Crawford and a horse blanket, proving that she doesn't spend all of her time looking at plants! CoNPS has certainly benefited from her leadership, expertise, and hard work over the years. An update on the Strategic Planning process was given by Eric Lane (Director, 1999). He explained the process that was followed by the Board and summarized progress to date. Much work remains in order to finalize a realistic work plan and accomplish our goals. A handout was made available that listed goals and objectives developed at the August planning session. Contact any Board member or your Chapter President for a copy. The Board will continue to have articles in *Aquilegia* as we complete our plans.

Rare and endangered species of the sagebrush community were discussed by Susan Spackman, Colorado Natural Heritage Program botanist. She emphasized eight plant species: three species of *Astragalus*, three *Penstemon* species, *Cirsium perplexum*, and *Lesquerella viscina*; but also noted that there are threats to the sage sparrow, as well as some bat and insect species. Creating and restoring landscapes with native species were discussed by Gretchen Van Reyper and Dr. David Buckner. Gretchen gave an informative talk about landscaping with native plants and provided good sources of seed and plant material. David discussed the problems associated with re-establishing sagebrush and how to overcome them, including some practical applications. Seedling sagebrush does not compete well with grasses, as sagebrush seedlings are less vigorous than grass seedlings. In a discussion of the paleoecology of the Basin going back approximately 10,000 years, the final speaker of the day, Dr. Steve Emslie provided an excellent overview of the climatic conditions of Gunnison Basin. Much of his data have come from caves and packrat middens. Although a few young pinyon trees have been found, evidence exists that indicates pinyon-juniper has been absent for about 3,000 years ago.

The Keynote Address was given by Dr. E. Durant McArthur, from the Shrub Sciences Laboratory, USFS, Provo, Utah. He has worked extensively on *Artemisia*, focusing his talk on subgenus *Tridentata*. He presented considerable information on the genetics of *Artemisia*, as well as the habitats of several subspecies. He also discussed hybridization and the Hybrid Zone Theory Hypothesis, which states that hybrids between species are narrowly adapted, but successful in dynamic habitats or zones. It appears that this is a mechanism allowing *Artemisia* to adapt to changing climatic conditions over time. Copies of Dr. McArthur's slides and tables are available from Gay Austin at 970-641-0471 (W), 970-641-6264 (H), or e-mail at

All attendees had a chance to learn more about sagebrush ecosystems -- starting with Friday's field trip on microbiotic crusts; continuing with the lectures on Saturday; and ending on Sunday with the sagebrush identification workshop and visits to a sagegrouse lek, as well as historic and archaic settlement sites. The Annual Meeting was filled with diverse activities and interesting topics, all related to sagebrush communities. Thanks again to the Plateau Chapter for hosting such an educational and inspiring meeting!

1998-1999 CoNPS WORKSHOPS

THE POACEAE: HOW TO KNOW THE TRIBES IN THE GRASS FAMILY

Leader: Dr. David Buckner

Location: Foothills Nature Center, Boulder

First session: Saturday, December 5, 1998

Second session: Sunday, December 6, 1998

In this workshop, Dave will discuss the structure of various natural groups within the grass family and how they can be identified. The grass family is so large that, without some understanding of the tribes within the family, identification of an individual grass becomes a formidable challenge. Keys to the tribes and genera will be available as handouts. Specimens of many grasses will be available for study. Every Colorado botanist should have a working knowledge of the grass family. Come and refine your grass identification skills.

CHENOPODIACEAE: THE GOOSEFOOT FAMILY

Leader: Dr. Hugh Wilson

Location: University of Colorado, Boulder

First session: Saturday, January 16, 1999

Second session: Sunday, January 17, 1999

The Colorado Native Plant Society's first out-of-state workshop leader is Dr. Hugh Wilson of Texas A&M University. Dr. Wilson co-wrote the treatment of genus *Chenopodium* for the *Flora of the Great Plains*. In this workshop, we will cover most of the genera that occur in Colorado east of the Continental Divide, focusing particularly on the species that occur on the plains. There are a large number of representatives of the Chenopodiaceae in Colorado, but they are not often collected because they are "weedy" and do not usually produce attractive flowers. Closely related species are sometimes separated on technical characters, making identification difficult. Nevertheless, this is a very important family in the Colorado flora. In addition to the workshop, Dr. Wilson will present a program for the CoNPS Boulder Chapter on Thursday, January 14, at Foothills Nature Center.

