

MONTANA Naturalist

Spring/Summer 2012

Diatoms: Through the Microscope



Water Ouzels

**Norway Maple
Syrup?**

**Nature
Journaling
and More**

page 9



Montana Natural History Center
Connecting People with Nature

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

MONTANA Naturalist

Features

- 4 Diatoms** by Loren Bahls
A microscopic look at our smallest plants
- 6 Tapping the Norway Maple**
by Jenny Tollefson
Exploring the sweet side of an invasive species
- 8 American Dippers** by Eugene Beckes
The "penguins" of Montana



Departments

- 3 Tidings**
- 9 Get Outside Guide**
Naturalist Notes; books for a cloudy day; nature journaling; spring scavenger hunt
- 13 Community Focus**
Master your naturalist skills
- 14 Imprints**
Summer Science Discovery Day Camps; Master Naturalist field weekends; MNHC welcomes development director; new programs at the Gardens
- 17 Far Afield**
Caddisflies
Underwater silk spinners
- 18 Magpie Market**
- 19 Reflections**
A Parliament of Owls



Cover — Bitterroot flower (*Lewisia rediviva*), Montana's state flower. Photo by Allison De Jong, taken on a spring hike on Waterworks Hill in Missoula, where bitterroots and other wildflowers bloom in profusion from April to June.

No material appearing in Montana Naturalist may be reproduced in part or in whole without the written consent of the publisher. All contents © 2012 The Montana Natural History Center.



Montana Natural History Center
Connecting People with Nature

120 Hickory Street
Missoula, MT 59801
406.327.0405

office@MontanaNaturalist.org
www.MontanaNaturalist.org

Executive Director
Arnie Olsen

Education Director
Lisa Bickell

Assistant Education Director
Brian Williams

Naturalist
Alyssa McLean

**Community
Programs Coordinator**
Christine Morris

**Volunteer Coordinator,
Field Notes Coordinator &
Montana Naturalist Editor**
Allison De Jong

**Development &
Marketing Director**
Whitney Schwab

Office Manager
Deb Jones

Administrative Assistant
Candace Romero

Visiting Naturalist Instructor
Christine Wren

Campus Corps Interns
Sara J. Call
Nadia Soucek

Summer Camp Instructors
Sam Case
Lindsay Fagrellius
Katy Morrison
Lilly Motl
Patrick Murphy
Meghan Rorick

Summer Intern
Rose Dickson

Board of Directors
Hank Fischer, *President*
Marilyn Marler, *Vice President*
Marcia Kircher, *Secretary*
Betty Oleson, *Treasurer*

Julie Cannon
Carol Ewen
Anne Garde
Janice Givler
Minette Glaser
Jim Hamilton
Sally Johnson
Rick Oncken
Penny Ritchie
Susan Roy
Stephen Speckart

**Montana Naturalist
Art Director**
Eileen Chontos

When I was hired as MNHC's Volunteer Coordinator three years ago, I had high hopes that it would be more than just another routine office job. And it has been. Not only have I formed relationships with an amazing group of people, from fellow staff and board members to volunteers and others in the conservation community, I've also developed a deeper understanding of this diverse ecosystem in which we live. Though I have lived in Montana for seven years, it was not until I met my botanist husband and began working for the Montana Natural History Center that I started learning the names of the wildflowers covering the nearby hillsides each spring and recognizing the songs and markings of western Montana's birds.

There's magic in learning about our place. As I've come to understand more of the intricacies of Montana's ecology, I've become more rooted in this place. The more I learn about this landscape I've chosen to call home, the more truly it *becomes* my home. I am grateful to work with an organization that encourages and enables me—and many others in the Missoula community—to continue observing, discovering, and gaining knowledge about the natural world.

Working with MNHC's wonderful cadre of volunteers has been incredibly rewarding these past three years, and I am grateful to be able to continue as volunteer coordinator while also taking on the new challenge of *Montana Naturalist* editor. I have already enjoyed interacting with a variety of talented writers, photographers and artists, from Loren Bahls and his exploration into the world of diatoms to Andrea Stierle's beautiful owl paintings and Joe Giersch's underwater photographs of caddisfly larvae (all of which can be enjoyed in this issue). I look forward to working with these and other local artists to continue to make *Montana Naturalist* the quality publication that Caroline Kurtz created. We at the Montana Natural History Center so appreciate her creative energy, vision, and dedication over this past decade and more. I am honored to follow in her footsteps.

Allison De Jong

Editor

adejong@MontanaNaturalist.org

Letter to the Editor

Dear Editor,

I enjoyed the lead story about pikas in the Winter 2011-12 issue of *Montana Naturalist*. The small, circular photo illustrations were given descriptive, byline commentary, but the big picture, to me, had the most ecological information content.

The pika is sitting on a defended territory corner, marked by the dense patch of the orange-colored lichen, *Rhizocarpon geographicum*. Pikas pee at certain places, but their nitrogen-rich urine also has a positive establishment & maintenance effect on this very obvious orange crustose lichen. Pika geographical presence (without sightings or sounds) often becomes known to alpine hikers spotting these bright orange patches on the top of rock "lookouts." Pika research should also include study of lichen ecology. Questions to ask might include: How long does an orange lichen patch remain after it no longer is peed on? What are the stages of lichen patch deterioration and loss when the pika no longer visits the site? Could the orange lichen patches be used to quantify or infer pika population numbers?

For more information, read the New Mexico Wildlife Notes prepared by Jane MacCarter at www.wildlife.state.nm.us/education/wildlife_notes/documents/pika.pdf.

Thanks again for preparing a great story!

Regards,

Jim Habeck, UM Professor Emeritus, Plant Ecology



Photo by Alan Wilson

DIATOMS

Montana's
Smallest
Native Plants

By Loren Bahls

Our encounters with nature are primarily visual. Many naturalists use binoculars and telephoto lenses to bring wildlife up close. Some use a hand lens to study flowers and other natural objects in fine detail, or a telescope to study the night sky. But few take the next step—to observe nature at a far more intimate level. For this you need a microscope.

Although most of us are vaguely aware of the teeming microscopic life in Montana's lakes and streams, few of us can name individual organisms, explain their ecological importance, or appreciate their exquisite beauty. Consider one particular group that has fascinated me for 45 years.

On a hike in the mountains last summer, I shed my boots and socks to ford an icy stream. The fast current, uneven bottom, and slippery rocks conspired (unsuccessfully) to throw me off balance. From experience, I knew the slippery coating on the rocks to be periphyton: a diverse but slimy community of tiny organisms, each producing a blanket, pad, stalk or tube of mucilage to anchor it in place. Collectively, these millions of bacteria, fungi, algae, and their extracellular products made my footing treacherous. Yet if you could zoom in on this slippery slime, you would see creatures in this community that stand above all the rest in their beauty, ecological importance, and biodiversity: the diatoms.

Diatoms are pigmented microbes distinguished by cell walls made of silicon dioxide, the same compound in the gemstone opal. Long a favorite with microscopists, diatom shells ("frustules") have a striking beauty owing to their glassy cell walls, symmetry, and delicate ornamentation. The frustules consist of two overlapping valves, or "theca," which fit together like the lid and bottom of a petri dish. Diatoms are also eukaryotes, meaning they share their advanced cell structure with lupines and grizzly bears.

Diatoms tell us ecological stories and have many uses. They are used as biological monitors of lakes and streams because species are relatively easy to identify, there is an extensive literature on diatom taxonomy and ecology, and each diatom prefers water quality

conditions that are unique for that species. As tiny fossils in lake sediments, diatoms are useful in reconstructing past climates and lake environments. Fossil deposits of diatom frustules—called diatomites—have also proven useful in the manufacture of products ranging from paints and toothpaste to swimming pool filters. In addition, diatoms are rich in natural oils, and scientists are studying ways to "farm" them in large batches to produce biofuels.

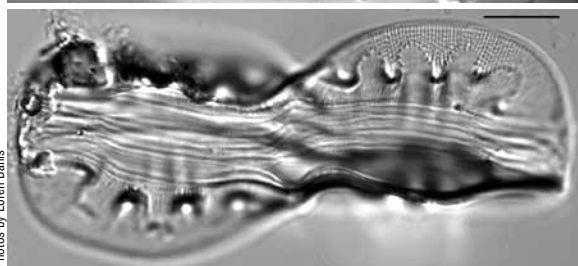
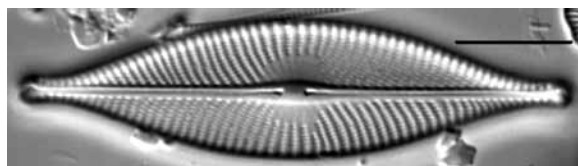
Diatoms originated at about the same time in Earth's history as flowering plants. The first appearance of diatoms in the geologic record is in marine deposits from the Jurassic era, about 150-200 million years ago. Diatoms later colonized fresh waters where they underwent a major explosion in biodiversity. Today, as in the early days of diatoms, these tiny plants are ubiquitous in aquatic habitats, where they are at the base of the food pyramid. It is estimated that they account for 40% of plant production worldwide, much of this occurring in the oceans. As photosynthesizers, diatoms convert water and carbon dioxide into biomass and oxygen. Experiments are underway to fertilize large areas of the ocean with iron to enhance diatom growth and their absorption of greenhouse gases.

