Spring 2020

2020 Friends of The University of Montana Herbarium Newsletter

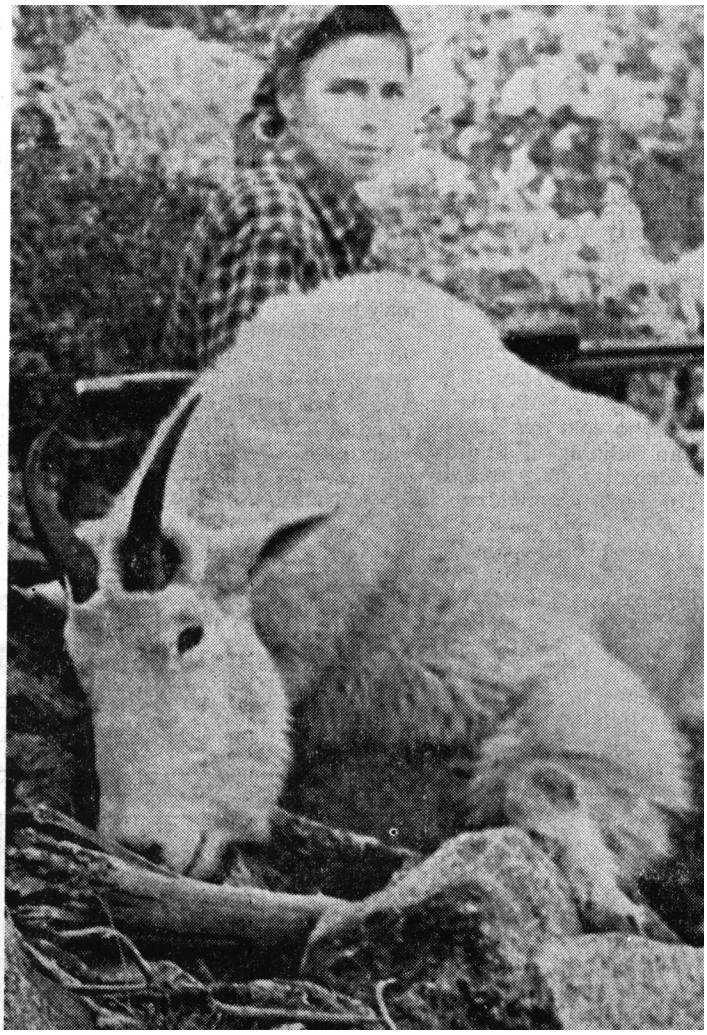
Peter Lesica

Friends of the University of Montana Herbarium

People of MONTU

Jaculyn Cory

by Maggie Ross



Jaculyn Cory was not your average botanist. She didn't have a formal education in plant taxonomy and didn't collect her specimens clad in typical field clothes. In spite of this, Jackie's goal was to catalog every plant in Ravalli County. Not an easy task, considering the vast floral diversity of the Bitterroot Valley. Details of her personal life are not well-known, but it's thought that she was self-taught and motivated by a passion for the outdoors and collecting things. She also collected antiques and was an avid hunter. In 1966, an article was written about her in the *Ravalii Republic* boasting her skills and accomplishments in hunting 42 game animals including a Rocky Mountain goat (pictured left).

Jackie was born in San Diego in 1927 but spent most of her life living southwest of Hamilton with her husband Jack and their two children. In 1973, when she was in her late 40s, Jackie harvested the first plant of her collection. She gathered over 150 specimens each year between 1973-1975 and also in 1978. In other years, she amassed between 20 and 90 specimens. She explored all over the county in various habitats ranging from scenic vistas on St. Mary's Peak and wet meadows of the Skalkaho Basin, to disturbed roadside habitats and even from her own backyard. She may have had an affinity for riparian vegetation or simply enjoyed being close to water as many of her specimens were from streambanks, edges of lakes and along the many rivers of the Bitterroot Valley. Her last documented collection was of *Juncus tenuis* in a dry field outside her house in August 1980. She maintained her collection in her personal herbarium which likely contained over 1000 specimens.

