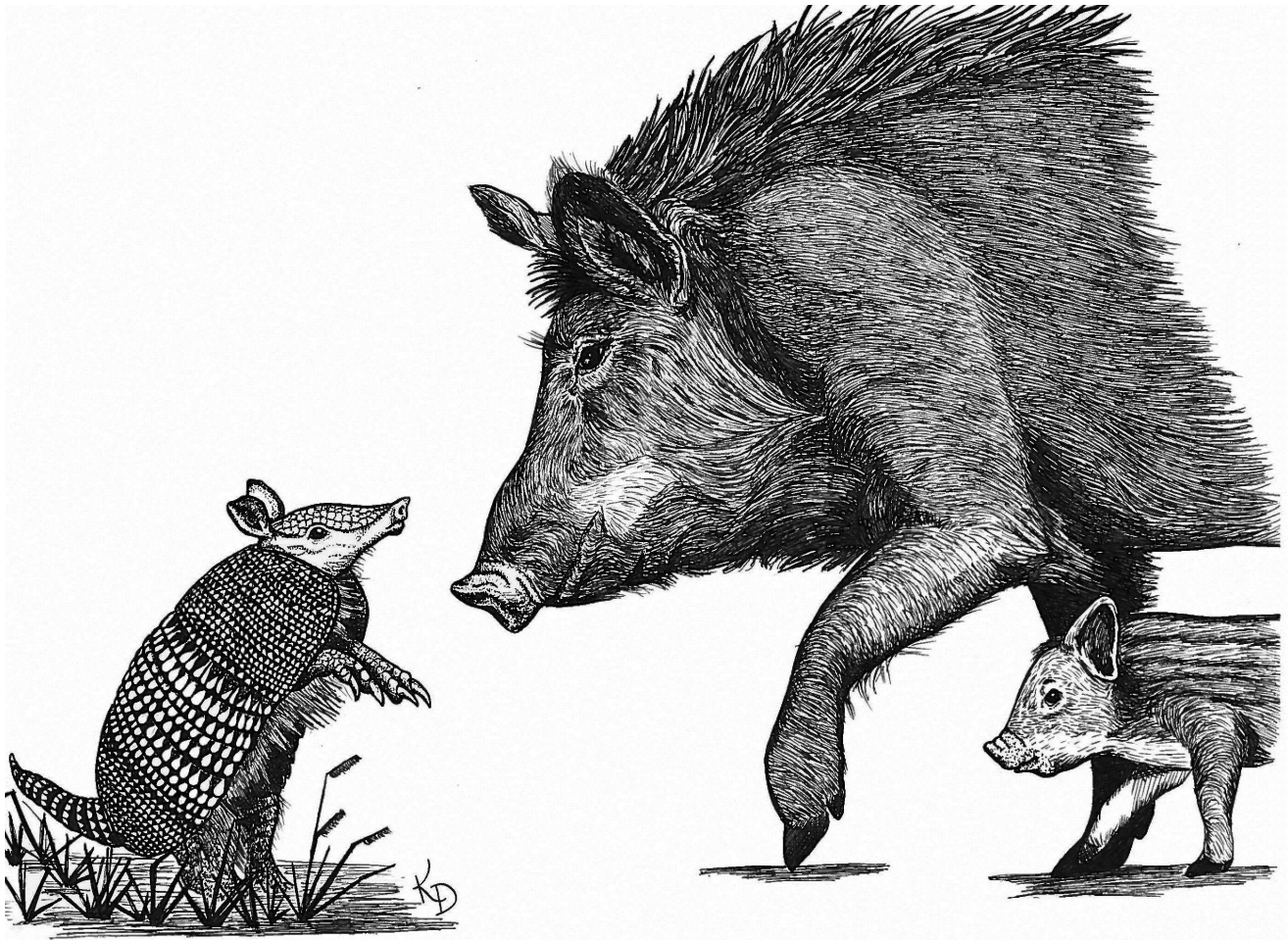


# TEXAS SOCIETY OF MAMMALOLOGISTS



## PROGRAM, ABSTRACTS, AND NEWSLETTER

37<sup>th</sup> Annual Meeting

8–10 February 2019

Texas Tech University Center at Junction

#TSM2019



# Texas Society of Mammalogists

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Cover illustration: *Dasypus novemcinctus* meets *Sus scrofa*, by Krysta Demere.

**Texas Society of Mammalogists  
37<sup>th</sup> Annual Meeting  
8–10 February 2019**

**Table of Contents**

Menu	2
Mammal Challenge	2
<b>Program and Abstracts</b>	
Program Schedule	3–7
Oral Presentation Abstracts	8–18
List of Posters	19–21
Poster Presentation Abstracts	22–36
2019 Business Meeting Agenda	37
Treasurer’s Report for Calendar Year 2018	38
<b>Newsletter</b>	
2019 Banquet Speaker	39
Patron Membership Announcement	39
In Memoriam: Robert J. Baker	39–41
News & Announcements	41–42
Research and Graduate Programs of TSM Members	42–62
Minutes of the 2018 Business Meeting	63–66

## **MENU 2019**

### **Friday:**

#### **6:00 pm DINNER**

Chicken fried steak, roasted mashed potatoes, cream gravy, broccoli, salad bar, rolls, chocolate pie

### **Saturday:**

#### **7:00 am BREAKFAST**

Breakfast tacos, hash browns, cinnamon rolls, assorted cereal and fruit

#### **9:35 am Coffee Break**

Coffee, tea, water, scones, muffins, granola bars, fruit

### **Saturday:**

#### **12:15 pm LUNCH**

Baked pork chops, fried okra, macaroni and cheese, salad bar, wheat rolls, brownies, ice cream

#### **3:00 pm Break**

Coffee, tea, water, cookies, trail mix, fruit

### **Saturday:**

#### **5:30 pm BANQUET DINNER**

Brisket, sausage, potato salad, coleslaw, beans, bread, peach cobbler

### **Sunday:**

#### **7:30 am BREAKFAST**

Scrambled eggs, bacon, hash browns, blueberry muffins, English muffins, assorted cereals and fruit

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## **TSM Members – Test your mammal knowledge and participate in our Annual Mammal Challenge!**

The challenge begins Friday evening at 6 pm and continues through Saturday, ending at lunch time. Winners (one faculty member and one student) are announced during the banquet and receive prizes, as well as the privilege of creating the mammal challenge for the next annual meeting!

The 2018 Mammal Challenge winners, and this year's Challenge coordinators, were Robert Martin (faculty emeritus, McMurry University) and Andrew MacPhie (student, Angelo State University).

## 2019 Program Schedule

### Friday, 8 February

3:00–7:30 pm	Registration	Dining Hall
4:30–6:00 pm	Meeting of the Executive Committee	Packard Building
6:00 pm	Dinner (serving line open 6:00–6:30pm)	Dining Hall
7:00 pm	Announcements/Welcome Address TSM President Richard Stevens	Dining Hall
7:30–9:30 pm	Poster Presentations	Dining Hall

### Saturday, 9 February

7:00 am	Breakfast and Registration (serving line open 7:00–7:30am)	Dining Hall
8:00 am	Introduction and Announcements TSM President Richard Stevens	Dining Hall

### PAPER SESSION 1 – Dining Hall

(Presenters' names are underlined)

**Chair: Cathleen Early, University of Mary Hardin-Baylor**

*Papers 1–10 are to be considered for the William B. Davis Award.*

- 8:05 Paper 1 – **MESOPREDATOR OCCURRENCE AND DISTRIBUTION IN AN URBAN ENVIRONMENT IN THE SOUTHERN HIGH PLAINS OF TEXAS**  
Christopher R. Carter<sup>1</sup>, Warren C. Conway<sup>1</sup>, Mark C. Wallace<sup>1</sup>, and Robert D. Bradley<sup>2</sup>,  
<sup>1</sup>Department of Natural Resources Management, Texas Tech University, <sup>2</sup>Department of Biological Sciences, Texas Tech University
- 8:20 Paper 2 – **COEXISTENCE AMONG FELIDS, CATTLE AND GAME SPECIES**  
Shelby B. Carter<sup>1</sup>, Michael E. Tewes<sup>1</sup>, Humberto L. Perotto-Baldivieso<sup>1</sup>, C. Jane Anderson<sup>1</sup>, Jason V. Lombardi<sup>1</sup>, Amanda M. Veals<sup>1</sup>, and Tyler A. Campbell<sup>2</sup>, <sup>1</sup>Caesar Kleberg Wildlife Research Institute, Texas A&M University – Kingsville, <sup>2</sup>East Foundation, San Antonio, Texas

- 8:35 Paper 3 – **“WE’RE NOT IN KANSAS ANYMORE”: IMPROVING ECOLOGICAL NICHE MODELS BY FILTERING IN ENVIRONMENTAL SPACE** Adrian A. Castellanos<sup>1</sup>, Jerry W. Huntley<sup>1,2</sup>, Gary Voelker<sup>1</sup>, and A. Michelle Lawing<sup>3</sup>, <sup>1</sup>Department of Wildlife and Fisheries Sciences, Texas A&M University, <sup>2</sup>Department of Ornithology, American Museum of Natural History, <sup>3</sup>Department of Ecosystem Science and Management, Texas A&M University
- 8:50 Paper 4 – **SEASONAL ROOST SITE CHARACTERISTICS OF *MYOTIS SEPTENTRIONALIS* IN THE KISATCHIE NATONAL FOREST, LOUISIANA** Carlos J. Garcia<sup>1</sup>, Roger W. Perry<sup>2</sup>, David A. Ray<sup>3</sup> and Richard D. Stevens<sup>1,4</sup>, <sup>1</sup>Department of Natural Resources Management, Texas Tech University, <sup>2</sup>Southern Research Station, USDA Forest Service, Hot Springs, Arkansas, <sup>3</sup>Department of Biological Sciences, Texas Tech University, <sup>4</sup>Museum of Texas Tech University
- 9:05 Paper 5 – **POLLEN IDENTIFICATION PROVIDES EVIDENCE THAT PALLID BATS VISIT AGAVE SPECIES IN THE CHIHUAHUAN DESERT** Virginia G. Jaquish and Loren K. Ammerman, Department of Biology, Angelo State University
- 9:20 Paper 6 – **SPATIAL CONFIGURATION OF FORAGING RESOURCES AND INDIVIDUAL CHARACTERISTICS OF BAOBABS POTENTIALLY DRIVE POLLINATOR MOVEMENT** Macy A. Madden<sup>1</sup>, Paul Webala<sup>2</sup>, and Tigga Kingston<sup>1</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Department of Forestry and Wildlife Management, Maasai Mara University, Narok, Kenya
- 9:35 **15 Minute Break**

## PAPER SESSION 2 – Dining Hall

**Chair: Dana Lee, Cameron University**

- 9:50 Paper 7 – **MORPHOLOGY AND GENETICS OF *SIGMODON FULVIVENTER DALQUESTI* IN THE CHIHUAHUAN DESERT ECOREGION** Preston J. McDonald and Caleb D. Phillips, Department of Biological Sciences, Texas Tech University
- 10:05 Paper 8 – **THE HOST COMMUNITY ECOLOGY OF A TICK-BORNE RELAPSING FEVER VECTOR (*ORNITHODOROS TURICATA*)** Rosa E. Ramirez<sup>1</sup>, Karina Salinas, Job E. Lopez<sup>2</sup>, Pete Teel<sup>3</sup>, Benjamin Schwartz<sup>1</sup>, and Ivan Castro-Arellano, <sup>1</sup>Biology Department, Texas State University, <sup>2</sup>Department of Pediatrics, Baylor College of Medicine, <sup>3</sup>Department of Entomology, Texas A&M University
- 10:20 Paper 9 – **OCELOT RESOURCE SELECTION IN A HIGHLY FRAGMENTED LANDSCAPE** Amanda M. Veals<sup>1</sup>, AnnMarie Blackburn<sup>1</sup>, C. Jane Anderson<sup>1</sup>, Michael E. Tewes<sup>1</sup>, Joseph D. Holbrook<sup>2</sup>, Humberto L. Perotto-Baldivieso<sup>1</sup>, Randy W. DeYoung<sup>1</sup>,

and John H. Young Jr.<sup>3</sup>, <sup>1</sup>Caesar Kleberg Wildlife Research Institute, Texas A&M University Kingsville, <sup>2</sup>Haub School of Environment and Natural Resources, University of Wyoming, <sup>3</sup>Texas Department of Transportation, Environmental Affairs Division

- 10:35 Paper 10 – **CHARACTERISTICS FOR PREDICTING BAT PRESENCE UNDER BRIDGES IN THE TRANS-PECOS ECOREGION OF TEXAS** Holly G. Wilson<sup>1</sup>, Stirling Robertson<sup>3</sup>, and Richard D. Stevens<sup>1,2</sup>, <sup>1</sup>Department of Natural Resource Management, <sup>2</sup>Museum of Texas Tech University, <sup>3</sup>Texas Department of Transportation

*Papers 11–12 are to be considered for the Rollin H. Baker Award.*

- 10:50 Paper 11 – **THE MAMMALS OF QUIMSACocha NATIONAL RECREATION AREA, AZUAY PROVINCE, ECUADOR** Seth Crockett<sup>1</sup>, Thomas E. Lee, Jr.<sup>1</sup>, Nicolas Tinoco<sup>2</sup>, M. Alejandra Camacho<sup>2</sup>, and Santiago F. Burneo<sup>2</sup>, <sup>1</sup>Department of Biology, Abilene Christian University, <sup>2</sup>Sección Mastozoología - Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador

- 11:05 Paper 12 – **MAMMAL SPECIES ABUNDANCE ANALYSIS USING CAMERA TRAPS AT CAMP BOWIE TRAINING FACILITY, BROWN COUNTY, TEXAS** Krystal M. Goedde, Rachel M. Leucht, Samantha R. Velasquez, and Joel G. Brant, Department of Biological Sciences, McMurry University

*Papers 13–14 are to be considered for the Packard Award only.*

- 11:20 Paper 13 – **MULTISEASON OCCUPANCY DYNAMICS OF OCELOTS IN SOUTH TEXAS** Jason V. Lombardi<sup>1,2</sup>, Michael E. Tewes<sup>1</sup>, Humberto L. Perotto-Baldivieso<sup>1</sup>, Jose M. Mata<sup>1</sup>, and Tyler A. Campbell<sup>1</sup>, <sup>1</sup>Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, <sup>2</sup>East Foundation, San Antonio, Texas

- 11:35 Paper 14 – **DETECTING INDIVIDUAL SITES AND LINEAGES SUBJECT TO EPISODIC DIVERSIFYING SELECTION IN REPRODUCTIVE (ZAN) AND HEARING (TECTA) PROTEINS** Emma K. Roberts<sup>1</sup>, Daniel M. Hardy<sup>2</sup>, and Robert D. Bradley<sup>1,3</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Graduate School of Biomedical Sciences, Texas Tech University Health Sciences Center, <sup>3</sup>Natural Science Research Laboratory, Museum of Texas Tech University

12:15 **Lunch** (serving line open 12:15–12:45pm)

1:15 **Group Photo** behind the Packard Building

### PAPER SESSION 3 – Dining Hall

**Chair: Cody Thompson, University of Michigan Museum of Zoology**

*Papers 15–19 are to be considered for the TSM Award.*

- 1:45 Paper 15 – **MACROECOLOGY OF THE GENOME** Jenna R. Grimshaw<sup>1</sup>, David A. Ray<sup>1</sup>, and Richard D. Stevens<sup>2,3</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Department of Natural Resources, Texas Tech University, <sup>3</sup>Museum of Texas Tech University
- 2:00 Paper 16 – **GUT-MICROBIOME AND DIGESTIVE EFFICIENCY DYNAMICS THROUGHOUT REPRODUCTION IN THE MEXICAN FREE-TAILED BAT, *TADARIDA BRASILIENSIS*** Oscar Sandate<sup>1</sup>, Matthew Fox<sup>1</sup>, Gregory Knox<sup>1</sup>, Marylin Mathew<sup>1</sup>, Craig Tipton<sup>1</sup>, and Caleb Phillips<sup>1,2</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Natural Science Research Laboratory, Museum of Texas Tech University
- 2:15 Paper 17 – **GENETIC VARIABILITY OF THE MEXICAN LONG-NOSED BAT (*LEPTONYCTERIS NIVALIS*) BASED ON MICROSATELLITES** Roxanne D. Pourshoushtari and Loren K. Ammerman, Department of Biology, Angelo State University
- 2:30 Paper 18 – **EXAMINING TRANSPOSABLE ELEMENT CONTRIBUTIONS TO BAT DIVERSITY AND EXTENDED AGING PHENOTYPES** Kevin A.M. Sullivan<sup>1</sup>, Emma Teeling<sup>2</sup>, Sonja Vernes<sup>3</sup>, Liliana Davalos<sup>4</sup>, Tom Gilbert<sup>5</sup>, Gene Myers<sup>6</sup>, Michael Hiller<sup>6</sup>, David A. Ray<sup>1</sup>, <sup>1</sup>Biological Science Department, Texas Tech University, <sup>2</sup>UCD School of Biology and Environmental Science, University College Dublin, Dublin, Ireland, <sup>3</sup>Neurogenetics of Vocal Communication GroupMax Planck Institute for Psycholinguistics Nijmegen The Netherlands, <sup>4</sup>Department of Ecology and Evolution, Stony Brook University, New York, <sup>5</sup>Centre for Ancient Genetics, Biological Institute, University of Copenhagen, Denmark, <sup>6</sup>Center for Systems Biology Dresden, Dresden, Germany, Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany, Department of Computer Science, Technical University Dresden, Dresden, Germany
- 2:45 Paper 19 – **GENETIC STRUCTURE AND THE POTENTIAL FOR HYBRIDIZATION IN POPULATIONS OF *PEROMYSCUS SPP.* OF PLATEAU REGIONS IN WESTERN OKLAHOMA** Sarah C. Vrla, Michelle L. Haynie, and Greg M. Wilson, Biology Department, University of Central Oklahoma

3:00 **15 Minute Break**

3:15 pm

**Business Meeting**

All members, including students, please attend!

Packard Building



5:30–9:00 pm                      **Annual Banquet and Auction**                      Dining Hall

5:30–6:30      Dinner (serving line open 5:30–6:00pm)

5:30              Silent Auction opens for bidding

6:30–7:00      Award Presentations

7:00–8:00      Guest Speaker Address:

***Helping Conserve Texas' Wildlife Diversity:  
Challenges for the 21st Century***

**Dr. David Schmidly**

**Professor Emeritus, University of New Mexico and Texas Tech University**

8:00–9:00      Live Auction  
                    Silent Auction ends 10 minutes after Live Auction

9:00 pm–?      Socializing and Dancing                      Dining Hall

**Sunday, 10 February**

7:30 am              Breakfast (serving line open 7:30–8:00am)                      Dining Hall

## Oral Presentation Abstracts

### Paper 1

#### **MESOPREDATOR OCCURRENCE AND DISTRIBUTION IN AN URBAN**

#### **ENVIRONMENT IN THE SOUTHERN HIGH PLAINS OF TEXAS** Christopher R.

Carter<sup>1</sup>, Warren C. Conway<sup>1</sup>, Mark C. Wallace<sup>1</sup>, and Robert D. Bradley<sup>2</sup>, <sup>1</sup>Department of Natural Resources Management, Texas Tech University, <sup>2</sup>Department of Biological Sciences, Texas Tech University ([christopher.carter@ttu.edu](mailto:christopher.carter@ttu.edu))

Urban landscapes provide valuable habitat to several mesocarnivores, however, few studies have been performed to determine what environmental features influence mesocarnivores presence and occupancy within urban areas. We used game cameras dispersed throughout portions of the city of Lubbock, Texas to characterize presence of coyote (*Canis latrans*), domestic cat (*Felis silvestris catus*), domestic dog (*Canis lupus familiaris*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), and Virginia opossum (*Didelphis virginiana*). Presence was correlated with environmental factors including grasslands, croplands, and human disturbance using a geospatially explicit supervised classification within ArcGIS. These features were measured in areas around cameras deployed throughout the Lubbock city limits. For those species with sufficient detections, preliminary analyses suggest that cat occupancy decreases with increases in open grasslands; gray fox occupancy increases with decreases in open vegetation; and coyote occupancy is positively related to increases in open grasslands. Virginia opossum occupancy increases in areas of human development and dogs currently show no correlation with any of these factors analyzed, despite a naïve occupancy of 39%. Previous analyses focused on grouping cameras into clusters; however, current analyses are building upon that work, and including individual camera approaches to refined correlation interpretation at smaller scales. Further analysis will include other local scale habitat features, and socioeconomic factors to ideally improve model performance.

### Paper 2

**COEXISTENCE AMONG FELIDS, CATTLE AND GAME SPECIES** Shelby B. Carter<sup>1</sup>, Michael E. Tewes<sup>1</sup>, Humberto L. Perotto-Baldivieso<sup>1</sup>, C. Jane Anderson<sup>1</sup>, Jason V. Lombardi<sup>1</sup>, Amanda M. Veals<sup>1</sup>, Tyler A. Campbell<sup>2</sup>, <sup>1</sup>Caesar Kleberg Wildlife Research Institute, Texas A&M University, <sup>2</sup>East Foundation, San Antonio ([shelbycarter511@hotmail.com](mailto:shelbycarter511@hotmail.com))

Interspecific interactions play important roles in determining population dynamics and species distribution. Spatial overlap between species is a fundamental component of spatial ecology for species. In southern Texas, ocelots (*Leopardus pardalis*), occur in two small breeding populations on private and public lands in Willacy, Kenedy and Cameron counties. The East Foundation's El Sauz Ranch in Willacy County has the largest known breeding population of ocelots in the United States. Interactions with livestock and large ungulates have not been examined. The East Foundation's mission is to support wildlife conservation and other public benefits of ranching and private land stewardship. The El Sauz Ranch is a unique privately owned property that integrates ranching, management of game species, and wildlife conservation. We are using a seven-year camera trap data set (2011-2018) to identify relative abundance and activity patterns for species of interest. We focused our efforts on ocelots, bobcats (*Lynx rufus*), cattle, nilgai (*Boselaphus tragocamelus*), feral hogs (*Sus scrofa*), and

javelina (*Pecari tajacu*). Preliminary results indicate that nilgai and cattle did not have similar abundance and activity patterns. Small game species displayed similar patterns. Future analysis will consist of estimating occupancy of ocelots, cattle and nilgai. Our project can be used to develop programs that balance ocelot conservation and economic production on private ranches in southern Texas.

