



Castilleja linearifolia

Castilleja

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All in the Family

A quiet upheaval over the past quarter century has wreaked havoc on widely-recognized plant families like the Scrophulariaceae (Figwort Family). Havoc, that is, for those of us expecting taxonomy to remain the same.

The Scrophulariaceae was originally the sixth largest family in Wyoming and in North America (Dorn 2001). In its original form (*sensu lato*), it contains Wyoming’s State Flower, the Wyoming paintbrush (*Castilleja linearifolia*), and dazzling arrays of other wildflowers including the *Penstemon* (beardtongue) genus.

There are even more mismatches between new and old ways of thinking about plant relationships than ever existed in the Bunker Family on television, thanks to molecular genetics. As a result, some of the best known temperate genera in the Scrophulariaceae have been transferred to a greatly-expanded treatment of the “new” Plantaginaceae (Plantain Family), now encompassing about 92 genera including the *Penstemon* genus, and 2000 species including those from other re-examined families (Albach et al. 2005). In this treatment, the



Above: Wyoming Native Plant Society and Gibbens’ penstemon welcome YOU to the joint 2012 Annual Meeting of WYNPS and the American Penstemon Society, June 22-25. This motif is emblazoned on Tshirts that will be sold at the event, designed by Dorothy Tuthill.

Plantaginaceae includes everything from highly specialized aquatic plants to tall shrubs and rainforest herbs, and an array of pollination adaptations.

Other genera in the original Scrophulariaceae have been transferred to a greatly-expanded treatment of the Orobanchaceae (Broom-rape Family), including our State Flower and its castillijian cohorts (Tank et al. 2009). Members of the Orobanchaceae are parasitic or hemiparasitic. In total, seven separate major evolutionary lines are now recognized in what was once the Scrophulariaceae.

The Scrophulariaceae in its trim new family configuration will have only two genera in Wyoming: *Scrophularia* (figwort) and *Verbascum* (mullein). As a result we lose two families in the (cont., p. 7)

WYNPS News

2012 Scholarship and Outreach Grant Winners: The 2012 Markow award winners are Andrew King (University of Wyoming), graduate student who is researching forest health and documentation methods in the Snowy Range, the Teton County Conservation District for publication of the Teton County Native Plant Pocket Guide, and the Weston County Natural Resources District for developing a xeriscape demonstration garden using native plants in Newcastle, Wyoming. They were awarded \$685, \$500 and \$845, respectively. We received numerous high quality proposals and regret that we could not fund them all. Thanks to everyone who applied... and to all in WYNPS who support our Research Scholarship and Outreach Grant Program.

Hikes: IF YOU HAVEN'T REGISTERED, THERE'S STILL TIME! Annual Meeting registration for June 22-24, in Laramie is still open. Registration is through the American Penstemon Society web site (<http://apsdev.org/aps/meetings.html>) or using the form in the last newsletter.

We are sponsoring an optional field trip on Monday to see the Blowout Penstemon. You can sign up for this trip at no cost whether or not you register for the rest of the meeting. To sign up for Monday only, send us an email: wynps@wynps.org.

...Look for a special separate hike mailing coming your way with all Wyoming events!

New Members: Please welcome the following new members to WYNPS: B.A. Ellenson, Cheyenne; Kent Fothergill, Twin Falls, ID; Jana Heisler-White, Laramie; Raymond Keale, Hot Springs, SD; Michael Kirkpatrick, Laramie; Elaine McGettrick, Boulder, WY; Rachel Newton, Boise, ID; Dana Tully, Pinedale; Brenna Wanous, Laramie.

Treasurer's Report: Balance as of 20 April: Scholarship = \$1,727.50; General \$5,244.41; Total = \$6,971.91.

Editor: Bonnie Heidel (bheidel@uwyo.edu)
Webmaster: Melanie Arnett (arnett@uwyo.edu)
Teton Chapter: PO Box 6654, Jackson, WY 83002 (Amy Taylor, Treasurer)
Bighorn Native Plant Society: P.O. Box 21, Big Horn, WY 82833 (Jean Daly, Treasurer)

Message from the President

The Board wants to thank everyone who submitted scholarship applications and outreach applications in this first year of expanded scope. We received a compelling slate of proposals that advance native plant appreciation and understanding in the state. Geography was NOT a criterion, but we ultimately chose three winning entries that represent us well in eastern, central and western Wyoming!

