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Coming Together in the Black Hills

(*Editor's note: The following article is a sneak preview of our 2017 Annual Meeting. It is excerpted from "Dakota Flora[1]" by David Ode, long-time state botanist in South Dakota, who will be our 2017 annual meeting speaker at events for Wyoming and South Dakota plant enthusiasts alike.*)

...The American pasqueflower (*Anemone patens; Pulsatilla patens*) became the first official symbol for South Dakota in 1903, when the legislature proclaimed it as the state's floral emblem. In addition to being the first official symbol, the pasqueflower has the reputation for being the first flower of spring. This prompted the legislature to endow our state flower with its own motto: "*I Lead.*"

„While pasqueflowers are no longer as plentiful as they once were, they are still one of the most common wildflowers in South Dakota, occurring on gravelly hills, buttes, and river bluffs throughout the state. ...Spring turkeys often fill their crops with pasqueflowers, and domestic and wild bees depend on the pollen to replenish their depleted winter stores of honey.

In his book "*A Sand County Almanac*", wildlife ecologist Aldo Leopold wrote, "The chance to find a pasqueflower is a right as inalienable as free speech." We should all work to guarantee that our children's grandchildren will have native prairies in which to find pasqueflowers one hundred years from now.

[1] ***Dakota Flora***, by David J. Ode, was recommended to Wyoming readers 10 years ago - *Castilleja* (2006); (http://www.wynps.org/newsletters/2006_10.pdf).

Left: American pasqueflower (*Anemone patens*). Photo by Charmaine Delmatier.

Additional information on pasqueflower is posted on the U.S. Forest Service website, Celebrating Wildflowers: https://www.fs.fed.us/wildflowers/ - go to "Plant of the Week" – pasqueflower information is under Pulsatilla patens.

In this issue:

WYNPS News

2017 Annual Meeting: ***Bound for the Black Hills!***

Plans for our 2017 Annual Meeting are highlighted in this issue. The full registration information, hike details and map will be posted later in March and reprinted in the May issue. The event is being held jointly with the Great Plains Native Plant Society, and the three days of field trips will run on both sides of the stateline (see the Announcement, next page).

Our informal "banquet" will be at the covered picnic shelter at the Devils Tower National Monument campground, prepared by Four Seasons, a Sundance wholesome food caterer. The amphitheater nearby will be venue for our evening speaker, David Ode, of Pierre, SD; both amphitheater and shelter are right beside the campground where we have two group sites already reserved. If you prefer a USFS campground, the nearest is Reuter Campground.

An exciting Friday night kick-off moonlight walk will be led by Black Hills Forest Service Botanist, Rylan Sprague, with a plant list in the Lakota language and ethnobotanical importance of plants we'll see that night. You can also expect a botanist's delight at Dugout Gulch with Beth Burkhart, at Englewood Springs Botanical Area with Rylan Sprague, at McIntosh Fen Botanical Area with Kelly Warnke, and at Warren Peaks with Nick Drozda. There will also be a gentle hike along Joyner Ridge trail at the base of Devils Tower led by National Monument personnel. Look for full details and registration information soon!

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New Members: Please welcome the following new members to WYNPS: Joyce Batson, Jackson; Mary Lohuis, Jackson; Suzanne Niles, Jackson; Lindsey Sanders, Jackson, Sue Summers, Pinedale; and Susan Tweit, Cody.

Treasurer's Report: Balance as of 22 Feb 2017: Scholarship = $2,280.50; General = $7,083.02; Total = $9,363.52.

The Next Deadline: Please send articles and hike announcements for the May issue by 15 April. Ideas are welcome any time!

Message from the President:

Thank you for this great opportunity to be with friends and colleagues, and to share our common passion; plants of this world, specifically Wyoming. When I was asked to be President, I immediately went down memory lane and revisited moments in time with all the incredible botanists I have had the privilege of being with for the past 25-30 years.

It has been a record-breaking snowfall in many areas of our state, and I'm anticipating the wildflowers will be outstanding, and perhaps we'll see some plant species that have rarely been seen. Let's make this a great year of appreciation, and I truly look forward to sharing it with you!

