



Friends of the University of Montana Herbarium



Spring 2021

Sagebrush Steppe Lessons from the Idaho National Laboratory by Matt Lavin



Fig. 1. Thickspike wheatgrass, Fernleaf biscuitroot, and tapertip hawksbeard abundant during 2011 after a 2010 burn in the INL sagebrush steppe

The sagebrush steppe of the Idaho National Laboratory (INL) is where I had the pleasure of spending the summers of 2009-2011. I collaborated with colleagues at Montana State University conducting invasive and rare plant surveys. The INL resides in the upper Snake River plains of southeastern Idaho. The INL area comprises almost entirely sagebrush steppe and is considered an “accidental wilderness,” due to the weapons research. I also have had the pleasure of studying plant diversity in the sagebrush steppe elsewhere, but the INL taught me some general lessons that apply in Montana, northwestern Nevada, southeastern Idaho, and western Wyoming. In contrast to many other parts of the western North American sagebrush biome, this northeast portion has summers that are plant productive and winters too cold for regular chinooks. This “sagebrush sea” is characterized by expanses of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) at lower elevations and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) at middle montane elevations and harbor underappreciated levels of plant species diversity. (continued on page 3)

NOTES from the BOARD

by Justina Dumont

This has been a challenging year. So much has been paused or canceled since COVID-19 started, the botany world and the herbarium are no exception. It is safe to say that we have all expanded our virtual communication skills this year and become, if not proficient, at least much more familiar with zoom calls despite any personal resistance. Our board meeting this year was not in person as it has always been, but 100% virtual. The herbarium visiting hours are by appointment only. The herbarium staff have continued working, but now they stagger schedules to reduce the potential exposure. My planned group visit to the herbarium in 2020 was pushed aside due to the COVID risk analysis and observing the low number of visitors this year it seems my trip was not the only one cancelled.

Despite the challenges that face us all this year, and despite the complexity of navigating this pandemic, the herbarium remains a critical asset to the botanical community and as such, I am looking forward to making my annual visit there to refresh my plant identification skills – as feeble as they may be. The herbarium for me has always been an opportunity to appreciate the wide diversity of our plants and the history of collecting in Montana. Each trip is a reminder of this rich history and when there, I feel connected to the other botanists who have contributed over the years to the preservation of this diversity. It is inspiring to be in a place with such overwhelming evidence of care and it reinforces the fact that I am part a of a larger community.

In this current state of new-normal where so many decisions take additional considerations, many things have been interrupted this past year or halted completely. As we pass the one-year mark of this pandemic, it is a good time to reevaluate what is truly important to maintain and what can fall away. The herbarium is a treasure. I am grateful to everyone receiving this newsletter who contributes to keeping it going and provides the much-needed support to keep this invaluable resource. Please do not forget to renew your membership dues and I hope to see some of you there as things open up and we resume doing the activities that we love.

HERBARIUM WISH LIST

Desktop or laptop that is fewer than 5 years old
Rolling office chair
Hand lenses

New Acquisitions - 2020

Peter Lesica: ca. vascular plants from MT with 1 Holotype and 4 Paratypes of *Musineon glaucescens*.

Kurt Hansen, Custer-Gallatin National Forest: Collections from southeastern MT, including county and state records.

Peter Donati, University of Montana: 17 vascular plants from western MT, including county records.

Joe Elliott: ca. 20 moss collections from MT, including county records.

Karen Gray: ca. 60 moss collections from WA, ID, MT.
Andrea Pipp, Montana Natural Heritage Program: MT collections of *Bergia texana* and *Calochortus bruneau-nis*.

Shane Sater, Montana Natural Heritage Program: MT collections of *Grindelia howellii* from Powell County.

Gifts and Exchanges - 2020

Dr. Anton Rexnick, University of Michigan Herbarium: three collections of *Carex* for determination.

Dr. Ihsan Al-Shehbaz, Missouri Botanical Garden: Two collections of *Schoenocrambe*, for determination.

Dr. David Murray, University of Alaska: Three collections of *Carex* for determination.

Dr. David Giblin, Burke Museum, University of Washington: Approximately 100 Lesica, duplicate specimens.

Dr. Barbara Thiers, New York Botanical Gardens: Approximately 100 Lesica, duplicate specimens.

Publications Using MONTU Specimens

Popovich, S. J., D. R. Farrar and A. V. Gilman. 2020. *Botrychium furculatum* (Ophioglossaceae), a New Moonwort Species from the Rocky Mountains of North America. *American Fern Journal* 110: 165-182.