...This past winter, I have enjoyed re-reading to my daughter the book, *Legend of the Indian Paintbrush*, retold and illustrated by Tomie dePaola. This beloved author/illustrator of mostly children's books wrote the book in 1988 based on a suggestion from a Wyoming friend, Patricia Henry. The book is beautifully illustrated and recounts a Native American legend of the Indian paintbrush. As the legend suggests, the colors of Indian paintbrush represent the sunset. I hope you see the colors of the sunset found in *Castilleja* throughout the seasons ahead.

I look forward to seeing you in Laramie and on other hikes!

~Amy Taylor

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

WYNPS Board – 2012

President: Amy Taylor, Jackson
(ajrtaylor@hotmail.com)
Vice-President: Dorothy Tuthill, Laramie
(dtuthill@uwyo.edu)
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Contributors to this Issue: Ann Boelter, Robert Dorn, Bonnie Heidel, Amy Taylor, Paul Taylor, Dorothy Tuthill, Jennifer Whipple.



A "NEW" Yellowstone Endemic:
Yellowstone sulfur buckwheat
By Jennifer Whipple

(Editor's note: The following is reprinted from an article on the three endemic plants of Yellowstone National Park, published this year in *Yellowstone Science* 20(1), and reprinted with the permission of the editor and author. It is posted at: www.nps.gov/yell/planyourvisit/yellsciweb.htm)

Hidden among the steaming geysers, running rivers, and the miles and miles of lodgepole pines in the Yellowstone caldera are three surprising vascular plants that are found nowhere else in the world: Ross' bentgrass (*Agrostis rossiae*), Yellowstone sand verbena (*Abronia ammophila*), and Yellowstone sulfur buckwheat (*Eriogonum umbellatum* var. *cladophorum*). The geothermal legacy of Yellowstone is associated with the life history of each of them, but each of these endemic taxa has a particular way of surviving the rigors of the park.

Yellowstone sulfur buckwheat does not occur directly next to thermal features, but instead is a component of the vegetation on barren, geothermally warmed ground adjacent to thermal areas. Primarily occurring on areas of glacial till with obvious obsidian sand on the surface, it can grow on other soil types such as soil derived from sinter. The entire world population is within the park, occurring in the Upper Geyser Basin, especially around Old Faithful, Midway geyser Basin, the Lower Geyser Basin, and in the vicinity of Madison Junction. These plants are part of an interesting thermal plant community that is encountered in the vicinity of geyser basins.

Growing on mildly influenced geothermal ground, it includes several species that are more often encountered at lower elevations or as components of the more xeric Great Basin flora. Superficially, these areas look relatively barren and have been perceived in the past as unimportant sites, but the plants have been drawn from different areas of the West, forming a unique community. Where the ground is cold and barely influenced by geothermal heat, the plants including Yellowstone sulfur buckwheat drop out of the vegetation. Perhaps they are unable to compete against other species in the area, such as the ubiquitous lodgepole pine.

Lodgepole may restrict the presence of Yellowstone sulfur buckwheat due to the wild buckwheat's apparent inability to tolerate much

shade. Most Yellowstone sulfur buckwheat plants are in full sunlight or in relatively open spots with only a few trees in the vicinity.

Wild buckweats are generally tolerant of some degree of disturbance. The environment in the geyser basins supports plants that can adapt to areas being disturbed by geothermal changes such as areas heating up or cooling down. Yellowstone sulfur buckwheat is quite capable of moving with changing conditions, as clearly demonstrated by its ability to spread into disturbed sites such as along the road prism near the interchange at Old Faithful.

One of the fascinating aspects of the wild buckweats in the thermal areas is that there are several taxa that appear superficially similar and thus it is easy to overlook the amount of diversity that is in plain view. On closer examination, all of these taxa are easily separated by typical variations in flower color, the inflorescence, and the shape and hairiness of the leaves, but they are also temporally separated.

The other bright yellow sulfur buckwheat in the area, *Eriogonum flavum* var. *piperi*, blooms early in the summer, well before Yellowstone wild buckwheat. The close relative, *Eriogonum umbellatum* var. *majus* with cream yellow flowers also blooms before Yellowstone sulfur wild buckwheat. These two taxa are considered members of the same species, but I have seen no sign of interbreeding or hybridization. The last wild buckwheat to begin blooming is Yellowstone sulfur buckwheat, mostly in July and early August, though I have seen plants in full bloom in early September, which is extraordinarily late for a native species in the park. Like many members of the genus, Yellowstone wild buckwheat has bright yellow flowers that dry on the inflorescences instead of falling off like most wildflowers, so the wild buckweats appear colorful long after the plants have ceased to bloom.

