Montana Natural History Center

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MONTANA Naturalist

TO PROMOTE AND CULTIVATE THE APPRECIATION, UNDERSTANDING AND STEWARDSHIP OF NATURE THROUGH EDUCATION

Ma's, the Prairie Turnip:
Digging Into the "Original Root" of Blackfeet Mythology

The Weird World of Slime Molds | Diversity in the Outdoors | Pandemic Seasons | Observing Owls

MONTANA Naturalist Fall/Winter 2020

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Features

Cover – A Snowy Owl *(Bubo scandiacus)* stands out among dried vegetation during a snow-free winter in the Mission Valley. Photo by Steven Gnam, gnam.photo.

Departments

Montana Natural History Center
Connecting People with Nature

120 Hickory Street, Suite A
Missoula, MT 59801
406.327.0405
MontanaNaturalist.org

tidings

PHOTO BY ALLISON DE JONG

On one of many adventures up Pattee Canyon this summer, reveling in its lush, wild beauty.

The last time I penned my Tidings, I was in my office at the Montana Natural History Center. Six months later, I'm writing this in my (admittedly cozy) home office/bedroom, thinking over the upheavals of this past half year. Besides choreographing the intricate dance of two working-from-home parents and caring for an energetic toddler, I've spent a lot of time exploring my neighborhood with said toddler—we know where all of the fruit trees are: plum, apricot, cherry, apple. We have thrown more rocks into rivers, streams, and puddles than I can count; Rowan, if you ask him, will say "Forty-nine!!" Rowan recognizes the calls of chickadees, nuthatches, crows, and pigeons; can differentiate a spruce cone from a ponderosa cone; and enthusiastically identifies maple, elm, oak, spruce, larch, and mountain ash (rowan!) trees.

My little family has been paying attention, these past months. Not that we didn't before, but without excursions to stores or restaurants or on the bus, we've been noticing more intricate details of our backyard, our neighborhood, Mount Sentinel, Pattee Canyon. And, as always happens when one pays attention, we've begun to connect, and care, in deeper ways, too. We revel in the chickadees bobbing on our sunflowers to feast on the seeds. In the deer wandering Mount Sentinel's narrow trails. The blush of green and, soon, gold, on the larches up Pattee Canyon.

And so, in this issue, we've reveled a little. We've taken notice. We've delighted in a diversity of people and places and creatures, because it helps ease the challenges of physically distancing ourselves from people and spaces and experiences we love—and miss.

So read on, and share the joy of our staff observing swallows swooping against the sunset and owls curiously watching their observers (page 12). Dive into the strange world of slime molds, with their surprisingly superlative adaptations (page 8). Share the experiences of two naturalists who reflect on the pandemic through the lens of places dear to them (pages 24 and 27). Read the stories of several special people who have given time and talent to MNHC over the years: Christine Wren, Bill Gabriel, Kallie Moore, and Breanna McCabe (pages 20-23). And listen to some diverse voices from our BIPOC (Black, Indigenous, and people of color) community: Rosalyn LaPier (Blackfeet/Métis), who shares the mythology and biology of a plant sacred to the Indigenous peoples of the Plains; and Alex Kim, a Korean-American transplant to Missoula who is bringing local BIPOC outdoors and increasing diversity in our wild spaces.

These are difficult times. But we can ease the way, for ourselves and those around us, by noticing, delighting in, and caring for the diversity and intricacies of the natural world—and the creatures and people who inhabit it.

Allison De Jong
EDITOR
adejong@MontanaNaturalist.org

Ma's, Montana's Original Plant-Based Food

BY ROSALYN LAPIER

"Now I shall give you a root-digger, and you may go out to dig roots; but you are not to dig that big turnip there, because it is medicine," said the Moon to her new daughter-in-law Feather Woman.

SMITHSONIAN AMERICAN ART MUSEUM

Women and Plants

The most widely harvested plant-based food on the northern Great Plains before interaction with Europeans or Americans was the tuber *Pediomelum esculentum*—or *Ma's* (pronounced "mahs," with the vowel like the "ah" in "father"), as it is called by the Blackfeet.

Pediomelum esculentum, formerly called *Psoralea esculenta*, is from the Fabaceae or legume family. It is native to the Great Plains and it grew all across the prairies in (what is now) central and eastern Montana.

A common misconception about Indigenous people of the northern Great Plains is that they only ate meat, such as bison *(Bison bison)*, elk *(Cervus canadensis)* or white-tailed deer *(Odocoileus virginanus)*. But this is incorrect. According to anthropologist Eugene Hunn, Indigenous peoples of the past probably "obtained in the neighborhood of 70 percent of their food energy needs from plant foods harvested by women."

Recent research has hypothesized that millions of *Pediomelum esculentum* tubers were gathered each year by Indigenous women on the Great Plains. If Indigenous people ate plant-based diets, and *Ma's* was such a widely harvested plant, how is it that we know so little about *Pediomelum esculentum*?

The most likely reason is that the first European and American explorers, traders, and settlers were men. These men usually talked to, observed, and recorded the lives of Indigenous men. They rarely interacted with Indigenous women. If they had they would have learned about the plant-based foods and medicines that women harvested from the wild or grew in their gardens.

Contemporary scientists are now working to correct this bias in the historical narrative and focusing new research on the lives of Indigenous women. They are learning that the prairies were the realm of women harvesting plant foods and medicines, not just men hunting bison.

The story of Ma's *centers on a human, Feather Woman, who married a star, Morning Star, the son of the Moon and Sun. Feather Woman moved to the Sky World to live with her new husband and in-laws. The Moon became her mentor, teaching Feather Woman about the various plants in the Sky World, the importance of water, and several religious rituals.*

Ma's, the Original Root

I learned about *Pediomelum esculentum* from my Blackfeet grandmother Annie Mad Plume Wall. (She is profiled in "Blackfeet Botanist," *Montana Naturalist*, Fall 2005). My grandmother shared stories of this essential plant food, its mythological origin story, and its importance to Blackfeet religion.

The Blackfeet word *Ma's* translates as "root." This may seem like a simple name, but it is the "original root" of Blackfeet mythology and their most important food item.

It became widely known by its French name *pomme-de-prairie* or *pomme-blanche*—prairie apples or white apples—after first contact. And then early Americans called it "prairie turnip," which remains its common name today.

Moon also gave her daughter-in-law a digging stick for harvesting, but instructed Feather Woman not to dig up a particularly large Ma's *in the Sky World. Of course, as a human, Feather Woman's curiosity grew and one day she dug it up.*

Harvesting Roots

Pediomelum esculentum is a perennial that grows in the early summer. The plant itself is small, usually only two to six inches tall, with palmate leaves and densely packed light blue flowers. It has a short life span before going dormant. It can grow each year, or in times of drought remain dormant for up to two years. The tuber is harvested when the plant begins to seed and before its leaves and stems dry up and blow away.

Recent research tells us that *Ma's* is well adapted to live in a prairie environment and can survive drought, hot summers, animal grazing, prairie fires, major summer hail storms, and harvesting by humans. Scientists theorize that Indigenous women harvested *Ma's* in different locations each year, because it can take two to four years for *Ma's* tubers to become mature enough to harvest. Indigenous women likely rotated their harvesting to different patches each year on a three-to-five-year rotation schedule, never using the same *Ma's* patch two years in a row.

Ma's disperses its seeds via wind in the same way a tumbleweed does, depending on strong winds to uproot the plant and blow it across the prairie, scattering seeds as it goes. Scientists theorize that Blackfeet and other Indigenous women probably re-seeded their *Ma's* patches each year by refilling each hole with seeds and soil.

We know that Indigenous women wait until *Ma's* is seeding before they harvest the tuber. With millions of holes being dug each year, it makes sense that Indigenous women would reseed into the same hole from which they had just dug the tuber. They could then return to the same *Ma's* patch every three to five years, and teach the next generation their methods of sustainability.

Feather Woman eventually returned to Earth and brought with her numerous wonderful objects important to humankind, which the Moon and other deities shared with her, including Ma's *and a digging stick used by women to harvest.*

MATT LAVIN, FLICKR.COM

Opposite page: George Catlin described Chin-cha-pee, Assiniboine, in 1832, as "fine looking...in a handsome dress of the mountain-sheep skin, holding in her hand a stick curiously carved, with which every woman in this country is supplied; for the purpose of digging up the...prairie turnip."

Left: ***Pediomelum esculentum*** looks like the familiar lupine, or ***Lupinus spp.***, which is poisonous.

Digging Roots

Historically, Indigenous women and girls harvested *Pediomelum esculentum*. It has a brief harvesting season, because it has a short growing season. Once the plant goes dormant, the leaves and stems blow away and leave little evidence of its existence, so Indigenous women could not return to harvest at a later time. This is probably why it was important to know exactly where to go each season to harvest this valuable resource.

Indigenous women made digging sticks out of green ash *(Fraxinus pennsylvanica)* or other hard wood. They were about three to four feet in length and their tips were sharpened and then hardened over fire. Some digging sticks were personalized with carvings, bone handles, or decorations. Digging sticks became lifelong personal possessions and were highly prized.

An Indigenous woman would position her stick next to the plant and move the stick back and forth to push it into the ground. The tubers, usually the size of a small egg, were not far below the surface. Indigenous harvesters removed the outer covering of the tuber to expose the white inner flesh, then used the long taproot to braid together dozens of tubers to preserve and store them for future use.