COLORADO'S MISSING FLORA

Leader: Susan Spackman

Location: Foothills Nature Center, Boulder

First session: Saturday, February 13, 1999

Second session: Sunday, February 14, 1999

The title of this workshop refers to those species that are thought to be extinct, thought to be extirpated (but still extant outside Colorado), or collected once or twice and never seen again within the State. This workshop will focus on making these species better known to the botanical public in hope that these plants may

someday be relocated within Colorado. Susan and her associates at the Colorado Natural Heritage Program will make available for us an abstract of each of these species, along with herbarium specimens of the species, if available. Information on many of these species is presented in the *Colorado Rare Plant Field Guide*, published by the Heritage Program or is presented in *Rare Plants of Colorado*, published by the Native Plant Society.

POLEMONIACEAE OF COLORADO

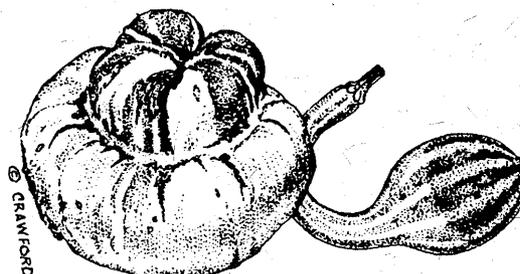
Leader: Dr. J. Mark Porter

Location: University of Colorado, Boulder

First session: Saturday March 6, 1999

Second session: Sunday March 7, 1999

Our second out-of-state workshop workshop leader is Dr. J. Mark Porter of Rancho Santa Ana Botanic Gardens located in Claremont, California. He has been actively involved in the development of the new San Juan Basin Flora, as well as study of the Polemoniaceae of the Four Corners area. Participants on the May 16, 1998, field trip to the Four Corners area may remember Mark as one of the co-leaders. He has some exciting new ideas about the Polemoniaceae and will bring us up to date on the recent research into this complex and confusing family. When is a *Gilia* not a *Gilia*? When it's an *Alicella*, a new genus proposed by Dr. Porter



BOTANICAL ILLUSTRATION: FIELD SKETCHING

Leader: Carolyn Crawford

Location: Foothills Nature Center, Boulder

First session: Saturday, April 17, 1999

Second session: Sunday, April 18, 1999

This is a much requested workshop topic. Well-known botanical artist Carolyn Crawford will present the techniques she uses for on-the-spot illustration of plants and plant parts. Topics to be covered include the use of colored pencils, a good dry medium for use in the field. Pen-and-ink and traditional watercolors do not work well in the sun and wind. There will be ample plant and flower material available for participants to work with. There is no better way to really see and know a flower than to draw its parts. Even if you never intend to illustrate commercially, drawing for enjoyment or for your own records is a good aid in flower identification.

CHAPTER NEWS

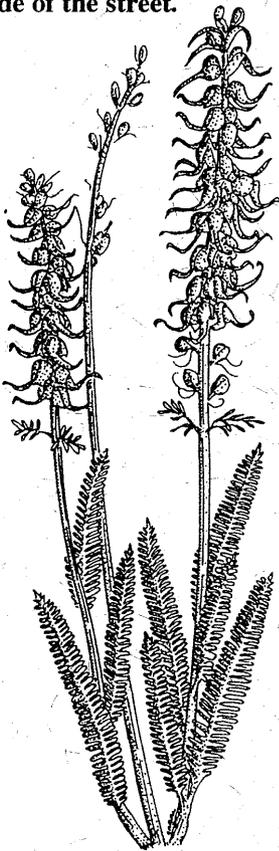
Boulder Chapter

Monthly meetings are held through May on the second Thursday of each month at the Foothills Nature Center located in Boulder on North Broadway opposite its intersection with Sumac. For more information, contact Carolyn Crawford or Bill Jennings at (303) 665-6903 or (303) 666-8348.

