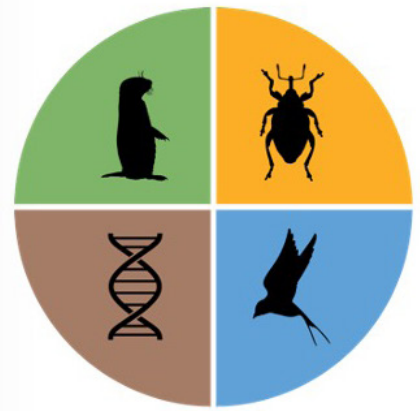


# NSRL NEWS

Volume 12, Spring 2025

**TEXAS TECH**  
**NATURAL SCIENCE RESEARCH LABORATORY**  
Office of the Provost  
Outreach & Engagement



## Grant Highlight: Building Capacity to Extend Mammal Specimens from Western North America

*by Heidi Amarilla-Stevens, Mammal Collection Manager*

The NSRL is currently involved in collaborative efforts with 19 other natural history institutions in the United States to digitize and mobilize trait data for more than 1 million mammal specimens from western North America. This project is funded by the National Science Foundation under the grant “Ranges: Building Capacity to Extend Mammal Specimens from Western North America,” or “Ranges,” for short, awarded to Drs. Richard Stevens and Robert Bradley as co-PIs for the Texas Tech subaward.

Specimen data consists of many different traits, such as sex, age, body measurements, and reproductive condition. Throughout time, natural history researchers have been recording specimen data in different formats or locations, including field notes, specimen tags, collectors’ personal catalogs, and journals. Typically, however, museums have digitized only portions of these trait data, primarily those that were recorded on voucher tags; thus, many data remain unrecorded, undigitized, and not readily available to the scientific community.

Natural history museums have a large portion of these trait data in formats that are difficult and time consuming to obtain. For example, to obtain trait data from a collector’s catalog, one needs to find the specimens collected by that researcher and match it with the catalog at hand, then, if trait data were recorded in the catalog, they then need to be digitized in a standard manner.

The aim of this NSF grant is to assist natural history museums with resources to extract trait data from museum archives, to standardize the format in which institutions will present these data, and to make these data available to the scientific community via online biodiversity platforms, such as iDigBio.

Why are these traits important? Because all the data from each specimen collected is part of the physical specimen, the more trait data we make available, the more research

that can be derived from it, and any new data that derives from research in turn becomes part of the specimen itself. This is a concept that in the museum world is called the “extended specimen.”

This effort promises to have a great impact on the scientific community because the final product will be the presentation of trait data in digital form, standardized across institutions, and readily available in open-source portals.

So far, nine students on the Ranges project have extracted trait data from skin tags, field notes, and collector’s catalogs for a total of 740 work hours. As Mammal Collection Manager, I supervise the students on a daily basis. The students are learning the importance of data standardization, accuracy, and integrity. These valuable skills will be helpful in their future careers, and we at the NSRL are proud to provide students with these hands-on experiences and to teach them these important concepts.



*Bryson Goldman, a senior in Natural Resources Management, is digitizing skin tag data for specimens of Tricolored Bat (*Perimyotis subflavus*) from Texas.*

# The Invertebrate Zoology Collection as the Voucher Repository for the Arthropod Biodiversity of the Davis Mountains Preserve

*by Jennifer C. Girón, Curator of Invertebrate Zoology*

The state of Texas, physically speaking, is for the most part relatively flat. It is composed of four major physical regions: Gulf Coastal Plains, North Central Plains (or interior lowlands), Great Plains, and Basin and Range Province. The Basin and Range Province is the only mountainous area of Texas, and it includes parts of the Guadalupe, Davis, Glass, Chalk, and Chisos mountain ranges.

The Davis Mountains are located near Fort Davis, enclaved in the primarily desertic Trans-Pecos region. Rather than being a continuous mountain range, the Davis Mountains are a sky island—mountains surrounded by desert—that is temperate and forested, contrasting with the surrounding desert ecosystem. [The Davis Mountains Preserve](#) protects about 32,844 acres ranging from about 4,900 ft (1,500 m) in elevation to the highest peak, Mount Livermore, at 8,378 ft (2,554 m) in elevation. The Preserve has been managed by [The Nature Conservancy](#) since 1998. The plants and vertebrate animals of the Preserve have been thoroughly surveyed and studied since the 1990s, when the Preserve was established. For invertebrates, however, there has not been a comprehensive study to date.

In 2021, Ashley Schmitz, who volunteers in the Entomology section of the Corpus Christi Museum of Science and History and is a Research Associate of the NSRL, got together with colleagues to request a permit to start arthropod surveys at the Preserve. This project has grown to a collaboration of more than 20 researchers from universities and state agencies, as well as retired professionals and avocational collectors—who, in their spare time, travel to the preserve to collect specimens during the warmer seasons.

The researchers use multiple collecting methods at several sites throughout the land, and they process the specimens by mounting, labeling, and identifying them. Some specimens are sent to specialists for identification. Those identified species are then recorded into a spreadsheet with locality information. To date, more than 1,600 arthropod taxa, including 1,363 identified species, have been recorded. The remainder are still under study to determine if they correspond to previously described species. Some of these specimens represent new records for the state of Texas, and some species are even new to science.

As Curator of the Invertebrate Zoology Collection of the NSRL, Museum of Texas Tech University (IZC-MoTTU) and a weevil researcher, I was invited in 2023 to become part of the research team to provide expertise identifying broad-

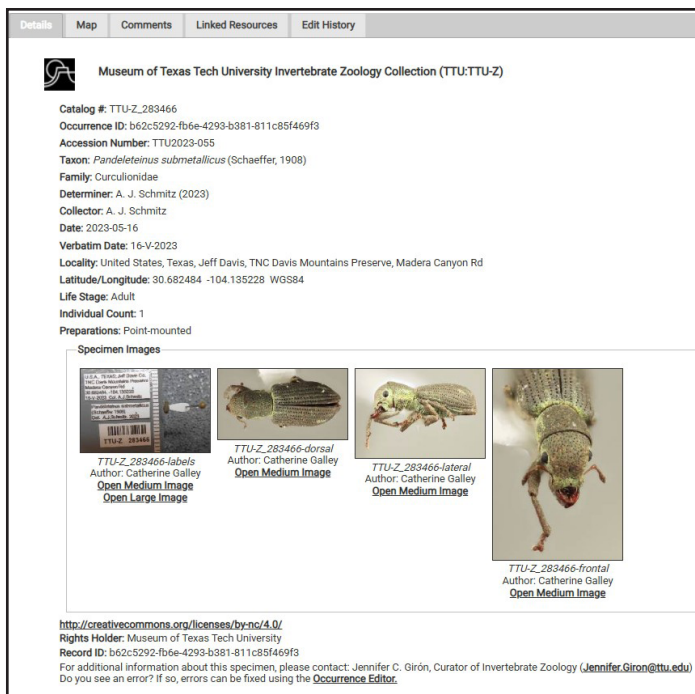


*A drawer of voucher specimens from the Davis Mountains Preserve accessioned into the IZC-MoTTU, all properly mounted, labeled, and identified, ready to be digitized.*

nosed weevils. When I accepted the invitation, I offered to house voucher specimens resulting from the project at the IZC-MoTTU, so that those specimens could be digitized and their information made available online through our database. This offering was immediately accepted, and we started receiving those specimens the very same year.

When the specimens arrive at the collection, they are in the best condition a curator can wish for: sorted, properly mounted, properly labeled, and identified to either genus or species, for the most part. Our job at the IZC is to accession them following Museum policies and enter the information into [our public database in the Symbiota ecdysis portal](#). Along with collecting data and identifications, our database allows us to link images to every record. All specimens have a general image of the specimen along with its respective data labels, but only one representative of each species gets the full treatment of high-resolution photographs of the dorsal view, lateral view, and the head, which we hope is useful when confirming identifications of insects in the region.

These publicly accessible resources have become a staple of the team's annual reports to the Preserve's administration and a good way to keep track of the project. The [list of arthropod species recorded from the Davis Mountains Preserve](#) so far is also available via ecdysis and the voucher specimens housed at the IZC-MoTTU are linked to it.



One of the digitized Davis Mountains voucher specimens with its associated data in the ecdysis data portal. Catalog number TTU-Z\_283466.

