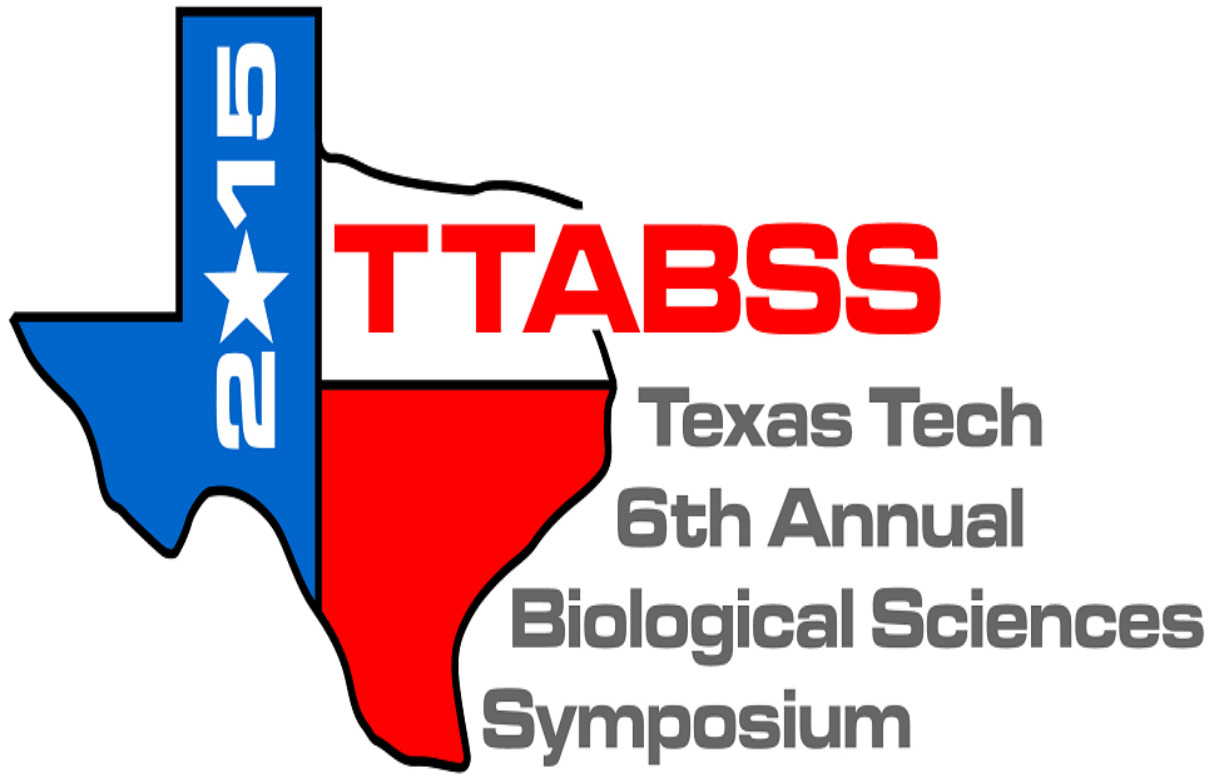


6th TEXAS TECH ANNUAL BIOLOGICAL  
SCIENCES SYMPOSIUM (TTABSS)



TEXAS TECH UNIVERSITY  
DEPARTMENT OF BIOLOGICAL SCIENCES  
LUBBOCK, TEXAS  
APRIL 10-11, 2015

# Thank You TTABSS 2015 Sponsors!



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Department of Natural Resources Management™



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## Welcome Note:

It is with great honor and my pleasure to welcome everyone to the 6<sup>th</sup> Texas Tech Annual Biological Sciences Symposium (TTABSS), which is held this year of 2015, on April 10<sup>th</sup> and 11<sup>th</sup>. This year the Biological Sciences Symposium is hosted at the Museum of Texas Tech University (Friday, April 10<sup>th</sup>) and at the Biological Sciences & Experimental Sciences buildings (Saturday, April 11<sup>th</sup>). Since the first Texas Tech Annual Biological Symposium in 2010, the Association of Biologists and the Department of Biological Sciences have been planning this annual symposium every year. Today, three graduate student organizations, (TTUAB, ANRS, and ASM) work closely with both Departments of Biological Sciences and Natural Resources Management to make this symposium possible.

Our goal as a scientific community is to provide a platform to share scientific findings and explore the diverse world of Biological Sciences, by exchanging ideas among peers and gain experiences from academic advisors. TTABSS comes to help in achieving that.

This year the symposium has a total of 150 undergraduate, graduate and faculty participation from 10 academic institutions. Our program will have 93 research presentations that include 44 poster presentations and 4 parallel oral sessions. For the first time, we would like to announce the invitation of two distinguished guest speakers, Dr. Wyndylyn von Zharen and Dr. Christopher A. Brochu, respectively. Both are renowned scientists in their prospective fields from Texas A&M University at Galveston and the University of Iowa. We are excited to have such incredible speakers to donate their time for our event and cause.

As a chairperson of the TTABSS committee, I would like to thank all the members of the committee team for their hard work and dedication. To our advisors for their advice and suggestions on organizing the program and to our event sponsors who had helped us to with the costs of TTABSS 2015 for all participants. I would like to express my deepest gratitude to all of you for your participation and contribution in making this year's event a continued success and for the development of a better conference for future years.

Wish you all a productive and enjoyable experience!

Brandon A. Gross  
Local Committee Chairperson  
President TTUAB 2014-2015

### **EVENT HOSTS**

The Association of Biologists at Texas Tech University (TTUAB)  
Department of Biological Sciences, Texas Tech University (DBS)  
Museum of Texas Tech University (MoTTU)  
American Society of Microbiology (ASM), TTU Chapter  
Department of Natural Resources Management, Texas Tech University (NRM)  
The Graduate School at Texas Tech University  
Association of Natural Resource Scientists at TTU (ANRS)

### **EVENT COLLABORATORS**

Department of Plant and Soil Science, Texas Tech University  
CISER/HHMI at Texas Tech University  
The Institute for Environmental and Human Health (TIEHH)  
Lonza  
Mountain Hideaway

### **PARTICIPATING INSTITUTIONS**

Texas Tech University  
Midland College  
McMurry University  
Texas Tech University Health Sciences Center  
Wayland Baptist University  
University of Tolima  
West Texas A&M University  
University of Iowa  
Texas A&M University at Galveston  
Eastern New Mexico University

## **A SPECIAL NOTE**

With the blessings of his wife, Heather Whitlaw, the Department of Natural Resources Management and the Association of Natural Resource Scientists; since 2012, the award for the Natural Resource Management and Conservation category has been named the:

### ***Warren B Ballard Memorial Award***

With the permission of his wife and family, Department of Biological Sciences, TTUAB and Tech ASM proudly names the microbiology award in honor and fond memory of Dr. Bilimoria, professor of microbiology and virology at Texas Tech University for 35 years, who also mentored almost 20 graduate students. This award would stimulate interest and discover the strength of aspiring students in the field of microbiology.

### ***Shan L. Bilimoria Memorial Graduate Student Award***

## **ACKNOWLEDGMENTS**

If not for the support from the following individuals, TTABSS 2015 would not have been possible.

### **TTU ADMINISTRATORS & DEPARTMENT OF BIOLOGICAL SCIENCES STAFF**

Mr. Kent Hance- Chancellor, TTU  
Dr. M Duane Nellis- President, TTU  
Dr. Lawrence Schovanec- Provost and Senior Vice President, TTU  
Dr. Robert V Duncan- Vice President for Research, TTU  
Dr. Mark Sheridan- Dean of Graduate School, TTU  
Dr. Michael San Francisco- Dean of Honors College, TTU  
Dr. Jeffrey Williams – Interim Dean, College of Arts & Sciences, TTU  
Dr. Clifford Fedler- Associate Dean of Graduate School, TTU  
Dr. John Zak – Associate Dean of Research, TTU  
Dr. Lou Densmore – Chair, Biological Sciences, TTU  
Dr. Lauren Gollahon – Associate Professor, Biological Sciences, TTU  
Dr. Mark Wallace – Chair, Natural Resources Management, TTU  
Dr. Richard E. Zartman – Chair, Plant & Soil Sciences, TTU  
Dr. Todd Anderson – Chair, The Institute of Environmental and Human Health, TTU  
Dr. Cameron Saffell- Museum of Texas Tech University  
Ms. Julie S. Isom- Associate Director, TTU/HHMI (CISER)  
Mrs. Lanita Ladd – Business Manager, Biological Sciences, TTU  
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Mr. Charles Barnes – Unit Manager, Biology Building, TTU  
Mrs. Nancy Hubbard – El Centro Project Manager, Biological Sciences, TTU  
Mrs. Vina Khan – Specialist II, Dept. of Biological Sciences, TTU  
Mr. Kunyu Li – IT Support, Biological Sciences, TTU  
Ms. Jennifer Smith – Unit Manager, Biology Greenhouse, TTU  
Ms. Pat Moore – Senior Office Assistant, Biological Sciences, TTU  
Ms. Jacqueline Miralles-Salazar – Senior Technician, Biological Sciences, TTU  
Ms. Lisa Torres – Lead Account Processor, Biological Sciences, TTU  
Ms. Janie Vasquez – Sr. Business Assistant, Biological Sciences, TTU

### **Judges**

Dr. Matthew Barnes – Natural Resources Management, TTU  
Dr. Rhonda L. Boros – Biological Sciences, TTU  
Dr. T. J. Boyle – Biological Sciences, McMurry University  
Dr. Robert D. Bradley – Biological Sciences, TTU  
Dr. Joel G. Brant - Biological Sciences, McMurry University  
Dr. Christopher A. Brochu – Earth and Environmental, University of Iowa  
Dr. Lou Densmore - Biological Sciences, TTU  
Dr. Sarah Fritts – Natural Resources Management, TTU  
Dr. Arun Ghosh - Biological Sciences, West Texas A&M University  
Dr. Tim Grabowski – Texas Cooperative Fish & Wildlife Research Unit, TTU  
Dr. Kerry Griffis-Kyle - Natural Resources Management, TTU  
Dr. Lauren Gollahon – Biological Sciences, TTU

Mr. Brandon A. Gross – Biological Sciences, TTU  
 Dr. Breanna Harris - Biological Sciences, TTU  
 Mrs. Julie S. Isom - Associate Director, TTU/HHMI (CISER)  
 Dr. Rao Kottapalli – Center for Biotechnology and Genomics, TTU  
 Dr. Paul Mangum - Biology Department, Midland College  
 Dr. Allison Pease - Natural Resources Management, TTU  
 Dr. Daniela Pereira-Derderian - Biological Sciences, Wayland Baptist University  
 Dr. Neal Platt – Biological Sciences, TTU  
 Dr. David A. Ray – Biological Sciences, TTU  
 Dr. Peter Schlichting – Natural Resources Management, TTU  
 Dr. Dylan W. Schwilk – Biological Sciences, TTU  
 Dr. Richard Stevens - Natural Resources Management, TTU  
 Dr. Ruwanthi Wettasinghe – Center for Biotechnology and Genomics, TTU  
 Dr. Masoud Zabet – Center for Biotechnology and Genomics, TTU  
 Dr. John Zak – Biological Sciences, TTU  
 Dr. Wyndylyn von Zharen – Natural Resources Management, Texas A&M University-  
 Galveston

**Moderators**

Mr. Matthew Acre – Natural Resources Management, TTU  
 Ms. Jessica East– Natural Resources Management, TTU  
 Ms. Nicté Ordóñez-Garza – Biological Sciences, TTU  
 Ms. Nardana Esmaeili – Biological Sciences, TTU  
 Ms. Laramie Lindsey – Biological Sciences, TTU  
 Ms. Julie Parlos – Biological Sciences, TTU  
 Ms. Kendra Phelps – Biological Sciences, TTU  
 Mr. Travis Stieb – Biological Sciences, TTU  
 Ms. Whitney Watson – Biological Sciences, TTU

**Thanks to the following businesses and individuals for their contributions:**

Crafthouse Gastropub	Starbucks	Pancake House
La Diosa	Texas Tech Libraries	Erika Densmore
Barnes & Noble	Texas Tech Athletics Dept.	River Smiths
Studio 57	Painting with a Twist	Jovenal Arañes
Texas Tech University Press		



*The 2015 TTABSS logo was produced exclusively for the Association of Biologists at Texas Tech University by Mr. Brandon A. Gross*



# ASSOCIATION OF BIOLOGISTS AT TEXAS TECH UNIVERSITY

## FACULTY ADVISOR/DEPARTMENT OF BIOLOGICAL SCIENCES CHAIR

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## FACULTY CO-ADVISOR

Dr. Robert Bradley

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## LOCAL COMMITTEE

### Chairperson

Brandon A. Gross

### Poster Competition & Public Relation

Laramie Lindsey & Chris Dunn

Juan P. Carrera-E

### Registration

Christine Prater

### Silent Auction

Sarah Mangum

### Abstract & Program Book

Matthew Acre

Nardana Esmaili

Brandon A. Gross

### Vendor Solicitation & Catering

Drake Smith

Matthew Acre

### Judge Solicitation

Matthew Acre

Brandon A. Gross

### Award Banquet

Emma K. Roberts

### IT/Website

Kunyu Li/ Nicté Ordóñez-Garza

# EVENT LOCATION

## POSTER SESSION

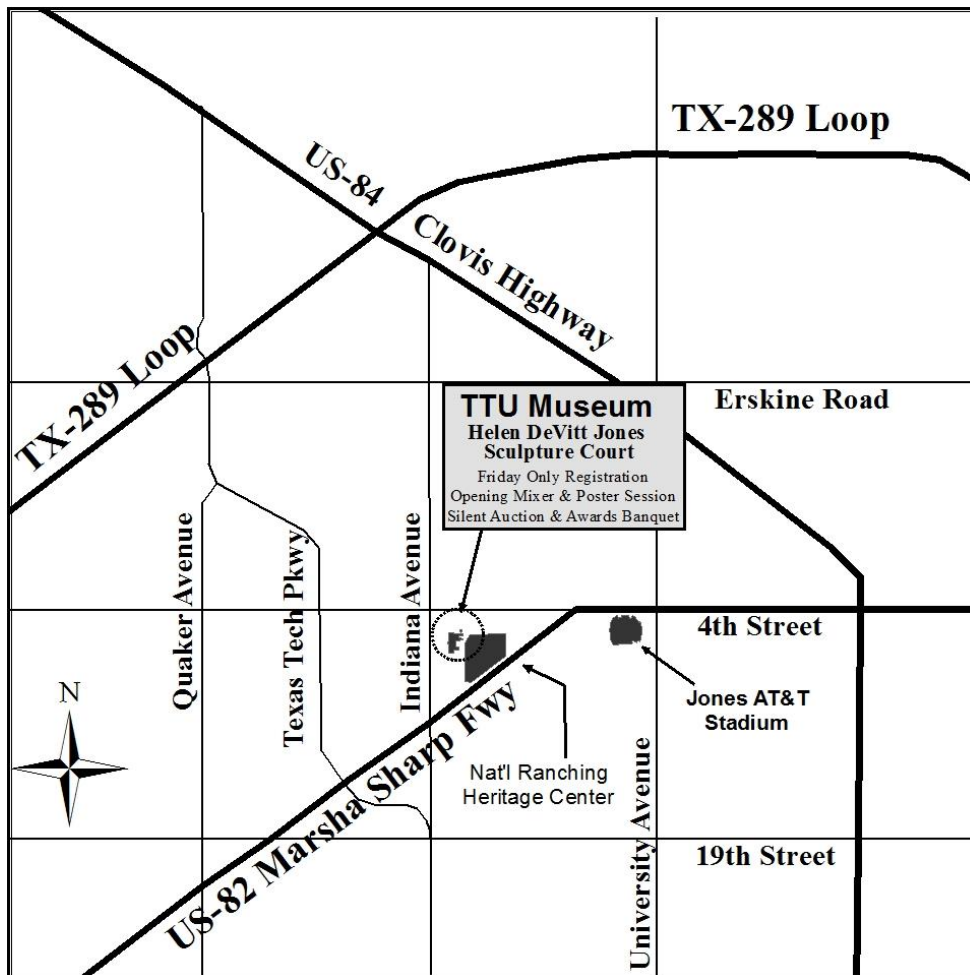
April 10<sup>th</sup>, 2015

Museum of Texas Tech University

3301 4th Street

Lubbock, TX 79409

806-742-2490



### DIRECTIONS

- From the south on US 84 (Slaton Hwy), travel north (becomes Avenue Q) to 4th Street, turn left (west) to Indiana Avenue.
- From Interstate 27, take the 4th Street exit, travel west to Indiana Avenue.
- From the northwest on US 84 (Clovis Hwy), travel east to Indiana Avenue and turn right (south) for approximately 1 mile to 4th Street.
- From the southwest on Marsha Sharp Fwy (US 62), exit onto Quaker Avenue north, travel north to 4th Street, then turn right (east).