November 12, 7:30 PM

Rocky Mountain Floristic Inventories

Dr. Ron Hartman (Rocky Mountain Herbarium, Department of Botany, University of Wyoming) will deliver a talk and slide show focusing on systematic floristic inventories carried out by the Rocky Mountain Herbarium with particular emphasis on the Flora of the Rocky Mountains project. **NOTE: This meeting will be held at Iris Center, 3198 North Broadway in Boulder, located about 11 blocks south of Foothills Nature Center, just south of Long's Iris Gardens, on the east side of the street.**



Pedicularis groenlandica
Artist: Kris Miëring

December 10, 7:30 PM

Sand Sage Prairies

Chris Pague (Land Steward, CO Nature Conservancy) will show in this slide presentation why the sand sage prairie is a significant and important part of Colorado's prairie landscape. See the results of recent studies to identify these areas, and become familiar with this community, its distribution, and conservation status.

January 14, 7:30 PM

Goosefoots of the Plains

Dr. Hugh Wilson (Department of Biology, Texas A&M University) will present a program on the goosefoots (Chenopodiaceae) of the Plains. He is co-author of the *Chenopodium* treatment in *Flora of the Great Plains*, and will be later presenting a workshop on the same topic. Come see this presentation on this large and difficult family as a preview to the workshop.

Fort Collins Chapter

Monthly meetings convening in the conference room at the USDA National Seed Storage Laboratory have been scheduled for November 3 and December 1. For additional information call Don Hazlett at (970) 834-1493.

November 3, 7:00 PM

Corylus (hazelnut) Taxonomy and Distribution

Ixchell Whitcher (Department of Biology, Colorado State University) will be discussing the taxonomy and distribution of the genus *Corylus*.

December 1, 7:00 PM

Araliaceae Taxonomy, Distribution, and Disjunct Taxa

Dr. Jun Wen (CSU Herbarium, Department of Biology, Colorado State University) will be discussing her research on disjunct distributions of taxa in the Araliaceae, as well as other plant families.

Plateau Chapter

Please contact Gretchen Van Reyper at (970) 835-3268 for Plateau Chapter activities.

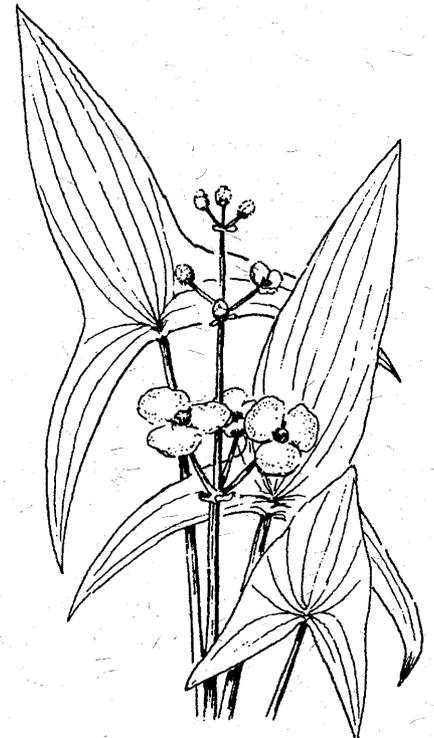
Metro-Denver Chapter

Monthly meetings are held in the Morrison Center at the Denver Botanic Garden. For additional information, contact Denise Larson at (303) 733-4338.

December 8, 7:30 PM

South Table Mesa

Loraine Yeatts will be delivering a presentation on this fascinating landform.



Sagittaria latifolia
Artist: Gary Bentrup

Southwest Chapter

Please contact Sandy Friedley at (970) 884-9245 for Southwest Chapter news and activities.

Yamparika Chapter

Please contact Reed Kelley at (970) 878-4666 for Yamparika Chapter news and activities.

Long-term harmful effects of crested wheatgrass on Great Plains grassland ecosystems

Peter Lesica and Thomas H. DeLuca

Invasions by exotic plants are occurring at an increasing rate and are considered a serious threat to both agricultural systems as well as native communities (Drake et al. 1989). Many of the most harmful exotics in North America were introduced intentionally (Ruesink et al. 1995, Williams 1980). Exotic plants such as tamarisk (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolia*), purple loosestrife (*Lythrum salicaria*), African lovegrasses (*Eragrostis lehmanniana*, *E. curvula*) and smooth brome (*Bromus inermis*) were originally brought to North America for agricultural or horticultural purposes but have displaced native species and threaten biological diversity of native communities (Malecki et al. 1993; Robinson 1965; Romo and Grilz 1990; Bock et al. 1986; Shafroth et al. 1995).

