UPSTREAM
News from Itasca Biological Station and Laboratories

Photo: Jonathan Schilling

Mycology students test the effects of hot oil and salted butter on *Morchella semilibera* (half-free morels).

Live and learn

Itasca field biology courses offer students the opportunity to grow as scientists and people.

Taking a field biology course is an immersive experience. Wading into lakes, maneuvering through bogs and navigating fallen trees on forays into the forest are all par for the course. But what about when students aren't in the field, in class or working on assignments?

For field biology students at Itasca Biological Station and Laboratories (IBSL), the engagement doesn't stop when the day's lecture or foray into the field is over. The experience continues in the evenings and on the weekends in informal ways. They participate in seminars given by instructors and visiting researchers, share their own research, interact with volunteer guides and engage in group activities, like bike rides through the park or wildflower hikes with volunteer guides.

"Students are in class for a big chunk of the day," says IBSL Associate Director Emily Schilling. "But we also set out to create an environment where students can stay engaged outside the formal curriculum. Sometimes that looks like students sitting at the picnic tables talking about what they collected that day. Sometimes it's an excursion with the directors in canoes paddling down the Mississippi headwaters. A lot of students soak up more in a few weeks than they would in a typical classroom setting over the course of a semester."

Schilling notes that the living-learning community approach also helps in other ways. While some field biology students arrive well-versed in the ways of the wilderness, those who are not can feel unmoored. "We're trying to make it more welcoming and accessible, not just to kids who grew up going to the Boundary Waters or camping every summer and are comfortable exploring the state park, but to anyone who wants to have that experience. The living-learning community model helps us do that."

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DIRECTOR'S MESSAGE

Greetings from Itasca Station

I hope this note from the north finds you well. It has been a weird, nearly snow-free winter. As I write this, I assume the fiddleheads, ramps and devil's urns are getting ready for ephemeral "show time." But who knows what they will encounter this spring. We could have snow, early fire or something altogether new. The future is unpredictable, or rather it is predictably uncertain.

We have always forged ahead as a species with an understanding that the road ahead goes around some blind curves. This is why we do some of our science for the sake of knowing, not for yields, extractions or earnings. We train our graduate students to be prepared to answer unknown problems, not to be our apprentices. We prepare ourselves with bits of knowledge, like a toolkit rather than a finished build.

Increasingly, we are also inviting other ways of knowing to Itasca, and we are experimenting a bit with programs that curate new conceptual spaces. One of these is Science of Craft, a cross-over between a science field course and a folk school craft workshop. Another is our Big River Continuum indigenous artist exchange program, where the role of art is not to translate our science but to inform our path of inquiry together.

Enjoy *Upstream*, and we hope to see you down a road that looks busy but fairly straight, for now. — Jonathan Schilling

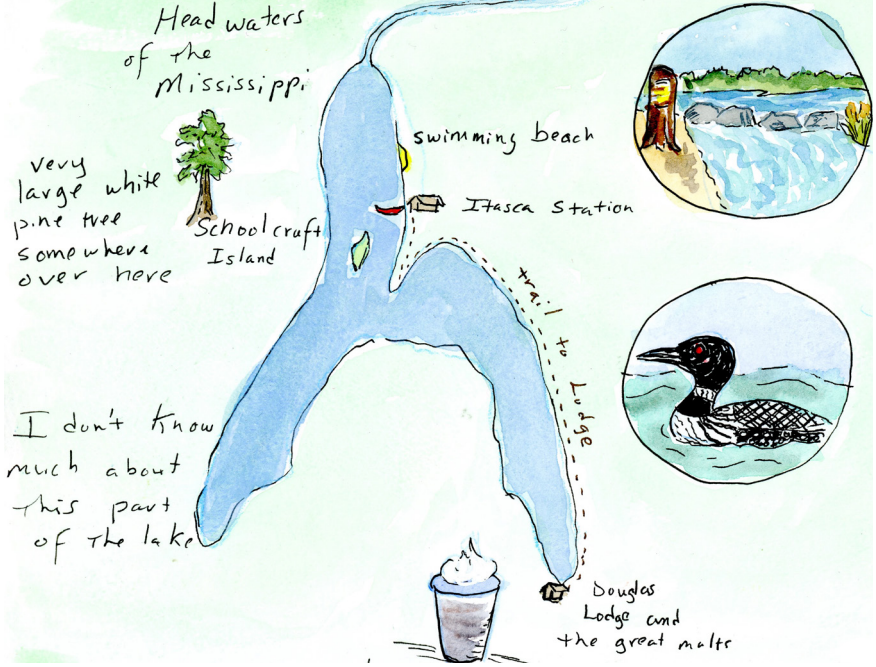

Illustration by Dr. Jennifer Powers, instructor for the "Drawn to Nature" nature journaling course.