## LOCAL RESTAURANTS

### SHORT DRIVING DISTANCE (within 2 miles)

<b>Name</b>	<b>Address</b>	<b>Phone</b>
Blue Sky Texas Burgers	3216 4 <sup>th</sup> St (Right Across from Museum)	(806) 368-0750
Jumbo Joe's Burgers	3310 4 <sup>th</sup> St (Right Across from Museum)	(806) 747-7900
Rosa's Cafe	4407 4 <sup>th</sup> St	(806) 785-5334
Sonic	4401 4 <sup>th</sup> St	(806) 771-0117
McDonald's	5201 4 <sup>th</sup> St	(806) 791-7701
Chick-Fil-A	312 University Ave	(806) 744-1564
Panda Express	313 University Ave	(806) 744-1999
Chili's Grill & Bar	607 University Avenue	(806) 744-2025
Cricket's Grill	2412 Broadway	(806) 744-4677
Dion's	905 University Avenue	(806) 747-4800
Firehouse Subs	411 University Avenue	(806) 747-9600
Freebirds World Burrito	1201 University Avenue	(806) 741-0900
Jimmy John's	2413 Broadway Avenue	(806) 740-0002
Little Panda	1221 University Avenue	(806) 722-0888
Mesquites Sports Grill	2419 Broadway	(806) 744-9277
One Guy's Pizza	1101 University Avenue	(806) 747-1226
Raising Canes Chicken	907 University Avenue	(806) 744-8552
Rocky LaRues	2420 Broadway #B	(806) 747-6366
Ruby Tequila's	413 University Avenue	(806) 747-7829
Sazon Restaurant	1205 University Avenue	(806) 687-2572
Spanky's	811 University Avenue	(806) 744-5677
Starbucks	801 University Avenue	(806) 744-8234
Subway	1109 University Avenue	(806) 744-1535
Which Wich Sandwich	1021 University Avenue	(806) 472-9424

### DRIVING DISTANCE (INSIDE LOOP 289)

<b>Name</b>	<b>Address</b>	<b>Phone</b>
Arby's	2422 19th Street, Suite 6037	(806) 744-2535
Burger King	2405 19th Street	(806) 762-2282
Fuzzy's Taco Shop	2102 Broadway	(806) 740-8226
Josie's Authentic Mexican Food	2332 19th Street	(806) 796-0192
McCallister's Deli	2415 19th Street	(806) 740-0022
McDonald's	2339 19th Street	(806) 747-5536
Quizno's	2312 19th Street #100	(806) 771-7827
Schlotzsky's Deli	3719 19th Street	(806) 793-5542
Skooner's Grill & Bar	1617 University Avenue	(806) 749-7625
Wendy's	2401 19th Street	(806) 741-0955

**6<sup>th</sup> Texas Tech Annual Biological Sciences Symposium  
April 10<sup>th</sup>-11<sup>th</sup> 2015**

**Venues: Museum of Texas Tech University  
3301 4<sup>th</sup> Street  
Lubbock, TX 79415**

**Department of Biological Sciences  
Box 43141  
Texas Tech University**

**PROGRAM AT A GLANCE**

**Friday, April 10<sup>th</sup>**

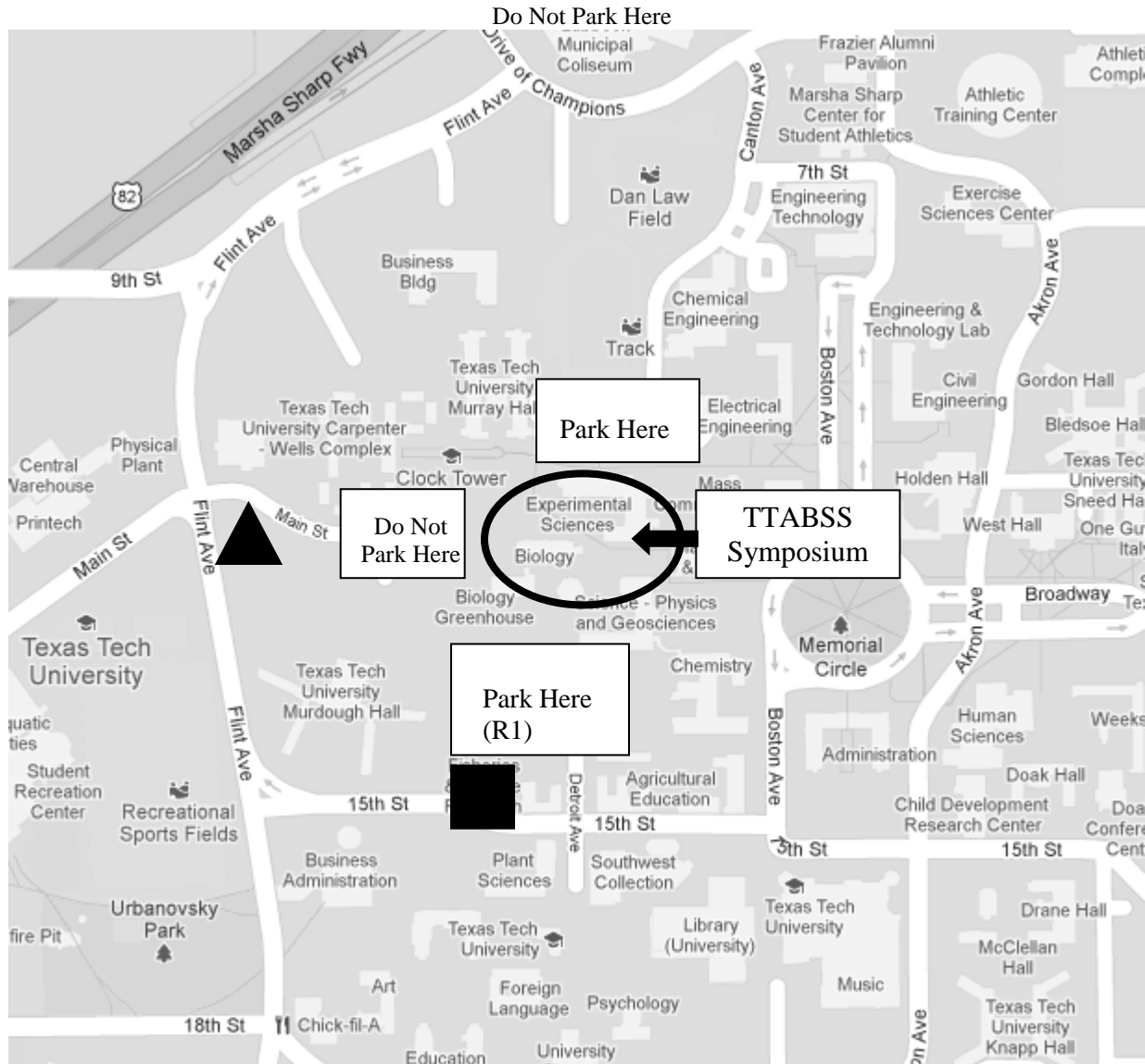
- 5:00 pm – 8:00 pm** Registration – Helen DeVitt Jones Sculpture Court
- 6:00 pm – 6:10 pm** TTABSS 2015 kick off by Dr. Lou Densmore, Faculty Advisor.
- 6:00 pm – 10:00 pm** Opening Mixer & Vendor Show – Helen DeVitt Jones Sculpture court
- 6:10 pm – 8:30 pm** Poster Session– Helen DeVitt Jones Sculpture Court  
(Poster Hanging 5:30 – 6:00 pm)  
(Poster Judging 6:10 – 8:30 pm)

**Saturday, April 11<sup>th</sup>**

- 08:00 am – 11:30 am** Registration – Department of Biological Sciences Building
- 08:00 am – 08:45 am** Breakfast – Department of Biological Sciences Building
- 08:45 am – 08:55 am** Welcome – Dr. Lou Densmore, Chairman, Dept. of Biology, TTU  
Department of Biological Sciences Building
- 09:00 am – 10:00 am** Oral Presentations – BIOL 106, BIOL 023, ESB 120 - -  
Biological Sciences Building/ Experimental Sciences Building
- 10:00 am – 10:15 am** Coffee break – Department of Biological Sciences Building
- 10:15 am – 11:15 am** Oral Presentations – BIOL 106, BIOL 023, ESB 120 - - Biological  
Sciences Building/ Experimental Sciences Building

- 11:00 am – 12:00 am** Plenary talk – Dr. Wyndylyn von Zharen “Three Loves Have I (and they’re all wicked)” – BIOL 101 – Biological Sciences
- 12:30 pm – 01:30 pm** Lunch break (On Your Own)
- 01:30 pm – 02:00 pm** Oral Presentations – BIOL 106, BIOL 023, ESB 120 - - Biological Sciences Building/ Experimental Sciences Building
- 02:00 pm – 02:15 pm** Coffee break – Biological Sciences Building
- 02:15 pm – 04:15 pm** Oral Presentations – BIOL 106, BIOL 023, ESB 120 - - Biological Sciences Building/ Experimental Sciences Building
- 04:30 am – 05:30 am** Plenary talk – Dr. Christopher Brochu “The ontogeny of phylogeny: preconception, discovery, and synthesis in crocodyliiform phylogenetics” – BIOL 101 – Biological Sciences
- 07:00 pm – 09:00 pm** Collections & Exhibit Viewing (Silent Auction)  
Helen DeVitt Jones Sculpture Court
- 07:00pm – 10:00 pm** Awards Banquet – Helen Devitt Jones Sculpture Court

# BIOLOGICAL AND EXPERIMENTAL SCIENCES BUILDINGS – SYMPOSIUM APRIL 11<sup>TH</sup>, 2015



**DETAILED SCHEDULE OF EVENTS**  
**POSTER SESSION**  
**FRIDAY, APRIL 10<sup>th</sup>**

**REGISTRATION**

**5:00 – 8:00 PM**

*Helen DeVitt Jones Sculpture Court*

**OPENING MIXER & VENDOR SHOW**

**6:00 – 10:00 PM**

*Helen DeVitt Jones Sculpture Court*

**TTABSS 2014 KICK OFF BY  
DR. LOU DENSMORE**

**6:00 – 6:10 PM**

*Helen DeVitt Jones Sculpture Court*

**POSTER SESSION**

**6:10 – 8:30 PM**

*Helen DeVitt Jones Sculpture Court*

## **UNDERGRADUATE**

- 1. MOLECULAR EVOLUTION OF THE CYTOCHROME-B GENE IN MOLES (LIPOTHYPHLA TALPIDAE) WITH DIFFERENT LEVELS OF FOSSORIALITY**  
Brian R. Rodriguez<sup>1\*</sup> and Jorge Salazar-Bravo<sup>1</sup>
- 2. DEVELOPING A PREDATOR-AVOIDANCE ASSAY IN *XENOPUS LAEVIS*: A POTENTIAL MODEL OF POST-TRAUMATIC STRESS DISORDER**  
Paul E. Duggan<sup>1,2\*</sup>, James A Carr<sup>2</sup>, and Breanna N. Harris<sup>2</sup>
- 3. EPISODES OF REPEATED DEHYDRATION INDUCE HYPOTHALAMIC GENE EXPRESSION PLASTICITY I: TRANSIENT RECEPTOR POTENTIAL CATION CHANNEL (TRPV4) AND VASOPRESSIN (AVP) TRANSCRIPTS**  
Jake A. Brozek<sup>1\*</sup>, José V. Menani<sup>2</sup>, Laurival A. De Luca Jr<sup>2</sup>, Silvana Chiavegatto<sup>3</sup>, and Daniela T.B. Pereira-Derderian<sup>1</sup>
- 4. EXPERIMENTAL DESIGN FOR MORPHOLOGICAL AND GENETIC PRESERVATION OF MUSEUM SPECIMENS FOR THE AMERICAN ALLIGATOR (*ALLIGATOR MISSISSIPPIENSIS*)**  
Brandon A. Gross<sup>1</sup>, Travis J. Stieb<sup>1\*</sup>, Miryam Venegas-Anaya<sup>1,2</sup>, Robert D. Bradley<sup>1</sup>, Ruth M. Elsey<sup>3</sup>, Ray E. Willis<sup>4</sup>, and Llewellyn D. Densmore III<sup>1</sup>
- 5. TIME AS A NICHE DIMENSION: AN EXAMINATION OF TEMPORAL PARTITIONING IN TWO PARAGUAYAN BAT COMMUNITIES**  
Carlos J. Garcia<sup>1\*</sup> and Richard D. Stevens<sup>1,2</sup>
- 6. EPISODES OF REPEATED DEHYDRATION INDUCE HYPOTHALAMIC GENE EXPRESSION II: VOLTAGE-GATED SODIUM CHANNEL TYPE-1 $\alpha$ , PROTEIN-2, JUN PROTO-ONCOGENE, AND INTERLEUKIN-1 $\alpha$**   
Catherine E. Wiechmann<sup>1\*</sup>, Ashlyn F. Westerman<sup>1\*</sup>, Jose V. Menani<sup>2</sup>, Laurival A. De Luca Jr.<sup>2</sup>, Silvana Chiavegatto<sup>3</sup>, and Daniela T.B. Pereira-Derderian<sup>1</sup>
- 7. 4T1 MURINE BREAST CANCER CELL CYTOTOXINS IN RUMEX CRISPUS (YELLOW DOCK)**  
Ashley M. Rivera<sup>1\*</sup>, Sarah C. Kelly<sup>1</sup>, Jessica R. Kenneson<sup>1</sup>, Robert T. McCutcheon<sup>1</sup>, Thomas E. McElwain<sup>1</sup>, Daniel W. Capps<sup>1</sup>, Adam J. Reinhart<sup>1</sup>, and Gary O. Gray<sup>1</sup>



8. **PURIFICATION OF COMPONENTS FROM *INULA HILINIUM* (ELECAMPANE) WHICH ARE CYTOTOXIC TO THE 4T1 MURINE BREAST CANCER CELL LINE**  
Sarah C. Kelly<sup>1\*</sup>, Thomas E. McElwain<sup>1</sup>, Ashley M. Rivera<sup>1</sup>, Jessica R. Kenneson<sup>1</sup>, Trevor Burrow<sup>1</sup>, Gary O. Gray<sup>1</sup>, and Adam J. Reinhart<sup>1</sup>
9. **EFFECTS OF INDEPENDENCE CREEK INFLOW ON PECOS RIVER WATER QUALITY, TERRELL AND CROCKETT COUNTIES, TEXAS**  
Greg L. Larson<sup>1\*</sup>, Brandi R. Linnenkugel<sup>1</sup>, Vanessa De La Cruz<sup>1</sup>, and Breanna De La Garza<sup>1</sup>
10. **QUESTING BEHAVIORS OF *RHIPICEPHALUS SANGUINEUS* AND *AMBLYOMMA AMERICANUM***  
Miel A. Johnson<sup>1\*</sup>, and Kenwyn R. Cradock<sup>2</sup>
11. **EFFECTS OF DIATOMACEOUS EARTH ON *AMBLYOMMA AMERICANUM* AND *RHIPICEPHALUS SANGUINEUS* (ACARI: IXODIDAE ) WATER BALANCE AND SURVIVAL**  
Megan C. Beaudoin<sup>1\*</sup> & Kenwyn R. Cradock<sup>2</sup>
12. **SATISFIED MALE ATHLETE DISPLAYS SIGNS OF SALT ADDICTION**  
Sharon Robinson<sup>1\*</sup>, Whitney Phillips<sup>1\*</sup>, and Daniela T.B. Pereira-Derderian<sup>1</sup>
13. **THE HARVEST MICE GENUS *REITHRODONTOMYS* ACROSS THE MESOAMERICAN HIGHLANDS**  
Nicté Ordóñez-Garza<sup>1</sup>, Gage R. Rowden<sup>1\*</sup>, and Robert D. Bradley<sup>1,2</sup>
14. **INTERACTIONS OF STRESS AND 3-iodothyronomine (T1AM) TREATMENT ON GENE EXPRESSION IN BREAST CANCER**  
Christopher Ponce<sup>1\*</sup>, Michael Rogowski<sup>1</sup>, Fariba Assadi-Porter<sup>1,2</sup> and Shaikh Rahman<sup>1</sup>
15. **UNDERSTANDING SPECIES LIMITS OF *PEROMYSCUS MEXICANUS* GROUP USING A GENETIC APPROACH**  
María R. Nuñez<sup>1\*</sup>, Nicté Ordóñez-Garza<sup>1</sup>, Gage R. Rowden<sup>1</sup>, and Robert D. Bradley<sup>1,2</sup>

## **GRADUATE**

16. **AN FMRI INVESTIGATION OF THE NEURAL CORRELATES OF THE RESTORATIVE EFFECT OF NATURE**  
Curtis Craig<sup>1</sup>, Ravi Rajmohan<sup>2\*</sup>, Debajyoti Pati<sup>1</sup>, Cherif Amor<sup>3</sup>, Jiancheng Hou<sup>4</sup>, Shaboo Valipoor<sup>1</sup>, Dan Fang<sup>1</sup>, and Michael W. O'Boyle<sup>1</sup>
17. **IMPORTANCE OF COTTON FIBER ELONGATION IN TERMS OF FIBER PROCESSING**  
Ruvini W Mathangadeera<sup>1\*</sup> and Eric F Hequet<sup>2,3</sup>
18. **TEMPERATURE TOXICITY OF THE NEONICOTINOID IMIDACLOPRID TO *CHIRONOMUS DILUTES* GROWTH**  
Kara A. Minton<sup>1\*</sup> and Jonathon D. Maul<sup>2</sup>
19. **ACROSS TEXAS TESTING THE ROLE OF RAPID ADAPTATION IN INVASIVE SALT CEDAR (*TAMARIX RAMOSISSMA*)**  
Soo-Rang Lee<sup>1\*</sup> and Matthew S. Olson<sup>1</sup>
20. **OVER EXPRESSION OF MULTIPLE STRESS GENES TO INCREASE DROUGHT-, HEAT-, AND SALT-TOLERANCE IN COTTON**  
J. Smith<sup>1\*</sup>, N. Mishra<sup>1</sup>, N. Esmaeili<sup>1</sup>, L. Sun<sup>1</sup>, D. Auld<sup>1</sup>, J. Burke<sup>2</sup>, P. Payton<sup>2</sup>, and H. Zhang<sup>1</sup>
21. **DAMSELS IN DISTRESS! PROXIMAL EFFECTS OF CLIMATE CHANGE ON THE DEVELOPMENT AND SURVIVORSHIP OF A MODEL ORGANISM (INSECTA, ODONATA: *ENALLAGMA CIVILE*)**  
Scott M. Starr<sup>1\*</sup> and Nancy E. McIntyre<sup>1</sup>
22. **BIOFILM MICROFLORA IN ICE MACHINES AND ASSESSING THE PLASMA NANOTECHNOLOGY IN THE BIPOLAR<sup>®</sup> UNIT**  
Nabarun Ghosh<sup>1\*</sup>, Mitsy Veloz<sup>1</sup>, Danius Bouyi<sup>1</sup>, Jon Bennert<sup>2</sup>, Jeff Bennert<sup>2</sup> and Chandini Revanna<sup>3</sup>
23. **ESTIMATING ENERGETIC CARRYING CAPACITY FOR NONBREEDING WATERFOWL ON RANCHING STOCK PONDS IN THE ROLLING PLAINS OF TEXAS**  
Lisa A. Clark<sup>1\*</sup>, Samantha S. Kahl<sup>1</sup>, Blake A. Grisham<sup>1</sup>, and Dan Collins<sup>2</sup>
24. **CLASSIFICATION OF TRANSPOSABLE ELEMENTS IN *PHORMIA REGINA***  
Laura Blanco-Berdugo<sup>1\*</sup>, Roy N. Platt<sup>1</sup>, and David A. Ray<sup>1</sup>

25. **USING VAGINAL IMPLANT TRANSMITTERS TO ASSESS FAWN SURVIVAL IN PRONGHORN**  
Emily R. Conant<sup>1\*</sup>, Mark C. Wallace<sup>1</sup>, Warren C. Conway<sup>1</sup>, Stewart G. Liley<sup>2</sup>, and Ryan L. Darr<sup>2</sup>
26. **STRUCTURE - FUNCTION STUDIES IN TANDEM TETRAMER MODELS REVEAL THE NATURE OF SUBUNIT COOPERATIVITY IN HETERO-TETRAMER K<sup>+</sup> CHANNELS**  
Spandana Vemulapally<sup>1\*</sup>, D. Marien Cortes<sup>1</sup>, and Luis G. Cuello<sup>1</sup>
27. **THE INFLUENCE OF CAMERA-TRAP SETTINGS ON CAPTURE SUCCESS IN PRONGHORN**  
Dakota P. Neel<sup>1\*</sup>, Warren C. Conway<sup>1</sup>, Mark C. Wallace<sup>1</sup>, and Stewart G. Liley<sup>2</sup>
28. **INFLUENCE OF SALINITY, SULFATE, AND FLUORIDE ON GROWTH OF GOLDEN ALGA**  
Rakib H. Rashel<sup>1\*</sup>, and Reynaldo Patiño<sup>1,2</sup>
29. **FOOD CHAIN STRUCTURE OF URBAN AND PLAYA LAKES OF THE SOUTHERN HIGH PLAINS**  
Kristin Stacy<sup>1\*</sup>, and Kerry Griffis-Kyle<sup>1</sup>
30. **ASSESSMENT OF MICROSATELLITES IN ESTIMATING INTER- AND INTRASPECIFIC VARIATION AMONG NEOTROPICAL *CROCODYLUS* SPECIES**  
Ashish Bashyal<sup>1</sup>, Brandon A. Gross<sup>1\*</sup>, Miryam Venegas-Anaya<sup>1,2</sup>, Faith Lowrance<sup>1</sup>, and Llewellyn D. Densmore III<sup>1</sup>
31. **TECTAL CRF CONCENTRATIONS ARE ALTERED BY ENERGY STATUS AND STRESSOR EXPOSURE IN *XENOPUS LAEVIS***  
Prater, C.<sup>1\*</sup>, Harris, B.N.<sup>1</sup>, Garcia, C.<sup>1</sup>, and Carr, J.A.<sup>1</sup>
32. **CHRONIC OXIDATIVE STRESS INDUCED INCREASED TUMORIGENICITY AND RESISTANCE TO DOXORUBICIN IN BREAST CANCER CELLS**  
Logeswari Ponnusamy<sup>1\*</sup>, Prathap Kumar S. Mahalingaiah<sup>1</sup>, and Kamaleshwar P. Singh<sup>1</sup>
33. **CHRONIC OXIDATIVE STRESS INDUCES NEOPLASTIC TRANSFORMATION OF HUMAN KIDNEY EPITHELIAL CELLS**  
Prathap Kumar S. Mahalingaiah<sup>1\*</sup>, Logeswari Ponnusamy<sup>1</sup>, and Kamaleshwar P. Singh<sup>1</sup>