Many Eurasian grasses have been intentionally introduced throughout temperate North America, primarily for hay and pasture. The most commonly planted exotic grass in western North America is crested wheatgrass (*Agropyron cristatum*, *A. desertorum*). There are between 15 and 26 million acres of crested wheatgrass on this continent (Holchek 1981; Rogler and Lorenz 1983). The conversion of native prairie to crested wheatgrass primarily occurred after the drought of the late 1920s and 1930s when large areas of marginal cropland were abandoned and then seeded with non-native grasses to reduce soil erosion potential (Lorenz 1986). Today, crested wheatgrass continues to be planted over large areas of the Northern Great Plains. Since 1985 several million acres of crested wheatgrass have been planted on idled cropland as part of the Conservation Reserve Program.

There are many reasons for the popularity of crested wheatgrass. It is tolerant of cold and drought and suited to most soils (Knowles and Buglass 1980). Crested wheatgrass establishes easily from seed, responds well to fertilizer (Box 1986) and has high nutritive value (Box 1986). It generally yields better than native grasses of the Great Plains (Dormaar et al. 1978; 1995; Smoliak and Dormaar 1985;

McWilliams and VanCleave 1960), and usually provides greater livestock weight gains (Smoliak 1968; Hofmann et al. 1993). Seeded stands of crested wheatgrass resist invasion by weeds (Knowles and Buglass 1980). The advantages of crested wheatgrass are obvious, and it is not uncommon for livestock managers to break native prairie in order to plant it.

Although crested wheatgrass is generally considered a beneficial introduction, there are several, often overlooked factors that do not have immediate economic impact but may create a significant long-term decline in biological diversity and soil resource sustainability. Few people who have walked through crested wheatgrass stands can deny that they have far lower plant species diversity compared to native mid-grass prairie (Dormaar et al. 1978). Crested wheatgrass is a strong competitor (Box 1986). It takes up phosphorus, especially from areas of enrichment, faster than native species (Black et al. 1994; Caldwell et al. 1985), and its seedlings are better than native species at sequestering moisture at low temperatures (Harris and Wilson 1970). As a result, few native plants are able to invade crested wheatgrass plantings (Looman and Heinrichs 1973; McHenry and Newell 1947; Wilson 1989) resulting in a virtual monoculture for at least 40-50 years (Anderson and Marlette 1986; Box 1986; Smoliak et al. 1967). The paucity of plant diversity in crested wheatgrass pastures undoubtedly results in lower diversity of invertebrate and vertebrate animals as well, although data documenting this effect on the Great Plains appear to be nonexistent.

Monocultures of crested wheatgrass have promoted population explosions of insect herbivores that generally remain at lower levels in multi-species communities (Lattin et al. 1994). These outbreaks have resulted in losses of graminoid productivity and the use of expensive pesticides.

Several studies suggest that there may be a long-term negative impact of crested wheatgrass stands on soil. The strong competitive ability of crested wheatgrass cre-

ates a ground layer with more exposed soil than in native mid-grass prairie (Wilson 1989), as much as ten times more in some cases (Dormaar et al. 1995). Grasslands with more exposed soil experience higher rates of erosion (Dormaar et al. 1995; McWilliams and VanCleave 1960).

Less evident and perhaps more serious than increased wind and water erosion is the possibility that stands of crested wheatgrass cannot maintain biochemical soil quality as effectively as native grasslands (Dormaar et al. 1995). High soil quality is defined by sustainability of microbial activity and diversity, efficient cycling of nutrients, and proliferation and function of roots of desirable plant species. It usually is measured by variables such as aggregate stability, bulk density, pH, soil organic matter, microbial biomass, and enzyme activity (Gregorich et al. 1994). Although crested wheatgrass has much higher above-ground productivity compared to midgrass prairie dominated by blue gram (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*), and western wheatgrass (*Agropyron smithii*), below-ground biomass in the surface horizons is significantly lower (Dormaar et al. 1995; Redente et al. 1989; Smoliak and Dormaar 1985; Smoliak et al. 1967). This lower below-ground biomass in crested wheatgrass reflects a reduction in both root detritus and root exudates that would otherwise be available for microbial use in the formation of soil organic matter.