The wild buckweats are a notoriously difficult to identify and rapidly speciating North American group, chiefly from the western portion of the continent. Yellowstone wild buckwheat was first described scientifically from collections made by Per Axel Rydberg and Ernst A. Bessey from the Upper Geyser Basin on August 6, 1897. First identified as a specimen of *Eriogonum umbellatum* (Rydberg 1900), it was later elevation to species status by E.L. Greene,

a California expert who named it *Eriogonum rydbergii* in honor of one of the two original collectors (Greene 1902). Subsequently it was presumed to be just a minor variant in the widespread and variable *Eriogonum umbellatum* complex, not sufficiently different to warrant any attention. James L. Reveal, the *Eriogonum* expert, after examination of herbarium material and seeing the plants in Yellowstone, believes that it is a distinct variety and worthy of taxonomic recognition. He published it as a recognized taxon in the treatment of *Eriogonum* in the Flora of North America (FNA 2005).

The recognition of Yellowstone sulfur wild buckwheat is directing attention to finding out more about it. The first mission is to find out the exact distribution of this taxon by surveying all of the known locations. Parts of the Upper Geyser Basin have already been mapped and, in summer 2011, mapping was initiated around Madison and in the

geyser basins along the Firehole River. In the future, its life history needs to be elucidated along with genetic investigation of its status and relationship with other members of the *Eriogonum umbellatum* species complex.

Key to *Eriogonum umbellatum* varieties in Wyoming (based on Dorn 2001, FNA 2005)

Flowers bright yellow

1. Leaves tomentose beneath
 2. Leaves floccose to glabrous above var. *umbellatum*
 2. Leaves lanate to densely tomentose above var. *cladophorum*

1. Leaves glabrous or glabrate on both sides var. *aureum*
Flowers cream to white or pale yellow

3. Leaf blades generally about 2/3 as wide as long, oval to obovate, woody caudex branches erect or ascending var. *dichrocephalum*
3. Leaf blades often more elongate and narrower, woody caudex branches prostrate var. *majus*



Wildflower Walkabout in Rawlins

By Paul Taylor

Rawlins erupted in an early riot of color in February this year when 60-80 kids created a mural of the Rawlins environs, full of local wildflowers. Inspired by the Australian Aboriginal tradition of topographical land dot map paintings, the mural represents a map of about 50 x 100 miles, west from Red Desert and Rawlins uplift to the Medicine Bow Range in the east, south to Saratoga, and north to Seminoe Reservoir and the Ferris Mountains.

Wildflower Walkabout is a map painting featuring Wyoming wildflowers that may be seen in these areas. Many have uses for food and medicine. The project teaches about the plants and land where we and they live.

The featured wildflowers include (left to right):

- Prickly Pear Cactus
- Tansy Aster
- Wood Lily
- Skyrocket/Scarlet Gilia
- Evening Primrose
- Blowout Penstemon
- Blue Flax
- Nuttall's Violet
- Wild Rose
- Bitterroot
- Trillium
- Little Sunflower
- Blue Columbine
- Mariposa Segó Lily
- Wyoming Paintbrush
- Nuttall's Violet

It w

artist-in-residence Paul Taylor and produced by he, Kathy Neuman and the Rawlins Boys & Girls Clubs in partnership with Pam Thayer and the Rawlins Downtown Development Authority/ Main Street, to be placed in downtown Rawlins. It was painted over a two week period by Boys & Girls Club members in grades K-8 overseen by Taylor, Kathy Neuman, Shayan Keisel, Kylie Craig and Mark Rachuleta. Further information is posted

at:<http://www.paultaylor.ws/index.php/about/murals/> .

Don't Look Now, but We're Surrounded!

Portals to Plants Around the West

For those of you who have yet to make a grand slam of all herbaria in the region, or else work and play near state lines, the internet and online specimen databases are opening new horizons to the flora beyond our borders and across western North America. One-stop shopping for documented information about plant distributions in the Intermountain West (data from 12 herbaria in Arizona, California, Colorado, New Mexico, New York Botanical Garden, Utah, and Wyoming), the Pacific Northwest (data from 13 herbaria in Idaho, Montana, Oregon, Washington, Alaska, British Columbia, and the Yukon) and parts of Great Plains centered on western South Dakota (data from 16 herbaria including U.S. Forest Service and National Park Service herbaria) are now available.

