

# NSRL NEWS

Natural Science Research Laboratory  
Museum of Texas Tech University

Volume 5, Fall 2017



## Genetic Resources Collection at the NSRL Partners with Wound Care Center and Bighorn Sheep Research Groups

This spring, two important partnerships were developed that will serve to enhance research capabilities at the Natural Science Research Laboratory. First, Dr. Caleb Phillips (Curator of the Genetic Resources Collection, GRC) and Dr. Randall Wolcott (Director of the Southwest Regional Wound Care Center) developed a plan for archiving research samples resulting from their collaborative efforts to study how microbiomes interact with human wounds and influence healing. Initially, plans are to archive approximately 90,000 samples in liquid nitrogen freezers housed in the GRC facility. Dr. Wolcott provided \$100,000 to help purchase an additional freezer, defray archival costs, and help defray personnel costs associated with computerizing and caring for this valuable collection.

Second, Dr. Warren Conway (Bricker Professor of Natural Resources Management) and Drs. Robert D. Bradley and Caleb Phillips at the NSRL partnered with the Wild Sheep Foundation and the Texas Bighorn Society to have the NSRL serve as the official repository for research samples associated with studies of North American bighorn sheep (*Ovis canadensis*). Traditionally, research samples have been maintained by individual investigators with little coordination for sharing samples or ensuring long-term care

of samples. This collaborative effort will bring essentially all bighorn sheep research samples to the NSRL where they will be housed in the GRC and maintained following the best practices available for natural history collections. Samples will be inventoried and computerized, and made available to qualified researchers upon request.

In addition to developing an archival initiative, the NSRL, Natural Resources Management, and Biological Sciences will be involved in conducting research on these samples to investigate the potential for transfer of respiratory viruses among wild sheep populations. The Wild Sheep Foundation provided \$50,000 to help purchase an additional freezer, defray archival costs, and for research support associated with this collection. The Texas Bighorn Society provided \$160,000 (over four years) to provide a research stipend for a PhD student to lead the research efforts.

The NSRL is excited about these expanded research opportunities. Both of these projects are the result of recent renovations to the Genetic Resources Collection of the NSRL and installation of a liquid nitrogen storage system. Those improvements were made possible by NSF grant funding and support from Texas Tech University.



*Texas Parks and Wildlife Department biologists and collaborators perform disease screening and monitoring of desert bighorn sheep during autumn 2016 in the Trans-Pecos region of Texas.*

# African Elephant Head Restored for Upcoming Exhibit

A taxidermy head-mount of a bull African Bush Elephant (*Loxodonta africana*) was donated to the Museum of Texas Tech University in 1983 by William G. McMillan, Jr., whose father had shot the animal during a walking safari in Kenya in 1947.

The elephant had been on display in the Museum's galleries until 2011, when it was removed during renovations of the galleries. This spring, funds were obtained from the Helen Jones Foundation to create a new, year-long exhibit, opening in January 2018, that compares the mammalian fauna of the African and North American grasslands. The grant included partial funds to restore the elephant to repair signs of wear and minor damage that had occurred since 1947.

The restoration project was completed by Danny Owens of Creative Critters Taxidermy, Wolfforth, Texas, with assistance from Clay Wagner of Deer Creek Wildlife Studio, Lott, Texas.



## OUTREACH NEWS AND EVENTS

In January, **Caleb Phillips** led a workshop on microbiome analysis at the 2017 Society for Integrative and Comparative Biology symposium entitled "With a little help from my friends: Microbial partners in integrative and comparative biology." Dr. Phillips also developed a symposium for the June 2017 meeting of the American Society of Mammalogists entitled "Genomic consequences to consequential questions in mammalogy."

**Robert Bradley** was invited by Ulyses Pardiñas of Centro Nacional Patagónico, Puerto Madryn, Argentina, to author 140 species accounts for the Family Cricetidae (rodents) in *Handbook of the Mammals of the World*. **Nicté Ordoñez-**

**Garza** and **Lisa Bradley** assisted with the maps and the bibliographies, respectively, for the accounts.

The NSRL was featured in two online news articles by *Texas Tech Today* this spring. [Texas Tech's NSRL: Where the Wild Things Are](#) and [Bats and Rats: A Deeper Look into Research at the NSRL](#) provided an overview of the NSRL's collections and highlighted several of the current research endeavors by NSRL associates. *Texas Tech Today* also produced a "Discover Texas Tech" [video](#) about the NSRL.