~Charmaine Delmatier, President

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Contributors to this Issue: Charmaine Delmatier, Robert Dorn, Bonnie Heidel, Dorothy Tuthill.

Announcing the Wyoming and Great Plains Native Plant Societies' Weekend of Extraordinary Black Hills Hikes and Destinations[2]

June 9-11, 2017 – *times and details to be announced*

Check-in Friday afternoon at the Crook County Courthouse Community Room, 309 Cleveland St. in Sundance

Friday Night, June 9:

We begin the weekend with a moonlight walk by full moon!

Inyan Kara Hill, native sacred site where the prairies and mountains meet, 25 min east of Sundance
By Rylan Sprague, Botanist for Northern Hills Ranger District, Black Hills NF

Saturday, June 10:

Half day:
Joyner Ridge Trail, gentle hike at the base of Devils Tower
By Rene Ohms (or staff), Chief of Resource Management, Devils Tower National Monument

Full Day:
Englewood Springs Botanical Area, site of the most orchid species on the Forest
By Rylan Sprague, Botanist for Northern Hills Ranger District, Black Hill NF (~0.5 miles south of Deadwood)

Warren Peaks, montane grassland with Botrychiums in the forecast! (Driving tour and limited walk)
By Nick Drozda, Botanist for Bear Lodge Ranger District, Black Hills NF

"Informal banquet" dinner at Devils Tower National Monument covered picnic shelter
[The $15 entry fee to Devils Tower NM is good for 1-7 days]
Evening program by David Ode, author

Sunday, June 12:

Early morning: WYNPS annual meeting – *light breakfast provided!*

Full Day:
McIntosh Fen Botanical Area, home to South Dakota's rare willows
By Kelly Warnke, Botanist for Mystic Ranger District, Black Hills NF

Dugout Gulch, relic boreal plants nestled under beautiful paper birch
By Beth Burkhart, Retired Botanist, Great Plains NPS and WYNPS Past-President

LODGING
Devils Tower campground: https://www.nps.gov/deto/planyourvisit/campgrounds.htm [Group reservations have been made by WYNPS; posted registration information will include group camping reservation options.]
Forest Service campground: https://www.fs.usda.gov/detail/blackhills/about-forest/districts
[Nearest is the Reuter Campground north of Sundance.]
Check visitor centers to get other options for camping or motels in and near Sundance.

[2] Times, detailed descriptions, and meeting places will be announced later. Look for registration info posted on the website soon - see www.wynps.org for those wishing to sign up via the internet. There will also be a printable registration version on the website site for those who wish to pay by check, and copied in the May newsletter.

Growing Native Plants

Part 23. Medium Height Shrubs

By Robert Dorn

To see these plants in color, go to the Society website (www.wynps.org.)

Elaeagnus commutata, Silverberry, grows to 6 feet or more high and forms thickets. The leaves are silvery-scurfy and to 3 inches long. The flowers lack petals but have pale yellow sepals to 0.5 inch long and are in clusters of 1 to 3 in the leaf axils. They are fragrant and attract many small insect pollinators. They appear in June and July. The fruits are silvery drupes to 0.5 inch across and are eaten by birds. The plants occur naturally along streams, in swales, and on moist slopes in the mountains, plains, and basins mostly in the western half of the state. They prefer full sun or partial shade and moist soil. They are tolerant of wind, cold, alkaline soils, clay soils, and drought. They may require periodic pruning to control their spread. They can be grown from semiripe stem cuttings treated with rooting hormone or from seed that is cold stratified for 60 to 90 days, then soaked in warm water for 24 hours, and planted in pots that are placed in the dark until seedlings emerge. It is also in the nursery trade.