34. **BATS FROM THE REGIONAL NATURAL PARK “EL VINCULO” (VALLE DEL CAUCA, COLOMBIA) AND ITS BUFFER ZONE**  
Daniela Arenas-Viveros<sup>1,2\*</sup>, Alan Giraldo-López<sup>1</sup>, and Carlos A. Saavedra-Rodríguez<sup>1</sup>
35. **URBANIZATION OF PLAYA WETLANDS IN THE SOUTHERN HIGH PLAINS: PRESENT AND FUTURE PATTERNS UNDER FOUR GROWTH AND CLIMATE SCENARIOS**  
Lucas J. Heintzman<sup>1\*</sup> and Nancy E. McIntyre<sup>1</sup>
36. **SOIL MICROBIAL COMMUNITY RESISTANCE AND RESILIENCE TO PETRODIESEL VERSES BIODIESEL**  
Meijun Dong<sup>1\*</sup> and Deborah Carr<sup>1</sup>
37. **TREE DISTRIBUTION PATTERNS IN THE SOUTHWEST JEMEZ MOUNTAINS, NEW MEXICO**  
Kamal Humagain<sup>1\*</sup>, Robert Cox<sup>1</sup>, and James Cain<sup>2</sup>
38. **TUMOR PURINE METABOLISM ENDPOINT CIRCUMVENTION AS A MULTIFACETED SURVIVAL MECHANISM – METHOD OPTIMIZATION AND PRELIMINARY RESULTS**  
Drake Smith<sup>1\*</sup> and Lauren Gollahon<sup>1</sup>
39. **TUMOR MEASUREMENT OF CORTICOSTERONE LEVELS IN FEATHERS FROM BOBWHITE QUAIL USING LC-MS**  
Francis Loko<sup>1\*</sup> and Steven M. Presley<sup>1</sup>
40. **ABUNDANCE AND LAND COVER ASSOCIATIONS OF MIGRANT AND WINTERING BIRDS OF PREY IN THE SOUTHERN GREAT PLAINS**  
Natasia Mitchell<sup>1\*</sup>, Benjamin Skipper<sup>2</sup>, and Clint Boal<sup>3</sup>
41. **QUANTITATIVE DETERMINATION OF RACTOPAMINE IN WHITE-TAILED DEER TISSUE**  
Shanoy C. Anderson<sup>1\*</sup>, Angella A. Gentles<sup>1</sup>, Elizabeth Buckner<sup>1</sup>, Subbiah Seenivasan<sup>1</sup>, and Ernest E. Smith<sup>1</sup>
42. **STUDYING THE PROTEIN-PROTEIN INTERACTIONS BETWEEN MelR, A TRANSCRIPTIONAL REGULATOR OF *melAB* OPERON, AND ITS BLOCKER, ANK-N5C-281, BY BACTERIAL TWO HYBRID SYSTEM**  
Vemulapally Sangama<sup>1\*</sup>, Parameswaran Hariharan<sup>1</sup>, Elena B. Tikhonova<sup>1</sup>, and Lan Guan<sup>1</sup>

**43. PATTERNS OF GENETIC DIVERSIFICATION IN A WIDELY DISTRIBUTED SPECIES OF BAT, *MOLOSSUS MOLOSSUS***

Laramie L. Lindsey<sup>1\*</sup> and Loren K. Ammerman<sup>2</sup>

**44. EVALUATING THE EFFECTS OF DROUGHT AND ANTHROPOGENIC ALTERATIONS ON THE GROWTH OF STREAM FISHES ON THE EDWARDS PLATEAU, CENTRAL TEXAS**

Wade A. Massare<sup>1\*</sup>, Timothy B. Grabowski<sup>2</sup>, and Tom Arsuffi

**DETAIL SCHEDULE OF EVENTS**  
**Saturday, April 11<sup>th</sup>**

**REGISTRATION**

**7:30-11:30 AM**

*Department of Biological Sciences Main Lobby*

**BREAKFAST**

**8:00-8:45 AM**

*Department of Biological Sciences Main Lobby*

**WELCOME**

**8:45-8:55 AM**

**Dr. Lou Densmore**

*Department of Biological Sciences Main Lobby*

**PLENARY TALK**

**11:00-12:00 AM**

**Dr. Wyndlyn von Zharen**

“Three Loves Have I (and they’re all wicked)”

*Biology Room 101*

**BREAK**

**10:00-10:15 AM**

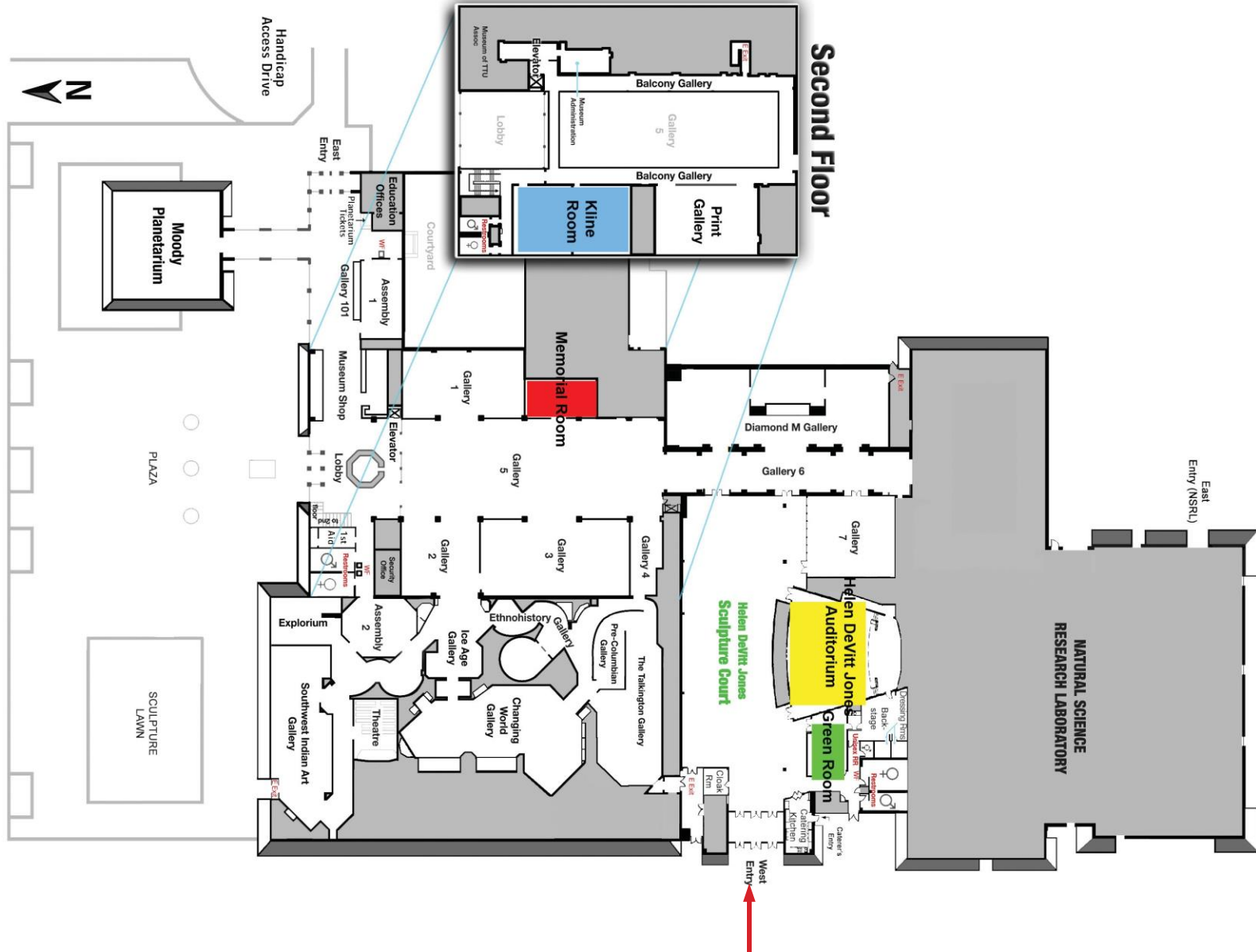
*Department of Biological Sciences Main Lobby*

**ORAL PRESENTATIONS**

**9:00-11:00 AM**

*Department of Biological Sciences & Experimental Sciences Building*

# Museum of Texas Tech University Interior Map



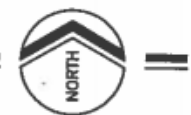
# P A R K I N G

DATE PRINTED: 02/12/13 DWG LOCATION: I:\Shared\Biology - 271\CAD Floor Plan\Biology.dwg



## FIRST FLOOR PLAN

SCALE: 1" = 40'-0"



PROJECT MANAGER:  
PROJECT #:  
DATE: 01/12/10

**TEXAS TECH UNIVERSITY**  
BIOLOGY  
FLOOR PLAN

Physical Plant Engineering Services  
Physical Plant Building - Suite 3  
Texas Tech University  
(P) (806) 742-2761  
(F) (806) 742-0147

Mailing Address:  
PO BOX 43142  
LUBBOCK, TX 79409  
on campus: MS3142

REVISIONS:

SHEET  
A-3  
OF 09



**ORAL PRESENTATIONS**

	<b>UNDERGRADUATE (BIOL 101)</b>	<b>NATURAL RESOURCES MANAGEMENT (ESB 120)</b>	<b>CELL &amp; MOLECULAR BIOLOGY (BIOL 106)</b>	<b>MICROBIOLOGY (BIOL 023)</b>
<b>9:00 AM</b>	<b>MESO-MAMMAL PRESENCE AND HABITAT ASSOCIATIONS OF BOBCATS AND AMERICAN PORCUPINE</b> (45) Trudi H. Cooke <sup>1*</sup> and Andrew C. Kasner <sup>2</sup>	<b>FROM BIGHORNS TO BULLFROGS: CONNECTIVITY OF AQUATIC RESOURCES IN SONORAN DESERT LANDSCAPE</b> (76) Joseph C. Drake <sup>1*</sup> , Nancy McIntyre <sup>2</sup> , and Kerry L. Griffis- Kyle <sup>1</sup>	<b>SLO INDUCED INFLAMMASOME ACTIVATION IS TRIGGERED BY PORE- FORMATION INSTEAD OF MEMBRANE REPAIR</b> (53) Matthew Romero <sup>1*</sup> , Pushpak Bhattacharjee <sup>1</sup> , and Peter A. Keyel <sup>1</sup>	<b>MUCIN DEGRADATION MECHANISMS BY <i>BATRACHOCHYTRIUM DENDROBATIDIS</i> VM1 ISOLATE <i>IN-VITRO</i></b> (72) Shalika Silva <sup>1*</sup> and Michael J.D. San Francisco <sup>1, 2</sup>
<b>9:15 AM</b>	<b>ANTIBACTERIAL ACTIVITY AND CHEMISTRY OF FIVE TEXAS PLANT SPECIES</b> (46) Kara Black <sup>1*</sup> , Anna Saghatelian <sup>1</sup> , Hyunshun Shin <sup>1</sup> , and Gary Wilson <sup>1</sup>	<b>THE INFLUENCE OF WEATHER PARAMETERS ON LESSER PRAIRIE-CHICKEN NEST SURVIVAL IN THE SHORT GRASS AND SAND SAGEBRUSH REGIONS</b> (77) Alixandra J. Godar <sup>1*</sup> , Blake A. Grisham <sup>1</sup> , Clint W. Boal <sup>2</sup> , David A. Haukos <sup>3</sup> , Jim C. Pitman <sup>4</sup> , and Christian A. Hagen <sup>5</sup>	<b>COMPLETE CYSTEINE SCANNING MUTAGENESIS OF MELIBIOSE PERMEASE IN <i>SALMONELLA TYPHIMURIUM</i></b> (54) Kelsey J. Markham <sup>1*</sup> , Aaron C. Scarpa <sup>1</sup> , Elena B. Tikhonova <sup>1</sup> , and Lan Guan <sup>1</sup>	<b>ALTERATION IN CYTOKINE AND CHEMOKINE EXPRESSION DURING <i>STAPHYLOCOCCUS AUREUS</i> WOUND INFECTIONS</b> (73) Kayla Bounds <sup>1*</sup> , Cassandra Kruczek <sup>2</sup> , Matt Myntti <sup>3</sup> , Jane A. Colmer-Hamood <sup>4,5</sup> , Randall Jeter <sup>1</sup> , and Abdul Hamood <sup>2,5</sup>
<b>9:30 AM</b>	<b>CLARIFICATION OF THE DISTRIBUTION OF THE EASTERN MOLE (<i>SCALOPUS AQUATICUS</i>, TALPIDAE) ON THE SOUTHERN ROLLING PLAINS REGION OF TEXAS</b> (47) Mitchell J. Crittenden <sup>1*</sup> and Joel G. Brant <sup>1</sup>	<b>BIRDS, TREES, AND HOUSE PRICES IN LUBBOCK, TEXAS</b> (78) Katherine P. Leuenberger <sup>1*</sup> , Samantha S. Kahl <sup>1</sup> , Michael Farmer <sup>1,2</sup> , Robert D. Cox <sup>1</sup>	<b>TECTAL CRF CONCENTRATIONS ARE ALTERED BY ENERGY STATUS AND STRESSOR EXPOSURE IN <i>XENOPUS LAEVIS</i></b> (55) Prater, C. <sup>1*</sup> , Harris, B.N. <sup>1</sup> , Garcia, C. <sup>1</sup> , and Carr, J.A. <sup>1</sup>	<b>INTERACTIONS AMONG ENVIRONMENTAL VARIABLES AND MICROBIAL COMMUNITIES IN RESERVOIRS OF THE UPPER COLORADO AND BRAZOS RIVERS, TEXAS, AS A POTENTIAL PROXIMATE CAUSE OF GOLDEN ALGA BLOOMS</b> (74) Tirhas A. Hailu <sup>1*</sup> , Randall M. Jeter <sup>1</sup> , John C. Zak <sup>1</sup> and Reynaldo Patino <sup>1,2</sup>
<b>9:45 AM</b>	<b>PHYLOGENY OF BATS OF GENUS <i>MONOPHYLLUS</i>. A STUDY OF GENETIC AND MORPHOLOGICAL DIVERGENCE BASED ON MITOCHONDRIAL CYTOCHROME-B GENE</b> (48) Marilyn Mathew <sup>1*</sup> , Dayana P. Bolzan <sup>2</sup> , Julie A. Parlos <sup>1</sup> , Robert J. Baker <sup>1</sup>	<b>REFUGE OR LAST GASP: LARVAL FISH ASSEMBLAGES IN RESERVOIR FRAGMENTS ON LAKE TEXOMA</b> (79) Morgan D. Gilbert <sup>1*</sup> and Allison A. Pease <sup>1</sup>		<b>A NOVEL MECP2 ACETYLATION SITE REGULATES BINDING WITH ATRX AND HDAC1</b> (75) Somnath Pandey <sup>1*</sup> , Glenn E. Simmons Jr. <sup>2</sup> , Svitlana Malyarchuk <sup>3</sup> , Tara N. Calhoun <sup>3</sup> , and Kevin Pruitt <sup>1</sup>

10:15  
AM

**BREAK**

*Department of Biological Sciences Main Lobby*

**UNDERGRADUATE**

(BIOL 101)

**NATURAL RESOURCES  
MANAGEMENT**

(ESB 120)

**PLANT & SOIL SCIENCES**

(BIOL 106)

10:30  
AM

**THE DIVERSITY OF DISTRESS  
VOCALIZATION OF OLD  
WORLD TROPICAL BATS**

Cody A. McIntire<sup>1\*</sup>, Joe Chun-Chia Huang<sup>2</sup>,  
Tigga Kingston<sup>2</sup>

**SEED BANK POTENTIAL OF  
MANGED WETLANDS ON THE  
UPPER TEXAS COAST**

Michael D. Whitson<sup>1\*</sup>, Warren C. Conway<sup>1</sup>,  
David A. Haukos<sup>2</sup>, and Dan Collins<sup>3</sup>

**DIGITAL IMAGE ANALYSIS OF  
OLD WORLD BLUESTEM  
CANOPY COVER TO PREDICT  
LEAF AREA AND YIELD**

Victoria. Xiong<sup>1\*</sup>, C.P. West<sup>1</sup>, and C.P. Brown<sup>1</sup>

10:45  
AM

**SOCIAL INTERACTION  
PREVENTS SALT ADDICTION IN  
GROUP-HOUSED ANIMALS**

Ashley M. Rivera<sup>1\*</sup>, Melissa M. Perez<sup>1</sup>,  
Daniela T.B. Pereira-Derderian<sup>1</sup>

**ASSESSING HABITAT-USE  
PATTERNS AND SURVEY  
METHODOLOGIES OF THE  
ENDANGERED SNAIL, PECOS  
ASSIMINEA, AT BITTER LAKE  
NATIONAL WILDLIFE REFUGE**

Elizabeth L. Roesler<sup>1,2\*</sup>, Timothy B. Grabowski<sup>2,3</sup>,  
and David Rogowski<sup>4</sup>

11:00  
AM

**Plenary talk – Dr. Wyndylyn von Zharen “Three Loves Have I (and they’re all wicked)”  
- BIOL 101**

**LUNCH BREAK**

12:00  
PM

	<b>UNDERGRADUATE (BIOL 101)</b>	<b>NATURAL RESOURCES MANAGEMENT (ESB 120)</b>	<b>ECOLOGY (BIOL 106)</b>	
1:30 PM	<b>VARIATION OF DNA SEQUENCES IN THE MITOCHONDRIAL CYTOCHROME B GENE IN THE GENUS <i>EPTESICUS</i></b> (51) Jake S. Smith <sup>1*</sup> , Julie A. Parlos <sup>1</sup> , Robert J. Baker <sup>1</sup>	<b>POTENTIAL PLASTIC RESPONSE OF GUADALUPE BASS TO HYDRROLOGICAL ALTERATION AND LANDSCAPE CHANGE WITHIN THE COLORADO RIVER BASIN</b> (82) Jessica Pease <sup>1*</sup> , Timothy B. Grabowski <sup>2</sup> , Allison Pease <sup>3</sup> , and Preston T. Bean <sup>1</sup>	<b>SPATIAL CLUSTERING AND BIAS IN SOUTHEAST ASIAN BAT SAMPLING LOCALITIES</b> (56) Marina Fisher-Phelps <sup>1*</sup> and Tigga Kingston <sup>1</sup>	
1:45 PM	<b>MOLECULAR SYSTEMATICS OF <i>GEOMYS</i> BASED ON TWO NUCLEAR AND TWO MITOCHONDRIAL GENES</b> (52) Emma K. Roberts <sup>1</sup> , Erica Gomez <sup>2</sup> , Sheri Ayers <sup>3</sup> , James Q. Francis <sup>1*</sup> , and Robert D. Bradley <sup>1,4</sup>	<b>ANALYSIS OF MOTION-CAPTURED PICTURES LOCATED ON MAN-MADE WATER SOURCES IN THE SOUTHERN HIGH PLAINS OF WEST TEXAS</b> (83) Trevor Gicklhorn <sup>1*</sup> , Nicholas Pirius <sup>1</sup> , and Clint Boal <sup>2</sup>	<b>DIFFERENCES IN DAY-ROOST HABITAT CHARACTERISTICS OF <i>ARTIBEUS LITURATUS</i>, BETWEEN TWO DISPARATE LANDSCAPES</b> (57) Garret D. Langlois <sup>1*</sup> , Sixto Fernandez <sup>3</sup> , and Richard D. Stevens <sup>2</sup>	
2 PM	<b>BREAK</b> <i>Department of Biological Sciences Main Lobby</i>			