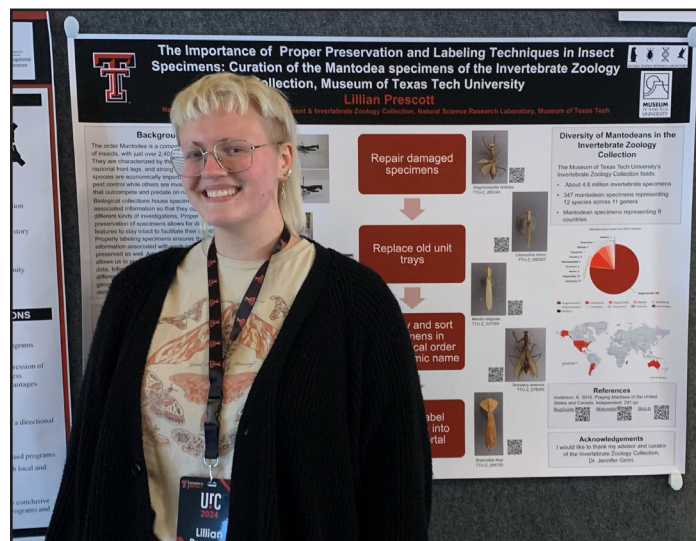
Lee Harris, a graduate student in the TTU Museum Sciences Program, is now in charge of digitizing (entering data and generating images) all the specimens that the NSRL has received to date. This project has now become a hands-on learning opportunity. Dr. Joseph Manthey, faculty member at the TTU Department of Biological Sciences, also joined the project to sample for carpenter ants to include them in his NSF-funded CAREER grant “Landscape genomics of co-evolution: a test in carpenter ants (Genus *Camponotus*) and their microbial symbionts,” which along with genomic-level data, will generate educational materials in collaboration with the Museum of Texas Tech.

The collecting season for 2025 is about to start. We are hoping that the weather this year will favor more insect diversity, but given the dry 2024 conditions, this year may not be ideal. At the IZC-MoTTU, we have about 800 voucher specimens from this project so far, over 200 of which are now fully digitized. Once the project ends, the team will summarize the findings and produce an illustrated catalog of the arthropods (or at least specific groups, probably including beetles) of the Davis Mountains Preserve.

## Undergraduate Student Highlight

Lily Prescott is a Natural Resources Management major with a Wildlife Biology concentration. She has been working at the Invertebrate Zoology Collection of the NSRL for two years now. During her first year, she recurated the mantis (Mantodea) and stick insect (Phasmatodea) collections, repairing damaged specimens, identifying and organizing them, and entering their label information into our [ecdysis database](#). In April of 2024, Lily presented part of her work in a poster about the curation of the Mantodea specimens at the TTU Undergraduate Research Conference (URC), where she tied for first place in the Energy & Environment Impact Area. Her current project involves developing learning resources for the Texas FFA Entomology Career Development Event. In November of 2024, the Museum sponsored Lily's attendance to the annual meetings of the [Entomological Collections Network](#) and the [Entomological Society of America](#), where she coauthored a poster about the FFA Entomology project. Lily was part of the Formal & Informal Teaching pilot section, where she was able to hear about initiatives on insect education.

The project Lily is developing at the NSRL is very important to her as someone who plans to go into outreach and education as a career. Lily's goal is to use the experiences gained from working at the NSRL to become a park ranger and wildlife educator, with a focus on the more “creepy crawly” animals that often go overlooked.



Lily Prescott presenting her poster at the TTU URC 2024.

## NSRL CURATORS



**Dr. Robert D. Bradley** is Director of the NSRL, Curator of Mammals, and Professor of Biological Sciences. Dr. Bradley's research foci are systematics and molecular evolution of New World rodents; hybridization; infectious zoonotic diseases; and natural history of mammals. He has been a faculty member since 1994.

He currently is advising 3 PhD, 3 MS, and 4 undergraduate students. He has graduated 20 MS, 4 MA, and 14 PhD students, and he has authored or edited 6 books and 225 peer-reviewed articles, all pertaining to mammals.

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**Dr. Nancy McIntyre** is the Curator of Birds and a Professor of Biological Sciences. She is a landscape ecologist whose research focuses on how land conversion and climate change are fragmenting migratory habitats for wildlife in the Great Plains of North America. Dr. McIntyre has served as

Curator of Birds since 2006. She currently is advising 1 PhD student and 1 MS student.

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**Dr. Jennifer Girón** is the Curator of Invertebrate Zoology. She handles loan and data requests, organizes and processes incoming specimens, and manages the specimen database hosted in the Symbiota ecdysis portal. She also trains and supervises students and volunteers working in the collection, performs outreach and engagement activities, and conducts research on beetle biodiversity.

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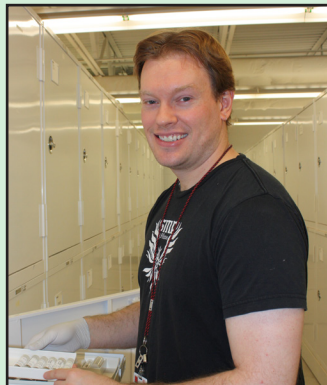
**Dr. Richard Stevens** is a Curator of Mammals and Professor of Natural Resources Management. He is a bat and rodent community ecologist, macroecologist, and biogeographer. His lab conducts collections-based ecological work in Paraguay, Colombia, Mojave Desert, and Texas. He currently is advising 7 PhD, 2 MS, and 5 undergraduate students.

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**Dr. Caleb D. Phillips** is the Curator of Genetic Resources and an Associate Professor of Biological Sciences. The Phillips' lab studies how gene expression and microbiome communities evolve in support of mammalian life histories; bioinformatics; and the evolutionary/developmental process of mammalian divergence. He currently is advising 2 PhD students and 1 MS student.

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**Heath Garner** is the Curator of Collections. His role is to facilitate the daily operations and maintenance of the NSRL collections. His duties include processing, tracking, and cataloging specimens, processing loans, training and supervising student workers and volunteers, documentation of data and collection activities, and preventative conservation of the collections.

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# NSRL COLLECTIONS - SUMMARY AND STATISTICS

The Natural Science Research Laboratory (NSRL) is a division of the Museum of Texas Tech University that archives biological samples and their associated data. These collections serve as a library of our natural heritage for education and research purposes. Natural history collections provide the foundation for our understanding of biodiversity. They serve as a historical reference for documenting changes in our environment and the effects of those changes on wildlife and, ultimately, on humans.

The collections maintained by the NSRL are available to researchers at academic, scientific, and government institutions around the world for scientific investigation, discovery, and problem-solving in the natural sciences. The causes and/or effects of animal-borne diseases, environmental pollutants, parasites, climate change, habitat loss, geographic isolation, and natural evolutionary processes and speciation are just a few examples of the investigations that can be conducted utilizing specimens and tissues archived in a natural history collection. Further, the resources of the NSRL are utilized by the academic and scientific communities to train and educate students at the undergraduate and graduate levels for careers in the natural sciences as well as museum science.

## Mammal Collection



The Mammal Collection currently contains 159,131 cataloged specimens of an estimated 1,442 species. Specimen preparation types include preserved skins, skeletal materials, alcohol-preserved specimens, and taxidermy mounts. In 2024, the Mammal Collection cataloged 962 specimens and granted 10 loans totaling 337 specimens.

## Bird Collection



The Bird Collection currently contains 6,101 cataloged specimens, as well as eggs and nests, of 858 species. In 2024, the Bird Collection cataloged 9 newly acquired specimens, and granted 5 loans totaling 76 specimens.

## Invertebrate Zoology Collection



The Invertebrate Zoology Collection contains an estimated 4.6 million specimens. These include insects, crustacea, endo- and ecto-parasites, arachnids, and other groups. Specimen preservation methods include dried, fluid, slide-mounted, and frozen. In 2024, the collection cataloged 8,059 specimens and granted 8 loans totaling 684 specimens.

## Genetic Resources Collection



The Genetic Resources Collection contains ~474,000 samples of tissues, blood, and extracted DNA from >100,000 specimens of mammals and other taxa. In 2024, the GRC granted 40 loans totaling 883 samples. The Collection incorporated 7,386 new samples obtained from 1,056 individuals.

As a whole, the NSRL hosted 367 visitors and volunteers in 2024, including researchers utilizing the collections, students taking classes, individuals and groups on tours, and volunteers assisting in the collections. The NSRL also filled 96 information requests. The NSRL employed 18 TTU students (3 graduate, 15 undergraduate) and 1 high school student during 2024.

## NSRL STAFF



**Kathy MacDonald** is the Collections Manager for the Genetic Resources Collection. Her primary duties include the organization and processing of incoming samples and the subsampling and processing of loans. Other duties include assisting with specimen tracking in the collections and data management and design.

