

FRIENDS OF THE PHILIP L. WRIGHT ZOOLOGICAL MUSEUM

SPRING-SUMMER 2023 (No. 41)

BACKROOM NOTES

BRING ON THE BIODIVERSITY DATA

We've had two big data-focused projects brewing in the UMZM lately! First, curator **Angela Hornsby** is one of several co-PIs (organized by main PI **Bryan McLean** at UNC-Greensboro) recently awarded a **National Science Foundation grant** for a project called RANGES: Building Capacity to Extend Mammal Specimens from Western North America. The main goal is to digitize trait info like mass, measurements, and reproductive condition from paper records, unlocking a huge dataset that museums have been building collectively over a century. The UMZM will move more of our digitized data into searchable fields and will also **hire several undergrads in the coming years** to georeference our specimens—turning written localities into easily-mapped geographic coordinates.

Second, we've been working to improve the **discoverability** of our collections—i.e., expanding the routes by which people can see what data and materials we have. In addition to our online catalog, we are in the process of publishing to **data aggregators** aimed at different types of users and searches. Below are some major aggregators on which our data can now be, or will soon be, found.

VertNet NSF-funded aggregator and publisher specific to **vertebrate museum collections**, with over 21 million records from 400 museums across 18 countries. VertNet is likely to become the main route by which outside users find our specimens.

iDigBio NSF-funded program focused on providing digitization support and data aggregation for **all types of natural history museum collections**—vertebrates, invertebrates, plants, fungi, etc.

GBIF Global Biodiversity Information Facility Huge collective funded by NSF, the Smithsonian, and numerous countries across the world. Its goal is to aggregate **all types of spatial biodiversity records**—fossils, specimens, sightings, recordings, photos, etc.—so all records for a taxon can be found using one search portal.

GloBI Specialized aggregator focusing on compiling data on **biotic interactions**. Our specimen data will primarily feed into GloBI as predator-prey and host-parasite interactions.



ABOVE: A bushel of bushy-tailed woodrats (*Neotoma cinerea*).

EDUCATION

MUSEUM STUDIES CERTIFICATE PROGRAM STARTING THIS FALL

The UMZM is excited to be part of the new UM **Museum Studies certificate program** approved for 2023-24. Organized by MMAC curator **Rafael Chacón**, this program will involve six 2-credit classes such as museum theory, exhibitions, communications, fundraising, and scientific collections. UMZM curator **Angela Hornsby** designed the framework for one course, Natural History Collections & Museum Informatics, to be offered Spring 2024. At this point, the target audience is working professionals looking for continuing education, and current grad students wanting to expand their potential career paths. Undergrads will be accepted as space allows. For questions, please contact Rafael (hrafael.chacon@umontana.edu).

2022 BY THE NUMBERS

Collections growth (& percent)	232 (1.03%)
Specimens loaned or data requested	322
Direct database queries (& daily average)	11,893 (32)
Intern & volunteer hours	948
Research hours	342
Tour participants	368

PASSION FOR PARASITES

One of the world's premier parasite taxonomists may be retired, but he's far from packing up the microscope.

Josh Moyer, M.S. Environmental Journalism '23

Note: A longer version of this story was originally published in the Montana Kaimin on March 16, 2023.

The National Library of Medicine reports that intestinal parasites infect a whopping 3.5 billion people each year, particularly in developing areas around the tropics. There are two basic types of parasites: ectoparasites and endoparasites. Ectoparasites live outside of organisms—ticks, fleas, lice and vampire bats. If you've been bitten by a mosquito, you've served as a host to an ectoparasite. Endoparasites are invasive. They live inside the host, whether that be in the bloodstream, intestines, brain or even the eye. The main group of endoparasites is worms, known as helminths, which are **Mike Kinsella's** area of expertise.

Kinsella is something of a savant when it comes to helminths, especially their taxonomy. He's a parasitologist—someone who's devoted his life to the creeps that crawl inside the animal world—who has helped discover numerous species, and even has 21 different species named after him. His personal favorite is *Mikenema kinsella*, which is the only full genus Kinsella has discovered.