MATT LAVIN, FLICKR.COM

Preserving & Eating Roots

Blackfeet and other Indigenous women historically preserved plants for food and medicine by drying them. The braids of *Ma's* tubers were commonly three feet long, but could be up to six feet long, and were hung up to dry in the sun.

Once a plant was dried it could be stored for years. Dried *Ma's* could be rehydrated whole or pounded into a flour. It was usually boiled and added whole into a soup or stew or the flour was added as a thickener.

Pediomelum esculentum is very nutritious. It is high in carbohydrates, protein, vitamins, and minerals. Its high-quality protein is similar to the levels found in quinoa *(Chenopodium quinoa)*. And it has high levels of iron, magnesium, zinc, and potassium.

Ma's tastes mild or plain, such as other carbohydrates like polenta or potatoes. Its flavor can be enhanced with spices or by adding it to other foods. Early American explorers and settlers commented that Indigenous people could subsist on *Ma's* for a long time without any meat, and noted that *Ma's* was good to eat in any season of the year.

Ma's became a popular trade item because of its longevity when dried, easy rehydration, and taste. In the mid-19th century four arm's-length braids of *Ma's* could be traded for one basket of shelled corn or a bison robe on the Missouri River.

STATE HISTORICAL SOCIETY OF NORTH DAKOTA: 00086-0391

Above: *Pediomelum esculentum* stems usually emerge in May and June, the flowers in June and July. It grows in low-elevation grasslands east of the Continental Divide from northern Saskatchewan south to Oklahoma.

Left: Hidatsa elder Owl Woman with strings of dried *Pediomelum esculentum* gathered on the North Dakota prairies near the Missouri River in 1916.

Opposite center: Non-Native Americans should avoid harvesting *Pediomelum esculentum* because it is a culturally important plant to Native Americans and is rare in many locations on the prairies.

Feather Woman returned to Earth as the teacher and she taught women how to harvest and preserve Ma's, *berries, and other plants.*

Ma's came from the Sky World and because of this the Blackfeet revere it. Blackfeet women were careful not to overharvest it. They managed the landscape, through fire or reseeding, to keep it abundant.

Revering Roots

Ma's was not just a staple food. The Moon called it "medicine" or sacred.

The Blackfeet and other Indigenous people view certain plants, animals, and other natural resources as sacred. A plant or animal is revered because it is a gift from the divine, a part of an origin story, introduced from the supernatural realm, or used for spiritual healing.

Indigenous people will often have restrictions on the use of these plants, either not harvesting them at all or setting restrictions over harvesting. Or they might restrict who can harvest and then use them. They will also develop land management strategies to sustain their abundance within certain ecosystems. Understanding how these ecosystems work is key to sustainable use.

This blending of ecological knowledge and religious understanding is called "traditional ecological knowledge."

ALEXANDRA GROSS, SPEAKWITHYOURFOOD.COM

Feather Woman's most important role was teaching the Blackfeet about the O'kan, *or sundance. Her story is retold and reenacted, similar to a Passion play, every summer to the next generation at the* O'kan.

Religious rituals like the *O'kan* often incorporated and celebrated certain plants, such as *Pediomelum esculentum*.

(955-543) MONTANA HISTORICAL SOCIETY RESEARCH CENTER PHOTOGRAPH ARCHIVES, HELENA, MT

Ma's Today

Ma's is no longer a staple in the Blackfeet diet. This is due to land loss, colonization, and the creation of the reservation that is near the mountains. Elders on the Blackfeet reservation rarely harvest *Ma's* today, because it grows on the prairies in their former homelands, not up against the mountains. Modern farming and ranching have changed the natural landscapes where it grows as well. It is still abundant in small undeveloped areas on the central and eastern Montana prairies, and Indigenous people in those regions still harvest it today.

Despite this, each summer its story is told within an elaborate ceremony at the *O'kan,* or sundance. Blackfeet women play the central role within the *O'kan*. They serve as its religious leader, or medicine woman, as instructed by the Moon. They incorporate the imagery, symbolism, songs, and story learned from Feather Woman as part of their regalia for the sundance, such as wearing a headdress with eagle plumes that symbolize the leaves of the *Ma's* and walking with the digging stick given by the Moon.

There is hope for the future of *Ma's*. Many young Blackfeet women are interested in learning about the stories of *Ma's*, Blackfeet plant-based foods, and the role of women in religious practice. They are interested in restoring our natural landscapes so that native plants can flourish. They are interested in revitalizing our traditional Blackfeet foods systems for both human health and the health of the planet. And they are showing their interest by learning traditional ecological knowledge from elder women in the tribe and helping pass that knowledge to other young women and girls.

—Rosalyn LaPier (Blackfeet/Métis), Ph.D., is the author of Invisible Reality: Storytellers, Storytakers and the Supernatural World of the Blackfeet *and an associate professor of Environmental Studies at the University of Montana.*

BEWITCHING BLOBS:

The Weird World of Slime Molds

BY DREW LEFEBVRE

What do you call a creature that is intelligent but has no brain, can move but has no muscles, can survive being cut into millions of pieces, and consists, amazingly, of just one single macroscopic cell? If this were a riddle, here's where you'd be treated to the punchline. But this is no riddle, just an introduction to one of our planet's most overlooked biological marvels. Meet the slime mold.

It's true: the name could be more appealing. Slime molds were once thought to be a type of mold and so, like all molds, were assigned to the Fungi kingdom. We now know that these creatures aren't fungi at all, and today scientists group them with the kingdom Protista, that catch-all for organisms that are neither animals, nor plants, nor fungi. There's debate over the usefulness of this classification: protists do not share a distinct common ancestor, and therefore don't form their own natural taxonomic group. This means that a given protist may be more closely related to animals or to plants than they are to other protists, making for a problematic category indeed. But isn't one of the most satisfying things about the natural world its reluctance to fit neatly into rigid categories? For now, Protista remains the best we can do for slime molds.

Slime molds are divided into two basic groups: *cellular* and *acellular*. Cellular slime molds remain microscopic for their entire life cycle, and are rarely observed in the wild (though they do have some fascinating properties). On the other hand, acellular, or *plasmodial*, slime molds are easily encountered in common environments such as leaf litter, rotting logs, tree bark, and similar sites, generally in temperate climates. It's likely you yourself have encountered a plasmodial slime mold but, like many early scientists, initially mistook it for a fungus. The first time you knowingly meet a slime mold, you just might be awed by its unique structure and multifaceted life cycle.

A plasmodial slime mold begins its life as a microscopic amoeba, rummaging through its environment in search of food: bacteria, fungal spores, and other microorganisms. A unicellular creature, the slime mold reproduces through basic cell division and leads a relatively uneventful life as a free-wheeling blob of protoplasm surrounding a nucleus. Yet this simple blob is capable of impressive behavior. If conditions change and the blob finds itself in a wetter environment, it will develop two whip-like tails, *flagellae*, used for swimming and for moving food particles closer. Once the humidity drops, it will regain its amoeboid form and resume crawling instead of swimming. And in very adverse conditions—severe dryness, extreme temperatures, or food scarcity—the slime mold will assume yet another form. Secreting a protective wall around itself, it enters a state of dormancy that can last a year or more, only becoming active again once conditions have improved.

Yet it's when two of these amoebas meet that things really start to get interesting. If genetically compatible, the two will fuse into one. Though the creature remains a single cell, it now begins to undergo nuclear division, dividing its nucleus again and again. This unicellular creature, now containing multiple nuclei, is known as a *plasmodium*. The plasmodium moves through its environment consuming as much as possible, experiencing enormous growth which, in turn, enables it to eat even more and grow even larger. It continues this process of growth, creating more and more nuclei within its single cell. Incredibly, every division is synchronous, with each nuclei dividing at the same time across the entire cell. Eventually, the plasmodium grows to the point where it is easily visible to the naked eye as a macroscopic, gelatinous mass covering the ground. Some organisms can attain a surface area of one square meter or more and contain up to several million nuclei! These slimy creatures are often translucent, white, or yellow, though some species may be bright shades of orange, pink, red, or green.

What does this mean for Montana naturalists? For starters, a large plasmodium provides the rare opportunity to view a single-celled organism with the naked eye. It also offers a unique glimpse into this creature's strange means of locomotion. Like most people, you're likely used to seeing macroscopic creatures propel themselves using limbs or, at the very least, muscles. But the unicellular plasmodium can afford no such luxuries, and moves through its habitat using a process called *protoplasmic streaming*. Like toothpaste through a tube, protoplasm squeezes from the rear of the creature toward the front, facilitating movement and enabling the plasmodium to creep along at about

PHOTO: DREW LEFEBVRE

one centimeter per hour. With some patience, you could watch one move across the forest floor.

Much like their microscopic former selves, plasmodia are quite responsive to their environment. They too can enter a dormant phase, taking on a hardened, protective form that enables them to outlast harsh conditions. They also respond to stimuli, moving away from light and toxic substances and moving toward nutrients (in the lab, oatmeal is their favorite). So far this may not sound too impressive, but scientists have shown that these mundane behaviors may work together to create a type of primitive cognition, suggesting that intelligence may not be confined only to those of us with brains.

Scientists in Japan have demonstrated that a species of slime mold can not only solve a maze, but can find the shortest path through it. Building on these results, another team of researchers conducted a now-famous experiment in which a slime mold was able to construct a model of Tokyo's subway system. Small piles of oatmeal were used to represent cities and towns, and initially the plasmodium dispersed through them evenly. Within several hours, however, the slime mold began to refine its pathways, strengthening some and pruning those no longer needed. After about a day, the plasmodium had constructed a network that looked almost identical to the actual railway system surrounding Tokyo, one which teams of engineers had spent years refining into the most efficient and economical route possible. These astonishing results have been repeated using other cities, and have prompted researchers to propose using slime molds to help plan future construction projects.