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**Heidi Amarilla-Stevens** is the Collections Manager for the Mammal Collection. Her duties include assisting in all aspects of the specimen curation process, as well as preparing loans, student training, and databasing. She also conducts research on improving curatorial practices for the long-term care of collections of natural history specimens and tissues.

[heidi.stevens@ttu.edu](mailto:heidi.stevens@ttu.edu)



**Lisa Bradley** is the Production Editor for Occasional Papers and Special Publications. Her duties include coordinating the review and revision process, copy editing, and final layout and design. She also assists in the writing and editing of scientific articles and books published by NSRL staff, preparation of grant proposals, development of NSRL exhibits for the Museum, and maintenance of the NSRL website.

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## A Non-typical Use of An NSRL Specimen

During the fall of 2024, a group of students enrolled in interdisciplinary seminars for the Honors College with Dr. Susan Tomlinson took a tour of the [Microsculpture](#) exhibit that was available in the galleries of the Museum at the time. The course focuses on illustration, so students were able to choose insect specimens from the gallery to use as models to create works of art. Anyssia Hernandez, an undergraduate student in Criminology of the College of Arts & Sciences, chose to represent a cicada for her project. On the left is an image of her creation. On the right is a photograph of the specimen. The amount of detail and the choice of colors in Anyssia's art are quite precise and highlight the hidden beauty of the specimen. We love when NSRL specimens are used for such unique, interdisciplinary purposes!



## Follow the NSRL on Facebook!

The Museum of Texas Tech University, of which the NSRL is a division, recently came under the administrative umbrella of the Office of the Vice Provost for Outreach and Engagement. Under a directive to increase its efforts at public outreach and engagement, the NSRL began its own Facebook page.

With funding from a Museum endowment, in March 2024, the NSRL hired a Graduate Intern for Outreach and Engagement, Seth Palmer, who is a Master's student in the College of Media and Communications. Seth established the [NSRL Facebook](#) page and manages its content, including creating posts or suggesting topics for the posts. Seth also assisted the NSRL with ideas for redesigning and reorganizing our website to make it more user friendly. In September, the NSRL also hired an undergraduate student, Emmalee Balch, who is majoring in Natural Resources Management;

she has a particular interest in outreach to schools and in educating the public about wildlife. Emmalee has been developing age-appropriate worksheets to accompany the NSRL exhibit Biodiversity of the Llano Estacado, creating content for hands-on science activities and lesson plans that will be made available to area schools, and participating in NSRL outreach events. We appreciate the efforts of these student employees!

Be sure to check out our Facebook page for content about NSRL events, research updates, wildlife features, and more! We hope these social media posts will be both informative and entertaining for our research colleagues, students, and alumni, as well as the public. Please share our posts with your Facebook friends to help spread the word about "who we are" and "what we do" at the NSRL, and comment on our posts with your feedback!



## Outreach and Engagement

2024 was a very busy year of outreach and engagement activities for the NSRL! Below are a few examples of the numerous events hosted or attended, presentations and tours given, and other opportunities during which the NSRL engaged with the public last year.

March - Heidi Amarilla-Stevens was invited to present "Importance of Scientific Collections" to 30 senior Biology students at the Colegio de Biólogos del Paraguay (College of Biologists of Paraguay).

March – Dr. Joe Manthey contributed to an animated YouTube video produced by the Field Museum entitled "New Uses for Old Specimens" about temporal genomics. View the video on YouTube by searching for "new uses for old specimens".

May – A group of 40 5th and 6th grade students from Klondike ISD (Lamesa, Texas) visited the Museum and received a behind-the-scenes tour of the NSRL, led by Dr. Robert Bradley. We value these opportunities for students, teachers, and others to learn about the NSRL, the value of natural history collections, and the importance of the NSRL's efforts in biological research, education, and wildlife conservation.



*Klondike ISD students touring the NSRL*

June - Dr. Jennifer Girón organized a public event at the Museum entitled "Come Bug Me" that showcased the Invertebrate Zoology Collection. The free event was attended by more than 400 people, who saw NSRL insect specimens in cases and through microscopes, as well as live insects provided by the Entomology Club of Texas Tech. The attendees were able to ask questions of Dr. Giron and the students, as well as attend a presentation by Dr. Girón about beetles.

June – Dr. Jennifer Girón, along with Dr. Scott Longing and undergraduate student Jill Forrest of Plant and Soil Sciences, led an entomology workshop at the TTU campus at Junction. This workshop was for teachers who will be coaching high school students to compete in the Entomology Contest of the Texas Future Farmers of America. The teachers were trained in methods of collecting invertebrate specimens and proper preservation, along with basics on insect morphology and identification.



*Entomology Workshop for FFA Teachers*

June – A group of 52 high school students in the Upward Bound Program of South Plains College received tours of the NSRL and other divisions of the Museum. The group's visit to the Museum was intended to provide cultural enrichment, educational value, and entertainment, but also to inspire students with potential college degree and career paths.



*Upward Bound tour of the NSRL*

July – During a collecting expedition through Kansas, Nebraska, and South Dakota, Dr. Robert Bradley had the opportunity to talk to the “Discovery Campers” (1st–3rd grade) at Fort Hays State University’s Kansas Wetlands Education Center. Dr. Bradley shared information about biodiversity research and natural history collections, and showed off some live critters that he and his students had caught in the area.



*Discovery Campers at Kansas Wetlands Education Center*

October – The Invertebrate Zoology Collection was featured in a story by KTTZ, the Texas Tech radio station for National Public Radio (NPR). Samantha Larned and Olivia O’Rand of KTTZ visited the NSRL and prepared a great story highlighting the IZC and the work of Dr. Girón. See the story [here](#).

October - For the second year, the NSRL participated in the City of Lubbock’s annual Halloween “Trick or Treat Street” event. Thousands of local kids and their families viewed displays of mammal and invertebrate specimens from our collections, acquired facts about the species on display, and learned about the NSRL and the Museum from our staff members and volunteers that worked the event.



*Young visitors to the mammal table at Trick or Treat Street*

November - The NSRL hosted two booths at Texas Tech’s Family STEM Night, a free public event for K-12 students and their families with hands-on STEM activities. Lisa Bradley and Heidi Stevens hosted the Mammal table, and Dr. Jennifer Girón and volunteers hosted the Invertebrate Zoology table.



*Invertebrate Zoology table at Family STEM Night*



*Mammal table at Family STEM Night*

November – Dr. Robert D. Bradley gave an invited presentation, “Texas Natural History in the 21st Century,” to a group with the Osher Lifelong Learning Institute of Texas Tech University.

# NSRL Trains Students in Specialized Skills Required for Careers in Museum Collections Management and Curation

*by Heidi Amarilla-Stevens, Mammal Collection Manager*

Throughout its history, the NSRL has trained hundreds of graduate and undergraduate students, many of whom were paid employees at the NSRL, in various practices related to natural history collections management. This article highlights Julia Carmona, a senior Biological Sciences major from Brazil and a Bobby Baker Scholar, who has been working in the Mammal Collection at the NSRL since August 2024. Her duties, under supervision, include all stages of specimen preparation, including cleaning, inventory, and storage. Additionally, Ms. Carmona performs data processing for the specimens in her care. Below is a description of the skills in specimen preparation and archival care that Julia has developed while working at the NSRL.

Typically, mammal specimens go through an initial preparation phase that is conducted by the collectors “in the field,” soon after collection. This involves removing the skin from the body, obtaining tissue samples from muscle and internal organs and placing the samples in liquid nitrogen for later storage in the Genetic Resources Collection, cleaning the skin of any fat or tissue remnants, stuffing the skin with cotton and sewing it shut, tagging all parts of the specimen (skins and skeletal materials) with preprinted paper labels that contain a unique field-number printed in the form of a barcode, and pinning the skins on boards to dry. The skull and skeletal material are tagged and then wrapped in string to keep the specimen and its tag intact, then they are air-dried until being taken to the NSRL. After the NSRL receives the specimens, they go through a series of curatorial processes, which are outlined below. This is where Julia, like other students that have preceded her, steps in.

**Air drying:** This is the first step in specimen preparation at the NSRL and consists of letting all specimens that enter the facility air dry under a laboratory hood. This mechanical hood circulates air, allowing both the skins and the tissues remaining on the skeletal materials to fully desiccate, minimizing odor and the possibility of mold growth.

