

Newsletter of the Idaho Native Plant Society • Promoting Interest in Idaho's Native Flora

The University of Idaho Arboretum & Botanical Garden

By Paul Warnick, Arboretum Horticulturist/Superintendent

The University of Idaho Arboretum & Botanical Garden is a 45-acre site on the southwest corner of the UI campus with a collection of over 18,000 documented plants from over 2900 distinct taxa. Most of the site is divided into four geographic areas: Asia, Europe, Eastern North America and Western North America, with the south end of the site designated for Display Gardens. Plants are planted based on where they are originally native within the geographical sections.

Like most things, a whole series of amazing things had to happen for the Arboretum to exist as we know it today. These started back in the mid-1970s when a group of professors from various colleges on campus met and decided to try to address the problem of 'a lack of diversity in the plantings on campus' (keep in mind that this was 40 years ago, before 'diversity' became the common buzzword it is today). They formed a committee which somehow arrived at the conclusion that the solution was to create a new arboretum. They took this proposal to the University President, Ernest Hartung, and as he was a 'plant guy' to some extent, he supported the idea and told the committee to go find a place for it.

The top third or so of the present site had been University property for a long time. Originally it had been used for fruit tree research; but as fruit production moved to areas with irrigated agriculture, the research moved with it. The space was being used as the driving range for the adjacent golf course when the Arboretum proposal was started. The bottom two thirds of the site had been a private farm and had recently been given to the University, and the University had no immediate plans for development. A memo was drafted proposing the plan and asking for objections. The only objection that was raised was brought by the Facilities Department, asking 'How are we going to maintain it?' (a question that hasn't really been answered yet...).

The next amazing thing was that about that time the UI Foundation was being formed to support donations to the University. They were looking for a project to support and settled on the Arboretum. They were able to raise enough money to hire a landscape architecture firm to do a master plan. That was a two-year process, beginning in 1978, which resulted in a plan that was approved by the Board of Regents in 1980. Like many master plans, the site today has very little resemblance to what was envisioned; but one major component has been followed, which is the geographic basis of the plantings. On Easter Sunday 1982, a group of volunteers from the Moscow Rotary club planted the first trees on the site. They are a group of grafted Japanese red pines and some older cultivars of flowering crabapples planted in the northwest ...Continued on Page 3

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Letter from the President

For the past five years, Michael Mancuso has served us faithfully as editor for our society's Sage Notes. I want to personally thank him for his willingness to serve our organization and for providing stimulating education and information for our membership. In the previous issue, I was intrigued to read about progress on the GLORIA project (Global Observation Research Initiative in Alpine Environments), a worldwide project to monitor the effects of climate change and human intervention on high-elevation plant species. Idaho now has four mountains located in the central part of the state designated as GLORIA peaks. I was fascinated by the article on MacFarlane's four-o'clock, an Idaho endangered species, published in the June 2019 issue. Other articles I have enjoyed include Michael Ottenlips discussion of Lomatium taxonomy in the March 2019 issue, Steven Rust's article on Tweedy's reedgrass in the December 2017 issue, and Janice Hill's notes on Spaulding's catchfly in the September 2017 issue, just to name a few. I also find interest in accounts of the annual meetings and great satisfaction in the reports regarding our society-supported conservation projects. Although many talented authors have shared their knowledge in Sage Notes, it takes a diligent editor to publish the information in a format that is usable by our membership. Michael has filled this role admirably. We will continue to see Michael serving in other INPS roles as he takes on new challenges. But we will miss his personal touch on the Sage Notes publication process.

Just a note: given Michael's resignation as editor, we have need for a new *Sage Notes* editor. This is a chance to provide truly meaningful service to our beloved INPS. Please contact me if you are willing to serve in this capacity or wish to know what the job entails. Write me at slove@uidaho.edu

Stephen Love INPS President



Dwarf mistletoe (Arceuthobium americanum) on conifer branch. Illustration by Karie Pappani. Photo reference: Charles Webber, California Academy of Science.

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Fall season colors at the Arboretum. Photo by Paul Warnick.

corner of the site. Today they form the overstory above the national *Hosta* display garden. Those trees were watered by volunteers who carried buckets of water from the golf course for several years until irrigation was installed on the site and nearly all those trees are still alive today.

Irrigation in the Arboretum is another of the amazing things that happened to allow the Arboretum to exist. Back in the 1980s the University began using re-claimed (gray water or treated sewage) water for irrigation. This was very forward thinking at that time, and they not only developed the idea, they installed enough infrastructure that there was water available to develop the Arboretum site. That re-claimed water is the only way that we can have green grass in the summer, and a majority of the collection probably would not survive for long without it.

In 1987, Dr. Richard Naskali, a Botany professor and one of the original faculty committee members, was appointed Arboretum Director where he served until his retirement in 2003. When he was appointed, he was given an annual budget but that money came with the restriction that it could only be used for maintenance, it could not be spent to develop the site. That resulted in the most amazing fact about the Arboretum, that it has been entirely developed with private donations, most of which were relatively small amounts. There was never a large pot of money to begin development, it was entirely developed in 'baby steps' with small donations. I was hired in 2000 as the Arboretum Horticulturist, a second fulltime employee, and worked with Dr. Naskali until his retirement. His position was eliminated in budget cuts at that time, and the Arboretum was back to one full-time employee again, where it has remained.

When I started in 2000, the collections consisted of just over 2700 documented plants, all of which were woody trees and shrubs. Today the collections include 5880 woody plants along with over 12,000 herbaceous plants. Most woody plants are in the geographic sections of the Arboretum, whereas the herbaceous plants are primarily in the display garden section at the south end. The xeriscape demonstration garden probably contains the greatest concentration of native plants, including a section on the east side of the gravel road devoted entirely to plants native to Idaho. Since quaking aspen are native in both northern and southern Idaho, there is a grove of them in the middle of the section. All plants north of the aspen are native to northern Idaho and all plants south are native to southern Idaho. It includes a small section of wild collected Palouse Prairie native plants, as well as various buckwheat species, some successfully domesticated Indian paintbrush (growing for 4 years), and some rarer plants such as McFarlane's fouro'clock and Jessica's aster.