**Richard Stevens** participated as a taxonomic expert to the creation of the IUCN Red List of Mammals of Paraguay.

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

- Baker, R.J., B. Dickins, J.K. Wickliffe, F.A. Khan, S. Gaschak, K. Makova, and C.D. Phillips (in press). Elevated mitochondrial genome variation after 50 generations of radiation exposure in a wild rodent. *Evolutionary Applications*.
- Bradley, R.D., N. Ordóñez-Garza, G. Ceballos, D.S. Rogers, and D.J. Schmidly. 2017. A new species in the *Peromyscus boylii* species group (Cricetidae: Neotominae) from Michoacán, Mexico. *Journal of Mammalogy* 98:154–165.
- Brandao, M.V., Y. O. Salgueiro, and J. Salazar-Bravo. 2017. The first record of *Calomys hummelincki* (Rodentia: Sigmodontinae) from the Lavrados of northern Brazil. *Therya* 8:67–70
- Collins, S.D., and N.E. McIntyre. 2017. Extreme loss of diversity of riverine dragonflies in the northeastern U.S. is predicted in the face of climate change. *Bulletin of American Odonatology* 12(2):7–19.
- Drake, J.C., K. Griffis-Kyle, and N.E. McIntyre. 2017. Using nested connectivity models to resolve management conflicts of isolated water networks in the Sonoran Desert. *Ecosphere* 8(1):e01652.
- Dunn, C.D., M.R. Mauldin, M.E. Wagley, J.E. Wilkinson, C.D. Phillips, and R.D. Bradley. 2017. Genetic diversity and the possible origin of contemporary elk (*Cervus canadensis*) populations in Texas. *Occasional Papers, Museum of Texas Tech University* 350:1–15.
- Elias, N.-A., R. Hashim, and T. Kingston. 2017. Resource availability and roosting ecology shape reproductive phenology of rainforest insectivorous bats. *Biotropica* 49:382–394. doi 10.1111/btp.12430.
- Fisher-Phelps, M., G. Cao, R. Wilson, and T. Kingston. 2017. Protecting bias: Across time and ecology, open-source bat locality data are heavily biased by distance to protected area. *Ecological Informatics* 40:22–34. <https://doi.org/10.1016/j.ecoinf.2017.05.003>.
- Frick, W.F., E.F. Baerwald, J.F. Pollock, R.M.R. Barclay, S.C. Loeb, R.A. Medellin, J.F. Pollock, J.A. Szymanski, A.L. Russell, T.J. Weller, and L.P. McGuire. 2017. Fatalities at wind turbines may threaten population viability of a migratory bat. *Biological Conservation* 209:172–177.
- Jayat, P., G. D'Elía, R. Torres, S. Pacheco, P. Ortiz, J. Salazar-Bravo, and B.D Patterson. 2017. Integration of morphological, ecological, and genetic evidence suggests that the genus *Andinomys* (Rodentia, Cricetidae) is monospecific. *Journal of Mammalogy* 98:1060–1077
- Kushak, R.I., H.S. Winter, T.M. Buie, S.B. Cox, C.D. Phillips, and N.L. Ward. 2017. Analysis of the duodenal microbiome in autistic individuals: Associations with carbohydrate digestions. *Journal of Pediatric Gastroenterology & Nutrition* 64:e110–e116.
- Larsen, R. J., P.A. Larsen, C.D. Phillips, H.H. Genoways, G.G. Kwiecinski, S.C. Pedersen, C.J. Phillips, and R.J. Baker. 2017. Patterns of morphological and molecular evolution in the Antillean Tree Bat, *Ardops nichollsi* (Chiroptera: Phyllostomidae). *Occasional Papers, Museum of Texas Tech University* 345:1–28.
- Phillips, C.D., J.D. Hanson, J. Wilkinson, L. Koenig, E. Rees, P. Webala, and T. Kingston (in press). Microbiome structural and functional interactions across host dietary niche space. *Integrative and Comparative Biology*. <https://doi.org/10.1093/icb/ix011>
- Rowan, N.R., E.W. Wang, A. Kanaan, N. Sahu, J.V. Williams, C.D. Phillips, and S.E Lee. 2017. Respiratory viral detection in the paranasal sinuses of patients with cystic fibrosis. *American Journal of Rhinology and Allergy* 32:105–108.
- Ruedas, L., S. Marques Silva, J. H. French, R. Platt II, J. Salazar-Bravo, J.M. Mora, and C.W. Thompson. 2017. A prolegomenon to the systematics of the South American cottontail rabbits (Mammalia, Lagomorpha, Leporidae: *Sylvilagus*): Designation of a neotype for *S. brasiliensis* (Linnaeus, 1758), and restoration of *S. andinus* (Thomas, 1897) and *S. tapetillus* Thomas, 1913. *Miscellaneous Publication, Museum of Zoology, University of Michigan* 205:i–iv+1–67 pp.
- Stevens, R.D., C.J. Garcia, E. Bohlender, and B. Gregory. 2017. Distributional update for bats of Louisiana. *Occasional Papers, Museum of Texas Tech University* 348:1–12.
- Tipton, C., M. Mathew, R. Wolcott, R. Walcott, T. Kingston, and C. Phillips. 2017. Temporal dynamics of relative abundances in chronic wound bacterial communities. *Wound Repair and Regeneration*. <https://doi.org/10.1111/wrr.12555>
- Vincenot, C., V. Florens, and T. Kingston. 2017. Can we protect island flying foxes? *Science* 355(6332):1368–1370.
- Yeong-Seok, J., R.D. Stevens and J.T. Baccus. (in press). Peninsula effect and species richness gradient for terrestrial mammals in Korea. *Mammal Review*.

## NSRL FACULTY 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 is currently directing 2 PhD and 4 MS students. He has graduated 19 MS, 2 MA, and 11 PhD students, and he has published 1 book and 166 peer-reviewed articles.

[robert.bradley@ttu.edu](mailto:robert.bradley@ttu.edu)



**Dr. Nancy McIntyre** is the NSRL 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 is currently advising or co-advising 1 MS, 2 PhD, and 1 undergraduate students.

[nancy.mcintyre@ttu.edu](mailto:nancy.mcintyre@ttu.edu)



**Dr. Caleb D. Phillips** is the Curator of Genetic Resources of the NSRL and an Assistant 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 is currently advising 3 PhD, 1 MS, and 1 undergraduate students.

[caleb.phillips@ttu.edu](mailto:caleb.phillips@ttu.edu)

## NSRL CURATORIAL AND SUPPORT STAFF



**Heath Garner** is the NSRL Curator of Collections. His role is to facilitate the daily operations and maintenance of the NSRL collections. His duties include specimen processing, cataloging, and tracking, loan processing, student worker and volunteer training and supervision, documentation, and collections preventative conservation.

[heath.garner@ttu.edu](mailto:heath.garner@ttu.edu)



**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 maintaining the NSRL website, assisting with specimen tracking in the collections, and data management and design.