Loans for Research - 2020

Angela Hornsby, **UM Zoological Museum:** Various specimens for display in the Mansfield Library.

Dr. Seung-Chul Kim, **Sungkyunkwan University,** Korea: Seven Montana collections of *Stellaria americana*, for genetic sequencing.

Sean Robinson, Curator, Jewell & Arline Moss Settle Herbarium, **State University of New York - Oenonta:** Four collections of *Sphagnum cuspidatum* from Montana, for genetic sequencing.

2020 FOH Annual Meeting

The annual business meeting of the Friends of the UM Herbarium will be Saturday, November 6th from 10 AM to 2:00 PM in Rm. 202 of the Natural Sciences Building on the UM Campus. Open to the membership.

Visitors to the UM Herbarium

General Public & Private Consultants

Elaine Scheff & Green Path Herb School, Julian Colescott

UM Researchers & Students

James Habeck, University of Montana Rocky Mountain Flora class, Marilyn Marler

Virginia Vincent, An Herbarium Hero 1930-2020

by Ptter Lesica

There's a lot going on in the University of Montana Herbarium (MONTU)- mounting, cataloging, data basing, photographing and filing specimens as well as checking cabinets for dermestid beetles, checking determinations, sending out and checking in loans and helping visitors find what they need. For thirty years Virginia Vincent did all of these chores at MONTU and almost always had a smile on her face.

Virginia grew up in New Jersey and graduated from the University of Vermont with a degree in zoology. She moved to Missoula in 1956 to study Wildlife Biology at the University of Montana, and she never left. Virginia is probably best known for her seasonal work as a Forest Service lookout, a job she held for 39 years. Her expertise in fire spotting was highlighted in Montana's PBS Back Roads of Montana program and in the July 2001 issue of National Geographic as well as appearances on television and an article about her mountain life in the Washington Post.

Virginia has always been interested in natural history, so when she went looking for a way to enhance her knowledge in 1985 during her "off season," she came to the UM Herbarium. The curator, Kathy Ahlenslager, trained her to mount plants. Nearly all of the day-to-day work at the UM Herbarium is done by work-study students, but unfortunately, student workers stay for one or two years at the most and then they lose their funding or graduate. Students mount, catalog and file specimens and prepare loans, but they need to be trained. Virginia started volunteering in earnest in 2001 and worked at least 80 hours each winter for the next 14 Years, training the students and helping them reach their full potential. Virginia brought continuity to the operation of the herbarium. For her hard work The Friends of the UM Herbarium gave her an annual honorarium in 2016.

In addition to her work in the herbarium, Virginia collected plant specimens for the local Forest Service herbarium which are now in the MONTU collections. She collected more than 200 specimens, almost all of which are from Missoula County and most from the vicinity of her Stark Mountain lookout. In 1983 she made the first collection of scalepod (*Idahoa scapigera*) from Montana. Virginia retired from her herbarium work in 2015. She passed away in August at the age of 90.



Virginia 2011

Sagebrush Steppe (*continued from p.1*)

Broad expanses of undisturbed to moderately disturbed sagebrush steppe dominated by mountain or Wyoming big sagebrush steppe often harbor 50 to 75 vascular plant species per hectare. This is a level of local diversity ("alpha diversity") comparable to what I find regionally along riparian corridors and in wetlands, in subalpine or alpine zones, or in open understory of ponderosa or lodgepole pine forests. In addition, different sites within the same region (e.g., Beaverhead County, Montana, Tendoy Mountains and Big Hole National Battlefield) can be 30-50% different in terms of plant species composition ("beta diversity").