	<b>EVOLUTIONARY BIOLOGY (BIOL 101)</b>	<b>TOXICOLOGY (ESB 120)</b>	<b>ECOLOGY (BIOL 106)</b>	<b>PROPOSALS (BIOL 023)</b>
<b>02:15 PM</b>	<b>CLASSIFICATION OF SINE (64) SUBFAMILIES IN <i>PEROMYSCUS MANICULATUS</i></b> Kevin A.M. Sullivan <sup>1*</sup> , Roy.N. Platt <sup>1</sup> , Robert D. Bradley <sup>1</sup> , and David A. Ray <sup>1</sup>	<b>HUMAN HEALTH (89) IMPLICATIONS VIA PFOS CONTAMINATION IN FISH NEAR BARKSDALE AIR FORCE BASE, LOUISIANA</b> Heather A. Lanza <sup>1*</sup> , Rebecca S. Cochran <sup>1</sup> , Adric D. Olson <sup>1</sup> , Joseph F. Mudge <sup>1</sup> , Christopher J. Salice <sup>2</sup> , Todd A. Anderson <sup>1</sup>	<b>BAT METACOMMUNITY (58) STRUCTURE IN ANTHROPOGENIC LANDSCAPE (COFFEE-GROWING ECOREGION, COLOMBIA)</b> María Cristina Ríos-Blanco <sup>1*</sup> , Jairo Pérez-Torres <sup>2</sup> and Richard D. Stevens <sup>1,3</sup>	<b>DIET OF PREGNANT AND LACTATING SEBA'S SHORT-TAILED FRUIT BAT(<i>CAROLLIA PERSPICILLATA</i>) (85)</b> Erin E. Stukenholtz <sup>1*</sup> , Richard D. Stevens <sup>1,2</sup> and Jairo Pérez-Torres <sup>3</sup>
<b>02:30 PM</b>	<b>APPLICATION OF GENETIC(65) DATA TO UNDERSTANDING CONSERVATION IN AN ENDANGERED SPECIES OF CAVE SPIDERS</b> Julie A. Parlos <sup>1*</sup> , Caleb D. Phillips <sup>1,2</sup> , James C. Cokendolpher <sup>3</sup> , Stirling Robertson <sup>4</sup> , and Robert J. Baker <sup>1,3</sup>	<b>REPRODUCTIVE AND (90) OFFSPRING EFFECTS OF CADMIUM ON THE FRESHWATER PULMONATE SNAIL <i>LYMANEA STAGNALIS</i></b> Evelyn G. Reátegui-Zirena <sup>1*</sup> , Bridgette N. Fidler <sup>1</sup> , Adric Olson <sup>1</sup> , Daniel Dawson <sup>1</sup> , Thomas Bilbo <sup>1</sup> , and Christopher Salice <sup>2</sup>	<b>POPULATION ECOLOGY OF (59) AMERICAN CROCODILE (<i>Crocodylus acutus</i>) IN COIBA NATIONAL PARK, PANAMA</b> Miryam Venegas-Anaya <sup>1,2</sup> , Armando H. Escobedo-Galván <sup>3</sup> , Sergio A. Balaguera-Reina <sup>2*</sup> , Faith Lowrance <sup>1</sup> , Oris I. Sanjur <sup>1</sup> , and Llewelyn D. Densmore III <sup>2</sup>	<b>STUDY OF CRINKLER-LIKE (86) PROTEINS IN <i>BATRACHOCHYTRIUM DENDROBATIDIS</i></b> Amanda M. Hicks <sup>1*</sup> and Michael J. San Francisco <sup>1</sup>
<b>02:45 PM</b>	<b>STOCHASTIC MULTILEVEL SELECTION AND THE (66) EVOLUTION OF ALTRUISM</b> Sarah E. Fumagalli <sup>1*</sup> , and Sean H. Rice <sup>2</sup>	<b>AN OVERVIEW OF FIELD AND (91) LABORATORY RESEARCH TO INFORM ECOLOGICAL RISK ASSESSMENTS OF PERFLUOROOCANE SULFONATE</b> Adric D. Olson <sup>1*</sup> , Meghan A. Funkhouser <sup>1</sup> , Heather A. Lanza <sup>1</sup> , Rebecca S. Cochran <sup>1</sup> , Evelyn G. Reátegui-Zirena <sup>1</sup> , Todd A. Anderson <sup>1</sup> , and Christopher J. Salice <sup>2</sup>	<b>(60) ON THE USE OF UNMANNED AERIAL VEHICLES TO RAPIDLY ASSESS MICROHABITATS OF TWO TEXAS LIZARD SPECIES, <i>COPHOSAURUS TEXABUS</i> AND <i>ASPIDOSCELIS GULARIS</i></b> Austin B. Osmanski <sup>1*</sup> , Michael T. Dixon <sup>2</sup> , Robert C. Dowler <sup>2</sup> , and Nicholas J. Negovetich <sup>2</sup>	<b>(87) SOIL MICROBIAL COMMUNITY RESISTANCE AND RESILIENCE TO PETRODIESEL VERSES BIODIESEL</b> Meijun Dong <sup>1*</sup> , and Deborah Carr <sup>1</sup>

	EVOLUTIONARY BIOLOGY (BIOL 101)	TOXICOLOGY (ESB 120)	PROPOSALS (BIOL 023)
03:00 PM	<b>BIO-DIVERSIFICATION OF SMALL MAMMALS ACROSS THE MESOAMERICAN HIGHLANDS</b> (67) Nicté Ordóñez-Garza <sup>1*</sup> , and Robert D. Bradley <sup>1,2</sup>	<b>THE IMPACT OF LARVAL CROWDING ON MOSQUITO INSECTICIDE TOLERANCE</b> (92) Thomas R. Bilbo <sup>1*</sup> , Dan E. Dawson <sup>2</sup> , and Christopher J. Salice <sup>3</sup>	(88) <b>COMPARISON OF BARK AND RESIN DUCT ALLOMETRIC RELATIONSHIPS AMONGST VARIOUS MEMBERS OF PINES (<i>PINUS</i>) IN WESTERN TEXAS MOUNTAIN RANGES</b> Erik M. Lindberg <sup>1*</sup> , Dylan W. Schwilk <sup>1</sup> , and Scott Ferrenberg <sup>2</sup>
03:15 PM	<b>MORPHOMETRIC AND GENETIC VARIATION IN EIGHT BREEDS OF ETHIOPIAN CAMELS (<i>CAMELUS DROMEDARIUS</i>)</b> (68) Yoseph W. Legesse <sup>3</sup> , Christopher D. Dunn <sup>1*</sup> , Matthew R. Mauldin <sup>6</sup> , Nicté Ordóñez-Garza <sup>1</sup> , Gage R. Rowden <sup>1</sup> , Sied A. Mohammed <sup>4</sup> , Mohammed K. Yusuf <sup>3</sup> , Gad Perry <sup>5</sup> , and Robert D. Bradley <sup>1,2</sup>	<b>OCCURRENCE OF PERFLUORINATED COMPOUNDS IN WATER AND SEDIMENT FROM THE BARKSDALE AIR FORCE BASE IN BOSSIER CITY, LOUISIANA</b> (93) Rebecca S. Cochran <sup>1*</sup> , Heather A. Lanza <sup>1</sup> , Joe F. Mudge <sup>1</sup> , Adric D. Olson <sup>1</sup> , Christopher J. Salice <sup>1</sup> , and Todd A. Anderson <sup>1</sup>	<b>ECOLOGY</b> (BIOL 106)
03:30 PM	<b>LINE-1 RETROTRANSPOSON ACTIVITY: A POSSIBLE FAMILY-WIDE DECREASE IN SCIURIDAE</b> (69) Sarah F. Mangum <sup>1*</sup> , Roy N. Platt <sup>1</sup> , and David A. Ray <sup>1</sup>		(61) <b>MOLECULAR GENDER IDENTIFICATION OF PORCUPINES (<i>ERETHIZON DORSATUM</i>) IN THE TEXAS PANHANDLE</b> Erica D. Thomas <sup>1*</sup> , and Rocky Ward <sup>1</sup>
03:45 PM	<b>EVOLUTION OF THE ZONADHESIN GENE REVEALS REPRODUCTIVE ADAPTATION UNIQUE TO DIVERGENCE OF EUTHERIAN MAMMALS</b> (70) Emma K. Roberts <sup>1*</sup> , Daniel M. Hardy <sup>2</sup> , Roy N. Platt II <sup>1</sup> , Caleb D. Phillips <sup>4</sup> , and Robert D. Bradley <sup>1,3</sup>		(62) <b>ZOOGEOGRAPHY, DIVERSITY, AND ALTITUDINAL DISTRIBUTION OF BATS FROM ECUADOR</b> Juan P. Carrera-E <sup>1*</sup> and Carleton J. Phillips <sup>1</sup>
			(63) <b>HIGH ROOST FIDELITY OF HAMMER-HEADED FRUIT BATS, <i>HYPSIGNATHUS MONSTROSUS</i>, UTILIZING A MAN-MADE DAY ROOST IN SOUTHERN NIGERIA</b> Iroro Tanshi <sup>1,2*</sup> and Jakob Fahr <sup>3,4</sup>

	<b>EVOLUTIONARY BIOLOGY</b> (BIOL 101)		
<b>04:00 PM</b>	<b>SINGLE LOCUS-BASED SPECIES (71)</b> <b>DELIMITATION REVEALS MANY CRYPTIC SPECIES WITHIN THE GENUS CALOMYS (RODENTIA : SIGMODONTINAE)</b> Narayan Kandell* and Jorge Salazar-Bravo <sup>1</sup>		
<b>04:15 PM</b>			
<b>04:30 PM</b>			

**PLENARY TALK**

**4:30-5:30 PM**

**Dr. Christopher Brochu**

“The ontogeny of phylogeny: preconception, discovery, and synthesis in crocodyliform phylogenetics”

*Biology Room, 101*

**COLLECTIONS & EXHIBIT VIEWING**

**7:00-9:00 PM**

*Helen DeVitt Jones Sculpture Court*

**AWARDS BANQUET**

**7:00-10:00 PM**

*Helen DeVitt Jones Sculpture Court*

## ABSTRACTS

### POSTER (UNDERGRADUATE)

#### **1. MOLECULAR EVOLUTION OF THE CYTOCHROME-B GENE IN MOLES (LIPOTHYPHLA TALPIDAE) WITH DIFFERENT LEVELS OF FOSSORIALITY**

Brian R. Rodriguez<sup>1\*</sup> and Jorge Salazar-Bravo<sup>1</sup>

<sup>1</sup>Department of Biological Sciences, Texas Tech University, Lubbock, Texas 79409

Broadly distributed in Asia, Europe and North America, members of the family *Talpidae* present a rich variety of anatomical and physiological specializations that have enabled them to exploit a diverse range of habitats: terrestrial, semi-aquatic, aquatic/fossorial, semi-fossorial, and fossorial. An energetically demanding lifestyle, coupled with the hypoxic atmosphere characteristic of the subterranean and aquatic environment may change the selective regime of genes that encode proteins involved in cellular respiration. Here, we examine the molecular evolution of the cytochrome b gene, a mitochondrial-encoded gene participating in oxidative phosphorylation in this monophyletic family. Several methods designed to detect the presence and direction of selection at the molecular level requires a phylogenetic tree for the group of interest; however, despite numerous studies to the effect the phylogeny of this group remains controversial. To address this shortcoming we used a multi-locus approach to reconstruct a well-resolved phylogenetic tree for the family. Our main hypothesis is that the colonization of the subterranean and aquatic niches created regimes of positive, directional selection in the cytochrome b gene. We estimated the rates of synonymous (dS) and non-synonymous (dN) substitutions,  $\omega$  and selection on AA based on physicochemical characteristics along different branches, across codons and simultaneously across codons and along lineages in the family. We detected evidence of positive selection on cytochrome-b variation in only 3 of 379 codon positions: 43, 360 and 372. Results of phylogenetic analysis of codon-substitution patterns revealed that the evolution of cytochrome-b in this group of moles is chiefly governed by purifying selection.

#### **2. DEVELOPING A PREDATOR-AVOIDANCE ASSAY IN *XENOPUS LAEVIS*: A POTENTIAL MODEL OF POST-TRAUMATIC STRESS DISORDER**

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Post-Traumatic Stress Disorder (PTSD), which affects 7% of Americans, results from severe trauma and leaves sufferers feeling stressed or threatened in non-threatening situations. While the etiology of PTSD is unknown, aberrant functioning of the stress-response system and amygdala fear-processing neurochemistry appear to play a role. Several predator-stress paradigms have been used to induce PTSD-like symptoms in rats. Predator exposure is a life-threatening, psychological stressor, making it a good PTSD model. We aim to develop a predator-avoidance model in African clawed frogs to 1) measure anxiety and 2) serve as a PTSD model. Using a divided aquarium we exposed 12 juvenile frogs to a control (no frog), a size-matched conspecific, or a large frog (predator) for 50 min and recorded behavior. Frogs were allowed to acclimate for 10 min, were exposed to the stimulus for 10 min, and were given 1g of chicken liver while exposed to stimulus for 30 min. Over the course of 1 week, the 12 focal frogs were exposed to all 3 stimuli. We hypothesize exposure to a large conspecific, but not a size-matched conspecific, will increase anxiety-like behavior (increased hiding, air gulping, decreased activity) and decrease food consumption. Exposure to large, but not size-matched, conspecifics resulted in decreased liver consumption ( $F_{2,22} = 8.17$ ,  $P = 0.002$ ; large vs. size-matched and control,  $P_s < 0.035$ ). Behavioral analysis is underway. We predict injection of anxiolytic drugs will ameliorate the effects of the large frog (decrease anxiety behavior and increase food consumption), thus establishing this as an anxiety test.

### 3. RESTRICTION EPISODES OF REPEATED DEHYDRATION INDUCE HYPOTHALAMIC GENE EXPRESSION PLASTICITY I: TRANSIENT RECEPTOR POTENTIAL CATION CHANNEL (TRPV4) AND VASOPRESSIN (AVP) TRANSCRIPTS

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Repeated cycles of water deprivation-partial rehydration (WD-PR) induce body-fluid balance-associated behavioral changes, such as sodium intake enhancement. We investigated the effect of repeated WD-PR on hypothalamic gene expression of Trpv4, Trpv6, Avp, and Avp (Avpr1a, Avpr1b, and Avpr2) and oxytocin (Oxtr) receptors by quantitative real-time PCR. Adult male Holtzman rats (n=6-11/group) were individually housed with chow, water, and 0.3 M NaCl. Rats were subjected to zero, one, or three cycles of 36h WD followed by 2h PR (only water available) at 7-day intervals. Sodium appetite test was performed after each cycle (2h access to NaCl and water). The hypothalamus of *partially rehydrated (pr)* animals was dissected at the end of cycles zero (control), one (1WD-PR<sub>pr</sub>), or three (3WD-PR<sub>pr</sub>) of repeated WD-PR. In 3WD-PR<sub>pr</sub>, Avp transcripts were up-regulated 16 or 10 fold versus control or 1WD-PR<sub>pr</sub>, respectively (p<0.05). Oxtr, Avpr1a, Avpr2, and Trpv6 transcripts were down-regulated by -79, -70, -50, and -54%, in 3WD-PR<sub>pr</sub> versus control (p<0.05). In 1WD-PR<sub>pr</sub>, Oxtr and Trpv6 transcripts were down-regulated by -77 and -60% versus control (p<0.05). *Hydrated(h)* animals in which the hypothalamus was collected four days after cycles zero, one (1WD-PR<sub>h</sub>), or three (3WD-PR<sub>h</sub>) of repeated WD-PR were also evaluated. In 3WD-PR<sub>h</sub>, Trpv4 transcripts were up-regulated by 52% or 73% versus control or 1WD-PR<sub>h</sub> (p<0.05). Avp transcripts were up-regulated 1.8 fold in 3WD-PR<sub>h</sub> versus control (p<0.05). Our data suggest that repeated episodes of dehydration in male rats induce plastic responses in hypothalamic genes coding for osmotic pressure regulation (Avp, Avpr1a, Avpr2, and Trpv4).

### 4. EXPERIMENTAL DESIGN FOR MORPHOLOGICAL AND GENETIC PRESERVATION OF MUSEUM SPECIMENS FOR THE AMERICAN ALLIGATOR (*ALLIGATOR MISSISSIPPIENSIS*)

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Museum collections are vital to preserving research specimens for long term studies. Scientists travel around the globe to utilize collections and the DNA that museum specimens hold. Due to this, specimen preservation is paramount to future studies in multiple fields, this project will deduce which preservation and cleaning method is the most efficient. This project will use three distinct methods (burial method, dermestid beetle, and maceration) to clean and preserve pre-juvenile and adult American alligator (*Alligator mississippiensis*) skeletons. DNA will then be extracted from the skeletons to test which method of cleaning yields the best DNA results. With this information, museum curators, private collectors, and scientists can clean their specimens in the most efficient way for DNA removal and preservation. This will allow future scientists to be able to obtain the highest quality bone DNA while also causing the least amount of damage to the specimen. With this knowledge we can increase, as well as preserve, specimens for long term studies on climate change, animal habitats, population trends, and biodiversity. The findings of this project will also encourage curators to open up valuable specimens for DNA extraction by providing the cost and benefit frame of damage to DNA to justify the in-depth study of the specimen. This study also aims to study the rate of successful DNA amplification on bush meat and the applications it will have on conservation.



## 5. TIME AS A NICHE DIMENSION: AN EXAMINATION OF TEMPORAL PARTITIONING IN TWO PARAGUAYAN BAT COMMUNITIES

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Community ecologists have long been interested in the patterns and processes involved in the structure of assemblages. Often times, aspects of the food niche are closely and statistically scrutinized to examine patterns of overlap and whether biotic interactions can possibly account for them. Another relevant dimension involves time and whether species are interacting along a temporal niche axis. Biotic interactions could produce low overlap in situations where species experience much interspecific competition. We examined temporal overlap of bats from two communities in interior Atlantic Forest of eastern Paraguay. We analyzed temporal patterns of species using the TimeOverlap Program. Pianka and Czechanowski indices demonstrated a high degree of overlap among species at both sites. Constrained permutation tests demonstrated that degree of overlap was highly significant but opposite of what would be predicted by competition theory. At both interior Atlantic Forest sites bats overlapped more along the temporal axis than expected by chance. Future studies are aimed at examining the generality of these findings across a number of other Neotropical sites as well as determining the mechanistic basis to these patterns.

