Castilleja

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May 1-May 7, 2006 is National Wildflower Week

A Wyoming Paintbrush Primer

By Bonnie Heidel

On January 31, 1917, Wyoming became the 19th state to designate a state flower, on the same day that Wyoming's Legislature passed a prohibition bill. Prohibition apparently had widespread support but Wyoming's appointed State Flower, *Castilleja linariifolia* (Wyoming paintbrush) did not.

"It ought not to be the prerogative of less than 0.1 % of the people to determine for the 99.9% what they shall admire or cherish" noted Aven Nelson in a polite article published later that year in "The Laramie Republican" (April 3, 1917). Nelson was Wyoming's leading botanist in the first half of the 20th Century, founder of the Rocky Mountain Herbarium, and he assumed the role of Acting President for the University of Wyoming that same year.

Wyoming paintbrush was not suited as Wyoming's emblem for two other reasons presented by Nelson, reasons that resonate today. Wyoming is awash in Indian paintbrushes, with sixteen different species or varieties (Dorn 2001). Wyoming paintbrush is the most widely- distributed of all paintbrushes in the state, but it is less-conspicuous and not as well known as some of the others.

Castilleja linariifolia (Wyoming paintbrush)
Photo by Walter Fertig

Furthermore, the distinction between Wyoming paintbrush and other paintbrush species rests on "strong but not superficially evident characters" (Nelson 1917), in a genus with its own vocabulary of technical terms. To illustrate his point, Nelson challenged readers and politicians to find the designated paintbrush in the summer months ahead. (*Continued on p. 6*)

In this issue:

WNPS News

See you in Pinedale! There's still time to register for the 2006 Annual Meeting (July 14-16). There is no fee, but organizers need the information, and attendees need to consider their camping or lodging ahead of time. *See the meeting map and schedule on p. 4.*

New Members: Please welcome the following new members to WNPS: Roberta Bolton (Cheyenne), Jonathon Carvella (Buffalo, NY), Mark Gabel (Spearfish, SD), Tamara Guggenmos (Cheyenne) and Katie Jones (Cheyenne).

By-Laws vote reminder: Voting is open on the proposed WNPS By-Laws amendment up until the time of the annual meeting on July 15. See the December issue for submitting your vote by mail as a proxy vote.

Wyoming Native Plant Society
P.O. Box 2500, Laramie, WY 82073

WNPS Board – 2005-06

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The 2006 Board officially takes over at the annual meeting.

Newsletter Editor: Bonnie Heidel (Laramie; bheidel@uwyo.edu)
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Treasurer's Report: Balance as of 4/16/06: General Fund: $1234.37; Markow Scholarship Fund: $316.50. Total Funds: $1540.87.

Message from the President

Epitomy of Paradox

Wyoming's history and natural history are as closely entwined as our State Flower, Wyoming paintbrush (*Castilleja linariifolia*) and unofficial state shrub, Big sagebrush (*Artemisia tridentata*). The life, color, and balance of Wyoming landscapes wouldn't be the same without one other.

Castilleja linariifolia, for all its color, is not a blazing emblem of fierce independence but of subtle interdependence and adaptation. The State Legislature may have thought they were enlisting such a blazing botanical emblem in 1917. Decades later, the Wyoming Native Plant Society endorsed the Legislature's decision in all its paradox.

In this 25th year of Wyoming Native Plant Society, it is fitting to revisit the history and natural history of our State Flower. The article was also distributed for wider reading in newspapers, issued with a challenge to find it! We are not going to ask the Legislature to reconvene this summer. But now is high time to ask ourselves what we depend on in Wyoming plants, and in our organization of people who recognize their importance. BH

Hike announcement: Bighorn Native Plant Society announces a June hike to a wildflower haven near Big Horn, WY: Saturday, June 18, @ 9 a.m. Dr. Dick Birkholz will lead a trip by permission on privately-owned land. Meet at the Band Shell in Kendrick Park in Sheridan, WY at 9:00 a.m. If you plan to attend, please contact Birkholz at (307) 674-4909 and leave a message and phone number to be reached or at his e-mail address birkholzds@bresnan.net .