Although individual diatoms are small—a very large one is about a ½ millimeter long—diatom colonies are often visible as tan or brown gelatinous masses on rocks in streams and along lakeshores. Some diatoms produce extremely large growths that interfere with recreation and degrade fish habitat. (See sidebar.) But to study and appreciate individual diatoms, you need a microscope. A really good microscope.

Famous Dutch microscopist Anton van Leeuwenhoek was the first to record the existence of diatoms, in 1703. He called them "animalcules" because some of them moved around under his microscope lens. This motion was later explained by the extrusion of a polysaccharide mucilage from slits and pores in the cell wall, a form of jet propulsion. The extruded slime hardens to form the blankets, pads, stalks, and tubes that enclose, support and attach diatom cells to rocks on the stream or lake bottom.

Identification of diatom species is based on ornamentation on the valve surface. To see this clearly through the microscope, all of the cell

Photo by Loren Bahls



Photos by Loren Bahls



Photo by Kalina Manoylov



Photo by Mark Edlund

"The universe would be incomplete without man, but it would also be incomplete without the smallest trans-microscopic creature that dwells beyond our conceitful eyes and knowledge."

—John Muir

[Editor's note: A version of this article originally appeared in the spring issue of *Kelseya*, the newsletter of the Montana Native Plant Society.]

contents—protoplasm and pigments—must be removed with strong acids and oxidizing agents. Once this is done, the treated diatom frustules are rinsed in distilled water, dried on a coverslip, and mounted on glass slides in high-refractive-index mounting media for microscopic study.

Diatom Collections and Flora

Since 1966 I have been exploring the trails and backroads of the northern Rockies, collecting diatoms along the way. The result of these explorations, and samples contributed by many other collectors, is the Montana Diatom Collection. The MDC consists of prepared slides and cleaned material from over 5,000 locations in the northwest United States. The MDC is housed in Helena with duplicate slides deposited in the Herbarium at the University of Montana. A description of the Montana Diatom Collection is available at the UM Herbarium website: <http://herbarium.dbs.umt.edu/diatoms.asp>

While the flowering plant flora of Montana is largely known and finding and describing new species is uncommon, Montana's diatom flora is largely unknown and the number of found species is growing by leaps and bounds. In the past two years, 30 new diatom species have been described from samples in the MDC, and many more wait to be published. In Montana, the known diatom flora is about 1,500 species, but probably an equal number, many of them endemics, remain to be named and described.

On a national scale, a team of experts is assembling the first ever online diatom flora for the United States: <http://westerndiatoms.colorado.edu/> With an estimated 200,000 species worldwide, diatoms are an important component of global biodiversity. But only about 24,000 species—12% of the global diatom flora—has been named and described. The online guide will assist scientists around the country in diatom identification for environmental assessment and for research in paleoecology, biogeography, and biodiversity. The flora, which already includes several of the new species from Montana, is funded by the U.S. Geological Survey and housed at the University of Colorado in Boulder.

On the far side of the mountain stream I donned my socks and boots and cast a line upstream into a promising pool. The trout I caught for dinner had a rich orange flesh, the result of carotenoid pigments acquired from a diet of stoneflies and small crustaceans. In turn, these invertebrates got their color from grazing on pigmented diatoms, and once again I was reminded of these trans-microscopic creatures that dwell beyond our conceitful eyes and knowledge. 🐟

*Loren Bahls is curator of the Montana Diatom Collection and a contributor to the online flora *Diatoms of the United States*.*

Counter clockwise from headline:

Cyclotella antiqua from Glacier National Park. 1000X.

Navicula whitefishensis from Upper Whitefish Lake, Flathead Co., MT. 1000X. This diatom is the most recent to be discovered in Montana.

Entomoneis ornata from Glacier National Park. 1000X.

Encyonema reimeri. Living cells in tube. 200X.

Cymbella mexicana. Living cells on stalks. 200X.

Didymosphenia geminata. Live cell on stalk. 400X.
(Note smaller diatoms colonizing the stalk of the larger diatom.)

Rock snot, Lake Creek, Grand Teton National Park, WY.



Photo by Sarah Spaulding

Rock Snot: When a Good Diatom Goes Bad

Didymosphenia geminata (Lyngbye)

Schmidt—Didymo for short—is a large stalked diatom native to the mountains and forests of the northern hemisphere, including the northern Rockies. Didymo produces macroscopic mats, composed mostly of stalks. When mature, these mats look like dirty cotton or clumps of dirty wool.


In the early part of this century, Didymo was introduced to streams in New Zealand, probably on fishing gear carried by anglers visiting from Europe and North America. Within a few short years, Didymo completely dominated hundreds of kilometers of New Zealand streams by covering up to 100% of the stream bottom with thicknesses greater than 20 centimeters, completely altering the physical and biological conditions in the streams. The resulting impact to fisheries, water supplies, tourism, and biodiversity was estimated to be several hundred million dollars.

There is also evidence that Didymo is expanding its geographic range in North America and that the frequency of nuisance blooms is increasing. Nuisance growths of Didymo have been documented in the Kootenai River below Libby Dam and in streams in Glacier National Park, where there is preliminary evidence that Didymo abundance is increasing and caused by the hydrological effects of climate change.



Photo by Sarah Spaulding

Tapping the Norway Maple



WILL DETOURS PAST OUR NORWAY MAPLE tree on the way to the school bus this late-winter morning. Mouth open wide, he positions his head under the metal spout and collects the drops of sap that sluggishly emerge from the tap – one, two, three, four . . . “Let’s go!” I call out from the sidewalk as the bus rounds the corner. “The sap will be flowing after school!”

Real maple syrup is not part of my heritage. As a kid, only Western Family brand maple-flavored syrup ever graced our pancakes and waffles. It wasn’t until I fell in love and moved to Vermont that I experienced maple culture first-hand. Our backyard woods were crisscrossed with a maze of plastic tubing connecting the sugar maple trees. Buckets of sap were transported to the sugar shack by horses where family members worked around the clock tending the fire and the sap evaporator. On a late-winter day each year, we would ski, hike, or slosh through the mud to the sugar shack deep in the woods, smelling the syrup from a mile away, and feast on pancakes with fresh, hot maple syrup. Needless to say, when we moved back to Missoula to raise our family, we kissed Western Family goodbye and made room in our grocery budget for real maple syrup.

Some years ago I met Bob Hayes, who operates a small ranch on Evaro Hill just northwest of Missoula.

On the day I met Bob, he offered me a spoonful of maple syrup he had just made from the sugar maple tree (*Acer saccharum*) outside his front door. Bob grew up in Vermont and, when he moved to Evaro Hill, he planted this tree from his home state to provide shade in the summer, glorious foliage in the fall, and sweet syrup in the spring. As we savored that pure, amber syrup we got to talking about tapping trees, and the various species of the genus

Acer that are suitable for the job. I told him about the Norway maple (*Acer platanoides*) in my backyard and, although he’d never heard of anyone tapping a Norway maple, he sent me home with some reading material: a small booklet by an old Vermonter, Noel Perrin, called “Making Maple Syrup.”

Native to continental Europe and western Asia, Norway maples were first introduced to the eastern United States in the mid- to late-1700s. It was Missoula’s co-founder Frank Worden who reportedly imported the first Norway maples from his home state of Vermont and planted them outside his Pine Street home. As it turns out, Norway maple thrives here in Missoula. While it has done an excellent job of providing deep, cool shade to generations of Missoulians, it has also spread like a weed, each tree producing an abundance of winged seeds that fly on the wind like tiny helicopters and manage to germinate in every nook and cranny.