#### Paper 3

**“WE’RE NOT IN KANSAS ANYMORE”: IMPROVING ECOLOGICAL NICHE MODELS BY FILTERING IN ENVIRONMENTAL SPACE** Adrian A. Castellanos<sup>1</sup>, Jerry W. Huntley<sup>1,2</sup>, Gary Voelker<sup>1</sup>, and A. Michelle Lawing<sup>3</sup>, <sup>1</sup>Department of Wildlife and Fisheries Sciences, Texas A&M University, <sup>2</sup>Department of Ornithology, American Museum of Natural History, <sup>3</sup>Department of Ecosystem Science and Management, Texas A&M University ([acastellanos@tamu.edu](mailto:acastellanos@tamu.edu))

A clear challenge for ecological niche modeling is determining how to best mitigate the effects of sampling bias from commonly collected biodiversity data. Recent approaches have focused on filtering occurrences in overrepresented regions based on geographic and environmental proximity. We tested the efficacy of filtering in geographic and environmental space using occurrence data from a restricted rodent, *Dipodomys compactus*, and widespread passerine, *Icterus graduacauda*. Our evaluation strategies examined 14 distance measures in geographic and environmental spaces and eight combinations of environmental variables and their ordinations. This resulted in 78 datasets for each species, which we evaluated using area under the curve (AUC), omission rate, the true skill statistic, and Schoener’s D to examine the effects of different filtering schemes. The degree of change produced by filtering on predicted suitability and evaluation statistics increased with increasing range size. Environmental filtering resulted in higher model fit at larger extents and retained more occurrences than geographic filtering. Our results indicate that models should be evaluated using multiple evaluation statistics at multiple thresholds. We recommend that ecological niche models using natural history collection data filter in environmental space with variables derived from permutation importance or the first few axes of a principal components ordination.

#### Paper 4

**SEASONAL ROOST SITE CHARACTERISTICS OF *MYOTIS SEPTENTRIONALIS* IN THE KISATCHIE NATIONAL FOREST, LOUISIANA** Carlos J. Garcia<sup>1</sup>, Roger W. Perry<sup>2</sup>, David A. Ray<sup>3</sup> and Richard D. Stevens<sup>1,4</sup>, <sup>1</sup>Department of Natural Resources Management, Texas Tech University, <sup>2</sup>Southern Research Station, USDA Forest Service, Hot Springs, Arkansas, <sup>3</sup>Department of Biological Sciences, Texas Tech University, <sup>4</sup>Museum of Texas Tech University ([carlos.j.garcia@ttu.edu](mailto:carlos.j.garcia@ttu.edu))

Roosts play important roles in ecology and evolution of bats and serve as sites for hibernation, rearing of young, mating, social interactions, digestion of food and protection from the natural elements. Importantly, bats use different kinds of roosts in both manmade and natural structures. As such, bats may use a variety of roosts depending on season or reproductive status. Because little is known about the roosting ecology of the northern long-eared myotis (*Myotis septentrionalis*) in the southern portion of its geographic distribution, our objectives were to conduct a telemetry study throughout the Kisatchie National Forest of Louisiana to identify roost

site characteristics important for *M. septentrionalis*. Because there are no true caves in Louisiana, we predicted that *M. septentrionalis* would opportunistically use trees as roosts throughout winter and summer seasons. We captured 29 *M. septentrionalis* throughout the Kisatchie National Forest in central Louisiana and tracked individuals back to their roosts for as many days as possible via telemetry. At each roost we quantified important tree and stand characteristics within an 18 × 18-meter plot encompassing the roost tree. We characterized 101 arboreal roosts and 187 “random roosts”. We used a multivariate analysis of variance (MANOVA) and discriminate function analysis to determine if *M. septentrionalis* selected different tree or stand characteristics in the winter and summer. Results from the MANOVA ( $F_{16,79}=7.84$ ,  $P<0.001$ ) and discriminate analysis suggest that *M. septentrionalis* select areas of high tree density in the summer, while large trees are preferred in the winter. Results from our analyses will help improve understanding of status of *M. septentrionalis* and assist with possible conservation management efforts in the future.

#### Paper 5

**POLLEN IDENTIFICATION PROVIDES EVIDENCE THAT PALLID BATS VISIT AGAVE SPECIES IN THE CHIHUAHUAN DESERT** Virginia G. Jaquish and Loren K. Ammerman, Department of Biology, Angelo State University ([vjaquish@angelo.edu](mailto:vjaquish@angelo.edu))

Pallid bats, *Antrozous pallidus*, though primarily insectivorous gleaning predators are known to consume nectar of cardón cactus, *Pachycereus pringlei*, and act as effective pollinators of this species in the Sonoran Desert. It is unknown whether a similar nectar feeding behavior may be occurring in the Chihuahuan Desert of southwest Texas, where several researchers have captured pallid bats covered in pollen. We collected pollen samples from pallid bats in Brewster County, Texas each month between April and August 2018. Clear tape was used to collect samples from the wing membrane on and around the 5<sup>th</sup> metacarpal. Cubes of glycerine and gelatin with fuchsin stain were used to collect stain and preserve the exine characteristics of pollen samples. Tape and cube samples were examined using light microscopy under 40x, 100x, and 1000x total magnification. Of the 67 bats sampled, 60% were found to have pollen densities  $\geq 1$  grain per  $\text{mm}^2$  and of these, 24/40 (60%) had high pollen densities between 19 and 158 grains per  $\text{mm}^2$ . We encountered most of the bats covered in high density of pollen in April and August. When compared to a pollen reference collection, the samples were determined to be *Agave* pollen. Two species of *Agave* occur in this region of Texas, *Agave havardiana* and *A. lechuguilla*. Reference collections of pollen from *A. havardiana* and *A. lechuguilla* were used to create a key to distinguish these species using characteristics of exine pattern, pollen grain size, and pollen grain wall thickness. Our analysis of pollen from bat samples is ongoing, however, our initial findings indicate that the pollen collected from pallid bats is predominantly *A. lechuguilla*. As further confirmation, in August 2018 we obtained video evidence of pallid bats visiting this species of *Agave*.

Paper 6

**SPATIAL CONFIGURATION OF FORAGING RESOURCES AND INDIVIDUAL CHARACTERISTICS OF BAOBABS POTENTIALLY DRIVE POLLINATOR**

**MOVEMENT** Macy A. Madden<sup>1</sup>, Paul Webala<sup>2</sup>, and Tigga Kingston<sup>1</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Department of Forestry and Wildlife Management, Maasai Mara University, Narok, Kenya ([macy.madden@ttu.edu](mailto:macy.madden@ttu.edu))

Fruit bats (Family: Pteropodidae) are opportunistic nectarivores, relying on fruit from fig trees, but also consume nectar and pollen from available flowers. Fig trees produce fruit asynchronously, generating a fruit resource that is available year-round. However, some trees, such as the baobab, that rely on bat pollination have seasonal flowering periods. It is unknown how year-round food resources affect fruit production on trees that are dependent on bats as pollinators. The spatial arrangement of food and water resources in the landscape should influence nightly movements of bats. We therefore predict that the spatial distributions of foraging resources will indirectly influence the number of fruits on pollinated plants. To test this, we used the bat-baobab (*Adansonia digitata*) mutualism in Kenya, where fruit bats (such as *Epomophorus* and *Rousettus aegyptiacus*) are the primary pollinators. Baobabs, year-round fruit resources (figs and pawpaw), and water sources were georeferenced and we counted the number of fruits on each baobab tree at the end of the flowering season in an approximately 4.0 km by 3.0 km plot near Nuui, Kitui County, Kenya. In addition, we collected information on other variables known to influence the number of fruit produced (i.e., land use, tree height, and girth at breast height). Using the number of fruit per baobab as the response variable (n = 76 baobabs), we used a regression tree analysis to identify important variables and thresholds contributing to differing fruit production among the baobab population. Our results show that baobabs closer to another baobab produced more fruit, but baobabs too near or too far from year-round fruiting trees produced fewer fruit. Baobabs with a larger girth also produced more fruit. The findings suggest an intricate relationship between the spatial configuration of the landscape, individual characteristics of trees, and its influence on pollinators such as fruit bats.

Paper 7

**MORPHOLOGY AND GENETICS OF *SIGMODON FULVIVENTER DALQUESTI* IN THE CHIHUAHUAN DESERT ECOREGION** Preston J. McDonald and Caleb D. Phillips, Department of Biological Sciences, Texas Tech University ([preston.mcdonald@ttu.edu](mailto:preston.mcdonald@ttu.edu))

The tawny-bellied cotton rat, *Sigmodon fulviventer dalquesti*, is a Texas endemic subspecies reported only from a single sampling near Fort Davis in 1991. The current population, distribution and evolutionary origin of *S. f. dalquesti* is enigmatic. The Texas Parks and Wildlife Department's Texas Conservation Action Plan designates *S. f. dalquesti* as critically imperiled within the state. Additionally, the relationship between *S. f. dalquesti* and other *S. fulviventer* subspecies in Mexico, Arizona, and New Mexico is not well understood. The current state of knowledge of *S. f. dalquesti* systematics consists of morphological distinction from *S. f. minimus* (New Mexican form), and a finding of mitochondrial cytochrome *b* divergence between *S. f. dalquesti* and *S. f. fulviventer* (Mexican form) roughly equivalent to 100,000 years of divergence. To inform an accurate conservation assessment, a more complete understanding of *S. f. dalquesti* biology is required. Here we present results of a morphometric analysis of 18 skull characters of *S. fulviventer* ssp. We also report preliminary results of a cytochrome *b* phylogenetic analysis.

Paper 8

**THE HOST COMMUNITY ECOLOGY OF A TICK-BORNE RELAPSING FEVER VECTOR (*ORNITHODOROS TURICATA*)**

Rosa E. Ramirez<sup>1</sup>, Karina Salinas, Job E. Lopez<sup>2</sup>, Pete Teel<sup>3</sup>, Benjamin Schwartz<sup>1</sup>, and Ivan Castro-Arellano, <sup>1</sup>Biology Department, Texas State University, <sup>2</sup>Department of Pediatrics, Baylor College of Medicine, <sup>3</sup>Department of Entomology, Texas A&M University ([rer101@txstate.edu](mailto:rer101@txstate.edu))

Tick-borne zoonotic diseases are a growing concern due to increased anthropogenic interactions with wildlife. Soft ticks of the species *Ornithodoros turicata* are the known vectors of *Borrelia turicatae*, the etiologic agent for Relapsing Fever in humans. With a documented increase of human cases in the past decade, research has begun to focus on host-vector relationships. This study seeks to evaluate the number of potential hosts at 12 caves in Central Texas as well as estimate soft tick abundance at select sites. We confirmed the presence of *Ornithodoros turicata* at surveyed sites. Potential hosts have been monitored via motion sensitive cameras placed at the entrances to these caves since February of 2016 and continued until May 2018. In addition, tick abundance was estimated with the use of CO<sub>2</sub> traps and capture-mark-recapture techniques. So far, possible hosts are comprised of 19 vertebrate species with over 1,000 observations. Counts of these hosts were used to assess variation in cave usage, with the highest records being of raccoons, black vultures, and opossums. Our abundance estimates for soft ticks are as high as 1639. Quantifying the frequency of host visitation in potential soft tick habitats, can elucidate vector-host interactions, narrowing species of concern. This in turn can lead to more effective management strategies potentially reducing the overall risk of infection.

Paper 9

**OCELOT RESOURCE SELECTION IN A HIGHLY FRAGMENTED LANDSCAPE**

Amanda M. Veals<sup>1</sup>, AnnMarie Blackburn<sup>1</sup>, C. Jane Anderson<sup>1</sup>, Michael E. Tewes<sup>1</sup>, Joseph D. Holbrook<sup>2</sup>, Humberto L. Perotto-Baldivieso<sup>1</sup>, Randy W. DeYoung<sup>1</sup>, and John H. Young Jr.<sup>3</sup>, <sup>1</sup>Caesar Kleberg Wildlife Research Institute, Texas A&M University Kingsville, <sup>2</sup>Haub School of Environment and Natural Resources, University of Wyoming, <sup>3</sup>Texas Department of Transportation, Environmental Affairs Division. ([amanda.veals@students.tamuk.edu](mailto:amanda.veals@students.tamuk.edu))

Wildlife species across the globe are faced with landscapes that are becoming increasingly impermeable to movement as the result of habitat loss and degradation. Road networks are widespread and influence wildlife populations in profound ways. The ocelot (*Leopardus pardalis*) is an endangered felid in the United States, with a remnant population of < 80 individuals in the Lower Rio Grande Valley of Texas. This area is one of the fastest growing population centers in the United States, resulting in high amounts of vehicle collisions and fragmentation of available habitat for ocelots. Despite the increases in ocelot-vehicle collisions, it remains unclear (1) what environmental factors influence collisions, and (2) how ocelots adjust their behavior relative to roads. To address these issues, we paired remotely sensed data with telemetry locations of ocelots and implemented resource selection functions. We examined a preliminary subset of data to determine resource selection by ocelots (n=9; 4 males, 5 females; with ≥ 68 total locations) from 1982-1988 at the home range scale. We tested a set of *a priori* models that included vegetation cover and road or traffic covariates for each individual. We found that ocelots selected woody vegetation cover more frequently than other land cover types (males ≥ 56%, females ≥ 67%). Our results support previous work on ocelot-habitat

relationships, where individuals spent most of their time in thick woody cover. This project aims to inform the placement of future road crossing structures to decrease ocelot-vehicle collisions and increase landscape permeability for this endangered species.

#### Paper 10

**CHARACTERISTICS FOR PREDICTING BAT PRESENCE UNDER BRIDGES IN THE TRANS-PECOS ECOREGION OF TEXAS** Holly G. Wilson<sup>1</sup>, Stirling Robertson<sup>3</sup>, and Richard D. Stevens<sup>1,2</sup>, <sup>1</sup>Department of Natural Resource Management, <sup>2</sup>Museum of Texas Tech University, <sup>3</sup>Texas Department of Transportation ([holly.wilson@ttu.edu](mailto:holly.wilson@ttu.edu))

Bats provide economically important ecosystem services across the entire state of Texas through their foraging activities. Important limiting resources for bats often are suitable roosts in which to spend the day. Highway structures such as bridges and culverts are often used as day roosts by bats, but the frequency of this behavior is unclear. Moreover, little is known regarding what characteristics bats seek when selecting bridges and culverts as roost structures. The Trans-Pecos ecoregion of Texas is floristically diverse and has the highest diversity of bats in the state. Our aim was to elucidate bridge characteristics important to bats when selecting roosts and to assess the relative efficacy by which bridge characteristics or habitat variables could predict use by bats in the Trans-Pecos. We systematically examined 118 bridges which contained a total of 25,422 bats from five species. A multivariate analysis of variance (MANOVA) on bat presence/absence supported the hypothesis that some bridge characteristics are more important than others when bats select roosts. Importance of different bridge characteristics may be different among bat species. Therefore, we also conducted species-specific MANOVA's followed by stepwise discriminate function analyses to examine importance of different bridge characteristics in determining presence/absence of five bat species. Species differed in bridge, road, and habitat types that best predicted presence/absence. These preliminary results provide baseline information on bat/highway infrastructure interactions and may have important implications that can aid in bat conservation efforts.

#### Paper 11

**THE MAMMALS OF QUIMSACOCOA NATIONAL RECREATION AREA, AZUAY PROVINCE, ECUADOR** Seth Crockett<sup>1</sup>, Thomas E. Lee, Jr.<sup>1</sup>, Nicolas Tinoco<sup>2</sup>, M. Alejandra Camacho<sup>2</sup>, and Santiago F. Burneo<sup>2</sup>, <sup>1</sup>Department of Biology, Abilene Christian University, <sup>2</sup>Sección Mastozoología - Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador ([scc17a@acu.edu](mailto:scc17a@acu.edu))

Quimsacocha National Recreation Area is located on the western slope of the Andes in Azuay Province, in southern Ecuador. All sampling locations were in the high páramo of the Andes (3,849 m). The habitats included: páramo, bogs, riparian, patches of elfin forests, and secondary cloud forest. Sherman traps, pitfall traps, camera traps, and mist nets were used to collect 120 specimens. Eight species were collected, including *Caenolestes caniventer*, *Didelphis pernigra*, *Cryptotis* sp. *Akodon mollis*, *Microryzomys altissimus*, *Phyllotis haggardi*, *Sigmodon peruanus*, and *Sylvilagus andinus*. One additional species, *Odocoileus ustus*, was documented with photography. Most of the 24 shrew specimens were collected from owl pellets that were found in a cliff/crevasse rock formation.

Paper 12

**MAMMAL SPECIES ABUNDANCE ANALYSIS USING CAMERA TRAPS AT CAMP BOWIE TRAINING FACILITY, BROWN COUNTY, TEXAS** Krystal M. Goedde, Rachel M. Leucht, Samantha R. Velasquez, and Joel G. Brant, Department of Biological Sciences, McMurry University ([goedde.krystal@mcm.edu](mailto:goedde.krystal@mcm.edu))

Camp Bowie Training Center is a National Guard facility located on 9,297 acres in Brown County, Texas. The objective of this study is to use standard camera trapping techniques to document species presence and determine if there is a correlation between species abundance with elevation, the time of year, moon phase, and time of day. Camp Bowie was broadly divided into 3 elevation zones: highland, slope, and lowland. A total of 10 camera traps were placed in varied locations and elevations. Sampling was conducted from August 2017 to January 2019. A total of 1,621 individuals, representing 13 species, were captured on camera trap footage over 2,416 trap nights. We observed 1,103 *Odocoileus virginianus*, 100 *Sylvilagus*, 92 *Canis latrans*, 85 *Procyon lotor*, 80 *Sciurus niger*, 57 *Sus scrofa*, 52 *Urocyon cinereoargenteus*, 20 *Dasypus novemcinctus*, 9 *Mephitis mephitis*, 6 *Lynx rufus*, 4 *Lepus californicus*, 2 *Felis silvestris*, 1 *Erethizon dorsatum*, and 10 unidentified individuals. *Sylvilagus* showed the most distinct activity pattern for time of year. *Sciurus niger* showed the most distinct activity pattern for time of year. *Canis latrans* showed the most distinct pattern for time of day. *Dasypus novemcinctus* showed the most distinctive activity pattern relative to moon phase and time of day. These results represent only preliminary data in a two-year research project.

Paper 13

**MULTISEASON OCCUPANCY DYNAMICS OF OCELOTS IN SOUTH TEXAS** Jason V. Lombardi<sup>1,2</sup>, Michael E. Tewes<sup>1</sup>, Humberto L. Perotto-Baldivieso<sup>1</sup>, Jose M. Mata<sup>1</sup>, and Tyler A. Campbell<sup>1</sup>, <sup>1</sup>Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, <sup>2</sup>East Foundation, San Antonio ([lombardijv@gmail.com](mailto:lombardijv@gmail.com))

About 80% of the known breeding population of ocelots *Leopardus pardalis* in the United States occurs exclusively on ranches in Willacy and Kenedy counties in South Texas. These ranches area support several large contiguous patches of dense thornshrub which is preferred by ocelots. Past studies have indicated ocelots in Texas select for woody areas with 95% canopy cover, 85% vertical cover and require large patches of thornshrub to survive. However, little is known regarding other factors which influence occupancy, colonization and localized extinction dynamics. From 2011-2018, we used camera traps on the East Foundation's El Sauz Ranch to assess how different macrohabitat and microhabitat factors influence ocelot occupancy in thornshrub communities in South Texas. We observed a negative correlation between initial occupancy and increasing distance to inland sand dunes. The probability of ocelots colonizing new areas was positively influenced by increasing density of woody patches. However, close proximity to paved roads increased the likelihood of localized extinction. This information suggests that greater densities of dense thornshrub communities adjacent to coastal inland sand dunes provide important habitat for ocelots in South Texas. Potential benefits of habitat preservation efforts need to evaluate potential risks of nearby roads.



Paper 14

**DETECTING INDIVIDUAL SITES AND LINEAGES SUBJECT TO EPISODIC DIVERSIFYING SELECTION IN REPRODUCTIVE (ZAN) AND HEARING (TECTA) PROTEINS**

Emma K. Roberts<sup>1</sup>, Daniel M. Hardy<sup>2</sup>, and Robert D. Bradley<sup>1,3</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Graduate School of Biomedical Sciences, Texas Tech University Health Sciences Center, <sup>3</sup>Natural Science Research Laboratory, Museum of Texas Tech University ([emma.k.roberts@ttu.edu](mailto:emma.k.roberts@ttu.edu))

Dynamic selective pressures are frequently rampant in protein-coding genes. Selection is often not constant and can vary extensively, resulting in bursts and wanes localized to a subset of sites in a gene and branches in a lineage. The punctuated equilibrium theory of selection explains biological systems exist in an extended period of stasis, which are later ‘punctuated’ by sudden shifts of radical change. Most evolutionary events are thought to occur in rare episodes of rapid evolution, when a single species splits into two lineages, followed by a period of slow evolutionary change or period of stasis. Evidence of punctuated equilibrium as documented adaptive radiations have been shown in many groups of mammals, including bats, rodents, cetaceans, and primates. Furthermore, computational techniques to detect natural selective pressures, many of which are commonly used and robust, fail to detect ‘episodes’ of selection because they are designed to detect widespread and pervasive selective pressures. This research combines various computational techniques, site-specific and branch-specific, to detect episodic selective pressures in two protein-coding genes: *Zan* (reproductive) and *Tecta* (hearing). Selection ‘hotspots’ were identified that corresponded to specific functional regions of each gene, certain lineages, and timeframes of selection and thus, may be pertinent in adaptive evolutionary events. Preliminary results taken from a comprehensive mammalian sequence alignment indicated intense episodic positive selection in *Zan* and more pervasive positive selection in *Tecta*. Corresponding amino acid sequence differences included insertions and deletions characteristic of certain groups of mammals, including the loss of an otherwise conserved proteolytic protein processing site in a group of rodents.