The Arboretum is open daylight hours throughout the year (roads and trails are not maintained during the winter) with free admission. There is a mile and a half gravel loop road through the site, along with several trails leading to spectacular views of the surrounding Palouse



Native plants of southern Idaho section of the Arboretum. Photo by Paul Warnick.

landscape. Free parking is available at the south end, 1200 W Palouse River Drive, and limited spaces in the golf course parking lot at the north end on Nez Perce Drive. There is a porta-potti restroom at the barn at the south end and public restrooms are available in the golf course clubhouse at the north end. To protect the wildlife and plantings, no pets are allowed. And because of the reclaimed water ,there is no drinking water available on site. For more information, the website is:

https://www.uidaho.edu/infrastructure/facilities/arboretum •

Naming the Dr. Richard J. Naskali Asian Section at the University of Idaho Arboretum & Botanical Garden

By Paul Warnick, Arboretum Horticulturist/Superintendent

Many INPS members will remember Dr. Richard Naskali, either as a botany professor at the University of Idaho; or, in his later role as Director of the UI Arboretum and Botanical Garden.



Entrance to the Dr. Richard J. Naskali Asian section at the arboretum. Photo by Paul Warnick.

The Idaho State Board of Education approved a motion at their October 2018 meeting to name the Asian section of the Arboretum to honor Dr. Richard J. Naskali for his work to develop the Arboretum as the first Arboretum employee. Dr. Naskali was one of the faculty members on the committee that came up with the idea of starting a new Arboretum back in the mid 1970s. He worked as a volunteer during the early years of development, starting with the first tree plantings in 1982. He was appointed Arboretum Director in 1987, the role he held until his retirement in 2003. Using only donated funds, he was able to establish the foundations of the collections you see today, with a wide array of trees and shrubs planted in the four geographic regions designated in the original master plan. Dr. Naskali died in September 2018; but prior to his passing he was asked which section of the Arboretum he would choose to be named in his honor, and he chose the Asian section. He always had an affinity for Asian plants and gardens, and a centerpiece of his personal garden was an authentic, carved granite Chinese garden lantern. The lantern has Chinese symbols carved on each of the four sides that represent the four seasons, spring, summer, fall and winter. He has asked if that lantern could be installed somewhere in the Arboretum.

Once the decision was made to name the Asian section for Dr. Naskali, the challenge became how to do that in an appropriate way to recognize his efforts. Usually when a building or site is named for someone, a sign would be mounted on the front door or front wall; but the Asian section really does not have a 'front' door. There are two main entries at the top of the Arboretum; but they also serve as the main entries to the entire site. I could not come up with a way to say that one is entering the Dr. Richard J. Naskali Asian Section—and also the entire University of Idaho Arboretum. There are also two entries coming from the south end of the Arboretum; but putting any kind of signage there seemed like recognizing the back door. So, I looked around and decided to create a new front door to the Asian section, beside the existing information kiosk, looking down the Arboretum valley.

I have always admired Asian moon gates in other gardens. They come in a huge variety of sizes and styles; but all of them consist of a circular opening, usually framing a distinctive view within the garden. I thought that would be an appropriate way to create the new entry and incorporating Dr. Naskali's Asian lantern seemed like a good fit as well. The lantern nicely matched the white granite rocks in the Vettrus Gathering Place project that we had installed last year across the road from the kiosk, so adding another granite boulder engraved with the name, and including an interpretive sign to explain Dr. Naskali's role, was an easy way to tie the projects together.

Drs. Sarah and Torrey Lawrence are the executors of Dr. Naskali's estate. They liked the concept; but Sarah was concerned that adding the entrance made that part



Dedication boulder for Dr. Richard J. Naskali at the arboretum. Photo by Terry Gray.

of the Arboretum awfully busy, with the Vettrus project, the kiosk, and a granite bench all very close together. After discussing several options (including moving the kiosk), Sarah suggested adding a set of rock steps like the Vettrus project to the side of the kiosk, leading down to the moon gate. I agreed that made a great addition and proceeded to take it to the University administrators for their approval. Again, they liked the concept; but Brian Johnson, Vice President of Facilities, suggested that we hadn't gone quite far enough. He suggested completely removing the existing pavers and retaining wall around the kiosk and replacing it all with boulders and flat stones to match the Vettrus project across the road. All of the people involved liked the very simple design for the moon gate of a free-standing steel circle. Mundy's Machine Shop in Moscow was able to fabricate the gate from corten steel. That is a product that is designed for the surface to rust, that essentially forms a protective barrier that will not oxidize further and does not require paint.

The project was funded with equal shares from Dr. Naskali's estate, University funds, and from Arboretum Associates funds from the annual plant sale. It was com-



Renovated kiosk near the entrance to the Asian section. Photo by Paul Warnick.

pleted on schedule and under budget (how often do you see those words?) and I believe successfully honors Dr. Naskali's important role in the development of the Arboretum. A dedication ceremony was held on September 26, and Dr. Torrey Lawrence and Joy Fisher spoke, recognizing Dr. Naskali's efforts, and a ribbon was cut to open the gate. •

Native Plants Create Winter Habitat

By Peggy Faith, Pahove Chapter

In recent weeks, as we have been doing fall garden clean-ups, I am reminded of the importance of leaving some duff and other native plant material for hibernating pollinators and other native invertebrates. Here are some things to look for as you choose how much to pack into the leaf bags or compost pile.