Undisturbed to moderately disturbed sagebrush steppe is distinguished from heavily or regularly disturbed sagebrush steppe by harboring a diversity of species in the following native plant functional groups: 1) succulents (e.g., Cactaceae, Crassulaceae); 2) hemiparasites (e.g., Orobanchaceae, Santalaceae); 3) perennial bunchgrasses (e.g., bluegrasses, needlegrasses, wheatgrasses); 4) nitrogen-fixing New World legumes, e.g. *Astragalus* (species with high chromosome numbers), *Dalea*, *Psoralegium*, and *Pediomelum*; 5) perennial caespitose forbs (e.g., species of *Arenaria*, *Cymopterus*, *Draba*, *Eriogonum*); 6) shrubs (e.g., Amaranthaceae, Anacardiaceae, Asteraceae, Rosaceae); 7) subshrubs (e.g., species of *Ericameria*, *Eriogonum*, *Leptodactylon*, *Phlox*); and 8) tuberous and rhizomatous species (e.g., species of wheatgrasses, Apiaceae, Asteraceae, Fabaceae, Liliaceae, Santalaceae). An abundance and diversity of native species in these eight groups are not expected in overgrazed rangeland, along regularly maintained roadsides or in any place where human activity is regular or impactful. My working hypothesis is that the plants in these eight groups, because they generally are difficult to domesticate, likely associate with mycorrhizae and other soil microbes in nutrient exchanges. Sites that are physically impacted by humans probably lack intact soil microbial communities, which limits the abundance and diversity of native species belonging to these eight groups. Although some species of these groups can prosper in regularly disturbed settings, they also have the ability to thrive in high-native-cover sagebrush steppe. It is the abundance and diversity of these eight groups that distinguish undisturbed sagebrush steppe, not the presence of just one or two species from these groups.

Undisturbed sagebrush steppe with a recent fire history harbors an abundance and diversity of the aforementioned plant groups (Fig. 1). This suggests that fire disturbance is less impactful on native plant diversity compared to physical disturbances like regular overgrazing. This finding is relevant to post-fire management. Studies by Jay Anderson and colleagues in southeastern Idaho suggest that active rehabilitation of burned sagebrush steppe (e.g., drill seeding) can impede the regeneration of sagebrush steppe from seed bank and underground plant structures. Reducing active management in post-fire sagebrush steppe allows sagebrush steppe in good ecological condition to rebound most rapidly after a burn on its own, despite big sagebrush requiring time to re-establish from seed.

Cheatgrass is not an issue in the northeastern part of the sagebrush biome because it requires hot, dry summers and chinook-prone winters to gain a growing advantage. Cheatgrass throughout much of the northeast portion of the sagebrush biome is confined to roadsides and other heavily impacted sites, such as where herbicide is regularly applied along roads and in and around crop fields (Fig. 2). When fires occur in this area of the sagebrush biome, cheatgrass disappears; its supposed positive feedback with fire is far from ubiquitous.

An alarmist perspective on fire and cheatgrass is all too common, which is unfortunate because it promotes excessive management of burned sagebrush steppe, which impedes its natural resilience. Western North American sagebrush steppe is most in need of protection from overgrazing and similar physical disturbances, which can be monitored using the abundance and diversity of the abovementioned eight plant groups. In addition, many areas of sagebrush steppe need protection from excessive post-fire management, which, to paraphrase Jay Anderson, causes the kind of physical disturbance that impedes the natural resilience of sagebrush steppe.

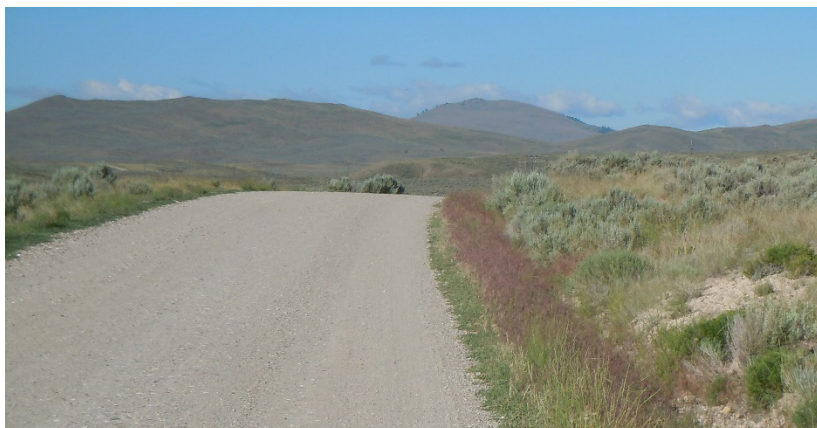


Figure 2. Cheatgrass (purplish seed heads) is confined to roadsides in Beaverhead County. Southwestern Montana harbors a “sea” of mountain big sagebrush steppe devoid of cheatgrass even though cheatgrass is common along roads. Here, cheatgrass co-occurs with mostly slender wheatgrass and prostrate knotweed. Photo taken 20 July 2011 east of Bannack MT along the Bannack Bench Road.