Plasmodia do more than just make their way *toward* certain substances; they also *retreat* from other ones. Recently, a research team in France set up a scenario in which a slime mold had to cross a bitter yet harmless substance in order to reach an oatmeal reward. Initially, the plasmodium refused. But after a few days of exposure, it stopped responding negatively to the bitter substance, crossing it speedily to get to the oats on the other side. These results are exciting because they show evidence of what psychologists call *habituation*. After realizing that the disagreeable substance was ultimately harmless, the slime mold was able to ignore the negative stimulus and push on through to the reward. You might do something similar if you purchase a new clock that ticks loudly: at first the sound is bothersome, but soon enough you find yourself ignoring it.

Evidence also suggests that a plasmodium can retain its habituation after being in a hardened, dormant state for a year or more, despite the extensive physical and chemical changes that such a state requires. Even more astonishing: if you cut a plasmodium into thousands of pieces, habituate half of them, and then fuse each one back together with an unhabituated piece, the new entities will all demonstrate habituation. And they'll remain that way even if you cut them apart again. Somehow, one slime mold is able to transfer its habituated response to another.

How can it perform what looks a lot like learning when its structure is so malleable that you can cut it into millions of pieces without consequences?

Habituation is considered to be one of the most primitive forms of learning. Those of us with brains and nervous systems do it all the time. But how can a unicellular creature with no neurons, one that cannot even be reliably assigned to a taxonomic kingdom, engage in habituation? How can it perform what looks a lot like learning when its structure is so malleable that you can cut it into millions of pieces without consequences?

Some scientists believe that slime molds are capable of primitive cognition, exhibiting basic intelligence despite their simple form. There's no definitive explanation of how this is possible, but we do have some leads. Some researchers have suggested that a plasmodium's structure may form complex, smart networks that process sensory information and feed it to the nuclei. Other scientists point to experiments showing that plasmodia can keep track of time and even anticipate events: perhaps slime molds use the regular rhythm of their own protoplasmic streaming to create an internal clock, and use it to make inferences about their environment. Lastly, it's worth considering that a better way of thinking about a slime mold might be as a superorganism. Much like an ant colony or bee hive, a plasmodium consists of numerous individual nuclei, all communicating and cooperating for the good of the whole. Perhaps this collective behavior forms the basis of their plasmodial intelligence.

PHOTOS FROM LEFT: RICHARD DROKER, FLICKR.COM; KURT BAUSCHARDT: FLICKR.COM; URMAS OJANGO, FLICKR.COM RICHARD DROKER, FLICKR.COM; NIKOLAY KASHPOR, CC

Let's jump back into natural history for just a moment. Incredibly, the plasmodial slime mold's life cycle is not yet complete. Once the plasmodium has run out of food, or possibly in response to other environmental triggers, a new phase begins: *frutification*. Unlike other structural shifts (growing flagellae, going dormant) this one is irreversible: once the process of frutification begins, it cannot be stopped. The plasmodium ceases feeding and makes its way to a dry, elevated, well-lit location. It becomes immobile, dissolves the pathways once used to stream protoplasm, and draws all of its slime up to create a series of protrusions or bumps: the *sporangia*, or spore capsules.

This is the time of its life when you are most likely to see a slime mold: elevated in plain sight, unmoving, with a bright pattern of delicate, squishy sporangia. Look for them in conifer forests, on leaf litter, rotting wood, or even living bark. The sporangia take a variety of shapes depending on species: bulbous, stalked, threadlike, foamy, or a range of other forms. They may change color as well. But no matter what they look like, they behave similarly. The sporangia mature, dry, and crack open, revealing powdery spores that spread on the wind or with the assistance of small insects. These spores may survive ungerminated for a long time—75 years in one known case. When conditions are just right, they germinate, releasing one or more amoebas into the world, beginning the cycle anew.

This rollercoaster of a reproductive cycles begs the question: Why so complex? As is nearly always the case, it seems to come down to evolutionary fitness. A large plasmodium can travel further in search of food than a microscopic amoeba, and can crawl higher up off the ground to disperse its spores over a greater distance. Add that to its peculiar form of primitive cognition, and it seems the slime mold may just have perfected a few life strategies to navigate the ups and downs of life on Earth.

What can we learn from slime mold? The more we find out, the more humbled we may feel about the scope of our own human intelligence. Perhaps centralized brains aren't the only path to cognition. It may be awhile before all our questions are answered, but until then, slime molds remain all around us. Why not head into the woods with your magnifying glass and see for yourself!

—Drew Lefebvre is Museum Programs Coordinator at MNHC. She recently encountered a plasmodial slime mold for the first time, and now has a new naturalist obsession.

PHOTO: MUSHROOMOBSERVER.ORG, RICH HOYER

Are you ready to grow some slime molds of your own?

It's surprisingly easy to cultivate these fascinating creatures at home, where you can get an up-close look at their life cycle. All you need is a knife or screwdriver; clear, shallow containers with lids (Tupperware or petri dishes); paper towels; and distilled water.

COLLECT

Use the knife or screwdriver to carefully remove a piece of outer bark, about the size of a postage stamp, from a tree. Deciduous trees with rough bark tend to produce more species of slime mold, but feel free to experiment. Be sure not to cut into the living layers of the tree, which would damage it—remove bark just from the dead outer layer. You may also want to try other material: bark from a dead tree, rotting wood, leaf litter, etc.

PREPARE

At home, cut a piece of paper towel to line each of your containers. Place each specimen in a separate container and label it with the date, location, and tree type. Fill each container with distilled water until the bark is completely submerged and allow it to sit overnight. In the morning, pour off the excess water, make sure the lid fits tightly, and set your specimen somewhere at room temperature with decent light, where it will be undisturbed.

OBSERVE

Take a look at your specimens after a few days. Larger slime molds may take weeks or months to develop, but some of the smaller species may develop quickly. Use a hand lens or microscope if you have one, and try to keep the lid on while observing, so they don't dry out. If you aren't seeing much, get in the habit of observing your specimen about once a week. Don't forget to add more distilled water when your specimens begin to dry out.

PRESERVE

Once your bark develops slime molds, keep an eye on them! If your specimen develops sporangia, you may want to remove the lid of your container to prevent mold from growing on them. To preserve your specimen, wait until the sporangia have matured and are showing their spores, then carefully remove it from the container and allow it to fully air dry. Your slime mold specimen can now be mounted, glued in a collection box, or otherwise placed in a safe, dry spot for observation and study.

SHARE

Show off your colorful once-celled creatures! We would love to see what you cultivate. Email your photos to dlefebvre@montanaturalist.org or share them on social media and tag the Montana Natural History Center (@mtnaturalhistorycenter or #MNHC).

Avian Observations from MNHC Staff

8 August 2020

Sunset at the Ducharme Fishing Access on the south end of Flathead Lake

Ser Anderson, Teaching Naturalist

I didn't expect to see much: late summer, late hour, not the best time for bird watching. But over the marsh, a dark cloud swoops. Hundreds, maybe thousands, of dark shapes against the cloud-streaked, color-tinged, darkening sky. The flock moves closer and each dark shape becomes a bird, a swallow.

I have never seen so many swallows at once. They move in concert, swooping as a flock across the sky, drawing images in the air with their sheer numbers. Each bird has its individual path as well, chasing insects. They never collide.

Except...

A larger bird, maybe twice the size of the swallows, slices through the flock on long, pointed wings. It is probably a merlin. Both swallows and merlins fly the same way: speed, agility, chase, evasion, capture. From the ground, I do not see the exact moment of contact, but the merlin emerges from the flock with a swallow clutched in its talons and soars off.

10 August 2020

An Evening of Owls at Ninepipe National Wildlife Refuge

Pat Little, Front Desk Associate

Short-eared Owls are such cool birds! When our friend Andrea said they had seen some near Ninepipe NWR we decided to go and look for ourselves. These owls are crepuscular—that is, they are most active at twilight—so we packed a picnic dinner and set off mid-afternoon to go owl hunting.

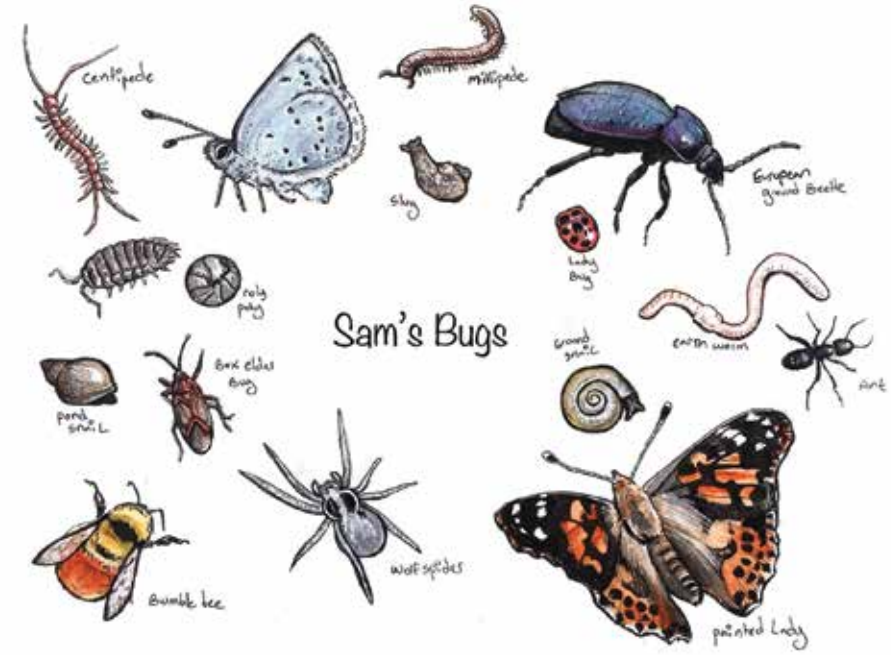
About a half hour before sunset we were touring the back roads, and coming over a rise we found half a dozen Short-eared Owls—some were sitting on fence posts, and others were flying around over the adjacent fields and the road.