Elaeagnus commutata, Sublette County

Jamesia americana, Cliffbush, grows to 6 feet high and 3 feet wide. The leaves are opposite, to 3 inches long and 2 inches wide. The flowers are white, to .75 inch across, and in clusters of 5 to 20 or more at the branch tips. They appear from late May to September depending on elevation. The plants occur naturally in our southeast mountains and foothills on open rocky slopes, on cliffs, and in canyons where there is extra runoff. They prefer partial shade and moist, well drained soils but will do well in full sun if kept moist. It can be grown from softwood or greenwood cuttings, from seed that is cold stratified for 30 to 60 days before spring planting, or from seed sown outdoors in fall. It is also in the nursery trade.

Jamesia americana, Albany County

Rosa woodsii, Wood Rose, is a thorny shrub with long, slender canes to 4 feet or more high. It spreads from rhizomes and can form dense, thorny thickets. The leaves are pinnately compound with 5 to 9 leaflets each to 2 inches long. The flowers are pale to deep rose-pink, to 2 inches across, and solitary to few together at the branch tips. They appear from May to July. The fruits (hips) are red to purple or sometimes nearly black and are eaten by birds. The plants occur naturally in open woods, ravines, thickets, and along streams in the mountains, plains, basins, and valleys. They prefer full sun to partial shade where moist. They tolerate poor soils, cold, and wind. It can be aggressive due to its spread from rhizomes. It can be grown from rhizome cuttings or from seed which may need 90 days cold stratification. It is also in the nursery trade.

Rosa woodsii, Goshen County

Rubus deliciosus, Rocky Mountain Raspberry, grows to 10 feet high and 8 feet wide often forming a vase shape with long arching branches. The plants are thornless with shallowly lobed leaves to 2 inches long and wide which turn yellow in fall. The flowers are white, to 2.5 inches across, solitary at the tips of short branchlets, but scattered over the entire bush. They appear from May to July and may flower for a month or more. The fruits are red to light purple, to 1 inch across, and eaten by birds. The specific epithet "deliciosus" suggests that they are delicious but they are actually somewhat dry and tasteless. When discovered in 1820, the members of the Long Expedition probably thought they were delicious

Rubus deliciosus, Fremont County, Colorado

after their long journey on field rations. The plants occur naturally on moist to dry, rocky slopes in our southeast mountains and foothills. They prefer full sun or light shade and moist or dryish, well drained soils. They are wind and drought tolerant and best when pruned annually to remove old canes to promote new growth. It can be grown from rootstock cuttings and is in the nursery trade.

Shepherdia argentea, Silver Buffaloberry, grows to 10 feet high and not quite as wide. It is thorny and spreads from rhizomes forming dense thickets. The leaves are opposite, silvery, narrow, and to 2 inches long. The flowers are inconspicuous, yellowish, and appear before the leaves. They are fragrant and attract many insect pollinators when they appear from April to June. The fruit is a tart, red berry, eaten by birds, and sometimes used to make jelly. Male and female plants are necessary to get berries. It can be pruned to form a small tree. The plants occur naturally along streams and other moist places in the plains, basins, and valleys. They prefer full sun or partial shade and moist soils. They tolerate cold, drought, and moderately alkaline or clayey soils. It can be grown from rhizome cuttings or greenwood cuttings or from seed planted outside in fall or cold stratified for 90 days for spring planting. It is also in the nursery trade including a cultivar with yellow fruit.

Shepherdia argentea, Platte County

Water-use efficiency techniques and trade-offs in two dominant Wyoming conifer species

By Jiemin Guo and Dave Williams
Department of Botany, University of Wyoming

Water availability is one of the most limiting factors of plant growth worldwide. Wyoming is in a semiarid region with winter snowfall followed by an extended dry period when plants often experience moderate to severe drought stress during the short growing season. Consequently, their survival and growth hinges on efficiency in use of water relative to productivity, which is known as water-use efficiency (WUE). My research, sponsored by the Wyoming Native Plant Society, investigated how two dominant conifer species, *Pinus contorta* (lodgepole pine) and *Picea engelmannii* (Engelmann spruce), regulate the trade-off between CO2 uptake and water loss at two different hillslope positions in the Libby Creek drainage of the Snowy Range Mountains in SE Wyoming over the summer of 2015. Trees of both species were compared between those on the upper and lower hillslopes. Those on upper slopes experience more severe drought compared to those on the lower hillslope that receive runoff and sub-surface flow from above.