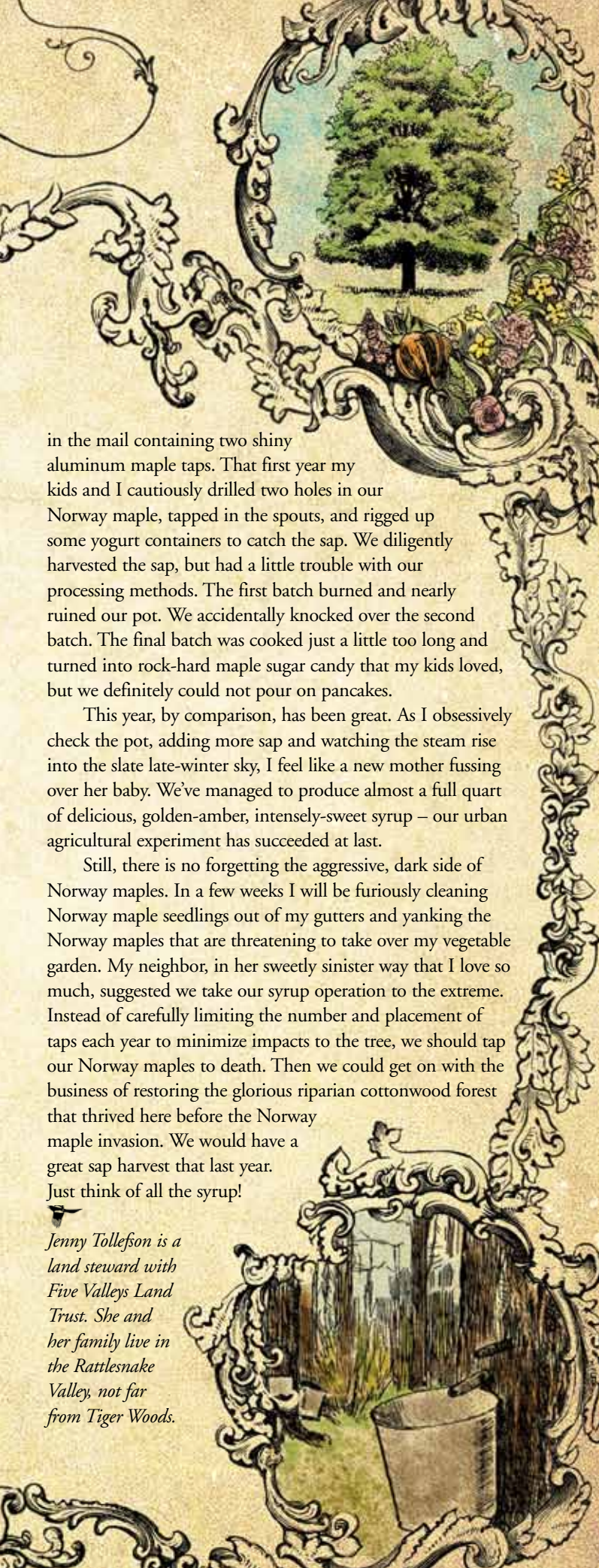
Since Frank Worden’s time, Norway maple has spread from our boulevards and yards into our city’s natural areas. In Greenough Park—forty-two acres of open space along Rattlesnake Creek just north of downtown Missoula—the native cottonwood forest that once shaded the riparian zone along the creek has been invaded by, and in some places taken over by, Norway maples. Some portions

of Greenough Park are undergoing active restoration, which has entailed cutting down all the Norway maples to allow for regeneration of native species. Much of the northeast corner of Greenough remains, for now, a Norway maple monoculture, devoid of any understory vegetation other than young Norway maples. It is a deep, dark, mysterious place. My kids have dubbed this patch of forest “Tiger Woods” (for the wild animals that surely lurk there, not for the golfer). Tiger Woods is a great place to explore, but from an ecological perspective, it doesn’t have much to recommend it.

A few months after my visit with Bob Hayes, a small package from him arrived

We’ve managed to produce almost a full quart of delicious, golden-amber, intensely-sweet syrup – our urban agricultural experiment has succeeded at last.

By Jenny Tollefson



in the mail containing two shiny aluminum maple taps. That first year my kids and I cautiously drilled two holes in our Norway maple, tapped in the spouts, and rigged up some yogurt containers to catch the sap. We diligently harvested the sap, but had a little trouble with our processing methods. The first batch burned and nearly ruined our pot. We accidentally knocked over the second batch. The final batch was cooked just a little too long and turned into rock-hard maple sugar candy that my kids loved, but we definitely could not pour on pancakes.

This year, by comparison, has been great. As I obsessively check the pot, adding more sap and watching the steam rise into the slate late-winter sky, I feel like a new mother fussing over her baby. We've managed to produce almost a full quart of delicious, golden-amber, intensely-sweet syrup – our urban agricultural experiment has succeeded at last.

Still, there is no forgetting the aggressive, dark side of Norway maples. In a few weeks I will be furiously cleaning Norway maple seedlings out of my gutters and yanking the Norway maples that are threatening to take over my vegetable garden. My neighbor, in her sweetly sinister way that I love so much, suggested we take our syrup operation to the extreme. Instead of carefully limiting the number and placement of taps each year to minimize impacts to the tree, we should tap our Norway maples to death. Then we could get on with the business of restoring the glorious riparian cottonwood forest that thrived here before the Norway maple invasion. We would have a great sap harvest that last year. Just think of all the syrup!

Jenny Tollefson is a land steward with Five Valleys Land Trust. She and her family live in the Rattlesnake Valley, not far from Tiger Woods.

Make Your Own Maple Syrup!

Equipment

This can be a low-tech endeavor, especially if you are operating at a small scale. Here is a basic equipment list to start with:

Drill to make the hole in your tree

Taps (you'll need 1-3, depending on the size of your tree)

Hammer for tapping in the spout

Buckets (or containers with hangers) to hang on the taps for sap collection

Cheesecloth to filter impurities from the sap

Hot plate (or outdoor gas range or outdoor fire) and a pot to boil the sap

Candy thermometer to measure the temperature of your sap as it turns into syrup

Glass jar to hold your syrup

Pliers to remove the taps from the tree when sugaring season is over

How to Tap Your Tree

Sap starts to flow between mid-February and mid-March. The exact time of year depends upon the weather conditions. Sap flows when daytime temperatures rise above freezing and nighttime temperatures fall below freezing. You can put 1 to 3 taps in a healthy tree, depending upon its size.

Step 1. Drill a hole. Taps are usually placed about 3 feet off the ground. Distribute taps around the circumference of the tree. Drill the taphole about 2 to 2½ inches deep with a slight upward angle so the sap will flow out readily.

Step 2. Tap the spout in gently with a hammer.

Step 3. Hang your bucket or container on the spout.



collecting the sap

Step 4. As you collect sap, begin to boil it on a hot plate, outdoor gas range, or outdoor fire. Do not boil the sap on the kitchen stove for any length of time without a good vent fan – boiling sap creates enough steam to peel paint off the walls! As the sap boils down, keep adding more sap. Maintain about 1½ inches of sap in your pot and watch it vigilantly to prevent burning.

Step 5. When the sap reaches your desired thickness, pour it into a jar to settle and cool.

Syrup is usually done when the temperature reaches about 7 degrees above the boiling point.



the finished product

Resources to get started:

The Maple Sugar Book, by Helen and Scott Nearing

Making Maple Syrup: Storey's Country Wisdom Bulletin A-51, by Noel Perrin
Amateur Sugar Maker - 20th Anniversary Edition, by Noel Perrin

How to Tap Trees and Make Maple Syrup, University of Maine Cooperative Extension 2007, Bulletin No. 7036. Available at: <http://www.umext.maine.edu/onlinepubs/pdfpubs/7036.pdf>

American Dippers

Not Your Average Songbird

Story and photos
by Eugene Beckes



Imagine being on the edge of a frothing cold mountain stream, examining it for a few moments, then jumping completely in. Submerged, your eyes would concentrate in

looking for particular things, as you move along the bottom of the icy waters. Your feet are perfectly adapted for grasping and pulling you along the many rocks and pebbles. But if the stream is too strong, or the rocks you encounter too large and smooth, well, you can use your wings to propel yourself through the water, much the way that a penguin does.

And why would you do this? Because it's under the water that most of your meals lie: creatures such as salmonfly larvae, caddisfly larvae, and a smorgasbord of other aquatic insects. You would also be tempted by the occasional tiny fish and even fish eggs you're able to grasp with your quick, pointed beak.

Beak? Beak? So who are you?

They used to be called Water Ouzels (my favorite name for them), but then their name was changed to the American Dipper—in this part of the world, at least, as there is also a European Dipper.

Why are they called "Dippers"? Because that's what they do: stand on rocks along the shore, dipping up and down, up and down, repeatedly. It looks almost like they're jumping rope, without the rope. And why do they do this? Some

ornithologists think the movement may frighten insects into moving and giving away their position. But I suspect only the Dipper knows for sure.

Not far from my home are a couple of streams where Dippers can be found year-round. That's right: they don't migrate. At least they don't migrate far. They may move downstream in the winter, as their higher altitude, more familiar waters freeze up. They need open water in order to survive.

Dippers live in the Rocky Mountains and other western waters, their range stretching all the way from Mexico to the northern reaches of Alaska. How do these little birds, slightly smaller than a robin, get through severe winters, particularly in the northern reaches of their range? Dippers generally do very well, occupying a niche that other birds utilize either very little or not at all; Dippers are the only "perching bird" in the world that dives under water and feeds on the aquatic insects mentioned.

Of course there are other shorebirds, such as Sandpipers and Greater Yellowlegs, to mention just two, who peruse the shorelines of creeks, rivers, and lakes, searching for insects and their larvae, but none of these completely submerge themselves. Down there, the only competition for the kind of food the Dippers are after are trout! (And, by the way, it's reported that the occasional giant Brown Trout may eat an Ouzel!)