The link to the Consortium of Intermountain Herbaria (<http://intermountainbiota.org>) in collaboration with the Southwestern Environmental Information Network, contains many features besides species searches, including map-based searches, high-resolution images of specimen sheets, descriptive pages linked to other on-line sources, and the ability to generate checklists by county or other criteria. The Consortium includes our Rocky Mountain Herbarium specimen database containing Wyoming specimens and beyond (also posted on-line: <http://www.rmh.uwyo.edu/>).

The link to the Consortium of Pacific Northwest Herbaria (<http://www.pnwherbaria.org/>) also contains many features besides species searches, including map-based searches, high-resolution images of specimen sheets, the ability to generate checklists by county or other criteria, and many options for filtering, displaying, and downloading data.

The link to the Black Hills State University Herbarium (<http://herbarium.bhsu.edu/>), as portal to its own accessions and those of 15 other herbaria,



focuses on species searches, includes the Rocky Mountain Herbarium specimen database, and has prospects for expanding in geographic scope in the Great Plains next year.

There is continual databasing and imaging work at many herbaria of neighboring states, as there is at Rocky Mountain Herbarium. For example, over 50,000 plant specimens housed in the Montana State University Herbarium are already on-line, and specimens at the University of Montana Herbarium will come on-line in the near future.

Being surrounded by a wealth of plant information is definitely a good thing. Three native plant society newsletter articles in adjoining states give the broader picture:

Barkworth, M. 2012. Opening the Region's Herbaria. *Sego Lily* 35(2): 6-9. Posted electronically at:

<http://www.unps.org/index.html>

Lavin, M. 2012. Herbaria Images Online: Major New Web Resources Available. *Kelseya* 25(3): 7. Posted electronically at:

<http://www.mtnativeplants.org/Home>

Legler, B. and D.C. Tank. In press. Digitizing Herbarium Specimens at the University of Idaho Stillinger Herbarium and the Consortium of Pacific Northwest Herbaria. *Sage Notes*. Will be posted electronically at:

<http://www.idahonativeplants.org/>

For the Moonwort-stricken

The newly-released 4th editions of *Colorado Flora: East & West Slopes* by W.A. Weber and R.C. Wittmann (2012) offer bonuses for botanists of adjoining states, including a complete *Botrychium* key to 21 taxa in the region, contributed by D.R. Farrar and S.J. Popovich (same regionwide content in both books). Each split in the key is illustrated, specimen images are included, and 7-state distribution is represented. Copies can be ordered from University Press of Colorado, book distributors; or Colorado NPS (<http://www.conps.org/Bookstore/index.shtml>); the latter for \$23 + \$3 shipping.

Growing Native Plants

Part 4. Tall Shrubs

By Robert Dorn

Tall shrubs are used mostly for their attractive flowers or fruits or for fall leaf color. Some are also used as part of a windbreak. A sampling of five species is treated here.

Acer glabrum, Rocky Mountain Maple, is slow growing reaching 15 feet high and as wide when mature. Rarely it can reach twice this height. It occurs naturally in all of our mountains except the Black Hills. The new twigs and buds are reddish and the leaves turn pale yellow to light reddish in fall. It tolerates shade or full sun but does best in partial shade. It needs well drained soil and regular moisture. It does not tolerate highly alkaline soils. It can be grown from seed planted outdoors in the fall. For spring planting the seed needs warm, moist stratification (68-86 degrees F) for 180 days followed by cold stratification for 180 days. Germination may be poor so plant extra seeds. It is also in the nursery trade.



Acer glabrum, Converse County

Cercocarpus ledifolius var. *ledifolius*, Curlleaf Mountainmahogany, is slow growing reaching 25 feet high and 15 feet wide when mature. It has narrow, leathery leaves that remain on the plant through the winter. It occurs naturally mostly on lower mountain slopes and rarely in the basins. There are three varieties in the state. The desert form, var. *intricatus*, is restricted to the area south of Rock Springs and seldom exceeds 6 feet high. It is very densely

branched and compact. The species prefers full sun and well drained soils. Be careful not to overwater. It is in the nursery trade and can be grown from seed after removing the feathery styles, scarifying, and cold stratifying for 90 days.