**Initial inventory:** After the specimens are completely dry, an inventory is conducted to record the number of specimens received, their identifying numbers, such as field numbers, and the specific location where the specimens are placed for the next step of the process. Here is where the barcode in the tags comes in handy. By scanning the tags, we eliminate transcribing errors, and we make the entire process more time efficient. This inventory will be updated throughout all stages of specimen preparation, until the final inventory is produced when the specimens are installed in

their permanent locations in the collection.

**Cold isolation:** Because our collection is biological in nature, all dried specimens undergo an initial isolation in our freezer at -40°C for a period of 14 days. This freezing period is performed to kill any ectoparasites and/or their eggs, as well as fungal spores, that might create an infestation in the building. Ultimately, these specimens will be housed in cabinets with other specimens, and we must protect our collection against infestations that can destroy biological materials. After 14 days in the freezer, skins are housed in temporary cabinets while their corresponding skeletal materials go through the processing steps outlined below.

**First cleaning:** After the skeletal material of a specimen completes its cold isolation, it is ready to be cleaned. We use a colony of beetles (from the Dermestidae family) that feed on the flesh of decaying animals. The adults lay their eggs in the decaying flesh and once the larva emerges, they feed on the available food resources. After all the flesh and internal organs are consumed, the skeletal material remains intact, completely articulated and clean.

**Second cold isolation:** A second freezing cycle of 14 days is performed after the skeletal materials leave the dermestid colony. The objective of this second freezing is to eliminate any dermestid larva that might remain inside the crevices of the skull or skeleton.

**Second cleaning:** Once the second cold isolation is completed, a second cleaning is done, this time by hand. The objective of this second cleaning is to remove any dead dermestid larva that remain in the crevices of bones, such as inside the skull or along the spinal cord. The specimens are then ready to be placed in a container, which is either a glass



vial or an acid free cardboard box, depending on the size of the skeletal material.

**Temporary storage:** The cleaned specimens are then reunited with their corresponding skins and placed in a temporary storage cabinet until they are fully identified to the species level and assigned a catalog number.

**Osteoscribing:** After each specimen has been given a unique catalog number, that number is written on the skull, as well as other bones if they are large enough. This process is called osteoscribing (osteo - meaning bone related, and scribe - meaning writing). Because specimens typically are removed from their containers (the vial or box that carries a label identifying the specimen) for study, it is necessary that each specimen be identifiable without ambiguity after being removed from its container for examination. By placing a unique number on each component (skin, skull, skeletal material) of the specimen itself, we are attaching a fixed identifier so that there is no confusion as to the identity of the specimen (or part) being examined and no chance for error or “mix-ups” in associating the specimen with its data and each of its physical components.

**Specimen installation:** After a Curator has confirmed the species identifications, skins and skeletal materials are placed together in their permanent locations in the Mammal Collection. Specimens are housed in taxonomic order, so that all specimens of the same species are stored together. Within a species, specimens are further organized by country, state, county, and finally catalog number.

Simultaneously with the specimen preparation process, a series of steps is performed with the data that are associated with each specimen. That process is as follows:

**Data entry:** The first step is to digitize the data as it is written in the field. We record the following for each

specimen: field number (unique number that identifies the specimen in the field), species name, date of collection and preparation, collector’s name, preparator’s name, measurements, locality, GPS coordinates, sex, and reproductive condition.

**Data update:** This update occurs after the osteal materials have been examined by the curator to confirm the initial identification that took place in the field. When species are closely related, it is sometimes necessary to examine the cranial morphology to correctly identify the specimen. If an initial or field identification differs from the curator’s identification, the data is updated.

**Data proofing:** This last step is time consuming. Here, all the data that were digitized are corroborated against the data that was written on the specimen tags. Data such as GPS coordinates are plotted on Google Earth to verify the accuracy of specimen locality. Specimen sex, measurements, and reproductive condition are confirmed against specimen tags and field notes.

There are other steps in the full process of specimen handling at the NSRL, such as data standardization, cataloging, and, lastly, making data available to the research community and the public. This is accomplished via the NSRL Vertebrate Database at <https://www.depts.ttu.edu/nsrl/collections/search-database.php> and various online portals such as GBIF, iDigBio, and the Consortium of Vertebrate Collections. These steps are conducted by Curator of Collections Heath Garner and Mammal Collection Manager Heidi Amarilla-Stevens.

We at the NSRL are very grateful for students like Julia who help the NSRL function on a daily basis, and very proud of their accomplishments as they learn skills that advance their education and their career goals! We look forward to future students joining our team!



## FACULTY AND STAFF GRANTS (active 2024)

**Bradley, R. D.** Gift for NSRL-based research. Antina.

**Bradley, R. D.** Gift for zoonotic research. Convergent Animal Health.

**Bradley, R. D., J. Manthey, and C. D. Phillips.** Development of a CODIS-like database for the conservation and management of black bears in Texas. Texas Comptroller's Office.

Chelikani, P., M. C. Penn, and **C. D. Phillips.** Dietary inulin fiber supplementation for protection against obesity, hypertension and stroke. American Heart Association.

Conway, W., **R. D. Stevens, R. D. Bradley,** M. Barnes and P. Gipson. Canid Tortoise predation study at Marine Corps Air Ground Combat Center. Department of Defense.

de la Sancha, N. U., S. A. Boyle, and **N. E. McIntyre.** Impacts of rapid habitat change: Mammalian diversity and its response to deforestation in a global biodiversity hotspot, the Atlantic Forest of South America. Walder Foundation, Biota Awards.

Dowler, R. C., and **R. D. Stevens.** Survey of the hooded skunk in the Chihuahuan Desert ecoregion of Texas. Texas Comptroller's Office.

Griffis-Kyle, K., and **N. E. McIntyre.** Sonoran Desert Tortoise Monitoring. Department of Interior, National Park Service.

Karamysheva, Z., and **J. Salazar-Bravo.** Ribosome remodeling as a mechanism of translational control during stress. National Institutes of Health.

**Kingston, T.** (subaward). PiPP (Predictive Intelligence for Pandemic Prevention) Phase II. National Science Foundation.

**Kingston, T.** Protecting cave roosting bats in Southeast Asia – SEABCRU Workshop. Bat Conservation International.

**Kingston, T.** Scholar Rescue Fund, Hosting Agreement Support for Dr. Moe Moe Aung. Institute of International Education.

**Kingston, T., L. Dávalos, A. Rasmussen, and S. Anthony.** Collaborative Research: Integrated mechanisms of environment host-virome interactions. National Science Foundation.

**Kingston, T., L. Dávalos, N. Simmons, and S. Tsang.** Collaborative: AccelNet: The Global Union of Bat Diversity Networks (GBatNet): Bats as a model for understanding global vertebrate diversification and sustainability. National Science Foundation.

**Kingston, T., and C. D. Phillips.** Community processes structuring assembly and disassembly of bat gut-microbial communities across a gradient of habitat degradation. National Science Foundation.

**Longing, S., B. Kelly, N. E. McIntyre, A. Laubmeier, and A. Pan.** Advancing biodiversity research to support transdisciplinary conservation innovation in Texas' ecosystems. Texas Tech University, Grand Challenge Catalyst Grant Program.

**Longing, S., J. C. Girón Duque, and J. D. Manthey.** Digitization of the bee (Hymenoptera: Anthophila) holdings at Texas Tech University with DNA barcoding for species of interest. Texas Parks and Wildlife Department.

**Manthey, J.** Landscape genomics of co-evolution: a test in carpenter ants (genus *Camponotus*) and their microbial symbionts. National Science Foundation.

**Manthey, J., B. Marks, and M. Yonas.** Comparative and temporal biodiversity genomics of Ethiopian Highland montane forest passerine birds. National Science Foundation.

**Manthey, J., C. D. Phillips, and R. D. Bradley.** Morphology, landscape genomics and effective population size of the Palo Duro Mouse, *Peromyscus truei comanche*. USFWS and Texas Parks and Wildlife Department.

Naithani, K., **N. E. McIntyre,** and K. A. With. IMPLEMENTATION: Shifting culture and mitigating inequities in landscape ecology through a collaborative network of professional societies. National Science Foundation BIO-LEAPS.

**Phillips, C. D.** Patient genetic determinants of chronic wound microbiome composition. National Institutes of Health.

**Salazar-Bravo, J.** and N. Bernal-Hoverud. A molecular analyses of the mammalian communities along an altitudinal gradient in the central Andes of Bolivia. Wildlife Conservation Society.