Paper 15

**MACROECOLOGY OF THE GENOME** Jenna R. Grimshaw<sup>1</sup>, David A. Ray<sup>1</sup>, and Richard D. Stevens<sup>2,3</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Department of Natural Resources, Texas Tech University, <sup>3</sup>Museum of Texas Tech University ([jenna.grimshaw@ttu.edu](mailto:jenna.grimshaw@ttu.edu))

Transposable elements (TEs) are sequences of DNA that can copy or move within the genome, increasing in copy number as they move. While the mechanisms of DNA mobilization are becoming better understood, there is still much we do not know about patterns and processes that lead to observed distributions of TEs within genomes. If TEs interact with one another and their environment similarly to species occupying ecological communities, then we may be able to apply ecological analyses to better understand patterns of TE insertion and accumulation. We employed basic ecological models to determine if TEs within genomes follow similar patterns as species in ecological communities. These include 1) species rank distributions (a genome would consist of a few common TEs and many rare TEs), 2) patterns of co-occurrence (some pairs of TEs will be highly segregated, some will be aggregated, and the rest will have random associations) and 3) the relationships between distribution and abundance. Thus far, we have analyzed 25 mammalian genomes to generate TE rank-abundance distributions as well as

estimates of co-occurrence for each genome. Preliminary results suggest that TEs do follow expected ecological patterns. Genomes appear to have many rare TE's and only a few common ones. Moreover, there are many pairs of TEs that are aggregating or clumping together and only a few that are segregating with the rest being randomly distributed with regard to one another. This research could have broad implications for understanding the way genomes and TEs evolve including clarification of TE insertion patterns as well as predictions of how TE families will expand, shrink, or accumulate over time.

#### Paper 16

### **GUT-MICROBIOME AND DIGESTIVE EFFICIENCY DYNAMICS THROUGHOUT REPRODUCTION IN THE MEXICAN FREE-TAILED BAT, *TADARIDA***

***BRASILIENSIS*** Oscar Sandate<sup>1</sup>, Matthew Fox<sup>1</sup>, Gregory Knox<sup>1</sup>, Marylin Mathew<sup>1</sup>, Craig Tipton<sup>1</sup>, and Caleb Phillips<sup>1,2</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Natural Science Research Laboratory, Museum of Texas Tech University  
([oscar.sandate@ttu.edu](mailto:oscar.sandate@ttu.edu))

Digestive efficiency is important to an organism's ability to extract nutrients and energy from food. Digestive efficiency is potentially shaped by many factors including gut-microbiome and dietary compositions, gut morphology, physiological response to energy demands across life stages, and host genetics. Relative to other mammals, bats experience unusually high energetic demands owing to the costs of powered flight yet have considerably shortened digestive tracts relative to similarly sized mammals. Moreover, mammalian pregnancy and lactation are costly, and probably even more so in bats which support fetuses that may be a third of the mother's body mass. Furthermore, compositional shifts to the gut-microbiome may be expected given the immunological modulation associated with pregnancy, but at the same time maintenance of microbiome community stability may be necessary for optimal functionality. Because of the unique characteristics of bats, microbiome function may be particularly important for bat reproductive success. In the current study we are investigating the relative roles of host-microbiome, diet and reproductive stage on variation in digestive efficiency in Brazilian Free-tailed bats, *Tadarida brasiliensis*. We collected fecal samples from female bats ranging from early pregnancy through post-lactation. 16s rDNA gene sequencing was used to characterize bacterial community composition, arthropod COI barcode sequencing to characterize diet, qPCR to estimate bacterial load, and digestive efficiency quantified using bomb calorimetry. Comparison of generalized least squares regression models in an information theoretical framework is being used to determine the best model and the relative importance of variables in shaping digestive efficiency.

#### Paper 17

**GENETIC VARIABILITY OF THE MEXICAN LONG-NOSED BAT (*LEPTONYCTERIS NIVALIS*) BASED ON MICROSATELLITES** Roxanne D. Pourshoushtari and Loren K. Ammerman, Department of Biology, Angelo State University ([rpourshoushtari@angelo.edu](mailto:rpourshoushtari@angelo.edu))

Mexican long-nosed bats (*Leptonycteris nivalis*) are endangered, migratory nectarivores that have been suspected of experiencing population declines. It is important to assess the genetic variability of species of conservation concern, because those with lower levels of genetic diversity tend to have decreased adaptive potential. We selected 43 microsatellite markers

designed for related species (33 for *L. yerbabuenae* and 10 for *Glossophaga soricina*) to test their effectiveness in *L. nivalis*. Twelve *L. yerbabuenae* loci and four *G. soricina* loci have amplified DNA from individuals of *L. nivalis*, captured from roosts at the northernmost and southernmost extent of its range. Of those 16, nine *L. yerbabuenae* loci have been genotyped in 112 individuals from both sites. Some loci exhibited homozygote excess, null alleles, and deviation from Hardy-Weinberg equilibrium. Genotypic linkage disequilibrium was detected in one pair of loci. There were 101 alleles across all loci in both populations. There was an average observed heterozygosity of 0.589, which was lower than the expected heterozygosity (0.621) and lower yet comparable to that observed in *L. yerbabuenae*. Statistical analysis of fixation index using these nine loci suggest low population differentiation ( $F_{st} = 0.006$ ) and a lack of genetic structure was found using the program STRUCTURE, which is supported by previous genetics studies on *L. nivalis*. The contemporary effective population size was estimated from microsatellite linkage disequilibrium using NeEstimator, excluding alleles with a frequency of 0.05 or less, to be 754 with a 95% confidence interval ranging from 143 to infinity. The inclusion of infinity suggests the results from these nine markers designed for *L. yerbabuenae* may be unreliable. We suggest that species-specific markers be developed in the future for greater confidence in the results of a genetic analysis like this one, due to the low success of cross-species amplification.

#### Paper 18

#### **EXAMINING TRANSPOSABLE ELEMENT CONTRIBUTIONS TO BAT DIVERSITY AND EXTENDED AGING PHENOTYPES**

Kevin A.M. Sullivan<sup>1</sup>, Emma Teeling<sup>2</sup>, Sonja Vernes<sup>3</sup>, Liliana Davalos<sup>4</sup>, Tom Gilbert<sup>5</sup>, Gene Myers<sup>6</sup>, Michael Hiller<sup>6</sup>, and David A. Ray<sup>1</sup>,

<sup>1</sup>Biological Science Department, Texas Tech University, <sup>2</sup>UCD School of Biology and Environmental Science, University College Dublin, Ireland, <sup>3</sup>Neurogenetics of Vocal

Communication Group Max Planck Institute for Psycholinguistics Nijmegen The Netherlands,

<sup>4</sup>Department of Ecology and Evolution, Stony Brook University, Stony Brook, New York,

<sup>5</sup>Centre for Ancient Genetics, Biological Institute, University of Copenhagen, Denmark,

<sup>6</sup>Center for Systems Biology Dresden, Dresden, Germany, Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany, Department of Computer Science, Technical University Dresden, Dresden, Germany ([Kev.am.sullivan@gmail.com](mailto:Kev.am.sullivan@gmail.com))

The Bat1k project is a bioinformatic collaboration to eventually sequence every bat species at very high quality standards. This endeavor will be important for phylogenetics, conservation efforts, understanding genome organization, and uncovering genomic mechanisms behind traits such as echolocation, diet, and aging. The lattermost point will be a prime focus, as several bats live up to 10x longer than expected given their body size. One aspect of bat biology that requires more scrutiny is their transposable elements (TEs). These genome components have significant impacts on genome structure and function. The currently published bat genomes show their TE landscapes can be much different than that of a typical mammal. Their mutational effects on gene expression have been confirmed in several sequenced genomes to date and speciation events have been linked to increases in TE activity. Here, we will describe TE data on the first six Bat1k genomes comparing the landscapes and activity in different yungochiropteran and yinterochiropteran lineages. Additionally, we will compare TE enrichment around genes associated with increased longevity to determine if higher levels of TEs may have led to an adaptive breakthrough in bat aging.

**GENETIC STRUCTURE AND THE POTENTIAL FOR HYBRIDIZATION IN POPULATIONS OF *PEROMYSCUS SPP.* OF PLATEAU REGIONS IN WESTERN**

**OKLAHOMA** Sarah C. Vrla, Michelle L. Haynie, and Greg M. Wilson, Biology Department, University of Central Oklahoma ([svrla@uco.edu](mailto:svrla@uco.edu))

The biological species concept defines separate species as those being unable to interbreed or produce viable, fertile offspring in sympatric areas. This, along with morphological differences, have been widely used to recognize most species in non-sympatric distributions. However, in many instances, hybridization between closely related species occurs in sympatric areas. This phenomenon is common in the genus *Peromyscus*. The white-footed mouse (*Peromyscus leucopus*) and the deer mouse (*P. maniculatus*) are sympatric across much of the central and eastern North America. Both are considered habitat generalists, but do exhibit distinct preferences as *P. leucopus* predominately occurs in woody or brushy areas, and *P. maniculatus* is found predominately in grassy areas. In the plateaus of Four Canyons Preserve in western Oklahoma, *Peromyscus* species could not be identified as either *P. leucopus* or *P. maniculatus* morphologically. In order to investigate the genetic structure of this population and determine if hybridization between these species is occurring, I am utilizing microsatellite data and comparing Four Canyon individuals to specimens from allopatric regions.

## POSTERS AT-A-GLANCE

### 1 – LANDSCAPE CHARACTERISTICS SURROUNDING OCELOT-VEHICLE COLLISION SITES

AnnMarie Blackburn

### 2 – TRACE NUTRIENTS FOR TEXAS MAMMALS: TRACKING COPPER STORES OF RATS AND DEER

Kaylee A. Hollingsworth

### 3 – COMPARISON OF TELEMETRY AND OCCURRENCE DATA TO INFORM OCELOT HABITAT SUITABILITY IN SOUTH TEXAS

Jason V. Lombardi

### 4 – PRELIMINARY RESULTS: SPATIAL ECOLOGY AND POPULATION DEMOGRAPHICS OF THE PLAINS SPOTTED SKUNK (*SPILOGALE PUTORIUS INTERRUPTA*) IN SOUTHEASTERN TEXAS

J. Clint Perkins

### 5 – SUMMER ROOSTING ECOLOGY OF EVENING BATS ON THE GULF COAST OF TEXAS

Jacob A. Rogers and Matthew C. Parker

### 6 – WINNERS AND LOSERS: SMALL MAMMAL RESPONSES TO TROPICAL LAND USE CHANGE

Jacquelyn Tleimat

### 7 – EVALUATION OF A BLACK-TAILED PRAIRIE DOG RESTORATION VIA TRANSLOCATION IN THE TRANS-PECOS ECOREGION, TEXAS

Barbara Sugarman

### 8 – SMALL MAMMAL DIVERSITY AT FINCA HARTMANN IN CHIRIQUI, PANAMA AND THE QUEST TO FIND *RHEOMYS*

Connor J. Burgin

### 9 – PILOT STUDY: MACERATION TECHNIQUES COMPARING HYDROGEN PEROXIDE AND WATER

Terri Cox

### 10 – THE USE OF UV-REFLECTIVE MORPHOLOGY IN ARCTIC CAMOUFLAGE

Taylor C. Gray

### 11 – MAMMALS OF SOUTHERN YUNNAN PROVINCE CHINA

Jonathan G. Jasper

12 - A QUALITATIVE SURVEY OF ULTRAVIOLET (UV) REFLECTIVE MORPHOLOGY  
IN ORDER CHIROPTERA

Carlie M. Jennings

13 – A QUALITATIVE SURVEY OF ULTRAVIOLET (UV) REFLECTIVE MORPHOLOGY  
IN MAMMALS

C. Claire Smith

14 – UPDATING SPECIES DISTRIBUTIONS USING CITIZEN SCIENCE AND MUSEUM  
RECORDS: A CASE STUDY WITH BLACK BEARS (*URSUS AMERICANUS*) IN TEXAS

Alaya S. Keane

15 – COMPARISON OF SATELLITE AND GPS COLLARS ON OCELOTS AND BOBCATS  
IN SOUTH TEXAS

Samuel H. Stone

16 – ESTABLISHMENT OF A LONG-TERM SMALL MAMMAL MARK-RECAPTURE  
STUDY AT UCO’S SELMAN LIVING LAB TO IDENTIFY FACTORS IMPACTING  
POPULATION AND COMMUNITY PERSISTENCE

Anna M. Wagner

17 – EVIDENCE OF ELK (*CERVUS ELAPHUS*) PREDATION BY A SOLITARY COYOTE  
(*CANIS LATRANS*) IN SW OKLAHOMA AND CONTINUED RESEARCH

Sarah C. Vrla

18 – A PHYLOGENOMIC APPROACH TO EXAMINING RELATIONSHIPS WITHIN  
*PEROMYSCUS*

Laramie L. Lindsey

19 – MAKING A *MYOTIS*: CONNECTING TRANSPOSONS AND MUTATIONS IN BATS

Nicole S. Paulat

20 – DO STORAGE TEMPERATURES AFFECT DNA QUALITY OF SAMPLES IN  
GENETIC RESOURCE COLLECTIONS?

Taylor J. Soniat

21 – USING GENOMICS TO CHARACTERIZE POPULATION STRUCTURE,  
CONNECTIVITY, GENETIC VARIATION, AND HEALTH OF DESERT BIGHORN SHEEP  
IN TEXAS

Emily A. Wright

22 – PHYLOGENY OF *PEROMYSCUS MANICULATUS* SPECIES GROUP USING NOVEL  
NUCLEAR MARKERS, *DHPS* AND *SYCE1*

Daysi Alvarez

23 – THE EFFECTS OF ESTRADIOL IN PREHIBERNATION THIRTEEN LINED GROUND SQUIRRELS, *ICTIDOMYS TRIDECEMPLINEATUS*

Lindsay Apgar

24 – REEVALUATING SPECIES OF *HSUNYCTERIS* USING GMYC METHODS

Austin R. Bidby

25 – EVOLUTIONARY RELATIONSHIPS AMONG SUBSPECIES OF THE EASTERN MOLE (*SCALOPUS AQUATICUS*) IN THE CENTRAL UNITED STATES

Caylie R. Holybee

26 – ASSESSING THE GENETIC DIVERSIFICATION OF BATS IN THE GENUS *MONOPHYLLUS*

Irene Vasquez

## Poster Presentation Abstracts

*The following posters (1–7) are to be considered for the Vernon Bailey Graduate Award.*

### Poster 1

#### **LANDSCAPE CHARACTERISTICS SURROUNDING OCELOT-VEHICLE**

**COLLISION SITES** AnnMarie Blackburn<sup>1</sup>, Amanda M. Veals<sup>1</sup>, C. Jane Anderson<sup>1</sup>, Michael E. Tewes<sup>1</sup>, Humberto L. Perotto-Baldivieso<sup>1</sup>, Randy W. DeYoung<sup>1</sup>, and John H. Young Jr.<sup>2</sup>,  
<sup>1</sup>Department of Wildlife Science, Texas A&M University-Kingsville, <sup>2</sup>Texas Department of Transportation, Environmental Affairs Division ([annmarie.blackburn@tamuk.students.edu](mailto:annmarie.blackburn@tamuk.students.edu))

Increasing urbanization in the last century has become a leading threat to biodiversity worldwide. The development of roads has widespread negative impacts on wildlife populations such as habitat fragmentation, decreased landscape connectivity, and wildlife-vehicle collisions. Roads can act as artificial boundaries and influence the spatial ecology and population sizes of species of conservation concern. The ocelot (*Leopardus pardalis*) is a federally endangered wild felid found in the Lower Rio Grande Valley (LRGV) of South Texas, with a population of <80 individuals. The LRGV is one of the fastest growing population centers in the country, resulting in rapid urban sprawl and increasing infrastructure development further fragmenting habitat and landscape connectivity. Previous research has found that vehicle collisions are the highest direct source of mortality for the LRGV ocelot population. This study aims to understand whether land cover spatial structure is related to ocelot road mortalities. Using LANDSAT 30-m resolution classified imagery we examined the amount and distribution of vegetation cover surrounding 29 ocelot-vehicle collision locations during 1984-2017 and compared them to random road locations using landscape metrics (e.g. percent cover, mean patch area, patch density, edge density, and aggregation index). These metrics were quantified at 2 spatial scales (150 m and 1108-1638 m) based on daily movement lengths of ocelots in the LRGV. This information will give conservation planners a better understanding of the landscape features correlated with ocelot road mortality and thus can be used to guide the placement of future wildlife crossing structures designed for ocelot recovery.

### Poster 2

#### **TRACE NUTRIENTS FOR TEXAS MAMMALS: TRACKING COPPER STORES OF RATS AND DEER**

Kaylee A. Hollingsworth, Rachel D. Shively and Perry S. Barboza,  
Department of Wildlife and Fisheries Sciences, Texas A&M University ([kayleeholli@tamu.edu](mailto:kayleeholli@tamu.edu))

Trace minerals such as copper (Cu), are essential for reproduction and disease resistance of mammals but trace nutrient availability is difficult to assess for wild populations. We examined the hypothesis that the availability of trace minerals to herbivores is affected by soil composition and weather (i.e. precipitation and temperature) that influence biomass and mineral concentration of plants. We measured trace minerals at three trophic levels across a gradient of precipitation and temperature. We sampled soil, grasses (11 species), and browse (9 species) across 15 sites during spring (May – June). We collected hispid cotton rats (*Sigmodon hispidus*;  $n = 73$ ) in late summer (August – September) and deer (*Odocoileus virginianus*;  $n = 317$ ) in winter (October – February). We used PRISM monthly records to calculate total precipitation and maximum temperature in summer (May – September) and minimum temperature in winter (October –



February). Soil Cu increased with summer precipitation and warmer winters. Grass Cu ( $4 \pm 2$  ppm) was lower and less variable than that of browse ( $6 \pm 5$  ppm). Unlike grasses, browse Cu increased with summer precipitation and temperature as well as warmer winters. Liver Cu in rats ( $10 \pm 4$  ppm) was lower and less variable than that of deer ( $145 \pm 158$  ppm). Unlike rats, liver Cu in deer increased with soil Cu and with summer precipitation, temperature and warmer winters. Short lives and high fecundity limit the accumulation of liver Cu in rats that rely on grasses with low levels of Cu for both food and shelter. Conversely, deer consume browse with a greater variation in Cu concentration over longer reproductive cycles that favor accumulation of large liver stores that ultimately depend on the availability of Cu in soil. Woody plants and large herbivores may be the best indicators of trace nutrient supplies for populations of mammalian herbivores.

#### Poster 3

**COMPARISON OF TELEMETRY AND OCCURRENCE DATA TO INFORM OCELOT HABITAT SUITABILITY IN SOUTH TEXAS** Jason V. Lombardi<sup>1,2</sup>, Michael E. Tewes<sup>1</sup>, Humberto L. Perotto-Baldivieso<sup>1</sup>, Daniel G. Scognamillo<sup>3</sup>, and Tyler A. Campbell<sup>2</sup>, <sup>1</sup>Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, <sup>2</sup>East Foundation, <sup>3</sup>Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University ([lombardijv@gmail.com](mailto:lombardijv@gmail.com))

Modeling habitat suitability can be an important aspect in the ecology and management of endangered species; however, data collection can be time-consuming and expensive. There is no real consensus on the best forms of data to use for these models, especially when it comes to endangered carnivores. In South Texas, the ocelot *Leopardus pardalis* is an endangered neotropical felid that occurs in two small populations in Willacy, Kenedy, and Cameron counties. Habitat loss, fragmentation, and road mortality have led to losses in genetic diversity across populations. The purpose of this study is to determine which type of occurrence data will be the best predictor of ocelot habitat suitability across South Texas. Using telemetry data collected from 2011-2018 in Willacy and Kenedy counties, we aim to compare VHF data, low and high frequency GPS data, and other occurrence data (cameras, confirmed locations, and capture locations) to help inform habitat suitability models for ocelots. This study has implications for ocelot recovery because it will indicate which environmental variables and types of spatial data best predict suitability. Information from this study will help researchers identify potential areas of occurrence, future habitat restoration, and where future populations can be established.

#### Poster 4

**PRELIMINARY RESULTS: SPATIAL ECOLOGY AND POPULATION DEMOGRAPHICS OF THE PLAINS SPOTTED SKUNK (*SPILOGALE PUTORIUS INTERRUPTA*) IN SOUTHEASTERN TEXAS** J. Clint Perkins<sup>1</sup>, Kamren P. Jefferson<sup>2</sup>, Matthew H. Hamilton<sup>2</sup>, Robert C. Dowler<sup>2</sup>, and Richard D. Stevens<sup>1,3</sup>, <sup>1</sup>Department of Natural Resources Management, Texas Tech University; <sup>2</sup>Department of Biology, Angelo State University, <sup>3</sup>Museum of Texas Tech University ([J.Clint.Perkins@ttu.edu](mailto:J.Clint.Perkins@ttu.edu))

Habitat loss and alteration are major causes of decline at both the species and population level. The plains subspecies of the eastern spotted skunk (*Spilogale putorius interrupta*) has

experienced population decline, at least partially due to habitat loss and alteration, both range wide and throughout Texas. The West Gulf Coastal Plains ecoregion is adjacent to the Gulf of Mexico and stretches from western Louisiana to south Texas. This ecoregion was historically prairie habitat but has experienced extensive anthropogenic alteration most notably conversion to croplands, range and pasture lands, and urbanization. We recently initiated research into the spatial ecology and population demographics of the plains spotted skunk on the Katy Prairie, an undeveloped albeit altered gulf coast prairie in Harris and Waller Counties, Texas. Trail cameras were deployed in early January 2019 to assess skunk habitat associations. Live trapping efforts, to radio collar skunks in order to assess home range characteristics, also began in January 2019. We provide preliminary results on the success of our camera and live trapping surveys and plains spotted skunk habitat associations.