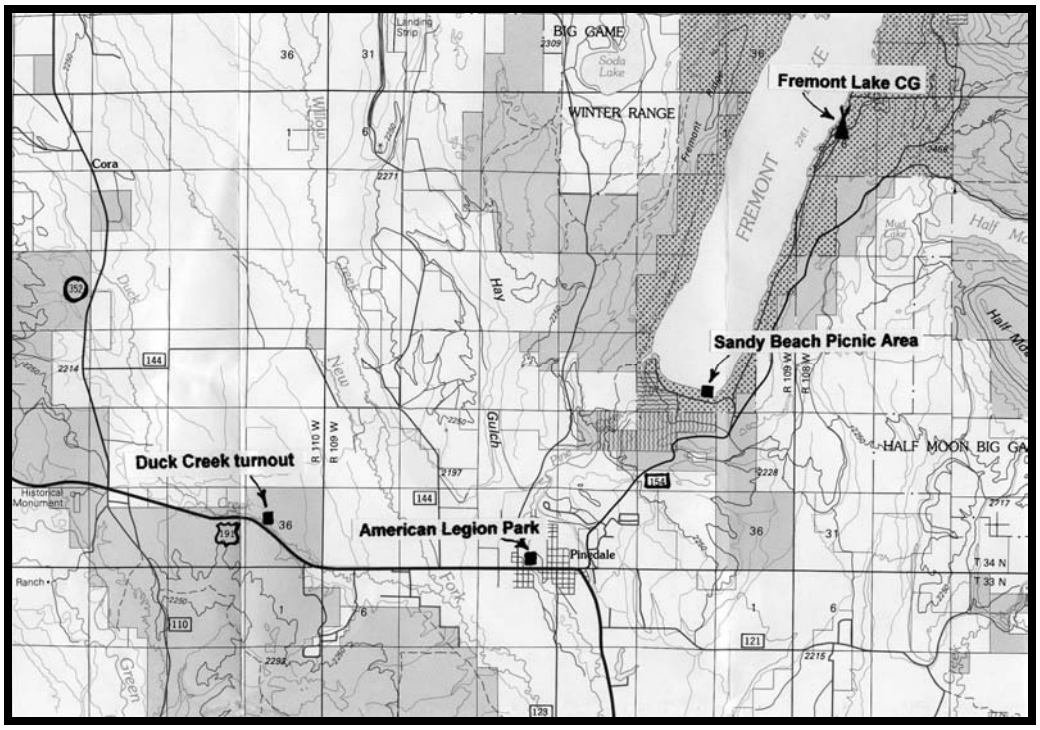
Contributors to this issue: Bonnie Heidel (BH), Elizabeth Saunders (ES) and hosting Pinedale members. The next newsletter deadline is not until September 22.

Reminder

2006 Wyoming Native Plant Society Meeting - Pinedale, Wyoming

July 14, 15 & 16

It's not too late to make plans for the 2006 Wyoming Native Plant Society annual meeting, July 14-16. Remember that this event will be based at Fremont Lake Campground (Bridger-Teton NF). Seven event options are planned, beginning with wild food foraging on Friday for the early birds. See the schedule and map for event locations.



Pinedale accommodations are limited! Refer to the March announcement for camping and lodging information. Organizers need to know how many people to expect and which events you will attend. Please provide that information to: kail@wyoming.com, or to: WNPS, Box 932, Pinedale, WY 82941 or 307.367.3058 **by June 15**.

SCHEDULE

Friday July 14

5:30 - 7:30 pm Food Foraging Foray. Steve Laster, Leader. Meet at Sandy Beach picnic area, Fremont Lake.

Saturday July 15

9:30 - 12 noon Mesa Sagebrush Tour. Steve Laster & Alison King, Leaders. Meet at Sandy Beach picnic area.

10 am - 12 noon Fremont Lakeside Plant & Birding Tour. Pam Curry & Ric Samulski, Leaders. Meet at Fremont Lake Campground boat dock near campsite #44.

Lunch - on your own

1:30 - 4:30 pm Kendall Warm Springs Area Tour. Walt Fertig, Leader. Meet at Duck Creek pull-out on Highway 191, mile marker 103, about 3 miles west of Pinedale.

2:00 - 4:30 pm Soda Lake & Aspen Tour. Tim Lingle, Leader. Meet at American Legion Park on Pine St. at Pine Creek.