Below-ground biomass under stands of crested wheatgrass has a higher carbon to nitrogen ratio than native grass species and only supplies about half as much organic N to soil (Biondini et al. 1988; Klein et al. 1987; 1988; Redente et al. 1989). The smaller quantity and lower quality of organic matter in the upper soil horizons under stands of crested wheatgrass result in a lower energy input to these soils compared to native range (Dormaar et al. 1978) and alter physical and biochemical processes in soil. Stands of crested wheatgrass are associated with higher bulk density, fewer water stable aggregates, and

"Wheatgrass" continues on page 7

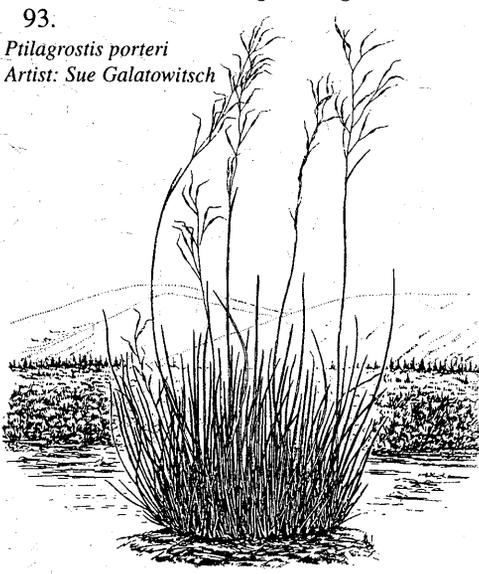
lower levels of organic matter and nitrogen compared to native grasses (Biondini et al. 1988; Dormaar et al. 1978; 1995; McHenry and Newell 1947; Redente et al. 1989; Smoliak et al. 1967). Crested wheatgrass provides the soil with a relatively high concentration of carbohydrates and little organic nitrogen (Klein et al. 1988). This combination likely results in increased mineralization of soil organic nitrogen (i.e., the so-called "priming effect") as quantities of readily degraded carbohydrates in the presence of limited nitrogen often result in a net demand on soil organic nitrogen (DeLuca and Keeney 1993; Jansson and Persson 1982; Mortensen 1963). It has been suggested that these alterations to soil quality may prevent native species from invading the crested wheatgrass monocultures (Klein et al. 1988).

Crested wheatgrass appears to influence soil quality in a manner similar to that of row crop systems. Crop species generally have limited root mass, provide soil with limited quantities of organic nitrogen, provide organic matter primarily in the form of carbohydrates (cellulosic crop residues), and result in a significant decline in soil organic matter quality (DeLuca and Keeney 1994). In the case of cropping systems much of the organic nitrogen is removed in the form of harvested grain. For crested wheatgrass stands, some of the humic nitrogen is converted to animal protein, but likely a great deal is lost to the atmosphere through volatilization of urine and senescing vegetation (Schimel et al. 1986).

We presently lack the knowledge to determine the long-term effects of crested wheatgrass on the Great Plains. However, there is a growing body of knowledge that suggests that crested wheatgrass alters the environment in many undesirable ways. Further research of the changes in soils and plant and animal diversity associated with crested wheatgrass are needed to assess its impact. Nonetheless, the continued conversion of native prairie and planting of crested wheatgrass or other exotic species seems ill advised.

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NOTE: This article was communicated by Bob Clark (Chair, Conservation Committee, CoNPS). Reprinted from the September-October issue of the *Journal of Soil and Water Conservation* with the permission of the Assistant Editor.

ANNOUNCEMENTS

The John W. Marr Fund: An endowment for the support of small grants for research

On March 24, 1990, the Board of Directors of the Colorado Native Plant Society established the John W. Marr Fund for the occasional award of small grants in support of research in plant biology. The Fund honors the late Dr. John Marr, Professor at the University of Colorado and the first President of the Colorado Native Plant Society.