Humble beginnings

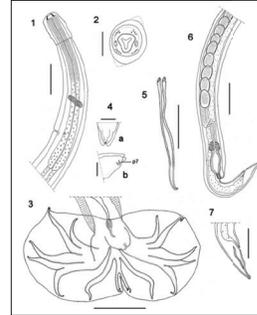
Born John Michael Kinsella in Louisville, Kentucky, in 1941, he became known by his middle name, "Mike," to his parents, **Norbert and Catherine**. He stuck around Louisville just long enough to get a bachelor's degree in biology at Bellarmine College, now Bellarmine University. He packed up in 1963 and drove his '51 Pontiac all the way to UM to start his Master's in zoology at 22 years old. It was the first time he'd ever been that far away from home.

Kinsella came to UM to work in wildlife. His first brush with bloodsuckers was during a mammalogy class required for his Master's degree. Back then, part of the curriculum was for each student to trap and skin three different species of mammal for UM's then-unnamed vertebrate zoology museum. While processing some voles he caught in Pattee Canyon, Kinsella found a type of flatworm known as *Quinqueserialis quinqueserialis*. From that moment, he was hooked. "These animals that live inside of other animals," he said. "They were fascinating to me."

Helminths ended up being the subject of Kinsella's Ph.D. thesis, which he also earned at UM. His project involved muskrat fluke, and his committee was chaired by **Philip Wright**, a soon-to-be close friend and eventually the namesake of the Philip L. Wright Zoological Museum. "When you've been around the University as long as I have, half the buildings on campus are named after people you know," Kinsella said. **Emma Lommasson** of the Lommasson Center was a close friend and neighbor, and **Bob Curry** of the Curry Health Center played handball with Kinsella for 40 years.

RIGHT: Mike Kinsella searches for endoparasites in 2005. Photo courtesy of Vasyi Tkach.

BELOW: Mike has many species named after him, but none so dear as *Mikenema (Paraheligmomella) kinsellai* (Digiani et al. 2009, <https://doi.org/10.1645/GE-1805.1>).



In 1969, the newly minted Dr. Mike Kinsella was eager to begin a career in parasitology. He spent two post-doctorate years with his family in Gainesville at the University of Florida in a parasite lab, but he couldn't manage to find a permanent university job that would host him. "In the early '70s, science jobs fell off," Kinsella said. "It was the end of the space program and the recession. There'd be 300 applications for a single job." Just as Kinsella was graduating for what he thought would be the last time, his father, Norbert, died of cancer. At this point, Kinsella reached a crossroads. As passionate as he was about parasitology, it just wasn't paying the bills. "[Kinsella's] own dad wasn't great," his daughter **Shannon** said. "So being a dad was really important to him." Defeated, Kinsella returned to UM for a pharmacy degree, what he saw as his only chance at a stable career to provide for his children.

While in pharmacy school, Kinsella worked under Curry at the health center. Once he graduated in 1975, he became a full-fledged pharmacist, working in that field until he retired 22 years later. But for Kinsella, retirement was far from the end of his story. "Mike is the unique researcher who increased his productivity after retirement," said **Vasyi Tkach**, a Ukrainian-born parasite researcher at the University of North Dakota. "It's not common, but that's what happened." In 1992, Kinsella opened Helm West, "Helm" for helminth and "West" for its comfortable seat in, well, the West. It was a modest setup—two-microscopes-in-the-living-room-of-his-house modest. But that didn't matter to Kinsella. Helm West had enough to achieve its purpose: Be a route for him to continue his craft long after retirement. He's already published 125 papers on his discoveries made out of his home lab. "Helm West is more productive than most university laboratories," Tkach said.

Working from home

While working out of Helm West, as he still does today, Kinsella has helped describe 32 different species brand new to science, two or three of those as a senior author. In his frenzy of taxonomy, Kinsella has one of each of the four types

of helminths—tapeworms, flukes, roundworms and thorny-headed worms—named after him, in no small part thanks to Tkach. Tkach has described many species for Kinsella, with the help of analyses that can distinguish species based on DNA. The pair met in an online parasite forum while Tkach still lived in Ukraine. They've kept in touch through the years, and Tkach proved to be a vital asset to Kinsella.

Naturally, Kinsella didn't just come into retirement after 20 years of being a pharmacist ready to kick ass and take patronyms. He'd spent his professional career building and refining his knowledge of helminths while serving as the on-call parasitologist at Missoula Community Microbiological Center, a job of late shifts and grueling work. He stuck with this gig even longer than he spent working as a pharmacist. Over time, Kinsella became known as a parasitologist not just in Missoula, but all over the world. Zoos, universities and wildlife departments from dozens of countries have sent him parasite samples for identification. In many cases, he's provided solutions. He's had the opportunity to study parasites in species ranging from African elephants to Antarctic penguins.

