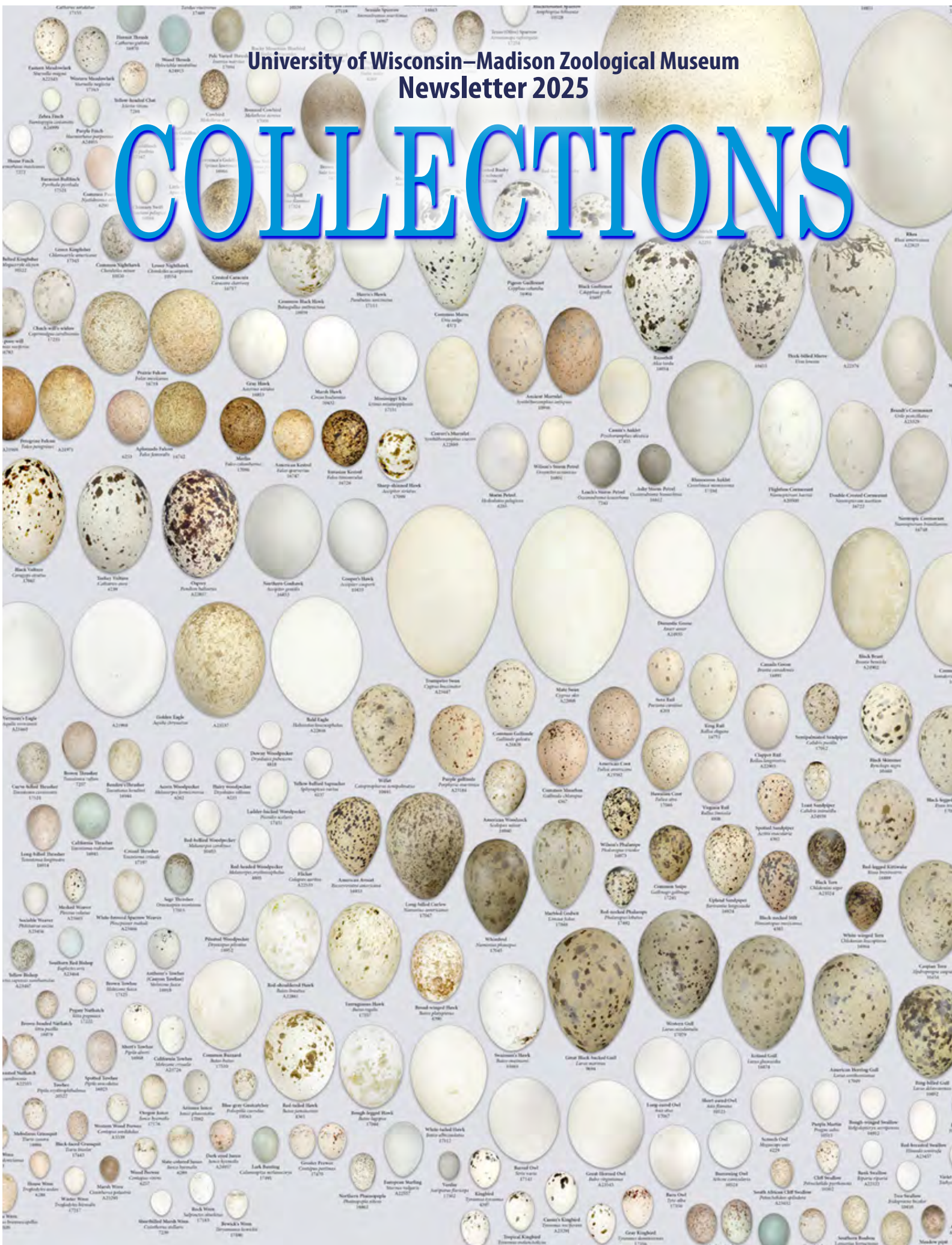


University of Wisconsin–Madison Zoological Museum  
Newsletter 2025

# COLLECTIONS



## Foreword from Prashant Sharma UWZM Director

**This past summer and ongoing semester** have been a busy and exciting time for the Museum. Our major efforts this past semester have focused on the production of new genomes for phylogenetically significant invertebrate taxa. Our publication of a high-quality sea spider genome yielded an interview in the *New York Times* and a valuable contribution to our rapidly growing cryogenic collection. Looking beyond invertebrates, we were also excited to receive bald eagles (our first acquisitions of this species since the 1980s), and precious cryogenic and sequence-grade samples of the American badger from the Vilas Zoo. As a result of our collaboration and reciprocal visits to the International Crane Foundation, we now hold samples of all 15 of the world's crane species!