Her collections have contributed significantly in documenting the diversity and distribution of flora of the Bitterroot Valley. Jackie was the first to discover *Boechera fecunda* in the Sapphire Mountains, a species endemic to Montana and listed as imperiled by the Montana Hatural Heritage Program. There are several other plant species of concern in her collection including some that are only found in the Bitterroot National Forest like *Trifolium eriocephalum* (imperiled) and *Penstemon payettensis* (critically imperiled). She also collected *Lewisia columbiana* (imperiled) from its only known location in the Bitterroot Mountains. She made her collection available to Klaus Lackschewitz for his book Vascular Plants of West-Central Montana: Identification Guidebook published in May 1991, a guide still used today by botanists and land managers. She then donated her collection to the University of Montana Herbarium, which represents about 10 percent of all the plants from Ravalli county in the MONTU herbarium.

Jackie passed away in 2018. She was an unconventional botanist and someone whose legacy is a testament to the power of citizen science. Her dedication to describing and cataloging the flora of her home is inspiring to anyone interested in learning more about the plants around them.

NOTES from the BOARD

The current decline in specimen collections in the US and the closing of more than 100 herbaria in the last three decades can lead us all into a dismal outlook on the future of Botany. However, I was recently enlightened to find youth in our local 4-H club preserving the practice. Two 4-H projects, the Range Plant ID and Weed ID, require collecting, mounting, and labeling of specimens. Tel and Faye Holland of the Horseprairie Hayshackers Club in Beaverhead County have been working on these projects. Tel, an eighth grader at Dillon Middle School, has 37 range collections and 53 weed collections, while his sister Faye, a seventh grader, has 30 weed specimens.

Tel enjoys these two projects as they have taught him the different lifespans of plants (annual, biennial, and perennial), which species are noxious, and which are poisonous to livestock. Faye enjoys the Weed ID projects and says it has taught her the parts of plants. Both Tel and Faye feel that they will use these skills in their futures. Tel plans to attend MSU to study Range and Agriculture, and then continue in the family ranch when he grows up. Faye also plans to attend MSU and become a Large Animal Veterinarian.

Jessie Salix

Tel and Faye with Collections

New Acquisitions

Peter Lesica: Roughly 140 vascular plants from throughout Montana.

R**ichard Halse**, Oregon State University: Vascular plant collections from Montana, Idaho, South Dakota, Oregon, California.

Carolyn Ferguson, Kansas State University: Four Phlox collections from Broadwater County, Montana.

Scott Mincemoyer: Vascular plant collections from various Montana counties, collected from 2014-2018.

Kurt Hansen, USFS Sioux District Ranger: Several vascular plants from southeast Montana counties.

Matt Lavin, Montana State University: Eight vascular plants from Montana, including two collections of *Phragmites australis* ssp. *australis* from Hill and Blaine counties.

Joe Elliott: Seventy-two moss collections from various Montana counties.

Dorothy Wallace-Senft: Vascular plant collections from various locations in Montana.

Shannon Kimball: Vascular plant collections from Granite, Missoula and Flathead Counties, Montana.

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of the University of Montana
Herbarium

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Shannon Kimball, Herbarium curator
Peter Lesica, Newsletter editor

2020 FOH Annual Meeting

The annual business meeting of the Friends of the UM Herbarium will be held Saturday, November 14 from 10 AM to 2:00 PM. The meeting will be held in Rm. 202 of the Natural Sciences Building on the UM Campus. This is the annual meeting of the Board of Directors and is open to the membership.