And in the communities he serves, whether they be international or right here at home, Kinsella can be key to helping the public. In 1993, 10 cases of giardia flared up in Missoula in just two weeks. That's usually a year's worth of cases. Often called "beaver fever," giardia naturally lives in beavers and other aquatic animals, causing few problems for them. When it crosses into humans, however, it can cause cramps, fever and intense diarrhea that can last for several months. In Missoula in '93, a beaver moved into Rattlesnake Creek a few yards upstream from where the town sourced its water. Before long, people contracted giardia straight from the tap. The town had to issue a boil water warning and immediately started building a well water system. Though giardia is caused by a protozoan parasite and not a helminth, Kinsella was still called in to test stool samples. He diagnosed more than 300 cases in Missoula in two months, though it's estimated that there were as many as 1,500. Whether it was through handling samples or from his own sink, Kinsella ended up contracting giardia himself during that fateful summer. Fortunately, he had a non-symptomatic case and

used himself as a guinea pig. He let the infection run its course untreated, looking at his own stool under a microscope every week or two. It took over two years for the giardia to stop showing up on tests. Kinsella added giardia to something he calls his Personal Parasite List, or PPL: a list of all the parasites he's harbored.

Outside of work, having a family led to some interesting additions to Kinsella's PPL. When the kids were young in Gainesville, the family was struck with a pinworm infestation. A pinworm is a nematode that lives inside the human intestine. At night—there's no delicate way to put this—the pinworms crawl out of the anus and lay eggs on the host's skin. The worms are so light that they can be transported through the air. "If one person in the house has them, all the people in the house do," Kinsella said. The entire family had to gag down a pink medicine called pyrantel pamoate. According to Shannon, the substance was so gross the kids were rewarded with a Hershey bar afterward. "Yeah, that probably traumatized them a bit," Kinsella said. Kinsella still has a pinworm sample he's kept from his daughter **Kathy** that he uses for educational purposes.

Today, Helm West is going as strong as ever. There's a box full of tapeworm samples on Kinsella's desk from Canadian voles that he suspects may contain a handful of undescribed species. In addition, Kinsella regularly joins current curator of the Wright Museum, **Angela Hornsby** and her so-called carcass club for "Parasite Parties," in which the undergrad club members dig through specimen organs and guts in search of parasites with the help of Kinsella's expertise. "He always wants us to give him more worms," Hornsby said. "We sometimes have to send him home with older samples to ID. He gets antsy if we aren't finding them."

Outside UM, Kinsella is a popular guest lecturer, especially in Shannon's middle school science classes, something he's done for years. His talks bring the gross-out factor kids love. "He's been a part of my classroom the whole time," Shannon said.

Neighborhood expert

Kinsella's seen parasites from around the world but has only been to three foreign countries: Canada, Mexico and Ireland. At 81 years old, the bucket list he keeps is incomplete (though he has managed to go skydiving, something Shannon says he did without telling his wife **Edna**). Regardless, when he looks back on his life, Kinsella isn't thinking about the things he hasn't done. He's remembering the things he has. He remembers the time he woke up to his professor Philip Wright at the foot of his bed telling him he was late to the field trip to the National Bison Range. He remembers 15 years of hiking in Glacier National Park with his family, a treasured tradition that lives on today. With all these memories, there isn't room left for regret.

"Sure, I would've loved to see Europe—England and France," Kinsella said. "It would've been nice to go to Australia and New Zealand. Although I never particularly wanted to go to the tropical countries. Maybe it's the parasites. I would've been a quivering mess the whole time."



ABOVE: Mike holds a bear cub in Florida.

2023 GRASLIE CURIOSITY INTERNS

It's a highlight of each spring semester to have our **Graslie Curiosity Interns** at work! **Ivie Carvo** brought a ton of creativity and skill to make a hands-on outreach module based on the layers of information in each specimen, and **Luke Johnson** put together a prodigious number of videos sharing our specimens and work with the public worldwide.

IVIE CARVO (Wildlife '23)



My Graslie project was called "Bringing the Zoological Museum to You." The idea was to make an interactive display for children to learn about the work that the museum does at the specimen level, so the project was a hands-on, four-step

activity that looked at the different layers of a red fox and the information we take from each layer. It included puzzles, activities, models and diagrams of different bones and organs, and even a chance to touch a real pelt and skull. In addition to that main project, I also got the opportunity to help create a new more versatile display case design for the museum, with some general background information and flexibility to change the specimens on display without a total remodel of the design.