The Museum continues to take in nearly 2000 new specimens each year. Other key acquisitions this past year included a second Masai giraffe, a 44-year-old sloth, and a Bactrian camel. As our collections continue to grow, the Museum has benefited greatly from the efforts of Sade, our preparator, who has greatly accelerated the processing of vertebrate samples in our collections. We continue to keep up with cataloging and digitizing the rapidly growing collections through Emily Halverson's dedication. With UWZM data now available on VertNet and iDigBio, we are starting to see increases in both loan requests and digital accessions. The Museum has also been fortunate to receive continued investment from the Department of Integrative Biology, as well as generous contributions from donors.

One of my favorite contributions to the Newsletter is sharing the accomplishments of our students. I am delighted to share that PhD student Benjamin Klementz, who has previously worked with the Museum through independent studies courses, was awarded first place student presentation prize at the American Arachnology Society meeting in June! Ben presented his work on the evolution of the chelicerate patella. Also in attendance were Sophie Neu, a new PhD student in iBio, and three of our illustrious Museum-affiliated alumni, Emily Setton, Carlos Santibáñez López, and Jesús Ballesteros. They participated in a symposium on chelicerate genomics that was well received and evaluated highly.

One major development that will impact the Museum is the creation of a new Department of Biology, which will include the former departments of Integrative Biology and Botany. After nearly five years of planning, deliberation, and consultations with major stakeholders, culminating in a vote before the University Academic Planning Council, the steering committee for this reorganization succeeded in its bid to establish a new biology department in the College of Letters and Science. This move better positions us to receive support for a new building in years to come. Our hope is that a new building will accommodate our growing collections, modernize our infrastructure, and create new capacities that we are currently missing, including exhibition spaces and updated classrooms for teaching and outreach. My participation on the steering committee now begins a new chapter, that of fulfilling the vision for a new building and a new Museum space for our collections.

*Prashant Sharma*

## Message from Laura Monahan UWZM Distinguished Associate Director; Curator of Osteology

**It has been another productive year at the University of Wisconsin Zoological Museum!** There are exciting new research projects in progress, we continue to teach and provide educational support, and find new ways to do outreach.

The Museum's research opportunities and collaborations are expanding. We have worked with the Henry Vilas Zoo for decades; as Prashant mentions above, in conjunction with the Zoo and Kaminski the Badger, we are working on a donor-funded, highly anticipated genomics project.

The Introduction to Museum Studies in the Natural Sciences course was taught for the 18th year this fall. On the second day of the class, the students joined John Lyons, Curator of Fishes, at Lake Wingra to talk about field work catching and preserving specimens, and they got the opportunity to don waders and seine for fish. The first group to wade in this year got the catch of the day: a large musky (the largest musky ever caught in this class)!

In addition, we were able to expand our teaching collection and offer more specimens for loans in laboratories with our new 3D scanners and printer. This essential equipment was purchased with grant funds received with collaborators in the department of Integrative Biology. Kandis Elliot, artist emerita, has been scanning and printing specimens which we were first able to make available in the fall semester.

We are always looking for ways to increase Museum outreach. For the past two years, John Stuhler, Curator of Mammals and Birds, and Emily Halverson, Museum Collections Manager, have offered Museum workshops through the Natural Resources Foundation of Wisconsin. These activities were well received, and this year organizers asked them to offer a second workshop, which filled immediately!

Learn more about Museum activities in this Newsletter. Thank you for another great year at the UWZM!