One owl had flown down to the dirt bank beside the road—we inched our way towards it and were able to get very close. It showed a lot of interest in us, tilting its head in what seemed to be an attempt to get a better look, watching us for quite awhile.

What a great evening!

What have you observed outside lately? What wild creatures, flora, and weather exist near your home? What makes your place unique?

Tell us about the natural history of your place—and it could get published! Send your Naturalist Notes (up to 350 words) and a photo or drawing, if you wish, to Allison De Jong, Editor, at adejong@MontanaNaturalist.org.



Bug Love

STORY AND PHOTOS BY JENAH MEAD, MNHC TEACHING NATURALIST

This summer, my three-year-old son fell in love. One day, there was a large European ground beetle crawling outside our front door. "Can I hold it?" he asked, cupping his small hands together. I obliged and the beetle quickly began to climb him. Delighted, he cried, "He's tickling me!" After that, Sam stopped for every invertebrate he saw. And he saw a lot.

He watched caterpillars crawl across trails. He searched for caddisfly larvae in creek beds. He turned over every rock and log he saw to uncover roly polys, snails, and spiders. He marveled over millipedes and tried to count how many legs they had. When a little blue butterfly perched on his finger, he sang it the ABCs. When it rained, he searched for worms on the sidewalk to carry back to the earth. He brought me slug after slug to hold.

To see the world through a child's eyes is magic. It fills you with wonder and hope. I believe the answer to the world's problems can be found somewhere in the gentleness my son shows to ants.

Children of all ages can keep a nature journal! A simple blank notebook will do - for each entry, note the date, location, and weather, then add a drawing and/or a written description of whatever fascinating animal, plant, rock, etc., you're observing.

Kids' Corner

Greta Shepard, age 12, was inspired by an art class she took from Kate Davis at the Missoula Art Museum a couple of summers ago, and has loved creating art ever since.

Ural Owl. Pencil drawing by Greta Shepard.

Calling All Kids!

Do you have any nature art, photography, poetry, or stories you'd like to share? We showcase kids' work in every issue in our "Kids' Corner"—and here's your chance for that work to be yours!

Send submissions to Allison De Jong, Editor, at 120 Hickory Street, Missoula, MT 59801 or by email to adejong@MontanaNaturalist.org.

PHOTO CONTEST!

CALLING PHOTOGRAPHERS OF ALL AGES! Submit photos of your naturalist observations/discoveries to *Montana Naturalist's* photo contest; winning entries will be showcased in our spring/summer 2021 issue. The winner of each category will also receive a one-year family membership (or free renewal for current members)! Post your photos on Facebook or Instagram and tag the Montana Natural History Center and/or #mnhcphotocontest. You can also email your photos (with captions) to contest@MontanaNaturalist.org, and please note which category (or categories) you're submitting to. You may submit multiple entries. Please post or submit photos by February 15th, 2021.

CATEGORIES:

Montana landscapes
Montana animals
Montana plants
People in nature (preferably exploring Montana!)
Youth photography (photographer must be 15 or under; photos can fit in any of the other four categories)

We can't wait to see what you're observing!

Programs for Kids

At the time of publication we are not currently offering our in-person **miniNaturalist** and **Saturday Kids' Activity** programs. Please check our website and Facebook/Instagram for updates.

MNHC PHOTO

Join Us for Virtual & In-Person Homeschool Naturalist Programs!

We are excited to announce the expansion of our Homeschool Program offerings this year. While you don't need to be a homeschooler to participate in these programs, you can expect the same level of experiential learning and naturalist knowledge that has consistently served and supported our homeschool community. We offer programs for pre-K through 8th grade.

This year's theme of **Nature Explorations** will provide a holistic look at how we can explore the world around us. **Each program is unique and designed to support and complement all programs in this series.** We hope you join us for one or more! Learn more about our various offerings and sign up at MontanaNaturalist.org/homeschool/.

COST:

Naturalists and Outdoor Naturalists: $90/student for 9 classes; registration required.

Museum Naturalists: $15/family/month; drop-in program.

Naturalist Explorers: $45/student/month; each month includes 3 classes. Registration required.

	Tuesday	Wednesday	Thursday	Friday
1st week of each month		**Outdoor Naturalists 1-2:30 p.m.** (Local Natural Area)	**Naturalist Explorers 10-11 a.m.** (Virtual) **1-2:30 p.m.** (MNHC)	**Museum Naturalists 10-11 a.m.** (MNHC) 
2nd week of each month	**6-8th Naturalists 10-11:30 a.m.** (MNHC) 		**Naturalist Explorers 10-11 a.m.** (Virtual) **1-2:30 p.m.** (MNHC) 	**PreK-K Naturalists 10-11:30 a.m.** (MNHC) **1st-5th Naturalists 10-11:30 a.m.** (MNHC) **1-2:30 p.m.** (MNHC)
3rd week of each month	**1st-5th Naturalists 10-11 a.m.** (Virtual) 		**Naturalist Explorers 10-11 a.m.** (Virtual) **1-2:30 p.m.** (MNHC)	

ART BY JENAH MEAD

MNHC is currently closed to the public, but we hope to reopen sometime this fall to showcase our new exhibit: Montana's Ancient Past. Please check our website and social media for updates.

Admission Fees:
$4/adults (18+), **$1**/children (4-18), **$8**/family rate, **Free**/children under 4, **$3**/seniors and veterans

FREE admission for MNHC members, ASTC Travel Passport Members, and EBT card holders!

Programs and events held at MNHC, 120 Hickory Street, unless otherwise noted.

Visit MontanaNaturalist.org to register for programs and become a member. For more information, call MNHC at 327.0405.

Join Us for Montana Nature Week!

In place of our annual Banquet and Auction fundraiser this year, we are excited to invite you to **Montana Nature Week!** Join us for online presentations from renowned scientists and naturalists, workshops from MNHC's talented staff, storytelling featuring MNHC founders, activities for the whole family, and more! You'll also have the opportunity to bid online for some incredible auction items and a chance to win amazing door prizes each evening. Get your tickets and check out the schedule at MontanaNaturalist.org.

GOOD FOOD STORE

The Montana Natural History Center
thanks the
GOOD FOOD STORE
for sponsoring our 2020 lecture series -
Treading Lightly: Learning from Nature as Observers and Scientists
Stay tuned for rescheduled lectures coming soon!

PHENOLOGY FOR OCTOBER-MARCH

OCTOBER:

Western larch needles turn golden and fall

Ursa Major (the Big Dipper) is at its lowest point in the sky

NOVEMBER:

Snowshoe hares change from brown to white

Elk and deer move to their winter ranges

DECEMBER:

Pygmy Nuthatches huddle together in hollow roosting cavities

Small mammals tunnel under the snow in search of food and shelter

JANUARY:

Bison shovel snow with their heads to get to the grasses beneath

American Dippers continue to feed in open water

FEBRUARY:

Bear cubs are born

Snow flies can be seen crawling over the snow

MARCH:

Beavers get to work during spring break-up

Cottonwoods produce resinous buds

COTTONWOOD: PICTOSCRIBE, FLICKR.COM; GRIZZLY BEARS: NPS/ERIC JOHNSTON; BISON: YNP, DIANE RENKIN; NUTHATCH: ALAN SCHMIERER, FLICKR.COM; SNOWSHOE HARE: DAVE DOE, FLICKR.COM; BIG DIPPER: DENNIS BEHM, FLICKR.COM

Adult Programs

Geology Tour

MNHC PHOTO

SEPTEMBER

September 1 - November 17
Fall Online Montana Master Naturalist Course, Tuesdays, 4:00-6:00 p.m., plus in-person field weekend September 19-20. $330; $300 MNHC members. FULL.

September 17 & 24
Geology Tour by Car and Foot with Bruce Baty, 2-Part Class, 10:00 a.m-12:00 p.m. $55; $50 MNHC members. FULL.

OCTOBER

October 7-9
Montana Nature Week, 7:00-8:00 p.m. ***Join us online for this year's virtual fundraiser!*** $50 regular registration/$5 living lightly registration. For more information and to purchase tickets visit MontanaNaturalist.org/montana-nature-week/.

October 12, 19, 26
Field Notes Writing Workshop, 6-Part Class, 10:00-11:30 a.m. $90; $70 MNHC members. FULL.

October 22 & 29
Geology Tour by Car and Foot with Bruce Baty, 2-Part Class, 10:00 a.m-12:00 p.m. $55; $50 MNHC members. Registration required. FULL.

October 21, 28, November 18
Online Nature Photo Critique Class with Neil Chaput de Saintonge and Jessica Carter from the Rocky Mountain School of Photography, 3-Part Class, 1:00-2:30 p.m. $60; $55 MNHC members. Registration required.