It's a dangerous world out there for all wild creatures. In spending a great deal of time along the shores of local streams, I've seen Goshawks and Cooper's Hawks occasionally fly low over the waters, hoping to pick off an Ouzel or other bird that might be caught unaware.

Dippers nest along the banks of the streams where they spend virtually



all their time. Their nests are often tucked into a cliff face, the exposed roots of an upturned tree, or even in the cavity of a fallen tree. One of the dangers these nests face is that, in years when there is a great deal of snow melt, waters may rise rapidly and if the nest isn't high enough, the nest and the chicks in it get washed away. Most Dippers pick their nest sites carefully, however, and most nests and their inhabitants survive to continue submerging themselves beneath the chilly waters, looking for their next meal. 🐾

Eugene Beckes spent his childhood exploring in a 150-acre, mostly wild-lands convent near his home in California, which was all he needed to develop a lifelong love and interest in all things wild. He has lived in Montana for 39 years.



Above left:

Diving beneath the water in search of food

Above right:

Food has been found—a caddisfly larva in its case. The Dipper will beat the case against a rock to remove the larva.

Naturalist Notes, of the Avian Variety:



Snowy Owl

Photo by Rob Gappert

This past winter western Montanans enjoyed a rare treat—a parliament of Snowy Owls made themselves at home near Polson, Montana. They received nationwide attention, and large numbers of people from Montana and beyond made the pilgrimage to observe these beautiful raptors, which could be seen perched on houses, electrical wires, and in fields. Other areas of the country, from Massachusetts to Michigan, were also visited by the birds. According to Denver Holt of the Owl Institute, such a migration is highly unusual. While a few Snowy Owls will make their way south each winter, the type of mass migration that happened this past winter is very rare. A possible explanation is that an unusually high number of lemmings last season led to the owls hatching an equally unusually number of offspring, and that the food shortage resulting from the increased owl population forced myriad birds to fly south in search of sustenance—and into the sights of thousands of admiring viewers.

Another white visitor was seen in the neighborhoods of west Missoula. John Bremer, one of MNHC's volunteer librarians, snapped a few pictures of a pale bird perched in a cottonwood tree near his home near Mullan Road, which turned out to be a partially leucistic Red-Tailed Hawk. The term leucism (pronounced "loo-kism") has a "confused history," according to David Sibley. Though birders have used it to describe various types of abnormal coloration, its correct usage describes birds that lack melanin in some or all of their feathers. Leucism differs from albinism in that true albinos are unable to produce melanin, and thus lack pigment in the eyes (causing them to appear pinkish) as well as in their feathers. Leucistic birds can and do produce melanin, but are unable to deposit it in some of their feathers. Some leucistic birds are mostly white, while others retain some of their normal coloring but have scattered white feathers or patches. For more information on abnormal coloration in birds, Sibley has a good overview on his website: www.sibleyguides.com.



Leucistic hawk

This year several of MNHC's Visiting Naturalist in the Schools classrooms, with the help of a few Master Naturalists, participated in the Great Backyard Bird Count (GBBC). The GBBC is an annual four-day event that engages bird watchers across the continent in observing what birds are where at that particular point in time.

MNHC provided interested teachers with basic bird field guides and bird feeders to hang in their school yards or nearby natural areas, and on Friday, February 17th, students and their Master Naturalist assistants spent an hour or two observing, identifying, and counting the birds that visited their feeders.



Chief Charlo students
identify birds with
the help of Master
Naturalist Don Stierle

MNHC Photo

Spring Scavenger Hunt

The snow is melting, the air is warming, the sun is shining, and the days are lengthening. It's time to get outside and enjoy all those signs of spring!

Pull out this page, put on your rubber boots, and go outside to see how many of these signs of spring you can find. To practice your naturalist skills even further, note the date, time, and location of each Sign of Spring.



{ } singing chickadee

Date____Time____Location_____



{ } squooshy mud (better step in it to make sure!)

Date____Time____Location_____



{ } buttercups

Date____Time____Location_____



{ } melting snow

Date____Time____Location_____



{ } cottonwood buds

(watch the same bud over several weeks - when does it leaf out?)

Date____Time____Location_____



{ } puddles

Date____Time____Location_____



{ } mountain bluebirds

Date____Time____Location_____



{ } robin red-breast

Date____Time____Location_____



{ } meadowlark song

Date____Time____Location_____



{ } wild spring breeze

Date____Time____Location_____



{ } rain

Date____Time____Location_____



{ } earthworms

Date____Time____Location_____



{ } green grass

Date____Time____Location_____



{ } crocuses coming up in yards

Date____Time____Location_____



{ } five different shades of green!

Date____Time____Location_____

What other signs of spring can you find?

April Gallery, all month. **Group Show:** Welcome the Osprey. Join us for First Friday, April 6, 4:30-6:30 p.m. Free.

April 4 Volunteer Naturalist Training, 4:00-5:00 p.m. **Fill the Bill.** Prepare for April classroom visits. No prior experience needed.

April 5 miniNaturalists Pre-K Program, 10:00-11:00 a.m. \$3; \$1 MNHC members.

April 11 Evening Lecture, 7:00 p.m. **The Natural History of Exotic Plant Invasion**, presented by Dean Pearson. \$4 suggested donation; MNHC members free.

April 14 Saturday Kids Activity, 2:00 p.m. **Super Cool Snakes**. \$3; \$1 MNHC members.

April 18 Volunteer Naturalist Training, 4:00-5:00 p.m. at the Native Plant Garden at Fort Missoula. Learn how to teach kids about the flora and fauna of western Montana during the May VNS school field trips. No prior experience necessary.

April 18 Volunteer Spring Celebration, 4:30-6:00 p.m. at the Native Plant Garden at Fort Missoula. Enjoy food and drink with fellow MNHC volunteers and staff in appreciation of your time and effort!

April 18 Evening Lecture, 7:00 p.m. **Glacial Lake Missoula Spring Fling**. \$4 suggested donation; MNHC members free.

April 19 miniNaturalists Pre-K Program, 10:00-11:00 a.m. \$3; \$1 MNHC members.

April 25 Evening Lecture, 7:00 p.m. **Grizzly Bears in the Crown of the Continent**, presented by Jeff Gailus. \$4 suggested donation; MNHC members free.

April 26 Native Plant Garden Program, 5:30-7:30 p.m. **Transplanting Perennials Workshop**. \$5 suggested donation; MNHC members free.

April 28 Saturday Kids Activity, 2:00 p.m. at the Native Plant Garden at Fort Missoula. **Art in Nature and Nature in Art**. \$3; \$1 MNHC members.

May Gallery, all month. **Nature Photography Group Show**. Join us for First Friday, May 4, 4:30-6:30 p.m. Free.

May 3 miniNaturalists Pre-K Program, 10:00-11:00 a.m. \$3; \$1 MNHC members.

May 5 Saturday Discovery Day, 9:00 a.m. to 2:00 p.m. **Project Learning Tree Educator Workshop**. \$35; \$30 MNHC members.

May 10 Native Plant Garden Program, 5:30-7:30 p.m. **Beginning Bird Identification Party**. \$5 suggested donation.

May 17 miniNaturalists Pre-K Program, 10:00-11:00 a.m. \$3; \$1 MNHC members.

May 19 Saturday Kids Activity, 2:00 p.m. **Birds!** with Animal Wonders. \$5; \$3 MNHC members.

May 19-20, Master Naturalist Field Weekend, 8:00 a.m. to 4:00 p.m. **Advanced Plant Identification**, taught by Greg Peters and Brian Williams. \$135; \$120 MNHC members. Registration opens April 3. Call 327.0405 to register.

May 23 Evening Lecture, 7:00 p.m. **Montana Mammals** with Kerry Foresman. \$4 suggested donation; MNHC members free.

May 24 Native Plant Gardens, 5:30-7:30 p.m. **Crash Course in Native Wildflower Identification**. \$5 suggested donation; MNHC members free.

May 26 Saturday Discovery Day, time TBA. **Loon Viewing and Festival at Seeley Lake**. \$30 MNHC members; \$35 non-members.