*Laura A. Monahan*



*The musky!*

## Bats on Display

*Text & Photos: Kandis Elliot*



**Several years in the making,**

Noland hall's first floor tryptic was finally finished this summer! Conceived and prepared by Seth McGee, instructor for the Biology Core Curriculum, this three-display exhibit features the multi-faceted, on going research into Wisconsin's bat populations. The first cabinet (top) displays a glimpse of the UWZM cases for bat specimens, how bats are prepared for the collection, and offers information on data collecting, preservation and teaching materials. The center display shows a look into a bat cave, with cave features modeled by Seth and enhanced with strategic lighting. There are little bats on the stalactites for viewers to discover, and information on the disastrous effects of white-nose syndrome. The right-hand display (bottom) showcases the UW Bat Brigade, a collective of students and professionals who are interested in monitoring bat populations on campus.

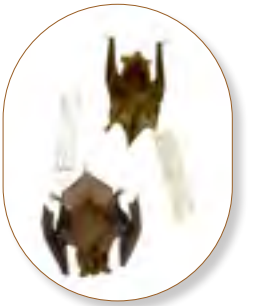
**The UW Bat Brigade** is a collective of students and professionals who are interested in monitoring bat populations on campus. The Bat Brigade is a Biocore collaboration with the Wisconsin Bat Program, an initiative developed by the Wisconsin Department of Natural Resources.

Using tools like echolocation recorders and thermal imaging cameras, Bat Brigade members are establishing a long-term campus data set that will inform research questions about population sizes, habitat use, and migration patterns. The data collected during each Bat Brigade survey is included in statewide and national bat monitoring efforts. The Bat Brigade hopes to contribute to the recovery effort by helping biologists monitor local bat populations while engaging UW students in the scientific process.

The Brigade is always looking for enthusiastic volunteers to join in. All are welcome on echolocation hikes. To learn more or get involved, contact Seth McGee: (Seth.McGee@wisc.edu).



*In the bat cave.  
Photo: Seth McGee*



## Meetings



### Freshwater Mollusk Conservation Society (FMCS) 2025

*Text & Photos: Patricia Zito*

The FMCS 2025 took place on May 12-16, 2025 at Marriott Eagle Crest, Ypsilanti, Michigan.

Rachel Muir, UWZM Honorary Fellow and Adjunct Curator of Mollusks, and student Patricia Zito set up a table to represent the University of Wisconsin–Madison Zoological Museum. Note the stunning display provided by UWZM posters *Fishes of Wisconsin* and *Freshwater Mussels and Clams of Wisconsin*. Rachel and Patricia were able to talk to multiple groups in private consulting companies, governmental agencies and some academic institutions.

Their work was helpful in further connecting the UWZM to the Freshwater Mollusk Society, obtaining endemic native American mussel specimens donations, and increasing Museum poster sales.

Rachel continues to collect and prepare new specimens and update information for the UWZM's mollusk collection.



### Madison Bird & Nature Festival

The Madison Bird & Nature Festival took place on April 26, 2025 at Warner Park. The Festival is an annual free, family-friendly event celebrating Madison Bird City, Arbor Day, and Earth Day. Many children were in attendance. Participants saw live birds by Open Door Bird Sanctuary and visited nature displays throughout the day. The UWZM hosted 2 tables, displaying bones and skulls, an owl skin, a vintage bird case panorama, and two UWZM posters: *Bird Bills Form and Function*, and our new *Eggs* featuring the UWZM's collection of eggs of over 460 species of birds.



*Behind the table: UWZM students Maya Drumm and Dante Munn.  
Photo: Laura Monahan*

## Working with the ICF

*Text & Photos: Laura Monahan*

The International Crane Foundation (ICF) is a 501(c)(3) nonprofit organization that "...works worldwide to conserve cranes and the ecosystems, watersheds, and flyways on which they depend" (ICF website). ICF was founded in 1973 by Ron Sauey and George Archibald, then students at Cornell University. The current ICF headquarters location in Baraboo, Wisconsin was originally the Sauey family farm. Sauey and Archibald began with the goal of conserving all fifteen of the world's crane species by conducting research, captive breeding, restoring habitats and educating the public. Over the years, ICF has helped establish community-based conservation efforts, conducted new successful captive breeding programs, and led effective reintroduction plans.

Today, International Crane Foundation conservation efforts are global, with focus areas, partners and offices in Asia, Africa, and North America. There are about 150 staff and many more partners in over fifty countries. Work that ICF staff and affiliates do is vital: 10 of the 15 species are vulnerable or endangered and some, like the Siberian crane, critically endangered. Important research and instruction are done at the ICF headquarters, which is accredited by the Association

of Zoos and Aquariums, and houses about 100 captive cranes, including the only complete collection of all 15 crane species in the world. Many of these individuals can be seen in newly renovated exhibit spaces on self-guided or guided tours.