[kathy.macdonald@ttu.edu](mailto:kathy.macdonald@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 published by NSRL staff, the preparation of grant proposals, and the development of NSRL exhibits for the Museum.

[lisa.bradley@ttu.edu](mailto:lisa.bradley@ttu.edu)

The position of **Curator of Invertebrate Zoology** is currently vacant. Due to a state-mandated hiring freeze and a subsequent budget cut, we unfortunately are unable to fill this position at this time. The Invertebrate Zoology Collection therefore is temporarily closed, and we are unable to accept research requests, collection visits, or donations of new material. Current NSRL staff are maintaining the collection. We hope to resolve these funding issues and fill this position in the near future.

## 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 134,852 cataloged specimens of an estimated 1,441 species. Specimen preparation types include preserved skins, skeletal materials, alcohol-preserved specimens, and taxidermy mounts. From January through June 2017, the Mammal Collection cataloged 5,676 specimens and granted 9 loans of 199 specimens.

### Bird Collection



The Bird Collection currently contains 5,523 cataloged bird specimens, as well as eggs and nests, of approximately 890 species. From January through June 2017, the Bird Collection cataloged 5 new specimens and granted 7 loans totaling 190 specimens.

### Invertebrate Zoology Collection



The Invertebrate Zoology Collection contains an estimated 4.5 million specimens. These include insects, crustacea, endo- and ecto-parasites, and arachnids. Specimen preservation methods include dried, fluid (ethanol or formalin), slide-mounted, and frozen.

### Genetic Resources Collection



The Genetic Resources Collection contains >370,000 samples of tissues, blood, and extracted DNA from >100,000 specimens of mammals and other taxa. From January through June 2017, the GRC granted 17 loans totaling 705 samples. The Collection incorporated 6,828 new samples obtained from 1,165 individuals.

As a whole, the NSRL hosted 289 visitors and volunteers from January through June, including researchers utilizing the collections, students taking classes, individuals and groups on tours, and volunteers prepping specimens. The NSRL also filled 64 data requests by researchers. Twenty-one students (16 graduate, 5 undergraduate) and 2 post-graduates were employed by the NSRL during all or part of the January through June time period.

## FACULTY AND STAFF GRANTS (active January–June 2017)

**Bradley, R.D.** “Natural History: Development of a liquid nitrogen system for the Genetic Resources Collection, Natural Science Research Laboratory, Museum of Texas Tech University”. NSF (Collections in Support of Biological Research).

Conway, W., **R.D. Bradley**, **C.D. Phillips**, and S. Cunningham. “Status of the bighorn sheep in Texas: translocation history, disease risk potential, and establishment of archival tissue collection for range-wide disease surveillance.” Wild Sheep Foundation and Texas Bighorn Society.

Griffis-Kyle, K., and **N.E. McIntyre**. “Synergistic links between ecological traps and climate change in metapopulation dynamics: The keystone role of arid wetlands.” Texas Tech University Proposal Support Program.

Griffis-Kyle, K.L., and **N.E. McIntyre**. “Assessment of landscape conservation success for non-target species at risk.” Western Association of Fish & Wildlife Agencies - Grassland Initiative.

Hoffmann, F., and **D. Ray**. “piRNA dynamics in the absence of active TEs.” National Science Foundation.

Johnson, E., and **R.D. Bradley**. “From the African Savannah to the North American Grassland - an Up From the Basement exhibit.” Helen Jones Foundation.

Johnson, J.S., **L.P. McGuire**, and M. Scafani. “Phenology of northern myotis (*Myotis septentrionalis*) autumn migration in western Pennsylvania.” Pennsylvania Department of Conservation and Natural Resources.

**Kingston, T.**, M. Farmer, R. Verble, S. Fritts. “IRES: Sustainable Development of a Tropical Agroforestry Program in the Rural Borneo Highlands.” National Science Foundation.

**Kingston, T.** “Southeast Asian Bat Conservation Research Unit.” National Science Foundation-Research Coordination Networks.

Longing, S., R. Cox, **N.E. McIntyre**, C. McKenney, and C. West. “Demonstration of pollinator conservation practices and a framework for regional implementation on the Southern High Plains.” USDA Natural Resources Conservation Service - Conservation Innovation Grants.

**McGuire, L.P.** “Bat migration across Lake Erie: Implications for offshore wind energy development.” Pennsylvania Department of Environmental Protection, Coastal Zone Management Program.

**McIntyre, N.E.**, and K. Hayhoe. “Collaborative proposal: Climatic and anthropogenic forcing of wetland landscape connectivity in the Great Plains.” NSF-Macrosystems Biology.

Morgan, G., and **R.D. Bradley**. “West Texas Garden (Stage 1): A landscaped learning experience.” The CH Foundation.

Morgan, G., E. Johnson, and **R.D. Bradley**. “Biodiversity of the Llano Estacado.” The Helen Jones Foundation.

Olson, S.H., **L.P. McGuire**, R.K. Plowright, D.T.S. Hayman, B.G. Dickson, C.L. Lausen. “Assessing white-nose syndrome in the context of nonstationary conditions in an advancing continental epidemic.” Department of Defense, Strategic Environmental Research and Development Program.

Plowright, R.K., O. Restif, **L.P. McGuire**, N. Bharti, E. Shanahan, P. Eby, M. Taylor, H. McCallum, and A. Peel. “Dynamics of zoonotic systems: human-bat-pathogen interactions.” National Science Foundation, Dynamics of Coupled Natural and Human Systems.

**Ray, D.**, and **R.D. Stevens**. “Comparing genetic diversity of the threatened northern long-eared bat across their range using whole-genome and RADSeq approaches.” USDA Forest Service.