Poster 5

**SUMMER ROOSTING ECOLOGY OF EVENING BATS ON THE GULF COAST OF TEXAS** Jacob A. Rogers, Matthew C. Parker, and Sarah R. Fritts, Department of Biology, Texas State University ([J\\_R983@txstate.edu](mailto:J_R983@txstate.edu))

Bats spend more time roosting than any other activity and do so in various natural and anthropogenic structures. Few studies have examined bats of the Gulf Coast of Texas and none have analyzed roost selection of evening bats (*Nycticeius humeralis*), a widely distributed species on the southern edge of its range. Evening bats occupy roosts in cavities of live and dead trees, behind exfoliating bark, in tree foliage, buildings, and other locations. Our objective was to determine roost selection of evening bats on the Gulf Coast of Texas. From May to Aug 2018 we mist-netted in bottomland hardwood tracts on San Bernard National Wildlife Refuge and radiotracked six evening bats to five different roosts: two buildings and three tall, large-diameter live oaks (*Quercus virginiana*) (height: 27–31m; dbh: 107–200 cm) located in urban areas. Bats were utilizing the protected areas for foraging yet roosting in urban neighborhoods. Colony size ranged from approximately 48 to 500+ bats. One building roost was shared with Brazilian free-tailed bats (*Tadarida brasiliensis*). All bats stayed in roosts for the full life of the transmitter (5–21 days) and no roost switching occurred. Understanding the complex roosting strategies of evening bats could aid in the conservation of this species, in what is possibly an area of low bat diversity (3 captured species). We plan to radiotrack more evening bats during summer 2019 to further examine roost selection and make comparisons with evening bats from more northern populations.

Poster 6

**WINNERS AND LOSERS: SMALL MAMMAL RESPONSES TO TROPICAL LAND USE CHANGE** Jacquelyn Tleimat<sup>1</sup>, Nurul Afiqah Adam Nabil<sup>2</sup>, Isham Azhar<sup>2</sup>, Azniza Mahyudin<sup>3</sup>, and Sarah Fritts<sup>1</sup>, <sup>1</sup>Department of Biology, Texas State University, <sup>2</sup>University College Sabah Foundation, <sup>3</sup>Universiti Malaysia Sabah ([j\\_t161@txstate.edu](mailto:j_t161@txstate.edu))

Bornean forests are rich in biodiversity, yet they are subject to some of the highest deforestation rates in the world. As of 2018, 21% of Sabah, a Malaysian state within Borneo, has been converted to oil palm. Borneo is home 245 species of small mammals, 89 of which are non-volant. Due to small home-range size and increased susceptibility to predation under loss of vegetation cover, many species of small mammals are sensitive to land use change. As many

small mammals are seed dispersers, insectivores, and prey for larger predators, it is necessary to understand how these species are responding to disturbance. Our objective was to compare small mammal species composition in agricultural and old-growth forest areas within the Crocker Range Biosphere of the Tambunan Valley in Sabah, Malaysia. We hypothesized that agricultural sites would yield fewer species, all being generalists whereas forested sites would yield a greater number of species, including specialists. To investigate small mammal composition, we sampled 3 agriculture sites and 3 old-growth sites near Tambunan, Sabah, Malaysia. The species evenness in agriculture and old-growth were the same (0.78), and Shannon-Wiener diversity was similar (1.4 in agriculture and 1.5 in old-growth). Our findings suggest that some species of small mammals may be expanding their ranges, as some species captured in agricultural plots were unexpected based on prior research. More research is needed to understand how land use change is impacting small mammals in Borneo, especially as large deforestation rates persist primarily for conversion to oil palm plantation.

#### Poster 7

#### **EVALUATION OF A BLACK-TAILED PRAIRIE DOG RESTORATION VIA TRANSLOCATION IN THE TRANS-PECOS ECOREGION, TEXAS** Barbara J. Sugarman<sup>1</sup>, Bonnie J. Warnock<sup>2</sup>, Patricia J. Harveson<sup>1</sup>, and Russell L. Martin<sup>3</sup>, <sup>1</sup>Borderlands

Research Institute, Department of Natural Resource Management, Sul Ross State University, <sup>2</sup>Department of Natural Resource Management, Sul Ross State University, <sup>3</sup>Texas Parks and Wildlife, Midland, Texas ([bjs17it@sulross.edu](mailto:bjs17it@sulross.edu))

Prairie dog (*Cynomys* spp.) populations in North America have declined over the past few centuries due to a combination of sylvatic plague (*Yersinia pestis*), shooting, poisoning, and habitat conversion. To combat the decline of this keystone species, wildlife managers have used translocation to help restore prairie dogs to areas of extirpation. In this study, we translocated black-tailed prairie dogs (*C. ludovicianus*) to a site on private property 59 km south of Alpine, TX. Vegetation was measured pre-translocation and will be measured at the same time of the year post-translocation to assess the ecological impacts that prairie dog reintroduction has on the ecosystem. We installed nesting boxes, tubes, and retention baskets at the restoration site to prevent the immediate dispersal of translocated prairie dogs. Two-hundred and fifteen black-tailed prairie dogs were captured: 156 from Marathon, TX and 59 from Lubbock, TX. All 215 prairie dogs were translocated to the same site. Fecal samples from prairie dogs were taken to measure glucocorticoid during the capture of 153 prairie dogs from Marathon, TX, and at various time periods post-translocation at the translocation site in order to observe the effects of translocation on the stress level of the prairie dogs. The prairie dog population at the translocation site was regularly monitored post-translocation and predators were removed from the site. This study will help wildlife managers with future translocations of prairie dogs and will aid in the restoration of black-tailed prairie dogs to their extirpated habitat in the Trans-Pecos ecoregion.

*The following posters (8–16) are to be considered for the Vernon Bailey Undergraduate Award.*

Poster 8

**SMALL MAMMAL DIVERSITY AT FINCA HARTMANN IN CHIRIQUI, PANAMA AND THE QUEST TO FIND *RHEOMYS*** Connor J. Burgin<sup>1</sup> and John D. Hanson<sup>2</sup>,

<sup>1</sup>Department of Biology, Boise State University, <sup>2</sup>Department of Biology, Columbus State University ([connorburgin@u.boisestate.edu](mailto:connorburgin@u.boisestate.edu))

Finca Hartmann is situated in the Cordillera de Talamanca of western Panama near the Costa Rican border near La Amistad International Park. We have conducted two small surveys of the small mammals (bats, rodents, and marsupials) in the region thus far and will continue to visit the region for future collecting efforts. Currently, our knowledge of the diversity in the region comes primarily from collecting done by Robert K. Enders, who sampled Finca Hartmann during the 1970's. Thus far, we are finding the same variety of species that have been identified by Dr. Enders. We set Sherman live traps and snap traps on the floor and in trees in the secondary moist cloud forest surrounding the Ojo de Agua Biostation at Finca Hartmann and in various streams, banana groves, and shade coffee groves. Terrestrially, the most captured species captured is *Handleyomys alfaroi*, although species of *Heteromys*, *Reithrodontomys*, *Oligoryzomys*, *Oecomys*, and *Peromyscus* have been captured as well using Sherman live traps that are set on the forest floor and logs. Arboreally, we have captured species of *Marmosa*, *Peromyscus*, *Nyctomys*, and *Tylomys*. We also collected bats in various specific localities in the area, collecting a variety of species in the genera *Sturnira*, *Carollia*, *Myotis*, *Eptesicus*, *Dermanura*, *Desmodus*, and *Pteronotus*. *Sturnira* sp. were by far the most commonly capture bat, which may be attributed to the numerous banana groves scattered throughout the forest along roads and streams, which is where much of our collecting occurred. A genus rarely captured by Dr. Enders is *Rheomys*, which is currently our target genus for the area, represented by two species, *R. raptor* and *R. underwoodi*. Only one specimen of genus *Rheomys* in these mountains has been captured in the last 20 years, so collecting more specimens is of high importance.

Poster 9

**PILOT STUDY: MACERATION TECHNIQUES COMPARING HYDROGEN**

**PEROXIDE AND WATER** Terri Cox and Julie A. Parlos, Department of Biology, Texas Tech University at Waco ([terri.cox@ttu.edu](mailto:terri.cox@ttu.edu))

The study of gross anatomy and osteological structures is imperative to museums, curators, and researchers who utilize specimens for numerous studies, teaching, and preservation in museums. Various maceration techniques are employed to remove soft tissue in a way that is both efficient and leaves the specimens in optimal condition. Although sodium hypochlorite (i.e. common bleach) was previously used as a maceration method, even so it has proven this to be highly caustic to osseous surfaces rendering them unsuitable for forensics and research. Dermestidae colonies are widely regarded as an acceptable standard for defleshing in research. However, an alternative to these colonies is being explored due to meticulous upkeep of the dermestid colony, the time-consuming defleshing process, and allogenic effects on those exposed to the colonies. Alternatives to dermestid colonies can be exceptionally beneficial for museums and collections with limited space. This option alleviates the need for separate housing of dermestid colonies which can colonies from invading and devouring specimen in museum collections. Due to

damage as a result of hypochlorite and complexities associated with Dermestidae, this study investigates optimal maceration techniques at different temperatures in comparison to different concentrations of hydrogen peroxide. Our research aims to evaluate maceration techniques in terms of dry mass lost over time. This was carried out by allowing each dry specimen to macerate at different water temperatures and hydrogen peroxide concentrations at 2.5 hr. intervals. After which, specimens were allowed to dry completely between each round of maceration. This study aims to establish parameters for techniques using water and hydrogen peroxide in a manner which would benefit small teaching collections who do not process a high volume of specimens.

Poster 10

**THE USE OF UV-REFLECTIVE MORPHOLOGY IN ARCTIC CAMOUFLAGE** Taylor C. Gray and Sarah C. Vrla, University of Central Oklahoma ([tgray14@uco.edu](mailto:tgray14@uco.edu))

The use of camouflage to reduce the risk of predator detection is a key to the fitness of an organism. Many examples of species changing color to enable them to reduce detection in changing environments can be found in nature. One example is species having a white winter coat to reduce risk of detection in snowy environments. This phenomenon has been observed in various mammalian species (*Alopex lagopus*, *Mustela spp.*, *Lepus spp.*, etc.) as well as birds (*Ptarmagin spp.*). The winter pelage of 12 seasonally color-changing species has been found to camouflage in both the visible and ultraviolet (UV) spectrums. Snow has been shown to reflect between approximately 15-95% ultraviolet (UV) light, depending on the amount of soil contamination present. Therefore, there is some evolutionary pressure for species in arctic environments to camouflage in the UV spectrum as well. In this study, we used UV photography to qualitatively confirm UV reflection in these species as well as others. This method incorporates the UV-reflective standard Flurion to visually discriminate between UV-reflectivity and absorption while also allowing us to estimate the degree of reflectivity observed. Our findings confirm UV reflective morphology is used as a mechanism of camouflage in arctic environments.

Poster 11

**MAMMALS OF SOUTHERN YUNNAN PROVINCE CHINA** Jonathan G. Jasper<sup>1</sup>, Thomas E. Lee, Jr. <sup>1</sup>, and Arthur Cleveland, <sup>1</sup>Department of Biology, Abilene Christian University ([jgj16a@acu.edu](mailto:jgj16a@acu.edu))

From 1987 to 1990 Art Cleveland and Brian Chapman made a series of mammal collections in southern Yunnan Province, China. These collections were amassed near the town of Mengla. This is in a tropical cloud forest region near the border of China and Laos. These surveys help provide information about this region at a time of rapid industrial growth in China. In the three decades since these specimens were collected, much has changed in this region. Sherman traps, tomahawk traps and mist nets were used to collect specimens in this remote region. The species collected confirm many new records for this region. These species include: *Cynopterus sphinx*, *Macroglossus sobrinus*, *Rousettus leschenaultia*, *Hipposideros Pomona*, *Hipposideros pratti*, *Hipposideros lylei*, *Megaderma lyra*, *Rhinolophus rouxii*, *Rhinolophus macrotis*, *Rhinolophus thomasi*, *Scotophilus heathi*, *Chaerephon plicatus*, *Taphozous theobaldi*, *Aselliscus stoliczkanus*, *Miniopterus schreibersii*, *Pipistrellus abramus*, *Eptesicus serotinus*, *Callosciurus erythraeus*,

*Rhizomys pruinosus*, *Rhizomys sumatrensis*, *Herpestes javanicus*, *Crocidura fuliginosa*, and *Rattus* sp.

Poster 12

**A QUALITATIVE SURVEY OF ULTRAVIOLET (UV) REFLECTIVE MORPHOLOGY IN ORDER CHIROPTERA** Carlie M. Jennings and Sarah C. Vrla, Biology Department, University of Central Oklahoma ([cjennings10@uco.edu](mailto:cjennings10@uco.edu))

Communication in the ultraviolet (UV) has an array of adaptive functions such as foraging, social signaling, sexual selection, nectar-location, territory marking, etc., and is known to occur in a wide variety of taxa including plants, insects, reptiles, birds, and mammals. Communication in the UV requires some form of signaling mechanism, in the form of UV reflective morphology (i.e. hair) as well as a visual system capable of interpreting wavelengths in the upper UV range (390nm). Reflection of ultraviolet light by morphological markings in the kangaroo rat, *Dipodomys ordii*, has been confirmed (McDonald et al., unpublished). This UV-reflective morphology has been validated quantitatively through UV-VIS photospectrometry and subsequently corroborated qualitatively with UV-photography. This method incorporates the UV-reflective standard Fluorion to visually discriminate between UV-reflectivity and absorption while also allowing us to estimate the degree of reflectivity observed. Using this approach, we examined UV-reflective morphology in a variety of species in Order Chiroptera. Here we present our preliminary findings of species that exhibit some degree of UV reflective morphology. These results qualitatively suggest UV-reflection among these species, though further study is needed to determine if these morphologies have any adaptive significance or are the product of neutral selection.

Poster 13

**A QUALITATIVE SURVEY OF ULTRAVIOLET (UV) REFLECTIVE MORPHOLOGY IN MAMMALS** C. Claire Smith and Sarah C. Vrla, University of Central Oklahoma ([csmith230@uco.edu](mailto:csmith230@uco.edu))

Communication in the ultraviolet (UV) has an array of adaptive functions such as foraging, social signaling, sexual selection, nectar-location, territory marking, etc., and is known to occur in a wide variety of taxa including plants, insects, reptiles, birds, and mammals. Communication in the UV requires some form of signaling mechanism, in the form of UV reflective morphology (i.e., hair) as well as a visual system capable of interpreting wavelengths in the upper UV range (390 nm). Reflection of ultraviolet light by morphological markings in the kangaroo rat, *Dipodomys ordii*, has been confirmed (McDonald et al., unpublished). This UV-reflective morphology has been validated quantitatively through UV-VIS photospectrometry and subsequently corroborated qualitatively with UV-photography. McDonald et al. also found UV-reflectivity in gophers (Geomyidae) and jerboas (Dipodidae), qualitatively, using the same UV-photography protocol. This method incorporates the UV-reflective standard Fluorion to visually discriminate between UV-reflectivity and absorption while also allowing us to estimate the degree of reflectivity observed. Using this approach, we examined UV-reflective morphology in a variety of mammalian species. We investigated UV-reflective morphology in Order Rodentia (Families Cricetidae, Sciuridae, Muridae, etc.), Order Eulipotyphla (Talpidae, Soricidae, and Eulipotyphla), Order Carnivora (Families Canidae, Felidae, Procyonidae, Mephitidae,

Mustelidae, etc.). Here we present our preliminary findings of species that exhibit some degree of UV reflective morphology. These results qualitatively suggest UV-reflection among these species, although further study is needed to determine if any of these morphologies have adaptive significance or are the product of neutral selection.

Poster 14

**UPDATING SPECIES DISTRIBUTIONS USING CITIZEN SCIENCE AND MUSEUM RECORDS: A CASE STUDY WITH BLACK BEARS (*URSUS AMERICANUS*) IN TEXAS**

Alaya S. Keane<sup>1</sup>, and Jonah W. Evans<sup>2</sup>, Jessica E. Light<sup>1</sup>. <sup>1</sup>Department of Wildlife and Fisheries Sciences, Texas A&M University, <sup>2</sup>Texas Parks and Wildlife Department ([layak.97@tamu.edu](mailto:layak.97@tamu.edu))

Given the decline in collection efforts worldwide, data from citizen science initiatives and natural history collections will be instrumental in better understanding species distributions, ecology, and evolution. As a test case, we use data from Texas Parks and Wildlife Department records, iNaturalist, and VertNet to better understand the distribution of the American black bear (*Ursus americanus*) in Texas. Our results conflict with previous findings, indicating that black bears are not present in many areas of Texas and likely only breeding in a small number of counties. Importantly, our study highlights the usefulness of successful citizen science programs and the long-term historical importance of museum records to better understand not only geographic distributions, but also the ecology and evolution of various species, including the American black bear. These initiatives paired with improved communication and collaboration between natural history museums, citizen scientists, and state and federal agencies can greatly increase records for a variety of species, facilitating future research.

Poster 15

**COMPARISON OF SATELLITE AND GPS COLLARS ON OCELOTS AND BOBCATS IN SOUTH TEXAS**

Samuel H. Stone<sup>1</sup>, Jason V. Lombardi<sup>1,2</sup>, Michael E. Tewes<sup>1</sup>, and Tyler A. Campbell<sup>2</sup>, <sup>1</sup>Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, <sup>2</sup>East Foundation, San Antonio ([Samuel.Stone@students.tamuk.edu](mailto:Samuel.Stone@students.tamuk.edu))

Global positioning system (GPS) telemetry is a widely used research technique to understand spatial, behavioral, and population ecology of carnivores across the world. Over the last few years, the introduction of GPS collars with iridium now allows for more accurate location data and ability to view locations in real time. Reliability of GPS collars in a variety of habitat types is important for conducting statistical analyses and making informed conclusions regarding an animal's behavior. The ocelot (*Leopardus pardalis*) is a habitat specialist which prefers dense thornshrub habitats in South Texas. Bobcats (*Lynx rufus*), are habitat generalists and co-occur with ocelots in thornshrub communities in South Texas. From 2005-2010, we collared 2 ocelots on the Frank D. Yturria Ranch and from 2011-2017 we collared 9 ocelots and 5 bobcats on the East Foundation's El Sauz Ranch in Willacy County, TX with Televilt POSREC-science GPS, Lotek Minitrack GPS, and Lotek Litetrack Iridium collars. The purpose of this study is to compare the fix transmission rate for satellite and GPS collars for ocelots, compare GPS fix transmission rate for each species and explore if extrinsic factors (e.g., vegetation, animal behavior, number of satellites) influence GPS collar performance. Preliminary data for ocelots (n=1) and bobcat (n=1) indicated ocelots had a 79.4% success rate, whereas bobcats had a 94.6%

success rate. Data from this research is essential for understanding ocelot and bobcat ecology and making informed decisions regarding ocelot recovery in South Texas.

Poster 16

**ESTABLISHMENT OF A LONG-TERM SMALL MAMMAL MARK-RECAPTURE STUDY AT UCO'S SELMAN LIVING LAB TO IDENTIFY FACTORS IMPACTING POPULATION AND COMMUNITY PERSISTENCE**

Anna M. Wagner<sup>1</sup>, Francisca M. Mendez-Harclerode<sup>2</sup>, Gloria M. Caddell<sup>1</sup>, Chad B. King<sup>1</sup>, and Michelle L. Haynie<sup>1</sup>, <sup>1</sup>Department of Biology, University of Central Oklahoma, <sup>2</sup>Department of Biology, Bethel College ([awagner8@uco.edu](mailto:awagner8@uco.edu))

The purpose of this project is to monitor changes in rodent populations and communities over multiple generations and to determine what factors affect how the populations and communities change over time. In March of 2018, a permanent trapping web was established at the University of Central Oklahoma's Selman Living Lab (SLL). Two additional permanent webs were established in June of 2018. The SLL is located in the gypsum hills of Woodward County in western Oklahoma. Surveys of the 3 webs will be conducted for 3 nights, 4 times a year, for a minimum of 5 years. During each trip, each animal collected will be processed as follows: species identification; determination of sex, age, body condition, and reproductive condition; standard measurements; marking for permanent identification (done through tattooing); and ear punches (for DNA). In addition to animal data, climate and vegetation data will be obtained during every trip. To date, 3 trapping surveys have been conducted. In March 2018, a single web was surveyed and 14 individuals representing 6 species were collected. In June 2018, all 3 webs were surveyed and 25 individuals (22 new, 3 recaptures) representing 8 species were collected. All 3 webs were surveyed in October 2018, and 43 individuals (39 new, 4 recaptures) representing 7 species were collected. Starting in 2019, surveys will be conducted in January, March, June, and October. The animal, climate, and vegetation data will be used to build mathematical models that can be used to determine which factors have the largest impact on population and community persistence.

*Poster 17 is not competing for an award.*

Poster 17

**EVIDENCE OF ELK (*CERVUS ELAPHUS*) PREDATION BY A SOLITARY COYOTE (*CANIS LATRANS*) IN SW OKLAHOMA AND CONTINUED RESEARCH**

Sarah C. Vrla and Brandon K. McDonald, Biology Department, University of Central Oklahoma ([svrla@uco.edu](mailto:svrla@uco.edu))

Coyotes are capable of killing elk calves and deer fawns; however, the taking of larger prey has been demonstrated only through cooperative hunting strategies. Walters et al. (2005) gave the first verifiable account of an individual coyote killing an adult elk in the Wichita Mountains Wildlife Refuge in southwestern Oklahoma. Provided here is photographic evidence of the event. The event in Figure 1 is a rare observation and raises many questions regarding coyotes in general and coyote populations inhabiting the Wichita Mountains. This attack is unique, involving a solitary coyote and large ungulate but the manner in which it occurred is an anomaly in particular. Verified coyote attacks on large ungulates involve coordinated efforts by multiple



coyotes utilizing a series of attacks to various parts of the body, often the posterior, resulting in multiple injuries. Once injured, the prey animal is tracked over the course of hours and days until the prey animal becomes weak and unable to flee or defend itself. The attack involved only one strike by the coyote to secure the elk by the throat and after a brief struggle, the elk expired. This mode of hunting is more typical of larger apex predators (e.g., wolf, cougar, etc.). This raises many biological questions. Presented here are photographs of the attack and goals of our project examining the foraging ecology of coyotes in the area of the documented attack.