Visitors to the UM Herbarium

General Public & Private Consultants

Joyce Ferguson, Sam Lashley, Elaine Sheff & Green Path Herb School, Wayne Phillips, Scott Mincemoyer, Janet Simms, Key Kolis, Claire Compton, Chris Cawley, Jen Ishum

UM Researchers & Students

University of Montana Western Plant Systematics Class, Phil Hahn (UM), James Habeck (UM)

Other Academic Researchers

Emme Heyderberb (MSU)

Federal, State, Tribal and NGO Biologists

Tom Parker and Geum Environmental Co., Andrea Pipp MTNHP, Megan Montgomery MTNHP, Craig Odegard U.S.Forest Service

Publications Using MONTU Specimens

Lesica, P. 2019. *Musineon glaucescens* (Apiaceae), a new species from central Montana, USA. Journal of the Botanical Research Institute of Texas 13: 1-6.

Freeman, C. C.. 2019. *Penstemon*. Pp. 82—255 in Flora of North America Volume 17, Magnoliophyta: Tetrachondraceae to Orobanchaceae. Oxford University Press, New York.

Montana's Sagebrush

by Stephen V. Cooper

Woody sagebrush species dominated huge swaths of the Intermountain West, Great Basin and Colorado Plateau prior to European colonization and to varying degrees yet today. Arguably woody sagebrush was most extensive in Nevada followed in uncertain order by Wyoming, Utah, Idaho, Montana, California, Oregon and even Washington (think of pre-settlement Columbia Basin). Given the extent and antiquity of this group (defined below) it's not surprising a number of species, most notably antelope, sage thrasher, and greater sage grouse are obligates of ecosystems dominated by these shrubs. Wholesale destruction of these sagebrush ecosystems followed by introduced of Eurasian weeds, such as cheatgrass (*Bromus tectorum*), supplanting natives has in turn imperiled the sage grouse and changed the whole character, ecology and productivity of vast landscapes.

Woody sagebrush is my non-technical reference to the subgenus Tridentatae (genus *Artemisia*), which in Montana is comprised of *A. arbuscula* (low sagebrush), *A. cana* (silver sagebrush), *A. nova* (black sagebrush), *A. tridentata* (big sagebrush) and *A. tripartita* (three-tip sagebrush). Several species of *Artemisia*, including *A. frigida* (fringed sage), *A. pedatifida* (matted sagewort) and *A. longifolia* (long-leaved sage) are at most subshrubs which die back to rootcrown annually.

Silver sagebrush is distinguished from all other shrubby sagebrush by having (mostly) entire leaves. It has two subspecies in Montana which are most confidently distinguished by leaf width; 3 to 5 cm for ssp. *cana* and less than 2 cm for ssp. *viscidula*. In addition, ssp. *cana* is much more tomentose than the viscid ssp. *viscidula*. In Montana *A. cana* ssp. *cana* occurs extensively on lower terraces of rivers and streams east of the Continental Divide, a habitat rapidly giving way to weedy grasses. Subspecies *viscidula* is found sporadically in the mountainous portion of our state scattered in grasslands and shrublands often with mesic graminoids such as *Festuca idahoensis, Stipa richardsonii,* and *Carex raynoldsii.* Some stands have obviously been burned at some point in the past, consistent with the crown and root sprouting following fire. Much of this habitat in southwestern MT has unfortunately undergone wholesale conversion to hay meadows.

Three-tip sagebrush is easily distinguished from the other shrubby sagebrush as the only taxon with narrow leaf lobes in excess of ⅓ the blade length. Three-tip sagebrush likely has two subspecies in Montana. Subspecies *tripartita* occurs in Beaverhead and Powell Counties where it occurs with mountain big sagebrush or in its environmental niche. Subspecies *tripartita* sprouts from the root crown post-fire, but there is a wide range in the percentage of stems re-sprouting, ostensibly dependent on burn severity. Subspecies *rupicola* is not documented in Montana by herbarium specimens, but it probably occurs here because in Wyoming it is found in wind-impacted habitats which are common in Montana as well.