**Ray, D.**, **R.D. Stevens**, and **R.D. Bradley**. “Population and conservation status of Texas pocket gophers (*Geomys* and *Thomomys*) in Texas with a focus on the subspecific status of *Thomomys bottae* via populations genomic tools.” Texas Parks and Wildlife Department.

Rico-Cernohorska, A., **J. Salazar-Bravo**, et al. “Generación de fortalezas para la determinación de enfermedades zoonóticas en el norte de La Paz (PBE4 - Phase II).” Proyectos Concursables De Investigacion E Interaccion Social (IDH), Bolivia.

**Stevens, R.D.** “Habitat affinities and day roost characteristics of the northern long-eared bat (*Myotis septentrionalis*) in Louisiana,” USFWS/Louisiana Department of Wildlife and Fisheries.

## FACULTY AND STAFF GRANTS (continued)

**Stevens, R.D.** “Winter day-roost characteristics of the northern long-eared bat (*Myotis septentrionalis*) in Louisiana.” U.S. Forest Service.

**Stevens, R.D.**, and M. Barnes. “White-nose Syndrome (WNS) Surveillance in Louisiana.” USFWS/Louisiana Department of Wildlife and Fisheries.

**Stevens R.D.** and S. Fritts. “Fort Wolters Bat Surveys”, Texas Army National Guard.

**Stevens, R.D.** and S. Fritts. “Camp Maxey herpetofauna surveys.” Texas Military Department.

**Stevens, R.D., D. Ray, R.N. Platt, and R.D. Bradley.** “RFP No. 209f for Endangered Species Research Projects for the Texas Kangaroo Rat.” Texas State Comptroller.

## Collections Activities: Maintaining the Fluid Collection

Maintaining a fluid-preserved natural history collection has its challenges, including making sure specimens are completely submerged in preservation liquid and that the preservation liquid is of the correct concentration and pH level. When fluid levels in a jar decline, the container must be “topped off” with a higher concentration of the preservation fluid to bring it back to normal levels or, if the quality of the fluid is inadequate, it must be replaced.

To refill or replace the preservation fluid in the NSRL’s fluid collection, the fluid type within each specimen container must first be known. Since 1995 to date, the standard has been to store specimens in 70% ethanol, but anecdotally, we know this has not always been the case. Specimens collected prior to 1985 tend to be preserved in isopropyl alcohol, but this practice, too, has been inconsistent. Historically, through the use of adhesive labels and detailed “wash” records, the NSRL has attempted to record fluid type for some of the specimen jars, but some labels have fallen off and in many cases the records are too few and outdated to be useful.

This fall, the NSRL staff will be expanding on a test project established this spring to assess the NSRL’s entire vertebrate fluid collection. We will be recording the fluid level of each jar, testing the pH level, determining the preservation fluid and its concentration, and then topping off those containers in need of additional fluid. The plan is to prioritize those specimens whose fluid levels are low, and then expand the process to the entire collection.

## STUDENT GRANTS AND RESEARCH AWARDS

**Jeff Clerc.** Graduate student (Liam McGuire). TTU Association of Biologists, Grants in Aid; Animal Behavior Society, Student Research Award; American Society of Mammalogists, Grants in Aid of Research.

**Lucas Heintzman.** Graduate student (Nancy McIntyre). Elo and Olga Urbanovsky Assistantship; TTU Water Conservation Research Scholarship; TTU Graduate Student Research Support Award.

**Macy Madden.** Graduate student (Tigga Kingston). TTU AT&T Chancellor’s Graduate Fellowship; Travel Grant, TTU Association of Biologists.

**Benneth Obitte.** Graduate student (Tigga Kingston). Bat Conservation International, Student Research Scholarship.

**Christina Rios-Blanco.** Graduate student (Richard Stevens). TTU Association of Biologists, Grants in Aid.

**Elizabeth Rogers.** Graduate student (Liam McGuire). TTU Graduate Student Research Support Award; TTU Association of Biologists, Grants in Aid.

**Amie Sommers.** Graduate student (Liam McGuire). TTU Association of Biologists, Grants in Aid.

**John Stuhler.** Graduate student (Richard Stevens). American Society of Mammalogists, Grants in Aid of Research; TTU Association of Biologists, Grants in Aid.

**Iroro Tanshi.** Graduate student (Tigga Kingston). Bat Conservation International, Student Research Fellowship; Michelle Knapp Memorial Graduate Research Award, Biological Sciences, Texas Tech University; Bat Conservation International Women in Conservation Science Award; IDEAWILD Equipment grant.



Using a density meter to determine the ethanol concentration of fluid.



Updated spun-bound polyester labels listing specimens in jar and fluid type.

## 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 both the Museum Publications Policy and the Guidelines and Procedures for Authors, available at our website, [www.nsrl.ttu.edu/publications](http://www.nsrl.ttu.edu/publications), for more information.

Lisa Bradley serves as the Production Editor for both series. Our goal is to produce 10–12 Occasional Papers and 1–2 Special Publications per year. 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 January–June 2017:

**Occasional Paper 345.** Patterns of morphological and molecular evolution in the Antillean Tree Bat, *Ardops nichollsi* (Chiroptera: Phyllostomidae). Roxanne J. Larsen, Peter A. Larsen, Caleb D. Phillips, Hugh H. Genoways, Gary G. Kwiecinski, Scott C. Pedersen, Carleton J. Phillips, and Robert J. Baker.

**Occasional Paper 346.** Recurrence of the Spotted Bat (*Euderma maculatum*) at historical sites in New Mexico, with notes on natural history. Keith Geluso.