5:30 - 9 pm WNPS Business Meeting, Campfire Dinner Social, & Native Plant Cultivation Presentation By Dessa Dale, speaker. Meet at Sandy Beach picnic area. Dinner hosted by Pinedale Sage & Snow Club. Wild plants, salads, & dessert provided. Bring your own main dish/meat & drinks.

Sunday July 16

9:30 am - 12 noon Elkhart Park Walk in the Winds. Walt Fertig, Leader. Meet at Sandy Beach picnic area. Bring a sack lunch.

Phylogenetic Analysis of the *Abronia ammophila* Green (Nyctaginaceae) Species Complex

By Elizabeth Saunders

Abronia ammophila and *Abronia mellifera* are closely related species of sand verbena. *Abronia ammophila,* as originally described, is endemic to the shores of Yellowstone Lake in Yellowstone National Park, and *Abronia mellifera* enjoys a more widespread distribution in Utah, Wyoming, Idaho, Washington, and Oregon. Unfortunately, *Abronia* species exhibit extreme variation and overlap in morphological characters most often used for taxonomic determination. Among these two species, determination of individual plants using existing keys is nearly impossible. As a result, there is a disputed taxonomy for both *A. ammophila* and *A. mellifera*, with some botanists calling into question their delineation into two species. Both species of *Abronia* are recognized in the *Flora of North America* and in Dorn (2001), but the latter treatment includes

Top: *Abronia ammophla* from Yellowstone National Park. Photo by E. Saunders
Below: *Abronia mellifera* from INEEL near Idaho Falls. The two species are easily distinguished at first glance although variation in morphological characters makes delinieation largely subjective.. Photographs by E. Saunders

some of the Sublette County material under *A. ammophila*.

So while the Yellowstone populations and neighboring populations in southern Wyoming and eastern Idaho look distinct at a glance, finding a suite of characters that will absolutely separate the two species is difficult. This study was designed to collect molecular characters to build a phylogeny for the *Abronia ammophila* species complex with the hope that a molecular-based approach would succeed where a morphological approach has resulted in ambiguous and often subjective species determinations for individual plants.

In July 2004 with the assistance of the WNPS, I collected leaf material from representative samples of *Abronia ammophila* from Yellowstone National Park, from *A. mellifera* at Big Piney, WY, and the Idaho National Engineering and Environmental Laboratory (INEEL) near Idaho Falls, ID, and from *A. fragrans* from Texas and Utah. Leaf material was brought back to the lab at Southern Illinois University for analysis. *Abronia latifolia*, a yellow-flowered, coastal California dune species, was selected as the outgroup for this study. Voucher specimens of *A. mellifera* were collected from Wyoming and Idaho. *A. fragrans* was collected from Utah and Texas, and *A. latifolia* from California. No voucher specimen of *A. ammophila* was collected from Yellowstone due to its relative rarity.

Deoxyribonucleic acid (DNA) was extracted from all samples. Several regions of the nuclear and chloroplast genomes have been amplified and sequenced to find regions evolving at a sufficient rate as to differentiate closely related species. To date, ITS-1 and ITS-2 (internal transcribed spacers) of the ribosomal gene family 18S-26S nuclear rDNA are sequenced. These genes, which have shown promise in resolving species-level relationships in many other genera, exhibit little variation among the *Abronia* species. However, we are evaluating several additional nuclear DNA regions that show promise for this effort.

The question of species delineation is important because there is some suggestion that *A. ammophila*, if indeed a Yellowstone endemic, may warrant additional protection. If the Sublette Co, Wyoming, populations and/or the Idaho populations are also *A. ammophila*, this would substantially affect the conservation status of the species.

The work completed to date has failed to answer this perplexing taxonomic question, but the tortuous path of botanical inquiry has lead to new insights in the fundamentals of *Abronia* reproductive biology. I have elected to continue working on this challenging problem - on more than one path of inquiry - and will keep the WNPS informed as work progresses. An article by the author on the reproductive ecology and pollination ecology of *Abronia ammophila* will be published in the upcoming issue (vol. 21, issue 2) of *Plant Species Biology*. ES

About the author: Elizabeth Saunders is a PhD candidate in the Department of Plant Biology at Southern Illinois University. The preceding article highlights masters thesis research conducted with the support of the 2004 Wyoming Native Plant Society scholarship.