There are two key parts to overall water use efficiency (WUE):

1. Direct transfer of CO2 in and water out through stomata, and
2. Diffuse transfer of them both through internal tissues of leaves. [The internal layer in leaves is called the mesophyll.]

Plants lose water during the process of carbon uptake, which is tightly regulated by stomata that operate like little valves on the leaf surface. Stomata regulate carbon-water balance which in turn affects photosynthesis and transpiration. The exchange and regulation of CO2 uptake and water loss at the stomatal level is well described (Farquhar and Richards 1984, Evans and Von Caemmerer 1996). Low stomatal conductance limits photosynthesis and at the same time conserves water loss. Yet, the photosynthetic rate in in most species of C3 plants, including conifers, is limited by CO2 concentration at the sites of key chemical reactions inside the chloroplast (Buckley et al 1999). After CO2 diffuses into intercellular airspaces through stomata, it must reach the chloroplast. This diffusion pathway inside leaves is termed mesophyll conductance (g_m) and is poorly understood (Evans and von Caemmerer 1996). It can significantly influence the rate of photosynthesis. Unlike stomatal conductance, increases in mesophyll conductance will increase the CO2 concentration at the chloroplast without losing water to the atmosphere often comparable to levels of stomatal conductance, though it varies among species and across environmental conditions (Warren 2008). Therefore, it is important to learn how mesophyll conductance varies and how it responds to water limitation and to what degree it limits photosynthesis and water-use efficiency (Flexas et al. 2008, Flexas et al. 2013).

I found that mesophyll conductance (g_m) increased at both sites over the study period in response to the dry conditions at the end of the growing season (seasonal dry-down), while stomatal conductance (g_s) decreased for the site that experienced more severe drought and was correlated with photosynthetic rate (A) and water use efficiency (WUE). In the lower hillslope position, where water is less limiting, photosynthetic rate (A), g_s and g_m increased during the growing season, but no significant differences were found between two species (Figure 1). At the upper hillslope position, g_s declined during the growing season as soil moisture availability declined, but photosynthetic rate (A) increased. Increased g_m was significantly higher in *Picea engelmannii* than in *Pinus contorta* at the upper hillslope position under greatest stress. Water-use efficiency was not significantly different between two species at both sites and was positively correlated with g_m. These results suggest dynamic responses of mesophyll conductance to drought stress have important implications for understanding leaf water use and carbon uptake. The increase in mesophyll conductance compensates in part for reduced stomata conductance to enhance photosynthesis rate and simultaneously improve water-use efficiency under drought conditions in conifers.