JENAH MEAD

NOVEMBER

November 2, 9, 16
Field Notes Writing Workshop, 6-Part Class, 10:00-11:30 a.m. $90; $70 MNHC members. FULL.

November 24 - December 17
Online Certified Interpretive Guide Training Course, Tuesdays & Thursdays, 10:00 a.m.-2:00 p.m. $235; you can pay an additional $150 to become an official Certified Interpretive Guide through the National Association of Interpretation. Registration required. Visit MontanaNaturalist.org for more information and to register.

FEBRUARY

February 2 - April 20
Spring Online Montana Master Naturalist Course, Tuesdays, 4:00-6:00 p.m. plus in-person field weekend April 17-18. $330; $300 MNHC members. Registration required; registration opens October 1.

January 12, 19, 26, February 2, 9, 16:
***Field Notes* Writing Workshop, 6-Part Class,** 10:00-11:30 a.m. $90; $70 MNHC members. Registration required.

Volunteer Opportunities

Volunteers, we miss you! We're looking forward to the time when we have in-person opportunities once again. In the meantime, join us for Virtual Volunteer Trivia during Montana Nature Week in October, and stay tuned for future opportunities. (Sign up for our volunteer newsletter at MontanaNaturalist.org/volunteer-with-mnhc/.)

October 6
Virtual Volunteer Trivia, 4:00-5:30 p.m. Enjoy the chance to hang out with MNHC staff and other volunteers and friends as we test our naturalist skills and learn some new facts! Sign up with a team or join one when you arrive at the Zoom event. RSVP to Drew at dlefebvre@MontanaNaturalist.org.

Nature Activities To Do at Home!

These activities are great for preschoolers, but can be fun for older kids, too. We'd love to see your family's creations—post photos of your project on Facebook or Instagram and tag the Montana Natural History Center, or email your photos to editor@MontanaNaturalist.org.

Go on a Rock Scavenger Hunt!

It's easy to find rocks...but give yourself a challenge and try to find all the rocks on the list. What other kinds of rocks can you find? Try making a scavenger hunt of your own!

- ○ A rock that skips on water 
- ○ A rock that you can climb 
- ○ A rock that makes a mark 
- ○ A rock that is very small 
- ○ A rock that moss lives on 
- ○ A rock that sticks to a caddisfly case (look in water) 
- ○ A rock that has a stripe 
- ○ A rock that feels rough 
- ○ A rock that bugs live under 
- ○ A rock that could be a pet 

Make Kindness Rocks

We can all use—and spread—a little more kindness these days!

You Will Need:

Rocks
Waterproof paint
Permanent marker
Paintbrush

How to Make Kindness Rocks:

1. Collect smooth rocks that are small enough to carry, but big enough to write on with a marker.
2. Decorate rocks with paint and let dry.
3. Use a permanent marker to write kind messages on your rocks.
4. Go on a kindness walk! Bring your neighbors joy by dropping off your rocks along trails, in parks, or around your neighborhood. Who do you think will find your kind words?
5. Finished rock waiting to be found!

ACTIVITY PHOTOS BY JENAH MEAD

Make a Wind Chime

ACTIVITY PHOTOS BY JENAH MEAD

You Will Need:
A stick
String
Nature objects
Beads and bells (optional)
Eyelet hooks (optional)

How to Make a Wind Chime:

1. Gather nature objects that make interesting sounds when you tap or shake them. This could be sticks, pinecones, a seed pod, or even rocks. Then find a nice, sturdy stick to hang them from.

2. Some objects may be hard to hang with string. To provide a place to tie a piece of string to, you can twist an eyelet screw into the top of your stick and punch a hole in your seed pod or other nature object.

3. Tie individual pieces of string to each object. If you like, you can add beads and/or bells to each string, too.

4. Tie each string to the stick.

5. To hang, tie a long piece of string to both ends of the stick. What does it sound like when the wind moves your nature objects together?

Word Search

Find these fun words from the articles in this issue!

If you don't know what they mean, look through the issue to learn about them—and then you can take your investigations further afield, to field guides, the internet, and outdoors!

AMOEBA
BLOB
DINOSAUR
EVOLUTION
EXTINCTION
FEATHER WOMAN
FLAGELLAE
FOSSIL
MA'S
MEDICINE
MILLIPEDE
MOURNING CLOAK
OCEANSPRAY
PLASMODIAL
ROLYPOLY
ROOTS
SHORT-EARED OWL
SLIME MOLD
SLUG
SPECIMEN
SPORANGIA
SWALLOWS
TURNIP
UNICELLULAR

M	L	R	G	S	T	M	Y	I	N	V	F	Y	S	A	B
N	O	U	L	U	P	L	G	O	I	E	J	A	H	M	O
F	L	U	R	A	O	E	I	P	A	K	E	R	O	O	L
S	L	N	R	P	I	T	C	T	E	V	C	P	R	E	B
U	I	A	Y	N	C	D	H	I	O	W	S	S	T	B	S
P	W	L	G	N	I	E	O	L	M	P	C	N	E	A	L
S	O	F	I	E	R	N	U	M	B	E	C	A	A	S	I
R	T	T	S	W	L	T	G	G	S	I	N	E	R	W	M
F	X	O	O	S	I	L	R	C	O	A	Y	C	E	O	E
E	J	M	O	O	P	D	A	U	L	Y	L	O	D	L	M
J	A	W	N	R	M	A	S	E	A	O	X	P	O	L	O
N	S	P	O	R	A	N	G	I	A	S	A	A	W	A	L
R	A	L	U	L	L	E	C	I	N	U	O	K	L	W	D
E	D	E	P	I	L	L	I	M	H	Z	G	N	F	S	A
L	I	S	S	O	F	C	D	M	E	D	I	C	I	N	E
D	T	O	C	L	S	I	V	G	L	T	W	H	Y	D	P

Increasing Access, Community, Diversity, & Equity:
Alex Kim Gets BIPOC Outside

BY ALLISON DE JONG

COURTESY OF ALEX KIM

Above: Alex Kim loves recreating in Montana's outdoor spaces—and bringing more BIPOC with him, one rafting, skiing, or hiking trip at a time.

When I sit down (outside, socially distanced) on a sunny August afternoon to interview Alex Kim, a first-generation Korean-American who runs weekly outdoor recreation programs for BIPOC (Black, Indigenous, and People of Color) through Missoula Parks & Recreation in addition to his full-time work as the Racial Justice Engagement Specialist for YWCA and EmpowerMT, the first thing he asks me is whether or not I've found anyone else in the area doing similar work.

"No," I tell him.

He nods and smiles knowingly. "I feel like that's a good segue to this whole conversation," he says, "because I didn't find anyone else, either."

Alex goes on to talk about growing up in Maryland, in a city, with little experience of the wild outdoors until he was in college. Almost six years ago he came west, wanting a change, and ended up making his way to Montana and Glacier National Park. The more of the West he explored, the more he realized that he wanted to dive into outdoor recreation—and the more he realized that he, as a person of color, stands out. "I could almost paint the picture of what a mountain man is supposed to be," he says. "I thought that it would at least be blurry enough that I could envision a different gender or a different type of person, but the disappointing reality is that it's not."

But Alex was determined. He made a list of the things he wanted to do, from rock climbing to fishing to snowboarding. He bartered his photography skills for information and education—"I will gladly take a picture if you teach me!"—and slowly learned about the right gear, clothing, rules, nutrition.

It wasn't easy, however, and the entire process opened up Alex's eyes to the challenges that people in general face in getting outside. "Very basic information was really hard to find," he says, "and I had the advantage of having something to barter. How hard must it be just to ask someone for this information?" He realized, increasingly, how exclusive the outdoors are, despite Americans' cultural ideal of the inclusivity of the outdoors and public lands.

Alex then began an internship with Backcountry Hunters and Anglers, which he enjoyed for multiple reasons (not least of which because he wanted to learn to fish), but which also threw the exclusivity of hunting and fishing and outdoor recreation into even starker relief. Search images on any social media platform, he says, "and pretty much the first thing that comes up is a bearded white dude." In and of itself, Alex didn't find that to be an issue, but he did see an issue with the systemic problems that lack of representation creates. "Society thinks that's okay, that that should be the model image, without thinking about the consequences for young people of color, or for BIPOC communities that might move here to Missoula as transplants."

And Alex wanted to change that. "I wanted community," he says. "I wanted to see people who looked like me, outside, doing things." He wasn't the only person of color in Missoula who was recreating outdoors, but when he looked at the many outdoor recreation programs in Missoula and across the state, he saw homogeneity, again and again and again. And though the population of Missoula is overwhelmingly White, there is an increasing number of BIPOC residents. "As a community we can

> "I wanted community. I wanted to see people who looked like me, outside, doing things."

strive to be better, strive to include people," Alex says. "We can reach out to those folks to show them that opportunities exist."

That's when Alex walked into Director Donna Gaukler's office at Missoula Parks & Rec with a carefully-crafted plan to provide outdoor recreation opportunities focused specifically on BIPOC. Alex and Donna, along with Outdoor Recreation Director Meg Whicher, created Elevate MT, which offers free clinics throughout the year aimed at introducing BIPOC to hiking, biking, skiing, and more. The program began in October 2019, and it's been thriving.

PHOTO: ALEX KIM

This summer, programs ran weekly on Sundays, though programming slows down in the fall and winter. So far the regular offerings have included cross-country skiing, mountain biking, and lots of rafting in the summer heat, with camping and hiking and backpacking in store for the fall. About a dozen people participate each week, from a variety of communities in Missoula—college students, long-time community members, refugees, and more. "[Elevate MT] creates a network of people who wouldn't necessarily meet otherwise," Alex says. "It gives them a chance to be around one another, a chance to relate."