Many people leave their ornamental grasses whole for "winter interest." Another reason is winter habitat. While cleaning up around a Great Basin wildrye (*Leymus cinereus*), we dislodged two little native ladybugs. As we



Ladybugs on Great Basin wildrye. Photo by Ivy Shay.

tle native ladybugs. As we all know, ladybugs have a tremendous appetite for aphids. So, I tucked the ladybugs back under the grass and am hoping to see them emerge ravenous next spring. Also, on the stems of the grass I found holes that turned out to be habitat for a moth cater-

pillar. My recommendation is to not cut down your tall grasses until March when the temperatures are warm enough for the invertebrates to be more active, or if you do cut them down, place the stems where they can stay until March before being composted. Take care when doing your pruning as well. I found a twig with a curious scaly pattern on it. One might think it



is a disease or some pest and snip it off to get rid of it. Well these tiny surfboard-shaped eggs are that of the katydid. Katydids do chew on our plants a bit, but won't do a significant amount of damage.

Kadydid eggs on a twig. Photo by Peggy Faith.

More importantly they are

a wonderful food source for birds and their chicks. Another insect we may not think so highly of, but which has a place in food webs, can be found in the duff. On one of our warmer November days I found a native species of stink

bug climbing on some sagebrush. How cute! I am tempted to use a picture of it as my holiday card! So do look around as you work on your garden clean-up, and be aware of leaving some winter habitat provided by your native plants! •



Stink bug on sagebrush. Photo by Peggy Faith.

MacFarlane's Four-o'clock Population Restablishment Efforts at Lower Otto Creek and Lucile Caves Conservation Areas in Idaho

By Lauren Pfund, Natural Resource Specialist, BLM Cottonwood Field Office, White Pine Chapter Member

We are proud to announce the first-ever reintroduction, to the wild, of MacFarlane's four-o'clock (*Mirabilis macfarlanei*) plants grown from seed. The planting rep-

resents the longawaited culmination of years of partnership, coordination, and planning between many dedicated individuals and across multiple agencies and disciplines. Mac-



MacFarlane's four-o'clock flowers. Photo by Craig Johnson.

Farlane's four-o'clock is a federally-listed Threatened species endemic to portions of the Snake, Salmon, and Imnaha river canyons in west-central Idaho and adjacent northeastern Oregon. If you happened to read the June 2019 issue of *Sage Notes*, you may recall Karen Colson's summary of ongoing restoration activities for MacFarlane's four-o'clock. She described the past successful transplant of *Mirabilis* rhizomes to two BLM conservation areas within the BLM Cottonwood Field Office, Lower Otto Creek and Lucile Caves Area of Critical Environmental Concern (ACEC). Both of these sites will now also become home to transplants established from seed.

As part of the recovery plan for this species, and in an effort to develop a more sustainable method for establishing new plants compared to harvesting and transplanting existing rhizomes, Ann DeBolt, Boise area botanist, received over 1000 cleaned, untested seeds from the BLM that originated from both a 1999 seedbanking project and a June 2017 collection. Starting in early November 2017, with the ambitious goal of producing 350 seedlings, she grew the seed for two years in



MacFarlane's four-o'clock seedlings, April 12, 2018. Photo by Ann DeBolt.

nursery conditions. According to Ann's propagation summary, first emergence was observed in early April 2018, with full emergence by mid-May. Seedlings were gently transferred from germination flats to 5.5 inch treeband containers after they developed secondary leaves. By July, no additional seeds had germinated. At the end of July, Ann began to see signs of dormancy. Plants were fully dormant by the end of August.

In September, BLM made the decision to postpone outplanting for one year, from fall 2018 to fall 2019, to allow seedlings to grow larger. This was weighed against the very real possibility of some overwinter mortality of the containerized MacFarlane's four-o'clock plants. Given that decision, in mid-November 2018, all containers were nestled several inches deep into the ground within a raised bed of garden soil and covered with row cloth for the winter. In early March 2019 the plants were moved to locations where they could receive sunlight for another growing season. On October 29, 2019, 58 dormant Mac-Farlane's four-o'clock plants grown from seed were planted at the Lower Otto Creek conservation area to en-

hance the population that was originally established in 2015 by transplanting rhizomes to the site.

A number of seeds that failed to germinate in 2018 popped up the next spring, making Ann glad she had not made any assump-



not made any assumptions after their initial Craig Johnson.

failure to sprout and simply thrown the seeds into the compost heap. Ann is retaining these germinants for another year to hopefully increase their size and improve their chance for successful transplanting.

The BLM has initiated several MacFarlane's four-oclock transplant efforts over the years. The first was during the fall of 1987, when rhizomes were collected from private land in the Salmon River Canyon's Long Gulch area. After being kept in cold storage dormancy, the rhizomes were transplanted in April 1988 to the Lucile Caves ACEC. On September 3, 1997, a large landslide on Highway 95 included a slope with MacFarlane's four-oclock plants on private land within the Long Gulch population. The BLM consulted with the U.S. Fish and Wildlife Service and in accordance with a memoranduim of understanding with the BLM and Idaho Transportation Department, salvage efforts for plants within the slide area took place. During the spring and fall of 1998, rhizomes were salvaged from the slide area and transplanted to the Lucile Caves ACEC.

The Lower Otto Creek conservation area was established in 2011 as an off-site mitigation area for accidental impacts caused to another Threatened plant species, Spalding's catchfly (*Silene spaldingii*), by an unauthorized trail built on BLM land a few miles further down the Salmon River. The fenced Lower Otto Creek area includes a natural population of Spalding's catchfly, along



with populations of some other rare Palouse Prairie region species. However, the site did not have a known natural population of MacFarlane's four-o'clock. During spring 2015, and in consultation with U.S. Fish and Wildlife Ser-

Lauren Pfund with MacFarlane's fouro'clock seedlings at Lower Otto Creek site. Photo by Craig Johnson.

vice, MacFarlane's four-o'clock rhizomes were collected from private land in the Long Gulch population and transplanted to BLM land within the Lower Otto Creek conservation area.