The Fund was established to encourage, through the provision of small grants-in-aid, research on the biology and natural history of Colorado native plants. Both field and laboratory studies are eligible for funding. Awards of \$500 or less may represent the sole support of a project, may be part of joint funding agreed upon with other granting groups or organizations, or may be used to supplement other funding obtained by the investigator(s).

Traditionally, awards from the John W. Marr Fund have been made at irregular intervals, subject to availability of suitable pro-

posals for which funding assistance is sought. However, the Board is now soliciting proposals for a January 15, 1999 deadline. Information on guidelines and requirements for proposals may be obtained by contacting the Society. Awards are made solely at the discretion of the CoNPS Board of Directors.

AQUILEGIA Deadline Approaches

Please submit all contributions for Vol. 23 No. 1 of *Aquilegia* on or prior to December 7, 1998. Short items such as unusual information about a plant, a little known botanical term, etc., are especially welcome. Please note that previously published articles submitted for reprinting in *Aquilegia* require permission from the editor of original publication. Camera-ready line art or other illustrations are also solicited.

Please include author's name and address, although anonymity may be requested. Articles submitted via e-mail or on disks (MAC preferably, or IBM) are very much appreciated. Please indicate word processing software and version.

FOR YOUR LIBRARY

CoNPS is pleased to provide a selection of books to members at discount prices; a partial list follows. If you are interested in any of these or would like a complete list of available selections, please contact: Velma Richards, 3125 Monmouth Ave., Englewood, CO 80110 or (303) 794-5432. Make check payable to CoNPS. Postage costs are additional for books received by mail. If you want to save postage charges, you can pick up the books yourself from Velma Richards in Denver, Pat Murphy in Boulder, or Denise Culver in Fort Collins.

COLORADO NATIVE PLANT SOCIETY — DISCOUNT PUBLICATIONS ORDER FORM

Title	Author	Price Per Book	Shipping/Handling Per Book	No.	Book Cost Total	Shipping/Handling Total
Alpine Flower Finder	Wingate & Yeats	4.50	2.00			
Alpine Wildflowers of the Northern Rocky Mts.	Strickler	7.50	2.00			
Alpine Wildflowers of the Rocky Mts.	Duft & Moseley	11.00	2.00			
Best Tasting Wild Plants of Colorado	Seebeck	13.50	2.00			
Canyon Country Wildflowers, Field Guide to	Fagan	12.00	2.00			
Catalog of the Colorado Flora: A Biodiversity Baseline	Weber & Wittman	40.00	3.25			
Changes in Vegetation and Land Use in Eastern CO	USDA	20.00	2.75			
Colorado Wildflowers	Jones	5.50	2.00			
Colorado's 30 Troublesome Weeds	CWMA	3.00	1.25			
Colorado's Best Wildlife Hikes	Irwin	15.00	2.75			
Colorado's Canyon Country	Pearson & Fielder	15.00	2.00			
Denver Grasses, A Key to the Common Genera	Wingate	0.25	0.50			
Desert Wildflowers	Taylor	18.50	2.75			
Dictionary of Word Roots	Borrer	9.00	2.00			
Edible and Medicinal Plants of the West	Tilford	16.50	2.75			
Edible Wild Plants of the Prairie	Kindscher	10.50	2.00			
Familiar Cacti North America	Heil	6.50	2.00			
Field Guide to Colorado Wildflowers, Vol. 1, Plains	Guennel	18.75	2.75			
Field Guide to Colorado Wildflowers, Vol. 2, Mountains	Guennel	18.75	2.75			
Flora of the Great Plains	Great Plains Flora Assoc.	44.00	3.75			
Flora of the Pacific Northwest	Hitchcock & Cronquist	46.00	3.75			
Flora of the San Juans	Komarek	15.50	2.00			
Floristic Survey: Black Forest	Maley	3.00	2.00			
Floristic Survey: Mesa de Maya Region	Clark	4.00	2.00			
Gardener's Guide to Plant Conservation, The	Marshall	7.00	2.00			
Grass Varieties in the USA	Lewis & Sharp	43.00	3.75			
Handbook of Rocky Mountain Plants	Nelson	16.00	2.75			
How to ID Grasses & Grasslike Plants	Harrington	11.20	2.00			
How to Identify Plants	Harrington	8.00	2.00			
Illustrated Keys to the Grasses of Colorado	Wingate	7.50	2.00			
Intermountain Flora 1, 3-6 (Contact Velma Richards)	Cronquist et al.	-	-			