*The following posters (18–21) are to be considered for the Clyde Jones Graduate Award.*

#### Poster 18

**A PHYLOGENOMIC APPROACH TO EXAMINING RELATIONSHIPS WITHIN *PEROMYSCUS*** Laramie L. Lindsey<sup>1</sup>, Roy N. Platt<sup>1</sup>, Caleb D. Phillips<sup>1,2</sup>, David A. Ray<sup>1</sup> and Robert D. Bradley<sup>1,2</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Natural Science Research Laboratory, Museum of Texas Tech University ([laramie.lindsey@ttu.edu](mailto:laramie.lindsey@ttu.edu))

Adaptive radiations are described by the origin of multiple new species over a short period of time. These new species are often cryptic, with little or no morphological variation and display low levels of sequence divergence as measured by comparison of mitochondrial and nuclear genes. The genus *Peromyscus* represents such a scenario with approximately 70+ species arising in the last 5-6my. Over the years, evolutionary biologists and systematists have attempted to resolve species boundaries of *Peromyscus* through morphological and genetic analyses. However, the proposed evolutionary tree still contains unresolved relationships suggestive of rapidly radiating characteristics of *Peromyscus*. Advances in sequencing through-put and computational biology have provided biologists the opportunity to utilize more comprehensive datasets including genomic, transcriptomic, and whole exome approaches. For this study, we designed a custom-built exome array to examine potential modes of speciation within *Peromyscus*. The *Peromyscus maniculatus bairdii* genome was scanned for genes associated with reproductive, immune system, locomotion, developmental, biological adhesion, multicellular organismal, and cellular processes. Further, genes associated with baculum development were included in the array. We hypothesize that genes associated with baculum development in *Peromyscus* are highly variable, and possibly played a role in the adaptive radiation within the genus. The final design contains 20,000 baits, designed to 80 nucleotides with 2x tiling for each bait. We obtained tissues or skin clips for 30 species across the *Peromyscus* phylogeny (2 male individuals and 1 female individual from each species), as well as 4 outgroup species, and DNA was extracted. Next, we will conduct hybridization, and prepare and index sequencing libraries, followed by analysis on the Illumina HiSEQ. We will conduct phylogenetic analyses for each constructed exon and scan the exome for signatures of selection.

Poster 19

**MAKING A *MYOTIS*: CONNECTING TRANSPOSONS AND MUTATIONS IN BATS**

Nicole S. Paulat<sup>1</sup>, Jennifer Korstian<sup>1</sup>, Roy N. Platt II<sup>2</sup>, and David A. Ray<sup>1</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Genetics Department, Texas Biomedical Research Institute ([nicole.paulat@ttu.edu](mailto:nicole.paulat@ttu.edu))

Transposable elements (TEs) are DNA sequences that mobilize through copy-and-paste or cut-and-paste mechanisms, expanding within a host genome. *Myotis* is one genus within vespertilionid bats which has experienced an unorthodox TE history. For example, their genomes are unique among mammals in containing many active DNA transposons, which continue to shape their genomic landscapes. Recent data suggests that, in addition to the indel mutations normally associated with TE activity, these genetic elements may also contribute to higher mutation rates via low-fidelity DNA repair mechanisms. DNA transposons preferentially insert near genes, and so transposon activity may be correlated with mutation rate increases in regulatory regions and coding sequences. Retrotransposons likely have a similar, but lesser mutational impact, as the elements insert via single-stranded nicks, and do not excise themselves. An analysis of transposon polymorphisms in eleven *Myotis* species will reveal the extent of mutations in nearby genes that are associated with DNA repair after transposon insertions and excisions. These increased mutation rates could correlate to differences in orthologous genes between closely related *Myotis* species and contribute to our understanding of this exceptionally diverse clade.

Poster 20

**DO STORAGE TEMPERATURES AFFECT DNA QUALITY OF SAMPLES IN GENETIC RESOURCE COLLECTIONS?**

Taylor J. Soniat<sup>1</sup>, Caleb D. Phillips<sup>1,2</sup>, Kathy MacDonald<sup>2</sup>, and Robert D. Bradley<sup>1,2</sup>, <sup>1</sup>Department of Biology, Texas Tech University, <sup>2</sup>Natural Science Research Laboratory, Texas Tech University ([taylor.soniat@ttu.edu](mailto:taylor.soniat@ttu.edu))

Frozen tissue samples housed in natural history collections have many uses in the fields of biology, ecology, virology, taxonomy, and evolution. The recent increase in genomic level sequencing has generated an ever-increasing interest in using properly archived tissue samples. Therefore, it is imperative that frozen tissue collections are preserved and maintained in perpetuity. In order to accomplish this, tissue samples should be maintained in an environment that is sufficiently cold as to prevent damage to the tissue and DNA. Historically, -20°C and -80°C storage conditions were used for most frozen tissue collections. Recently, many institutions are starting to implement the use of liquid nitrogen freezing systems, which enable storage at temperatures as low as -196°C. To examine the effects of traditional storage conditions of frozen tissue collections (-80°C), tissue samples were obtained from the Genetic Resource Collection at the Natural Science Research Laboratory of the Museum of Texas Tech University. To control influence of body size variation and preparator experience, samples from Cricetid rodents prepped by a single individual were obtained at ten-year intervals ranging from 1986 to 2016. DNA was extracted using robotics for consistency, and the relative proportion of DNA of different molecular weights was assessed using a Fragment Analyzer. Molecular weights of samples were analyzed as a function of time and temperature. There was a significant difference in DNA quality between tissues from 1986 when compared with the other three time

periods. Additionally, there was a significant difference in DNA quality between liver and muscle tissues.

Poster 21

**USING GENOMICS TO CHARACTERIZE POPULATION STRUCTURE, CONNECTIVITY, GENETIC VARIATION, AND HEALTH OF DESERT BIGHORN SHEEP IN TEXAS** Emily A. Wright<sup>1</sup>, Froylan Hernandez<sup>2</sup>, Caleb D. Phillips<sup>1,3</sup>, Robert D. Bradley<sup>1,3</sup>, and Warren C. Conway<sup>4</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Texas Parks and Wildlife Department, Alpine, Texas, <sup>3</sup>Natural Science Research Laboratory, Museum of Texas Tech University, <sup>4</sup>Department of Natural Resources Management, Texas Tech University ([emily.wright@ttu.edu](mailto:emily.wright@ttu.edu))

Desert bighorn sheep (*Ovis canadensis nelsoni*) were extirpated from the Trans-Pecos Region of Texas by the 1960s due to overharvesting, competition with, and diseases from domestic sheep and exotic livestock. Restoration and translocation efforts by Texas Parks and Wildlife Department have reestablished populations to where bighorn sheep numbers have increased from ~ 14 in 1959 to > 1,500 across 11 mountain ranges. Several conservation concerns surround these restocking efforts. First, to understand the origins, and potential disease risks relative to the source stock origins of translocated bighorn sheep, source stocks must be examined. Second, bighorn sheep are susceptible to several epizootic diseases, such as pneumonia, thus potentially impeding augmentation and translocation success. Although diseases usually target individuals with compromised immune systems, this may not be the case with *Mycoplasma ovipneumoniae*, given its ability to impact all age and sex classes, particularly within small, isolated sheep populations. Third, these populations may have undergone inbreeding and genetic drift. Genetic profiles will be generated using mitochondrial DNA (mtDNA) and RADSeq to understand current Texas bighorn sheep population structure and diversity. Specifically, MtDNA markers track the success of maternal lineages to measure spatiotemporal genotype movement, whereas RADSeq methods will generate SNPs (single nucleotide polymorphisms) to identify variation between individuals and populations, and SNPs can be mapped to genomic loci to identify specific genetic traits. This research will provide baseline information relevant for management and conservation purposes to assess inbreeding and “genetic health”, optimize future translocation efforts, and develop parameters for tracking genotype fitness.

*The following posters (22–26) are to be considered for the Clyde Jones Undergraduate Award.*

Poster 22

**PHYLOGENY OF *PEROMYSCUS MANICULATUS* SPECIES GROUP USING NOVEL NUCLEAR MARKERS, *DHPS* AND *SYCE1*** Daysi Alvarez<sup>1</sup>, Laramie L. Lindsey<sup>1</sup>, and Robert D. Bradley<sup>1,2</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Natural Science Research Laboratory, Museum of Texas Tech University ([daysi.alvarez@ttu.edu](mailto:daysi.alvarez@ttu.edu))

The genus *Peromyscus* (geographic distribution including much of North and Central America) is a speciose group with approximately 70+ species hypothesized to have arisen during the last 5-6 million years. Systematists have attempted to resolve species boundaries of *Peromyscus* through morphological and genetic analyses. The *maniculatus* species group is of special interest because historically it has been thought to be comprised of approximately 4 species (*P.*

*maniculatus*, *P. melanotis*, *P. sejugis*, and *P. polionotus*). *P. maniculatus*, by far, has been the most morphologically and genetically diverse member of the species group, with as many as 68 subspecies being recognized. Recent efforts indicate that (based on mitochondrial, some SNP data, and chromosomes) *P. maniculatus* may be represented by 5 additional species. Through previous analyses of transcriptome data, we determined two novel nuclear markers (*Dhps* and *Syce1*) associated with reproduction that have high dN/dS ratios comparing four taxa across the *Peromyscus* phylogeny. *Dhps* could act as a post-zygotic barrier for hybridizing species of *Peromyscus* and prevent further development of hybrid embryos. The *Syce1* gene may be acting as a pre-zygotic barrier, thus preventing hybridization between species of *Peromyscus*. Consequently, we examined these two genes in light of the proposed systematic elevations within what formally was recognized as *P. maniculatus*. For this study, liver tissues were obtained through the NSRL (Natural Science Research Laboratory). Primers were designed for a 1,058 bp region of *Dhps*, and an 895 bp region of *Syce1* (both spanning at least one intron and one exon). Polymerase chain reaction and Sanger sequencing were conducted on individuals from the *maniculatus* species group. Sequences were analyzed under Bayesian and likelihood frameworks and preliminary results suggest that there is high sequence variability in the *Dhps* gene within the *maniculatus* species group.

Poster 23

**THE EFFECTS OF ESTRADIOL IN PREHIBERNATION THIRTEEN LINED GROUND SQUIRRELS, *ICTIDOMYS TRIDECEMPLINEATUS*** Lindsay Apgar, Siddharth Kortikere, Madison Myles, and Jessica Healy, Department of Biology, Austin College ([lapgar15@austincollege.edu](mailto:lapgar15@austincollege.edu))

Estradiol is a sex hormone that has been shown to have anorexigenic (hunger-reducing) effects in non-hibernators. However, in hibernators such as the thirteen-lined ground squirrel, *Ictidomys tridecemlineatus*, estradiol concentrations are at their highest during the breeding season, which overlaps with the time at which organisms are increasing their fat stores for the next winter. The purpose of this study is to determine whether estradiol has an anorexigenic effect in hibernators, and if so what the mechanism is. We hypothesized that estradiol would have anorexigenic effects during the prehibernation fattening season, and that the addition of estradiol would lead to a decrease in the activity of energy-sensing enzyme AMP-activated protein kinase (AMPK) by decreasing AMPK's activator liver kinase B1 (LKB1). We further hypothesized that these anorexigenic effects would be accompanied by decreased fat mass, decreased levels of the hunger-inducing hormone ghrelin, and increased metabolic rate. We implanted body temperature data loggers and either estradiol or oil capsules in five weight-matched male squirrels and monitored food intake, measured oxygen consumption and fat mass, and took white adipose tissue biopsies and blood samples for western blots and enzyme immunoassays. None of our hypotheses were fully supported, indicating that either our sample size was too small or that estradiol is not an anorexigenic hormone in hibernators.

Poster 24

**REEVALUATING SPECIES OF *HSUNYCTERIS* USING GMYC METHODS** Austin R. Biddy and Julie A. Parlos, Department of Biological Sciences, Texas Tech University at Waco ([austin.biddy@ttu.edu](mailto:austin.biddy@ttu.edu))

The order Chiroptera is comprised of 20 families, and Phyllostomidae are New World leaf-nosed bats. Of the various subfamilies within Phyllostomidae, Lonchophyllinae are nectarivorous bats, found in Peru, Bolivia, and Brazil north to Nicaragua. Within the past couple decades, Lonchophyllinae have undergone much taxonomic revision, including the delineation of the genus *Hsunitycteris* from *Lonchophylla* in 2014. Recent evaluation of *Hsunitycteris* led to the description of *H. dashe*. Including *H. dashe*, we reanalyzed specimens of *Hsunitycteris* using GMYC methods, attempting to estimate the number of species within the genus. The research community has described five species of *Hsunitycteris*, consisting of *H. pattoni*, *H. cadenai*, *H. dashe*, and two divergent groups of *H. thomasi*. This study utilized the first 400 base pairs of the Cytochrome B gene, and these analyses suggest that three to six species comprise *Hsunitycteris*. This data set will be further analyzed to determine whether discrepancies continue with these analyses and the current perception of *Hsunitycteris*.

Poster 25

**EVOLUTIONARY RELATIONSHIPS AMONG SUBSPECIES OF THE EASTERN MOLE (*SCALOPUS AQUATICUS*) IN THE CENTRAL UNITED STATES** Caylie R. Holybee<sup>1</sup>, Joel G. Brant<sup>2</sup>, and Dana N. Lee<sup>1</sup>, <sup>1</sup>Department of Agriculture, Biology and Health Sciences, Cameron University, <sup>2</sup> Department of Biology, McMurry University ([caylierholybee@gmail.com](mailto:caylierholybee@gmail.com))

*Scalopus aquaticus*, commonly known as the eastern mole, is native to the eastern United States (east of the Rocky Mountains) with populations extending into southern Canada and northern Mexico. In fact, this particular species is said to be the most prevalent of any North American mole known today. Yates and Schmidly (1977) used morphometrics to study individuals from the central United States, and Hall (1981) reported that 16 subspecies were recognized at the time. Here, we used cytochrome b sequence data to evaluate the genetic differences of seven *S. aquaticus* subspecies to examine if geographical barriers within the central United States affect the gene flow of this species. We also included specimens representing new Texas county records in order to identify their subspecies designation. We sequenced 465 base pairs of the cytochrome b gene from 38 museum specimens collected throughout the central United States. The DNA alignment was edited and found to have no insertions/deletions and could be translated. Both neighbor joining and maximum likelihood methods following a Tamura3 + G model of evolution and 1,000 bootstrap replicates suggest there is genetic support for only two of these seven *S. aquaticus* subspecies. Two specimens from Louisiana form a separate group from all other specimens in Texas, Oklahoma, Kansas, Nebraska, South Dakota, Iowa, Missouri, and Tennessee. The validity of the subspecies in Louisiana, *S. aquaticus howelli*, was also supported with an average genetic distance of 4.75% when compared to any other specimen. Pairwise genetic distances between all other moles were less than 3%. Our results using cytochrome b DNA sequence are similar to those of a previous unpublished student thesis using D loop sequences. Together these studies suggest high levels of gene flow among moles throughout the

central United States and call into question the taxonomic status of many subspecies in *S. aquaticus*. Future studies should examine more specimens east of Louisiana.

Poster 26

#### **ASSESSING THE GENETIC DIVERSIFICATION OF BATS IN THE GENUS**

***MONOPHYLLUS*** Irene Vasquez<sup>1</sup>, Laramie L. Lindsey<sup>1</sup>, Julie A. Parlos<sup>2</sup>, Robert J. Baker<sup>1,3</sup>, Robert D. Bradley<sup>1,3</sup>, Hugh H. Genoways<sup>4</sup>, <sup>1</sup>Department of Biological Sciences, Texas Tech University, <sup>2</sup>Department of Biological Sciences, TTU Biology at Waco, <sup>3</sup>Natural Science Research Laboratory, Museum of Texas Tech University, <sup>4</sup>University of Nebraska State Museum, Lincoln ([irene.vasquez@ttu.edu](mailto:irene.vasquez@ttu.edu))

The genus *Monophyllus*, the Antillean long-tongued bats, is distributed throughout the Greater and Lesser Antilles in the Caribbean region. *Monophyllus* is comprised of two species, *M. plethodon* and *M. redmani*. *M. plethodon* resides in the Lesser Antilles islands and three subspecies historically have been recognized (*M. p. frater* – now extinct, *M. p. luciae*, and *M. p. plethodon*). *M. redmani* occurs in the Greater Antilles islands with three subspecies (*M. r. clinedaphus*, *M. r. portoricensis*, and *M. r. redmani*). Based on prior knowledge (morphological data and preliminary molecular data), we hypothesize that *Monophyllus* consists of several species and that the currently recognized *M. redmani* can be split into more than one species based on the genetic species concept. The hypothesis was tested by evaluating molecular data generated from the mitochondrial cytochrome-*b* gene (1,140 bp), and the nuclear beta-fibrinogen gene intron 7. The species, *Glossophaga soricina*, was used as an outgroup. Thirty-nine samples were obtained through the NSRL (Natural Science Research Laboratory) from almost all subspecies of both *M. plethodon* and *M. redmani*. Likelihood and Bayesian showed a strongly supported monophyletic arrangement of all samples identified as *M. plethodon*, and a monophyletic clade of *M. redmani*. The two clades were genetically divergent by a K2P value of 10.9%. Preliminary results suggest that *M. plethodon* and *M. redmani* are different species based on the occurrence of genetically divergent clades. Further, the preliminary analyses suggest two genetically divergent clades (9.2%) within samples representing *M. redmani*.

**Texas Society of Mammalogists  
37<sup>th</sup> Annual Business Meeting  
Texas Tech University Center at Junction  
9 February 2019**

**AGENDA**

1. Approval of the Minutes of the 2018 Business Meeting
2. Report of Secretary-Treasurer, Marcy Revelez
3. Report of Permanent Secretary, Lisa Bradley
4. Report of Editor, Michelle Haynie
5. Reports of Committees
  - a. Committee for Honorary Members, Phil Sudman
  - b. Committee for Student Honoraria, Jessica Light
  - c. Financial Advisory Committee, Phil Sudman
  - d. Committee on Conservation, Mike Tewes
  - e. *ad hoc* Auction Committee, Marie Tipps
  - f. *ad hoc* Informatics Committee, Michelle Haynie
  - g. *ad hoc* Constitution Committee, Richard Stevens
6. Election of Secretary-Treasurer
7. Election of President-Elect
8. New Business
  - a. Selection of site for 2020 Annual Meeting
  - b. Other New Business
9. Closing Remarks of TSM President, Richard Stevens
10. Adjourn

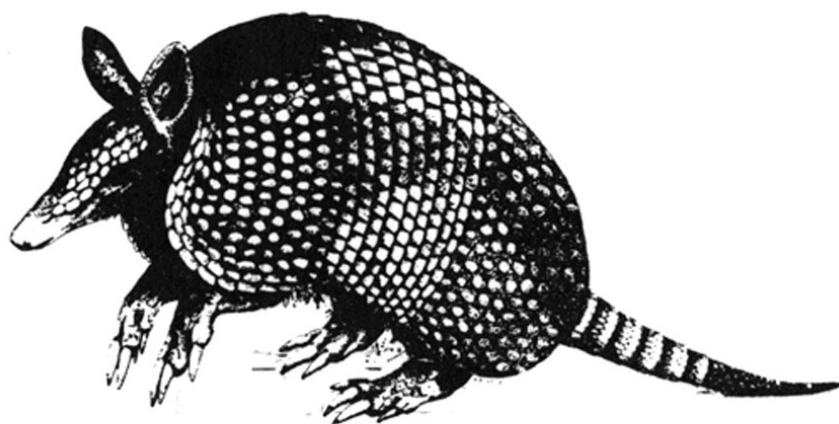
**Texas Society of Mammalogists**  
**Treasurer's Report for 1 January to 31 December 2018**  
**Submitted by Marcia (Marcy) A. Revelez, Secretary-Treasurer**

Income and expenses of TSM for the 2018 calendar year are shown below. Our checking account is with Bank and Trust. Our investments are handled by Morgan Stanley. The checking account balance as of the first of the year was \$5,400.20. Total income in 2018 was \$14,401.70 and total expenses were \$17,266.26. No funds were transferred to Morgan Stanley in 2018. TSM total assets at the end of 2018 were \$101,993.67. The value of the investment fund decreased \$6,872.01.