May 30 Evening Lecture, 7:00 p.m. **Sparrows** with Kim Todd and Creagh Breuner. \$4 suggested donation; MNHC members free.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
April MNHC Hours: Tuesday-Friday, noon - 5 p.m. and Saturday noon - 4 p.m. Admission Fees: \$2/adults, \$1/children under 12 (maximum \$6) Free/children under 3 and MNHC members.			Evening Lecture. The Natural History of Exotic Plant Invasion, 7:00 p.m.		April Gallery, all month. Group Show: Welcome the Osprey.	Saturday Kids Activity. Super Cool Snakes, 2:00 p.m.
15	16	10	11	12	13	14
			Volunteer Naturalist Training & Spring Celebration, 4:00-6:00 p.m.	miniNaturalists, 10:00 a.m.		
		17	18	19	20	21
			Evening Lecture. Grizzly Bears in the Crown of the Continent, 7:00 p.m.	Native Plant Garden Program, 5:30-7:30 p.m.	<i>Osprey chicks hatch</i>	Saturday Kids Activity. Art in Nature and Nature in Art, 2:00 p.m. at the Garden at Fort Missoula
		24	25	26	27	28
May				miniNaturalists, 10:00 a.m.	May Gallery First Friday Nature Photography Group Show 4:30-6:30 p.m.	Saturday Discovery Day. Project Learning Tree Educator Workshop., 9:00 a.m. - 2:00 p.m.
		1	2	3	4	5
				Native Plant Garden Program. Beginning Bird Identification, 5:30-7:30 p.m.		
6	7			10	11	12
	<i>Morels poke through melting snow</i>			miniNaturalists, 10:00 a.m.		Saturday Kids Activity. Birds! 2:00 p.m.
13	14			17	18	19
			Evening Lecture Series. Montana Mammals, 7:00 p.m.	Native Plant Garden Program. Crash Course in Native Wildflower Identification, 5:30-7:30 p.m.		Saturday Discovery Day. Loon Festival at Seeley Lake, TBA
		22	23	24	25	26
			Evening Lecture Series. Sparrows, 7:00 p.m.		June	
		29	30	31		
	Citizen Science Pika Project Training, 1:00-2:30 p.m.		<i>Coyote pups emerge from dens</i>	miniNaturalists in the Gardens, 10:00 a.m.	June Gallery First Friday. Young Artists Depict Nature, 4:30-6:30 p.m.	Saturday Kids Activity. The Great Insect Hunt, 2:00 p.m.
3	4	5	6	7	8	9

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY							
<div> Master Naturalist Field Weekend, 7:00 a.m. to 4:00 p.m.</div> <div>10</div>				<div> Native Plant Garden Program. Which Are Weeds? 5:30-7:30 p.m.</div> <div>14</div>		<div> Saturday Discovery Day. Ecology Walk for Families, 10:00 a.m.-Noon</div> <div>16</div>							
	<div>June 18-22 Fish, Frogs, and Pollywogs (Pre-School) Awesome Animals (Grades K-1) Pondemonium! (Grades 1-3) Rocking Raptors (Grades 3-5)</div> <div>17</div>			<div> Native Plant Garden Program. Bee Mimics, 5:30-7:30 p.m.  miniNaturalists in the Gardens, 10:00 a.m.</div> <div>21</div>									
	<div>June 25-29 Insect Insanity! (Grades K-1) Go Fish! (Grades 1-3) Survivor! (Grades 6-8)</div> <div>24</div>												
<div>July</div>													
<div> Summer Science Discovery Camps See Imprints for details, page 14.</div>													
	<div>July 9-13 Predator Prowl (Grades K-1) Animal Art (Grades 1-3) Fire Works Camp (Grades 3-5)</div> <div>9</div>			<div>Berries begin to ripen</div> <div>11</div>	<div> Native Plant Garden Program. Macro Photography Workshop, 5:30-7:30 p.m.</div> <div>12</div>								
	<div>July 16-20 Mini-Biologists (Pre-School) Jr. Survivor Camp (Grades 1-3) Super Sleuths (Grades 1-3) NSI—Nature Scene Investigators (Grades 3-5)</div> <div>16</div>			<div> miniNaturalists in the Gardens, 10:00 a.m.</div> <div>19</div>									
	<div>July 23-27 Happening Habitats (Grades K-1) Mammal Mani (Grades 1-3) Color in Nature (Grades 3-5)</div> <div>22</div>			<div> Native Plant Garden Program. Design an All Season Garden with Native Shrubs, 5:30-7:30 p.m.</div> <div>26</div>									
	<div>July 30-August 3 Rocking Rocks (Grades 1-3) Creepy Crawlies (Grades 3-5) Backcountry Explorers (Grades 6-8)</div> <div>29</div>												
<div>August</div>													
	<div>August 6-10 Aqua Critters (Grades K-1) Bugs and Slugs (Grades 1-3) Eco Warriors (Grades 3-5)</div> <div>5</div>	<div>Swallows gather to migrate south</div> <div>7</div>		<div> miniNaturalists in the Gardens, 10:00 a.m.</div> <div>1</div>	<div> August Gallery First Friday. Sam Case, Natural Illustrations, 4:30-6:30 p.m.</div> <div>3</div>	<div> Saturday Discovery Day. Floodplain Forests: An Adventure for Families, 10:00 a.m.-Noon</div> <div>11</div>							
				<div> Native Plant Garden Program. Nature Journaling, 5:30-7:30 p.m.</div> <div>9</div>									

June Gallery all month. **Young Artists Depict Nature.** Join us for First Friday, June 1, 4:30-6:30 p.m. Free.

June 2 Saturday Kids Activity, 2:00 p.m.

The Great Insect Hunt at the Fort Missoula Native Plant Gardens. \$3; \$1 MNHC members.

June 4 Citizen Science Pika Project Training, 1:00-2:30 p.m. Come learn about the Craighead Institute's Pika Project from April Craighead, who will present on pika ecology and teach interested volunteers how to collect and report data. Contact Allison at 327.0405 for more information and to RSVP.

June 7 miniNaturalists in the Gardens, 10:00-11:00 a.m. \$3; \$1 MNHC members.

June 9-10 Master Naturalist Field Weekend, 7:00 a.m. to 4:00 p.m. **Advanced Birding,** taught by Charles Miller and Brian Williams. \$135; \$120 MNHC members. Registration opens April 3. Call 327.0405 to register.

June 14 Native Plant Garden Program, 5:30-7:30 p.m. **Which Are Weeds? A Native Plant Gardeners' Conundrum.** \$5 suggested donation; members free.

June 16 Saturday Discovery Day, 10 a.m. to noon. **Ecology Walk for Families** at the Mount Jumbo Saddle. \$5 donation; MNHC members free.

June 21 Native Plant Garden Program, 5:30-7:30 p.m. **Bee Mimics** with David Schmetterling and the Missoula Butterfly House. \$5 suggested donation; MNHC members free.

June 21 miniNaturalists in the Gardens, 10:00-11:00 a.m. \$3; \$1 MNHC members.

July Gallery all month. **Young Artists Depict Nature.**

July 5 miniNaturalists in the Gardens, 10:00-11:00 a.m. \$3; \$1 MNHC members.

July 12 Native Plant Garden Program, 5:30-7:30 p.m. **Macro Photography Workshop** with Hobie Hare. \$10; \$8 MNHC members.

July 19 miniNaturalists in the Gardens, 10:00-11:00 a.m. \$3; \$1 MNHC members.

July 26 Native Plant Garden Program, 5:30-7:30 p.m. **Design an All Season Garden with Native Shrubs.** \$5 suggested donation; MNHC members free.

August Gallery all month. **Sam Case, Natural Illustrations.** Join us for First Friday, August 3, 4:30-6:30 p.m. Free.

August 2 miniNaturalists in the Gardens, 10:00-11:00 a.m. \$3; \$1 MNHC members.

August 9 Native Plant Garden Program, 5:30-7:30 p.m. **Nature Journaling.** \$5 suggested donation; MNHC members free.

August 11 Saturday Discovery Day, 10:00 a.m. to noon. **Floodplain Forests: An Adventure for Families** at Kelly Island. \$5 suggested donation; MNHC members free.

August 30 Native Plant Garden Program, 5:30-7:30 p.m. **Seed Collecting.** \$5 suggested donation; MNHC members free.

Look for these program symbols in *Montana Naturalist* and on our website at www.MontanaNaturalist.org.



Adult Program



Youth Program



Volunteer Opportunity



Nature Journaling Tips

Keeping a nature journal is a great way to keep track of your outdoor observations. Anyone can start a nature journal—all you need is a notebook (with lined or unlined pages; many naturalists prefer unlined paper so they can do lots of drawing and painting) and pen, and, if you want, colored pencils, watercolors, or other kinds of coloring tools.

There is no wrong way to keep a nature journal! Some people prefer written observations. Some focus more on sketching and drawing, and most do some combination of the two. The main purpose is to have fun and see how much you can observe and learn in the process.

Local artist and naturalist Claire Emery describes a nature journal as many things:

- A way of engaging with the world around us.
- A learning tool.
- A place to make connections.
- An ongoing record of observations, both written and drawn.
- A precious handmade object in a mechanized world.

The best way to begin is simply to go outside and observe. It's a good idea to note the date, time, location, and weather. By doing so, you'll be creating a record you can look on in years and seasons to come. Then, as you sit outside, journal in hand, ask yourself—What do I hear? What do I see? How do I feel? What do I smell?