The transplanted rhizomes have generally survived, both in the wild and in botanical garden locations. The

survival of the new seedling transplants will be evaluated by subsequent years of careful monitoring, with success hopefully facilitated by ongoing weed treatment measures. Increased seedling production through nursery partnerships is expected to continue, to allow for future population augmentation at Lower Otto Creek, Lucile Caves, and po-

tentially other suitable



Craig Johnson preparing to plant at Lower Otto Creek site Salmon River in background. Photo by Lauren Pfund.

protected sites on federal land. Lessons continue to be learned, and documenting the evolution of these propagation and outplanting efforts will contribute valuable knowledge to the MacFarlane's four-o'clock recovery project. As the recovery team strives to develop the most appropriate adaptive management strategies for the species, this information will hopefully play a role in improving the species' conservation status and perhaps eventual federal de-listing. •



The Solitary Native Pollen Wasp—An Unusual Pollinator

Article and Photos by Nan Vance, White Pine Chapter

I discovered the unusual black and yellow-striped pollen wasps about 12 years ago while roaming Puffer Butte at Fields Spring State Park in the southeastern corner of Washington. My primary interest in wasps had been to look for the purported wasp-pollinated *Paeonia brownii*.

I wanted to see if the newly emergent *Dolichovespula* (hornet) gynes were visiting the opening flowers hungry for the copious nectar the peony offered. Perhaps because of that I noticed one day in June what superficially looked



Figure 1. Pseudomasaris vespoides male foraging flowers of Penstemon pennellianus.

like a common wasp uncommonly foraging flowers of the strikingly blue *Penstemon pennellianus*. *P. pennellianus* is a Blue Mountains endemic and perhaps because Puffer Butte is on the edge of its range it is not abundant; however, this small colony was able to support these wasps. Upon casual inspection they resembled the similarly striped vespid wasps which are in the same family as the annoying non-native paper wasp *Polistes dominula*.

However, the bodies of these wasps appeared to be slimmer and the distal ends of their antennae looked clavate or clubbed (Figure 1). Their behavior around the flowers was less like that of an aculeate wasp and more like a provisioning bee. I could identify the females as



Figure 3. Male Pseudomasaris vespoides mating precariously with female on Penstemon pennellianus.

their antennae were shorter and darker than the males' (Figure 2). Their behavior also revealed their role in provisioning for they focused intently on foraging for nectar and pollen as they efficiently went from flower to flower. I also noticed that they foraged only *Penstemon* flowers. The males on the other hand with longer brighter yellow antennae and more prominently clubbed tips were focused on finding the females and would either fly around the inflorescences looking to get lucky or they would settle on a flat place strategically located to see females or possibly other males (Figure 3). Every now and then they would land on a flower to forage for pollen and nectar. I was observing a species of the genus *Pseudomasaris* (Ashmead), or what is commonly called a pollen wasp, so-called because unlike their vespid wasp cousins, they provision their soil-constructed nests with a mixture of pollen and nectar. The taxonomy of pollen wasps is Hymenoptera: Vesoidea, Vespidae, Masarinae. These solitary wasps share a family relationship with stinging wasps based on morphological and only recently phylogenetic characters; certainly not on behavior which is unique to the 14 genera in the subfamily Masarinae (*sensu* Carpenter 2001) to which they belong. The range of 14 North American *Pseudomasarine* species encompasses the

western U.S.; however, only four of these species can be found in Idaho.

The Pseudomasarine wasps are oligolectic (species that specialize in collecting pollen from one genus or species, or from only a few genera or species of flowering



Figure 2. Pseudomasaris vespoides female visiting Penstemon glandulosus.

plants) with respect to genus (Gess 1996). The wasps I was observing on that day were *Pseudomasaris vesp-oides* (Cresson) which have a narrow foraging range only within the genus *Penstemon*. Since I have been studying them for the past decade, I have seen them also visit flowers of *P. glandulosus* and *P. venustus*. They likely visit other Penstemon species that accommodate their size and life cycle. They prefer not to range far and wide for scattered flowers, but will settle on groups or colonies

where they mate and build their nests. They are solitary, but I have seen the males occasionally display some territoriality in confrontations with another male. The confrontations are very short and always non-fatal, though they may get a little



Figure 4. Pseudomasaris edwardsii male foraging Phacelia hastata var. hastata.

roughed up; I noticed after a confrontation they rest and groom themselves before resuming their search for a mate. They do not sting as far as I know. Knowledge about their natural history and behavior is limited because of their limited distribution which is confined to the distribution of certain penstemon species. Their nests are difficult to find, being built of mud and concealed in niches close to the ground (Gess 1996).

Since that day, each season I make a point of looking for the *Pseudomasaris* wasp and have been rewarded by finding two other species: *P. edwardsii* (Figure 4), *P. zonalis* and possibly *P. marginalis* (which is difficult to

distinguish from *P*. *zonalis*). I have seen these oligolectic wasps foraging the flowers of the genus *Phacelia*. Depending on where I am, I can find them visiting flowers of *P*. hastata var. hastata or *P*. heterophylla. These two



Figure 5. Pseudomasaris vespoides female entering corolla of Penstemon glandusosus for pollen and nectar.

wasp species have been reported visiting other *Phacelia* species, but in my observations they confine their provisioning of pollen and nectar gathered solely from *Phacelia* flowers. Their behavior was similar to that of *P. vespoides* in their mutual foraging inflorescences of the same plants at the same time as other insects. They are not aggressive and in fact I saw them driven away by the notoriously aggressive *Anthidium* bees.