## FACULTY AND STAFF GRANTS (active 2024) (cont.)

**Stevens, R. D.** Anthropogenic risk assessment of bat species of greatest conservation need in Texas. Texas Comptroller's Office.

contributions of characteristics of landscape, habitat and highway structures in determining day-roost utilization. Texas Department of Transportation.

**Stevens, R. D.** Conservation management of bat Species of Greatest Conservation Need in the Trans-Pecos of Texas. Texas Comptroller of Public Accounts.

**Stevens, R. D., others, and R. D. Bradley.** Collaborative Research: Ranges: Building capacity to extend mammal specimens from Western North America. National Science Foundation.

**Stevens, R. D.** Survey of tri-colored bat winter roost sites and associated white-nose syndrome in east and central Texas. US Fish and Wildlife Service/Texas Parks and Wildlife Department.

**Stevens, R. D., and R. D. Bradley.** Digitation PEN: BatPEN! - A partnership to facilitate scientific inquiry into the vast functional trait diversity of phyllostomid bats. National Science Foundation.

**Stevens, R. D.** Use of highway structures by bats in East Texas: Inventory of bats and assessment of relative

## OCCASIONAL PAPERS AND SPECIAL PUBLICATIONS OF THE MUSEUM OF TEXAS TECH UNIVERSITY

The NSRL produces two peer-reviewed publication series, Occasional Papers and Special Publications, both of which are edited by Dr. Robert D. Bradley, Director of the NSRL. These series provide outlets for scholarly works resulting from museum-based natural history research. Relevant topics include, but are not limited to, taxonomic studies, faunal lists, species descriptions, zoonoses research, distributional records, and field and museum techniques and methodology, including molecular methods that are applicable to field or museum research. Publication in these series is available to all authors without regard to their association with Texas Tech University. Authors who plan to submit manuscripts to these series should refer to the Museum Publications Policy and the Guidelines and Procedures for Authors, available at [www.depts.ttu.edu/nsrl/publications/authors.php](http://www.depts.ttu.edu/nsrl/publications/authors.php), for more information.

Lisa Bradley serves as the Production Editor for both series. Feel free to contact Lisa, [lisa.bradley@ttu.edu](mailto:lisa.bradley@ttu.edu), if you are interested in submitting manuscripts or monographs to the Occasional Papers or Special Publications series.

### Publications produced in 2024:

**Occasional Paper 390.** Mitochondrial DNA indicates that extirpated *Ovis canadensis texianus* was a member of the Desert Bighorn Sheep complex. Emily A. Wright, Michael R. Buchalski, and Robert D. Bradley.

(Mammalia: Chiroptera) that co-occur in the southeastern United States. Hannah G. Belinne, Sarah C. Vrla, Jayme E. Czap, and Richard D. Stevens.

**Occasional Paper 389.** Updated checklist and distribution of wild terrestrial mammals in Louisiana. Justin D. Hoffman, Courtney Lester, Darian Doucet, and Damilola Iguwe.

**Special Publication 80.** Comprehensive annotated checklist of Recent land and marine mammals of Texas, 2024, with comments on their taxonomic and conservation status. David J. Schmidly, Robert D. Bradley, Franklin D. Yancey, II, and Lisa C. Bradley.

**Occasional Paper 388.** Wing measurements for differentiating three cryptic species of *Myotis*

View and download Occasional Papers and Special Publications at the NSRL website:  
[www.depts.ttu.edu/nsrl/publications](http://www.depts.ttu.edu/nsrl/publications)

## 2024 PUBLICATIONS BY NSRL FACULTY, STAFF, AND STUDENTS

- Acosta, L. H., J. L. Poma-Urey, K. Barboza-Marquez, K. Rivero, J. Ochoa-G., and **J. Salazar-Bravo**. 2024. First records of three species of *Lasiurus* Gray, 1831 (Chiroptera, Vespertilionidae) in Bolivia. *Check List* 20(5):1054-1066. <https://doi.org/10.15560/20.5.1054>.
- Andersen, B. A., **R. D. Stevens**, and L. M. McGuire. 2024. Interspecific variation in lower temperature thresholds of an assemblage of wintering bats. *Journal of Mammalogy* 105:98–106.
- Batrice, A., **T. Kingston**, and A. L. Rutrough. 2024. Measuring Asian social media sentiments towards bat exploitation. *Anthrozoös* 1-17. <https://doi.org/10.1080/08927936.2024.2345474>.
- Behrends, G. J., Y. Meheretu, and **J. D. Manthey**. 2024. The Great Rift Valley is a greater biogeographic barrier than the Blue Nile Valley for six Ethiopian Highland passerines in the eastern Afrotropical biodiversity hotspot. *Ornithology* 141:ukae030.
- Belinne, H. G., S. C. Vrla, and **R. D. Stevens**. 2024. Morphometric approaches as a tool to distinguish three cryptic species of *Myotis* (Mammalia: Chiroptera) bats. *Occasional Papers, Museum of Texas Tech University* 388:1–11.
- Bernal-Hoverud, N., D. Morales-Moreno, E. E. Quispe, J. Rojas, O. Torrico, R. B. Wallace, and **J. Salazar-Bravo**. 2024. First record of *Neogale africana* (Desmarest, 1818), Amazon weasel (Carnivora, Mustelidae), in Bolivia. *Check List* 20(3):828–832. <https://doi.org/10.15560/20.3.828>.
- Biddy, A. R., **J. D. Manthey**, J. L. Ware, and **N. E. McIntyre**. 2024. Species distribution models predict genetic isolation of *Hetaerina vulnerata* (Odonata, Calopterygidae: *Hetaerina vulnerata* Hagen in Selys, 1853). *Ecology and Evolution* 14:e70107.
- Blackburn, D. C., D. M. Boyer, J. Winchester, J.A. Gray, the **oVert Project Team** and E. L. Stanley. 2024. Increasing the impact of vertebrate scientific collections through 3D-imaging: the openVertebrate (oVert) Thematic Collections Network. *BioScience* 74:169–186.
- Borovec, R., and **J. C. Girón**. 2024. Taxonomic status of the genus *Heteroschoenus* Schoenherr (Coleoptera: Curculionidae: Entiminae) with notes on Afrotropical Geonemini. *The Coleopterists Bulletin* 78:210–213. <https://doi.org/10.1649/0010-065X-78.2.210>.
- Brito, J., R. Garcia, F. Castellanos, G. Gavilanes, J. Curay, J. C. Carrion-Olmedo, D. Reyes-Barriga, J. M. Guayasamin, **J. Salazar-Bravo**, and C. M. Pinto. 2024. Two new species of *Thomasomys* (Cricetidae, Sigmodontinae) from the western Andes of Ecuador and an updated phylogenetic hypothesis for the genus. *Vertebrate Zoology* 74:709–734. <https://doi.org/10.3897/vz.74.e128528>.
- Coleman, J. L., N. Randhawa, J. Chun-Chia Huang, **T. Kingston**, B. PY-H Lee, J. M. O’Keefe, A. L. Rutrough, V. Dinh Thong, S. M. Tsang, and C. R. Shepherd. 2024. Dying for décor: Quantifying the online, ornamental trade in a distinctive bat species, *Kerivoula picta*. *European Journal of Wildlife Research* 70(4):1–5.
- da Silva Araujo, R., P. E. D. Bobrowiec, **R. D. Stevens**, R. Teixeira de Moura, M. A. Sabato, W. E. Magnusson. 2024. Effects of an Amazon dam on taxonomic, functional and phylogenetic diversity of non-volant small mammals. *Biodiversity and Conservation* 33:4275–4294.
- Díaz-Grisales, V., J. Romero-Nápoles, H. González-Hernández, **J. C. Girón Duque**, N. Bautista-Martínez, A. Castañeda-Vildózola, S. Anzaldo, and A. L. Lourenção. 2024. Host plants of the weevil genus *Heilipus* Germar, 1824 (Coleoptera, Curculionidae, Molytinae, Molytini, Hylobiina). *Contributions to Entomology* 74:217–234. <https://doi.org/10.1139/contrib.entomol.74.e129094>.
- Fenton, M. B., P. A. Faure, E. Bernard, D. J. Becker, A. C. Jackson, **T. Kingston**, P. H. C. Lina, W. Markotter, S. M. Moore, S. Mubareka, P. A. Racey, C. E. Rupprecht, and L. Worledge. 2024. Bat handlers, bat bites, and rabies: vaccination and serological testing of humans at risk. *FACETS* 9:1–11.
- Girgente, H. E., and **N. E. McIntyre**. 2024. Evaluation of speculated reproductive habitat for *Somatochlora calverti* (Corduliidae), a rare and range-restricted dragonfly. *International Journal of Odonatology* 27:85–92. <https://doi.org/10.48156/1388.2024.1917274>.
- Girón, J. C.**, M. A. Balk, W. Dahdul, H. Lapp, I. Mikó, E. Alhajjar, B. Wynd, S. Tarasov, C. Lawrence, B. Khakurel, A. Porto, L. Yan, I. E. Fluck, D. S. Porto, J. N. Keating, I. T. Borokini, K. C. Seltmann, G. Montanaro, and P. Mabee. 2024. Meeting Report for the Phenoscope TraitFest 2023 with Comments on Organizing Interdisciplinary Meetings. *Biodiversity Information Science and Standards* 8:e115232. <https://doi.org/10.3897/biss.8.115232>.
- Grimshaw, J. R., D. Donner-Wright, R. Perry, C. A. Lemen, C. J. Garcia, **R. D. Stevens**, and **D. A. Ray**. 2024. Disentangling genetic diversity of *Myotis septentrionalis*: population structure, demographic history, and effective population size. *Journal of Mammalogy* 105:854–864.
- Heintzman, L. J., **N. E. McIntyre**, E. J. Langendoen, and Q. D. Read. 2024. Cultivation and dynamic cropping processes impart land-cover heterogeneity within industrial agroecosystems: a metrics-based case study in the Yazoo-Mississippi Delta (USA). *Landscape Ecology* 39:29. <https://doi.org/10.1007/s10980-024-01797-0>.
- Hernández-May, M. A., M. Pérez de la Cruz, **J. C. Girón**, R. S. Anderson, and J. A. Méndez-García. 2024. First record of *Exophthalmus albofasciatus* (Champion, 1911) (Coleoptera, Curculionidae, Entiminae) in Mexico feeding on *Coccoloba barbadensis* Jacquin, 1760 (Polygonaceae). *Travaux du Muséum National d’Histoire Naturelle “Grigore Antipa”* 67:57–63. <https://doi.org/10.3897/travaux.67.e102876>.