Checking Account Balance as of 31 December 2017	\$5,400.20
Investment Account (Morgan Stanley) balance 31 December 2017	\$106,330.04
<b>Total TSM assets as of 31 December 2017</b>	<b>\$111,730.24</b>
<b>2018 Income</b>	
2018 Annual Meeting income (registration, meals and lodging fees)	\$7,482.00
Membership Dues	\$220.00
T-shirts (76 ordered, 45 free)	\$760.00
Auction Income (live \$4,235, silent \$580)	\$4,815.00
Contributions	\$619.70
Patron memberships	\$496.00
Meeting photos	\$9.00
Total income	\$14,401.70
<b>2018 Expenses</b>	
2018 Annual Meeting Expenses to TTU Center	\$9,326.00
Entertainment - DJ	\$600.00
Refreshments/Beverages	\$757.79
Refreshments/Beverages (2017 meeting; belated reimbursement of purchaser)	\$667.76
Program copy charges (ASU print shop)	\$155.76
Nametags	\$167.55
Computer, software	\$119.99
Office supplies	\$124.94
New checks for checking account	\$32.70
PO Box	\$167.00
Student Awards	\$3,700.00
T-shirt charges (Gandy Ink) 110 purchased	\$812.50
Speaker Travel Reimbursement \$860.15 (\$632.45 owed pending receipts; \$227.70 paid)	
honorarium	\$0.00
airfare	\$0.00
car rental/gas/rideshare	\$0.00
hotel	\$227.70
Shipping	\$0.00
Stripes fees (\$249.35 registration, \$131.93 auction)	\$381.28
PayPal fees	\$25.29
Total expenses	\$17,266.26
Checking Account Balance 31 December 2018	\$2,535.64
Investment Account (Morgan Stanley) balance 31 December 2018	\$99,458.03
<b>Total TSM assets as of 31 December 2018</b>	<b>\$101,993.67</b>



# **Texas Society of Mammalogists**



**Newsletter  
2019  
The 37<sup>th</sup> Annual Meeting**



## 2019 Banquet Speaker

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Our banquet speaker will be Dr. David J. Schmidly, Professor Emeritus at University of New Mexico. Dr. Schmidly has spent his career studying the mammals of Texas, in particular from perspectives of systematics and biogeography, as well as history of the enterprise across the state since the inception of Mammalogy. He is the author of numerous publications in scientific journals. He is also an author of *The Mammals of Texas*, *The Bats of Texas*, and *Texas Natural History: a Century of Change*.

## Patron Membership

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Members are encouraged to consider becoming Patrons of the Society by donating \$100 (or more) to support the Society's student paper awards. A list of Patron members is published on the website and in the program. Regular Patron membership is achieved with a donation of \$100. Members who exceed \$100 in donations to the Society's student awards fund will receive a certificate recognizing their total donation level as follows: \$125, Ocelot Level; \$250, Bobcat Level; \$500, Puma Level; \$1000, Jaguar Level. Members can upgrade at any time, and all donations are cumulative. There is no time limit or minimum contribution requirement as a member works toward the next level. Donation levels are confidential.

## In Memoriam: Robert J. Baker (1942–2018)

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On 30 March 2018, the Texas Society of Mammalogists, and the field of mammalogy as a whole, suffered a grievous loss when Robert J. Baker, Ph.D., passed away after several months of declining health. As a founding member of the Texas Society of Mammalogists, Robert was believed to have attended more meetings than any individual in TSM's history. He not only attended, but he dedicated his time and seemingly boundless energy and enthusiasm to ensuring TSM's growth and success throughout the years. His absence at the annual meetings will be deeply felt by his many colleagues and academic progeny that are carrying on his dedication to the society.

### **Robert J. Baker as a Mammalogist and Educator**

Most would agree that Robert Baker is probably the most successful, productive, and impactful mammalogist ever affiliated with a Texas institution. He was a faculty member of Texas Tech

University (TTU) for his entire 48-year career; he was a Horn Professor, which is the highest faculty honor bestowed by TTU; he chaired the graduate committees of 48 Master's students and 50 Ph.D. students; his bibliography of publications is currently at 438, and still growing; he was a founder of the TTU Museum's Natural Science Research Laboratory, and served as its director from 1976 until his retirement in 2015. The list of his accomplishments goes on, and it is too long and complex to fully describe here. For more details, a professional obituary, authored by Hugh Genoways, Robert Bradley, David Schmidly, Lisa Bradley, James Bull, Karen McBee, Meredith Hamilton, and Peter Larsen, was published in the August issue of the *Journal of Mammalogy* that describes Robert Baker's career of more than 50 years. In addition, a memorial volume of more than 40 papers authored by friends, colleagues, and former students currently is being prepared for publication in the Special Publications series of the Museum of Texas Tech University.



### **Robert J. Baker's Impact on TSM**



*Baker (standing) at the "Texas State Mammal" Meeting, 1979*

The first "Texas State Mammal" meeting, a precursor to TSM, took place at Junction in February 1979. That meeting was organized by Dr. Robert L. Packard, the first mammalogist hired by Texas Tech University (in 1962), and he was accompanied at that meeting by his young colleague, Dr. Robert J. Baker, the second mammalogist hired by TTU (in 1967). That 1979 meeting also was attended by many TSM members that are still actively involved and attending the annual meetings, including Brian Chapman, Art Cleveland, Robert Dowler, Ira Greenbaum, David Schmidly, and Earl Zimmerman. Sadly, Dr. Packard passed away just two months later, but Robert Baker, Art

Cleveland, and several others took up the mantle to officially establish a Texas mammal society. The organizational meeting of the Texas Society of Mammalogists took place in 1981, at which the Constitution was drafted, and the first annual meeting with student presentations took place in 1983. Robert Baker served as the ad hoc presiding officer for the 1983 business meeting, during which the Constitution was approved by the membership.

Robert Baker was not just an "active" member of the Society—he was truly a leader throughout the years. As a founding member, Robert was involved in establishing the agenda and format for the meetings. Baker's graduate and undergraduate students gave papers at nearly every meeting of the society throughout his career. He served as TSM's eighth President (1990–1991), and was a Chair or member of numerous committees throughout the years. He was outspoken at Executive Committee meetings, especially on topics concerning the proper governance of the society and the financial well-being of TSM. He never let TSM lose sight of its purpose to be a

student-focused society. In the early years, he was instrumental in establishing the Patron Membership category as a fund-raising initiative to support student awards, and he served as the first Chairman of the standing committee for Student Honoraria (established 1984). He personally donated more funds to the society than any other individual, both through cash donations and by purchasing items at the society's annual fundraising auction (often after an intense battle of back-and-forth with competing bidders; in some cases, he then gifted the hard-won item to his competitor). No doubt, during the society's early years, Baker's financial generosity kept the society afloat. For many years, it was necessary to "pass the hat" to collect funds for student awards, the band, and adult beverages; Baker always made up the difference.



*Left to right: Rollin Baker, Art Cleveland, Robert Baker, Jim Patton, Carl Phillips at the "25<sup>th</sup> Anniversary" meeting of TSM, 2007*

The Texas Society of Mammalogists might not exist today if it had not been for the passion and dedication that Robert committed to its establishment, development, and financial stability throughout the years. As members, we owe him our gratitude, and we can best honor his memory by carrying on that devotion to the science of mammalogy and to the professional growth and success of students—the heart and soul of the Texas Society of Mammalogists, and the dream fostered and then nurtured by Robert J. Baker.

## News & Announcements

### Still Wanted! Observations and Specimens of Spotted Skunks!



*Robert Dowler*—My graduate students and I continue to collect data on spotted skunks in Texas and would be most appreciative if you could notify us of any specimens you encounter—observations, road-killed individuals, trail camera photos, obscure museum specimens or recent additions to collections that might not be on databases. We would especially like TSM members to keep an eye out for road-killed animals that could be salvaged between now and the February meeting. If any specimens are found, regardless of condition, and frozen, we could possibly use these for endoparasite analyses. Thanks and see you in Junction. For questions or to send information: Robert Dowler-325/486-6639 or Hannah Jones - 325/226-9222;

robert.dowler@angelo.edu

### Students Wanted!

We would like to encourage students to become more actively involved in the society. One of the ways you can do this is to join a committee. Below are the committees that are open for participation. If you are interested in joining a committee, please let us know while you are here at the meeting. You also can email [TXmammals@gmail.com](mailto:TXmammals@gmail.com) with the name of the committee(s) you would like to join. We will pass your name along to the committee chair and they will be in touch with you. In addition to committee work, we are looking for volunteers to assist at the

meeting every year (e.g., help with registration, etc.). If you are willing to assist at the meeting, please email [TXmammals@gmail.com](mailto:TXmammals@gmail.com) and indicate when you would be available to help and what you would like to do.

#### Conservation Committee

The role of this Committee is to monitor governmental and other activities that relate to conservation of mammals in Texas; advise officers and membership of the Texas Society of Mammalogists on issues of concern; and respond to the issues via formal resolutions. This Committee is intended to serve as a clearinghouse for information on all aspects of conservation of Texas mammals and to maintain the capacity to respond promptly and effectively in crises.

#### Ad hoc Auction Committee

The role of this Committee is to request and collect donations, set up and help conduct the live and silent auctions at the meeting, and help collect payments at the end of the auctions.

#### Ad hoc Government Liaison Committee

The role of this Committee is to facilitate interactions between the Texas Parks and Wildlife Department and TSM regarding issues that may affect mammalian conservation and research in Texas. It is similar to the Conservation Committee but is aimed specifically at communicating with TPWD.

#### Ad hoc Informatics Committee

The role of this Committee is to update and maintain the web and social media presence of the society. TSM currently has Facebook and Twitter accounts.

### **Website Updates**

We are working on updating the society website and are seeking requests for information you would like to see included on the site. We have developed pages to advertise jobs, internships, graduate student positions, etc. Please send your suggestions and requests to [TXmammals@gmail.com](mailto:TXmammals@gmail.com) or to Michelle Haynie ([mhaynie@uco.edu](mailto:mhaynie@uco.edu); Website Editor).

## **Abilene Christian University**

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Department of Biology, 1600 Campus Court, Abilene, TX 79699



### **Tom Lee**

Phone: 325-370-4442

Email: [leet@acu.edu](mailto:leet@acu.edu)

#### Research Interests, Projects, and Grants:

Abilene Christian University funded research last summer for a trip to Ecuador. Jack Minter funded new cases for the ACU natural history collection.



#### Undergraduate Students and Their Research:

- My students and I completed another field collection trip to the Andes of Ecuador. Seth Crockett and Nicholas Tinoco and I worked at almost 13,000 feet in southern Ecuador. Seth will present the results of our trip at these meetings.
- Jonathan Jasper will present data on mammals of southern Yunnan, China that Art Cleveland collected from 1987 to 1990.

#### Additional Information:

The Abilene Christian University Natural History Collection reopened this year after it was closed for two years while the room it was housed in was renovated. Pebbles Lee put on a great event to celebrate the reopening.

## Angelo State University

Department of Biology, San Angelo, TX 76909



### **Loren K. Ammerman**

Phone: 325-486-6643

Email: [loren.ammerman@angelo.edu](mailto:loren.ammerman@angelo.edu)

Web page: [www.angelo.edu/content/profiles/75-loren-k-ammerman](http://www.angelo.edu/content/profiles/75-loren-k-ammerman)

#### Research Interests, Projects, and Grants:

I am interested in bats and other mammals. I work with students to use molecular data to reconstruct evolutionary relationships of organisms and to investigate species boundaries and phylogeography. I also am interested in distribution, community structure, and the ecology of bats, especially in Texas.

I am currently funded for the project “Binational Conservation of an Endangered Pollinator: Research, Protection, and Recovery for the Mexican Long-nosed Bat” to use thermal imaging and PIT tag systems to monitor seasonal roost use in Big Bend National Park (TPWD Section 6 funding via contract with Bat Conservation International).

#### Current Graduate Students and Their Research:

- Virginia Jaquish – MS thesis student, *Agave* flower visitation by pallid bats, *Antrozous pallidus*, September 2017-present
- Miranda Perry – MS thesis student, Macronutrient composition of milk in insectivorous bats from the Chihuahuan Desert, August 2018-present
- Roxy Pourshoushtari – MS thesis student, Activity of Mexican long-nosed bats in Big Bend National Park, and, Population genetics of endangered Mexican long-nosed bats (*Leptonycteris nivalis*) using microsatellite markers, January 2017-present

#### Current Undergraduate Students and Their Research:

- Sydney Decker – Defining lineages of the Northern Yellow Bat (*Dasypterus intermedius*) based on nuclear and mitochondrial markers (Undergraduate Research Scholar, Fall 2015-present)

- Brent Wesley – Identification of barcoding genes for Agave species in western Texas (Undergraduate Research Scholar, Fall 2018-present)

#### Additional Information:

The Angelo State Natural History Collection has over 18,500 mammal specimens and over 20,000 tissue specimens. The collection is searchable at <https://www.angelo.edu/dept/biology/asnhc/> and on VertNet and GBIF. Contact Loren Ammerman or Robert Dowler if you have any questions about the collection.



#### **Robert C. Dowler**

Phone: 325-486-6639

Email: [robert.dowler@angelo.edu](mailto:robert.dowler@angelo.edu)

Web page: <http://www.angelo.edu/content/profiles/293-robert-dowler>

#### Research Interests, Projects, and Grants:

My graduate students and I are beginning field work to determine the spatial ecology of the plains spotted skunk (*Spilogale putorius interrupta*) in Texas after receiving continued funding through the Texas Comptroller's office. We are continuing work on other aspects of the ecology of eastern spotted skunks, including their endoparasites. I am considering putting additional M.S. students on additional areas of this research in the coming year. **I also am interested in all specimen records in Texas for any spotted skunks, as well as any sightings, photographs, or tissue samples with locality data. In particular we are trying to gather whole animals for endoparasite studies.** I am also interested in the conservation biology and systematics of Galapagos rodents, collaborating with Cody Edwards at George Mason University.

#### Graduate Students and Their Research:

- J. Clint Perkins completed his M.S. research on conservation status of the plains spotted skunk in Texas and is now heading up a Ph.D. study through Texas Tech University of spatial ecology of populations of these skunks at the Katy Prairie and nearby areas of Texas.
- Kamren Jefferson is beginning her M.S. research on den site selection of the eastern spotted skunk.

#### Undergraduate Students and Their Research:

- Matthew Hamilton is finishing the B. S. in Biology this semester and will be working on ecology of eastern spotted skunks as a graduate student beginning in May.



# Austin College

900 N. Grand Ave., Sherman, TX 75090

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## Jessica Healy-La Price

Phone: 903-813-2338

Email: [jhealy@austincollege.edu](mailto:jhealy@austincollege.edu)

### Research Interests, Projects, and Grants:

My primary area of study is the physiological ecology of ground squirrels that hibernate. Using both laboratory and field populations of thirteen-lined ground squirrels, I investigate interactions between hormones that control food intake and reproduction. I also have an ongoing long-term project examining the effects of small mammal exclosures on a prairie restoration site.

### Undergraduate Students and Their Research:

- Lindsay Apgar, Siddharth Kortikere (Effects of small mammal exclosure on prairie restoration)
- Monica Martinez, Lisha Jacob, Taqwa Armstrong (Sex hormones and food intake in thirteen-lined ground squirrels)

# Cameron University

Lawton, OK 73505

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## Dana N. Lee

Phone: 580-591-8009

Email: [dalee@cameron.edu](mailto:dalee@cameron.edu)

### Research Interests, Projects, and Grants:

I primarily study bats and am interested in all aspects of their ecology, genetics, and evolutionary relationships; although, I use molecular biology tools to study the genetic variation of other wildlife populations. Undergraduate students in my lab are either examining DNA sequence and regulatory regions of tumor suppressor genes in bats or using PCR to detect viruses found in Texas and Oklahoma bats.

Joel Brant (McMurry University) and I are working on producing a molecular phylogeny for subspecies of the Eastern Mole.

# Columbus State University

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Department of Biology, Columbus, GA



## **John Delton Hanson**

Phone: 806-549-4669

Email: [hanson\\_john1@columbusstate.edu](mailto:hanson_john1@columbusstate.edu)

### Research Interests, Projects, and Grants:

My research currently working on the systematics of various neotropical rodent groups. In addition, I am in the process of establishing some long term ecological projects looking at mammalian communities in areas being restored to long-leaf pine habitat.

# Houston Museum of Natural Science

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Dept. of Vertebrate Zoology, 5555 Herman Park Dr, Houston, TX 77030-1799



## **Dan Brooks**

Phone: 713-639-4776

Fax: 713-639-4767

Email: [dbrooks@hmns.org](mailto:dbrooks@hmns.org)

Web page URL: [www.hmns.org/exhibits/curators](http://www.hmns.org/exhibits/curators)

### Research Interests, Projects, and Grants:

Although I do quite a bit of work with birds, research interests in mammalogy span a variety of topics including community and behavioral ecology, biogeography and taxonomy, harvest patterns, natural history and conservation. I am particularly interested in

Neotropical species in lowland regions east of the South American Andes (especially the Peruvian Amazon, Paraguayan Chaco, and eastern Bolivia). Additional regions of coverage include Texas, Middle America, Africa, and the Philippines.

Current mammalogy projects I'm involved in include:

- Predation on *Tadarida* by raptors and night herons (with K. Winston and T. McSweeney)
- *Tadarida* movements during major flooding events (with T. McSweeney)
- Medium and large mammals of the unprotected area in the middle basin of the Planas River, floodplains of Colombia. (C. Aya-Cuero et al.)

### Graduate Students and Their Research:

Working at a museum, I don't have my own grad students but currently serve as an external committee member for several students. In terms of Mammalogy, there are currently two committees I serve on, both Ph.D. candidates:

- Juan Carlos Diaz (Rice Univ.) – Tracking the origins and source of genetic variation in the gene *Vkorc1*
- Kim Dingess (Indiana Univ.) – Vocal communication of the Dusky Titi Monkey (*Callicebus donacophilus*)

Additional Information:

The primary driver of the Houston Museum of Natural Science is Education, including outreach. We educate every 4th and 7th grader in Houston Independent School District annually (approx. 700,000 students/yr), have nearly 2.5 million individuals come through the doors per annum, and are the 4th highest attended museum in the country; surpassed only by Smithsonian, AMNH, and the MOMA, we are the highest attended US museum west of the Mississippi. Every year I tour college-level classes through our collections and permanent wildlife exhibit halls. If you have any interest in coming for a visit just touch base directly!

## McMurry University

Department of Biology, Abilene, TX 79697

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**Joel G. Brant**

Phone: 325-793-3875

Email: [brant.joel@mcm.edu](mailto:brant.joel@mcm.edu)

Research Interests, Projects, and Grants:

My research interests are primarily concerned with the natural history of mammals, particularly in Texas and the Chihuahuan Desert. My current research program focuses on the natural history & ecology of mammals in the Southern Rolling Plains, northern Edwards Plateau, and northeastern Chihuahuan Desert. My current projects include a survey of the mammals of the Southern Rolling Plains, specifically Taylor County & surrounding areas (with Tom Lee); an examination of the ecological distribution and population genetics of *Scalopus aquaticus* in Texas (with Dana Lee); assessing the ecological impacts of wind farms on bat diversity (with Tom Lee); and a survey of mammals at Camp Bowie Training Center in Brown County, Texas.

# Purdue University

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West Lafayette, IN



## **J. Andrew DeWoody**

Phone: 765-496-6109

Email: [dewoody@purdue.edu](mailto:dewoody@purdue.edu)

Web page:

<https://web.ics.purdue.edu/~dewoody/DeWoody/wordpress/>

### Research Interests, Projects, and Grants:

Evolutionary genetics and genomics; molecular ecology and evolution; natural history; conservation biology; wildlife and fisheries management. Our research occurs at the intersection of ecology, evolution, and genetics. Ongoing or recent projects have centered on fishes, herps, birds, and a variety of mammals including

marsupials, rodents, and cetaceans.

### Graduate Students and Their Research:

My graduate students and postdocs work on a variety of questions in ecology and evolution, including important conservation issues related to threatened and endangered species (e.g., gray whale population structure). Students matriculate through either the Biology program or a Wildlife program.

### Undergraduate Students and Their Research:

My undergraduates are all mentored by graduate students or postdocs. Most start as “assistants”, but the best students develop their own research projects.

### Additional Information:

I am always looking for bright, motivated students so please contact me if you are interested in an immersive experience at a top-notch graduate school. See my webpage for more details.

# Tarleton State University

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Department of Biological Sciences, Stephenville, TX 76402



## **Christopher L. Higgins**

Phone: 254-968-9019

Email: [higgins@tarleton.edu](mailto:higgins@tarleton.edu)

Web page: [faculty.tarleton.edu/higgins/](http://faculty.tarleton.edu/higgins/)

### Research Interests, Projects, and Grants:

Most of my research focuses on how local processes (e.g., behavior, competition, hybridization, parasitism) combine with regional processes

(e.g., colonization, environmental filtering, extinction) to determine the distribution and abundance of organisms. It combines experimental and observational approaches, and often uses computer simulations to determine whether empirical observations deviate from null expectations. Although most of my work has involved uncovering broad-scale patterns of metacommunity structure, I am currently interested in how various dimensions of biodiversity (functional, phylogenetic, and taxonomic) interact to provide insight into underlying structuring mechanisms.

The Higgins Research Lab recently completed a three year survey of mammals at Palo Pinto Mountains State Park (TPWD Contract No. 455307) and is now surveying bats at Camp Bowie and Camp Swift military training facilities (TMD Contract No. 17-2014-ENV). In addition, we are monitoring changes in small mammal assemblages at Timberlake Biological Field Station as part of Tarleton's Research Experiences for Undergraduates (REU) program (NSF Contract No. 1658984).

#### Additional Information:

The REU Site award to Tarleton State University, located in Stephenville, TX, will support the training of 10 undergraduate students from 2-year colleges or 4-year universities with limited research opportunities for 10 weeks during the summers of 2018 - 2020. Research will be conducted both on the main campus and at Timberlake Biological Field Station, located south of Goldthwaite in Mills County, TX. The scientific focus is on environmentally related issues associated with converting a working cattle ranch into a long-term biological field station. Ranching was once a widespread and profitable business with little environmental focus. However, increasing emphasis on sustainable land and water use has helped reshape how cattle ranchers manage their resources to maximize their gain while minimizing their impact on surrounding ecological systems. Faculty mentors will guide undergraduate students through the scientific process as they address basic and applied issues associated with balancing economic sustainability with environmental sustainability. Please visit TBFS's website for more information (<https://www.tarleton.edu/timberlakeranch/>).