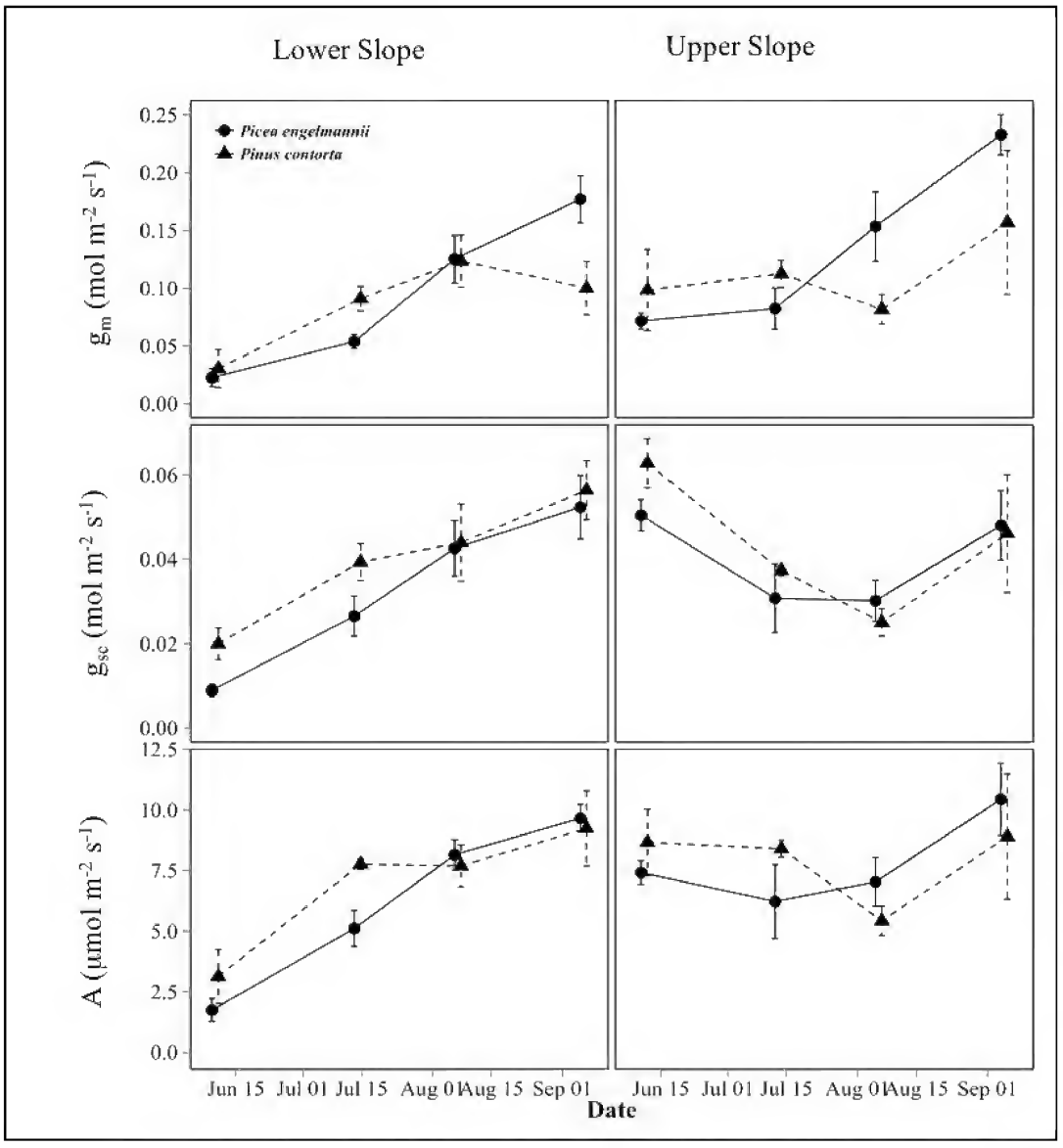

Figure 1. Average mesophyll conductance, stomatal conductance, photosynthesis and predawn water potential measured at two sites over time. Values are mean standard errors, n=4.

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(Editor's note: Jiemen Guo is the 2015 Recipient of the Markow Scholarship, awarded by Wyoming Native Plant Society.)

BEE Aware of Neonicotinoides

By Sophie Osborn

(*Reprinted from Laramie Audubon Society Newsletter 17(2) of April 2015*)

In July 2015, the U.S. Fish and Wildlife Service boldly issued a surprising national policy decision to phase out the use of neonicotinoids – a class of persistent pesticides that has been shown to harm bees and other pollinators – on national wildlife refuges by January 2016.

Welcomed initially because of their lower acute toxicity to vertebrates than the pesticides that preceded them, neonicotinoids (or "neonics", as they are often called) have become the world's most widely used insecticides and have elicited growing concern because of their persistence in the environment, their high solubility in water, and the ease with which they can contaminate surface and groundwater. The Environmental Protection Agency has approved approximately 600 of these products, despite warnings and concerns expressed by its own toxicologists about potential environmental effects.

Neonicotinoides are systemic insecticides whose water solubility allows them to be absorbed by the leaves and roots of plants. As a result, neonics can be found in the nectar and pollen of plants grown from treated seeds. More than 140 of our crops are grown from seeds that are pretreated with neonicotinoids, including virtually all corn, and a large percentage of soy, wheat, and canola seeds planted in the U.S.