All you really need for nature journaling is a notebook and something to write with. But here are some other items that may come in handy:

- field bag, for carrying your journal, colored pencils, etc.
- waterproof pen
- magnifying glass, for seeing the details
- ziplock bag (for rainy days!)
- colored pencils
- watercolors or gouache paints and brushes
- film canister for water
- big rubber bands to hold down the pages of your journal (especially on windy days)

Book Corner:

It's a Bird . . . It's a Plane . . . It's a Cloud!

Cloud spotting can turn the most mundane trips around town into a real naturalist's adventure, and there are several great books that can heighten the experience.



First is *The Cloudspotter's Guide: The Science, History, and Culture of Clouds* by Gavin Pretor-Pinney. He gives detailed descriptions of the different kinds of clouds and their subspecies, like the wispy cirrus clouds or “mare’s tails” outside my window just now. It also includes interesting tidbits such as the history of the meteorologists in Bergen, Norway, who first worked out the complex science of the development of rain clouds, and the Chinese scientist Zhonghas Shou who uses the appearance of certain cloud types as a short-term earthquake predictor.

If you want to share this experience with kids, Tomie de Paola's *The Cloud Book* is a great introduction. He describes the basic cloud types, mixing elementary scientific information with the mythology of clouds and the popular sayings that have been used for centuries to predict weather, including: “When the fog goes up the mountain hoppin’, then the rain comes down the mountain drippin’.”

To take your cloud spotting to the next level, *The Cloud Collector's Handbook*, also by Pretor-Pinney, gives you a field guide and a “birding list” in one. Each type of cloud you find and record is worth points. For those in Missoula, it is easy to get 15 points for the stratus clouds that lay low in the valley on inversion days, and you can pick up another 5 points for getting above the clouds and seeing their undulating upper surface.

Very young children can join in the fun as well with Eric Carle's *Little Cloud*, a great book for encouraging the age-old game of spotting different shapes in the clouds.

Finally, check out www.clouds365.com where you can share your finds with this online cloud appreciation community.

—by Peggy Christian





Master Naturalists practice identifying birds on a summer field trip at Kelly Island

In the Details

Getting up close and personal with nature

By Nadia Soucek
Photos by Merle Loman

A desire for a deeper understanding of local landscape led one University of Montana Environmental Studies graduate student down the path to develop the Master Naturalist course. Brian Williams, Naturalist and Assistant Education Director at the Natural History Center, was inspired to create this course because the details of local place were missing from his educational experience. Williams said his inspiration came from wanting to know about the minutiae.

“We often teach big concepts, but we would never add the details. It would be easy to talk about the mosaic of forest patterns left behind by a forest fire, but we would never know what tree species that means, why there was that mosaic. I wanted to know the details underneath that story, especially as an educator.”

Unlike other Master Naturalist courses around the country, where the curriculum is based more on a broad overview of key plants and animals, Williams’ goal for this course was a focus on developing skills. As Williams emphasized, “When we study

plants [in the Master Naturalist Course], it’s not just a walk to identify all the plants in Missoula, it’s ‘How do you identify those plants so you can do this on your own?’” Students in the course do learn some of the local flora and fauna, but they also walk away with the skills to continue learning on their own once the course is over.

The spring course meets once a week for twelve weeks plus three Saturday field days. The wide range of topics covered include

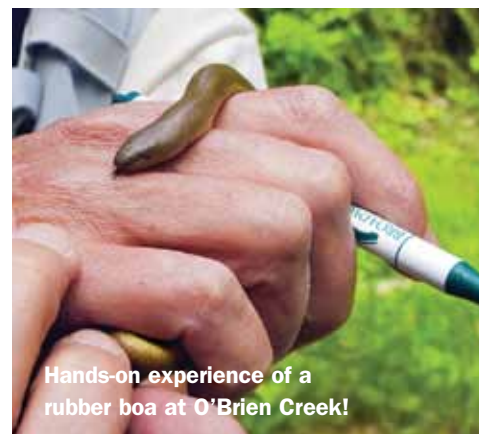
tracking, insects, Montana plants and animals, species identification, journaling, interpretive skills, and one of Williams’ favorites: birds.

“The lesson on bird anatomy and physiology is not just bird identification,” says Williams. “It’s this little bit of in-depth study of how birds work, which is a perspective that I don’t think you can really get anywhere else. If you go to the Audubon you’re usually not going to hear that kind of information, so it goes a little bit deeper than bird identification.”

The first class, offered in 2005, was composed half of students and half of

community members, much to Williams’ surprise. “I don’t even know how people found out about it that first year; we hardly did any advertising. And that’s held true all the way up through now, that there is this huge interest that I would not have predicted.” To date 170 students and community members have taken the Master Naturalist course, and, to maintain their Master Naturalist certification, over the past three years 35 of those graduates have volunteered more than 2,500 hours for various local natural history and environmental organizations.

Nadia Soucek is a master’s student in Environmental Studies at the University of Montana. She is also an intern at MNHC and is currently participating in the spring Master Naturalist Course.



Hands-on experience of a rubber boa at O'Brien Creek!



A cedar waxwing watches from her nest at Fort Missoula

The Montana Natural History Center offers four Montana Master Naturalist Courses each year: two 12-week courses in the spring, an intensive one-week course in the summer, and a six-week course in the fall. For more information on upcoming Master Naturalist courses, please contact the Montana Natural History Center at 406.327.0405 or visit the website at www.MontanaNaturalist.org.



MNHC Photo

Summer Science Discovery Day Camps

Discoveries galore await children outside this summer! Get going with our Summer Science Discovery Day Camps for kids of pre-school age (3-4) through 8th grade. MNHC week-long camps engage children in the study of nature through field trips, arts & crafts, and scientific exploration. Teens can gain experience through our Leaders in Training Program. Camp themes and content are geared toward students entering the grade categories listed in the fall of 2012.

Full payment due upon registration. Registration is confirmed ONLY when full payment is received. Registration fee includes a **\$50 non-refundable deposit.** Register through our NEW ONLINE registration system at www.MontanaNaturalist.org! Registrations also accepted by phone: 327.0405.

Camps begin and end at the MNHC near McCormick Park at 120 Hickory Street in Missoula. Camps include local field trips to surrounding natural areas.

Day Camp Program Hours

Full-day camps Monday - Friday, 9:30 a.m. to 4:30 p.m.

Half-day camps Monday - Friday, 9 a.m. to 1 p.m.

Pre-school camps Monday-Friday, 9 a.m. to 11 a.m.

Before and after care is available free from 8:30 to 9:30 a.m. and 4:30 to 5:30 p.m.

Cost

Full-day camps \$175/members, \$220/non-members

Half-day camps \$85/members, \$130/non-members

Pre-school camps \$75/members, \$95/non-members

Scholarships are available

MNHC memberships can be purchased annually for \$50.00 per family.

Ages

Camp themes and content are geared towards students in a specific grade range. This allows our instructors to plan activities that work best for students in those grades. Camps are designed for students entering grade categories noted in the fall of 2012.



Pre-School Camps

Morning camps

For children ages 3-4

Monday - Friday, 9 a.m. to 11:00 a.m.

\$75/members, \$95/non-members

Fish, Frogs, and Pollywogs

June 18-22

Come join us as we poke around in the water and learn about some fascinating aquatic critters! We'll put on an aquatic-themed play and make puppets!

Mini-Biologists

July 16-20

Spend a fun week learning about insects, mammals, skulls, and tracks! We'll investigate some cool habitats around the Montana Natural History Center and make our own plaster tracks!

Kindergarten through 1st grade

Half-day camps

Monday - Friday, 9:00 a.m. to 1:00 p.m.

\$85/members, \$130/non-members

Awesome Animals

June 18-22

Come learn about some amazing animals that are found in Montana! We'll talk about predators and prey and learn about simple food chains. We'll also take a field trip or two to local natural areas and look for tracks, scat, turtles, and aquatic invertebrates!



Insect Insanity!

June 25-29

Insects are fascinating creatures with many different adaptations that help them survive. In this camp, we'll learn about terrestrial and aquatic invertebrates and spend some time dipping our nets into the water to see what we find! We'll make our own insect nets and learn about metamorphosis. We'll even make an insect habitat to observe our catches during the week!

Predator Prowl

July 9-13

What's a predator, and what do they eat? Are you better at camouflage or finding your prey? We'll learn about some surprising predators found here in Montana and look at some real predator skulls!

Happening Habitats

July 23-27

In this camp we'll explore different terrestrial habitats found around MNHC. We'll catch insects, look for tracks, and learn about some of the birds that live in the city. We'll also make a habitat for the aquatic critters we catch, set a scent station to see who comes to visit at night, and make our own birdfeeders out of recycled materials!

Aqua Critters

August 6-10

Spend the week getting your feet wet! We'll explore a new, nearby aquatic habitat every day. We'll wade, look for aquatic invertebrates, see if we can spot any osprey, and learn about how important water is to all living things.