#### **Philip D. Sudman**

Phone: 254-968-9154 or 817-484-4229

Email: [sudman@tarleton.edu](mailto:sudman@tarleton.edu)

Web page URL: [faculty.tarleton.edu/sudman/](http://faculty.tarleton.edu/sudman/)

#### Research Interests, Projects, and Grants:

I continue to have a keen interest in pocket gopher genetics/phylogenetics/population genetics. Although I have been reassigned and now work primarily out of Tarleton's Fort Worth campus, I hope to continue to mentor graduate students on a limited basis, so if you are interested at all in a project of mutual interest and are seeking a small university atmosphere, please get in touch.

**Russell S. Pfau**

Phone: 254-968-9761

Email: [pfau@tarleton.edu](mailto:pfau@tarleton.edu)

Web page: [faculty.tarleton.edu/pfau/](http://faculty.tarleton.edu/pfau/)

**Research Interests, Projects, and Grants:**

My main research focus is population and evolutionary genetics. Small mammals have been the primary subject of my research; but I have broadened my taxonomic coverage to include crabs, fish, plants, and insects. Ongoing projects include:

- Distribution of shrews (*Blarina*) in the southern Great Plains using mtDNA sequencing (for identification) and morphometric analysis to examine geographical patterns of variation
- Population genetics of several pocket gopher species in the genus *Geomys*
- Distribution of *Sigmodon hispidus* in Mexico
- Population genetics of the invasive mud crab, *Rhithropanopeus harrisii*
- Species status of two bumblebees in Texas (in collaboration with Jessica Beckham and Jeff Johnson, University of North Texas)
- Conservation genetics of the crawfish frog (State Wildlife Grant, TPWD) in collaboration with Toby Hibbitts, Texas A&M—College Station.

**Undergraduate and Graduate Students and Their Research:**

- Jennipher Campbell and Megan Irizarry – Population genetics of gophers (*Geomys*).
- Jason Villaret-Dean – Distribution of shrews (*Blarina hylophaga* and *B. brevicauda*) in the southern Great Plains using mtDNA sequencing.
- Seth Hamby (Master's student) – Population genetics of the Texas endemic plant, *Dalea reverchonii*.

## Texas A&M Natural Resources Institute

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Texas A&M University, College Station, TX 77843

**Krysta D. Demere**

Phone: 979-458-8553

Email: [Krysta.demere@ag.tamu.edu](mailto:Krysta.demere@ag.tamu.edu)

Web page: <https://nri.tamu.edu/>

**Research Interests, Projects, and Grants:**

My current research focus revolves around the ecological monitoring of military lands and conducting baseline biological surveys to ensure compliance with environmental policies. Additionally, in collaboration with Texas Parks and Wildlife, my team and I surveyed bat hibernacula across Texas during the 2016-2017 winter season and documented the first known occurrence of *Pseudogymnoasucus destructans* (the fungus responsible for the development of white-nose syndrome in bats) in the state. Personal



areas of interest for me are largely concerned with community structure, ecology, the natural history of bats and other non-game species.

## Texas A&M University-College Station

Department of Wildlife and Fisheries Sciences, Biodiversity Research and Teaching Collections,  
Texas A&M University, College Station, TX 77843



### **Jessica Light**

Phone: 979-458-4357

Email: [jligh2@tamu.edu](mailto:jligh2@tamu.edu)

Web page: [www.jessicalight.org](http://www.jessicalight.org)

### Research Interests, Projects, and Grants:

I am an evolutionary biologist with a focus on phylogenetic, population genetic, and ecological interactions between parasites and their hosts. To address these broad research interests, I employ a variety of tools such as molecular (multiple genes, population genetic loci, or genomic data) and morphological data from field-collected and museum specimens. My lab is currently funded by Texas EcoLabs (to explore biology of Nelson's pocket mouse and pocket gophers and their lice), TPWD (to explore the distribution of the Nelson's pocket mouse in Texas), and Texas A&M University. My lab was also recently funded by the National Science Foundation (to investigate the population genetics of an expanding population of chewing lice) and CONACYT (to assess the role of the Mexican Plateau as a center for diversification).

### Graduate Students and Their Research:

- Adrian Castellanos is a sixth year Ph.D. student. For his dissertation research, he is undertaking a comparative phylogeographic study across Central America, concentrating his investigation on analyzing published data and obtaining new genomic data from the variegated squirrel and the gray four-eyed opossum.
- Whitney Preisser is a sixth year Ph.D. student. Whitney is examining how parasite diversity (specifically parasites of cricetid rodents) varies across latitude.
- Leila Sicilliano-Martina is a third year Ph.D. student (co-advised with Dr. Michelle Lawing). Leila is exploring evolutionary changes in morphology in captive and domesticated animals.

### Undergraduate Students and Their Research:

- Undergraduate students Emma Dohnalik and Grace Vielleux have been instrumental in assisting with TPWD and Texas EcoLabs fieldwork. Emma also has participated in *Peromyscus* morphometrics research. Both students plan to stay active in the lab over the next year.
- Several undergraduate students have worked in the Biodiversity Research and Teaching Collections on various organizational projects. Their assistance is much appreciated.
- Undergraduate students Celeste Wickman and Tony Keith helped conduct pocket gopher fieldwork associated with Texas Ecolabs funding.

- Recently graduated students continue to assist with research projects, including exploring the distribution of across North America and investigating the distribution of NUMTs in mammals.

Additional Information:

The mammal division in the Biodiversity Research and Teaching Collections (<http://brtc.tamu.edu>) currently has over 66,000 specimens. Our data are available online through VertNet, iDigBio, and GBIF.

## Texas A&M University-Kingsville

Feline Research Program, Caesar Kleberg Wildlife Research Institute



**Michael Tewes**

Phone: 361-593-3972

Email: [michael.tewes@tamuk.edu](mailto:michael.tewes@tamuk.edu)

Web page: <https://www.ckwri.tamuk.edu/research-programs/feline-research-program>

Research Interests, Projects, and Grants:

Small cats – ocelot, bobcat, jaguarundi, margay, clouded leopard, Asiatic golden cat, leopard cat, marbled cat; not-so-small: cougar and jaguar

Graduate Students and Their Research:

- AnnMarie Blackburn: M.S. student looking at patterns in landscape use of ocelots when crossing roads as well as how nearby roads can affect survival rates of ocelots. Thesis title: Influence of roads and landscape features on the spatial ecology and mortality of ocelots in south Texas
- Shelby Carter: M.S. student interested in wild cat ecology and conservation, wildcat mating and reproduction. Thesis research: Coexistence among felids, cattle and game species
- Jason Lombardi: Ph.D. student interested in using GPS data, remote-sensing technology, and non-invasive survey techniques to explore different aspects of the biology and ecology of mammalian carnivores and other threatened mammals. Dissertation title: Habitat factors of ocelot occupancy in South Texas. Three other on-going projects: 1) Survey for endangered ocelots and evaluation of potential restoration sites; 2) Ocelot occupancy and co-occurrence of felids in Northeastern Mexico; 3) Collaboration with researchers at the University of Georgia examining region-wide distribution and occupancy of threatened Allegheny Woodrats in Virginia.
- Maksim Sergeyev: Ph.D. Student; research focus: Ecology of high intensity, fine scale movement patterns and thermal environments used by interacting ocelots and bobcats





**Lon Grassman**

Phone: 361-222-1790

Email: [lon.grassman@tamuk.edu](mailto:lon.grassman@tamuk.edu)

Research Interests, Projects, and Grants:

I currently conduct field research on wild felids in Texas and Argentina, and have spent several years working in Thailand investigating wild cat ecology and conservation. To date, I have studied 10 cat species using radio-telemetry or camera trapping. These species are jaguar, jaguarundi, margay, ocelot, tiger, leopard, clouded leopard, Asiatic golden cat, marbled cat, and leopard cat.



**Jane Anderson**

Phone: (919) 454-9382

Email: [jane.anderson@tamuk.edu](mailto:jane.anderson@tamuk.edu)

Research Interests, Projects, and Grants:

I specialize in applied, interdisciplinary ecology, typically focused on: terrestrial mammal ecology and management, invasive species management, and human dimensions of natural resource conservation. I am currently studying ocelot landscape ecology in south Texas.

## Texas Tech University

Department of Biological Sciences, and Natural Science Research Laboratory, Museum of Texas Tech University, Lubbock, TX 79409



**Robert D. Bradley**

Phone: 806-834-1303

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

Web page: [www.biol.ttu.edu](http://www.biol.ttu.edu), [www.nsrl.ttu.edu](http://www.nsrl.ttu.edu)

Research Interests, Projects, and Grants:

My research interests include: systematic relationships, molecular evolution, genomics, and natural history of mammals, particularly in the cricetid and geomyoid rodents; determining the genetic basis for adaptation in *Peromyscus*, examination of hybrid zones between genetically distinct taxa; including isolating mechanisms and the dynamics of genetic introgression; exploring the utility and application of the Genetic Species Concept; examination of the origin and evolution of rodent-borne viruses, especially in the use of rodent phylogenies and genetic structure to predict the transmission and

evolution of viruses; modeling predictions associated with epidemiology; and growth and utilization of natural history collections, especially those pertaining to mammals.

#### Current Projects:

- Systematics of the genus *Peromyscus*
- Use of genomic methods to investigate speciation and adaptation in *Peromyscus*
- Systematic and phylogenetic studies of *Peromyscus boylii* species group
- Systematic and phylogenetic studies of *Peromyscus maniculatus*
- Endangered species research on *Dipodomys elator* with Richard Stevens and David Ray
- Phylogenetic relationships of Neotomine and Reithrodontomyine rodents
- Systematic and phylogenetic studies of the genus *Neotoma*
- Systematic studies of the genus *Geomys* and *Thomomys* with Richard Stevens and David Ray
- Ecology of hanta- and arenaviruses in the southwestern US and Mexico
- Effects of zonadhesin gene in speciation of mammals
- Revision of *Texas Natural History: A Century of Change* with D. J. Schmidly and L. C. Bradley

#### Graduate Students and Their Research:

- Emma Roberts (PhD Candidate) is in her 5<sup>th</sup> year. Dissertation research involves gamete recognition proteins, reproductive isolation and the role they play in mammalian speciation.
- Laramie Lindsey (PhD Candidate) is in her 5<sup>th</sup> year. Laramie is being co-chaired by Dr. Caleb Phillips and her dissertation involves examining transcriptomes and exomes in various species of *Peromyscus* in order to detect genes associated with speciation process.
- Taylor Soniat (MS student) is in his 4<sup>th</sup> year. Taylor will be examining the quality of DNA obtained from various archival methods at the Museum.
- Emily Wright (MS student transferring into a PhD position) is in her 3<sup>rd</sup> year. Her research project will utilize genomic methods to characterize population structure, connectivity, genetic variation, and health of Desert Bighorn Sheep in Texas.
- Heidi Stevens (MA student) is in her 3<sup>rd</sup> year. Her research examines the post-mortem degradation rate of DNA and RNA in liver and muscle samples collected from *Sigmodon hispidus*". Heidi is a Museum Science major so her research projects focuses on our Genetic Resource Collection.
- Joanna Bateman (PhD student). She is in her 1<sup>st</sup> year, following the completion of a MS degree with Duke Rogers at BYU. Joanna probably will use genomic methods to determine speciation and evolution in heteromyid rodents.

#### Recently Graduated Students:

- Nicté Ordóñez-Garza (PhD, 2016) - "Diversification of cricetid rodents in the montane regions of Mesoamerica: Is the Isthmus of Tehuantepec a vicariant barrier?"
- Juan P. Carrera Estupinan (PhD, 2016) - "Diversity, zoogeography, and community ecology of Bats in the Ecuadorian Andes."

Both Nicté and Juan have moved to Ecuador (Juan's home) and are interviewing for faculty positions.

#### Undergraduate Students and Their Research:

- Last year, 9 undergraduate students (Morgan Ballard, Courtney Evans, Daysi Alvarez, Mariah Mills, Huy Nguyen, Cassie Poehlein, Marissa Rodriquez, Irene Vasquez, and Chris Vu) were involved in various research projects in the Laboratory.

#### Additional Information:

- My teaching responsibilities include: Mammalogy, Natural History of the Vertebrates, Molecular Systematics and Evolution, Mammalogy for Advanced Students, and Principles of Systematics. In addition, I teach Mammalogy at the Texas Tech University Center at Junction each May (referred to as the Intersession Semester). This is an excellent opportunity to receive credit at the Graduate or Undergraduate level. I also teach "Field Methods" for the Museum of TTU each summer. This three-week course offers an opportunity to garner experience in field biology.
- I am the Director of the Natural Science Research Laboratory, Museum of Texas Tech University.
- In addition, I am editor of the publication series (*Occasional Papers* and *Special Publications*) at the Natural Sciences Research Laboratory, Museum of Texas Tech University. We are seeking to increase the number of contributions to these two series, so please, send us your manuscripts!



#### **Caleb D. Phillips**

Phone: 806-834-8181

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

Web pages: [www.biol.ttu.edu](http://www.biol.ttu.edu), [www.nsrl.ttu.edu](http://www.nsrl.ttu.edu)

#### Research Interests, Projects, and Grants:

The Phillips laboratory studies metagenomes, genomes, craniofacial development, as well as some morphology and molecular mammalogy.

The lab is currently supported by a Texas Parks and Wildlife

Department SWG, the National Science Foundation, as well as an

ongoing genetic consulting contract with Zara Environmental LLC.

#### Graduate Students and Their Research:

- Oscar Sandate (MS student): Microbiomes, diet and energetics of *Tadarida brasiliensis* throughout pregnancy
- Matthew Fox (PhD student): Post-transcriptional regulation of Sonic Hedgehog in craniofacial development
- Craig Tipton (PhD student): Interindividual, temporal, and geographic distribution of chronic wound microbiomes and how they are influenced by host (human) genetics
- Preston McDonald (MS student): Status, Distribution, Morphology and Genetics of *Sigmodon fulviventer dalquesti* in the Chihuahuan Desert Ecoregion (TPWD SWG)

- Megan Rowe (MS student): Distribution of Musashi-binding elements across the genomes of mammals
- Rachael Wiedmeier (MS student): Spatio-temporal structure of bighorn sheep microbiomes and how they may relate to disease susceptibility

#### Additional Information:

My teaching responsibilities include Bioinformatics, Metagenomics and Organic Evolution. These courses are offered at both graduate and undergraduate levels. I am also Curator of Genetic Resources at the Natural Science Research Laboratory.



#### **Richard D. Stevens**

Department of Natural Resources Management, Lubbock TX 79409

Phone: 806-834-6843

Email: richard.stevens@ttu.edu

Web page URL: <http://www.myweb.ttu.edu/richstev/>

#### Research Interests, Projects, and Grants:

- Patterns of biodiversity of New World bats.
- Conservation of Atlantic Forest bat communities.
- Metacommunity structure of rodents of the Mojave Desert.
- Distributional update for Texas Kangaroo rats (with Robert Bradley and David Ray).
- Summer and winter day-roost use by *Myotis septentrionalis* in Louisiana.
- Winter occupancy and activity of bats in Louisiana and eastern Texas (with Liam McGuire).
- Comparative population genetics of imperiled bats of Louisiana (with David Ray).
- Population Status of Texas Pocket Gophers (with Robert Bradley, David Ray, and Neal Platt).
- Continued Study of the Plains Spotted Skunk (with Bob Dowler).
- Bat Survey of Fort Wolters (With Sarah Fritts).
- Use of Highway Structures by Bats in the Trans-Pecos Ecoregion of Texas.

#### Graduate Students and Their Research:

- Cristina Rios-Blanco—Cristina started her Ph.D. at TTU in August 2014. She is interested in how bat communities are assembled at regional scales. She is studying Neotropical bat metacommunities along elevational gradients and trying to use elevational contexts to better understand bat metacommunity structure. She will also be developing a network approach to apply to metacommunities to better elucidate biological processes important to metacommunity dynamics.
- John Stuhler—John is a fourth year Ph.D. student having completed his M.S. at the University of Wisconsin. He is interested in the ecology/conservation biology of Texas kangaroo rats and is conducting an intensive study of habitat preferences. He is also interested in large-scale diversity patterns in heteromyid rodents.
- Michaela Halsey—Michaela, a fourth year Ph.D. student, is interested in the influence of the physical landscape on gene flow and population genetic structure in Heteromyid and

Geomyid rodents. She plans to demonstrate how such information, analyzed via bioinformatic methods, can guide conservation management and practice. She is co-advised by David Ray and me.

- Erin Stukenholtz—Erin finished her M.S. in August 2016. She conducted her thesis on dietary patterns of bats, especially differences between pregnant and nonpregnant (males, females and juveniles) bats in terms of their diets and relating this back to the energetics of pregnancy and lactation. She also developed a less invasive means of determining early pregnancy by examining vaginal cytology and progesterone levels in feces. She is now working on her Ph.D. focusing on the urban ecology of feral pigeons.
- Carlos Garcia—Carlos is a M.S. student under David Ray and me. For his masters, he is working on studying the roosting ecology of the threatened bat species, *Myotis septentrionalis*, in Louisiana and is interested in studying the diets between *M. septentrionalis* and *M. austroriparius*. He has also conducted a survey throughout the state of Louisiana for white-nose syndrome.
- Jenna Grimshaw—Jenna is a second year Ph.D. student co-advised by David Ray and me. She earned a M.S. with Chris Higgins at Tarleton State University. Her current research is to identify patterns of genetic structure in three species of critically-imperiled Louisiana bats: *Myotis austroriparius*, *M. septentrionalis*, and *Eptesicus fuscus*. More specifically, she aims to determine if each of these three species comprise a single population or multiple genetic subpopulations with little gene flow. She is also interested in the distribution of transposable elements among mammalian genomes from a genomic ecological perspective.
- Brett Andersen—Brett is a second year Ph.D. student co-advised by Liam McGuire and me. He earned his M.S. from University of Nebraska at Kearney under Keith Geluso. Brett is interested in winter bat community structure in east Texas and Louisiana as well as differences in ecophysiology of migrating versus non-migrating species of *Lasiurus*.
- Holly Wilson—Holly is a first year Ph.D. student who recently earned her M.S. from Fort Hays State University under Elmer Birney. She is interested in how bats use highway structures as day-roosts in the Trans Pecos of Texas as well as characterizing ecological neighborhoods of pallid bats.
- Clint Perkins—Clint is a first year Ph.D. student who recently earned his M.S. from Angelo State University under Bob Dowler. His project revolves around population and spatial ecology of the plains spotted skunk, *Spilogale putorius interrupta*.
- Macy Madden—Macy is the newest addition to the lab. She is interested in plant-pollinator interactions between baobab trees and *Rousettus aegyptiacus* and *Epomophorus* species in South Africa and Kenya.

# Trinity University

Department of Biology, One Trinity Place, San Antonio, TX 78212

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## **David O. Ribble**

Phone: 210-999-8363

Email: [dribble@trinity.edu](mailto:dribble@trinity.edu)

Web page: [www.trinity.edu/](http://www.trinity.edu/)

### Research Interests, Projects, and Grants:

I am interested in the evolutionary ecology of small mammals, including *Peromyscus* and elephant-shrews. My research in recent years has ranged from studies of social organization to mating behavior to thermal ecology. I have recently begun leading a course in Costa Rica where we are monitoring the elevational distribution of small mammals on the Pacific Slope from Monteverde to the coast. I just finished my first year serving as Associate Vice President of Academic Affairs for Budget and Research, so while my own research agenda has diminished, I am enjoying supporting and promoting others at Trinity University.

# University of Central Oklahoma

Department of Biology, Center for Wildlife Forensic Science and Conservation Studies,  
Edmond, OK 73034

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## **Michelle L. Haynie**

Phone: 405-974-5774

Email: [mhaynie@uco.edu](mailto:mhaynie@uco.edu)

Web page:

<http://sites.uco.edu/cms/biology/Faculty%20Web%20Pages/dr.-michelle-haynie.asp>

### Research Interests, Projects, and Grants:

My research interests lie primarily in population genetics and molecular systematics. I am interested in using genetic markers to address conservation and evolutionary questions, with most of my current research focusing on comparative hybrid zone studies and the identification of cryptic species. I also am interested in genomic drivers of the speciation process and local adaptations.

My current projects include:

- Genetic identification of *Peromyscus* at the Four Canyons Preserve and assessment of a putative contact zone between *P. maniculatus* and *P. leucopus*
- Genetic examination of *Geomys* contact zones in Oklahoma
- Status and trends of bobcat populations in Oklahoma (with Vicki Jackson, Sue Fairbanks, and Jerrod Davis)
- A genetic evaluation of bobcat subspecies in Oklahoma

- Phylogeography of Sonoran mud turtles in a fragmented landscape (with Paul Stone and Marie Stone)
- A long-term small mammal mark-recapture survey at UCO's Selman Living Lab to identify factors that impact population and community persistence (with Francisca Mendez-Harclerode, Gloria Caddell, Chad King, and Sean Laverty)

#### Graduate Students and Their Research:

- Laura Kimmel – Phylogeography of Sonoran mud turtles in a fragmented landscape; co-advised with Dr. Paul Stone
- Kristy Meyer – Reexamination of a known *Geomys* contact zone in Cleveland Co., Oklahoma
- Sarah Vrla – Genetic and morphological identification of *Peromyscus* at the Four Canyons Preserve and assessment of a putative contact zone between *P. maniculatus* and *P. leucopus*
- Cristina Coffman – Genetic examination of *Geomys* contact zones in central Oklahoma and a putative cryptic species in the Oklahoma panhandle (graduated summer 2018)

#### Undergraduate Students and Their Research:

- Taylor Gray – Qualitative survey of UV reflective morphology in snakes; potential implications of UV reflective morphology in arctic camouflage; Taylor also is assisting with the bobcat project and is part of the Selman team
- Carlie Jennings – Qualitative survey of UV reflective morphology in bats; Taylor also is assisting with the bobcat project and is part of the Selman team
- C. Claire Smith – Qualitative survey of UV reflective morphology in mammals; Claire also is assisting with the bobcat project and is part of the Selman team
- Anna Wagner – Anna is assisting with the bobcat project and is part of the Selman team
- Kayle Patananian – Kayle is assisting with the bobcat project and also works in a developmental biology research program at UCO
- Brooke Savory – Phylogeography of Sonoran mud turtles in a fragmented landscape, Brooke will be adding microsatellite genotypes to this dataset; Brooke also is part of the Selman team
- In addition to the students working in my lab, 15 other undergraduate students from two different institutions have participated in the Selman project. I also have had two graduate students, not in my lab, participate.