## 2024 PUBLICATIONS (CONT.)

- Husband, D. M., and N. E. **McIntyre**. 2024. Finding isolated aquatic habitat: Can beggars be choosers? *Diversity* 16:468. <https://doi.org/10.3390/d16080468>.
- Korstian, J., **R. D. Stevens**, T. Lee and **D. Ray**. 2024. Unraveling the *Myotis* morass: ultraconserved-element analysis reveals introgression, cryptic diversity, and taxonomic trouble in the most species-rich bat genus. *Journal of Mammalogy* 105:259–276.
- Langlois, G. D., and **R. D. Stevens**. 2024. Roosting behavior of a Neotropical bat (*Artibeus lituratus*): a comparison between two disparate landscapes in the Atlantic Forest of Paraguay. *Behavioral Ecology and Sociobiology* 78:106.
- Manthey, J. D.**, and G. M. Spellman. 2024. Recombination rate variation shapes genomic variability of phylogeographic structure in a widespread North American songbird (Aves: *Certhia americana*). *Molecular Phylogenetics and Evolution* 196:108088.
- Martinez-Cardenas, A., S. J. Vernes, E. C. Teeling, M. Mai, G. Sanchez-De La Vega, J. Gasca-Pineda, E. Aguirre-Planter, L. E. Eguiarte, **C. D. Phillips**, and J. Ortega. 2024. The genome sequence of the endemic Mexican Common Mustached Bat, *Pteronotus mexicanus* Miller, 1902 [Mormoopidae; Pteronotus]. *GENE* 15:929:148821.
- Montanaro, G., J. P. Balhoff, **J. C. Girón**, M. Söderholm, and S. Tarasov. 2024. Computable species descriptions and nanopublications: applying ontology-based technologies to dung beetles (Coleoptera, Scarabaeinae). *Biodiversity Data Journal* 12: e121562. <https://doi.org/10.3897/BDJ.12.e121562>.
- Orellana, K. S., and **J. C. Girón**. 2024. Status of knowledge of the Anthribidae (Insecta: Coleoptera: Curculionoidea) in Colombia. *Biota Colombiana* 25: e1149. <https://doi.org/10.21068/2539200X.1149>.
- Pacheco, L. F., F. R. Méndez de la Cruz, D. Buchori, and **J. Salazar-Bravo**. 2024. Increasing the size and coverage of protected areas will not be enough for effective biodiversity conservation. *Biodiversity* 1–8. <https://doi.org/10.1080/1488386.2024.2403034>.
- Plowright, R. K., A. N. Ahmed, T. Coulson, T. W. Crowther, I. Ejotre, C. L. Faust, W. F. Frick, P. J. Hudson, T. Kingston, P. O. Nameer, M. T. O'Mara, A. J. Peel, H. Possingham, O. Razgour, D. M. Reeder, M. Ruiz-Aravena, N. B. Simmons, P. N. Srinivas, G. M. Tabor, I. Tanshi, I. G. Thompson, A. T. Vanek, N. M. Vora, C. E. Willison, and A. T. H. Keeley. 2024. Ecological countermeasures to prevent pandemics. *Nature Communications* 15:2577 <https://doi.org/10.1038/s41467-024-46151-9>.
- Revollo-Cadima, S., and **J. Salazar-Bravo**. 2024. Identifying areas of conservation importance based on spatial patterns of evolutionary diversity for non-volant small mammals in the Andean Puna. *Journal of Arid Environments* 224:105230. <https://doi.org/10.1016/j.jaridenv.2024.105230>.
- Schmidly, D. J., **R. D. Bradley**, F. D. Yancey, II, and **L. C. Bradley**. 2024. Comprehensive annotated checklist of Recent land and marine mammals of Texas, 2024, with comments on their taxonomic and conservation status. *Special Publications, Museum of Texas Tech University* 80:1–76.
- Smith, P., M. Belén Barreto, G. Vargas, M. Owen, **H. Amarilla Stevens**, M. Ruedi, F. Rojas, and R. Owen. 2024. New departmental records for Paraguayan bats (Mammalia: Chiroptera). *Journal of Bat Research & Conservation* 17(1):30–38.
- Stevens, R. D.** 2024. Winter activity of *Perimyotis subflavus* in east Texas. *Western North American Naturalist* 84:67–71.
- Stevens, R. D.**, F. Netto, M. Ortiz and **H. N. Amarilla-Stevens**. 2024. Reproductive patterns of three species of bats from interior Atlantic Forest of eastern Paraguay. *Mastozoologia Neotropical* 31:e01001.
- Storz, J. F., M. Quiroga-Carmona, S. Liphardt, N. Herrera, N. M. Bautista, J. C. Opazo, A. Rico Cernohorska, **J. Salazar-Bravo**, J. M. Good, and G. D'Elia. 2024. Extreme high-elevation mammal surveys reveal unexpectedly high upper range limits of Andean mice. *The American Naturalist* 203:726–735. <https://doi.org/10.1086/729513>.
- Straka, T. M., J. Coleman, E. A. Macdonald, S. Rogge, **T. Kingston**, and M. H. Jacobs. 2024. Beyond biophobia: positive appraisal of bats among German residents during the COVID-19 pandemic - with consequences for conservation intentions. *Biodiversity and Conservation*. <https://doi.org/10.1007/s10531-024-02872-3>.
- Stuhler, J. R., C. Portillo Quintero, J. R. Goetze and **R. D. Stevens**. 2024. Efficacy of remote sensing technologies for estimating abundance of a rare kangaroo rat across its distribution. *Bulletin of the Wildlife Society* e1510.
- Stukenholtz, E. E., and **R. D. Stevens**. 2024. The relationship between Grinnellian and Eltonian niche characteristics and passerine distribution across a latitudinal gradient. *Diversity* 16:32.
- Subedi, M. R., C. Portillo-Quintero, **N. E. McIntyre**, S. S. Kahl, R. D. Cox, G. Perry, and X. Song. 2024. Ensemble machine learning on fusion of Sentinel time series imagery with high-resolution orthoimagery for improved land use/land cover mapping. *Remote Sensing* 16:2778. <https://doi.org/10.3390/rs16152778>.
- Sutor S., **N. E. McIntyre**, and K. Griffis-Kyle. 2024. Vegetation cover, topography, and low-traffic roads influence Sonoran desert tortoise (*Gopherus morafkai*) movement and habitat selection. *Movement Ecology* 12:68. <https://doi.org/10.1186/s40462-024-00503-8>.
- Thomas-White, K., E. E. Hilt, G. Olmschenk, M. Gong, C. D. Phillips, C. Jarvis, N. Sanford, J. White, and P. Navarro. 2024. An accurate metagenomics pipeline to characterize self-collected vaginal microbiome samples. *Diagnostics* 14:2039.