The biggest thing I am taking away from this internship is the belief that my goal of a career in environmental education is achievable. I came into this internship with a lot of ideas but also a lot of doubt in my abilities to make those ideas a reality. However, now I am walking out of this semester with a start-to-finish complete project proving that I can do this in my future. I am filled with more confidence in my future than I ever have been, and I am excited to see how this experience continues to shape me and inform my life even years down the road.



ABOVE: Ivie and UMZM volunteer Kevin Niehaus get ready for visitors at spectrUM Discovery Area on Earth Day.

RIGHT: New patterns emerge under UV light, like on this budgerigar—one of the many themes that ran through Luke's social media work this semester.

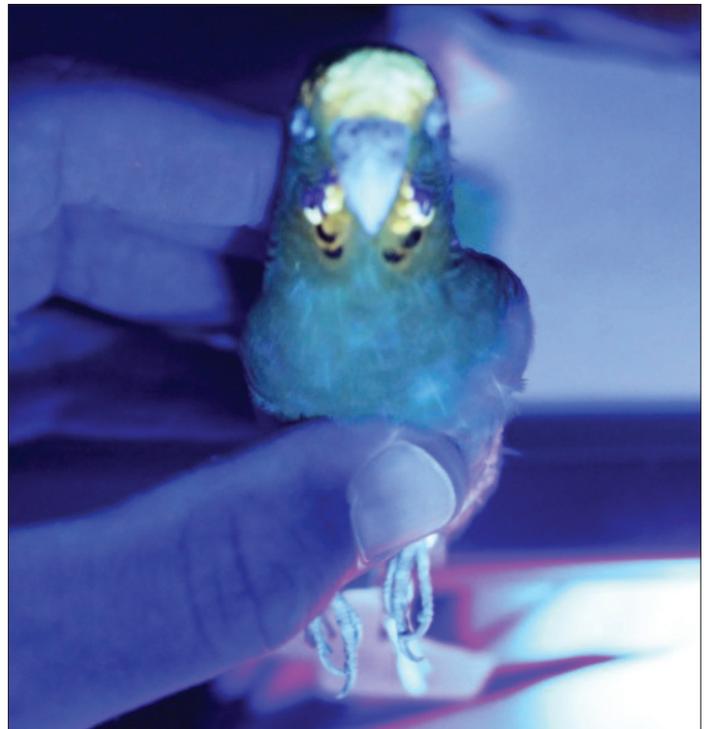
LUKE JOHNSON (Wildlife '23)



The Graslie Internship has been an amazing experience. Being able to work in the museum this semester has been extremely rewarding. It has taught me numerous things such as how to work with scientific literature better and

how to become a more confident speaker, and of course I learned some pretty cool facts about the animals in our collection. The highlight of the experience was seeing the responses to videos that I was posting to social media. It was a really cool experience to see how the audience reacted to different types of videos I was able to produce.

My expectations of this experience were blown away, and it was fun to interact with people learning about the topics I covered for the first time. It was rewarding as well to expand my knowledge about how our museum worked. I especially enjoyed researching topics such as color in animals, and it was fun to travel down rabbit holes and learn about tangential topics that I found in my research, like genetic mutations that a budgerigar could have besides the one that makes them blue. Overall, I would say that this experience was an extremely rewarding one that taught me a lot about myself both as a person and as a researcher.



REDEFINING IDENTIFICATION TECHNIQUES OF PREY REMAINS IN MERLINS (*FALCO COLUMBARIUS*)



Taylor Coon
 B.S. Wildlife Biology &
 B.A. Communication Studies '23
 Avian Science Center, Dreitz Lab

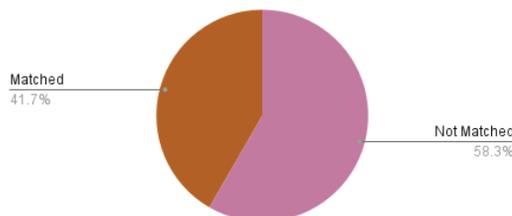
The UMZM has been a critical resource in the development of my senior thesis. My research focuses on identification methodology for prey remains. Prey remains are any feathers, fur, and appendages left after a predator has consumed a prey species. They are found throughout the animal kingdom and are used to inform diet analyses that can lead to a more complete understanding of ecosystem dynamics. For a species that primarily consumes small passerines and shorebirds, like the merlin, this results in a messy conglomeration of feathers that can be difficult to identify to species. The visual identification method has routinely been the most used methodology for identifying these remains. Yet, with the advancements of genetic technology, the accuracy of the visual identification method has been under scrutiny. **The goal of my project was to determine how observer confidence impacts the accuracy, or percentage of correct identification, of the visual identification method.**