Neonics are potent neurotoxins that have come under increasing scrutiny because of their high toxicity to insect pollinators like honeybees – studies have linked the use of several neonicotinoid pesticides with the widespread collapse of honeybee colonies – and the threat they pose to aquatic life. Although neonics are deadliest to insects, birds, too, are susceptible to these poisons. A single corn seed treated with imidacloprid – the oldest and most widely used of the neonics – can kill a bird the size of a blue jay. And daily consumption of one-tenth of a treated seed during the breeding season can disrupt a songbird's ability to reproduce.

But as often seems to be the case with environmental poisons, it is their more insidious effects that ultimately may become the overarching concern. Countless birds depend on insects whether year-round or during the breeding season, when their fast-growing young need large infusions of protein to develop into the winged creatures whose flight and navigational abilities seem almost supernatural to us. So it shouldn't be surprising if the prevalence of insecticides that target the invertebrates on which so many birds depend leads to declining populations of insectivorous birds. Recent research in the Netherlands has found a close correlation between declining populations of common insectivorous farmland birds and the presence of neonicotinoids that have run off terrestrial landscapes and contaminated lakes and ponds.

Agricultural uses of neonicotinoids are not the only concern. In 2013, the Pesticide Research Institute and the nonprofit organization Friends of the Earth U.S. found that about half of the bee-attractive nursery plants sold at large retail garden centers such as Lowe's, Walmart, and Home Depot contained neonicotinoids at levels that either could kill pollinating bees by attacking their nervous system or cause sublethal effects, such as impairing the bees' ability to forage and navigate, and suppressing their immune systems. Succumbing to public pressure from conservationists, Lowe's pledged to phase out neonicotinoids from its stores.

In 2013, the European Union implemented a two-year ban on the use of three neonicotinoides on flowering crops such as corn and sunflowers, because of growing concerns regarding the "unacceptable hazard" neonicotinoids appear to pose for bees. However, the U.S. has been slower to address these concerns, making the U.S. Fish and Wildlife Service's policy decision all the more impressive. We can help bolster efforts to limit the widespread use of neonics by avoiding the use of these insecticides in our own gardens, by purchasing organic plants or growing them from untreated seeds, and by asking nursery managers to provide plants that are free of neonicotinoids. Because, after all, when we're trying to create backyard habitat for the birds and pollinators that brighten our summer days, the last thing we want is to harm the very creatures we're trying to help.

Botanist's Bookshelf –
Holmgren, Noel H. and Patricia K. 2017. ***Intermountain Flora: Vascular Plants of the Intermountain West, U.S. A. Volume 7. Potpourri: Keys, History, Authors, Artists, Collectors, Beardtongues, Glossary, Indices.*** New York Botanical Garden, Bronx, New York. 303 pp. (Hardcover). (ISBN 978-0-89327-546-4) $119 + shipping. [The entire series is currently available for $647+shipping.]

Trending toward Timeless

By Bonnie Heidel

Intermountain bristlecone pine (*Pinus longaeva*) trees are the oldest living individual plants on earth and adorn the cover of Volume 1 of the *Intermountain Flora* (IMF; Cronquist et al. 1972). They are timeless sentinels that reappear on the cover of the final IMF volume (Volume 7) printed this year (2017) as though to bookmark a long, long project that has been 80 years in the making. The final volume adds a stamp of timelessness.

The IMF is a nine-part series (Volumes 1, 2a, 2b, 3a, 3b, 4, 5, 6 and now 7). IMF volumes have already been called the ". . . standard against which other floristic works are judged." (Rhodora). They cover the vascular flora of the Intermountain Region, an area encompassing "... essentially the dryland region (approximately 267,000 sq. miles) between the Sierra Nevada on the west and the Rocky Mountains on the east, and between the moister country of the Pacific Northwest on the north, and the warmer drylands (often characterized by *Larrea*) to the south. It is the core of the region in which the foothills and lowlands are largely dominated by sagebrush (*Artemisia tridentata* Nutt., sens. lat.) and chenopodiaceous genera such as *Atriplex*. Each volume provides reliable keys, thorough descriptions, and plentiful illustrations for the flora of this region." (New York Botanic Garden Press). They include an overview of the vegetation, geology, phytogeography and botanical history of the Intermountain region in Volume 1.