## 2024 PUBLICATIONS (CONT.)

Wright, E. A., J. V. Bayouth, J. P. Bayouth, A. E. Worsham, G. E. McDaniel, T. S. Hollinger, V. A. Lacy, E. K. Johnston, D. R. Pipkin, E. K. Roberts, and **R. D. Bradley**. 2024. Contemporary hybridization between female mule deer and male white-tailed deer in west Texas differs from the hypothesized sex mating patterns recovered from ancient hybridization events. *The Canadian Journal of Zoology* 102:239–252.

Wright, E. A., **R. D. Bradley**, and **J. D. Manthey**. 2024. Translocations, rising populations, and phylogeographic consequences: Genomic implications for conservation of introduced aoudad (*Ammotragus lervia*) in the southwestern US. *Journal of Mammalogy* 105:1353–1364.

Wright, E. A., G. G. Brugette, K. F. Buckert, F. Hernández, J. H. Reed, S. R. Wyckoff, J. C. Taylor, K. R. Manlove, **C. D. Phillips**, and **R. D. Bradley**. 2024. Multi-locus sequence typing indicates multiple strains of *Mycoplasma* in desert bighorn sheep and aoudad in Texas. *Journal of Wildlife Management*, 88:1–25.

Wright, E. A., M. R. Buchalski, and **R. D. Bradley**. 2024. Mitochondrial DNA indicates that extirpated *Ovis canadensis texianus* was a member of the desert bighorn complex. *Occasional Papers, Museum of Texas Tech University* 390:1–29.

Wright, E. A., **J. D. Manthey**, M. R. Buchalski, B. R. McKinney, C. E. Brewer, K. Hurley, **D. A. Ray**, **C. D. Phillips**, F. Hernández, and **R. D. Bradley**. 2024. Genomic affinity following restoration of a locally extirpated species: a case study of desert bighorn sheep in Texas. *Conservation Genetics* 25:1209–1230.

Wright, E. A., M. B. Reddock, E. K. Roberts, Y. W. Legesse, G. Perry, and **R. D. Bradley**. 2024. Genetic characterization of the prion protein gene in camels (*Camelus*) with comments on the evolutionary history of prion disease in Cetartiodactyla. *PeerJ Bioinformatics and Genomics* 12:1–29. <https://doi.org/10.7717/peerj.17552>.

## STUDENT SCHOLARSHIPS, GRANTS, AND RESEARCH AWARDS 2024

**Jouseef Ahmed**, PhD. Chair: Tigga Kingston. Travel Award to attend 8th World One Health Congress (WOHC) in South Africa.

**Katelyn Albrecht**, PhD. Chair: Robert D. Bradley. Bobby Baker Memorial Endowed Scholarship.

**MST Hasina Begum**, PhD. Chair: Dr. Breanna Harris. Bobby Baker Memorial Endowed Scholarship.

**Julia Carmona Cabral**, undergraduate. Advisor: Robert D. Bradley. Bobby Baker Memorial Endowed Scholarship.

**Justin Dawsey**, MS. Chair: Nancy McIntyre. Helen DeVitt Jones Scholarship.

**Davis Mathews**, undergraduate. Advisor: Robert D. Bradley. Bobby Baker Memorial Endowed Scholarship.

**Sufia Neha**, PhD. Chair: Robert D. Bradley. Bobby Baker Memorial Endowed Scholarship.

**Abigail L. Rutrough**, PhD. Chair: Tigga Kingston. National Science Foundation Graduate Research Fellowship; Bat Conservation International, Student Scholar; Bat Conservation Trust, Kate Barlow Award; TTU Graduate Student Research Support Program; C.B. and Fran Carter Foundation. Academic Scholarship.

**Emily Schmalzreid**, MS. Chair: Robert D. Bradley. Bobby Baker Memorial Endowed Scholarship.

**Sean Sutor**, PhD. Chair: Nancy McIntyre. TTU Doctoral Completion Fellowship; NASA-MSU Professional Enhancement Award, International Association for Landscape Ecology; David J. Morafka Research Award, Desert Tortoise Council.

**Md Ashraf Ul Hasan**, PhD. Chair: Tigga Kingston. Lewis and Clark Fund for Exploration and Field Research; Grants-in-aid, Department of Biological Sciences, TTU.

## STUDENT PRESENTATIONS 2024

During 2024, 21 graduate students gave 41 presentations, 6 undergraduate students gave 7 presentations, and 2 postdocs gave 2 presentations (34 oral and 16 poster) of their research at 2 local, 4 state or regional, 7 national, and 5 international conferences and society meetings.

## STUDENT PRESENTATION AWARDS 2024

**Angela Alviz**, graduate. William B. Davis Award, best graduate student oral presentation in classical mammalogy at the organismal level. Texas Society of Mammalogists.

**Nuria Bernal-Hoverud**, graduate. Clyde Jones Award, best graduate student poster presentation in mammalian molecular biology, evolution, and systematics. Texas Society of Mammalogists.

**Sufia Neha**, graduate. TSM Award, best graduate student oral presentation in mammalian molecular biology, evolution, and systematics. Texas Society of Mammalogists.

**Lillian Prescott**, undergraduate. Tied for 1st place, LEDA Outstanding Presenter Energy & Environment Award. TTU Undergraduate Research Conference.

**Abigail Rutrough**, graduate. Luis F. Bacardi Bat Conservation Award. Annual North American Symposium for Bat Research; 1st Place, Ecology. Texas Tech Annual Biological Sciences Symposium.

**Sean Sutor**, graduate. Best Student Presentation Award. Annual Meeting of the International Association for Landscape Ecology-North America.

**Sean Sutor**, graduate. 1st place, student presentation awards. Desert Tortoise Council.

**Sean Sutor**, graduate. Best Overall Graduate Student Presentation. Texas Tech Annual Biological Sciences Symposium.

**Md Ashraf Ul Hasan**, graduate. 2nd place, oral presentation. 5th International Southeast Asian Bat Conference.

## 2024 GRADUATES

**Jake Ancira, M.S.** Chair: Caleb D. Phillips. Thesis title: Quantifying the influence of microbiomes and patient variables on wound healing time of chronic wounds through Structural Equation Modeling. Current position: Analyst at MicroGenDX, Lubbock, Texas.

**Daniela Arenas-Viveros, Ph.D.** Chair: Jorge Salazar-Bravo. The effect of the Central Andes on the diversification of distinct lineages of South American rodents. Current position: Lecturer, University of Wisconsin, Madison.

**Jack Hruska, Ph.D.** Chair: Joe Manthey. Dissertation title: Comparative genomics and phylogeography of birds inhabiting Mesoamerican pine-oak habitats. Current position: Postdoc, University of Nebraska-Lincoln.

**Hannah Girgente, M.S.** Chair: Nancy McIntyre. Thesis title: Documenting the Odonates of Florida's seepage streams in search of the Calvert's Emerald (*Somatochlora calverti*). Current position: Consultant, Virginia Tech Department of Entomology.

**Joseph Girgente, M.S.** Chair: Nancy McIntyre. Thesis title: Ecomorphological variation in *Hylogomphus geminatus* (Odonata: Gomphidae). Current position: Environmental Scientist, Coastal Resources, Inc., Maryland.

**Garret Langlois, Ph.D.** Chair: Richard D. Stevens. Dissertation title: Environmental Determinants of behavioral ecology: Differences in roosting ecology and socioecology of a Neotropical bat (*Artibeus lituratus*) between two disparate landscapes in the Atlantic Forest of Paraguay. Current position: Head of Research, Lubbock Arts and Intersections Research Group, Texas Tech University.

**Emma Sanchez, M.S.** Chair: Richard D. Stevens. Thesis title: Use of culverts as diurnal roosts by Tricolored Bats (*Perimyotis subflavus*) in East Texas: exploring seasonality and spatial resource selection. Current position: Project Coordinator, Texas A&M Natural Resources Institute, College Station.

## UNDERGRADUATE RESEARCH 2024

During 2024, at least 26 undergraduate students conducted research under the direction of 7 NSRL faculty and staff associates.