Abronia keys

Abronia ammophila

- Leaves mostly all with petioles as long as or longer than blades; involucral bracts 3-5 mm long; fruits 4-6 mm long, 2.5-4.5 mm wide (Dorn 2001)
- Wings of fruit reduced to lobes, fruits seldom as wide as long (Galloway 2003)

Abronia mellifera

- Leaves, at least the upper, often with petioles shorter than blades; involucral bracts often 6 mm or more long; fruits 5-12 mm long; 2.5-10 mm wide (Dorn 2001)
- Fruit wings thin; fruit usually as wide as long (Galloway 2003).

A Wyoming Paintbrush Primer
Continued from p. 1

Two other issues were raised by Nelson in questioning whether Wyoming paintbrush can be truly known and admired as a state flower. The colors of Indian paintbrushes and their correct identification are confounded by widespread hybridization in the wild, so that there are taxonomic perils in finding the true appointee. Furthermore, the paintbrush genus in general was deemed less than suitable by Nelson because each species is partially parasitic on the roots of other plants and can rarely be cultivated apart from its hosts. If we look to plants for behavior, it can also be pointed out that the intense colors of paintbrushes are a form of botanical deceit, with coloration that is not on the "flower parts" in the technical sense, but on modified leaves of many hues in the inflorescence.

Aven Nelson looked to the future: *"Some day when we know our state better, when the affections of our children or our children's children shall have become linked to the floral treasures of our state by intimate and loving association, then will sentiment for some one of these flowers become crystalized into law, but it will be law or the heart and not of the session book" (Nelson 1917).*

The future took a new twist. In 1994, the State Legislature received botanical pardon of sorts with the adoption of "*Castilleja*" (technical name for the paintbrush genus) as mascot for the Wyoming Native Plant Society (WNPS) newsletter. The lead newsletter story on Indian Paintbrush (Fertig 1994) remains one of the best overviews for the genus in the state and our enigmatic state flower, posted on the WNPS homepage (http://uwyo.edu/wyndd/wnps/wnps_home.htm). The genus name, and later the species logo, have graced the organization's newsletter for the last 12 years of its 25-year history. This gesture has yet to set the record straight on state highway maps, highway signs, and the homepage for Wyoming state government, in which other imposters have been put on display as representing Wyoming's State Flower. One of the most frequent stand-ins is Scarlet paintbrush (*Castilleja miniata*), recently incriminated in other nefarious botanical behavior as an alternate host for blister rust (*Castilleja* 24(3)).

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National Wildflower Week, May 1-7, is a fitting time to consider our State Flower and plant allegiances, while recognizing the rainbow of other paintbrushes in the state.

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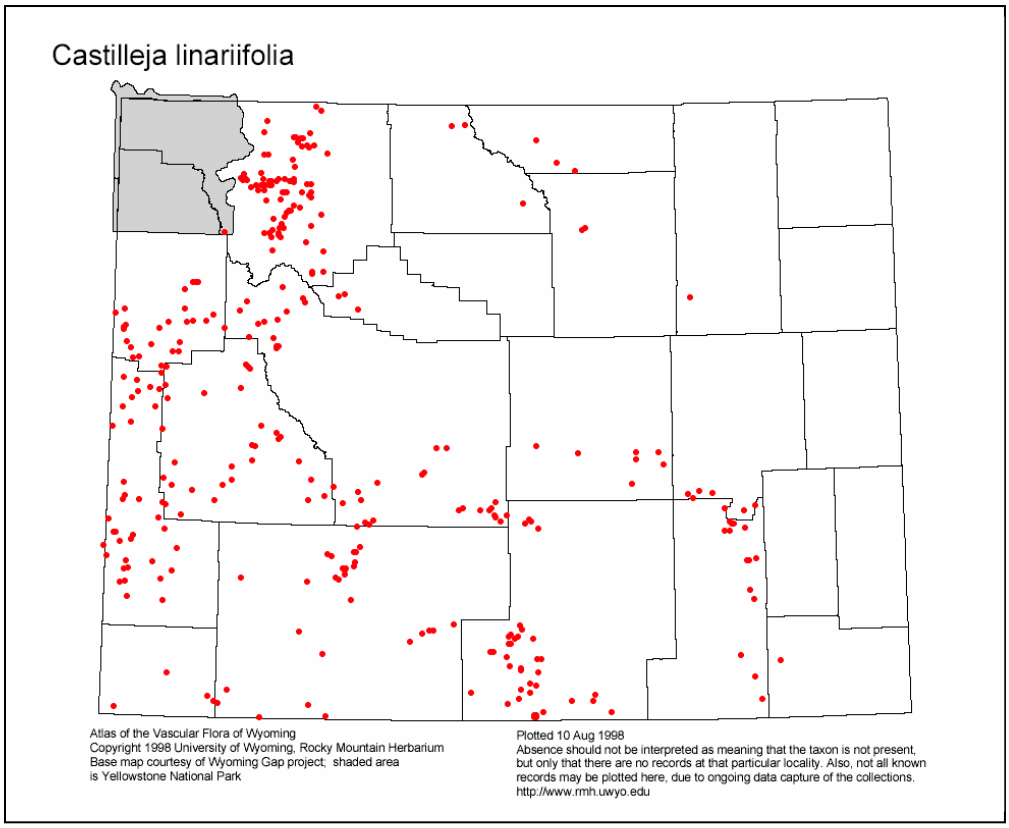
The red colors of Wyoming paintbrush appear during late June and July in the middle of summer heat. In fact, Wyoming paintbrush may divert not just energy but water from host plants like big sagebrush (*Artemisia tridentata*), and it transpires water more readily than the sagebrushes.