The University of Wisconsin Zoological Museum, in its capacity as a repository for specimens of endangered species, has collaborated with ICF for decades. After death, cranes are sent to the Wisconsin Veterinary Diagnostic Laboratory or the UW School of Veterinary Medicine for necropsy. Following their release, the remains are sent to the UWZM. We retain all ICF captive (and some wild) crane specimens and eggs.

During the summer, the Museum hosted aviculture and veterinary staff from ICF, providing them with a behind-the-scenes tour of our collections. Tours for staff from partner donor institutions have proved useful in order to show them what we do at the Museum and how we process specimens, as well as to have a more in-depth discussion about why we preserve specimens here and how they are used in research, teaching and outreach.

In exchange, ICF hosted Museum staff for a behind-the-scenes tour of their facilities in September. The tour was led by Kim Boardman, Curator of Birds, and Diana Boon, Director of Conservation Medicine, and gave us remarkable insight and greater understanding about the amazing work that is being done at the International Crane Foundation.

During that visit, we received a collection of crane eggs, which completed the Museum's representatives of the world's 15 crane species.



*Crane pasture enclosure. Foreground, information signage.  
Back, 2 cranes and shelter.*



*The sarus crane, tallest flying bird on the planet.  
Photo: Janet Speth*



*Crane eggs on display at ICF.*



*Siberian crane  
Illustration: K. Elliot*

## Visits

### Henry Vilas Zoo

Text: John Stuhler

**Badger blood, donated by a Vilas Zoo Badger**, has been stored in the UWZM Genomic Resources Collection for future research. The Genomic Resources Collection, formally created in 2021, houses material taken primarily from mammals and birds, but also some reptiles, amphibians and fish. At the end of 2025, this collection already had over 6,000 vials containing tissue material. The majority of these samples are housed in ultracold (-80°C) freezers for long-term viability and are available for use by researchers.



Zoo badger being prepped for his blood draw.

Photo: Prashant Sharma



Bucky Badger and UWZM crew:

From left, Prashant Sharma, John Stuhler, Laura Monahan, Bucky Badger.

Photo: Kristin Moala, HVZ Marketing/Outreach Coordinator

### Harvard Museum of Natural History

Text & Photos: Laura Monahan

**In May 2025, Laura and colleagues Tracy Drier and Ilia Guzei, UW-Department of Chemistry**, participated in a highly productive research visit to Boston to explore the Blaschka Glass Invertebrate and Ware Glass Flower collections at the Harvard Museum of Natural History. We studied the specimens on exhibit and met with the collection staff overseeing the models. The invertebrate collection has about 430 models. Harvard's Ware Collection of Glass Models of Plants (opened in 1893) is the only collection of its kind in the world, and has about 4,500 models. While there, the UWZM group also visited the Boston Science Museum, which has a small collection of Blaschka models. This project was funded by the Brittingham Trust.



Ware Collection of Glass Models of Plants.



Caesalpinia pulcherrima, Pride of Barbados, Model 569, Leopold and Rudolf Blaschka, 1895.

### Field Museum

Text & Photos: Greg Mayer

**On December 5, two carloads of UWZM staff**—Director Prashant Sharma, Associate Director Laura Monahan, Curator of Mammals and Birds John Stuhler, Curator of Fishes John Lyons, Collections Manager Emily Halverson, Adjunct Curator of Mollusks Rachel Muir, and Preparator Sade Latka—drove down to the Field Museum of Natural History in Chicago, where they were met by Adjunct Curator of Amphibians and Reptiles Greg Mayer.

Greg had arranged for the group tours of several departments: Birds with Collections Manager Ben Marks, Mammals with Collection Manager Adam Ferguson, Fishes with Collection Manager Caleb McMahan, Amphibians and Reptiles with Greg, the Library with Director Elizabeth McKinley, and the Keller Action Center with Curator Diego Santana, and finishing off with the special exhibit, Reptiles Alive!



With Caleb McMahan in Fishes.



Adam Ferguson shows John Stuhler a tray of Black-footed ferrets (Mustela nigripes).