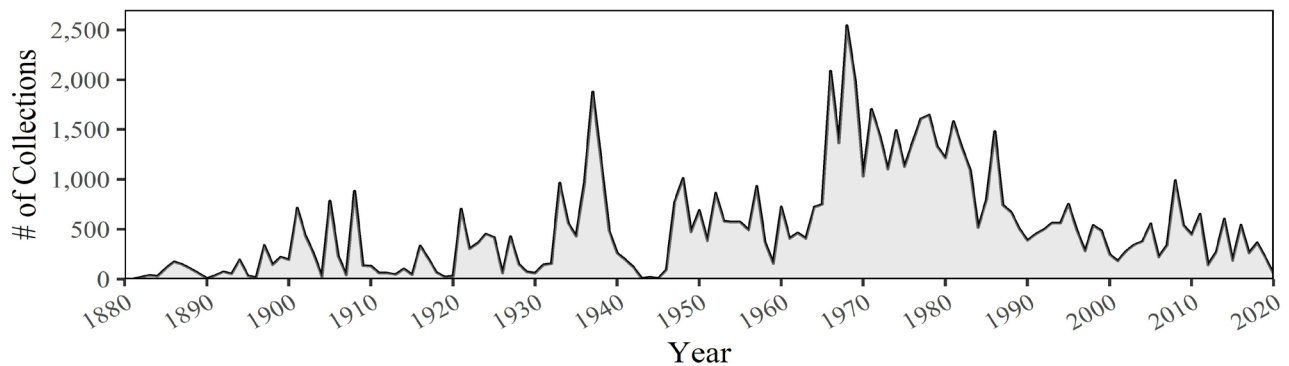
Exploring MONTU Specimen Data

by Peter Donati

Making specimens from MONTU available online through the Consortium of Pacific Northwest Herbaria (CPNWH) allows you to browse our collections from wherever you may be. This perk is especially valuable, now more than ever during a pandemic. This is not the only perk though. Every specimen uploaded to the consortium database becomes an easily manipulated data point. This data is very valuable because it allows us to quickly sort through specimens and easily answer questions that would otherwise be extremely laborious to answer if we only used traditional methods of cataloging our specimens.

In this article I will ask some interesting questions and use the MONTU specimen data to present some visuals to answer them. I included both vascular and bryophyte specimens but filtered it down to only reflect collections made in Montana. I also excluded Missoula Research Center (MRC) collections since the databasing of those specimens is still ongoing.

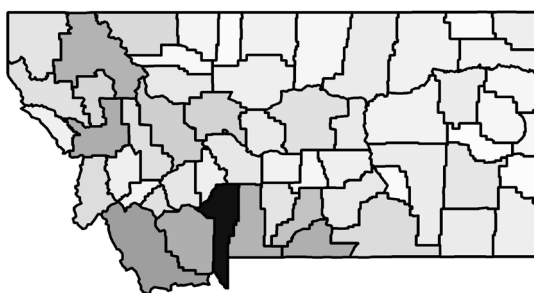
What does the annual number of collections look like across years?



Notice in this figure the big dip during World War II. Collections quickly rebounded in 1946 after the war, which also coincides with when LeRoy Harvey became curator and began to make extensive collections. Also interesting is the high number of accessions for the 1970's. This reflects Klaus Lackschewitz's most active years of collecting and really puts his contributions into perspective. Collections for 2020 appear low because many of the vouchers have yet to be formally accessioned and uploaded.

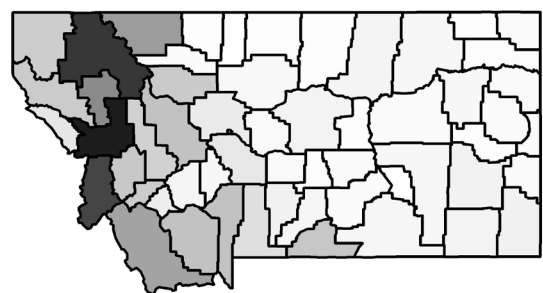
How do MONTU collections vary geographically across Montana? How do they compare to MONT collections?