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Title	Author	Price Per Book	Shipping/Handling Per Book	No.	Book Cost Total	Shipping/Handling Total
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Medicinal Wild Plants of the Prairie	Kindscher	10.50	2.75			
Meet the Natives, ninth edition	Pesman	10.50	2.00			
Mushrooms of Colorado	Evenson	18.75	2.75			
North American Range Plants	Stubbendeick	20.00	2.75			
Plant Identification Terminology	Harris & Harris	14.50	2.75			
Plant List: Dinosaur Nat'l Monument	Naumann	1.25	1.00			
Plant Survival	Capon	13.00	2.00			
Plants of Arizona, Field Guide	Epple	18.75	2.75			
Plants of Florissant Fossil Beds Nat'l Monument	Edwards & Weber	2.50	2.00			
Plants of the Rocky Mountains	Kershaw et al.	16.50	2.75			
Prairie Garden, Creating a Shortgrass Prairie Garden	Brune	3.25	1.25			
Prairie Plants and Their Environment	Weaver	11.00	2.00			
Prairie Wildflowers of Northern Rocky Mts.	Strickler	7.50	2.00			
Retracing Major Stephen H. Long's 1820 Expedition	Goodman & Lawson	31.50	2.75			
Rocky Mountain Berry Book	Krum	9.00	2.00			
Rocky Mountain Flora	Weber	16.00	2.00			
Rocky Mountain Flower Finder	Wingate	4.00	2.00			
Sagebrush Country: A Wildflower Sanctuary	Taylor	11.00	2.00			
Scat and Tracks	Halfpenny	7.50	2.00			
Simplified Guide to Common Colorado Grasses, A	Wingate	3.25	1.25			
Southern Rockies, Sierra Club Guide	Benedict	16.00	2.00			
Tallgrass Prairie Wildflowers	Ladd	15.00	2.75			
Utah Flora, A, 1993 edition	Welsh et al.	68.00	3.75			
Vascular Plants of Montana	Dorn	10.50	2.00			
Vascular Plants of Wyoming (1992 ed.)	Dorn	13.00	2.00			
Weeds of the West (1996 ed.)	Whitson, Editor	18.00	3.75			
Western Trees, Field Guide to	Stuckey & Palmer	8.50	2.00			
Wild about Wildflowers	Warren	16.00	2.00			
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Crested Wheatgrass in Colorado

William A. Weber, F.L.S.

Professor and Curator Emeritus, University of Colorado

My treatments of what we call crested wheatgrass have varied over the years, and I am not satisfied including all of our representatives under the umbrella name *Agropyron cristatum*. There happen to be diploids ($2n=14$), as well as tetraploids ($2n=28$). The diploid has been referred to as "fairway crested wheat" and is readily distinguishable from the tetraploid. Sarkar (1956) named the diploid *A. cristatiforme*, but it now appears that there is an older name for this taxon, which is *A. mongolicum* Keng, J. Wash. Acad. Sci. 28: 305.

1938. As the name suggests, it has been used for many years on golf fairways. The tetraploids, as far as I can tell, consist of *A. pectiniforme* Roemer & Schultes and *A. desertorum* Fischer ex Link in Colorado. We do not have, in Colorado, any plants that can be assigned to *A. cristatum*. This is a plant with very short, dense spikes, in which the spikelets are very densely hirsute. It is common in Central Asia.

There are still differences of opinion regarding the nomenclature of *A. pectini-*

forme, but a new treatment is being developed that should resolve the differences between Sarkar's treatment and that of Dewey (1983). The following key is adapted from Sarkar (1956).

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Sarkar, P. 1956. Crested wheatgrass complex. *Can. J. Bot.* 34: 328-345.