Aside from that sense of community, Elevate MT aims to empower participants to go out and recreate on their own. For those of us who regularly recreate in our state's wild spaces, we know to bring water, layers, sunscreen, bear spray. We know to inform someone else where we're going, know how to read a map, how to figure out where we can and cannot access the land. But that knowledge, as Alex learned, is not always readily available, and he's excited to see how sharing this information can help expand people's opportunities. "Our goals are to build confidence, to teach as much as we can," says Alex. "We want to build people's knowledge and competency. We want them to feel that they don't need to depend on a program. People should be able to be independent, especially in the outdoors."

A broader benefit to Elevate MT's programming is that it provides some of the missing diversity in Montana's wild spaces. "Every time we're on the river, I count how many BIPOC I see outside our group," Alex tells me. "The last two times it was zero. But now all the people who are floating past us get to see that we are out here. We're on the oars, sharing positions that are stereotypically positions of power, of knowledge. And that's pretty special."

One of Alex's long-term goals for the program is to create more BIPOC guides and educators. In opening the door to the outdoors, this program provides a stepping stone for BIPOC not only to feel comfortable recreating outside, but to become experts themselves. And that expertise opens up not only recreational opportunities, but potential job opportunities—allowing young BIPOC to imagine themselves as, say, a raft guide or a fishing guide, when those possibilities may have never before been on their radar.

Another of Alex's long-term goals is for the City of Missoula to fund a full-time position to manage Elevate MT. Currently it's a small program which Alex runs on the weekends, but there's a lot of room for growth, from providing more programming to creating an online presence for and marketing those programs. Missoula residents interested in helping support Elevate MT can call or write their elected officials and encourage them to fund and support these programs. "Everyone in the community can pitch in," says Alex. "This is a great opportunity for the City."

Ultimately, Alex is simply grateful for the opportunity to provide Missoula's BIPOC community a helping hand in getting outdoors, at a time when issues of race and equity are coming to the forefront and shifting our social dynamics. "It's exciting to see society change and grow, to see us begin to empathize with one another in more than one facet of our lives," says Alex. "The outdoors is just one more place where we can learn to be empathetic towards one another, to learn about each other, to find ways to relate.

"BIPOC are seen in so many different lights, and this program wants to shed light on the joy and power of Missoula's BIPOC community. The outdoors is a great space for that."

For BIPOC and allies who are interested in participating, look for Elevate Montana's private group on Facebook or email Alex at alex@empowermt.org.

Above: Elevate MT's goals include both having fun in the outdoors and providing education so participants can recreate on their own in the future. On the many rafting trips this summer, that included sharing what to take along, prepping the boats, reading the river, manning the oars, and more.

Interested in learning about others who are working towards diversity and equity in the outdoors—and seeing the diversity that exists? Here's a few organizations, people, and hashtags to follow on Instagram:

#blackbirdersweek
#blackinnature
@blackgirlstrekkin
@browngirl_outdoorworld
@brownpeoplecamping
@colourthetrails
@hood_naturalist
@latinooutdoors
@melaninbasecamp
@nativewomenswilderness
@she_colorsnature
@teresabaker11
@torigoesoutside
@unlikelyhikers
@wildginaa

Over the last decade, Christine has spent the majority of the months of May and October outdoors, connecting 4th graders to nature.

MNHC PHOTOS

Farewell to Christine Wren: *The Legacy of a Teacher*

By Allison De Jong

This summer, our wonderful naturalist Christine Wren retired, after spending 12 years teaching in MNHC's Visiting Naturalist in the Schools (VNS) Program, first as a volunteer and then as one of our staff naturalist educators. Christine's deep love for children, passion for natural history, decades of experience in education, and quiet confidence and compassion make her an incredibly effective educator, an inspiring naturalist, and a good friend. (We miss her already.) In her years at MNHC Christine helped hone and improve the VNS curriculum; made learning about nature vivid, tangible, and fun for hundreds of Montana kids; and encouraged and inspired everyone who had the privilege of working with her.

I had the pleasure of talking with Christine recently as she reflected on her time at the Montana Natural History Center. MNHC was a perfect fit for Christine from the start. After two decades as a classroom teacher, she was ready for something different, and MNHC's VNS Program fit the bill. "It satisfied the need for me to still stay in that teaching role," she says. "But it aligned so exactly with the kind of teaching I had found to be the most meaningful, the most powerful, in my career: kids learning outside, with hands-on activities, asking questions that would drive their curiosity."

"…it aligned so exactly with the kind of teaching I had found to be the most meaningful, the most powerful, in my career: kids learning outside, with hands-on activities, asking questions that would drive their curiosity."

In the 35 years since Christine started her teaching career, she's seen an increasing need for this kind of experiential education. "It's so important for us now to nurture a generation of children whose value and whose sense of meaning and responsibility are connected to the natural world," she says, and she's grateful to MNHC for giving her the opportunity to work with children in this way. "It's been fun to watch kids blossom and see how many of them thrive when given the space to think on their own. What a gift to give them room to think and to feel and to share those thoughts."

And, as every teacher knows, the most rewarding part of teaching is those moments when you realize you've made an impact on students' lives. "A couple of times it's happened that a child comes up and says, 'Christine!' and the parent is wondering, 'Who's this stranger?' And the child says, 'This is my naturalist! This is Christine!' That's the legacy of a teacher," Christine says. "When you run into one of those kids who has a great smile and thanks you for the time spent—it's the long-held reward for those many, many hours when it was hard, those one or two brief words that say, 'That was an important time in that child's life, and that program and my relationship with them made a difference.'"

Christine has certainly made a deep and long-lasting difference in the lives of all the people she's taught and worked with at MNHC. ***We are so grateful for the years she spent here—and we wish her much joy in her new adventures!***

NATURE'S NOTES

Connecting nature with music

What do you get when you combine nature with music? Find out in our new video series!

Join us for a collaboration between the Montana Natural History Center and the Missoula Symphony Orchestra in **Nature's Notes**, our four-episode video series! We will explore the connections between music and some of Montana's most beautiful, natural music and sounds in nature.

In these videos, designed for families and kids aged 5 - 12, you'll hear all about our favorite instruments, listen to an orchestra, learn about the natural world, explore a nature activity, and even practice making musical instruments of your own! We will release a new episode each month from October through January, showcasing a different connection between instrument sections of the orchestra and sounds of nature in Montana.

Episode 1: Wings & Woodwinds! – *October 2020*

Episode 2: Trumpets, Trombones, and Bears, Oh My! – *November 2020*

Episode 3: Drumming, Humming, and Thrumming – *December 2020*

Episode 4: Strings, Streams, and Pizzicato Springs – *January 2021*

Learn more and access the videos and activities at MontanaNaturalist.org/natures-notes/.

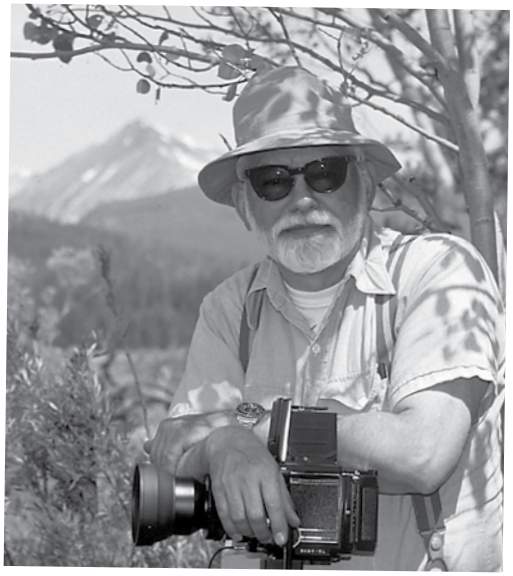
SPOTLIGHT:

COURTESY OF ALYSSA GIFFIN

Introducing Alyssa Giffin, our newest Teaching Naturalist!

Alyssa grew up in Stevensville, Montana, where she enjoyed camping, hiking, and rafting with her family, and found a love for nature. She began her academic career in the Environmental Studies program at the University of Montana. Throughout college she continued to explore Montana, as well as the West Coast and various countries abroad, where she constantly sought out wild and untouched spaces. Alyssa is very excited to be back at MNHC where she has enjoyed teaching our youth about nature and rediscovering her love for nature because of them.

Welcome, Alyssa!



COURTESY OF BILL GABRIEL FAMILY

After 32 years with the U.S. Forest Service, Bill Gabriel became a prolific photographer and writer, continuing to revel in—and advocate for—the natural world.

As To The Mission

A Lifelong Naturalist Remembered

This issue, I am joined in prose by colleague and MNHC Collections Registrar Alyssa Cornell as we remember naturalist and environmental advocate Bill Gabriel.

Bill was a lifelong naturalist who worked all over North and South America, conducting environmental analysis. He amassed a lifetime of amazing experiences in nature and could tell you hours of riveting and wonderful stories of Montana, Alaska, and places much further afield.

Bill passed away this spring, but he lived a life not only as a pioneer in environmental sciences, but also as a fierce advocate for education and the environment. We at MNHC were lucky enough to count him as a friend.

Alyssa and her partner recently had a special chance to meet this incredible person who exemplified a love and stewardship of nature. Here is that story.