## 6. EPISODES OF REPEATED DEHYDRATION INDUCE HYPOTHALAMIC GENE EXPRESSION II: VOLTAGE-GATED SODIUM CHANNEL TYPE-1 $\alpha$ , RABAPTIN PROTEIN-2, JUN PROTO-ONCOGENE, AND INTERLEUKIN-1 $\alpha$

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Repeated cycles of water deprivation-partial rehydration (WD-PR) induce body-fluid balance-associated behavioral changes, such as sodium intake enhancement. We investigated the effect of repeated WD-PR on hypothalamic gene expression of Ptn, Ddn, Tac3, Grm4, Syt9, nNOS, Nmu, Ntrk1, Plat, Crh, Crhr2, Il3ra, Il1a, Il6, Scn1a, Scn1b, cFos, FosB, Rabep2, Jun, Ywhag, and Ywhaz by qPCR. Adult male Holtzman rats (n=4-11/group) were individually housed with chow, water, and 0.3M NaCl. Rats were subjected to zero, one, or three cycles of 36h WD followed by 2h PR (only water available) at 7-day intervals. Sodium appetite test was performed after each cycle (2h access to NaCl and water). The hypothalamus of *partially rehydrated (pr)* animals was dissected at the end of cycles zero (control), one (1WD-PR $pr$ ), or three (3WD-PR $pr$ ) of repeated WD-PR. In 3WD-PR $pr$ , Rabep2 and Jun transcripts were up-regulated by 6% and 42% versus 1WD-PR $pr$ , respectively (p<0.05). Rabep2, Ptn, nNos, Plat, Syt9, and Crhr2 transcripts were changed by 72%, -91%, 61%, 21.4 fold, and 1.9 fold in both 3WD-PR $pr$  and 1WD-PR $pr$  versus control (p<0.05). *Hydrated (h)* animals in which hypothalamus was collected four days after cycles zero, one (1WD-PR $h$ ), or three (3WD-PR $h$ ) of repeated WD-PR were also evaluated. In 3WD-PR $h$ , Il1a and Scn1a transcripts were up-regulated by 150% and 45% versus both 1WD-PR $pr$  and control (p<0.05). Grm4 transcripts were down-regulated by -36% in 3WD-PR $h$  and 1WD-PR $h$  versus control (p<0.05). Our data suggest that repeated episodes of dehydration in male rats induce plastic responses in hypothalamic genes coding for neuronal excitability, survival, and inflammation.

## **7. 4T1 MURINE BREAST CANCER CELL CYTOTOXINS IN RUMEX CRISPUS (YELLOW DOCK)**

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*Rumex crispus* (yellow dock), an herbal remedy used in Turkey and the Far East, has been shown to possess anti-microtubulin, anti-inflammatory, and antimalarial activity. It is used to treat constipation, diarrhea and eczema, and has been shown to be cytotoxic and/or induce apoptosis in T47D, MDA-MB-231 and MDA-MB-436 breast cancer cells and other cancer cell lines. Studies in our laboratory have shown that plant species (e.g., Ginger, Turmeric) with anti-inflammatory activity have cellular components cytotoxic for 4T1 murine breast cancer cells. To our knowledge, the cytotoxicity of yellow dock against 4T1 cells has not been investigated. Yellow dock root powder was subjected to dichloromethane reflux (1 hr), and the resulting extract resolved by Sephadex LH20 chromatography (75% ethanol). Fractions were pooled based upon UV-visible spectroscopic analysis (280 nm), and pooled fractions were assayed for 4T1 cell cytotoxicity (MTS assay). Pooled cytotoxic fractions were further characterized via HPLC (C<sub>18</sub>, 0-75% methanol gradient, 30 min). Six HPLC peaks were identified as cytotoxic to 4T1 cells (MTS assay). None of the six peaks co-migrated with emodin or chrysophanol, known bioactive components of yellow dock. Mass spectroscopic analysis (MALDI TOF) of the six HPLC peaks was undertaken, and none of the HPLC peaks contained species with molecular weights that corresponded to emodin (270.24), chrysophanol (254.21), nepodin (216.13) or known bioactive anthraquinones. Further studies are underway to characterize these 4T1 cytotoxins.

## **8. PURIFICATION OF COMPONENTS FROM INULA HILINIUM (ELECAMPANE) WHICH ARE CYTOTOXIC TO THE 4T1 MURINE BREAST CANCER CELL LINE**

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The plant *Inula helenium* (elecampane), is a medicinal plant that is found widely throughout England. It has been used as a diuretic, antiseptic, skin cream, and has been used in treating pulmonary diseases. Previous studies in our laboratory have shown elecampane to be cytotoxic to 4T1 murine breast cancer cells. In this study, we sought to isolate and purify specific cytotoxic molecules from elecampane. Powdered elecampane root was refluxed in dichloromethane for 1 hour, the dichloromethane was distilled off and the extract was resuspended in ethanol. The resulting ethanolic extract was size fractionated on a Sephadex LH20 column with 75% ethanol as the mobile phase and initially analyzed through absorbance at 280 nm. Fractions from the column were assayed for cytotoxic effects on 4T1 cells. Cytotoxic fractions were further characterized using HPLC (solid phase: C<sub>18</sub>, mobile phase: 0-75% methanol gradient over 30 minutes). One peak was identified through HPLC from the most cytotoxic fraction. This peak was collected and further characterized using mass spectroscopic analysis (MALDI TOF). Based on the mass spectroscopic analysis, the most likely size of the cytotoxic molecule isolated through this study was determined to be 440 g/mol. Further research is ongoing to identify this cytotoxic component of elecampane.

## **9. EFFECTS OF INDEPENDENCE CREEK INFLOW ON PECOS RIVER WATER QUALITY, TERRELL AND CROCKETT COUNTIES, TEXAS**

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Water quality data were obtained from two Pecos River sites located on the Chandler Ranch upstream and downstream of the Independence Creek confluence in Terrell County, Texas. The data included sites visits between May 15, 2014 and December 10, 2014 (4 visits) for field data, including 3 visits to collect

samples for lab analyses. Additionally, historical water quality data were obtained at these Chandler Ranch sites, as well as established Pecos River monitoring sites (2) near Sheffield (upstream) and the Lower Pecos (2 sites) near Val Verde County (downstream) to assess regional trends in water quality. Historical data for Independence Creek were also collected. A review of historical data at the two Pecos River Chandler Ranch sites, from April 1994-July 1995 (quarterly), and May 2014-December 2014, 2015 (quarterly) revealed a parallel of the regional trend established from the 1995-2012 (quarterly) data reviewed at the two upstream Sheffield sites and the two downstream Lower Pecos sites. The Pecos River enters the Sheffield area very saline after traversing through very salty Cenozoic Pecos Alluvium Aquifer formations from Pecos to Sheffield. After Sheffield, freshwater inflow from spring systems of the Edwards Trinity Plateau Aquifer, most notably Independence Creek, dilute the Pecos River, enhancing its water quality.

## **10. QUESTING BEHAVIORS OF *RHIPICEPHALUS SANGUINEUS* AND *AMBLIOMMA AMERICANUM***

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Ticks are organisms found across the world that are dependent on seeking, acquiring, and feeding on a host in order to survive. They live in various regions across the world, however, this study focuses primarily on species native to the Western region of North America. Although much research has been conducted on the processes of feeding, mating, and disease transmission, there are few studies that review the host-seeking behaviors of ticks. The aim of this study was to observe the questing behaviors of *Rhipicephalus sanguineus* and *Amblyomma americanum* in order to discover which types of surfaces are preferred when searching for a host, or if the decision is random. This was achieved by creating an isolated arena with varying surface options for unfed adult *R. sanguineus* and *A. americanum* to choose from. The goal was to achieve three distinct surface types- smooth (a plastic straw), rough (a wooden dowel), and one to imitate fur on a mammal (a pipe cleaner). After repeated observations, we found, that after three trials with 20 ticks for both *R. sanguineus* and *A. americanum*, the wooden dowel was favored by *R. sanguineus* and the straw was favored for *A. americanum*. This experiment was to establish a foundation for further research in order to further understand tick questing behaviors.

## **11. EFFECTS OF DIATOMACEOUS EARTH ON *AMBLIOMMA AMERICANUM* AND *RHIPICEPHALUS SANGUINEUS* (ACARI: IXODIDAE) WATER BALANCE AND SURVIVAL**

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Unfed, adult *Amblyomma americanum* and *Rhipicephalus sanguineus*, ticks were treated with diatomaceous earth in order to test its effectiveness as an acaricidal substance and pest control method. This study was conducted in order to investigate more alternative techniques to disrupt the transmission of tick-borne diseases, which have direct veterinary and medical significance. The treated *R. sanguineus* ticks exhibited significant water loss, as displayed by the reduction in mass over time, and overall higher mortality rates (n=15, Average Control=0%, Average Treatment=55% mortality). The *A. americanum* ticks in this group also displayed higher mortality than those in the control groups (n=15, Average Control=11%, Average Treatment=91% mortality). This suggests that the diatomaceous earth was able to produce significant cuticle damage causing water stress and mortality.

## **12. SATISFIED MALE ATHLETE DISPLAYS SIGNS OF SALT ADDICTION**

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Increased salty food is seen in sodium-depleted human. Vigorous physical activities cause sodium depletion. Thus, we investigated if WBU athletes crave more salt rich foods than non-athletes. Four

hundred ninety-one healthy college student volunteers completed a food survey. Pleasantness of twenty-nine foods was ranked from 0 (not pleasant) to 10 (extremely pleasant). Subjects endorsing either satiety (0-4 answer in a 0-10 scale) or hunger (5-10 answer) were divided by gender into two groups, athlete and non-athlete. Data was analyzed based on ranked food pleasantness and salt content (high, intermediate, or low). Satisfied female athletes [n=38] showed a decreased preference for ham ( $4\pm 1^*$ ), bacon ( $5\pm 1^*$ ), and peanut butter ( $6\pm 1^*$ ) versus non-athletes ( $6\pm 0$ ,  $7\pm 0$ ,  $7\pm 0$ , respectively) [n=104, \*p<0.05]. Hungry female athletes [n=34] showed decreased preference for pickles ( $5\pm 1^*$ ), peanut butter ( $6\pm 1^*$ ), salad ( $6\pm 0^*$ ), milk ( $5\pm 1^*$ ), celery ( $3\pm 1^*$ ), and carrots ( $5\pm 1^*$ ) versus non-athlete ( $6\pm 0$ ,  $7\pm 0$ ,  $8\pm 0$ ,  $7\pm 0$ ,  $5\pm 0$  and  $7\pm 0$ , respectively) [n=49]. Satisfied male athletes [n=69] have an increased preference for ham ( $8\pm 0^*$ ) and spaghetti ( $8\pm 0^*$ ) versus non-athlete [n=61] ( $6\pm 0$  and  $7\pm 0$ , respectively). The male hungry athlete [n=80] has an increased preference for rice ( $7\pm 0^*$ ) and orange ( $8\pm 0^*$ ) versus non-athlete [n=41] ( $6\pm 0$  and  $7\pm 0$ ), respectively). Results suggest that the satisfied and hungry female athlete avoids salty foods; the satisfied male athlete preferred salty foods; and the hungry male athlete craved foods rich in polysaccharide, protein, and vitamin C.

### **13. THE HARVEST MICE GENUS *REITHRODONTOMYS* ACROSS THE MESOAMERICAN HIGHLANDS**

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Several species of harvest mice, *Reithrodontomys* are co-distributed in the highlands of Middle America. Some authors consider the Isthmus of Tehuantepec, as a biogeographic barrier for vertebrate species distributed in this region. Hooper (1952) suggested that a barrier, approximately, at the present position of the Isthmus of Tehuantepec divided the ancestral species of *Reithrodontomys*, into northern and southern segments. The northern segment gave rise to the subgenus *Reithrodontomys*, and the southern segment give arise to the *Aporodon* subgenus. In order to understand the diversification of *Reithrodontomys*, in this region, and to test Hooper's hypothesis, we utilized cytochrome-*b* gene sequences and phylogenetic analyses to estimate the timing of diversification of these small mammals. Published DNA sequences were combined with new species from this study to test this hypothesis. The geographic sampling spans the entire known distribution for these rodents. Preliminary results suggest that Isthmus of Tehuantepec is acting as a barrier separating widely distributed *Reithrodontomys mexicanus*, *R. sumichrasti*, and *R. fulvescens*. However, additional analyses are required to support hypotheses congruent with the lineage diversification.

### **14. INTERACTIONS OF STRESS AND 3-IODOTHYRONOMINE (T1AM) TREATMENT ON GENE EXPRESSION IN BREAST CANCER**

Christopher Ponce<sup>1\*</sup>, Michael Rogowski<sup>1</sup>, Fariba Assadi-Porter<sup>1,2</sup> and Shaikh Rahman<sup>1</sup>

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The present study assessed the effects of T1AM treatment and cell density mediated oxidative stress on the expression of three different genes implicated in stress, hypoxia-inducible factor 1-alpha (HIF1a), pyruvate dehydrogenase alpha 1 (PDH1a), and lactate dehydrogenase alpha (LDHa). We hypothesized that both T1AM and cell density mediated oxidative stress affect HIF1a, PDHa, and LDHa gene expression in MCF-7 cells. To test our hypothesis, non-invasive MCF-7 (ER+) breast cancer cells were cultured under standard culture conditions (5% CO<sub>2</sub>) and incubated at 37° C. Cells were seeded at 50k, 100k, and 150k in Dulbeccos's Modified Eagle's Medium (DMEM). The cells were then treated with either 50 mM T1AM or DMSO (control) for 24 hours. After that, cells were harvested for total RNA extraction and gene expression analyses. Cells in the plate those were seeded at 100k and treated with 50 mM T1AM showed moderate increase in HIF1a and LDHa gene expression. In conclusion, our data

indicate that, the cell density mediated stress along with the T1AM treatment are responsible for moderate increase in H1F1a and LDHa gene expression in MCF-7 cells.

## **15. UNDERSTANDING SPECIES LIMITS OF PEROMYSCUS MEXICANUS GROUP USING A GENETIC APPROACH**

María R. Nuñez<sup>1\*</sup>, Nicté Ordóñez-Garza<sup>1</sup>, Gage R. Rowden<sup>1</sup>, and Robert D. Bradley<sup>1,2</sup>

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The genus *Peromyscus*, deer mice is one of the most widely distributed mammalian taxa in North America. Due to their broad distribution this genus consists of more than 70 species. Currently *Peromyscus* is divided into 13 species groups. *Peromyscus nudipes* is one of the species in the *P. mexicanus* species group, and it is distributed from Nicaragua to Panama. *P. nudipes* systematic relationships to the other *P. mexicanus* species has not been well studied. For this study, 65 Cytochrome-b (cytb) sequences were examined, 28 samples were obtained from GenBank and the other 37 from the Museum of Texas Tech University. Mitochondrial DNA was extracted with standard DNA methods. Standard Polymerase Chain Reaction (PCR) procedures were followed using primers LGL765 and LGL766 for amplification. The laboratory work included PCR cleaning, and cycle sequencing using the same primers. Cycle sequencing reactions were purified and products were sequenced with an automated sequencer. Resulting sequences were aligned and proofed using sequencer 4.10.1 (Gene Codes Corp). A phylogenetic tree was generated using Maximum Likelihood and Bayesian methods, and genetic distances among samples to assess levels of genetic divergence of the species in the *P. mexicanus* group were calculated with the Kimura 2-parameter model of evolution.

### **POSTER (GRADUATE)**

## **16. AN FMRI INVESTIGATION OF THE NEURAL CORRELATES OF THE RESTORATIVE EFFECT OF NATURE**

Curtis Craig<sup>1</sup>, Ravi Rajmohan<sup>2\*</sup>, Debajyoti Pati<sup>1</sup>, Cherif Amor<sup>3</sup>, Jiancheng Hou<sup>4</sup>, Shaboo Valipoor<sup>1</sup>, Dan Fang<sup>1</sup>, and Michael W. O'Boyle<sup>1</sup>

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While the positive effects on cognition and well-being demonstrated by nature and greenery are well known, the neural correlates of these effects are underexplored. In this study, ten participants observed images from each of three different categories: Nature images, positive non-nature images, or neutral objects while they underwent fMRI (BOLD) scanning. Nature images elicited significantly more bilateral activation in the frontal, sensorimotor, and cerebellar regions relative to neutral objects, which may be associated with imagined movement through space and reflect high level engagement of visuospatial attention. Nature images also produced significantly more activation in left-lateralized brain regions, many of which belong to the default mode network (DMN) relative to positive non-nature images, which plays a role in mediating self-awareness (Raichle et al. 2001). These results provide support for Kaplan's Attention Restoration Theory as it pertains to nature environments, particularly as our findings suggests neural correlates for the constructs of "soft fascination" and "reflection" via the DMN (Kaplan & Berman, 2010).

## **17. IMPORTANCE OF COTTON FIBER ELONGATION IN TERMS OF FIBER PROCESSING**

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In order to compete with man-made fibers in the textile industry, it is important to ensure the good processing performance of cotton fibers. Therefore, it is necessary to understand the changes in fiber properties which occur due to processing. If the decisive tensile properties in fiber processing could be identified, they could be given more consideration in the breeding programs to improve the processing performance of cotton fibers. Among the main tensile properties, fiber strength is considered as the dominant tensile property while fiber elongation has generally been neglected. Lack of HVI calibration standards for elongation and the presence of a weak negative correlation between bundle tenacity and elongation, are the main reasons for the lack of interest in elongation. The importance of elongation in fiber processing, was separately assessed using thirty two cotton samples which represented a wide range in elongation. These samples belonged to two families where all the fiber properties except elongation were constant within a family. The results indicated the better performance of higher elongation fibers. This was observed with the yarn quality data as well as with the tensile property measurements of fibers. Thus, in order to achieve better processing performance of cotton fibers, elongation should be given more consideration in the breeding programs.

## **18. TEMPERATURE TOXICITY OF THE NEONICOTINOID IMIDACLOPRID TO *CHIRONOMUS DILUTES* GROWTH**

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Studies have shown that aquatic invertebrates can be highly sensitive to neonicotinoids [1]. Exposure to low-level concentrations for extended lengths of time has resulted in physiological costs such as reduced growth [2]. A reduction in growth is likely to have adverse effects on an organism's fitness. [3]. Several agricultural chemicals have been shown to have temperature dependent toxicity [4]; however, this has not been thoroughly examined for neonicotinoids. Temperature can influence toxicokinetics as well as physiological mechanisms related to detoxification of contaminants [5]. In addition, daily temperature variation may interact with neonicotinoids modifying their toxicity [6]. Overall, this study investigated how environmentally realistic daily temperature variation may influence macroinvertebrate growth when co-exposed to a neonicotinoid. The relationship between imidacloprid toxicity and daily temperature variation was assessed using the model organism *Chironomus dilutus*. Evaluating body length, head capsule width (HCW), dry mass and ash free dry mass (AFDM), growth endpoints were compared using two temperature patterns, 24°C and 21-31°C. A 10-d exposure was used to assess imidacloprid toxicity and responses were analyzed using a two-factor ANOVA. There was a significant interaction of temperature variation and imidacloprid concentration on *C. dilutus* body length and AFDM. The main effect of temperature and imidacloprid concentration on organism HCW was significant, but there was no interaction effect. This indicates that environmentally realistic daily temperature variation may influence pesticide toxicity differently than at constant temperatures. Furthermore, this study may provide information for risk estimates of this chemical in the aquatic environment and under future climate-altered scenarios.