A tray full of rather skunk-like African striped weasels (Poecilogale albinucha doggetti).



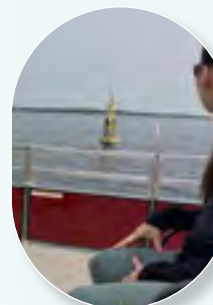
Live Alligator mississippiensis.



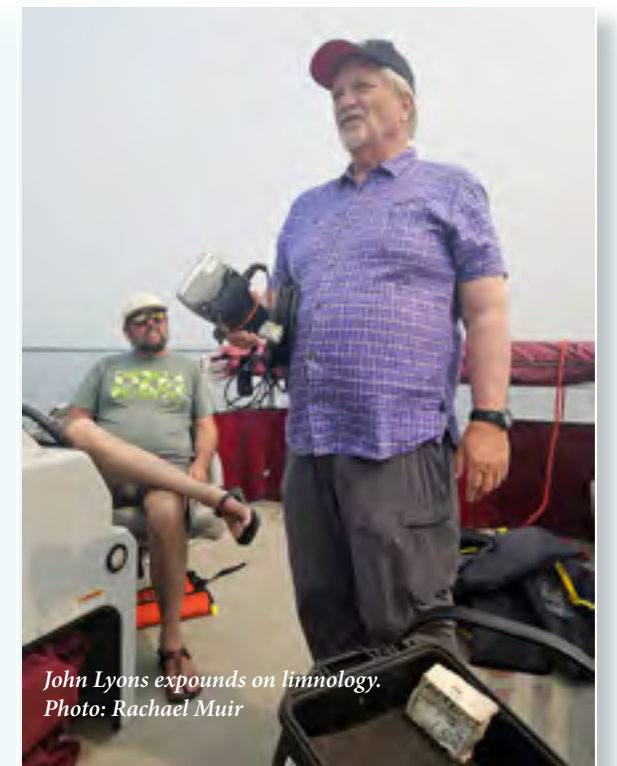
### Voyage on Lake Mendota

Text: Laura Monahan

**In June, John Lyons, Curator of Fishes**, along with Limnology boat captain Aaron Nolan, provided a tour of Lake Mendota for Museum staff. Lake Mendota is a long- and well-studied lake. In the deepest part, there is a floating station maintained by the Center for Limnology. When we arrived at the station, John gave Museum staff a demonstration using a secchi disk, to measure the transparency of the water. He also demonstrated the plankton net and captured microinvertebrates that we were able to examine. After our limnology tutorial, we took a ride around the lake, during which John and Aaron showed us natural and human-made points of interest. After the tour, John gave us a tour of the Hasler Laboratory for Limnology, a unique building along the lake, with some of the best views on campus!



The station. Photo: Laura Monahan



John Lyons expounds on limnology. Photo: Rachael Muir

### 3D Printing



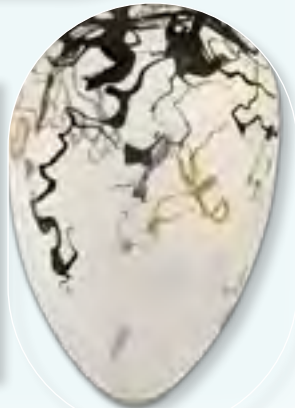
Museum staff have been working to master the 3D printer equipment (introduced in the 2024 Newsletter). Above left, the scanner camera setup, right, the printer, washer, and UV fixer. Inset, Biocore staffer and 3D printing wizard Danny Parrell checks out the software and hardware operation. Below left: Scanning *Geospiza fuliginosa*, the small ground finch, endemic to the Galapagos Islands.



Room 443A has been taken over by the 3D equipment and also the finishing paraphernalia: paints, airbrush, sandpaper, brushes and other supplies used to render some realism to the blank white models. Below, we see finished replicas of a bear mandible, skulls of *Camarhynchus pallidus*, the Galapagos woodpecker finch, and a great auk egg. These hardy replicas will be used in classes instead of vulnerable specimens. Can you pick out the real finch skull in the photo?