To collect pollen, females of *P. vespoides* usually enter the tube-shaped *Penstemon* flowers that have anthers

mounted inside the corolla (Figure 5). They do not buzz like bumble bees to shake the pollen loose, but I have seen the female insert herself head first deep into the corolla and rapidly pulsate her abdomen in a way that vibrates the



Figure 6. Pseudomasaris edwardsii female gathering pollen from anthers of Phacelia heterophylla.

anthers and loosens the pollen. This is quite different from the way a female wasp collects pollen from *Phacelia*. She lands on the flower and uses her forelegs and tarsi to pull the pollen from the anthers toward her mouth, which is on the terminus of long filaments projecting outward to the exterior of the corolla (Figure 6). All *Pseudomasaris* wasp females collect pollen and nectar in their mouth which are stored and transported in a honey stomach. After she carefully constructs a cell she will deposit her egg, then deposit the provision which is a mass of pollen bound with nectar. Nectar is also used to moisten the soil used in constructing each cell (Torchio 1970). For the Masarine wasps that depend on *Phacelia*, life is more precarious than for the *Penstemon*-visiting *P. vespoides*. *Phacelia* is often regarded as a weedy plant even though it is native and supports numerous pollinating species, including the unique species described here that are totally dependent on its flowers. Too often I have seen numerous plants sprayed and killed during roadside weed eradications because unfortunately, that is where *Phacelia* is commonly found. I will continue to study these fascinating, solitary, ground nesting wasps. Hopefully in the coming spring you will look closely at *Penstemon* or *Phacelia* flowers to ascertain these species and then watch for them as they are excellent pollinators and uniquely special hymenopterans. •

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Eriogonum YHB Working Session

By Beth Corbin, Pahove Chapter

A gaggle of intrepid botanists (Buckwheaters?) gathered at The College of Idaho in Caldwell, Idaho, on November 22, 2019, to attempt to figure out a difficult group of perennial *Eriogonum* fondly known as the YHB—yellow headed buggers (ahem...). This session was coordinated by Dr. Don Mansfield and Beth Corbin and brought together many of the finest botanical minds in Idaho. In addition, we were most fortunate to have the *Eriogonum* expert Dr. Ben Grady join us from Wisconsin (his travel courtesy of the Idaho State Bureau of Land Management office and the Pahove Chapter of the Idaho Native Plant Society). Ben introduced himself as "I'm Ben Grady, and I have an *Eriogonum* problem." Most of us could relate! Participants in the Idaho Eriogonum YHB



Barbara Ertter, Ann DeBolt and Jennifer Miller trying to figure it out. Photo by Lynn Kinter.

Working Session included: Ben Grady, Don Mansfield, Beth Corbin, Janet Bala, Ann DeBolt, Barbara Ertter,

Harpo Faust, Lynn Kinter, Steve Love, Michael Mancuso, Jennifer Miller, Carol Prentice, Roger Rosentreter, Sandy Smith, and Danielle Trawick.

Taxonomy of the YHB has always been difficult, and several names have been applied to the same plants over the years. Some of the named taxa are potentially of conservation concern, so we are interested in sorting out appropriate recognition of species, subspecies, and varieties. The YHB group in Idaho that we focused



Ben Grady and Don Mansfield at the YHB working session. Photo by Lynn Kinter.

on included anything named *Eriogonum capistratum*, *E. crosbyae*, *E. prociduum*, and *E. mancum* (and their subspecies, varieties, and forms in whatever combinations), along with several other related species (Table 1).

Our working session began with a brief overview of the YHB by Dr. Ben Grady. Then we delved into morphological measurements and characterization of representative samples. Before getting together for the YHB session we had borrowed specimens (herbarium sheets) from several herbaria throughout the Pacific Northwest region. These provided us with a fine range of representation of Idaho and adjacent state's YHB to work with. Don had selected 5-10 specimens of each taxon/geographic area for intensive data collection. At the session, we divided into groups of 2-3 people, each one focusing on specific measurements or characters of the involucres,

Table 1: Eriogonum considered in the YHB Working Session.

Taxon as currently named	General Location
<i>E. brevicaule</i> vars. <i>laxifolium</i> & <i>bannockensis</i>	Southeast Idaho (and adjacent states)
E. calcareum vars. calcareum* & sceptrum	Southwest Idaho
E. capistratum/crosbyae (includes welshii*)	Central Idaho
E. chrysops	Southeast Oregon
E. crosbyae var. crosbyae	Southern Oregon
E. crosbyae/capistratum (muhlickii)	Montana
E. crosbyae (ertterae) "War Eagle"	War Eagle Mtn (Owyhee Co, Idaho)
E. mancum	Central Idaho, southeast Idaho, Montana
E. meledonum* (crosbyae var. meledonum)	Central Idaho
E. prociduum/crosbyae var. mystrium*	South Mountain (Owyhee Co, Idaho)
E. prociduum/crosbyae var. mystrium	Southeast Oregon, northeast Nevada
E. prociduum var. prociduum	California, western Nevada, southern Oregon
E. scopulorum*	Wallowa Mtns, Oregon & adjacent Idaho
E. soliceps*	Montana & eastern Idaho
E. verrucosum (crosbyae var. verrucosum)	Central Idaho

*Currently on the Idaho Rare Plant List.

perianth (the tepal people), scape, pubescence, leaves, and habitat/location. Each group went through the same sets of specimens, so by early afternoon we had data for a spreadsheet of 21 characters for over 100 herbarium sheets (Table 2).

Our (apparently unrealistic) hope was to have everything figured out by the end of the day, with a key drafted and specimens annotated, along with conquering global hunger and the climate crisis. Alas,

it was not to be; this is a difficult group for a reason.

Several characters defied easy characterization, particularly rigid versus membranous involucres and whether the perianth was pustulose. As is often the case, there were some clear examples on either end, but several specimens "in the middle." We did our best and powered through.



Roger Rosentreter, Janet Bala, Steve Love, and Jennifer Miller at the YHB working session. Photo by Lynn Kinter.

Our afternoon discussion tried to make sense of the data, although we found it difficult to step from the "trees" of individual measurements we'd been focusing on to the "forest." We found that further analysis of the data would be needed to parse out the messiest groups, particularly the central Idaho YHBs and

Owyhee South Mountain and War Eagle Mountain plants.

We were able to come up with a list of more or less clear taxa within the YHB that appeared to hold together morphologically and geographically, so will not focus further work on these plants (Table 3).