1st-3rd grade

Full-day camps

Monday - Friday, 9:30 a.m. to 4:30 p.m.
\$175/members, \$220/non-members

Pondemonium!

June 18-22

Join us for a week of adventure and discovery as we explore local ponds! We'll learn about Montana's frogs, snakes, and turtles, use nets to collect and observe aquatic creatures, explore food chain connections, and discover other fun facts about aquatic habitats. We'll visit Lee Metcalf and Bancroft ponds, and maybe even catch a turtle!

Go Fish!

June 25-29

Learn about stream ecology, fish in Montana, and how to catch the big one! In addition to fishing, we'll learn about aquatic invertebrates and how they are important to fish. We'll visit local streams and ponds, create our own tackle boxes, and use waders, nets, and fishing poles to reel in adventure!

Animal Art

July 9-13

Come learn to use crayons, paint, sculpture, and even elements from nature to create your own works of art! We'll visit the Missoula Art Museum for inspiration, and then create our own nature-inspired work using lots of different mediums like drawing, watercolor and printmaking. We'll visit a bird banding station and sketch some of the amazing birds we see! We'll host an art opening at the end of the week to show off our creations!

Jr. Survivor Camp

July 16-20

Want to learn some useful outdoor skills? We'll spend the week learning about shelter building, how to stay safe and not get lost, how to use a compass, basic map reading skills, and bear awareness. We'll learn Morse code and write each other messages, make our own first aid kit to keep, and even make some delicious ice cream!

Super Sleuths

July 16-20

Who pooped in the woods? What animal left those tracks behind? We'll answer these questions and more as we explore local natural areas and look for signs of wildlife. We'll create our own track guides, practice tracking each other through the woods, learn about how biologists use telemetry to study animals, and make a special camp T-shirt!

Mammal Mania

July 23-27

Come learn about some of the amazing mammals that are found in Montana. We'll take a trip to the Bison Range to look for one of the largest mammals in Montana and spend the week learning about mammals that live nearby. We'll take a trip to the zoological museum at the University and spend some time studying skulls!

Rocking Rocks

July 30-August 3

What do you know about geology? Come learn with us as we spend a week learning about minerals and rocks through fun activities. We'll make our own fossils, learn about the three different types of rocks, mine for sapphires, and have a special visit from an astronomer from the University who will tell us about rocks from space! We'll even make some instruments out of natural objects to make our own rock band!

Bugs and Slugs

August 6-10

The world of invertebrates is full of amazing creatures. We'll spend the week looking for insects and other invertebrates using nets, hand lenses, and microscopes to learn more about what makes them so unique. We'll make our own bug nets to keep, set traps to lure insects in, and go on an extra-special trip to the electron microscope at the University!

3rd-5th grade

Full-day camps

Monday - Friday, 9:30 a.m. to 4:30 p.m.
\$175/members, \$220/non-members

Rocking Raptors

June 18-22

This week we'll learn about raptors and their amazing adaptations. We'll study osprey, hawks, eagles, owls, and falcons to see what we can learn about them. We'll even have a visit to a bird banding station! We'll learn how to use binoculars, make kites, and even make some bird houses for raptors that might be living in our backyard!

Fire Works Camp

July 9-13

Fire can be frightening, but it's also an important part of ecosystems. We'll spend the week learning about the causes of fire, fire behavior, how plants and trees survive fire, how fire helps some plants and animals survive, and how people can make their homes safe from forest fires. We'll visit the Smoke Jumper Center, perform some exciting experiments at the Fire Lab's Burn Chamber, and take a few field trips to some local burned areas to see the effects of fire firsthand!

NSI—Nature Scene Investigators

July 16-20

Have you ever wondered who left that pile of scat in the woods, or who left that track by the river? We'll spend the week answering these questions as we poke around in the woods to see who's been here! We'll also learn some skills for basic survival, including fire and shelter building, first aid, and Leave No Trace principles!

Color in Nature

July 23-27

Come join us as we spend a creative week perfecting our art skills! We'll visit the Missoula Art Museum and a bird banding station, make baskets and bird feeders out of natural and recycled materials, make our own jewelry, and much more! We'll host an art opening at the end of the week to show off our creations!

Creepy Crawlies

July 30-August 3

Who doesn't love learning about insects? We'll spend the week seeing what we can catch and learning about metamorphosis and other amazing insect facts. We'll even start our own (live) insect collection that we will release at the end of the week. A trip to the electron microscope at the University will let us see all sorts of neat critters up close and personal!

Eco Warriors

August 6-10

Interested in learning about how we can make power with the sun, wind, and water? Come learn all about the fields of Biomimicry and "green" design. You'll see some examples of great inventions, create a solar-powered motor boat, and make a solar-powered oven to roast s'mores in!

6th-8th grade

Full-day camps

Monday - Friday, 9:30 a.m. to 4:30 p.m.
\$175/members, \$220/non-members

Survivor!

June 25-29

Spend the week learning techniques for basic survival, including how to start a fire without matches, how to construct a shelter that will keep you warm, how to filter your own water, make a fishing pole, predict weather, make your own string, and perform basic first aid. We'll also make our own compass, learn about bear awareness, go fishing, and make our own ice cream!

Backcountry Explorers

July 30-August 3

Want to spend a week in the woods this summer that includes a fantastic overnight backpacking trip? We'll hike some beautiful trails every day and explore the world around us using the tools of a naturalist such as field guides and compasses. We'll also learn about plants and animals common to our region as we get out and explore, and practice Leave No Trace Principles. *This camp will feature an overnight backpacking trip from August 2-3.*

Teens!

Leaders in Training Program

ALL SUMMER

Teens aged 14-17 can volunteer for a Leader in Training position and gain experience in child care and summer camp instruction by assisting camp instructors with programs. Contact MNHC at 327.0405 for application instructions and more information.

spotlight:

MNHC Welcomes Development & Marketing Director

There's a new face at MNHC! **Whitney Schwab**, hired in March, is MNHC's new Development and Marketing Director. Whitney has a B.A. in Natural Resources Recreation Management from the University of North Carolina at Wilmington and an M.S. in Environmental Studies from the University of Montana, where she focused on Environmental Advocacy and Collaboration. Her professional experience includes work as an environmental educator, non-profit administrator, fundraiser and small, sustainable business developer. Whitney's interests include connecting folks to meaningful experiences with the natural world as well as promoting environmental sustainability within the built environment. She serves on the boards of both the United States Green Building Council Montana Chapter and Youth Homes. Whitney's free time is currently focused on her young son, who is already learning bird calls and listening to the owls and coyotes that call in the evening by her home.



Photo by Merle Loman

Master Naturalist Field Weekends

MNHC is once again offering two Advanced Master Naturalist Field Weekends this spring and summer. These weekends provide an opportunity for Master Naturalists and interested community members to take their training to the next level, practicing their identification skills in the field under the guidance of experienced naturalists.

The first weekend, May 19-20, focuses on Montana's plant world.

Naturalists who want to build their skills in recognizing the diverse flora of Montana will spend their time outdoors in a mix of habitats – forest, riparian, and grassland – practicing identifying flowers. UM botany and science instructor Greg Peters and MNHC naturalist Brian Williams will lead the group in honing their skills and increasing their confidence in keying out flowers and building their knowledge of plant families.

The second weekend, June 9-10, focuses on birds. Early summer is an ideal time to build a solid foundation of bird identification skills, as species are closely tied to specific habitats, males are in full plumage and song, and there are no juveniles or migrants to confuse the process. Lifelong naturalist and birder Charles Miller and MNHC naturalist Brian Williams will help participants take full advantage of this window of opportunity to learn the western Montana breeding birds by plumage, song, habitat, and behavior.

Cost for each field weekend is \$135 for non-members and \$120 for MNHC members, with full payment due upon registration. Call 327.0405 to register.

New Workshops at the Native Plant Garden at Fort Missoula

Our Native Plant Garden offerings are doubling in 2012. With a beautiful new classroom and other new additions to the grounds, the Native Plant Garden at Fort Missoula is an ideal learning environment, and MNHC will be taking full advantage of this improved resource. Throughout the summer months,

we'll be hosting two community workshops per month on a variety of topics. Garden lovers can learn about everything from

transplanting perennials and identifying wildflowers to recognizing bee mimics and practicing macro photography. You can even learn how to design an all-season garden using native shrubs or collect seeds from native plants. It's a great way to spend a summer evening—learning something new in (and about) the great outdoors! Most programs are free for members, with a \$5 suggested donation for non-members. See our Calendar for a list of all upcoming Garden programs.



MNHC Photo



MNHC Photo

MNHC will also be offering several Garden programs for young children. We'll be continuing our miniNaturalist program throughout the summer, spending the first and third Thursdays of the months of June, July and August out at the Garden, where pre-schoolers can learn about plants, birds, bugs, soil, and other fun nature topics. **miniNaturalist** programs are from 10:00-11:00 a.m. and cost \$3/child for non-members, \$1/child for members.