Airbrush paraphernalia



Text & Photos: Kandis Elliot

### The Mu's Fishes in the World

Text & Artt: Kandis Elliot

The **Fishes of Wisconsin poster** was created in 2011 by UWZM's resident Illustrator Kandis Elliot using Curator of Fishes John Lyons' vast collection of slides of Wisconsin fishes. It took more than a year to prepare and has been a best seller on the UWZM webstore ever since. It is 44 inches high and 13 feet long. The fishes are illustrated at the average life size at which they can reproduce; however, many of these grow to much larger sizes (lunkers wouldn't fit on the poster). Each fish is available as a stand-alone image, and as such have been used in other family-specific posters. They are also provided freely to DNR publications and for other uses in need of good fish portraits.



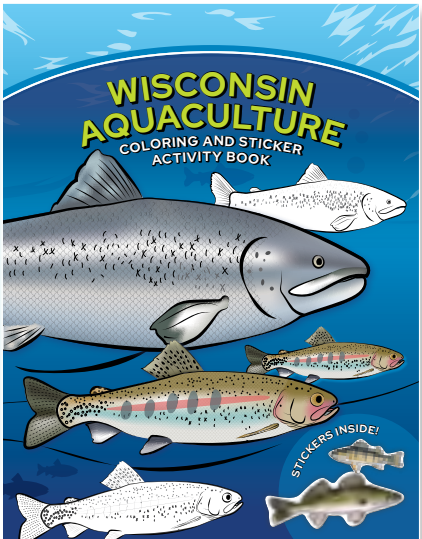
UWZM Curator of Fishes John Lyons gave a talk about paddlefish on Wednesday, May 21 2025, at the Gamma Ray Bar (121 West Main, just off the square) as part of the Madison "Pint of Science" festival. Here John and student Alison Henke show a life-size paddlefish print. (Alison got to take the paddlefish home!)



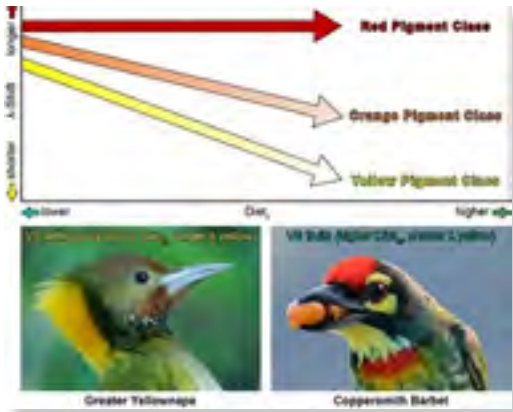
The UWZM's Sauger and Walleye portraits were used in the Summer 2025 *Wisconsin DNR Magazine* in this article by Zach Wood, public information officer in the DNR's Office of Communications. He explains "...Wisconsin anglers know to expect the unexpected. Yet, some fish are particularly noteworthy when encountered due to their unique appearance and (to those in the know) their fascinating lineage. "That's right, we're talking about Wisconsin's hybrid fish! ...The Saugeye!"



UWZM fishes also made an appearance in the *Wisconsin Aquaculture Coloring and Sticker Activity Book*, from Wisconsin Sea Grant and Wisconsin Water Resources Institute Publications. This beautiful booklet, complete with stickers! can be purchased at: <https://publications.aqua.wisc.edu/product/wisconsin-aquaculture-coloring-and-sticker-activity-book/> It is also available as a free PDF for downloading.



Publications

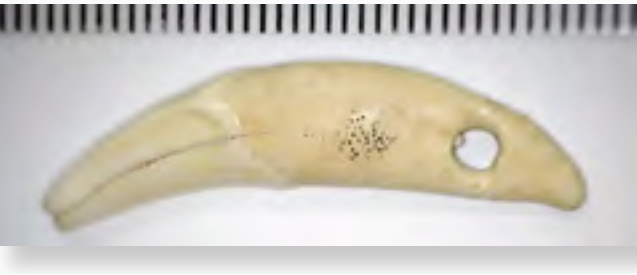


**Robert Bleiweiss**  
*Symmetric Responses to Diet by Plumage Carotenoids in Violet-Sensitive Piciform–Coraciiform Birds*  
*Diversity* 2025, 17(6), 379  
<https://doi.org/10.3390/d17060379>

Recent studies of piciform-coraciiform birds (woodpeckers, barbets, toucans, bee-eaters, etc.) discovered that their carotenoid-based plumage reflectance shifted to bluer (shorter) wavelengths in response to increased dietary carotenoid pigments. This pattern is opposite to the classic red shifts documented in other bird groups. Interaction between diet and the two main avian color vision systems promotes this plumage diversity.