- 1a. Spikes short-linear, indistinctly pectinate, dense, without noticeable space between the spikelets; (glumes glabrous; culm minutely villous below the spike; blades glaucous). *A. desertorum* Fischer ex Link
- 1b. Spikes oblong-oval, distinctly pectinate, with squarrose parallel spikelets (2)
- 2a. Spikes dense, but with noticeable space between spikelets; rachis and culm glabrous; blade smooth or scabrous *A. pectiniforme* Roemer & Schultes
- 2b. Spikes dense, with relatively less space between spikelets; rachis villous; culm minutely villous below the spike; blade sparsely hairy *A. mongolicum* Keng

ANNOUNCEMENTS

Yellow starthistle identified on Front Range

Congratulations to CoNPS President Jeff Dawson for identifying and reporting the first confirmed infestation of yellow starthistle (*Centaurea solstitialis*) on the Front Range. This 1,400 plant infestation at the Denver Federal Center was swiftly eradicated by local natural resource managers. Yellow starthistle is very rare in Colorado and that's the way many of us would like to keep it. After consuming more than 10 million acres in California, this invasive exotic is moving our way. If you spot a suspicious plant or patch of plants, contact your local county weed supervisor and Eric Lane, State weed co-ordinator and Board member. Yellow starthistle is easily recognized by its small, thorn-protected yellow flowers and winged stems.

\$ 1998 Native Plant Art Contest Winners \$

The winners of the 1998 Native Plant Art Contest were from Fort Garland, Colorado Springs, and Fort Collins. Ann Gethen from Fort Garland was awarded the \$100.00 first place award for her beautiful color drawing of *Oenothera caespitosa* (Onagraceae), the gumbo evening primrose or gumbo lily. Daryl Mergen of Colorado Springs was awarded the \$50.00 second place award for an excellent sketch of our state grass *Bouteloua gracilis* (Poaceae), blue grama. Elizabeth Hunter of Fort Collins was awarded the \$25.00 third place award for a very nice photograph

of *Cleome serrulata* (Capparaceae), the Rocky Mountain bee plant. This contest was sponsored by CoNPS.

NEW 1999 Colorado Noxious Weed Calendars

For the first time in Colorado history, a calendar highlighting Colorado noxious weeds in familiar localities around the state is in production. Developed by Pitkin, La Plata, and Boulder County weed managers, as well as former Society Director Carol Spurrier, this 12-month calendar is an important addition to home or office. Gaze wistfully at Boulder's Flatirons while drinking your morning cup of joe. Wait! What's that in the foreground? A large expanse of chicory!

This informative, sure-to-be a collector's item, home-grown calendar is available for only \$2.50 from the Colorado Big Country RC&D office, located at P.O. Box 2168, Glenwood Springs, CO 81602 or call (970) 945-0727 x4. Tell 'em Eric sent ya!

New CoNPS T-Shirts Now Available

In conjunction with the 1998 CoNPS Annual Meeting, Denise Culver, CoNPS Treasurer developed t-shirts featuring a design by Carolyn Crawford. These t-shirts are still available at a reasonable \$13.00 per shirt for members, or two for \$25.00. Please contact the Society to place your order.

CALENDAR

CHAPTER MEETINGS

Boulder Chapter

Nov 12 Rocky Mountain Floristic Inventories

Dec 10 Sand Sage Prairies

Jan 14 Goosefoots of the Plains

Fort Collins Chapter

Nov 3 *Corylus* Taxonomy and Distribution

Dec 1 Araliaceae Taxonomy, Distribution, and Disjunct Taxa

Metro-Denver Chapter

Dec 8 South Table Mesa

FIELD TRIPS AND WORKSHOPS

Nov 7, 8 **The Helleboraceae in Colorado**
First Session: Saturday, November 7
Second Session: Sunday, November 8

Dec 5, 6 **The Poaceae: How to know the Tribes**
First Session: Saturday, December 5
Second Session: Sunday, December 6

Jan 16, 17 **Chenopodiaceae: The Goosefoot Family**
First Session: Saturday, January 16
Second Session: Sunday, January 17

Feb 13, 14 **Colorado's Missing Flora**
First Session: Saturday, February 13
Second Session: Sunday, February 14

March 6, 7 **Polemoniaceae of Colorado**
First Session: Saturday, March 6
Second Session: Sunday, March 7

April 17, 18 **Botanical Illustration: Field Sketching**
First Session: Saturday, April 17
Second Session: Sunday, April 18



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