Every flora is out-of-date on the day it is printed. Authors Noel and Patricia Holmgren make an end-run around finitude in the culminating volume of the IMF by including many things they might have wanted in the series over the earlier 45 years. The final volume trends toward timeless in a novel treatise that is at once both foundational reference and flourish, cross-referencing after-the-fact and forward-thinking in perspective, terse and technical as floras ought be, and personal in telling about the original vision of Bassett Maguire of an *Intermountain Flora Project* to fill a gaping hole in western floras, as passed on to his botanical protégés and grand-protégés. The authors present a history of the *Intermountain Flora Project* and personalities involved, including a biography of Maguire and of all IMF principal authors and botanical illustrators.

This flora is presented as undertaking with a robust project timeline and biographies. The authors didn't stop with introducing the core team but profiled prominent plant collectors centered in the Intermountain West. Other botanists contributing to western floras are featured in a collage of photographs plus a myriad of fastidious acknowledgements. The gallery of botanist images date from early etchings of the 1800's to photographs of a couple years ago, providing a glimpse of 353 personalities over time that is also allusion to the breadth of botanical work represented in the IMF, lending a face (actually, many faces) to the years, miles and perseverance that culminated in the IMF and other western floras. Generations of Wyoming botanists are prominently featured, from Aven Nelson to Robert Dorn, Ron Hartman and Burrell "Ernie" Nelson. The collage will convince any casual observer that botanists are an endearing, diverse and eclectic part of the race.

Volume 7 was originally conceived of as a supplemental aid to using the earlier volumes. It includes a master key to families and full species-level index to all prior volumes by both scientific and common names. It also provides a glossary that is almost 50% longer than the original one, and author bylines to cite for all family treatments. Furthermore, it provides a showcase for taxonomic changes wrought over the decades, as exemplified in the *Penstemon* genus. New Intermountain keys to the *Penstemon* genus (artificial and technical) are presented, accompanied by full descriptions and illustrations for each of the 23 species added to or differing from the 1984 treatment. (Six are in Wyoming!)

In short, IMF belongs on the shelves of every herbarium and major educational institutions of the region and every wide-ranging botanist of the same.

Prior IMF volumes can be used without Volume 7, but are easier to use with it. The volume is also valuable for taxonomic research. Last but not least, it offers botanical stories for novice and pro alike.

"Potpourri" is the nonstandard term used for this IMF volume rather than "Supplement." Perhaps it refers to the loose aggregate of chapters: keys to families, authorship and citation conventions for all family treatments in prior IMF volumes, history of the *Intermountain Flora Project*, biographies of the core writing and illustrating teams, plant collector profiles, the *Penstemon* chapter, and geographic boundaries of the IMF. But it is far more than a reference. Holmgrens transformed a wrap-up publication into an unprecedented chronicle and testimony to botanical camaraderie, an inspiration for new botanists and a landmark to celebrate completion.

Reference

Cronquist, A., A. H. Holmgren, N. H. Holmgren, and J. L. Reveal. 1972. *Intermountain Flora; Vascular Plants of the Intermountain West, U.S.A. Volume 1: Geological and Botanical History of the Region, its Plant Geography and a Glossary. Vascular Cryptogams and the Gymnosperms.* Hafner Publishing Company, New York, NY.

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, annual student scholarship and small grants awards. Membership is open to individuals, families, or organizations. To join or renew, please return this form to:

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Membership

[ ] WYNPS annual membership: $10.00

[ ] WYNPS annual membership + scholarship support: $20.00 ($10.00 for membership and $10.00 for Scholarship fund)

[ ] WYNPS Lifetime membership: $300 ($150 for membership and $150 for Scholarship fund)

[ ] Sublette Chapter annual membership: $5.00

[ ] Teton Chapter annual membership: $5.00

Total enclosed:_____ THANK YOU!

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