View and download Occasional Papers and Special Publications at the NSRL website:

[www.nsrl.ttu.edu/publications](http://www.nsrl.ttu.edu/publications)

## UNDERGRADUATE RESEARCH

During January–June 2017, 20 undergraduate students were conducting research under the direction of 7 NSRL faculty associates.



Undergraduate students Bruno Sabila-Helmer, Katharine Brackman, and Lucas Schilder show off some bird specimens they prepared during Nancy McIntyre's Ornithology class.

## FACULTY AWARDS

**Caleb Phillips** received the Mortar Board and Omicron Delta Kappa Faculty Recognition Award for Teaching.

**Robert Bradley** received the 2017 Champion of Women in Science award from the West Texas Association for Women in STEAM.



Robert Bradley with current and former students, including the 7 female graduate and undergraduate students who nominated him for the Champion of Women award.

# NSRL Mammal Collection Receives Renewed Accreditation

In April, the Systematic Collections Committee of the American Society of Mammalogists (ASM) reviewed the mammal collection of the Natural Science Research Laboratory as part of the Society's accreditation process. The NSRL is pleased to report that the mammal collection has been re-accredited by this prestigious society. The mammal collection of the NSRL was originally accredited by ASM in 1975, and has maintained that accreditation throughout the decades. The accreditation process ensures that the NSRL is following the standards and policies set forth by the ASM.

The NSRL's mammal collection currently contains more than 135,000 catalogued specimens of more than 1,400 unique species. Specimen preparation types include preserved skins, skeletal materials, alcohol-preserved specimens, taxidermy mounts, and associated tissue samples for most specimens. These archived specimens, and associated tissues and data, are used by researchers throughout the U.S. and internationally for studies of the world's mammalian biodiversity and the impacts of natural evolutionary processes, geographic isolation, diseases and parasites, habitat loss, climate change, pollution, and more.

The American Society of Mammalogists was established in 1919 for the purpose of promoting interest in the study of mammals. The Systematic Collections Committee of ASM was formed in 1972 as an outgrowth of an ad hoc committee formed at the request of the National Science Foundation. The Systematic Collections Committee serves ASM by handling all matters that come before the society related to systematic collections of mammals. Its responsibilities include: advising curators worldwide in matters relating to collections administration, curation, and accreditation; maintaining a directory of mammal collections and conducting a survey of existing collections approximately once each decade; maintaining a list of curatorial standards for mammal collections; and managing a collection-accreditation program under the auspices of the Society.

Receiving and maintaining accreditation from ASM is a significant accomplishment for a mammal collection. The NSRL is proud of its history of being recognized by ASM for upholding high standards of collections management and curatorial practices.



**American Society of Mammalogists**

ROBERT D. BRADLEY, President  
Department of Biology  
University of Maryland, Life Road  
Lithia Park, MD 21720  
(301) 326-7200  
Email: rbradley@um.edu

DEBORAH A. BELL, President-Elect  
Department of Wildlife, PUA, &  
Conservation Biology  
University of Colorado  
Duran, CO 80518  
(303) 756-6881  
Email: deba@colorado.edu

FRISKA A. BARTY, Vice-President  
Department of Biology  
University of New Orleans  
Lakecharrier, LA 70111  
(504) 777-4222  
Email: bartf@uno.edu



DAVID C. LAMBERG, Recording Secretary  
Department of Zoology and Physiology  
University of Wyoming - Corral  
Cheyenne, WY 82021  
(307) 486-2622  
Email: lamberg@uwyo.edu

MATTHEW E. HIGHTON, Secretary-Treasurer  
U.S. Environmental Protection Agency  
Office of Research and Development  
2215 R Street, Suite 600  
Columbus, OH 43260  
(614) 367-7114  
Email: mhighton@epa.gov

PAUL S. STAPP, Publications Director  
Department of Biological Science  
California State University, Fullerton  
Fullerton, CA 92731  
(714) 271-2542  
Email: pstapp@csufullerton.edu

9 August 2017

Dr. Robert D. Bradley, Director  
Natural Science Research Laboratory  
Museum of Texas Tech University  
Lubbock, TX 79409

Dear Dr. Bradley:

It is with great pleasure that I write to confirm that the Collection of Mammals of the Natural Science Research Laboratory of the Museum of Texas Tech University has been fully reaccredited by the American Society of Mammalogists (ASM) as of July, 2017. Texas Tech University is one of 51 institutions in the United States, Canada, Mexico, and Ecuador that meet the curatorial standards set by the Systematic Collections Committee of the Society. Dr. Thomas Lee, Jr. and I, representing the Committee during our site visit, were impressed with the facilities and staff that care for the collection. You and the other curators were especially helpful in gathering information for the committee and arranging the site visit. I have enclosed the committee's report with this letter. An accreditation certificate from the Society will follow. The President of the American Society of Mammalogists, I and the other members of our committee send our hearty congratulations for this achievement.

With best regards,



Robert C. Dowler  
Chair, Systematic Collections Committee  
American Society of Mammalogists

Copy: Gary Morgan, Caleb Phillips, Heath Garner, Robert Sikus



## MAY 2017 GRADUATES

**Narayan Kandel, Ph.D.** Chair: Jorge Salazar-Bravo. Dissertation title: Coalescence time of New World Mammarenavirus, population expansion and species delimitation in reservoir rodent host. Current position: Assistant Professor of Biology, Wiley College, Marshall, Texas.

**Daniela Arenas-Viveros, M.S.** Chair: Jorge Salazar-Bravo. Thesis title: Speciation processes in the Sigmodontine: The genus *Akodon* as a first approximation. Current position: PhD student, Texas Tech University.