As for the rest of the YHB we looked at, we decided more analysis is needed to sort them out. First we need to determine which characters are most reliable to distinguish taxa. In addition to the characters used, we also brainstormed

Table 2. Characters measured or described during the YHB Working Session.

nvolucres	texture (rigid vs membranous)	shape (campanulate vs turbinate)	hairs and/or glands
nvolucres	length	# of involucres per head	
_eaf shape	blade length	blade width	petiole length
_eaf hairs	upper surface	lower surface	glands
Scape	hairs	glands	color
Perianth	color	pustulose or not	glands
Habitat	elevation	substrate	vegetation community
Geographic	codes for	longitude (for	
ocation	general area	numerical analysis)	

other potential characters. Complicating factors include hybridization and phenotypic (and year-to-year) variations. Substrate specificity doesn't seem to be particularly useful but geography (i.e. longitude across the range we looked at) may be. Another complication is that perianth texture may differ between fresh and dried specimens. Ben noted that genetic work done to date has not been helpful to sort out the YHB, but next generation sequencing may help clarify things better. He will pass along specific information on how to collect tissue (along with a voucher) for this.

A preliminary view of the spreadsheet of characters did not lend itself to elucidation. However, we agreed on a path forward. First, Don and Beth will run morphometric analyses on data collected at the session (this has begun and preliminary results look promising). Ben will come up with a rough key to test on these specimens. A subset of Buckwheaters will spread out the specimens to see how the apparent groupings suggested by the morphometric analysis hold up. Folks are encouraged to attend the annual Eriogonum Society (Ben is president) meeting in Elko, Nevada this summer (where other YHB abound). We may be able to reconvene in Idaho before or after that meeting and continue this discussion.

Overall, it was an interesting and hopefully useful experience for all involved. As Don Mansfield noted, no one ...Continued on Page 14

Table 3: Reasonably clear YHB taxa.

E. brevicaule vars. laxifolium & bannockensis	Leaf shape and distribution make good distinctions.
E. calcareum vars. sceptrum &	See Reveal & Mansfield, Phytoneuron
calcareum	2014, 18:1-2 and Smith & Mansfield,
	2017, Madrono 64:22-31.
E. capistratum (muhlickii)	From Montana. May be appropriate to
_	raise muhlickii to species level.
E. chrysops	Glandular tepals.
E. crosbyae var. crosbyae	There is no crosybae in Central or East
	Idaho.
E. scopulorum	Discrete distribution and morphology.
E. soliceps	One involucre per head (but there are
-	hybrids).

A Tribute to Rob Bursik (February 12, 1964–February 27, 2018)

By LeAnn Abell, Calypso Chapter

Late summer, 2018. No! It can't be true! I sat there in front of my computer monitor, stunned. Minutes before, I'd been looking at a plant specimen on the Consortium of Pacific Northwest Herbaria website—one collected by Rob Bursik, botanist/ecologist/wetland scientist extraordin-

aire. A question regarding the specimen came to mind, and I thought, "Hmmm... I'll bet if I email Rob about it, he might be able to provide an answer"; which he had done for me in the past. I opened a Google Search window, typed in Rob's name, the name of his business, Dragonfly Gardens...

And, oh my goodness!! The links that filled the computer screen all referred to stories about Rob Bursik of Amery, Wisconsin, killed in a collision by a distracted truck driver in Minnesota...on the same day in February that the 2018 Idaho Rare Plant Confer-

ence began. While I tried to grasp the sad news, I thought, how could this happen to someone as gifted and talented as Rob? The smart, mellow, helpful, patient, all-around nice, funny guy, dad, and husband that he was? Gone? Just unbelievable.

Over subsequent weeks, I found myself thinking about Rob, trying to focus on the positive impacts he had on this planet, instead of the horrific way he died. I began remembering various times I'd been around him; often, bringing a smile to my face because of some goofiness involved. More and more I recalled how much I'd learned from him. During fall 2019, I thought that some sort of tribute to Rob should be included in the 2020 Idaho Rare Plant Conference. This article is an attempt to begin to appreciate what Rob contributed to our knowledge of Idaho's flora; especially, rare plants and their conservation.

So, who was Rob Bursik, and what is his connection to Idaho and its native plants? Rob and his wife, Cheryl Clemens, moved from Wisconsin to Pullman, Washington in 1986 to attend graduate school: Cheryl at Washington State University and Rob at University of Idaho. Rob started working with Douglass Henderson in the UI Stillinger Herbarium and eventually served as a teaching assistant for the General Botany course. I worked with Rob as a "T.A." for the General Botany Lab Sections. He was a natural teacher who had knowledge combined with patience, with charisma thrown into the mix. Students who probably started the labs mostly interested in checking off General Botany on their class schedules, instead



Rob Bursik, 1964-2018

found themselves enjoying Botany Lab, and actually learning something.

Rob's master's thesis focused on Idaho and far northeastern Washington wetlands; more specifically, peatlands, generally defined as wetlands with waterlogged

substrates and at least 30 cm of peat accumulation. Rob spent hundreds of hours inventorying scores of sites in the Idaho Panhandle, collecting plant specimens, sampling water chemistry; and gathering observations about plant community ecology. The outcome of his efforts was a comprehensive treatment/description of Idaho peatlands. These small, previously overlooked sites support the richest rare plant species diversity of any habitat in Idaho, containing 10% of the state's rare flora. A key aspect of

964-2018 Rob's peatland work was the documentation of five plant species previously unreported in Idaho: *Carex chordorrhiza, Eleocharis tenuis, Eriophorum viridicarinatum, Iris versicolor,* and *Rubus pubescens.*

With graduate school in the rear view mirror, Cheryl and Rob moved to western Washington and then to Spokane. Rob worked as a consultant and with the Idaho Conservation Data Center (ICDC; currently the Idaho Natural Heritage Program), continuing his important work on peatlands, other wetland systems, and rare plant species conservation. Rob held wetland plant identification trainings around the region, sharing his vast knowledge of peatlands/wetlands, while encouraging practitioners of diverse backgrounds and skill sets that even they could identify *Carex* species.

Rob and Cheryl eventually moved back to Wisconsin so their kids could grow up closer to both their families. Rob and Cheryl established a native plants business, Dragonfly Gardens, which "carries a wide range of native perennials, grasses, ferns, shrubs, and trees to restore native habitats from shoreland, wetlands, and forests, to prairies." Later, Rob and Cheryl parted ways as a married couple but still remained friends and partners in the greenhouse business. Rob also put into action his great talent for teaching others and became a biology instructor at several local institutions, the last 20 years at North Hennepin Community College. Rob eventually married Jessica and life went on until Tuesday, February 27, 2018.