Cercocarpus ledifolius var. *ledifolius*,
Uintah County, Utah

Prunus americana, Wild Plum, is a fast growing shrub reaching 10 feet high and wide at maturity. Pruning the lower and side branches may stimulate it to grow to 20 feet or more. The plants often sucker to form a thicket. It occurs naturally in the foothills and plains in the eastern half of the state. It flowers profusely in early spring before the leaves appear. The flowers are white to cream. The fruits are edible, tart-sweet, and especially good for jelly. The skin tends to be rather sour so is best removed. Fruits will be much fewer than the number of flowers, and some fruits will drop before they are ripe, perhaps an energy conservation strategy. The leaves turn yellow or reddish in fall. It likes full sun or light shade, does best in moist to dry, well drained soil, and is tolerant of wind. It is in the nursery trade and can be grown from seed. Plant the seed in fall outside and barely cover with soil to allow some light exposure. Remove the fruit pulp and cold stratify for 120 days for spring planting. Conservation districts often offer this species to rural residents for windbreak planting.



Prunus americana, Goshen County

Prunus virginiana, Chokecherry, is grown for its attractive and aromatic flowers, for shelterbelts, and for the fruits which are used to make jelly or wine. It is slow growing and can reach 25 feet high at maturity. It suckers and forms dense thickets. It occurs naturally over most of the state in the plains and basins and to moderate elevations in the mountains. The white flowers appear in spring in dense, elongate clusters to 5 inches long. The fruit is



Sorbus scopulina, Clearwater County, Idaho

Sorbus scopulina, Mountainash, is slow growing reaching 12 feet high at maturity. It is grown for its attractive compound leaves and orange-red fruits. The white to cream, fragrant flowers in flat-topped clusters are also attractive. It occurs naturally in the mountains of the state. It likes moist, loamy, shady places but can grow in full sun if kept moist. It is in the nursery trade but not easy to find. It can be grown from seed that has the pulp removed and warm stratified (68-86 degrees F) for 115 days followed by 75 days cold stratification. Barely cover the seeds to allow some light exposure.



Prunus virginiana, Platte County

All in the Family (Continued from p. 1)

iflora (Callitrichaceae and Hippuridaceae, transferred to Plantaginaceae), and scattering of Wyoming's original scrophs (Table 1; next page). Look for full treatments in the upcoming Vol. 17 of the *Flora of North America*. BH

Table 1. New family assignments for genera originally included in Scrophulariaceae, Callitrichaceae, Hippuridaceae, Orobanchaceae, and Plantaginaceae, after Olmstead (2002) – listed on next page

Orobanchaceae (Broom-rape Family) *Castilleja* (Indian paintbrush)
Orobanche (Broom-rape)
Orthocarpus (Owl's clover)
Pedicularis (Lousewort)

Plantaginaceae (Plantain Family) *Agalinis* (Agalinis)
Bacopa (Water-hyssop)
Besseyia (Kittentail)
Callitriche (Water-starwort)
Chionophila (Snowlover)
Collinsia (Blue-eyed mary)
Cordylanthus (Bird beak)
Digitalis (Foxglove)
Gratiola (Hedge hyssop)
Hippuris (Mare's-tail)
Limosella (Mudwort)
Linaria (Toadflax)
Penstemon (Beardtongue)
Plantago (Plantain)
Synthesis (Synthesis)

Scrophulariaceae (Figwort Family) *Scrophularia* (Figwort)
Verbascum (Mullein)
Phrymaceae (Lopseed Family) *Mimulus* (Monkey flower)
Phyrma (Lopseed)

References

- Albach, D. C., H. M. Meudt and B. Oxelman. 2005. Piecing together the "new" Plantaginaceae. *Am. J. Bot* 92: 297-315.
Olmstead, R. G. 2002. Whatever happened to the Scrophulariaceae? *Fremontia* 30(2): 13-22.
Tank, D. C., J. M. Egger and R.G. Olmstead. 2009. Phylogenetic classification of Subtribe Castillejinae (Orobanchaceae). *Systematic Botany* 34(1): 182-197.

Wyoming Native Plant Society is a non-profit organization established in 1981 to encourage the appreciation and conservation of the native plants and plant communities of Wyoming. The Society promotes education and research through its newsletter, field trips, and annual student scholarship and small grants awards. Membership is open to individuals, families, or organizations. To join or renew, return this form to:

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

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P.O. Box 2500
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