Wyoming paintbrush is known from at least 18 counties of Wyoming (see map, next page) in high plains, foothills and mountains. It is not restricted to Wyoming but extends from southern Montana to northern New Mexico, and from southern Oregon across California. It often grows among shrubs, including sagebrush (*Artemisia* spp.) or antelope brush (*Purshia tridentata*); (Nelson and Williams 1992).

(*Continued on p. 7.*)

A Wyoming Paintbrush Primer

Continued from p. 6



Distribution of Wyoming paintbrush in Wyoming
From: *Atlas of the Vascular Plants of Wyoming*.
Posted electronically by the Rocky Mountain Herbarium at: http://www.rmh.uwyo.edu.

Can *you* identify Wyoming paintbrush? Photographs of almost half of the paintbrushes in the state, including the Wyoming paintbrush, appear in a recent Wyoming wildflower book (States and States 2004). For the technical characteristics and distinctions, readers are referred to the current Wyoming flora (Dorn 2001) and regional handbooks (Nelson and Williams 1992).

In general, the loose cluster of long arching flowers that make up the Wyoming paintbrush inflorescence almost gives it the appearance of fireworks frozen in midair, a visual contrast to Nelson's characterization of Wyoming paintbrush as a "shy" plant.

For quick reference, here is a checklist of the characteristics that distinguish Wyoming paintbrush from other paintbrushes in the state, all of which must hold true for positive identification.

- Red or reddish inflorescence
- Hood of the "tubular flower" extends more than half the length of the flower
- Most colorful part of inflorescence represented by the sheath that enwraps the flower
- Leaves long and narrow, generally without any lobes on those leaves below the inflorescence
- Perennial

Recently, the University of Wyoming Extension Horticultural Specialist developed ways to propagate it by seed and cuttings, with the help of host plants (Panter 2001), so it might yet appear in gardens.

Perhaps it is fitting that Wyoming has an enigmatic State Flower. Wyoming Native Plant Society will offer an introduction to Wyoming's State Flower as part of the 2006 annual meeting held in Pinedale, July 14-16. Remember to register and plan ahead. BH

See the back page, p. 8, for a complete list of the references cited in this article.

References – A Wyoming Paintbrush Primer

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The Wyoming Native Plant Society, established in 1981, is a non-profit organization dedicated to encouraging the appreciation and conservation of the native flora and plant communities of Wyoming. The Society promotes education and research on native plants of the state through its newsletter, field trips, and annual student scholarship award. Membership is open to individuals, families, or organizations with an interest in Wyoming's flora. Members receive *Castilleja*, the Society's quarterly newsletter, and may take part in all of the Society's programs and projects, including the annual meeting/field trip held each summer. Dues are $7.50 annually. To join or renew, return this form to:

Wyoming Native Plant Society
P.O. Box 2500
Laramie, WY 82073

Name: _____

Address: _____

_____

Email: _____

___ $7.50 Regular Membership
___ $15.00 Scholarship Supporting Member
($7.50 goes to the Markow scholarship fund)

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