Using Denali merlin prey remains, entry-level observers were provided with identification tools including field guides, photographs of feather spreads, UMZM museum specimens and past dietary studies of merlins in Denali (Laing 1985, Wilbor 1996). They then marked their determined species identification, personal level of certainty (low-medium or high) and relevant sample data. The visually identified contents were then split into observer designated envelopes (ODEs) of two flight feathers for molecular testing. In the Montana Conservation Genomics Lab, I was able to extract, amplify and sequence DNA from these ODEs. The sequence was then matched in a barcoding database to produce the "correct" species identification.

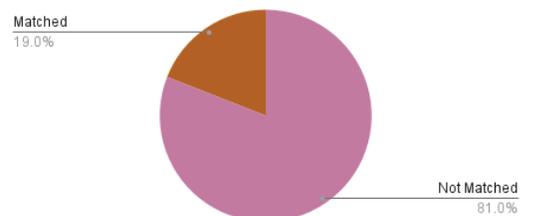
When observers had a high level of certainty, the visual identification and molecular identification matched 41.7% of the time. When observers had low-medium levels of

Figure 1. Charts for low/medium and high certainty of extracted and sequenced ODEs demonstrate the significant correlation that certainty level with genetic/visual identification. Low/medium certainty effectively matches 19% (n = 4) of the time whereas high certainty matches 41.7% (n = 5). Total low/medium certainty (n = 21) for extracted and sequenced ODEs. Total high certainty extracted and sequenced ODE samples (n = 12).

High Certainty Matches

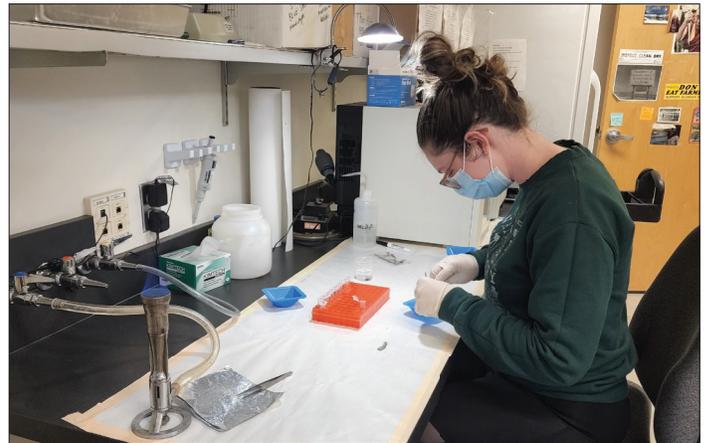


Low/Medium Certainty Matches



ABOVE: The beak of a songbird found in merlin prey remains is compared to a UMZM specimen. Taylor used a variety of specimens for preliminary identification by volunteers.

BELOW: Taylor works in the Montana Conservation Genomics Lab to isolate and sequence songbird DNA from merlin prey remains for molecular identification.



certainty, the visual identification and molecular identification matched 19% of the time. More often than not, observers indicated low-medium certainty. As evidenced by an analysis of variance, in the instance of visual identification with entry-level observers, **human certainty level correlates with the accuracy of visual identification and is significant** (Figure 1, p-value = 1.05 E -24).

I am incredibly thankful to **Dr. Victoria Dreitz, Steve Lewis, Sally Painter, Dr. Andrew Whiteley, Dr. Scott Mills**, my volunteers and museum curator **Dr. Angela Hornsby** for their endless support in this project. It would not have been possible without you all!

WHO'S IN THE MUSEUM

GRAD STUDENTS: Our super volunteers from Anthropology, **Holli McDonald** and **Lacy Hazelwood**, keep rolling through large ungulate skeleton condition notes, while **Haley O'Brien** from Anthro and **Taylor Gold Quiros** from EE continue on projects for their research. In the prep lab, **Lily Emerick Valentine** from creative writing, **Tina Czaplinska** from Anthro, and **Nicole Lopez** and **Cynthia Ulbing** from EE have all been hard at work in Carcass Club.