Naturally Creative

Two new short courses invite participants to explore the intersection of science, nature and art.

Biologists are, by definition, keen observers of the natural world. They are students of life after all and there's a long tradition of naturalists documenting nature in word and image. This summer, Itasca Biological Station and Laboratories is offering a unique opportunity for anyone interested in exploring their creative side in a science context to step into that world with short courses on nature journaling and nature writing led by scientists with creative credentials. The courses are designed to allow participants to explore their curiosity and develop their ability to capture insights gained from close observation of nature on the page.

Some of the inspiration comes from the increasing popularity of "folk schools" where people can learn traditional crafts from experienced artisans. IBSL leaders saw an emerging niche for their own version that weds science and craft, hence the name Science of Craft. Director Jonathan Schilling describes the courses as "somewhere between a folk school course and a regular science field course."

The inaugural courses are each three days long and offered back to back for those who would like to participate in both. Dr. Jennifer Powers (professor, Plant and Microbial Biology) will lead a course on nature journaling — *Drawn to Nature: Observing and Documenting Itasca State Park*. Dr. Marlene Zuk (professor, Ecology, Evolution, and Behavior) and Dr. Kathryn Nuernberger (professor, English) will co-lead a class on nature writing — *Writing the Wild: A Northwoods-Inspired Poetry and Prose Course*.

The courses are about more than learning a new skill, says IBSL Associate Director Emily Schilling. They are about getting outside, slowing down and observing the natural world. "It's just as much about the process as the product." — Stephanie Xenos

Learn more about Science of Craft offerings at z.umn.edu/itascacourses.

Outside the lab

Michael Smanski shares highlights from his years visiting the station.

Biochemistry Molecular Biology and Biophysics faculty member Mike Smanski typically conducts his research on genetically modified organisms in his lab on campus. But a few times a year, he heads north. Though he doesn't conduct research at the station, the station experience has become a core part of his work and mentorship. — Adara Taylor

What does your involvement at Itasca look like?

I teach undergraduate modules during Nature of Life most summers. I also teach graduate student modules for our Biochemistry doctoral students in August. In the fall and winter, I often visit the station for departmental or training program retreats.

As someone who primarily conducts research in lab settings, what value does the station add to your work and life?

What I appreciate most is the "campy" nature of the activities that occur at the station. It is a great atmosphere to build relationships with students and faculty in a way that we don't get on the Twin Cities campuses. The grad students get to come into the program with a shared experience that's way outside the norm of what they're used to. If you want to relate it to biology, it's like insects that shed their shells. You need to break out of your shell if you're going to grow a bigger one. Itasca is great for doing that.

What's your favorite thing to do at the station?

I think being on the lake is a big thing. I taught myself how to ice fish up there one winter, which seemed like an important step in learning how to be a Minnesotan. In the summers, I go in the morning out on a paddleboard before the breakfast bell rings. I love the stillness and serenity that the Northwoods provide in every season.

Dr. Michael Smanski talking with students during Nature of Life.

Photo: Jonathan Schilling

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About the guides

For the past few years, a small group of volunteers has been on hand to engage with field biology students. Dubbed "guides," they spend time with the students and serve as a resource. They share their insights, lead activities and engage with students in an informal way at mealtimes. The guides bring a lifetime of experience to the task. Last year, Alan Holt (retired scientist, Nature Conservancy), Corby Kistler (retired scientist, USDA), Jim Sparks (retired scientist, Bureau of Land Management), and Sue Wick (retired professor, College of Biological Sciences) served as guides.

Wick made the trip to Itasca many times for Nature of Life, the College's one-of-a-kind program for incoming students. She enjoys the more relaxed role of guide and sees the value in the concept. "The guides all come from different professional scientific backgrounds," she says "and are able to provide different perspectives about career paths and the natural world to the students." — Stephanie Xenos

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EDITOR

Emily Schilling

CONTRIBUTORS

Kristal Leebrick, Adara Taylor, Stephanie Xenos

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Meet the new station scientist

Victoria Simons is a Bemidji State University alumna who went on to graduate from Colorado State University in 2023 with a master's degree in Fish, Wildlife and Conservation Biology, where she studied foraging and provisioning behavior in birds. Taking the position as Station Scientist this winter was a full circle moment for Simons, who spent lots of time as an undergrad conducting ornithology research at Itasca. — Adara Taylor

How did you get connected to the station?