Black sagebrush has shown a progression in its taxonomic status from variety to subspecies of *A. arbuscula* to full species. Its common name derives from its rather dark green cast which in turn is due to cuneate leaves having dark, punctate glands. The most effective morphological identification feature is the stiff, distinctively brown to orange-brown flower stalks that persist into the following year. Its northernmost documented occurrence is Lewis and Clark County (Limestone Hills), but there is good reason to believe it may occur further north in the Big Belt or Castle Mountain. At least in Montana it is associated with limestone or other calcic soils. It is perhaps most common on the lower slopes of the Pryor Mountains and east-flank of the Beartooth Mountains. Elsewhere in Montana, especially Beaverhead Co., the stands are fairly limited and much seemingly suitable habitat goes unoccupied. One can occasionally discriminate a classic sage-green big sagebrush stand abutting a dark green low-stature shrubland, almost always where a calcareous substrate abuts a non-calcareous one.

Low sagebrush has two subspecies that occur in Montana, *arbuscula* and *longiloba*, although the latter is sometimes considered a full species. Both have compact crowns less than 30 cm with gray-green foliage, and both subspecies are documented in Montana only from Beaverhead Co. Subspecies *arbuscula* flowers in the summer and has pointed leaf lobes. It is found on shallow soils, often with a clay pan or shallow bedrock. Subspecies *longiloba* flowers in "spring" and has rounded leaf lobes. It also occurs on shallow soils and on ephemerally flooded, poorly drained swales or flats. Driving on ephemerally flooded ssp. *longiloba* flats in Nevada will result in your vehicle axel-deep in mud. Fire-response for low sagebrush has not been adequately documented.

A huge volume of literature testifies to the importance of big sagebrush, the most common and broadly distributed woody sagebrush. Montana is home to at least three subspecies: ssp. *wyomingensis*, ssp. t*ridentata,* and ssp. *vaseyana*. In Montana ssp. *wyomingensis* is the most broadly distributed of the three, occurring from the eastern plains (virtually all Montana counties

subspecies *tridentata*

subspecies *vaseyana*

subspecies *wyomingensis*

thereof and into North Dakota) to the far southwestern corner of Beaverhead Co. In eastern Montana within a short distance ssp. *wyomingensis* can be ten to 20 cm in height with leaves 0.6 to 0.9 cm long on the clay pans to well over a meter tall with leaves at least 2 cm long on the mesas and ridgelines. In southwestern Montana ssp. *wyomingensis* is found only at the lowest elevations. Subspecies *vaseyana* is most common in better soils of higher elevation, more moist sites up to subalpine/alpine ridges at least to 9,600 ft. Subspecies *tridentata* occurs both east and west of the Divide usually on lower to upper stream terraces and benches. Its habitat has been significantly diminished by herbicide treatment, burning and conversion to hay pastures. A*rtemisia tridentata* ssp. *spicaformis* quite probably occurs in Montana on high-elevation sites with late-lying snow; however, there are currently no populations documented by herbarium specimens.

Identifying big sagebrush to subspecies can be difficult, but here are a few tips. (1) Flowers provide little help and are often not present. (2) Leaf shape varies from wider than long in ssp. wyomingensis to long and narrow in ssp. *tridentata* with ssp. *vaseyana* intermediate. Always examine numerous leaves from a given plant and take care to not use those from new shoots. (3) Characterize landscape position of the collection since the three subspecies occur in different habitats (see above). Confusing forms due to hybridization can occur where these habitats transition. (4) "Blacklight" or UV light examination (see below) can be a very useful in addition to leaf morphology and habitat although it is somewhat of an art.