UNDERGRAD VOLUNTEERS: Our ever-reliable **Marissa Italiano** continued to work on mostly curatorial tasks this spring, and over the summer she'll be carrying on with data and georeferencing projects. **Kevin Niehaus** organized a large accession of skulls and skeletons, and he, Marissa, and **Kyle Wonders** helped with outreach activities on- and off-campus. **Kelsey Miller** continued training on skeleton articulations with Larry, while **Sawyer Vozka**, **Sierra Fleischmann**, **Luke Johnson**, **Sierra Lee**, **Ivie Carvo**, **Oren Jaffe**, **Lauren Western**, **Anne Calonico** and **Jess Powell** all helped in Carcass Club—and, Ivie and Luke were also our super Graslie Curiosity Interns this year!

FRIENDS & VISITORS: **Sam Getty** continued to come in when off-work to help with specimen preps and databasing. **Autumn Evans**, **Jordan Rodriguez**, and **Andrea Stephens** all lent a hand in Carcass Club, while **Mike Kinsella** and **Kara Cromwell** were bound to show up when parasites were involved! **Larry DePute** continues to articulate skeletons—most recently traveling back and forth to help with a mountain lion articulation at Alberton School. **Kerry Foresman** and **Weber Greiser** dropped off new accessions, and we hosted **Montana Natural History Center Master Naturalist Classes**, **UM Retirees Association**, **UM Pre-Veterinary Club**, and many others for tours.

CARCASS CLUB LEADERBOARD

Active preppers as of May 2023 (minimum 5 preps)

Preparator	Tally	Known for
Sam	158	right-hand woman in the UMZM
Sawyer	26	mustelid maestro
Sierra F.	20	biological jewelry
Luke	19	merit badge collector
Sierra L.	15	red-tailed hawk perseverance
Kelsey	10	skeleton articulation
Oren	10	big birds & mystery mustelids
Ivie	8	raptor whisperer
Lauren	8	personalized prep tray
Autumn	6	sheer prep biomass!
Marissa	6	shrew preps and data czar
Lily	6	our poet-in-residence
Andrea	6	solitaire skin and goshawk skel
Jordan	5	bunny wars (I)
Nicole	5	bunny wars (II)
Anne	5	pre-vet & cat lover

MUSEUM MEMORIES

Mike Kinsella shared his memory of the UMZM's resident burrowing owl (*Athene cunicularia*), "José." It was brought from Mexico—hence the name—and was cared for by Nicolaas (Nico) Verbeek who studied the life history of the water pipit for his MS degree. Nico also served as curator of the museum 1963–1965, and he kept José in the old collections space in Health Sciences where it would fly around freely at night. José eventually wound up in the collections—and as you can see from the tag, Nico may have been surprised to see that José was actually female!



ABOVE LEFT: José in life, perched on the back door of the collections space in HS.

ABOVE RIGHT: José's specimen tag with a little surprise—she was a female!

BELOW: José preserved in the research collections today.



FROM THE CURATOR

It has been my genuine pleasure to lead the UMZM over the last four years—getting to care for and grow the collections, work with dozens of curious and engaged UM students, and meet many of you who support this museum and all of its goals. So, it's with lots of good memories and excitement for this museum's bright future that it will be time for me to say goodbye in September 2023. The UMZM will land (as all collections do, many times over!) in the hands of a new curator following a call for applications this summer, and I'll be moving on with my family to Minneapolis to take over a new role as Collections Manager in the research division of the University of Minnesota Bell Museum. Thanks to all of you for your support of the UMZM—I'll be joining your ranks as a Friend of the PLWZM so I can also keep up with, and cheer on, all the good work happening here in Missoula!

Angela Hornsby, Ph.D.
UMZM Curator





PHILIP L. WRIGHT
ZOOLOGICAL MUSEUM

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umzm@mso.umt.edu

Curator: Dr. Angela Hornsby
Director: Dr. Jeff Good

OUR MISSION

The Philip L. Wright Zoological Museum, a unit of the Division of Biological Sciences of the University of Montana, is committed to the collection and preservation of zoological specimens for the purposes of research, education, and community outreach. The UMZM works for both current and future generations, sustaining these irreplaceable resources representing our natural heritage in Montana and beyond.



**FRIENDS OF THE
PHILIP L. WRIGHT
ZOOLOGICAL MUSEUM**

**SUPPORT ALL WE DO BY
DONATING TO THE UMZM!**

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- | | |
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