## TTU FACULTY ASSOCIATES OF THE NSRL

The following faculty at Texas Tech University have research programs that both contribute to and benefit from a working relationship with the Natural Science Research Laboratory. Graduate and undergraduate students of these faculty members, as well as those of the faculty Curators of the NSRL, conduct field-based research studies that result in growth of the NSRL collections and conduct laboratory-based research utilizing the resources of the NSRL to advance the sciences of mammalogy, ornithology, invertebrate zoology, wildlife ecology, and many other disciplines. The NSRL's strong history of field-based and organismal research, and continued commitment to such endeavors, set us apart from many other natural history programs.



**Dr. Tigga Kingston** is a Professor of Biological Sciences. Her research and activities are dedicated to the conservation ecology of Paleotropical bats. She has been working on the conservation ecology of bats of Southeast Asia for more than 20 years, with projects in Malaysia, Indonesia, Myanmar, Philippines, and Vietnam. More recently, she has student projects and collaborations in Africa, specifically Nigeria, Kenya, and South Africa.

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<http://kingstonlab.org/>



**Dr. Joseph D. Manthey** is an Assistant Professor of Biological Sciences. His research group uses a combination of fieldwork, specimens, ecological data, genomics, and bioinformatics to study how organisms (mostly birds) evolve across both geographic and genomic landscapes. Major research themes include: (1) how and why species' genomes change through evolutionary time, (2) diversification at different spatial and temporal scales in sky islands, and (3) impacts of fragmentation on population connectivity in sky islands.

[joseph.manthey@ttu.edu](mailto:joseph.manthey@ttu.edu)  
[mantheylab.org](http://mantheylab.org)



**Dr. David A. Ray** is a Professor of Biological Sciences. The Ray laboratory focuses on the study of genomes and genome evolution with an emphasis on transposable elements and their role in the diversification of species. Model organisms include bats, several other mammals, and crocodilians.

[david.a.ray@ttu.edu](mailto:david.a.ray@ttu.edu)  
<http://www.davidraylab.com/>



**Dr. Jorge Salazar-Bravo** is an Associate Professor of Biological Sciences. His research revolves around two basic themes: developing and testing phylogenetic hypotheses for mammalian taxa at various hierarchical levels; and using first principles in ecology and evolution to understand the triggers for disease emergence. Research topics he has pursued, as represented in his publications, include: systematics, biogeography, evolution, and conservation of Neotropical mammals; the ecology and evolution of virus/host co-evolution; and the interplay between ecology and disease.

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<http://www.depts.ttu.edu/biology/people/Faculty/Salazar-Bravo/>

## Faculty and Curator Presentations at Professional Meetings

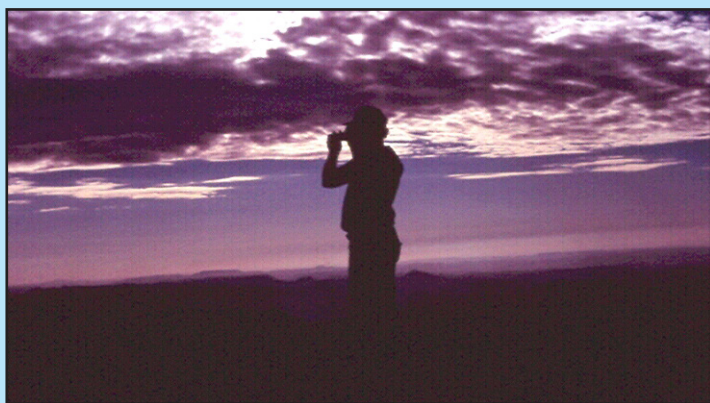
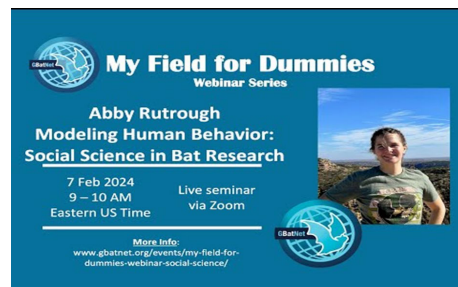
**Jennifer Girón.** “Come Bug Me: the first attempt at an outreach event showcasing the Invertebrate Zoology Collection of the Museum of Texas Tech University.” Presented at the Annual Meeting of the Entomological Collections Network, November 2024, Phoenix, Arizona.

**Jennifer Girón et al.** “A Collaborative Project on the Biodiversity of Arthropods of the Davis Mountains Preserve in Texas, Emphasizing Collections Data Management.” Presented at the Annual Meeting of the Entomological Collections Network, November 2024, Phoenix, Arizona.

**Jorge Salazar-Bravo.** “Cradles, species attractors, and pumps: patterns and processes of mammalian evolution on the Andes.” Invited presentation as part of the Roundtable Discussion “Mammals on the Shoulders of Giants: the importance of South American mountains for the diversity and diversification of Neotropical mammals” at the 12th Mammalian Congress of Mammalogy, September 2024, Armação de Buzios, Rio de Janeiro, Brazil.

**Jorge Salazar-Bravo et al.** “The biogeography of the mountain islands of the Salar de Uyuni.” Presented as part of the Roundtable Discussion “Mammalian diversity and conservation in/around the salt flats and drylands of the Andean highlands.” Dr. Salazar-Bravo was also the organizer of this Round Table Discussion at the 12th Mammalian Congress of Mammalogy, September 2024, Armação de Buzios, Rio de Janeiro, Brazil.

In February 2024, Abby Rutrough, student of Tigga Kingston, contributed to the Global Union of Bat Diversity Networks (GBatNet) “My Field for Dummies” series with a webinar entitled “Modeling Human Behavior: Social Science in Bat Research”. View the webinar here: [https://www.youtube.com/watch?v=EWA1cf-QS\\_w](https://www.youtube.com/watch?v=EWA1cf-QS_w).



*Looking for good students! Bradley in Davis Mountains, Texas.*

### A Message to Prospective Students:

Faculty and staff associated with the NSRL are very active in field- and specimen-based research. Our faculty and students have interests in mammalogy, ornithology, invertebrate zoology, molecular systematics, genomics, ecology, and museum science. Most of the undergraduate and graduate students that are affiliated with the NSRL receive degrees in the Department of Biological Sciences or the Department of Natural Resources Management.

We also have students who are part of the Museum Science program. Together, we have a strong core of faculty and undergraduate and graduate students, and we are always on the look-out for potential new students. If you are interested in pursuing a graduate degree or undergraduate research opportunities, please contact any of the faculty members highlighted in this newsletter.

NSRL News is produced by Lisa Bradley with assistance from the staff, students, and associates of the NSRL. Please contact Lisa to request a hard copy or to submit comments or contributions for upcoming issues of NSRL News.

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NSRL, Museum of Texas Tech University, Lubbock, TX 79409

# From the TTU Development Office

The Natural Science Research Laboratory of the Museum of Texas Tech University is a global leader in biodiversity collections, research, and education. It can be proud of the following:

- The NSRL has enabled and facilitated a multitude of research projects and the education of more than 250 TTU graduate students and more than 500 undergraduate students.
- The faculty, staff, and students of the NSRL have generated more than 2,000 peer reviewed scholarly publications while directly affiliated with the NSRL.
- The NSRL is recognized, nationally and internationally, as a leader in curatorial science and collections management practices.
- The NSRL houses the largest biological collection in Texas, 2nd largest natural history collection in Texas, 2nd largest mammalian genetic resources collection in the western hemisphere, 3rd largest invertebrate collection in Texas, and 4th largest mammal collection in an academic institution in the US.
- The NSRL, throughout its history, has been comprised of a significant scientific community of curators, faculty, and students who have engaged in major research endeavors bringing in more than \$25 million in external research awards and endowments.

Impressive doesn't begin to describe the Natural Science Research Laboratory. As our growth continues and the momentum builds, we are always looking to cultivate additional partnerships that will help to build the connection between conservation, biodiversity, research, education, and stewardship. Preservation and knowledge of this great State of Texas is vital and the biodiversity, essential beauty, and iconic wildlife it provides us should be cared for and used to educate and enrich future generations.

It is with sincere gratitude, I thank YOU for your consideration and support of our great institution. We welcome the opportunity for YOU to join us in making a difference as we build our future!



Assistant Development Officer  
Office of Outreach and Engagement/  
Office of Advancement

## Support Natural Science Research and Education!

**Your donation can be dedicated specifically to scientific research endowments, to student research support and education, to collection resources and capacity, or to highest priority use as determined by the NSRL/Museum leadership.**

**Scan the QR code to donate, or contact Annette Castellano for more information:**

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