Blacklight Technique: To a clean glass vial filled with at least 10 ml of water add several whole leaves collected from a single shrub. In a dark space use a long-wave UV source several inches away to illuminate the vial's solution. A bluish-cream glow (florescence) indicates the presence of coumarin, and the presence/absence as well as intensity of the glow can indicate various taxa. Montana shrubby taxa producing no florescence include *A. tridentata* ssp. *tridentata, A. t.* ssp. *wyomingensis* and *A. nova*. Those that fluoresce, in decreasing order of strength, are *A. arbuscula* ssp. *longiloba* (intense), *A. tridentata* ssp. *spiciformis* (possibly in MT), *A. tridentata* ssp. *vaseyana, A. arbuscula* ssp. *arbuscula, A. cana, A. tripartita* ssp. *tripartita, and A. tripartita* ssp. *wyomingensis.* Plants of hybrid origin will evidence intermediate fluorescence signatures.

Identification of big sagebrush subspecies is particularly critical regarding fire response. From years of study in Montana we know that ssp. *wyomingensis* is very slow to recover to pre-burn canopy cover, taking perhaps much more than 100 years in many circumstances. Subspecies *vaseyana* recovers in less than 40 years and ssp. *tridentata* yet more quickly. Results of "sagebrush control" could last much more than a lifetime and have cascading effects in the food-chain. One reason for slow recovery after fire is that *Artemisia* seeds have no pappus, so nearly all seeds fail to travel far from the parent plant, greatly limiting dispersal into burned areas. Differing fire response and lack of dispersal undoubtedly play a role in the distribution of the various species and subspecies on Montana's landscape.

MONTU Moves Ahead with Strategic Planning

by Shannon Kimball

The University of Montana Herbarium has come a long way since Morton Elrod started collecting MONTU's first records in the late 1800's. Since Elrod's retirement the herbarium's course has primarily been directed by the decisions of its curators, who have steadily added specimens and worked to ensure that MONTU is a reliable and organized source of scientific data. With the formation of the Friends of the University of Montana Herbarium in 1995 the curator was able to seek professional input from a diverse group people with a vested interest in MONTU. This group is represented by elected members: the FOH Board of Directors.

For over 20 years the collaboration between curator and FOH has worked very well. In the interest of defining a specific roadmap for MONTU's future however, the curator has begun drafting a Strategic Plan for the herbarium. Often heard discussed in the corporate world, a strategic plan helps an organization set reachable goals for itself, then chart a path to attain them over a defined period of time. Though the plan hasn't been finalized, the following five Strategic Goals will likely be addressed in MONTU's 2020 Strategic Plan.

MONTU Goal #1: Provide accurate representation of the plant biodiversity in Montana, past and present, through the care of current collections and acquisition of new, archival grade, vascular and non-vascular specimens.

MONTU Goal #2: Increase access to MONTU collections through digitization (databasing) of all Montana and non-Montana specimens, including the United States Forest Service Rocky Mountain Research Station Herbarium (MRC).

MONTU Goal #3: Provide opportunities for UM students, state and federal agency staff, and interested members of the community to learn about the vascular and non-vascular plants of Montana.

MONTU Goal #4: Form collaborative and supportive relationships with partner herbaria (e.g. the University of Washington Herbarium), state and federal agencies (e.g. Montana Natural Heritage Program) and Montana conservation organizations (e.g. Montana Native Plant Society) whose Missions and Goals are in alignment with MONTU's.

MONTU Goal #5: Increase departmental support for the Curator position by bringing University of Montana funded FTE to 0.5 (20 hours/week) and reinstating work-study student funding.

MONTU Goal #6: Increase the Friends of the University of Montana Herbarium community to 100 members.

The Strategic Goals will each contain specific actions that will serve as the focus of activities in the herbarium from the time the Strategic Plan is adopted forward. Tasks that don't fall into the Goal categories defined above, such as adding material to and revising MONTU's website, will remain part of our organization and be performed as normal operational activities. Long range goals, such as finding a larger space for our growing collection, will not be part of the Strategic Plan Document but may be discussed and incorporated at the 5-year mark. The entire document will be reviewed and updated at the 5- and 10-year marks, in 2026 and 2031.