The investigation surrounding Rob's death revealed video footage from inside the semi-tractor trailer's cab

showing the truck driver looking at his cellphone for eight seconds before he slammed into Rob's car at 63 mph while it was stopped at a red light. Somehow, immediately following the tragedy, Rob's family was able to speak out publicly about the truck driver's actions and pleaded for people to put down their electronic devices and just drive! Days after the crash, the State Patrol called the crash a clear case of distracted driving.

A week after Rob's death, the local media described the hundreds of family, friends and coworkers who turned out for a visitation and memorial service in Amery, Wisconsin, to honor the life of Rob Bursik. The volume of visitors to his visitation required many people to wait in lines outside the funeral home during a windy and cold Sunday afternoon. But those who waited said they did not mind the cold because, they said, Rob Bursik had warmed their hearts for many years.

"He was just loved by everybody, and it is still hard to wrap my head around this," said Eric Aleckson, a friend of Bursik's. "It is so senseless and such a huge loss. This community is really hurting, and I hope it sends a message to the world that texting and driving creates unnecessary dangers on the road." Jane Hancock, who worked for Bursik at Dragonfly Gardens, remembered how generous Bursik was when her own son died in a car accident a decade ago. "It was a very traumatic time for me and Rob was so generous in my time of grief," Hancock said. "He gave me a memorial tree, which I planted in my son's memory, and it is just such a tragic loss to have Rob gone now, too." Messages left online by his students following Rob's death revealed he was a beloved teacher, inspiring his students to learn and care about our planet. Hennepin College President Barbara McDonald said, "He will be remembered for his passion for the sciences, his commitment to students and his ability to inspire those around him."

Rob's positive impacts continue to shine through. His research in Idaho and northeastern Washington still serves as the definitive work on peatlands in this geographic area. He collected more than 1500 plant specimens in Idaho and hundreds more in adjacent states. Rob contributed hundreds of rare plant species reports to the Heritage Programs of Idaho and other states. Through his work as a teacher, he influenced hundreds of people to connect with nature and decide to take care of our planet.

And, finally, the words of the people who gathered to honor Rob clearly show what an exceptional human being he was. He will be greatly missed, but his spirit lives on through his research, his family and friends, and the Rob Bursik Memorial Scholarship established by his community in Amery, Wisconsin to honor Rob's love of teaching and to support the future endeavors of an Amery High School senior each year. Memorial Scholarship: (https://dragonflygardens.net/rob_scholarship/)•

Announcements

The 2020 I daho Rare Plant Conference (RPC) will be held February 25-27, 2020, at the Idaho Department of Fish & Game Southwest Region Office in Nampa, Idaho. Held every other year, the conference is organized by INPS along with various agencies and others interested in the conservation of Idaho's rare flora. The conference provides opportunities to learn about Idaho's rare plant species and contribute to their conservation, and to network with other plant enthusiasts. In addition to updating the INPS Rare Plant List, the conference program will include a series of presentations and a poster session. A banquet dinner provided by Sa-wad-dee Thai Restaurant will include a presentation by Dr. Jim Cane—recently retired from the USDA Pollinating Insect Research Unit at Utah State University in Logan, Utah. His talk is titled "A tour about natural histories of our wild bees and some of their entrancing activities at Idaho wildflowers." Register for the conference by February 9 to avoid a late registration fee. A registration form and additional information about the conference can be found on the INPS webpage: https://idahonativeplants.org/rare-plant-conference/

The 2020 INPS Annual Meeting will be hosted by the Sawabi Chapter, Pocatello, on June 12–15, 2020. The Mink Creek Group Site on the Caribou National Forest will be the center of activity. Tentative plans call for three plant walks each day on Friday and Saturday and two plant walks on Sunday. These walks will be around the local area. Visits to the Ray J. Davis Herbarium on the ISU campus are planned. Some RV spots and tent sites will be available at the group site, which has no hookups and few trees. The Group Site is 7 miles from the Scout Mountain Campground in the Caribou National Forest with 53 campsites (10 single and 2 double that can be reserved 6 months in advance). Registration will be the old-fashioned way, by check in the mail. Watch for the registration forms in the next *Sage Notes* or on the INPS Website, www.idahonativeplants.org. For questions, email Sawabi President Geoff Hogander at ghogande@yahoo.com.

Using Artificial Intelligence to Identify Herbarium Specimens

By David Giblin, Ph.D., University of Washington Herbarium, Burke Museum

A nearly identical version of this article originally appeared in Douglasia, the newsletter of the Washington Native Plant Society. Reprinted here with permission.

Scientists are developing the capacity to identify herbarium specimens from their digital image. A little background is in order to fully appreciate this development. Starting in the late 1990s, the National Science Foundation (NSF) began awarding grants to herbaria around the U.S. to "digitize" vascular plant specimens. At that time digitize basically meant keystroking label data into a relational database application so that the label text could be published online for free, public access. It is important to remember that the World Wide Web (the graphical interface to the internet) only really came into being around 1993, and websites and browsers (think Mosaic) were quite basic compared to what we know today. Moreover, digital cameras were in their infancy and very expensive, computer server space was expensive, and there really was no "cloud" for storing images.

Fast forward to the mid-late 2000s when both digital cameras and server space became relatively cheap. Now NSF was funding herbaria to not only keystroke the label data, but to also image each specimen and assign geocoordinates (latitude/longitude) using georeferencing software. The results of NSF funding in our region can best be seen by visiting the Consortium of Pacific Northwest Herbaria database

(www.pnwherbaria.org/data/search.php), where there are nearly a million vascular plant images resulting primarily from NSF-funded projects.