MONT



% of collections 0% 5% 10% 15%

MONTU

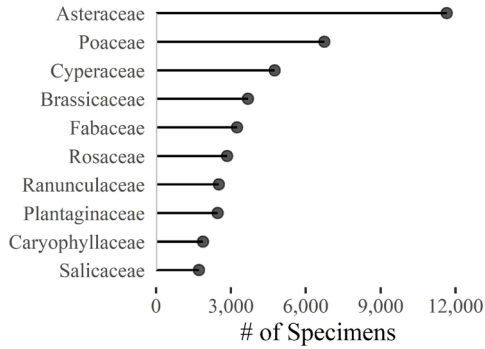


% of collections 0% 5% 10% 15%

The location of MONTU as well as the habitat diversity, botanical curiosities, and vast public lands of western Montana are reflected in this figure. At MONTU, Flathead, Missoula, and Ravalli Counties make up about 35% of the total Montana collections. At the Montana State University Herbarium (MONT), collections are much more evenly distributed across the state, aside from Gallatin County. If these collections were to be combined, it would help to even out the geographical distribution of MONTU specimens.

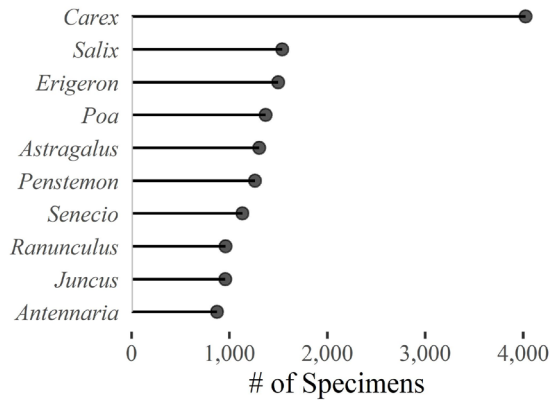
Which taxonomic entities are best represented at MONTU?

Families

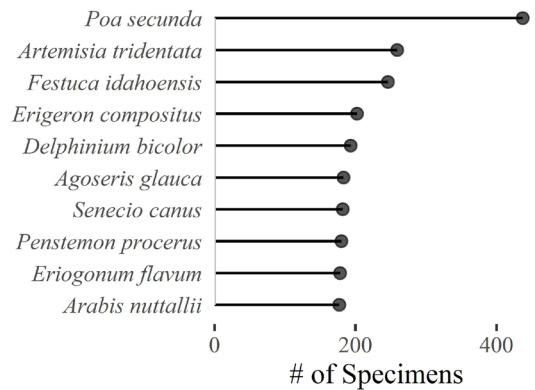


The figures here show the top ten most represented groups within each taxonomic ranking listed. It comes with little surprise that Cyperaceae and *Carex* are both well represented. The margin that *Carex* holds in front of the other genera is definitely not small, yet at the same time it is noticeably missing from the species list. This results from the extreme diversity of *Carex*, as its specimens are spread across the many species within it. *Carex utriculata* is our most documented species of the genus with 136 specimens, and it shares spot 29 for the most collected species with *Phacelia hastata*.

Genera



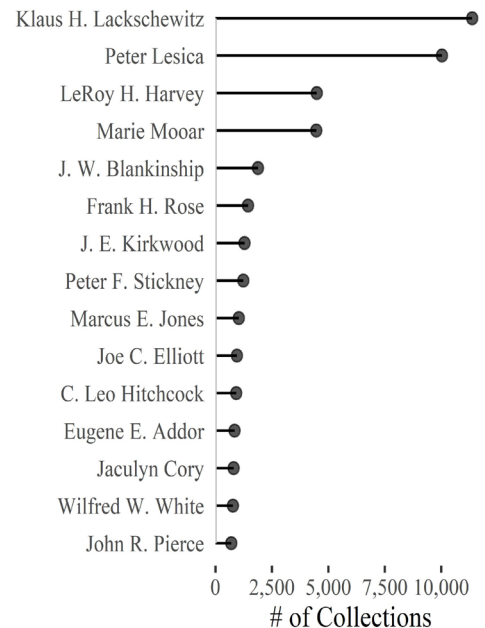
Species



Who are the most avid collectors, past and present?

The extensive and diverse collections from Lackschewitz and Lesica, the many wetland collections from Mooar, Ericaceae collections from Stickney, bryophyte collections from Elliott, and the meticulous documentation of Ravalli County flora by Cory all come together to make MONTU the resource that it is. Every collector, whether shown here or not, brings something unique to the specimens housed at MONTU.

These visuals concisely outline the vast taxonomical, geographical, and temporal variation that the physical specimens represent. If you are reading this, I likely don't need to persuade you to see how valuable it is to have this broad representation of Montana flora all squeezed into one place. I hope this helps reinforce the reason for the existence of the Friends of the Herbarium in the first place though – to preserve and support the continued improvement of these valuable collections. All of the data can be found at <https://www.pnwherberia.org/data/datasets.php>.