**Carolyn Freiwald, et al.**  
*Ancient dog mitogenomes support the dual dispersal of dogs and agriculture into South America.*  
*Proceedings of the Royal Society B.*, 292: 20242443. 13 May 2025.

Archaeological and palaeogenomic data show that dogs were the only domestic animals introduced during the early peopling of the Americas. Hunter-gatherer groups spread quickly towards the south of the continent, but it is unclear when dogs reached Central and South America. To address this issue, we generated and analyzed 70 complete mitochondrial genomes from archaeological and modern dogs ranging from Central Mexico to Central Chile and Argentina, revealing the dynamics of dog populations. Our results demonstrate that pre-contact Central and South American dogs are all assigned to a specific clade that diverged after dogs entered North America. Specifically, the divergence time between North, Central and South American dog clades is consistent with the spread of agriculture and the adoption of maize in South America between 7000 and 5000 years ago. An isolation-by-distance best characterizes how dogs expanded into South America. We identify the arrival of new lineages of dogs in post-contact South America, likely of European origin, and their legacy in modern village dogs. Interestingly, the pre-contact Mesoamerican maternal origin of the Chihuahua has persisted in some modern individuals.



Canid canine (with pathology) made into bead at Ucanal, Guatemala.

**John Lyons, et al.**  
*Peer-Reviewed*

Clancy, N. G., F. J. Rahel, B. K. Peoples, A. W. Walter, J. Lyons, N. E. Mandrak, P. E. Budy, E. A. Frimpong, and W. F. Cross. 2025. *On the importance and practical conservation of nongame fishes.* Fisheries, In Press.

Lackmann, A. L., J. Lyons, K. A. Kuber, T. P. Parks, D. L. Walchak, E. S. Bielak-Lackmann, C. R. Vaughan, S. D. Kuehl, J. D. Woodling, and M. E. Clark. 2026. *Improved age analysis reveals lifespans greater than 50 years for highfin carpsucker Carpiodes velifer, quillback C. cyprinus, and river carpsucker C. carpio in Wisconsin.* Aquaculture, Fish, and Fisheries, In Review.

*Popular*  
Lyons, J. 2025. *The curious rise of the pallid shiner in the Upper Mississippi River.* American Currents 50(4):29-32.

Lyons, J. 2025. *Searching for fish on the highway: photographing fish- and fishing-themed license plates.* American Currents 50(2):20-22.

Lyons, J. 2025. *Neonics – where are the mayflies?* Big River Magazine, January/February 2025:26-29.

Lyons, J., and J. M. Artigas-Azas. 2025. *Little-known cichlids of the Pacific slope of Mexico.* Amazonas 14(1):46-54.



Vieja guttulata  
Rio Pumpuapa, Tapichula, Chiapas, Mexico.

**Kandis Elliot**  
Non-fiction and Biological Fiction



*Fishes of the Heartland Table.* Kandis and co-author Dr. Paul Baumann (OSU Emeritus) amassed vintage fish recipes with brief biologies and full-color portraits of game fish common to the Midwest. Information on species biology and current status is up to date and checked by John Lyons. The second section of the book features 150 recipes gleaned from Wisconsin and other heartland cooks, anglers, and farm and cabin kitchens over the years.

*Death in Arcane County* presents 10 short biological mysteries detailing the life, death, and strangeness of the people and animals in the Dodge County Wildlife preserve, as chronicled by Charles D. Farnsworth, zoologist at the University of Wisconsin. Real biology and biological fiction are cleverly intertwined by the author, who warns: "Some leeway at to veracity is to be expected."

Both paperbacks are available on Amazon Books.

**Emily Halverson**  
*Fork-tailed Flycatcher*  
*The Passenger Pigeon. Vol. 85, Nos. 3-4, Fall-Winter 2023.*

In 2023, Emily was contacted by a local man who found a very unusual bird identified as a fork-tailed flycatcher, a southern species not native to the United States. This specimen had very clear puncture wounds consistent with injuries that would be sustained from a cat kill. The collector confirmed he had pet outdoor cats and also feral cats on his property. The UWZM had four fork-tailed flycatcher study skins in the collection, all collected from Brazil. We have now officially added a fifth, collected in Wisconsin.