Caddisflies

By Allison De Jong
Photos by Joe Giersch

Imagine you're hiking along a trail in your favorite Montana mountains. It's spring—there's still snow beneath the Douglas-firs and the cottonwoods are just budding. You come to a rushing stream, but instead of immediately crossing the bridge to the other side, you walk down to the edge and touch your fingers to the icy cold water. If you reached in a little further, perhaps turned over a rock or two, you might just spot that amazing little aquatic insect, the caddisfly.

Caddisflies are insects of the order Trichoptera, which means "hairy wings," so named for the minute hairs that cover the wings of the adult insects. Trichoptera encompasses 21 families and more than 1,400 species in North America, and is the largest insect order that is entirely aquatic—aquatic, that is, at the larval and pupal stages (which together last anywhere from four months to two years), but terrestrial for their 30 or so days as adults. And, unlike any other aquatic insects, caddisfly larvae produce silk.

Like butterflies and moths, to which they are closely related, caddisfly larvae have silk glands in their lower lip, and it is their ability to produce a sticky silk that enables them to build for themselves the inch-long, tube-shaped shelters that have caused fly fishers to dub them "rock rollers." Some of those shelters are portable cases, usually tapered tubes made of intricately-arranged grains of sand, small rocks, pieces of bark, or other plant material. Others are attached retreats, secured to underwater rocks or logs and made entirely of silk or of bits of rock, plant material, and other detritus held together with silk.

Their ability to build these portable or attached homes enables caddisflies to survive in a variety of aquatic environments. The largest number of caddisflies live in relatively small, cool streams, but they can also be found in larger, warmer rivers or even standing water. Those that live in swift-moving water use their cases as ballast; the weight of the case keeps them from being borne away by the current, yet is light enough to keep them buoyant. Those that build attached retreats find quieter eddies or sheltered areas in the stream where their fragile homes won't be easily torn away. And whether they live in homes of sand or bark or silk, the larvae are constantly exposed to a regular flow of fresh, oxygenated water. Even in slow-moving or still water, the larvae can wiggle inside their cases, creating their own tiny currents—and a fresh supply of oxygen.

Despite their protective cases, however, caddisflies do get eaten, and are, indeed, an important food source for trout, other fish, and various birds [see American Dipper article on page 8]. Some species break down plant material into smaller pieces that can be eaten by even tinier creatures, while other species catch minute pieces of organic material in silk nets, eat them, and, in digesting them, produce larger pieces of organic material that can be eaten by other organisms. Whether the eater or the eaten, caddisflies have an important role to play in freshwater ecosystems.

So if you do happen to glimpse a crawling tube of pebbles or a silky net of leaf bits clinging to a rock in a mountain stream, take a closer look and see if you can find the little larva inside... and don't forget to return the rocks gently to the way you found them. 🦋

Some of those shelters are portable cases, usually tapered tubes made of intricately-arranged grains of sand, small rocks, pieces of bark, or other plant material.

Northern Case Maker -
Allomyia bifosa adult
Logan Pass, Glacier National Park



Northern Case Maker -
Allomyia bifosa larva
Logan Pass, Glacier National Park



Humpless Case Maker -
Brachycentrus sp. larva
N. Fork Boise River, Boise, ID



Uenoid Case Maker -
Neothremma sp. larva
East of Lolo Pass, ID

Caddisfly Silk Biomimicry

Unlike spiders and butterflies and silk worms, caddisflies spin their silk underwater—where it is not only sticky but is able to stick to a surprising number of objects, from rocks to leaves to bark. Some caddisflies have even used glass beads and flakes of gold as case-building materials. This quality is quite remarkable when you consider the difficulty of, say, getting a band-aid to adhere to wet skin. Researchers at the University of Utah have identified the chemical and structural makeup of the Trichoptera silk, with hopes to replicate it and create adhesive tape that could be used during surgical procedures. To read more, go to <http://www.unews.utah.edu/old/p/022210-1.html>.



Common Netspinner -
Parapsyche elsis net
Jackson Creek,
Glacier National Park



Science is springing up all over at

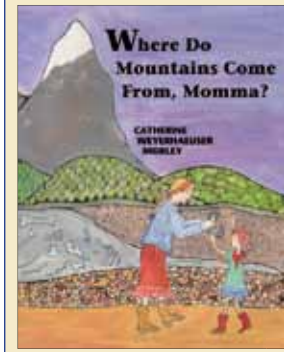


ExplorationWorks
Montana's Museum
of Interactive Science
and Culture. New NASA
exhibits coming June 2012.
Science is Fun—Try It!

ExplorationWorks!

995 Carousel Way in Helena
 406/457-1800 ext. 1
www.explorationworks.org

Shop the ExploreStore for
 unique science and
 learning kits for all ages.



**Answer
 your
 child's
 lofty
 questions**

For ages 4 to 8
 32 pages
 paper, \$12.00

MP Mountain Press
 PUBLISHING COMPANY
 P.O. Box 2399 • Missoula, MT 59806 • 406-728-1900
 800-234-5308 • info@mtmtpress.com
www.mountain-press.com



GOOD FOOD
 S T O R E

www.goodfoodstore.com | Missoula | 406.541.3663



Clark Fork School

Nature-based, community-focused
 education in the heart of the Rattlesnake

Now enrolling for summer camps and
 2012-2013 school year

Two-year-olds - 5th Grade



2525 Rattlesnake Drive, Missoula 406.728.3395 www.clarkforkschool.org

Tune in to
Field Notes

Hear all about the flora, fauna, bugs and
 birds of western and central Montana.

Field Notes can be heard Sundays at 12:25 p.m.
 and Mondays at 3:00 p.m. on KUFW/KGPR radio,
 89.1 in Missoula and 89.9 in Great Falls.

Field Notes welcomes new writers
 and sponsors. Contact the
 Montana Natural History Center
 at 327.0405 for details.

Montana
 Public Radio



Friends of the

Lee Metcalf National Wildlife Refuge
 P.O. Box 758, Stevensville, MT 59870
 406-777-5645

Love kids? Love nature?

Volunteer with
 our Visiting
 Naturalist full-
 day field trips!

Field trips run
 every school day
 from April 30 -
 June 1.

Spend a day (or three) outside with 4th and 5th grade students
 teaching them about our big, beautiful world!

To volunteer or for information,
 contact Allison De Jong, Volunteer Coordinator at 327.0405
 or adejong@montananaturalist.org



Western Screech Owl *Otus kennicottii*



A Study of Strigiformes

Northern Sawwhet Owl - *Asio bairdii*



Great Horned Owl *Bubo virginianus*



Snowy Owl *Bubo scandiacus*

Fourteen owl species can be found in Montana. Scientist Andrea Stierle depicted these four in her nature journal for the Master Naturalist Course. Snowy Owls are not often seen in Montana, but occasionally (like this past year) they make their way farther south in the winter months. Great Horned Owls, Northern Saw-Whets, and Western Screech Owls are more common and can be found in western Montana year-round.

Drawings by Andrea Stierle, Master Naturalist



Montana Natural History Center

Connecting People with Nature

120 Hickory Street
Missoula, MT 59801
www.MontanaNaturalist.org

NON-PROFIT
ORGANIZATION
US POSTAGE
PAID
PERMIT 569
MISSOULA, MT

Montana Natural History Center is an equal opportunity service provider.
Montana Natural History Center trips are permitted on the Lolo National Forest (Clause VII.B).

Yes! I want to become a member and support the
Montana Natural History Center. *All memberships are annual.*

☐ Family Membership: \$50 ☐ Individual Membership: \$35

☐ Supporting Membership (magazine only): \$10

All gifts are tax deductible to the full extent of the law.

☐ I am enclosing payment by check.

Name

Address

City

State

Zip

Phone

☐ I would like to pay with credit card (circle one): AMEX VISA Mastercard

Account Number

Exp. Date

Signature

☐ Sign me up for the monthly email newsletter.

Email address:

☐ I want to volunteer! Send me a volunteer application.

☐ I would like more information on making a planned gift or gift of stock.

*Make us your base camp for discovery with a visit to our website –
www.MontanaNaturalist.org. Become a member on-line, explore our programs
and discover where the Montana Natural History Center can take you!*

**Fill out and mail to Montana Natural History Center, 120 Hickory Street, Missoula, MT 59801
or Fax: 406.327.0421**

Family & Individual Membership Benefits

Annual subscription to *Montana Naturalist*
Free visitor center admission
Discounts on all programs
Invitations to special programs
Access to the Ralph L. Allen Environmental
Education Library



If you have enjoyed the articles and
photos in *Montana Naturalist*, won't
you please help us continue to celebrate
Montana's natural history by becoming a
supporting member? Your \$10 donation will
go directly to support the costs of producing
this magazine. *Thank you!*

Please send donations to:
Montana Naturalist,
c/o Montana Natural History Center
120 Hickory St.
Missoula, MT 59801