While I was an undergrad at Bemidji State University, my advisor put me in touch with Dr. Sarah Knutie, a visiting scientist who does bluebird and tree swallow research at the station. I got to spend a summer here at the station as a field technician for her research project. Right after that I got my master's position at Colorado State University where I monitored nest boxes at CSU's Mountain Campus field station. I really loved the whole field station experience, so when I saw the position at the Itasca Station, I knew it would be a perfect fit for me.

Do you have a favorite bird you're excited to see at the station?

I love the common loon. It's something that I really missed when I was down in Colorado. Seeing them on the lakes and hearing them makes me really excited to be in loon country again. I've already reached out to the DNR about research opportunities. They have a volunteer Loon Watcher Program where observers track the number of nests, and adult and juvenile loons seen on the lake. I'm adding that to our lake sampling procedure, and I am excited to track loon activity in the state park this summer.

What's your favorite part about being at Itasca?

That's a tough question. Honestly, I just love the station environment both in terms of the nature and the people parts of it. Everyone has been so kind and welcoming. You really get a taste of the Minnesota-nice culture. Pairing that with the physical setting of the station — with the tall pines standing like protective sentries around the lake — there is a strong sense of tranquility here. Everything comes together in a very peaceful and pleasant package.

Around Itasca

Photo credits: Madie Cloutier (center) and Emily Schilling (left and right).

Dr. Emily Schilling collecting Canada darners at Wilderness Loop Beaver Pond and holding one up for a closer look.

To catch a dragonfly

Emily Schilling leads research on the migratory journey of the Canada darner.

Wading in fish-free ponds is not for the faint of heart. Predaceous insects lurk under water lilies, searching for prey. In this murky, alien world of tadpoles, amphipods and algae dwells a predaceous insect with lots of admirers, including Dr. Emily Schilling, dragonfly enthusiast and associate director of the Itasca station, who spends lots of time in aquatic ecosystems where fish aren't the top predators.

"Dragonfly nymphs are so cute," says Schilling, "and they thrive in these systems that lack predatory fish." Her fascination with dragonfly life cycles and the ecology of fish-free ecosystems led her to become the first scientist to document the migration of a common dragonfly species called the Canada darner (*Aeshna canadensis*). She is studying when and where they're traveling.

To investigate, she and a team of dedicated field techs collect Canada darners at nearly every stage of their life cycle. As adults, the wings of these full-fledged, glimmering aerial predators hold chemical clues about where they were born. Chemical signatures assimilated by young nymphs persist in their bodies after they have emerged to become aerial adults. Scientists can match these signatures — called hydrogen isotopes — to specific latitudes using isotope "maps." Schilling has identified Canada darners that have flown as far as 500 miles from the ponds where they emerged.

Catching adult darner dragonflies requires a lot of hand-eye coordination. To demonstrate her point, Emily pulls up a photo of a field technician holding a bug net in one hand (for catching adults) and a dip net in the other (for sampling aquatic nymphs). "You always have to be on the ready to catch one as they happen to zoom by," Schilling explains. Sampling tenerals — dragonflies that have just emerged from their final aquatic instar — is a much more peaceful process but requires careful planning to catch them as they emerge.

"As far as the aesthetic of the ponds we study, they are just really beautiful," says Schilling, describing an elegant array of water lilies floating gracefully on water that's crystal clear "until you mess it up with your waders!" A chorus of birds and frogs sings nearby. "There's just so much life under the surface that we don't see unless we look." — Adara Taylor

A special place

Bruce Dumke spent time at the station as an undergraduate and left with lifelong memories and a deep connection to the natural world.

Rising at daybreak to take a quiet hike through the forest and listen for birds. Climbing a 100-foot red pine in forester gear to snap a photo of an eagle's nest. Netting fish in the evening to study the size differences of ciscoes in Mary Lake versus Elk Lake. Add the sights of native flowers blooming on the forest floor in early spring, and you have the story of how a field class at Itasca Biological Station and Laboratories in the late 1970s instilled in Bruce Dumke (B.S. Biology, '78; DDS, '86) his lifelong love of nature and continued connection to Itasca and the College of Biological Sciences (CBS).

Dumke enrolled in CBS after spending his early college years taking general courses at Minnesota State University, Mankato. He grew up in Mankato, the son of a dentist who encouraged him to "study what I'm good at," and that was biology, he says.