Most major herbaria today, including the University of Washington Herbarium, are imaging all new specimens added to the collections. Additionally, when external funding is secured, herbaria are digitizing as many legacy (i.e., already in the collections) specimens as possible. The collective result of these efforts is that more than 300 million herbarium specimens worldwide have been imaged and made available through online databases. This has facilitated the remote identification of misidentified or previously unidentified specimens by amateur and professional botanists. However, with over 300 million plant specimens to be examined, there simply are not enough knowledgeable botanists to review everything. Time to call in artificial intelligence technology.

Research teams in North America, Europe, and Asia have developed artificial intelligence protocols that are now identifying imaged herbarium specimens with high levels of accuracy (80% in one study – better percentage than humans). Should working botanists be concerned that they will be replaced by computers? For the moment, no. Artificial intelligence and machine learning applied to herbarium specimen identification points out misidentifications that allows botanists to revise biodiversity analyses, develop more accurate distribution maps, and identify potential species new to science. There are literally thousands of new species sitting in herbaria worldwide because there are not enough experts, or enough experts with time, to find new species by plowing through hundreds or thousands of specimens in collections that they will never visit.

To get an appreciation for what is being done I encourage you to visit the following online article in the journal *Nature* from 2017: "Artificial intelligence identifies plant species for science." You can find the article here: www.nature.com/news/artificial-intelligence-identifies-plant-species-for-science-1.22442.

The application of computer science tools to field and collections-based botany strikes me as an unplanned encounter of the 18th and 21st centuries (Linnaeus made herbarium specimens in the mid-1700s). The upshot of this serendipitous confluence should result in better understanding of plant diversity patterns on both local and global scales, as well as the discovery of new species that very well may have never occurred or were literally decades in the offing. Considering the threats to plant diversity worldwide, I'd rather have that information sooner, even if it means that such discoveries are credited to computers. •

YHB Working Session.....Continued from Page 11

has ever tried this particular approach of group consensus on taxonomic questions before, so it was noteworthy in that regard. Although we did not solve all the Idaho YHB issues, it was a productive start, made more valuable by the participation of a diverse and knowledgeable group of botanists. Special thanks are owed to curators and collection managers from the following herbaria that lent specimens: Boise BLM (BBLM), Boise State University (SRP), University of Idaho (ID), Idaho State University (IDS), University of Montana (MONTU), Oregon State University (OSC), Washington State University (WS), and University of Washington (WTU). •

Chapter News

CALYPSO CHAPTER

When: Meetings are the first Wednesday of March, April, May and October at 7:00 pm. Field trips take place during the spring, summer, and early fall months. Where: Meetings are now being held in the Wildlife Building, North Idaho Fairgrounds, Coeur d'Alene. Contact: Derek Antonelli, ds.ca.antonelli@gmail.com

Upcoming Events

March 4: Derek Antonelli—Idaho's Beautiful Noxious Weeds.

April 1: **TBA.**

LOASA CHAPTER

When: Meetings are held the third Thursday of each month at 7:00 pm.

Where: Taylor Building, Room 247, College of Southern Idaho, Twin Falls.

Contact: Bill Bridges, bridgesbill34@yahoo.com

Upcoming Events

January 16: Steve Paulsen—His Native Roots business and Dr. Stephen Love's wildflower research.

February 20: Terry Ruby—Weed Control. March 19: Topic TBA.

April 16: Tom Stewart with the U.S. Forest Service—Fire restoration.

PAHOVE CHAPTER

When: Meetings are held on the second Tuesday of each month from September–April at 7:00 pm. Dates, times, or topics are occasionally subject to change. Upcoming meeting information is sent to members via postcard and/or email. Events are also posted on the Pahove Chapter page of the INPS website.

Where: The MK Nature Center Auditorium, 600 S. Walnut Street, Boise.

Contact: For more information about activities please visit the Pahove Chapter page or email Karie Pappani at pahove.chapter.president@gmail.com.

Upcoming Events

January 14: Tim Davis from Friends of the Owyhees— Topic TBA.

February 11: Trevor Caughlin, Assistant Professor at Boise State University—Topic TBA.

March 10: Barbara Ertter—Circumnavigating Spain by Tour Bus, Train and Foot (plants included).

April 14: Roger Rosentreter—Annual Grasses.

SAWABI CHAPER

When: Meetings are held on the third Monday night of October, November, January, February, March and May. Programs begin at 7:00 pm and refreshments are available afterwards. Each meeting is preceded by a short presentation on the plant family of the month. Where: The Middle Fork Room of the Pond Student Union Building on the lower Idaho State University campus.

Contact: Geoff Hogander, ghogande@yahoo.com.

UPPER SNAKE CHAPTER

Contact: Kristen Kaser, kaser.kristen@gmail.com.

WHITE PINE CHAPTER

When: Meetings are held once a month at 7:00 pm except during the summer. Field trips can occur most any month. Please check the chapter website at www.whitepineinps.org for events which may be scheduled or finalized after *Sage Notes* is printed; or email the chapter officers at whitepine.chapter@gmail.com. Where: Great Room of the 1912 Building, 412 East Third St. in Moscow (between Adams and Van Buren). Contact: INPS, White Pine Chapter, PO Box 8481,

Moscow, ID 83843 or whitepine.chapter@gmail.com.

WOOD RIVER CHAPTER

When: Meetings are generally held each month with field trips throughout the summer and lectures during the off season.

Where: Various locations.

Contact: Email Kristin Fletcher at

naturewalker7@gmail.com for general information and Lisa Horton at LisaHortonJewelry@gmail.com to be added to the chapter's monthly email list.

Upcoming Events

January 24: Dr. Jennifer Forbey, Boise State University, will discuss sagebrush, its evolution, and ecosystem roles. 7:00 pm @ Emanuel Episcopal Church in Hailey.

February 22: Guided snowshoe field trip at Craters of the Moon National Monument led by staff naturalists. Snowshoes provided. Meet at Hailey Park and Ride. Time TBA.

March: Buds and Birds snowshoeing field trip to The Nature Conservancy's Silver Creek Preserve. Date and time TBA. •



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