**Luke Rankin, M.S.** Chair: Jorge Salazar-Bravo. Non-thesis. Currently seeking employment.

## STUDENT PROFILES



**James Q. Francis**, M.S. student, Department of Biological Sciences. Advisor: Robert D. Bradley.

I have always been interested in mammalian evolution and taxonomy, and those interests have manifested into a thesis project researching the phylogenetics of *Peromyscus maniculatus*. I am trying to understand how variation at the genetic level corresponds to phenotypic differences in multiple populations of this widely distributed species. Identifying genetic variation can provide shed insight on how populations of this species can adapt and thrive in a wide variety of ecosystems.



**Laramie Lindsey**, Ph.D. student, Department of Biological Sciences. Advisor: Robert D. Bradley.

I am implementing transcriptomics in determining putative testes-specific genes that have reproductive functions and may have played a role in the speciation of *Peromyscus*. The next step of my dissertation research will utilize exomic methodologies so that I can broaden my sampling scheme to include taxa for which frozen tissues are not available to natural history collections. I will sample across the whole *Peromyscus* phylogeny and compare the exomic dataset to the current proposed *Peromyscus* species tree.



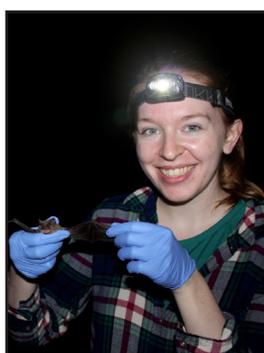
**Macy Madden**, Ph.D. student, Department of Biological Sciences. Advisor: Tigga Kingston.

My current research focuses on understanding the bat-baobab pollination network in Kenya. Baobab trees have chiropterophilous flowers, or flowers designed for bats, but introduced food items for bats such as mangoes and pawpaw may distract bats from their pollinator role; instead of visiting baobabs, bats visit these high reward, fruiting trees. Fewer pollinator visitations potentially leads to less fruit production, possibly impacting long term survival of the baobabs and those people and animals that rely on baobabs. My research questions incorporate components of animal behavior, landscape ecology, and human modified landscapes to inform how vital interactions might be maintained within a changing environment.



**Emma Roberts**, Ph.D. student, Department of Biological Sciences. Advisor: Robert D. Bradley.

My dissertation focuses on the molecular evolution of a reproductive protein called zonadhesin and the role of egg-sperm fusion proteins in isolation mechanisms in mammals. I am examining pairs of species that are known to hybridize, including pocket gophers from the genus *Geomys*, wood rats from the genus *Neotoma*, and ground squirrels from the genus *Ictodomys* to determine if zonadhesin is functioning as a reproductive isolation barrier to gene flow. My future career interests involve the evolution of both pre- and post-mating reproductive isolation in various species of mammals.



**Beth Rogers**, M.S. student, Department of Biological Sciences. Advisor: Liam McGuire.

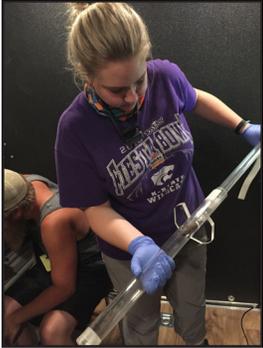
My research interests are broadly based in physiological ecology, and the ways animals respond physiologically to energetically challenging circumstances and environmental changes. I'm currently exploring these questions in my work studying flexibility in metabolic fuel use and storage in the Brazilian free-tailed bat (*Tadarida brasiliensis*) during the breeding season. Specifically, I'm examining variation in body composition and lipid oxidative capacity throughout the summer to address how this species achieves energy balance during reproduction and associated migratory periods. This research will help to fill the knowledge gap about how organisms can use phenotypic flexibility to cope with fluctuating energetic demands, and will contribute to our knowledge on the life-histories of migratory bat species.

## STUDENT PROFILES (CONT.)



**Oscar Sandate**, M.S. student, Department of Biological Sciences. Advisor: Caleb Phillips.

My current research primarily focuses on better understanding the relationships between mammalian hosts and the gut-microbiome throughout the course of pregnancy and lactation. Using bats as our study system because of their unique physiological qualities, we assess changes in bacterial community composition along with bacterial community variation and how they in turn affect microbiome functionality and efficiency throughout gestation. My research aims to characterize microbiomes across pregnancy and to provide a more thorough understanding of the host-microbiome relationship during the reproductive period.



**Amie Sommers**, M.S. student, Department of Biological Sciences. Advisor: Liam McGuire.

I am currently studying phenotypic flexibility in response to variation in energetic demand. The goal of my study is to understand the impacts of intrinsic and extrinsic energy demand on organisms, and how an increasingly demanding environment may further necessitate a phenotypic response beyond what is required by intrinsic demands.



**Taylor Soniat**, M.S. student, Department of Biological Sciences. Advisor: Robert D. Bradley.

My thesis research involves an investigation of the quality of DNA, relative to length of archival time that can be obtained from frozen tissues associated with natural history collections. The scope of this project includes a window of time from 30 years ago to present. Further, I am examining the effects of different archival conditions (mechanical vs. liquid nitrogen freezers) to determine which is most effective at preserving biological material over extended time frames.



**Iroro Tanshi**, Ph.D. student, Department of Biological Sciences. Advisor: Tigga Kingston.

My research is focused on uncovering the deterministic drivers of species richness pattern and non-random structure of forest interior insectivorous bat ensembles along elevational gradients in the Cameroon/Nigerian mountain range. Despite being in the middle of Africa's largest bat biodiversity hotspot, this area was hitherto unstudied. Now with support from the Natural Research Science Laboratory, Bat Conservation International and the Rufford Foundation, my research has allowed us to explore the bat diversity of this biodiversity hotspot by conducting three field visits in the period 2015–2017, leading to new country and elevational range records.