**Prashant P. Sharma**  
**2025 Cool Science Image Contest Winner!**  
*From Campus News October 1 By Chris Barncard*

This teddy bear won't be cuddly for long. It's the embryo of an Arizona bark scorpion. Spots of color map the expression of two different copies of a gene that play an important role in nervous system development. The separate expression patterns show researchers how the respective copies' functions have diverged over millions of years of evolution.



*Other Museum publications (2025)*

Manin, Aurélie, Regis Debruyne, Audrey Lin, Ophélie Lebrasseur, Evangelos Antonios Dimopoulos, Lucio González Venanzi, Sophy Charlton et al. "Ancient dog mitogenomes support the dual dispersal of dogs and agriculture into South America." *Proceedings B* 292, no. 2049 (2025): 20242443.

Lo-Man-Hung, N., Andrade, S.C., Sharma, P.P., Torres, T.T., Brown, F.D. (2025, in press) Efficiency of five RNA extraction protocols for *Grammostola actaeon* (Pocock, 1903) small spinneret tissue samples. *Journal of Arachnology*.

Hussein, S.I., Al-Awadhi, R.M., Nafie, M.S., Abdel-Nabi, I.M., Gerges, M.M., Sharma, P.P., Abdel-Rahman, M.A. (2025) Scorpion venom cytolytic peptide Smp43 induces caspase-dependent apoptosis in ovarian carcinoma cell line OVCAR-3. *Egyptian Journal of Basic and Applied Sciences* 12:3 00-316.

Klementz, B.C., Kulkarni, S.S., Abshire, K.A., Sharma, P.P. (2025) Exploring genome architecture as a source of phylogenetic characters for resolving the apulmonate arachnid phylogeny. *Molecular Phylogenetics and Evolution* 210: 108380.

Papadopoulos, N., Kulkarni, S.S., Fromm, B., Baranyi, C., Setton, E.V.W., Sharma, P.P., Wanninger, A., Brenneis, G. (2025) The genome of a sea spider corroborates a shared Hox cluster motif in arthropods with reduced posterior tagma. *BMC Biology* 23: 196.

Abshire, K.M., Sharma, P.P. (2025) Embryonic staging of the brown garden snail *Cornu aspersum* (Gastropoda: Stylommatophora), an emerging model gastropod. *Journal of Molluscan Studies* 91: eyaf012.

Klementz, B.C., Brenneis, G., Laumer, E.M., Neu, S.M., Harvey, M.S., Sharma, P.P. (2025) Evolution and homology of leg segments in Chelicerata: Evo-devo solutions to century-old challenges. *Arthropod Structure and Development* 87: 101446.

Hinne, I.A., Ciccotti, H.R., Wudarski, J., Pham, M.N., Sharma, A., McVicar, M.M., Faustino, B., Nuss, A.B., Sharma, P.P., Gulia-Nuss, M. (2025) Early embryonic development in the tick *Ixodes scapularis* suggests syncytial organization and cellularization before blastoderm formation. *EvoDevo* 16: 4.



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## Statistics for 2025

76 loans of 6121 specimens  
90 accessions of over 6000 specimens  
44 visits and tours for 394 people

Highlights for new animals: Masai giraffe, lion, yak, emu, Bactrian camel and a 44-year-old sloth. We also received a pine grosbeak, eastern meadowlark, and four bald eagles. The bald eagles were the first we have received in three decades. Additionally, the museum received a substantial collection of bird mounts from Marian University. The International Crane Foundation provided eggs of different species of cranes so we now have all 15 species in the egg collection.

Emily Halverson  
Collections Manager

### Great Auk, *Pinguinus impennis*, 3D models

Top to bottom, facsimiles based on:

- Egg #26, Hancock's Egg
- Egg #3 College of Surgeon's Egg aka Dr. Jack Gibson's Egg
- Egg #25, Earl of Derby's Egg
- Egg #34, Spallanzani's Egg
- Egg #38, Tomkinson's Egg

There are 75 Great Auk eggs known to exist.