## **19. ACROSS TEXAS TESTING THE ROLE OF RAPID ADAPTATION IN INVASIVE SALT CEDAR (*TAMARIX RAMOSISSIMA*)**

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The role of rapid natural selection during biological invasion is often overlooked. Because colonizers face environmental challenges during invasion, selection can favor increased physiological tolerance to environmental demands. We hypothesized that rapid response to natural selection plays an important role for invasion success in the highly invasive tree *Tamarix ramosissima* (salt cedar) which has become major threat to riparian ecosystems in the western U.S. since it escaped from cultivation in the late 1800's. Using field collected genotypes, a greenhouse study with a completely randomized design was conducted to test whether *T. ramosissima* genotypes differed in their response to wet and dry soil moisture conditions. Among 10 morphological character measurement, we found that *T. ramosissima* populations from the Texas Gulf coast can grow more quickly than populations from arid regions of New Mexico in response to increased soil moisture. This genetic variation in a trait is required for a response to selection, but its presence does not prove that adaptation has occurred. To determine whether these differences result from local adaptation, we will compare the level of quantitative genetic divergence ( $Q_{st}$ ) to divergence in neutral loci ( $F_{st}$ ) between geographic regions with different soil moisture regimes. Elevated divergence in quantitative traits caused by neutral processes is a statistical signature of local adaptation.

## **20. OVER EXPRESSION OF MULTIPLE STRESS GENES TO INCREASE DROUGHT-, HEAT-, AND SALT-TOLERANCE IN COTTON**

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Abiotic stresses such as drought, heat, and salt are the major causes of crop failure and are the main challenges that we face today in agriculture. With an increasing world population, soil erosion, deforestation, and urban development, higher yielding crops are urgently needed in order to sustain our civilization on earth. Recombinant DNA technology has assisted traditional breeding to overcome the agricultural challenges, while the genetic engineering approach is being used to modify gene expression in plants to improve plant performance under stressful conditions. Scientists studied many genes and their functions in plant cellular metabolism and have discovered a number of promising genes that can combat abiotic stresses. By using transgenic technology to overexpress genes for increased tolerance against drought, heat, and salt in cotton, significant improvement in yield is expected under stressful conditions. Since abiotic stresses do not come alone, in fact they usually come in various combinations, it is imperative to create transgenic cotton that can be tolerant to several stresses simultaneously. My Ph.D. research project aims at developing cotton lines that would confer multiple stress tolerance and produce higher yields under conditions of drought, heat, and salinity that is often found in West Texas.

## **21. DAMSELS IN DISTRESS! PROXIMAL EFFECTS OF CLIMATE CHANGE ON THE DEVELOPMENT AND SURVIVORSHIP OF A MODEL ORGANISM (INSECTA, ODONATA: ENALLAGMA CIVILE)**

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Current climate change predictions estimate increased air temperatures across the southern Great Plains, putting many organisms at risk from environmental changes affecting larval and adult life stages. Proximally, increased air temperatures can lead to elevated water temperatures, but experiments are lacking on potential responses in terms of ontogenetic development or survival. The familiar bluet damselfly (Odonata, Coenagrionidae, *Enallagma civile*) was chosen to examine these effects because this widespread and abundant species can serve as a model for responses by other aquatic and amphibious animals. Eggs were collected and reared under four water temperature regimes (26, 32, 38, and 41°C). Once eggs hatched, nymphs were placed into individual containers and were observed and fed each day.

Body measurements after molts, development rate, and deaths were recorded daily. Nymphs in the two hotter treatments had reduced survivorship; individuals in colder temperatures survived to adulthood. Individuals in 32°C emerged the quickest, going from egg to adult in 38 days. Elevated temperatures can thus be advantageous and detrimental, causing concern for aquatic invertebrates in the future.

## **22. BIOFILM MICROFLORA IN ICE MACHINES AND ASSESSING THE PLASMA NANOTECHNOLOGY IN THE BIPOLAR® UNIT**

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Biofilms are the collections of microorganisms, mainly bacteria, growing together in a matrix of polymers secreted by the microorganisms. Once microbes grow into well-developed biofilms, cleaning and sanitation become difficult. With the advent of moisture and organic media biofilms are formed on the walls of the ice makers and refrigerators. Scientific tests revealed that ice from many restaurants had higher levels of bacteria than samples of water taken from their lavatory bowls<sup>1</sup>. Dirty ice machine causing contamination via ice cubes is also a major health problem in other countries including the United States<sup>2</sup>. To prevent any potential contamination, the interior surface biofilm microflora in the ice machine must be sanitized regularly. We evaluated the Bi-Polar® unit by Air Oasis in sanitizing the ice machine surface. The Bi-Polar® creates cold plasma discharge which consists of positive and negative ions from water vapor in the air. Positive and negative ions attach to particles which cluster together to create inactivated larger particles. Two sets of petri-plates were inoculated with sterile cotton swab with the inoculum collected from the ice-maker surface at the time intervals of 24, 48, 72, 120 and 168 hours. Developed colonies were observed after 24 hours of incubation at 37° Celsius. Bacterial/fungal colonies were isolated using a SZ-40 stereo-scope. Prepared slides from bacterial colonies stained with Gram staining and fungi with Lacto-Phenol Cotton Blue stain were observed and micrographed at 100X with a Leica DM-750 microscope. After running the Bi-Polar® 168 hours, there was a significant reduction in microbial entities.

## **23. ESTIMATING ENERGETIC CARRYING CAPACITY FOR NONBREEDING WATERFOWL ON RANCHING STOCK PONDS IN THE ROLLING PLAINS OF TEXAS**

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The quality of wetland habitat for waterfowl during migration and throughout winter likely influences body condition and rates at which waterfowl complete annual cycle events, including migration and reproduction. Thus, from a waterfowl management perspective, identifying the value of habitat for waterfowl is of particular significance. Recent data from midwinter surveys conducted by Texas Parks and Wildlife Department reveal increased waterfowl use in the Rolling Plains Ecoregion of Texas on livestock watering tanks (i.e. stock ponds), especially during dry years. As a preliminary study, we are examining the availability of foraging resources for wintering waterfowl on man-made stock ponds in the Region to better understand the interaction between stock pond features and waterfowl use. Field methodologies include recording water quality measurements, benthic and water-column sampling for aquatic invertebrates, and vegetation sampling with a 25cm quadrat. During the fall and winter of 2014 – 2015, seeds and aquatic invertebrates known to be consumed by waterfowl will be analyzed to estimate energetic carrying capacity across 32 stock ponds in the Region. Calculating Duck Energy Days (DEDs) will give insight and explore the ability and capacity at which stock ponds can support waterfowl populations. Additionally, game cameras and waterfowl surveys throughout the study period will provide data to support an occupancy model. As drought and water availability are projected to become more



prevalent in the Rolling Plains Region, stock ponds are likely to become more important to waterfowl, especially if natural wetlands become less available.

## **24. CLASSIFICATION OF TRANSPOSABLE ELEMENTS IN *PHORMIA REGINA***

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*Phormia regina* (black blow fly) is a forensically, medicinally, and agriculturally significant insect. Thus identification of genetic diversity in the species could be important in determining locality information associated with forensic investigations and the spread of disease. Transposable Elements (TEs), segments of DNA that can mobilize in a genome, are a major source of genetic and genomic diversity. They include diverse types such as Short INterspersed Elements (SINES), Long INterspersed Elements (LINES), Long Terminal Repeats (LTR) retrotransposons and DNA transposons. We were interested in better understanding the TE-based genetic diversity of the recently available *P. regina* genome and executed a *de novo* analysis of TEs. To analyze the repeats we obtained the raw sequence data, then with a combination of blasting and mapping of the genome we removed all known mitochondrial and non-coding RNA. Next we utilized 10% of the genome to characterize the TEs. Then these insertions were classified into their respective families.

## **25. USING VAGINAL IMPLANT TRANSMITTERS TO ASSESS FAWN SURVIVAL IN PRONGHORN**

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Pronghorn (*Antilocapra americana*) recruitment is important to maintain populations and allow for the persistence of recently translocated populations. In 2013, extremely low (6:100) fawn to doe ratios were observed for recently translocated pronghorns in Fort Stanton, New Mexico. In January 2014, females ( $n = 26$ ) were radio-collared and ultrasounded to determine pregnancy. Pregnant females were implanted with a VIT (Model M3930L, 21g; ATS, Inc., Isanti, Minnesota, USA) prior to translocation to Fort Stanton to estimate fawn production. Sixteen VITs were expelled at parturition and expelled VITs assisted in fawn capture from 9 different females ( $n=13$  fawns). A total of 29 fawns were captured and outfitted with ear tag transmitters in 2014, where 45% of captured fawns were associated with does with VITs while 55% of captures were opportunistic. Fawns were monitored twice daily to determine survival and cause-specific mortality. In 2014, fawn survival was 0% with the majority ( $n = 25$ ; 86%) of mortalities presumably occurring from predation. Current efforts are focused upon refining VIT technology, and estimating fawn survival in 2015.

## **26. STRUCTURE - FUNCTION STUDIES IN TANDEM TETRAMER MODELS REVEAL THE NATURE OF SUBUNIT COOPERATIVITY IN HETERO-TETRAMER K<sup>+</sup> CHANNELS**

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Voltage gated potassium channels (Kv channels) consist of four identical subunits that form a central permeation pathway in which changes in diameter of an inner constriction known as the activation gate (AG) catalyzes their transition from the closed to the open state. Kv channels play a major role in shaping and regulating action potential in all excitable cells. Kv channels are known to express as homo-tetramers as well as hetero-tetramers and they have a crucial role in excitability disorders such as arrhythmias, long QT syndrome, hyperactivity disorders, and many other behavioral disorders. This renders heteromeric Kv channels as potential pharmaceutical targets but challenges arise because of their hetero-multimeric nature

and diverse sequence identity, which make the smart design of safer and more specific therapeutic drugs difficult. Thus, it is of significant importance to study in detail the structure-function relationship in heteromeric Kv channels. The prokaryotic relative of Kv channels, KcsA, is the bonafide structural and functional surrogate of Kv channels. We constructed tandem-tetramer constructs of KcsA in which all four protomers are expressed as a single polypeptide chain by engineering linkers between the protomers. We were able to express and purify these tandem-tetramer proteins to homogeneity with their oligomeric state intact. This opens up a new and unprecedented avenue to introduce dose dependent mutations in the channel tetramer to evaluate the cooperative behavior of the channel function i.e., ion permeation, gating and ion selectivity, from a functional and structural point of view by using electrophysiology and X-ray crystallography approaches.

## **27. THE INFLUENCE OF CAMERA-TRAP SETTINGS ON CAPTURE SUCCESS IN PRONGHORN**

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Camera-traps have become an important and useful tool for monitoring wildlife populations. Early studies, which utilized camera-traps, focused primarily on rare and elusive species. However, this non-invasive technique is now being used on a wide range of species and environments worldwide. Despite the growing popularity of camera-trap studies, little information exists on the relationship between capture success and the amount of time allowed between individual photographic events. Our study was located on two different areas in southeast New Mexico. Camera traps were used to monitor pronghorn (*Antilocapra americana*) use of anthropogenic water sources and modified fence passes. Cameras were deployed in conjunction with the release of translocated pronghorn in January of 2013 and 2014. During the study, cameras were programmed to capture either 1, 3, 5, or 10 photos in a sequence with various time delays between photos and triggers. To date, nearly 300,000 images have been collected where groups of up to 25 individuals were documented. Understanding the influence of photographic rate on capture success in pronghorn, as well as other desert wildlife species may increase the efficiency and design of future camera trapping efforts.

## **28. INFLUENCE OF SALINITY, SULFATE, AND FLUORIDE ON GROWTH OF GOLDEN ALGA**

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*Prymnesium parvum* (golden alga) is a toxigenic harmful alga native to marine/estuarine habitats that has recently invaded inland brackish waters, causing severe ecological damage. A recent study of the Pecos River reported the unexpected finding of an upper salinity limit of ~20 ppt for golden alga presence, and other field studies reported positive associations with sulfates and fluoride. The objective of this study is to experimentally characterize the influence of salinity (NaCl, 5-30 ppt), sulfate (nominal 0-1000 mg/mL), and fluoride (NaF, nominal 0-125 mg/L) on golden alga growth. Culture conditions included 22°C, 12L:12D, 3 replicates/treatment, 2 independent tests. Stationary (maximum) cell densities were achieved at 21-24 days. Maximum cell densities increased as salinity increased from 5 to 15 ppt, but decreased at higher levels. At constant salinity (5 ppt), cell densities were positively associated with sulfate concentration. While cell density decreased in the presence of fluoride, concentrations tested were above environmental levels. Our laboratory results with salinity and sulfate are consistent with field observations and provide evidence of causality. This information may be useful to inform management strategies based on water

quality indices to curb the incidence and prevent the further spread of toxic blooms of golden alga.

## **29. FOOD CHAIN STRUCTURE OF URBAN AND PLAYA LAKES OF THE SOUTHERN HIGH PLAINS**

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In arid and semi-arid regions, aquatic habitats have been declining in number and quality as a result of drought and increased anthropogenic use. Consequently, aquatic and semi-aquatic organisms are forced to use less than ideal habitats. Amphibians are useful indicators of both aquatic and terrestrial habitat quality as a result of their complex life history. Understanding how habitat quality influences life history and trophic position of a predator can help to predict the future stability of the local food web. Some salamander species can exhibit an alternative life history, maturing from aquatic larvae into an aquatic paedomorphic adult in contrast to the traditional metamorphic adult, as a result of longer hydroperiods. Water permanence influences community structure such that more permanent waters tend to have higher predator density (including fish), and a shift in invertebrate prey taxa to smaller and less calorically beneficial species, indicating poorer habitat conditions. In the case of the Barred Tiger Salamander, *Ambystoma mavortium*, many paedomorphs are additionally cannibalistic, which can contribute to reductions in local populations of upper-level predators. We will (1) determine whether paedomorphic tiger salamanders, as a result of cannibalism, have a higher <sup>15</sup>N/<sup>14</sup>N ratio, indicating a higher trophic level, than larval salamanders (2) compare urban and playa lakes for the incidence ratio of larval and paedomorphic salamanders (3) and determine whether allochthonous inputs have greater influence in the salamander food chain, at urban lakes in contrast to playas. This research will help to understand how habitat quality and the degree of human impact can affect an upper-level predator.

## **30. ASSESSMENT OF MICROSATELLITES IN ESTIMATING INTER- AND INTRASPECIFIC VARIATION AMONG NEOTROPICAL *CROCODYLUS* SPECIES**

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We tested microsatellites that were developed for the saltwater crocodile (*Crocodylus porosus*) for cross-species amplification and to provide an estimate of inter- and intraspecific variation among four species of Neotropical crocodiles (*C. rhombifer*, *C. intermedius*, *C. acutus*, and *C. moreletii*). Our results indicated that with the exception of 2 loci in *C. intermedius*, all 10 microsatellite loci were successfully amplified in the 4 species, producing a set of variably sized alleles that ranged in number between 2 and 14 alleles per locus. Similarly, private alleles (i.e., unique alleles) also were reported in all 4 species for at least 3 loci. The mean observed and expected heterozygosity (averaged across species for all 10 loci combined) ranged from 0.39 to 0.77 and from 0.44 to 0.78, respectively. In addition to this, we evaluated these microsatellites in 2 populations of *C. acutus* and *C. moreletii* to assess their utility in estimating intraspecific levels of polymorphisms. These microsatellites also showed considerable allelic variation in population level analysis. The set of 10 microsatellite loci in our study have the potential to be used as a tool in population and conservation genetic studies of Neotropical crocodiles.

## **31. TECTAL CRF CONCENTRATIONS ARE ALTERED BY ENERGY STATUS AND STRESSOR EXPOSURE IN *XENOPUS LAEVIS***

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Several lines of evidence suggest that the neuropeptide CRF modulates visually guided prey capture in anurans. Previous work in our lab indicate that the tectum possess its own intrinsic CRF signaling system which could play a role in modulating the rapid and subconscious perception and recognition of food.

Whether tectal CRF content changes in response to stressors or energy status upstream of the hypothalamus is unknown. We hypothesize that tectal CRF plays a role in mediating prey capture and that food deprivation will decrease and stressors will increase CRF concentration in the optic tectum. We examined these effects on CRF content in the optic tectum (OT) and compared these changes to those in the hypothalamus/thalamus (H/T), telencephalon (Tel), and brainstem (BS). Frogs received no food or normal food rations for 2 wk. For the stressor studies, frogs were untreated or exposed to ether vapors (1 min) or shaking stress (4 h). Food deprivation decreased CRF OT but did not alter H/T concentrations. Exposure to shaking did not alter CRF in the OT but elevated concentrations in the H/T. Ether elevated CRF in the OT but did not alter CRF content in the H/T. Decreased CRF content in the OT following food deprivation and increased CRF content following ether stressor suggests that the CRF OT signaling system can be modulated changes in energy balance and exposure to a reactive but not anticipatory stressor.

### **32. CHRONIC OXIDATIVE STRESS INDUCED INCREASED TUMORIGENICITY AND RESISTANCE TO DOXORUBICIN IN BREAST CANCER CELLS**

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Breast cancer is the second leading cause of cancer related mortality in women globally. Evidence suggests that environmental-estrogenic chemicals are associated with breast cancer development and chemoresistance. Increased reactive-oxygen species (ROS) production leading to oxidative stress is one of mechanisms for carcinogenic effect of xenoestrogens. Effects of exposure to ROS in breast cancer development/progression and chemo sensitivity are not well understood. Therefore, MCF-7 breast cancer cells were exposed to non-cytotoxic (25 $\mu$ M) and cytotoxic (250  $\mu$ M) levels of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) induced oxidative stress for 6 months and evaluated for cell growth, tumorigenicity and sensitivity to doxorubicin. Results of this study revealed that chronic exposure to oxidative stress increases cell growth and adaptive response in breast cancer cells. These findings were confirmed by cell-cycle analysis and related gene/protein expression. In addition, doxorubicin-induced cytotoxicity was significantly less in MCF-7 cells chronically exposed to H<sub>2</sub>O<sub>2</sub>, when compared to control cells. Chronic oxidative stress also increased tumorigenic phenotype of MCF-7 cells as revealed by increase soft-agar grown colonies and wound healing migration with up-regulation of metastatic markers, dysregulation of epithelial/mesenchymal and epigenetic-regulatory genes. To further evaluate the involvement of DNA methylation in oxidative stress induced decrease in doxorubicin-sensitivity, MCF-7 cells were pretreated with demethylating agent 5-aza-2'-deoxycytidine (5-aza-2dC), and then treated with doxorubicin. Pretreatment with 5-aza-2dC significantly resensitized chronic-ROS adapted MCF-7 cells to doxorubicin-induced cytotoxicity. Results of this study for the first-time provided direct-evidence for chronic oxidative stress induced adaption and reduced chemo-sensitivity in breast cancer cells, mediated by epithelial to mesenchymal transition and epigenetic mechanisms.