**Emily Wright**, M.S. student, Department of Biological Sciences. Advisor: Robert D. Bradley.

Currently, I am examining mechanisms that allow hybridization between White-tailed Deer (*Odocoileus virginianus*) and Mule Deer (*Odocoileus hemionus*). Both species of deer are known to hybridize along the edges of the Llano Estacado and in the Trans-Pecos region. Additionally, I'm exploring the role that zonadhesin (ZAN) plays in post-mating isolation. It is thought that ZAN is a possible isolating mechanism between closely related species by controlling gamete binding across species boundaries. I plan to pursue a Ph.D. in Marine Biology.

## STUDENT PRESENTATIONS AND AWARDS

During the period January through June 2017, at least 19 graduate students, 3 undergraduate students, and 1 post-doctoral associate gave 22 oral and 10 poster presentations of their research at 8 local, regional, and national conferences and society meetings. Five students won 6 awards for their presentations:

**Laramie Lindsey.** Graduate student. Second Place, Oral, Evolutionary Biology, 8th Texas Tech Annual Biological Sciences Symposium; TSM Award, Texas Society of Mammalogists.

**Oscar Sandate.** Graduate Student. Clyde Jones Award, Poster, Texas Society of student.

**Taylor Soniat.** Graduate student. First Place, Oral, Museum Science, 8th Texas Tech Annual Biological Sciences Symposium.

**John Stuhler.** Graduate student. William B. Davis Award, Oral, Texas Society of Mammalogists.

**Whitney Watson.** Undergraduate student. Second Place, Oral, Undergraduates, 8th Texas Tech Annual Biological Sciences Symposium.



*Whitney Watson, Taylor Soniat, and Laramie Lindsey won awards for their presentations at the 8th Texas Tech Annual Biological Sciences Symposium.*



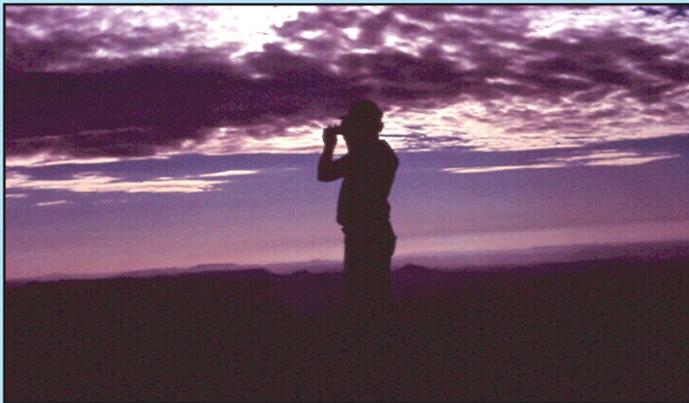
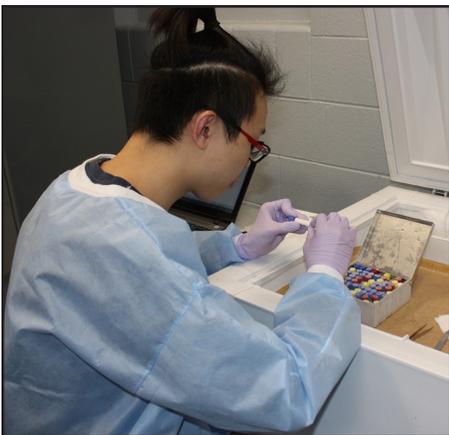
*Left to right: Laramie Lindsey, Oscar Sandate, and John Stuhler won awards for their presentations at the annual meeting of the Texas Society of Mammalogists.*

# Update: Status of the Liquid Nitrogen Conversion Project

In 2014, Dr. Robert D. Bradley (Director of the NSRL) and Dr. Robert J. Baker (Former Director of the NSRL, now retired) submitted a proposal to the Collections in Support of Biological Research program of the National Science Foundation (NSF) to transfer the frozen tissues of the Genetic Resources Collection (GRC) from mechanical  $-80^{\circ}\text{C}$  freezers to vapor-phase liquid nitrogen freezers in order to ensure the collection's long-term preservation and availability for scientific research. That proposal was fully funded by NSF, with a start date of September 2015. However, renovations of the space delayed installation and activation of the liquid nitrogen system until January 2016, thus postponing full implementation of processing and transfer efforts.

Each frozen sample must be processed, as needed, before being transferred to its permanent location in the liquid nitrogen freezers. Processing of samples involves assigning barcodes and affixing barcode labels, relabeling caps, rehousing the samples in new steel boxes, labeling the boxes, and updating the inventory of sample locations. Continued growth of the collection, as well as the day-to-day management of the collection (e.g., the processing of loans), have affected the rate at which the processing and transfer of the older samples has been accomplished. To date, staff and students have completed the transfer of more than 135,000 samples to liquid nitrogen, including the entire Radioactive Collection of 14,330 samples. Another 22,000 samples have been prepared for transfer. The goal is to complete the transfer of all samples that are suitable for liquid nitrogen vapor storage by 1 September 2018.

To date, the grant has funded five Museum Science and four Biological Science students who have received hands-on curatorial and collections management experience while contributing more than 4,600 hours of effort toward this project. This fall, the GRC will train two new Museum Science students to assist with the completion of this project.



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

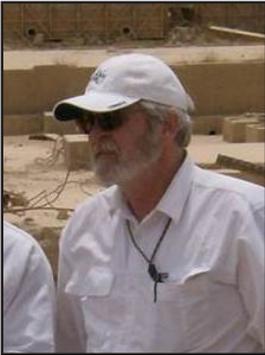
## A Message to Prospective Students:

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.