Bill wanted to donate a sizable collection to MNHC but his health made it difficult for him to bring the donation to us. So, my partner and I hopped in the truck and headed out. Bill welcomed us warmly into his home and I was amazed at the personal library within. The shelves upon shelves of books held decades of knowledge and he wanted to share that with us.

Bill donated books, survival gear, fishing tackle, photographs, and a diverse collection of skulls and pelts. Although I only knew him for one day, I learned a lot about this knowledgeable and kind man while assisting with packing all these items. They spoke of a man who loved and appreciated wildlife and being outdoors. We came across some of Bill's smokejumper gear and he regaled us with stories and jokes from his past. At last we said our thanks and goodbyes, and as we drove away, I wished that I had had more time to get to know Bill Gabriel—but I feel lucky that I had the chance to meet him, even if it was only for a short time.

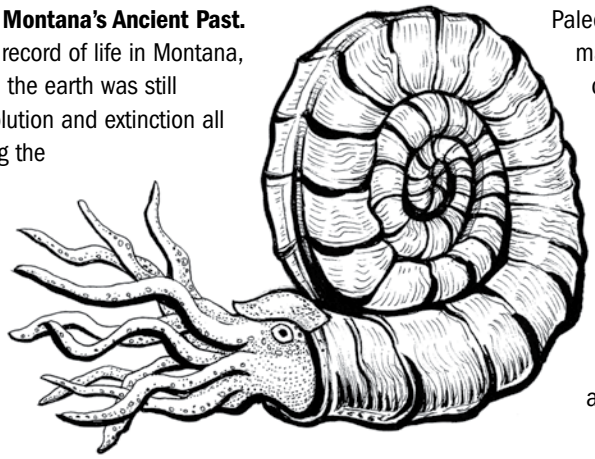
And so we will always remember our dear friend and his generous disposition: a person with a huge heart and an inquisitive spirit, always willing to take time to share and to support environmental learning.

Thurston Elfstrom,
Executive Director

MNHC's New Exhibit Explores Montana's Ancient Past

Get ready for MNHC to have a whole new look! Thanks to a grant from the Institute of Museum and Library Services, we've been hard at work on a new permanent exhibit: **Montana's Ancient Past.** This large exhibit follows the fossil record of life in Montana, starting 4.5 billion years ago when the earth was still lifeless, and traces the path of evolution and extinction all the way until the present day. Along the way we meet a wide-ranging cast of ancient creatures: feathery crinoids, many-finned fishes, massive dinosaurs, and more.

Montana has a rich fossil record, representing nearly every major time period in Earth's history. In order to showcase these time periods in our exhibit, MNHC has partnered with the University of Montana Paleontology Center, who is graciously loaning us many of their specimens. Come learn how the diversity of life has adapted to Earth's changing geology and climate, leading to the forms we see today. The specimens come alive with colorful text and maps, as well as detailed drawings from our very own staff artist Jenah Mead. An interactive kids' table rounds out the display, letting our young visitors see and touch real fossils up close.



JENAH MEAD

We can't wait to share our exhibit with you! Keep an eye out for an opening date in the near future.

VOLUNTEER SPOTLIGHT:

COURTESY OF KALLIE MOORE

Volunteer Spotlight: Kallie Moore

By day, **Kallie Moore** is the Collections Manager at the University of Montana Paleontology Center (UMPC). When not up to her elbows in fossils, she co-hosts and creates content for PBS Eons, a YouTube channel with nearly 1.5 million subscribers that explores the history of life on Earth. In short, her life is already filled to the brim with fossils, geology, dinosaurs, and other ancient creatures. Yet she somehow always makes time for MNHC, too.

This year, Kallie has proven herself indispensable as we develop our new permanent exhibit: Montana's Ancient Past. Of course, every paleontology exhibit needs fossil specimens, and that's where Kallie—and her management of the UMPC's magnificent collection—comes in.

"I'm lucky to manage such a wide-ranging collection, from microfossils to mammoths, including specimens from over 20 different countries that represent around 2.5 billion years of life on Earth," says Kallie. "It's incredibly exciting to help MNHC develop this paleontology exhibit and supply UMPC specimens. And I'm happy that more people will get to enjoy and learn from them."

Kallie graciously provided MNHC staff with a tour of the UMPC's collection, letting us ooh and ahh over the amazing specimens. She was full of knowledge and enthusiasm, constantly sliding open heavy drawers and standing on ladders to reach fossils in the highest cabinets. As she uncovered more and more specimens, we were awed by all the information in her head. Did she have the entire collection memorized?!

We've now decided which fossils to include in the exhibit, but Kallie's work is still not complete. All of the exhibit's text makes a stop at her desk before going to print, ensuring that everything is accurate, up to date, and, of course, as full of interesting facts as possible.

"Kallie's enthusiasm for these subjects is contagious and you can't help but feel inspired when she shares her wealth of knowledge," says MNHC Collections Registrar Alyssa Cornell-Chavez. "I always enjoy getting to meet with her and getting the chance to learn more from her, and we usually end up nerding out over history and paleontology."

We're so grateful to have an expert—and a celebrity—like Kallie right here in Missoula. Thanks, Kallie, for sharing your contagious enthusiasm and for helping us make Montana's Ancient Past a success!

Check out Kallie's channel at YouTube.com/Eons!

COURTESY OF BREANNA MCCABE

Volunteer Spotlight: Breanna McCabe

As a Missoula native, **Breanna McCabe** has a deep understanding of our community's reputation for collaboration. But she didn't anticipate her own graduate school internship would give her the opportunity to weave a new partnership between the Montana Natural History Center and MontanaPBS.

After a career in TV broadcasting that took her from KPAX-TV to Spokane, Breanna returned to Missoula for a job at her alma mater as a news editor and video producer. While working full-time, she decided to also pursue a master's degree in environmental science and natural resource journalism. Breanna fell in love with birds while producing her thesis documentary on whitebark pine, and she took an ornithology class at UM to learn more. Her passion for the natural world led her to the Montana Natural History Center, and when she inquired about an internship opportunity, the wheels started turning.

"Breanna's passion for the natural world is clear, so she's a great fit for an internship with us," says Museum Programs Coordinator Drew Lefebvre. "She has lots of experience in the video production world, and from the start she was eager to share that. We immediately started brainstorming projects she could work on!"

The COVID-19 pandemic provoked Breanna to draw upon her video skillset to help MNHC bring its lessons to learners who can't physically visit the Center. Along the way, Breanna landed a job as a producer at MontanaPBS and, with the support of her new colleagues, imagined a video series that could benefit both MNHC and MontanaPBS. By drawing on the existing expertise at MNHC, Breanna is producing a series of lessons about birds aimed at young learners. The video series will be available to teachers, parents, and learners of all ages across the globe through PBS LearningMedia—and, of course, through MNHC's own channels. Breanna hopes to equip the next generation with simple birding skills they can carry with them the rest of their lives.

"While I grew up with my eyes peeled for all animals, an ornithology course in my thirties absolutely changed the way I notice birds," Breanna says. "I hope these videos empower viewers with the skills to start identifying birds everywhere they go, and ultimately ignite a passion for protecting our precious natural world."

We're so glad to have Breanna and MontanaPBS on our team this year.

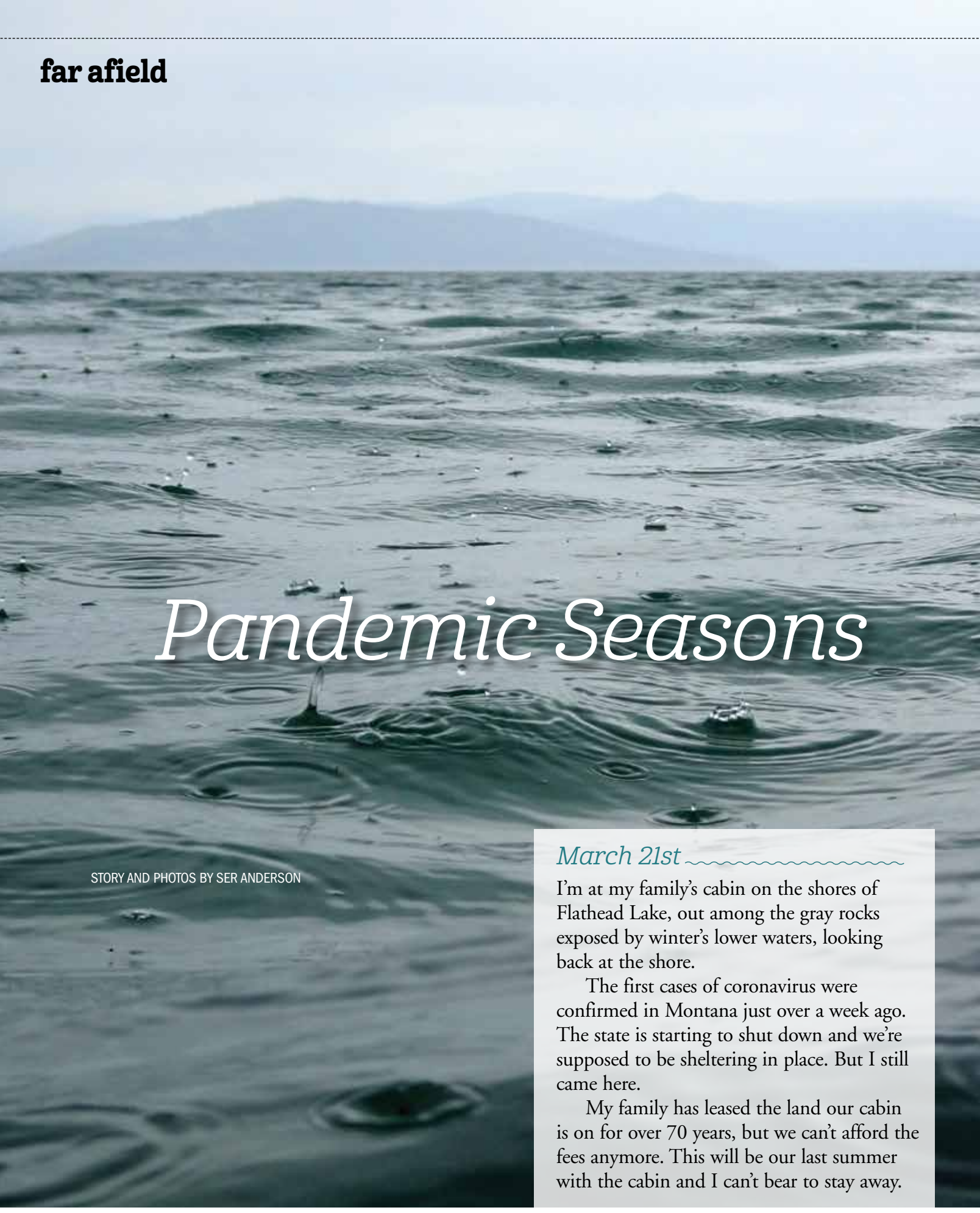
Thank you, Breanna!