### **33. CHRONIC OXIDATIVE STRESS INDUCES NEOPLASTIC TRANSFORMATION OF HUMAN KIDNEY EPITHELIAL CELLS**

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Kidney cancer is highly fatal among all genito-urinary cancers and its incidence rate has been increasing since last decade. Mechanistic understanding of the risk factors associated with kidney cancer development is of immense importance to develop preventive strategies. Oxidative injury to cellular macromolecules has been suggested as a common pathway shared by multiple risk factors, but there is no direct evidence for oxidative stress induced neoplastic transformation in human kidney cells. In this

context, normal kidney epithelial cells (HK-2 cells) were exposed to non-cytotoxic (25 $\mu$ M) and cytotoxic (250  $\mu$ M) levels of hydrogen peroxide induced oxidative stress for 6 months and evaluated for cell growth and neoplastic transformation. The data of this study revealed that exposure to chronic oxidative stress induces neoplastic transformation in normal kidney cells at low dose and adaptation of cells at higher dose. These findings were also confirmed by changes in gene expression, cell cycle, anchorage independent growth and *In-vivo* tumorigenicity assay. Short interfering RNA (siRNA) mediated silencing of pluripotent stem cell marker gene (*Oct 4*) and epithelial to mesenchymal transition (EMT) related transcription factor gene (*Snail1*), partially reversed low dose induced neoplastic transformation and high dose induced adaptive response, respectively. In summary, the study findings for the first time suggested that chronic exposure to low level of oxidative stress is sufficient to induce malignant transformation in kidney epithelial cells through acquisition of stem cell characteristics. In addition, the EMT may potentially play an important role in increased survival and adaptive response of renal cells to oxidative stress.

#### **34. BATS FROM THE REGIONAL NATURAL PARK “EL VINCULO” (VALLE DEL CAUCA, COLOMBIA) AND ITS BUFFER ZONE**

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Diversity, richness and abundance, as well as mobility of bats were measured in areas with different vegetation cover in the Regional Natural Park “El Vínculo” and its buffer zone in the Hacienda La Campiña and the Sonsito River Basin. 22 species of bats of five families were captured; being the nose leaf bats (Phyllostomidae) the most rich and abundant family. The highest species richness was obtained in the buffer zone (Hacienda La Campiña) and the highest abundance inside the Park (Restoration zone). Bats moved in all directions and between all areas of study, with distances ranging from 250 m in *Carollia perspicillata* to 2.12 km in *Glossophaga soricina*. The sampled area forms a functional system where vegetation mosaics are small modified surfaces within a larger matrix, which are used by highly mobile species that benefit from environments with forest cover (RNP) and open areas in the surrounding matrix (buffer zones).

#### **35. URBANIZATION OF PLAYA WETLANDS IN THE SOUTHERN HIGH PLAINS: PRESENT AND FUTURE PATTERNS UNDER FOUR GROWTH AND CLIMATE SCENARIOS**

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Playas are shallow, runoff-fed wetlands of the Southern High Plains (SHP) of North America that are critical habitats for migratory and resident wildlife, in an area projected to experience modest human population growth and modest to severe impacts from climate change over the next century. Many playas have already been modified via urbanization for stormwater management and recreation. However, few studies have examined the important conservation implications of urbanization on playas, and limited knowledge exists of the expected rates of future playa urbanization under different growth and climate scenarios. We investigated playa urbanization utilizing a GIS-based model of SHP wetlands and the US Environmental Protection Agency’s Integrated Climate and Land Use Scenarios (ICLUS). Projected patterns of urbanization for the SHP (focusing on Lubbock County, Texas) will incorporate portions of the surrounding exurban landscape along with unknown compositions and configurations of non-urbanized playas. Results to date indicate that the pattern of playa urban incorporation is highly variable (with respect to composition, configuration, and connectivity) for each of the four ICLUS scenarios (A1, A2, B1, B2). Highest rates of projected urban playa incorporation are expected under scenario A2. The goals of this project are to aid wildlife and municipal managers’ planning and conservation of playa

wetlands as conservation concerns for playa wetlands are magnified in light of shifting climate and demographics on the SHP.

### **36. SOIL MICROBIAL COMMUNITY RESISTANCE AND RESILIENCE TO PETRODIESEL VERSUS BIODIESEL**

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Oil based drilling fluids are essential in oil and gas exploration and production however spills and their ultimate disposal result in soil contamination. Although drilling fluid use and disposal as sludge via land farming are permitted as long as required site restoration takes place, there is limited information about the effects of the oil bases on the soil, the microbial community or site restoration potential. As oil shale drilling increases worldwide, the effects of disposed drilling fluid sludge in land application should be examined. Petro-diesel, refined from crude oil, is the conventional choice for horizontal drilling. Biodiesels are being considered as a substitute from the assumption they have less impact because they are derived from vegetable oils. In this study, the effects of petro-diesel will be compared with three biodiesels in three soil types, a sandy loam, a sandy clay loam and a silt loam, which are common soils throughout Texas, the Midwest and Canada. Soil microbial community resistance and resilience will be measured by using 16S sequencing of the soil community DNA, and Biolog ECO and SFP2 microtiter plates for substrate utilization. Microbial community function will be measured from isolated soil proteins using mass spectrometry based proteomics. We will also address site restoration effects by testing seed germination and plant growth of environmentally relevant plant species. The overall hypothesis is that the base oils of biodiesel have less adverse impact than petro-diesel on soil microbial communities.

### **37. TREE DISTRIBUTION PATTERNS IN THE SOUTHWEST JEMEZ MOUNTAINS, NEW MEXICO**

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Trees are major contributors to local and global ecosystem function, as they represent a large reservoir of carbon. The Southwest Jemez Mountains Collaborative Landscape Restoration Project is a large-scale restoration plan that seeks to restore forest structure and composition through a series of treatments, including prescribed burning (RX) and forest thinning (TRT). This region includes vegetation types of forests (aspen, ponderosa pine, spruce-fir), woodlands (oak, pinyon-juniper), and grasslands. However, conifers constitute the major proportion of the tree species. I measured vegetation composition, tree distribution, and understory vegetation in 224 plots across the region. The point-centered-quarter method was used to measure tree density and DBH every 40m in a 200m transect for all plots. Preliminary data analysis shows that the trees are denser in the areas to be treated either with RX or TRT which supports the accuracy of the selection of the sites for treatment. Simple linear regression suggests that smaller trees are more densely distributed than the larger trees and may require thinning or treatment with fire.

### **38. TUMOR PURINE METABOLISM ENDPOINT CIRCUMVENTION AS A MULTIFACETED SURVIVAL MECHANISM – METHOD OPTIMIZATION AND PRELIMINARY RESULTS**

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Solid tumors characteristically generate immunosuppressive concentrations of CD73-derived extracellular adenosine, and this mechanism is accepted to be the primary means of tumor immune evasion. Although

the tumor-specific mechanisms of adenosine perfusion have been established in detail, the respective functions of adenosine metabolites have yet to be investigated. The primary byproduct of adenosine metabolism is inosine. Under normal conditions, inosine is metabolized to uric acid and exits the body as waste. Tumor conditions such as ischemia and hypoxia instead require the salvage and repurposing of waste precursors, the primary of which being inosine. In addition, inosine has a wide range transcriptional and translational activity, and it has yet to be determined how these functions contribute to the genesis and progression of solid tumors. This project has been designed to investigate the possible functions of inosine in tumor cell homeostasis, transcriptome aberrations, and the production of immunosuppressive purines. Here we present an improved HPLC method for detecting purine metabolites and preliminary results that are in agreement with the literature.

### **39. MEASUREMENT OF CORTICOSTERONE LEVELS IN FEATHERS FROM BOBWHITE QUAIL USING LC-MS**

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Populations of northern bobwhite (*Colinus virginianus*) have been declining across their range, including the Rolling Plains ecoregion of Texas and Oklahoma, for several decades. A hypothesized cause of this decline has been changes in weather patterns that have altered aspects of life history traits such as survival and reproduction. A potential underlying mechanism for this is weather-induced change to corticosterone hormone levels in birds and subsequent physiological or behavioral changes. In this study, we investigate this hypothesis by first measuring concentrations of corticosterone in feathers collected from wild birds across the Rolling plains, and then analyzing this data in relation to weather data using a correlative statistical approach. From 2011 to 2013, 665 bobwhite carcasses were collected from several ranches and wildlife management areas in the Rolling Plains. From 168 of these carcasses, corticosterone was extracted from primary wing feathers using methanol and purified using solid phase extraction. Corticosterone concentration was then measured using LC-MS. Preliminary analyses indicated that corticosterone levels range from 0.3 ng/mL to 13.9 ng/mL, with a mean of 2.74 ng/mL. To our knowledge, no previous study has examined bobwhite corticosterone levels using feathers as the sample matrix, or examined corticosterone levels at all within the Rolling Plains. Conclusions reached from this innovative study will lend to better understanding of bobwhite quail decline and potentially inform management practices.

### **40. ABUNDANCE AND LAND COVER ASSOCIATIONS OF MIGRANT AND WINTERING BIRDS OF PREY IN THE SOUTHERN GREAT PLAINS**

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Wind energy development is a rapidly advancing source of renewable, non-carbon emitting energy in the Southern Great Plains. However, it is not without environmental cost in terms of potential mortality and disturbance to wildlife. Birds of prey in particular appear to be susceptible to direct mortality from wind turbines. Each winter, the Southern Great Plains experiences an influx of birds of prey that migrate through the area or settle in for the winter. However, little contemporary or quantitative information is available regarding the composition, abundance, or distribution patterns of these birds across the landscape. We initiated bird of prey surveys along 51 50km road survey transects in the Southern Great Plains of eastern New Mexico, the panhandle of Texas, and western Oklahoma. Our goal is to determine species richness, abundance, and species-specific land cover associations in the region to assess potential risk of energy development to migrating and wintering birds of prey. We will use a distance sampling approach to estimate species-specific detection rates and resulting density estimates across the region. We

have completed October surveys, with mid-December and early January surveys pending. Final analysis of the survey data will be presented.

#### **41. QUANTITATIVE DETERMINATION OF RACTOPAMINE IN WHITE-TAILED DEER TISSUE**

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Ractopamine belongs to a group of beta-agonist compounds and has been reported to mimic stress hormone. As a drug, it has been used in livestock production to promote leanness in meat, increase rate of weight gain and improve feed efficiency. Over 160 countries including China and European Union (EU) have banned the use of ractopamine in animal feed. In contrast, ractopamine is permitted for use in countries such as the United States and Japan. FDA's established maximum residue limit (MRL) for pork and beef are 50 ppb and 30 ppb, respectively. Interestingly, MRL set by Codex Alimentarius Commission (WHO/FAO) is 10 ppb for both beef and pork. Ractopamine has been associated with nervous system disorders in pigs. The use of ractopamine during the period leading up to slaughter has led to an increased level of concerns for human health and safety. The use of ractopamine in the white-tailed deer growth and development is increasing among some farmers. There is no data available on the characterization of ractopamine in white-tailed deer tissue. Therefore, the objective of the first phase of this project is to develop and validate analytical methods to characterize ractopamine residues in white-tailed deer tissues using Liquid Chromatography/Mass Spectrometry (LC/MS/MS) and Liquid Chromatography/Ion Trap to build a qualitative and quantitative reference dataset.

#### **42. STUDYING THE PROTEIN-PROTEIN INTERACTIONS BETWEEN MeIR, A TRANSCRIPTIONAL REGULATOR OF *melAB* OPERON, AND ITS BLOCKER, ANK-N5C-281, BY BACTERIAL TWO HYBRID SYSTEM**

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The goal of this project is to establish a bacterial two-hybrid system for studying protein-protein interactions and for screening protein-capture reagents. The well-established bacterial adenylate cyclase-based two-hybrid system is based on the functional reconstitution of a regulatory cascade depending on cyclic adenosine monophosphate (cAMP). For a functional selection, we applied the PCR-based one-step gene-deletion method and created three *E. coli* strains by deleting the *cyaA* gene encoding adenylate cyclase, which synthesizes cAMP in *E. coli*. Using two available screen-vectors containing T18 or T25 motif of *Bordetella pertussis* adenylate cyclase toxin, two pairs of hybrids with a protein known to form a dimer (leucine zipper and a DNA-binding protein MeIR) were generated for evaluation. We observed that only cells expressing a pair of leucine zipper hybrids or a pair of MeIR hybrids are capable of fermenting maltose or melibiose, indicating that activity of adenylate cyclase was restored and the method was validated. The first application is to study an unsolved problem on the inhibitory mechanism of transcription of *melAB* operon by a designed protein (ANK-N5C-281). We observed that only the cells containing hybrid vectors expressing MeIR and ANK-N5C-281, are capable of fermenting maltose. The internal controls and two hybrid vector controls showed no fermentation, suggesting that MeIR possibly interacts with ANK-N5C-281, *in vivo*.



### **43. PATTERNS OF GENETIC DIVERSIFICATION IN A WIDELY DISTRIBUTED SPECIES OF BAT, *MOLOSSUS MOLOSSUS***

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The taxonomy and evolutionary relationships of the velvety free-tailed bat, *Molossus molossus*, from Central and South America long has been debated. Within this species, and in fact the entire genus *Molossus*, specimens have been difficult to identify and have presented several taxonomic challenges. The objective of this project was to characterize the genetic relationship among individuals representing subspecies of the widely distributed species, *M. molossus*. We tested the hypothesis that genetic patterns of diversification would reflect subspecies lineages. The mitochondrial gene, cytochrome *b* (*cytb*) was amplified and sequenced for specimens throughout its geographic range. A Bayesian analysis of 678 base pairs of the *cytb* gene was conducted for 63 specimens with *M. alvarezii* as an outgroup. Genetic divergence was estimated. Our results showed that some subspecies such as *M. m. daulensis* and *M. m. tropidorhynchus*, based on morphology and geographic location, are consistent with the mitochondrial lineages recovered. However, not all currently recognized subspecies of *M. molossus* were recovered by this analysis. Overall there was low average divergence across all specimens (4.7%), however a mitochondrial lineage containing the Cuban subspecies, *M. m. tropidorhynchus*, was 7.9% divergent from the other *M. molossus* specimens. This level of divergence and the recovery of a monophyletic lineage containing all Cuban specimens was consistent with recognition of the taxon as a distinct species.

### **44. EVALUATING THE EFFECTS OF DROUGHT AND ANTHROPOGENIC ALTERATIONS ON THE GROWTH OF STREAM FISHES ON THE EDWARDS PLATEAU, CENTRAL TEXAS**

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Drought and landscape-level anthropogenic impacts, such as alterations of stream channel morphology and flow regime, have the potential to affect fish growth. However, it is unclear how these factors interact. We evaluated the influence of the interaction between drought and anthropogenic factors on growth rates of stream fishes within a pair of adjacent river systems in Texas. The flow regime of the North Llano River (NLR) was heavily altered compared to the South Llano River (SLR) due to stronger spring contributions to base flows. Otoliths from eleven species common to the NLR and SLR were back-calculated for estimated lengths at age. Growth data using several models will 1) identify potential differences between the NLR and SLR and their individual species, and 2) if an overall difference is present among individual species we will test for differences between several covariates that vary across specimens. Preliminary results evaluating the effects of drought and altered flow regime on the growth of eleven species will be presented. Results from this study will provide biologists with an understanding of how drought coupled with anthropogenic alterations affects overall growth rate of stream fishes improving decisions for management and conservation of fishes occupying similar river systems.

**ORAL (UNDERGRADUATE)**

#### **45. MESO-MAMMAL PRESENCE AND HABITAT ASSOCIATIONS OF BOBCATS AND AMERICAN PORCUPINE**

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Surveying was done from April 2014 to February 2015 at a site in Briscoe County near Quitaque, Texas using automatically triggered cameras to identify the presence of meso-mammals, estimate relative meso-mammal abundance, and determine habitat associations of bobcat (*Lynx rufus*) and the American porcupine (*Erethizon dorsatum*). Cameras were active for 4 2 week trapping periods or 448 total trap nights (TN) on the 1,862 ha ranch resulting in 35 capture events (0.078 Meso-mammals/TN). Grey fox (37%) were the most relatively abundance species followed by porcupine (28%), coyote (20%), bobcat (6%), raccoon (6%), and badger (3%). Both the bobcat and American porcupine showed similar associations for higher percent of shrub canopy cover, distance from roads, lower elevation, and nearness to creek bed while porcupine showed addition associations for nearness to water source, and hardwood stand.

#### **46. ANTIBACTERIAL ACTIVITY AND CHEMISTRY OF FIVE TEXAS PLANT SPECIES**

Kara Black<sup>1\*</sup>, Anna Saghatelian<sup>1</sup>, Hyunshun Shin<sup>1</sup>, and Gary Wilson<sup>1</sup>

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The overuse of prescribed antibiotics has recently led to an increased amount of antibiotic resistant bacteria. Plants have been used as a source for novel medicines, and many plants have shown antibacterial properties. We hypothesize that antibacterial compounds can be found in the following West Texas plants: *Asclepias viridis*, *Asclepias syriaca*, *Gaillardia pulchella*, *Solanum eleagnifolium*, and *Glandularia bipinnatifida*. The antibacterial activity of these species will be assessed using Thin Layer Chromatography (TLC) plates that have been spotted with plant extracts, developed, and covered with bacteria infused agar. All antibacterial compounds will then be isolated. We will be presenting preliminary comparisons of the antibacterial activity of these plants with regards to *Escherichia coli* and *Pseudomonas putida*, as well as the potential structures of the isolated antibacterial compounds.

#### **47. CLARIFICATION OF THE DISTRIBUTION OF THE EASTERN MOLE (SCALOPUS AQUATICUS, TALPIDAE) ON THE SOUTHERN ROLLING PLAINS REGION OF TEXAS**

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The eastern mole, *Scalopus aquaticus*, occurs throughout the panhandle and eastern portion of the state. Until recently, a gap in distribution could be found on the Southern Rolling Plains Region (Callahan, Coke, Coleman, Fisher, Jones, Nolan, Runnels, Shackelford, and Taylor Counties). We compared recent collections of *S. aquaticus* on the Southern Rolling Plains to soil maps to determine the preferred habitat of this fossorial species. We then visited these potential habitats in search of sign of mole activity. Victor Harpoon traps were placed along observed runs throughout the region in attempts to obtain new voucher specimens. Shallow foraging runs were observed in seven new habitat patches in Callahan, Fisher and Jones counties. A voucher specimen was obtained from Fisher County for the first time in recorded history. This study increases our knowledge of the distribution of this often overlooked member of the mammalian fauna of Texas. Future efforts will investigate additional potential patches on the Southern Rolling Plains and assess the genetic variation of these new populations relative to other populations in Texas and the Eastern United States.

#### **48. PHYLOGENY OF BATS OF GENUS MONOPHYLLUS. A STUDY OF GENETIC AND MORPHOLOGICAL DIVERGENCE BASED ON MITOCHONDRIAL CYTOCHROME-B GENE**

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The genus *Monophyllus* is distributed throughout the Caribbean Islands. Two species of *Monophyllus* are recognized, *M. redmani* and *M. plethodon*, and are sympatric in Puerto Rico. Two hypotheses were formed, first that *M. plethodon* has multiple species and second that there is more than one species of *M. redmani*; both hypotheses were based by evaluating morphological differences and application of the Morphological Species Concept. Molecular data, generated from the mitochondrial cytochrome-*b* gene, were used to test if genetic differentiation was congruent with morphological variation. Genetic distance between *M. redmani* and *M. plethodon* is approximately 11%. Considering the Genetic Species Concept, analysis of cytochrome-*b* does not support the hypothesis of more than one species of *M. plethodon* (genetic distance < 5%). The experimental data generated from analysis of *M. redmani* suggests that there could be an undescribed species on the island of Puerto Rico (genetic distance > 5%). Genetic distance values of the cytochrome-*b* gene are compatible with standards used to determine taxonomic status in mammals. Multiple species concepts exist, and not all can be applied. However, application of multiple species concepts provide more confidence in conclusions drawn from the data. Based on available data, there is no indication for the existence of more than three species in the genus *Monophyllus*. Further research to analyze the cytochrome-*b* gene, by completing sequencing, is being conducted. In addition, we plan to sequence a nuclear gene which could determine if gene flow is occurring among the two groups classified as *M. redmani*.