The plan will take shape over the next few months as it is circulated through the FOH Board and the Assistant Dean of the Division of Biological Sciences. With their collective support the plan should be implemented January 1st of 2021.

Kanchi Gandhi

A Life of Taxonomic Nomenclature

by Alvin Powell (adapted from Harvard Gazette, October 2019)

Scientists count 1.4 million different names for plants on Earth. But botanists estimate there are just 300,000 existing species. That means there's a veritable Tower of Babel of plant names kicking around. So what happened? In some cases it was a matter of scientists "discovering" slightly different variants of the same species; in others it was owing to new descriptions of wide-ranging species in geographically diverse locations; then there have been changes in scientific understanding of relationships between species; and finally, there's plain old human error.

Kanchi Gandhi to the rescue. The senior nomenclatural registrar is part of a small community of global experts toiling in relative obscurity to bring order from the chaos and ensure that when botanists talk to each other about a plant, they can be confident they're talking about the same one. The job includes not only ensuring that newly discovered plants are named properly, but also serving as something of a global taxonomic cop tossing out names that don't follow guidelines, sending botanists flush with the excitement of new discovery back to the keyboard for another try.

In fairness to those with naming "fails" to their credit, the rules that have sprung up since Carl Linnaeus' "Species Plantarum" in the mid-18th century first described a plant using two Latin names are complex. Gandhi keeps in his Harvard Herbarium office the 203-page "International Code of Nomenclature for algae, fungi, and plants" — known as "The Shenzhen Code" for the city where this latest version of guidelines was adopted in 2018.

Before Linnaeus established his system, plants were known by what are called polynomials: long names made up of multiple descriptive terms. Before "Species Plantarum" was published, just 5,000 plants were described, Gandhi said, and talented botanists memorized them all. Linnaeus' innovation, first applied to plants and later to animals, was to create a two part name, today given in either Latin or Greek. The first designates the broader group to which the plant belongs, called a genus, and the second names the plant itself as a species.

Over the centuries since, scientists have created more than a million additional names, creating enough confusion that international collaborations of scientists arose to police the situation and write the first naming guidelines — the ancestor of today's Shenzhen Code. Today, nomenclature is regulated by the International Association for Plant Taxonomy, based in Bratislava, Slovakia, on whose Committee for Vascular Plants Gandhi sits. The committee works to ensure scientists everywhere use the same standards. It also wrestles with knotty issues such as renaming plants.

Gandhi got his start in plant nomenclature on the job. He grew up in India and got a master's degree in botany from Bangalore University in 1970. He was steered to collecting, classification, and nomenclature in his first job, surveying rainforest plants in his home state of Karnataka for a collaborative project between Indian scientists and the Smithsonian Institution. Gandhi said Dan Nicolson, the Smithsonian's project director, became a mentor and taught him the basics of plant nomenclature.

Gandhi threw himself into the work and, when the project concluded four years later, was a junior scientific assistant and responsible for roughly one-third of the resulting book. He went on to teach at Bangalore University for eight years and then headed to the U.S. in the 1980s for a doctorate, receiving a Ph.D. from Texas A&M. There, he coauthored the "Checklist of the Vascular Plants of Texas," which landed him a job at the University of North Carolina. That's where Harvard's David Boufford found him on a search to fill an opening for a Herbarium nomenclaturist. Gandhi has been at Harvard since 1995.

Gandhi, now 71, still arrives at 9 each morning and works until 9 in the evening, when he hops the Red Line to Alewife and catches the last bus to Lexington at 9:35 p.m. He routinely works weekends and credits his wife, Kasthuri, for picking up the slack at home. Despite the pace, he has no plans to slow down and said he'll continue working as long as the department will have him. "I like what I do, sharing knowledge," Gandhi said. "It's not a high-profile job, but I live simply."