At the U of M, he took a class from zoologist Don Gilbertson, who encouraged Dumke to enroll in courses at Itasca. The program included students from CBS and the Forestry School (that's how he got the gear to climb that 100-foot pine), lessons in limnology and ichthyology with Jim Underhill, invertebrate biology with Gilbertson, botany with Douglas Pratt, and birds with Itasca director and renowned ornithologist David Parmelee.

Students studied copepods and tardigrades under microscopes in Gilbertson's lab. "He could find them in the moss on the roof of the cabin," Dumke says. "These guys all knew where to look. They knew what stump or rock to turn over to find something."

The congregant meals, the evening campfires, the skunks that sometimes wandered into those gatherings provided tales Dumke's wife, Cathy, says she's heard many times. "That course had the highest impact on his education," she says. And, he adds with a laugh, "It was the most fun."

After graduation, Dumke studied marine biology at the University of Hawaii but after two years, he returned to Minnesota to attend dental school at the U. "I realized I wanted to deal more with people," and he did. Dentistry was a good career, he says, but now that he's retired, instead of attending dental conventions, he and Cathy hike all over Minnesota and the world using Dumke's trusty field guides and the Cornell Lab of Ornithology's Merlin phone app to help them identify birds, plants, and animal tracks.

The Dumkes are also active participants in CBS alumni activities, attending the spring bison release at Cedar Creek Ecosystem Science Reserve and the annual CBS Scholarship and Recognition Dinner, which they say is a highlight as they meet a new generation of biologists.

Dumke recalls with particular fondness a walk led by mycologist and IBSL Director Jonathan Schilling during an Itasca Alumni Weekend. He came away from that experience in awe of the knowledge and enthusiasm shared by the faculty there.

"Itasca is just a special place in this state," Dumke says. His wife Cathy agrees: That one semester he spent at Itasca more than four decades ago, "has enriched our lives." — Kristal Leebrick

Bruce Dumke climbing a pine tree, boating on Lake Itasca and on campus with his wife, Cathy. Photos at Itasca courtesy of Bruce Dumke.

An underwater amphitheater

A University of Minnesota Duluth graduate student surveys how fish respond to noise.

Believe it or not, fish can hear you. “Sound actually amplifies underwater if it breaks through the water’s surface tension,” says Leah Glimsdal, a University of Minnesota Duluth (UMD) graduate student studying how underwater acoustics affect fish communities. You can imagine how terrifying it might be for fish when people who go ice fishing drill their holes. “They usually get scared right away,” says Glimsdal. “We call that an escape response.”

Her experimental design is simple: drill a hole, submerge a camera and a water-proof microphone in the icy lake water, then wait over an hour to drill a second hole nearby. Despite being initially scared off by the drill, many fish (or more fish than were initially there) quickly returned to the site of the drilling. Glimsdal is still unsure why.

“Around two minutes after drilling, I see seven times more fish than before drilling,” says Glimsdal. She thinks they’re coming back to feed on zooplankton. These tiny aquatic organisms are normally found near the top of the water column but are much lower post-drilling. It’s possible they get stuck in a current created by the drill. “It’d be like us swimming in molasses — they’re not able to swim out.”

Glimsdal, hopes to continue investigating how sound influences aquatic species. “Fish use sound a lot. They use it for mating, predator and prey detection, finding habitats,” she says. “Louder sounds can mask their ability to hear those sounds.” — Adara Taylor

A grad program (re)treat

Visits to the station help generations of graduate students find footing amid busy academic schedules.

Each year, incoming Biochemistry Molecular Biology and Biophysics (BMBB) graduate students make their way to the Itasca Biological Station for a weekend retreat in the northwoods. It’s one of several graduate program retreats at the station that provide students an invaluable community-building experience they remember throughout their time in the program.

BMBB Department Head David Bernlohr has attended the grad school retreat for his department since he joined as faculty nearly four decades ago. “A great part of the trip is bonding on the drive up,” says Bernlohr, who knows every golf course, sweet-corn stand, restaurant and notable landmark from Minneapolis to Bemidji. His order on the way up to the station at the Dairy Queen in Royalton, Minnesota? “It’s hard to beat a Peanut Buster Parfait.”

Bernlohr notes that beyond acquainting students with faculty, orienting them to University services and conducting a brief poster-session, the most valuable aspect of the Itasca retreat is that it offers students, faculty and staff meaningful opportunities to connect.

“Whether it’s going to the headwaters of the Mississippi River, having a ping-pong tournament, biking around the lake or just having a bonfire, there’s lots Itasca brings that we never have an opportunity to do as a group here in the Twin Cities,” says Bernlohr. “It’s always fun to go back.” — Adara Taylor

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