A TRULY UNIQUE YEAR AT MONTU

by Shannon Kimball

No matter who you are or where you were in the first couple of months of 2020, the arrival of Coronavirus forced you to develop new ways to function. To keep the gears turning at MONTU, our staff became as flexible as possible with the changing safety conditions of each day. We realized early on that having a completely remote work force was not possible. Direct access to specimens is required of almost everything we do, and specimens are fragile and best suited to archival conditions. As a result, we adopted a work schedule that staggered shifts, with some working evenings and weekends. Doing so allowed us to keep our normal staff of four steadily working and safe through the winter months, and gave us the opportunity to have one of the most productive winters we have ever had. Some highlights:

Staff members were able to enter 1800 specimens into our MONTU database, more than had been entered in any of the previous ten years. Our focus this year was the Forest Service's Rocky Mountain Research Center Herbarium (MRC), which is housed at MONTU and was curated for decades by Peter Stickney. Bringing these specimens online makes them visible to researchers worldwide. Roughly half of the MRC collection is now available to view online through our website (<http://hs.umt.edu/herbarium/default.php>). Our newest work study student, **Cora Rivers**, was instrumental in making sure steady progress was made each month.

Over the course of the year more than 3850 vascular plant specimens were imaged, uploaded to MONTU's online database, and linked with corresponding database records. These high-resolution images provide a more complete record of MONTU's specimens than the databased labels alone by enabling database users to examine features such as leaf texture, and shades of flower petal color. Many of the newly uploaded images are from the MRC collection, and the entire staff contributed to this effort.

Almost 450 specimens collected by emeritus MRC curator Peter Stickney have been added to the MRC collection. The plants were collected by Peter over the course of his fifty-year career and include valuable records from Washington, Idaho, Montana and Wyoming. For forty-two of those years Peter served as the Associate Plant Ecologist for the Forest Service. This project was funded by private contributions from Peter, and allowed MONTU to hire **Dorothea Kast** to focus solely on mounting, cataloging, digitizing, imaging and filing all of the incoming specimens.

In his third year at MONTU **Peter Donati** used his herbarium experience to update the MONTU Type Cabinet. Peter databased and imaged all of our type specimens, and made sure that a hard copy of supporting literature was included with each specimen in its corresponding folder. He assembled an excel database that lists each record with details for every collection. The database will be added to MONTU's website in April. Peter has also databased and imaged hundreds of incoming MONTU and MRC collections.

Lichenologist Tim Wheeler has been working on updating the systematics and confirming taxonomic identifications of our lichen collection for over a year and is roughly half way through those records. Once Tim has completed his project MONTU staff will bring those records online by digitizing all of our Montana collections.

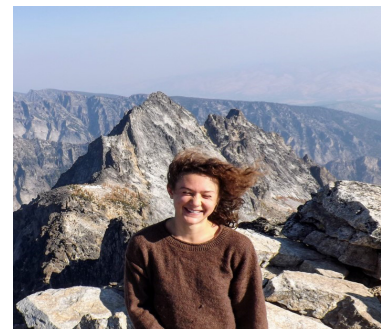
The MONTU Strategic Plan (see 2020 FOH Newsletter) was reviewed, edited and finalized by curator Shannon Kimball, Peter Lesica and the board of directors of the Friends of the Herbarium. It is awaiting final approval from the Associate Dean of Biological Sciences. The draft plan is available on MONTU's website.



Peter Donati



Dorothea Kast



Cora Rivers

Yes! I want to help protect the irreplaceable collections and enhance the facilities of the University of Montana Herbarium

Name: _____
Address: _____
City, State & Zip: _____
Email: _____
I prefer a digital copy of the FOH newsletter: _____



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Regular Member	\$15
Sustaining Member	\$25
Contributing Member	\$50
Organization	\$50
Life Membership	\$300
Endowment Gift	\$_____

Send checks to:
Herbarium, Division of Biological Sciences
University of Montana
Missoula, MT 59802

Dues are for a period of **two years**. Dues for current members are payable in even-numbered years. New memberships are accepted at any time. All contributions to the Friends are tax deductible to the full extent provided by law. All checks should be made payable to: U.M. Foundation/Friends of the U.M. Herbarium.

Join or renew online: www.hs.umt.edu/herbarium/support.php

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