Today, among his duties, Gandhi is the nomenclature and etymology editor for the massive, 30-volume "Flora of North America" whose first volume was published in 1993 and which Gandhi said he hopes will finally be finished in the next couple of years. He's also editor of the International Plant Names Index and associate editor of the journal Rhodora. He daily fields queries from scientists wrestling with knotty name issues and counts among his credits straightening out the name of the California holly for which Hollywood is likely named — he notes jokingly that movie producers have never credited his work saving "Hollywood."

Mamiyil Sabu, a professor of botany at the University of Calicuta in India, said although expert nomenclaturists are indeed rare, what really sets Gandhi apart is his willingness to help. He's aided Sabu with naming problems on several occasions and repeatedly traveled to India to lecture on the topic. He's very simple, very humble. He's ready to help everybody," Sabu said. For that work, he's been named an honorary member of the Indian Association for Angiosperm Taxonomy and in 2010, received a distinguished service award from the American Association of Plant Taxonomists. Perhaps most enduring, however, is the decision by several botanists to name plants after him — meticulously following international naming rules, of course. Earlier this year, Sabu became the eighth and latest to do so, naming a new species of ginger: *Globba kanchigandhii*.

MONTU Activities
by Shannon Kimball

The University of Montana Herbarium staff and volunteers were very focused on databasing projects this year, in an effort to increase our collection's online catalog. Our Montana vascular plants have been available to online herbaria users for years, through the Consortium of Pacific Northwest Herbaria (pnwherbaria.org). Last year we were able to add Montana mosses to MONTU's online presence. This year we've hired Montana Lichenologist Tim Wheeler to confirm identifications and update the taxonomy for our entire Montana lichen collection. We hope to have MONTU's Montana lichens online by the end of 2021.

With Herbarium Assistants Maggie Ross, Peter Donati and Dorothea Kast carrying most of the load, herbarium staff have been working to database Rocky Mountain Research Station Herbarium (MRC) vascular plants. The MRC collection has been curated over the last several decades by Peter Stickney, and contains specimens collected by Peter and many other botanists/ecologists, primarily from Region One of the Forest Service. Bringing these collections out of the cabinets and giving them an online presence will be an important addition to the pool of plant biodiversity data in Montana.

In addition to databasing, Dorothea Kast has been mounting plants that were collected by Peter Stickney over the course of his career and have been stored at his home. The plants have been preserved in the manner that Peter has perfected, with impeccable attention to specimen preparation and presentation of all important distinguishing morphological characters. The specimens are accessioned into both MRC and MONTU as they are mounted, and will be databased as we gradually work our way through the MRC collection.

The events of early 2020 cut short the activities of our two extraordinary volunteers, Jack Schooley and Christian Dupree. Both are UM Wildlife Biology students that had toured the herbarium as part of their Rocky Mountain Flora curriculum. Jack and Christian had started photographing the MRC vascular plant collection, enabling the linkage of images to online database records. Jack will graduate by the time this newsletter goes to press, but we hope Christian will return to the herbarium when our operations are again up and running.

Working from home during a pandemic. Top to bottom: Maggie Ross, Peter Donati & Christian Dupree.

Hey! Let's Remember
It's time to pay your dues!
Please see the back page for details

Montana Peat Moss

By Joe C. Elliott

Species of *Sphagnum*, "peat moss", are an ecologically and economically group of mosses. Their role in acidifying wetlands, thereby influencing the species composition of other plants, has been well established and their potential role as indicators of climate change warrants looking closely at their distribution, species diversity, ecology, and conservation status.

The Montana Natural Heritage Program (MNHP) evaluates and tracks the status of plants and animals of elevated conservation concern. Nineteen species of *Sphagnum* have been reported for Montana, of which 11 have been designated as Species of Concern (SOC) by the MNHP. The conservation status of SOC indicates the need for management consideration for factors such as rarity, restricted distribution, threats to populations, or losses in habitat.