## TTU FACULTY ASSOCIATES OF THE NATURAL SCIENCE RESEARCH LABORATORY

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. Ron Chesser** is a Professor of Biological Sciences. His research program focuses on assessing radioactive contamination, reconstructing flow of radioactive materials into the environment, and modeling the impacts and recovery of mammal populations affected by radiation. He has conducted research at Chernobyl, Ukraine, since 1992. He worked in Iraq for eight years (2005–2013) dismantling the former nuclear infrastructure, and he has contracted with the US Department of State, Department of Energy, International Atomic Energy Agency, Great Britain Ministry of Industry, US Civilian Research & Development Foundation, and the European Commission.

[ron.chesser@ttu.edu](mailto:ron.chesser@ttu.edu)

<http://www.faculty.biol.ttu.edu/chesser/homepage/>



**Dr. Warren Conway** is the Bricker Endowed Chair in Wildlife Management within the Department of Natural Resources Management. He and his students are involved in a variety of research projects in Texas, New Mexico, and Oklahoma with common themes of wildlife-habitat relationships, population and community dynamics, population management, restoration, and conservation, and toxicology and disease prevalence. Current projects include mule deer and pronghorn survival and habitat selection; urban mesocarnivore community ecology; elk response to prescribed fire and thinning; wildlife genetics; and disease and toxicology of populations of bighorn sheep, axis deer, and American woodcock.

[warren.conway@ttu.edu](mailto:warren.conway@ttu.edu)

[https://www.depts.ttu.edu/nrm/people/faculty/faculty\\_pages/warrenconway/conway.php](https://www.depts.ttu.edu/nrm/people/faculty/faculty_pages/warrenconway/conway.php)



**Dr. Tigga Kingston** is an Associate Professor of Biological Sciences. Her research and activities are dedicated to the conservation ecology of Palearctic 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.

[tigga.kingston@ttu.edu](mailto:tigga.kingston@ttu.edu)

<http://kingstonlab.org/>



**Dr. Liam McGuire** is an Assistant Professor of Biological Sciences. His research focuses on the ecology and physiology of bats and birds in situations of energy limitation (e.g., migration, hibernation) and the strategies these animals use to cope with environmental variation, often in the context of conservation issues. He takes an integrative approach using techniques ranging from molecular biology and biochemistry, to whole animal physiology, behavioral and movement ecology. Current research foci include the physiological ecology of bat migration, and the physiological ecology and pathophysiology of hibernating bats affected by white-nose syndrome, a devastating fungal disease responsible for killing millions of North American bats.

[liam.mcguire@ttu.edu](mailto:liam.mcguire@ttu.edu)

<https://www.depts.ttu.edu/biology/people/Faculty/McGuire/>



**Dr. David A. Ray** is an Associate 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.4.ray@gmail.com](mailto:david.4.ray@gmail.com)  
<http://www.davidraylab.com/>



**Dr. Brenda Rodgers** is an Associate Professor of Biological Sciences. Her research centers on the impacts of radiation on small mammals, mechanisms of adaptation to low dose radiation in pregnant females and fetuses, and human health issues in contaminated environments. She has worked on mammal population impacts at Chernobyl, Ukraine, since 1997. She worked for eight years in Iraq evaluating human impacts in contaminated regions and training scientists on laboratory practices, and she has contracted with the US Department of Energy (Low-dose Program), US Department of State, and the Civilian Research & Development Foundation.

[brenda.rodgers@ttu.edu](mailto:brenda.rodgers@ttu.edu)  
<http://www.depts.ttu.edu/biology/people/Faculty/Rodgers/>



**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.

[j.salazar-bravo@ttu.edu](mailto:j.salazar-bravo@ttu.edu)  
<http://www.depts.ttu.edu/biology/people/Faculty/Salazar-Bravo/>



**Dr. Richard Stevens** is an Associate 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. They also conduct morphometric studies to try to better understand the relationship between form and function in bats as well as how phenotypic variation contributes to large-scale patterns of biodiversity.

[richard.stevens@ttu.edu](mailto:richard.stevens@ttu.edu)  
<http://www.myweb.ttu.edu/richstev/>



## PLEASE SUPPORT THE NSRL

Dear Former Students, Colleagues, and Friends:

In 2015, a fund-raising initiative for the NSRL was established. The NSRL Fund for Excellence is designed to help support the many collections activities of the NSRL. Our goal is to use these funds to establish a student curatorial position. This position would enable the NSRL to improve curatorial and collection management activities, as well as help support students with a professional interest in natural history collections. As this fund grows, we envision that we will be able to financially support multiple students.

Your contribution to the Natural Science Research Laboratory Fund for Excellence is very important to the future of the NSRL. With limited, and often declining, funding from state and federal sources, the NSRL needs your help to ensure our continued service to the academic and scientific communities. We appreciate your consideration in giving a tax deductible donation in support of the NSRL's operations and research. Many of you benefited from the resources provided by the NSRL, now we ask that you help the NSRL continue its quest to be among the premier natural history collections in the world.

Donations to the NSRL Fund for Excellence may be made through the Texas Tech Foundation, Inc. To donate by check, please make the check payable to Texas Tech Foundation, designate NSRL Fund for Excellence on the memo line, and mail to: Texas Tech University System, Financial Services, Box 45025, Lubbock, TX, 79409-5025. To give by phone, call toll free: 1-866-448-3888. To donate online, visit the website of TTU Institutional Advancement at <http://donate.give2tech.com/> and enter Natural Science Research Laboratory Fund for Excellence in the search box.

**YOUR SUPPORT IS APPRECIATED! THANK YOU!**

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

[lisa.bradley@ttu.edu](mailto:lisa.bradley@ttu.edu)

806-834-4732

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



NATURAL SCIENCE  
RESEARCH LABORATORY

at the Museum of Texas Tech University