Operation Purple: MNHC Educators Connect Military Families to Nature

MNHC is excited about its newfound partnership with the National Military Family Association's Operation Purple® Program. Our naturalist educators have been hard at work developing lesson plans and educational videos for military families across the country in an effort to connect more communities with nature. This fall, MNHC will also host live Zoom family activities for the Operation Purple® Program and interact with families nationwide!

NATIONAL MILITARY FAMILY ASSOCIATION | Operation Purple® Program


Lesson 4:
How Blue is the Sky?
Operation Purple® Program
Why is the sky blue? A better question might be, how blue is the sky? Let's explore the blue hue!
Activity Overview & Goals
Materials Needed



Pandemic Seasons

STORY AND PHOTOS BY SER ANDERSON

March 21st

I'm at my family's cabin on the shores of Flathead Lake, out among the gray rocks exposed by winter's lower waters, looking back at the shore.

The first cases of coronavirus were confirmed in Montana just over a week ago. The state is starting to shut down and we're supposed to be sheltering in place. But I still came here.

My family has leased the land our cabin is on for over 70 years, but we can't afford the fees anymore. This will be our last summer with the cabin and I can't bear to stay away.

The sunshine is warm and the skies are blue, but the first day of spring is only just behind us and from here, it doesn't look like anyone else got the news. The forest green of the conifer needles stretches above the bare branches of shrubs and the lingering remains of last fall's flowers, both in shades of brown, tan, and gray. The trees and even the air are mostly quiet and still, not yet filled with birdsong, the myriad insect noises, the flit of wings, or the shimmer of gnat clouds.

But there is a spot of motion—deep brown bouncing in front of the gray of the rocks, before settling in a patch of sun, wings outstretched. The sunlight lends warmth to somewhat drab colors: pale butter-yellow borders, lines of sky-blue dots just inside those borders and set against the rich brown of the wings.

It is my first butterfly of the year, a mourning cloak, called out of its hibernation by a series of warm days.

For the last couple weeks, I've been fighting anxiety and fear—the sense that the world could be ending, the knowledge that, if I'm not careful, just by breathing, I could kill someone—and the desire to curl up and disappear. Being here is supposed to help.

Though no longer snowy, the landscape remains stark and still, yet across it—the dragging tail of winter—floats this sign of spring, of hope, of growth, of emergence, of life going on.

June 28th

A week into summer, I am swimming in the rain.

The cold water holds me, moves around me, lets me go. I keep my head above the surface and the raindrops spatter on my face. Around me, drops bounce off the surface of the water a short distance, then fall again to be absorbed by the lake. My hands are not numb, but stiff, feeling the cold more than the rest of me. I swim under the gray sky, in the rain, and I cry too, shaking not with shivers but with sadness.

My brother called from Oregon this afternoon to tell my parents he might not come home this summer. My sister, living in Arizona, definitely won't make it home. I didn't know until now how much I was counting on this summer, and a chance for all of us to say goodbye together.

Last summer, my siblings and most of my dad's siblings visited Montana at the end of June, but during the best time for them to go up to the cabin, I was away for work. We knew then that we were giving up the lease at the end of this summer, but we had one more year. I thought that meant we had more time. How could any of us predict a pandemic?

The last time I remember swimming with my sister was in June three years ago. The water was so cold that I didn't want to go all the way in, thinking it might finally be time to let go of our lifelong competition about who would get in first and stay in longer. I'm not sure if we actually swam together then, and now I don't get the chance to cement in my mind one last memory of us in the lake together.

I have not lost a loved one to COVID-19 nor have I lost the chance to be with a loved one in their final moments. I haven't lost my job or my savings. This is what I'm losing: the ability to say goodbye to the place I love most with the people I have shared it with most closely.

I cry and let myself feel like the rain is the world crying with me. And I keep swimming. In the rain and the cold, the water moving around me the way it always has, soothing, supporting, solace.

July 11th

I'm sitting out on the dirt patio in front of the cabin, reading in the shade and looking out at the sparkling lake.

Last weekend, the hillslope around the cabin was dotted with bright white clusters of fragrant, four-petaled stars. Today, tiny cream-colored flowers in dense, hanging pyramids cascade over their shrubs like ocean waves breaking onto the sand. The mock-orange flowers have given way to oceanspray.

It is starting to feel like summer, but it is still early enough in the season that something new blooms every week and I can practically hear time rushing by. I'm afraid to blink or leave in case I miss anything.

I feel a growing urgency to make the most of my remaining time at our cabin and a larger sense of urgency to be as fully alive as I can today and pursue my dreams because now might be my only chance. Life has always been uncertain, but the pandemic is forcing me to live more closely with the knowledge of the precarious nature of my days.

I don't want to write off this year as a year I'd rather erase. I don't want to stick my head in the sand and lose track of time.

Except sometimes I do. I want to hide from everything: the fear and anxiety of living during a pandemic, all the waiting for the next phase, the sadness of letting go of the cabin, the urgency and pressure to use my time well. And at home in Missoula, inside with internet access, hiding is all too easy.

It is coming here to the cabin, getting outside, watching the movement of the seasons, that brings me out of hiding again. I feel urgency, but it is paired with expansiveness, a feeling of wealth. Every moment is a gift. I give myself time to linger, to just sit in my favorite place, looking up when movement catches my eye.

A drab little bird flits between the lobed leaves of a small Rocky Mountain maple and down to a small nest woven of dry grasses. After a short pause, the bird, some kind of flycatcher, flies away again.

I walk up the driveway so I can peer down into the nest. There is a single, impossibly fluffy chick opening its beak wide to be fed by its parents.

Life begins anew, bold and urgent. I am alive to see it, to watch the seasons changing, to move through the seasons in my own life—the moments to seek shelter, to grow, to create, to let go. I am learning to embrace all of it.

—Ser Anderson is a Teaching Naturalist at MNHC. Their work has been published in Camas *and* Whitefish Review, *and more of their writing and photography can be found at notesonamomentblog.wordpress.com.*

Sheltering in Place

STORY AND PHOTO
BY DANIELLE LATTUGA

When it first hit, we thought of it as a wave. And we felt less guilty about not seeing our loved ones—because we weren't supposed to. It was nearly March and the farm was already pulling us under, into the coming season: the dirt hinting at thaw, the seeds laid out and ready for starting, the new field to till. It was just our second year and uncertainty was not a new reality for us, for we had leapt, full-bodied into our goal, accepting all risk and dreaming of flowers. Whether virus or frost, it was, and still is, all about biology.

We all moved around less and as the spring came on, I swear I could feel the earth breathe easier. The feeling left me hollow, the irony too sharp. Of course it would take a respiratory illness to clear the air.

So, we planted more food than we planned on, and hoped, that somehow, the flower business would grow, despite the *nonessential* nature of our work. As the days grew long and the heat hit, the roots grew deep and what we thought of as a wave became more of a tide. Long, drawn, rising and falling, all adrift; reality ever altered. I started to cry every time I saw someone I once hugged.

But the flowers bloomed in waves, nonetheless. First the tulips and narcissus, then the peonies, a flush of dandelion, ranunculus, dames rocket. Mustard, birdsfoot trefoil, cosmos . . . wild and cultivated. In the absence of the social life I'd known, I started collecting interactions between flower and other. My sister sharing photos of her roses. My son smelling lilacs. The smile in the eyes of my friend's mother when she received a bouquet of tulips from my sanitized hand. The bees gathering pollen. Deer snatching stray daffodils. The surprising and fragrant weight of snapdragons filling my embrace.

Now we are thick in dahlias and zinnias, clover and bee balm. When I cut a bunch, the hummingbirds squeak and thrum around me, hover at my face, eye to eye. Blackbirds and chickadees rob the sunflowers. Honeybees and bumblebees, mason bees and flies—more pollinators than last year, more than I could ever count or identify. The most essential workers swirl and whirl around me and somehow, I feel held.

—Danielle Lattuga and her family are guest settlers on the Confederated Salish and Kootenai Tribal Reservation, where they are actively turning the land that they tend into a flower farm and pollinator sanctuary. You can read more of her work at daniellelattuga.com.

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