Sphagnum, a mostly circumboreal genus, is restricted to cool, wet habitats worldwide. In Montana, *Sphagnum* habitats include wetlands that accumulate peat (fens) and margins of streams, springs, lakes, swamps, and marshes. Habitats in Montana that support *Sphagnum* occupy a relatively tiny area of the landscape, with soils, vegetation, and hydrological conditions that differ from the surrounding forest or treeless alpine areas. In contrast, the arctic and northern boreal landscapes have extensive bogs and fens underlain by permafrost that support a diversity of peatmoss species. About one-third of the forested areas of neighboring province of Alberta are covered by peatland. Centers of distribution of many Montana species are in the more-northerly latitudes, with many Montana Sphagnum species near the southern extent of their range.

The Montana *Sphagnum* flora is relatively rich (19 species) compared to the Idaho (17 species) and Wyoming (14 species), but fewer species than the province of Alberta (24 species). The most species-rich of Montana fens are Shoofly Meadows in the Rattlesnake Mountains, Mud Lake Fen near Skalkaho Pass, and Meadow Lake in the Mission Mountains, each with six species of *Sphagnum*.

Peat mat at Meadow Lake

The spatial distribution of *Sphagnum* in peatlands is directed by gradients within the wetland environment, with many species occupying microsites along wet-to-dry gradients, nutrient gradients (closely correlated with pH), and the degree of exposure to sunlight . Through modification of the pH of the growth medium, *Sphagnum* directs ecological succession in peatlands and affects the species composition of vascular plants and other mosses.

Fens often have micro-relief of small raised areas (hummocks) and lower, wetter areas (hollows). Hummocks reflect moisture and pH gradients with the wettest microsites being at the lower part of the hummocks and the driest (and most acidic) at the top. The lowest sites in peatlands typically are wettest for the greatest part of the growing season and have higher pH values than the more elevated sites on hummocks, which are acidified by *Sphagnum*-mediated cation exchange. Studies in Alberta found that in rich fens, the height above the water table is the most important environmental gradient directing species distribution within microsites.

Typically, *Sphagnum* species occupy microsites along a hummock to hollow gradient, with some species predictably near the tops of hummock and other species occupying hollows or intermediate locations.

Montana *Sphagnum* species have been scarcely studied. Over the last few years I have visited fens and collected disjunct and rare *Sphagnum* species for the first time in the state. There are many fens that I have yet to visit. I encourage any of you herbarium aficionados, coming across peat moss, to collect it and send it to me or better yet, identify it yourself. There is still a lot of glory to be had by finding rare species, not to mention the ecstasy of being at one with a pristine fen with bog lemmings and grizzly bears scurrying around in the underbrush.

Loans for Research

Don Mansfield – College of Idaho: Various Eriogonum species, for systematics research.

John Spence, Glen Canyon National Recreation Area: One collection of Pseudoleskea, for identification.

Gifts and Exchanges

Dr. Stephen Downie, University of Illinois: Gift of 3 type collections of *Musineon glaucescens*.

Jim Smith, Snake River Plains Herbarium, Boise State University: Gift of 3 type collections of *Musineon glaucescens.*

B. Ernie Nelson, Rocky Mountain Herbarium, University of Wyoming: Gift of 1 Isotype of *Musineon glaucescens.*

Dr. Leigh Johnson, Stanley Welsh Herbarium, Brigham Young University: Gift of 1 Paratype Collection of *Musineon glaucescens.*

Carolyn Ferguson, Kansas State University: 2 *Phlox* collections, gifts for determination.

David Murray, University of Alaska: 1 collection of *Carex chalciolepis* and 1 collection of *Carex atrosquama*, gift for ID confirmation.

Barbara Thiers, New York Botanical Garden: Gift of 79 Lesica duplicate specimens from Montana and 1 Isotype Collection of *Musineon glaucescens.*

David Giblin, University of Washington Herbarium: Gift of 107 duplicate Lesica specimens from Montana.

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

Name:_____
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Missoula, MT 59802

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