#### Additional Information:

- I am still in the process of writing the "Mammals of Oklahoma" with Bill Caire and Lynda Loucks. We are getting closer!
- I currently am seeking a M.S. student to continue working on gopher genetic diversity in Oklahoma, particularly populations in southeastern Oklahoma.





## **Vicki Jackson**

Phone: 405-974-5480

Fax: 405-974-5726

Email: [vjackson4@uco.edu](mailto:vjackson4@uco.edu)

### Research Interests, Projects, and Grants:

My research interests include spatial ecology and captive wild animal care.

My current projects and grants include:

- October 2019: STEM Summer Bridge Program – UCO STLR Program.
- August 2018: Mammal Survey for The Nature Conservancy- Oklahoma City Zoo Property – The Nature Conservancy.
- March 2018: STEM Freshman Research and Mentoring Program – UCO STLR Program.
- October 2017: STEM Summer Bridge Program – UCO STLR Program.
- July 2017: Current Distribution of Eastern (Plains) Spotted Skunks (*Spilogale putorius interrupta*) in Eastern Oklahoma – Oklahoma Department of Wildlife Conservation.
- April 2017: Conference: Identifying Challenges for Elementary Educators: Implementing the Oklahoma Academic Science Standards – National Science Foundation (Division of Undergraduate Education).
- August 2016: Baseline Mammalian Surveys at Oka' Yanahli Preserve – The Nature Conservancy.

### Graduate Students and Their Research:

- Mesocarnivore Survey of Southeastern Oklahoma (Spencer Gotcher, KaLynn Branham)
- Mesocarnivore Survey of Pontotoc Nature Preserve (Aaron Kidd)
- Dominance Hierarchies of Juvenile African Painted Dogs (Rikki Curto)
- Occupancy Modelling of Mesocarnivores at Oka' Yanahli Nature Preserve (Dineesha Premathalike; completed May 2018)

### Undergraduate Students and Their Research:

- Mammal Survey at a Public Park, Oklahoma City, OK (Ashely Hughes, Toran Muldowney-Anderson, Theron Blunck)
- Introduction to Captive Animal Behavior, Oklahoma City Zoo, Oklahoma City, OK (Brayden Fennity, Hailey Cloud, Jose Gallegos, Josh Jacob)
- Small Mammal Surveys at Oka' Yanahli Nature Preserve, Johnston County, OK (Wendy Monterroso)
- Spotted Skunk Survey in LeFlore County, Oklahoma (Austin Jones)
- Creation of a Slide Library for Identification of Mammalian Fur (Sofia Alvarez-Briglie)
- Using Photographic Evidence to measure Growth in African Painted Dogs (Amanda Smith)



# The University of Texas at Austin

Texas Memorial Museum, 2400 Trinity St. Stop D1500, Austin, TX 78712

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## **Pamela R. Owen**

Phone: 512-232-5511

Email: [p.owen@austin.utexas.edu](mailto:p.owen@austin.utexas.edu)

Web page: [www.TexasMemorialMuseum.org](http://www.TexasMemorialMuseum.org)

### Research Interests, Projects, and Grants:

- Evolutionary history of American badgers (Taxidiinae).
- Late Cenozoic mammalian faunas: Phill Shaw (museum volunteer) and I continue work on late Pleistocene mammal remains from the Slaughter Creek Site in southeastern Travis County. Besides the *Capromeryx* (diminutive pronghorn) material we described in 2017, there are some intriguing taxa from this site, including: a llama-like camelid, wolves (*Canis dirus* and *C. lupus*), and a machairodont felid. Other taxa identified include *Bison*, *Odocoileus*, *Equus*, *Procyon lotor*, and *Canis latrans*.

### Additional Information:

As Associate Director of Texas Memorial Museum, I coordinate and support collections-based natural science programs for educators, preK-16 learners, and the public. I developed two new teacher professional development workshops focusing on mammals: *Bite Club – Exploring Tooth Evolution*, and *Stepping Out! – Mammal Limbs and Movement*. I continue to serve as Associate Editor for *Mammalian Species* (fossil record section) and serve on the Public Education Committee of the American Society of Mammalogists. I provide annual training in mammalogy for five chapters (Balcones Canyonlands, Capital Area, Good Water, Hays County, and Lost Pines) of Texas Master Naturalists.

# University of Houston—Downtown

Department of Natural Sciences, 1 Main Street, Houston, TX 77002

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## **Amy Baird**

Phone: 713-222-5301

Email: [BairdA@uhd.edu](mailto:BairdA@uhd.edu)

Web page: <https://bairdlab.wordpress.com/>

### Research Interests, Projects, and Grants:

My research interests include molecular phylogenetics, phylogeography, and speciation of mammals. Current projects include genetic studies of local populations of pocket gophers; molecular phylogenetics of lasiurine bats, including phylogeography of the Hawaiian Hoary bat; population genetics of bowhead whales

(grant funded through the North Slope Borough); and taxonomy of *Rhogeessa* bats (with John Bickham and Jessica Light). I've also been working on herps with a phylogeographic study of *Rhinoclemmys* (with John Carr). I am partially funded by a grant from the North Slope Borough (PI).

Undergraduate Students and Their Research:

- Travis Exline – Travis is working on phylogeography of shrews from Central America
- Pedro Brito – Pedro is working on mtDNA sequencing and SNPs in bowhead whales

## U.S. Centers for Disease Control and Prevention

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CDC Biorepository, Atlanta, GA 30345



**Marcia (Marcy) A. Revelez**

Phone: 404-498-1665

Email: [mrevelez@cdc.gov](mailto:mrevelez@cdc.gov)

Web page URL: <https://www.cdc.gov/csels/dls/cdc-biorepository.html>

Research Interests, Projects, and Grants:

I have over twenty years of experience working in natural history collections, primarily with mammal and genomic collections. I am now the Lead and Collections Manager for the CDC Biorepository, which is made up of approximately 6 million specimens from research, surveillance, and emergency response efforts at CDC. My role is to modernize the biorepository, with emphasis on policy and collection stewardship. Research interests revolve around best practices, collections management, data management, and IPM. I am part of a new endeavor to create a preparedness repository for CDC, to facilitate public health response to emergency outbreaks in the U.S.

Additional Information:

Member, federal Interagency Working Group of Scientific Collections (IWGSC); member, Enviro-Bio Group for International Society of Biological and Environmental Repositories; member, Biobanking standards for International Organization for Standardization (ISO); member, workgroup National Plan for digitization of biodiversity collections (Network Integrated Biocollections Alliance (NIBA)), Biodiversity Collections Network (BCoN); member, Systematics Committee, American Society of Mammalogists (ASM)

# Minutes of the 2018 Business Meeting

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**Texas Society of Mammalogists  
General Business Meeting  
Texas Tech University Center, Junction, Texas  
17 February 2018**

The meeting was called to order by President John Hanson at 3:15 pm in the Packard Building of the Texas Tech University Center at Junction. The minutes of the 2017 Annual Business Meeting, as written in the 2018 Program for the Texas Society of Mammalogists (TSM), were approved.

## **Officers' Reports**

**Secretary-Treasurer.** Marcy Revelez noted that the Treasurer's report was in the Program and she provided a brief summary of the report. She noted that registrants who cancel late generally cannot receive refunds, because the TTU Center charges for the facility use by the person, and those charges are based on registration numbers provided in advance of the meeting. She reminded the members that registration and lodging fees are now waived for presenters, thanks to the current available assets of the Society, which are largely the result of auction income and donations. Attendance at the current meeting was about 115 members, which is somewhat lower than in recent years. Marcy noted that the total attendance was nearly 50% students, and thanked them for attending. She also mentioned that more than 30 institutions were represented at the meeting.

**Permanent Secretary.** Permanent Secretary Lisa Bradley reported that she takes photographs to document the meeting, and she maintains the archives of the society at the TTU Southwest Collection and asked that members send any relevant items for the archives to her. She asked that Committee Reports be turned in to her at the meeting or forwarded to her soon after the meeting. She also noted that she prepares the annual program for the meeting.

**Editor.** Newsletter Editor Russell Pfau reported that he had produced the 2018 Newsletter (printed in the back half of the program booklet). He also announced that he would be resigning his position as Editor, but that the Executive Committee had a nominee to bring forward (during New Business) as his replacement. He also noted that the Editor's duties include managing the TSM website. He informed the membership that the newly redesigned website, however, was thanks to the efforts of President John Hanson. Marcy noted that the primary reason for the change to the website was to make online registration and abstract submission possible. The membership thanked Russell for his years of service to the Society with a round of applause.

## **Reports of Committees**

Phil Sudman, Chair of the Committee for Honorary Members, reported that his report would be made at the banquet, and encouraged members to bring potential nominations to him. At the banquet that evening, Phil Sudman apologized that he had forgotten to prepare the framed certificate for Michael Tewes, the 2017 Honorary Member winner, but it would be presented to him in 2019. In addition, Phil announced that there were two Honorary Members being named in 2018, Lisa Bradley and Robert Bradley.

President-elect Richard Stevens, Chair of the Committee for Student Honoraria, announced that there had been a very good slate of talks this year (18 oral, 22 poster). He explained that the evaluation of papers was being done a little differently this year, with new forms available for the judges. The completed evaluation forms would be mailed to the student presenters after the meeting, to provide the students with valuable feedback. He noted that the remainder of his report would be given later that evening at the

banquet. President Hanson and Richard thanked the 15 judges who had volunteered to evaluate papers at the meeting.

After the banquet dinner, Stevens announced the winners of the presentation awards. Each winner received a cash award (\$500 for the Packard Award and \$400 for all others).

The award winners for oral presentations were:

1. Robert L. Packard Award — Roxanne Pourshoushtari, Angelo State University
2. TSM Award — Alexandra Shaffer, Angelo State University
3. William B. Davis Award — Jason Lombardi, Texas A&M University-Kingsville
5. Bobby Baker Award – Brittney Jones, Angelo State University
6. Rollin H. Baker Award — Michael Moran, Austin College

Poster presentation award winners were:

1. Clyde Jones Award (graduate) — Bridgett Downs, Texas A&M University
2. Vernon Bailey Award (graduate) — Leila Siciliano-Martina, Texas A&M University
3. Clyde Jones Award (undergraduate) — Sydney Decker, Angelo State University
4. Vernon Bailey Award (undergraduate) — Bernardo Traversari, Trinity University

Phil Sudman, Chair of the *ad hoc* Financial Advisory Committee, reported to the membership that the investment account had earned about 14% over the course of 2017. He noted that covering the registration and housing costs of student presenters this year was the first significant use of the investment funds and was a big step in the right direction. He reminded the members that the auction and donations make this possible, and he encouraged members to continue to support the Society. To address a question, he explained that the TSM investment fund is comprised of two low-to-moderate risk mutual funds. Marcy and Phil agreed that they could, in the future, bring the portfolio from Morgan Stanley to the annual meeting and allow members to review that portfolio, if desired.

There was some discussion of the financial and logistical implications of the meeting growing. Marcy and John emphasized that the Society has a plan for handling more oral presentations.

Michael Tewes, Chair of the Committee on Conservation, reported that the 2017 Border Wall Resolution of TSM had been used as a model for similar resolutions by other groups, such as the Texas Chapter of the Wildlife Society, the Texas Wildlife Association, and the American Society of Mammalogists.

Marie Tipps, Chair of the *ad hoc* Auction Committee, reported that the 2017 auction raised \$3,460 in the live auction and \$834 in the silent auction, for a total of \$4,294. Marie asked for help after the Business meeting with getting the auction items and tables over to the Dining Hall to set up for the live and silent auctions. She thanked committee members Cory Ross and Carla Ebeling for their assistance, and the membership for donating items to the auction. She reminded members that the Auction Committee is always looking for additional donations from members or businesses, and for additional committee members.

### **Election of Officers**

President Hanson announced that the Executive Committee had nominated one candidate for President-Elect, Jessica Light (Texas A&M University). The floor was opened for additional nominations. There were none. Jessica was elected by acclamation.

### **New business**

It was moved and seconded to hold the 2019 TSM meeting at the TTU Center at Junction. Motion passed. The 2019 meeting will be held February 8–10.

President Hanson announced that the Executive Committee had nominated Michelle Haynie for Editor. The floor was opened for additional nominations. There were none. Michelle was elected by acclamation.

President Hanson informed the membership that he had established an *ad hoc* Informatics Committee to manage the website and our social media presence (Twitter, Facebook, etc.), with Michelle Haynie as Chair. The Committee would be responsible for correcting any problems with the website, as well as expanding the website to include news, accomplishments of members, professional resources such as grant and job announcements, etc., as well as promoting TSM via social media. He encouraged members to see Michelle to serve on that committee.

President Hanson announced that Richard Stevens would be appointing an *ad hoc* Constitution Committee to address, over the course of the next year, several issues identified by the Executive Committee that might justify constitutional or by-law amendments.

The floor was opened for additional new business. Heidi Stevens mentioned that in recent years more members had been bringing their children to the meetings, and she raised the possibility of creating a committee that would be responsible for providing children's activities and supervision while parents are presenting or attending talks, etc. Marcy explained that Heidi was willing to lead a sort of "day camp" during the meeting. Phil Sudman brought up the possibility of liability issues. Richard Stevens was asked to investigate such potential issues, and to visit with TTU about the proposed idea over the course of the next year.

President Hanson reminded members that t-shirts for Robert Baker, David Schmidly, and Ira Greenbaum, and a program for Ron Pine, would be available in the Dining Hall for everyone to sign and express their get well wishes.

At the Banquet later that evening, President Hanson presented a draft Resolution of the Society (see below), which was approved by acclamation.

**WHEREAS**, the Texas Society of Mammalogists has been in existence since 1981 and annually seeks to bring together the top minds in Texas mammalogy, and

**WHEREAS**, some of our most dedicated and senior members were unable to attend this year due to illness and injury, and

**WHEREAS**, Dr. David Schmidly, our 4<sup>th</sup> president, has been instrumental in developing the science of mammalogy in Texas through his mentoring of graduate and undergraduate students, and his publication record, including *The Mammals of Texas*, *Marine Mammals of the Gulf of Mexico*, *Texas Natural History: A Century of Change*, and *The Bats of Texas*, and

**WHEREAS**, Dr. Robert J. Baker served as chair of the organizational meeting and was our 8<sup>th</sup> president, and has fostered not only the understanding of the mammals of Texas, but throughout the western hemisphere through publications on karyotypic megaevolution, species concepts, and chiropteran systematics, and Dr. Baker served as Director of the TTU NSRL for many years and graduated many students who went on to influential careers in mammalogy, and

**WHEREAS**, Dr. Ira Greenbaum, who served as our 11<sup>th</sup> president and the default expert on Robert's Rules of Order for the society, has furthered the study of mammalogy through his investigations of rodent systematics through allozyme analyses, chromosomal studies, and nuclear and mitochondrial

investigations, and his research has influenced and molded our understanding of the genus *Peromyscus*, both through his own work and that of his students, and

**WHEREAS**, Dr. Ron Pine has been a long time dedicated member of the Texas Society of Mammalogists, and has influenced the study of mammals in the western hemisphere through his field work and morphological studies, and has shared his encyclopedic, intricate, and minute knowledge of the field with many students over the years,

**THEREFORE, BE IT RESOLVED** that the members of the Texas Society of Mammalogists at its 36<sup>th</sup> annual meeting acknowledge the hole their absence leaves in our midst and wish them a speedy recovery and that they return to our meetings soon.

Also at the Banquet, the winners of the Mammal Challenge were announced. Jack Francis (student winner in 2017) explained that individuals who had won before were ineligible to win again. The highest student score was by Laramie Lindsey (who had won before), and the next highest score was by Andrew MacPhie. Loren Ammerman (faculty winner in 2017) presented Andrew with a certificate and congratulatory gift. The highest faculty scores were by Bob Dowler, Marcy Revelez, Tom Lee, and Robert Martin. Dr. Martin and Andrew receive the honor of planning the Mammal Challenge for 2019.

President Hanson announced that the Society was awarding Jaguar Patron membership to Ann and Terry Maxwell, in recognition of their generous contributions to the Society and to the TSM fund-raising auction for many years. Ann was presented with a certificate and was thanked with a round of applause from the membership.

The meeting was adjourned at 6:56 pm (with a recess from 3:47 pm to 6:33 pm).

Respectfully submitted,  
Lisa Bradley  
Permanent Secretary

## STUDENT AWARDS

***These awards are made possible by the generous donations of the Society's members and by fundraising activities.***

Robert L. Packard Award – The Robert L. Packard Award is presented for the Best Overall oral presentation. Eligibility is open to any student who has not previously received this award. This award currently includes an honorarium of \$500.

The Robert L. Packard Award was first awarded in 1985 for the best student presentation. In 1990, when the TSM Award was established, the Packard Award was designated for the best presentation in classical mammalogy. Since 1998, the Packard Award has been designated for the Best Overall oral presentation. The award was named in honor of Robert L. Packard (1928-1979), the founder of the Texas Society of Mammalogists.

TSM Award – The TSM Award is presented for the best oral presentation in mammalian molecular biology, evolution, and systematics by a graduate student. Eligibility is open to any graduate student who has not previously received this award. This award currently includes an honorarium of \$400.

The TSM Award was established in 1990.

William B. Davis Award – The William B. Davis Award is presented for the best oral presentation in classical mammalogy at the organismal level by a graduate student. Eligibility is open to any graduate student who has not previously received this award. This award currently includes an honorarium of \$400.

The William B. Davis Award was established in 1998 in honor of William B. Davis (1902-1995), a leading mammalogist in Texas and the first Head of the Department of Wildlife and Fisheries Sciences at Texas A&M University. Davis authored or co-authored five editions of *The Mammals of Texas* (1947, 1960, 1966, 1974, 1994).

Bobby Baker Award – The Bobby Baker Award is presented for the best oral presentation in mammalian molecular biology, evolution and systematics by an undergraduate student. Eligibility is open to any undergraduate student who has not previously received this award. This award currently includes an honorarium of \$400.

The Bobby Baker Award was established in 2013 in honor of Bobby Baker (1986-2012), who was an active and award-winning undergraduate member of the Texas Society of Mammalogists.

Rollin H. Baker Award – The Rollin H. Baker Award is presented for the best oral presentation in classical mammalogy at the organismal level by an undergraduate student. Eligibility is open to any undergraduate student who has not previously received this award. This award currently includes an honorarium of \$400.

The Rollin H. Baker Award was established in 2002 in honor of Rollin H. Baker (1916-2007), president of the Society in 1984-85 and an active member of TSM from 1984 until his death in 2007.

Clyde Jones Awards – The Clyde Jones Awards are presented for the best poster presentations by one graduate student and one undergraduate student in mammalian molecular biology, evolution, and systematics. Eligibility is open to any student who has not previously received the award at the respective academic level.

The initial Clyde Jones Award was established in 2004 in honor of Clyde Jones (1935-2015), Horn Professor of Biological Sciences at Texas Tech University. Jones was an active member of TSM since its inception in 1983 until his death in 2015, and was President of the Society in 1987-88.

Vernon Bailey Awards – The Vernon Bailey Awards are presented for the best poster presentations by one graduate student and one undergraduate student in classical mammalogy at the organismal level. Eligibility is open to any student who has not previously received the award at the respective academic level.

The initial Vernon Bailey Award was established in 2004 in honor of Vernon Bailey (1864-1942), Chief Field Naturalist and Senior Biologist for the Department of Agriculture's Bureau of Biological Survey (1897-1933). Bailey conducted the first and most complete biological survey of Texas, from 1889 to 1905.

# TEXAS SOCIETY OF MAMMALOGISTS

## Honorary Members

<b>Class of 1985</b> W. Frank Blair (D) Walter W. Dalquest (D) William B. Davis (D) Robert L. Packard (D)	<b>Class of 1997</b> Robert J. Baker (D) <b>Class of 1998</b> James Scudday (D) Herschel Garner <b>Class of 1999</b> David J. Schmidly <b>Class of 2002</b> Art Harris <b>Class of 2003</b> Arthur G. Cleveland <b>Class of 2004</b> Ira F. Greenbaum	Robert E. Martin <b>Class of 2006</b> Ann Maxwell Terry Maxwell (D) <b>Class of 2007</b> Guy Cameron Earl Zimmerman <b>Class of 2008</b> John Bickham <b>Class of 2010</b> Robert Dowler <b>Class of 2011</b> Ron Pine	<b>Class of 2013</b> Fred Stangl <b>Class of 2015</b> Rodney Honeycutt <b>Class of 2017</b> Michael Tewes <b>Class of 2018</b> Lisa Bradley Robert Bradley
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## Patron Members

Jo Actkinson Loren K. Ammerman Amy Baird Robert Baker (D) Rollin Baker (D) John Bickham Lisa Bradley Robert Bradley Joel Brant Guy Cameron Darin Carroll Brian Chapman Ron Chesser Scott Chirhart	Arthur G. Cleveland Michael Dixon Robert C. Dowler Cathy Early Carla Ebeling Herschel Garner Jim Goetze Ira F. Greenbaum Meredith Hamilton John Hanson Michelle Haynie Steve Hoofer Mandy Husak Michael Husak	Clyde Jones (D) Stephen Kasper Thomas E. Lee Jessica Light Robert E. Martin Ann Maxwell Terry Maxwell (D) Kevin McKinney Steve McReynolds Anne Merchant Chris Montag Jim Patton Russell Pfau Caleb Phillips	Carl Phillips Brenda Rodgers Duke Rogers David J. Schmidly Stephanie Shelton Steve Smith Phil Sudman Michael Tewes Ron Van Den Bussche Christopher Walker Kenneth T. Wilkins Don Wilson Bernd Wursig Earl Zimmerman
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