#### **49. THE DIVERSITY OF DISTRESS VOCALIZATION OF OLD WORLD TROPICAL BATS**

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New studies into the vocalizations of bats have shown that many species are capable of producing a structurally diverse repertoire of syllables. These syllables often vary with behavioral contexts and relatively little is understood about these variations in syllable acoustics and temporal emission patterns between behaviors. For this study, we analyzed recordings of distressed individuals from 12 species of Southeast Asian bats in terms of syllable acoustics and temporal emission patterns. An analysis of our results show variations in both the frequency modulated (FM) and the quasi-constant frequency (QCF) syllables, resulting in a diverse collection of syllables to be combined into simple or complex phrases. The syntax of these phrases may be indicators of a calls specific function or as a means of recognition among nearby species. The exact function of distress vocalizations is still unclear; they may be a method of warning nearby individuals to the presence of a predator or they may be used to request aid from nearby conspecific individuals. Further studies into the acoustic variations in syllables with changes in behavioral context will be needed to further categorize and identify a function of syllable structure.

#### **50. SOCIAL INTERACTION PREVENTS SALT ADDICTION IN GROUP-HOUSED ANIMALS**

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Social interaction positively drives reward behavior. Salt intake enhancement is a behavioral sensitization due to repeated sodium deficiency adaptation, likewater deprivation (WD)-partial rehydration (PR)-sensitization in individually-housed (IH) animals. We investigated if repeated WD-PR would affect salt

addiction in group-housed (GH) animals. Adult male Sprague-Dawley rats were GH (five/cage) or IH (one/cage) and had access to chow, water, and 0.3M NaCl. Spontaneous salt intake was recorded for four weeks. Daily sodium intake in GH dep did not alter ( $3.9 \pm 0.1$ ,  $4.0 \pm 1.1$ ,  $4.9 \pm 1.1$ ,  $4.6 \pm 0.7$  mL/week, respectively). Daily salt intake in IH dep increased after the first WD-PR ( $1.7 \pm 0.5$ ,  $2.5 \pm 0.7^*$ ,  $3.3 \pm 0.8^*$ ,  $2.6 \pm 0.6^*$  mL/week, respectively,  $*p < 0.05$ ). Blood biochemistry was similar between GH dep and GH non-dep ( $145 \pm 1$  Na<sup>+</sup>mEq/L,  $6.6 \pm 0.1$  K<sup>+</sup>mEq/L,  $7.3 \pm 0.2$ g% total protein,  $289 \pm 1$  mOsmol/kg). Serum sodium decreased in IH dep compared to IH non-dep ( $144 \pm 1^*$  vs.  $140 \pm 1$  Na<sup>+</sup>mEq/L). The other parameters were similar between both groups ( $6.7 \pm 0.2$  K<sup>+</sup>mEq/L,  $6.8 \pm 0.2$ g% total protein,  $288 \pm 2$  mOsmol/kg). All groups presented more taste bud open-pores ( $62 \pm 9^*$ %) than closed-pores ( $16 \pm 3$ %). There was no difference on open- or closed-pores between IH or GH groups. Stomach epithelium analysis (A=rosy, B=reddish, C=deep reddish, D=pinpoint ulcers) among groups showed similar pigmentation (IH dep: A/B=50%; IH non-dep: A=70%, B=30%; GH dep: A=30%, B=70%; GH non-dep: A=40%, B=60%). Thus, spontaneous sodium intake enhancement impairment in GH animals was not dependent on changes in blood homeostasis, taste bud open-pore count, or stomach pigmentation. Therefore, salt addiction in IH animals may be driven by long-term changes in the brain.

## 51. VARIATION OF DNA SEQUENCES IN THE MITOCHONDRIAL CYTOCHROME B GENE IN THE GENUS *EPTESICUS*

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Determining how many species exist in a particular genus is the cornerstone for understanding biodiversity. Resolution at this level is confounded by taxa that do not have morphological features which resolve species boundaries and relatedness. An example of such a genus is *Eptesicus*, which has been primarily identified by the number of teeth and the shape of the tragus. The genus *Eptesicus* has a near-cosmopolitan distribution, but is not found on Antarctica or inside the Arctic Circle. This paper examines 80 specimens, primarily from North and South America by sequencing the first 400 base pairs of the mitochondrial, protein coding cytochrome b gene. The 400 base pairs resolve species identity and will allow us to estimate the number of species necessary to explain genetic variation as compared to morphological variation. It has been proposed that a genetic distance greater than 5% usually is accompanied by completion of speciation. We will use this metric to estimate the number of species present in our sample of 80 specimens.

## 52. MOLECULAR SYSTEMATICS OF *GEOMYS* BASED ON TWO NUCLEAR AND TWO MITOCHONDRIAL GENES

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Phylogenetic relationships among members of the genus *Geomys* have been difficult to discern because of the conservation of morphological characters, presumably as a result of their fossorial lifestyle. Early studies of chromosomes and allozymes generated a few phylogenetic hypotheses, but most were hindered by taxonomic sampling and low resolving power of characters due to homoplastic events. In recent years, DNA sequence data has been obtained from two mitochondrial genes, 12S ribosomal RNA (12S rRNA) and cytochrome-*b* (*cytb*) and one nuclear gene, retinoid-binding protein 3 (*Rbp3*), and used to generate phylogenetic relationships for all members of the genus. Herein, we utilize a combined dataset and include a second nuclear marker, the coding region of the alcohol dehydrogenase gene (*Adh-1*). Using a combination of molecular techniques and phylogenetic analyses, we were able to include many samples of *Geomys* and several *Cratogeomys* samples, a sister genus. Although this study is preliminary with only twelve species examined, the data appears to be useful for addressing phylogenetic relationships among

the genus *Geomys*. However, more taxa and species of *Geomys* need to be further examined to obtain better resolution of the phylogenetic relationships in this group.

## **ORAL (GRADUATE)**

### **CELL & MOLECULAR BIOLOGY**

#### **53. SLO INDUCED INFLAMMASOME ACTIVATION IS TRIGGERED BY PORE-FORMATION INSTEAD OF MEMBRANE REPAIR**

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Macrophages activate membrane repair and the inflammasome in response to bacterial pore-forming toxins like streptolysin O (SLO). SLO mutants that are more easily resisted by repair processes produce increased amounts of IL-1 $\beta$ . This suggests that membrane repair may influence inflammasome activation, though it is not clear whether pore-formation or triggering repair pathways directly activates the inflammasome. In order to determine the relationship between membrane repair and the inflammasome, we first determined the mechanism of membrane repair in macrophages. Dose-dependent cytotoxicity of SLO is lower in macrophages than in either 3T3 or HeLa cell lines, indicating increased repair efficiency in macrophages. This was not due to decreased SLO binding to macrophages. Macrophages challenged with sublytic doses of SLO shed microvesicles similar to HeLa and 3T3 cells. Although pore-formation was necessary for inflammasome activation, the pore-dead SLO N402E still promoted microvesicle shedding. However, a second SLO pore-dead mutant, SLO G395V/G396V failed to promote shedding. This suggests that membrane binding and the extent of oligomerization, rather than pore-formation, is necessary to trigger membrane repair. Since pore-formation is necessary for IL-1 $\beta$  secretion, these data suggest that membrane repair itself does not promote inflammasome activation. Instead membrane repair preserves the cell long enough to execute its inflammatory program.

#### **54. COMPLETE CYSTEINE SCANNING MUTAGENESIS OF MELIBIOSE PERMEASE IN *SALMONELLA TYPHIMURIUM***

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The melibiose permease of *Salmonella typhimurium* (MelB<sub>St</sub>) catalyzes the symport of a galactopyranoside and a coupling cation (H<sup>+</sup>, Li<sup>+</sup>, or Na<sup>+</sup>). High-resolution 3D x-ray crystal structures show that MelB<sub>St</sub> adopts a typical major facilitator superfamily fold, comprised of twelve transmembrane  $\alpha$ -helices, organized into two pseudo-symmetric N- and C-terminal domains. In order to create a tool to further study the transport mechanism and conformational dynamics of MelB<sub>St</sub>, we constructed a single-Cys mutant Library by site-directed mutagenesis for each residue based on a functional Cys-less. The entire library of 475 mutants was tested for transport activity using both melibiose fermentation and [<sup>3</sup>H]melibiose flux assays. Surprisingly, 13% or ~23% of the mutants show activities at levels of <5% (inactive) or <15% of Cys-less MelB<sub>St</sub>, while most of them exhibits significant protein expression. When we compared both assays, about 75% of mutants exhibit consistent results; 14 inactive mutants ferment melibiose well; conversely, 4 mutants, which fail to ferment melibiose, have significant transport activity. This complete Cys scanning mutagenesis study indicates that MelB<sub>St</sub> is highly susceptible to signal-site mutations and that these important positions are mainly located in within the inner helices of MelB<sub>St</sub>, constituting the hydrophilic cavity for co-substrate binding and access as indicated by the crystal structure.

## **55. TECTAL CRF CONCENTRATIONS ARE ALTERED BY ENERGY STATUS AND STRESSOR EXPOSURE IN XENOPUS LAEVIS**

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Several lines of evidence suggest that the neuropeptide CRF modulates visually guided prey capture in anurans. Previous work in our lab indicate that the tectum possess its own intrinsic CRF signaling system which could play a role in modulating the rapid and subconscious perception and recognition of food. Whether tectal CRF content changes in response to stressors or energy status upstream of the hypothalamus is unknown. We hypothesize that tectal CRF plays a role in mediating prey capture and that food deprivation will decrease and stressors will increase CRF concentration in the optic tectum. We examined these effects on CRF content in the optic tectum (OT) and compared these changes to those in the hypothalamus/thalamus (H/T), telencephalon (Tel), and brainstem (BS). Frogs received no food or normal food rations for 2 wk. For the stressor studies, frogs were untreated or exposed to ether vapors (1 min) or shaking stress (4 h). Food deprivation decreased CRF OT but did not alter H/T concentrations. Exposure to shaking did not alter CRF in the OT but elevated concentrations in the H/T. Ether elevated CRF in the OT but did not alter CRF content in the H/T. Decreased CRF content in the OT following food deprivation and increased CRF content following ether stressor suggests that the CRF OT signaling system can be modulated changes in energy balance and exposure to a reactive but not anticipatory stressor.

## **ECOLOGY**

## **56. SPATIAL CLUSTERING AND BIAS IN SOUTHEAST ASIAN BAT SAMPLING LOCALITIES**

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Species distribution models are widely used in species conservation, but model effectiveness depends on data biases and model uncertainty. When data are spatially biased, for example if they are clustered or overly dispersed, the true distribution of a species is not represented. Biases can arise from failings in sampling methodology or uneven effort across a species' suspected range. The most common spatial bias in occurrence data is an over-sampling of easy-access sites such as protected areas, urban areas, and sites near roads. Our objective was to assess spatial clustering in Southeast Asian bat sampling localities and bias towards easy-access areas. We assessed spatial clustering using a Getis-Ord  $G_i^*$  test to identify hot and cold spots in the data. Easy-access bias was estimated by calculating distances of localities from roads, protected areas, and urban centers and comparing those distances to distances calculated from an equal number of randomly generated points using Kolmogorov-Smirnov (KS) tests. Based on 1553 collated sampling localities, the mean center of bat localities was displaced 500km east of the random mean center. Most of mainland Southeast Asia was a significant cold spot and multiple hot spots occurred in Malaysia, Indonesia, Philippines, and Singapore. Finally, KS tests showed that localities are significantly closer to easy-access sites. Clustering and bias can increase uncertainty in species distributions models for Southeast Asian bats, thus steps should be taken to remove data clustering and bias through *a priori* or *a posteriori* methods.

## **57. DIFFERENCES IN DAY–ROOST HABITAT CHARACTERISTICS OF ARTIBEUS LITURATUS, BETWEEN TWO DISPARATE LANDSCAPES**

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Habitat selection is neither arbitrary nor random, as both survivorship and fitness depend on animals evolving to make the best possible decision for maximizing both. Therefore, day–roost selection in bats should be for the optimal roosts available of this density–dependent resource. The great fruit–eating bat (*Artibeus lituratus*) occurs as an abundant bat species across both contiguous and matrix landscapes in the interior Atlantic Forest of eastern Paraguay. This matrix is a mosaic of agriculture, ranches, residences, indigenous villages, and forest patches that are remnants or regrowth. We examined differences between contiguous forest and a fragmented area based on measurable characteristics of roosts. We selected numerous habitat variables to characterize roosts based on previous studies. Roost characteristics included tree/vine species, whether the roost tree was alive/dead, diameter at breast height (dbh), tree height, location, aspect, and presence/absence of vine knots. Stand–level habitat characteristics included canopy height, canopy cover, grade and aspect of slope, distance to nearest taller tree, number of trees ( $\geq 10\text{cm}$  dbh) within 10m, vines ( $\geq 2\text{cm}$  dbh) within 5m, and quantity of trees (total and  $\geq 70\text{cm}$  dbh) recorded from a ten–factor prism timber cruise. Differences were significant; findings show disparities regarding several day–roosts variables, based upon the landscape in which *A. lituratus* occurs. Those differences suggest *A. lituratus* is selecting suboptimal habitat based on a roost–limited landscape. Understanding plasticity regarding habitat use is critical for mitigating ecological degradation, as contiguous habitat becomes increasingly scarce or marginal.

## **58. BAT METACOMMUNITY STRUCTURE IN ANTHROPOGENIC LANDSCAPE (COFFEE-GROWING ECOREGION, COLOMBIA)**

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Bats are well known to play an important role in tropical ecosystems, such as seed dispersal and pollination. These ecosystem services are provided, not by just one bat species, but by an entire bat community. Using metacommunity theory to characterize patterns and understand structure, understanding of bat assemblages can be facilitated by the integration of different spatial and temporal scales to explain relationships among species, environmental and spatial processes. Here we address the main question: Is the bat meta–community structure in an anthropogenic landscape determined by environmental or spatial gradients? We reviewed 5,279 bat records from the study area found in museums in Colombia, and in international databases. We evaluated the distribution pattern which best describes the location of the different species of bats in the ecoregion. A total of 56 species were recorded at 26 sites were the most important species were phyllostomid bats. Environmental variables best explained the structure of the bat meta–assemblage. Moreover structure was best described by a species sorting model. The distribution pattern of the meta–assemblage corresponded to a Clementsian quasi–structure. This implies that despite some communities being clustered, some species are distributed along much of the environmental gradient. These results demonstrate that environmental configuration of the landscape, related to anthropogenic land use and could affect the presence of these bats as well as their ecological roles.

## **59. POPULATION ECOLOGY OF AMERICAN CROCODILE (*Crocodylus acutus*) IN COIBA NATIONAL PARK, PANAMA**

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We conducted nocturnal surveys in the insular and coastal areas of Coiba National Park (CNP) and its mainland buffer zone in Panama (Chiriquí conservation site) from 2009–2012 to determine the conservation status of *Crocodylus acutus*. In 99 nights, we surveyed 147.2 km and captured 185 animals during nocturnal transects inspection with headlamps. Overall, sex ratio was 1.00:1.01 female/male with significant differences by size/age class and year. Females were slightly larger in total length than males (115.1 ± 56.9 cm-females, 105.4 ± 71.8 cm-males). The encounter rate was calculated based on number of animals captured per km of surveyed transect. The *C. acutus* encounter rate per year was 1.8 ind/km (60 ind in 33.5 km in 12 places visited) in 2009, 1.0 ind/km (90 ind/87.4 km/18 places visited) in 2010, and 1.3 ind/km (35 ind/26.3 km/8 places visited) in 2012. Based on our spatial analysis, the animals showed a dispersed pattern in most sites on CNP. Captured *C. acutus* were found in 581.1 km<sup>2</sup> total area within 78% natural habitat, including mangroves and beaches, and 22% disturbed habitat on both the mainland and the islands. In addition, the spatial analysis showed reduction in natural land cover; crocodile habitat showed limited conversion to agricultural land use; and we found correlation between crocodile population size and protected areas. The differences between mainland and island populations regarding ecology suggest that a long-term monitoring program for American Crocodiles is necessary to distinguish between natural fluctuations and anthropogenic changes on population dynamics and conservation status.

## **60. ON THE USE OF UNMANNED AERIAL VEHICLES TO RAPIDLY ASSESS MICROHABITATS OF TWO TEXAS LIZARD SPECIES, *COPHOSAURUS TEXANUS* AND *ASPIDOSCELIS GULARIS***

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We examined the effectiveness of using an unmanned aerial vehicle (UAV) as a tool for the rapid assessment of microhabitat in Texas spotted whiptail (*Aspidoscelis gularis*) and greater earless lizard (*Cophosaurus texanus*) along gravel roadways on Devils River State Natural Area – Big Satan Unit (DRSNA-BSU) from July through September, 2014. Point locations of lizard sightings were also compared with DRSNA-BSU environmental maps including: soil type, vegetation type, Normalized Difference Vegetation Index (NDVI), elevation, and slope. Multiresponse Permutation Procedures (MRPP) and Permutational Multiple Analysis of Variance (PerMANOVA) analyses indicated that the spatial distributions of the two lizard species were significantly different. Non-metric Multidimensional Scaling (NMDS) analyses revealed that grasslands, low slopes, and soft soils were correlated with the presence of *A. gularis* while steep slopes, rocky soils, and the xeric plants lechuguilla, sotol, and guajillo were associated with the presence of *C. texanus*. Data collection for one individual lizard in the field could be completed in less than three minutes with the use of our UAV, making the technology an ideal technique for gathering habitat data in a short amount of time.



## **61. MOLECULAR GENDER IDENTIFICATION OF PORCUPINES (ERETHIZON DORSATUM) IN THE TEXAS PANHANDLE**

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North American porcupines (*Erethizon dorsatum*) are a polygynous mammal for which evidence suggests an atypical dispersal pattern that is female biased. This species does not exhibit any external sexual traits aside from observed pregnancy and breeding behavior, making sex determination by visual inspection difficult. A reliable and time efficient molecular technique has been developed for DNA sex determination in mammals involving the analysis of sex-linked zinc finger protein genes, which are present on both female (*Zfx*) and male (*Zfy*) chromosomes. The objective of this study is to determine gender and gender differences in the porcupine using molecular markers. I am specifically looking for genetic parameters that either support or refute the female-biased sex ratio and dispersal tendencies, as well as genetic variation within and between populations. For DNA analysis hair, quills, feces, tissue, and toenail clippings are collected from both live-trapped animals and vehicular mortalities. Genomic DNA is extracted from collected samples using Beckman-Coulter testing and amplified using polymerase chain reaction (PCR). Amplified PCR products are visualized on an automated sequencer to determine gender. Deviations from Hardy-Weinberg equilibrium are used to detect levels of genetic variation. Preliminary results are being evaluated at present. Porcupines are relatively unstudied in the Great Plains region of North America. Information specific to this geographic area will aid in the management and overall understanding of the porcupine in Texas.

## **62. ZOOGEOGRAPHY, DIVERSITY, AND ALTITUDINAL DISTRIBUTION OF BATS FROM ECUADOR**

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Ecuador is categorized as a megadiverse country with high levels of species richness and endemism for several taxonomic groups. The Order Chiroptera (bats) is currently the most diverse and studied group of mammals in the country. The last taxonomic revision recognizes 176 species, belonging to 8 families, distributed across 9 zoogeographic ecoregions. However, no formal analysis has been conducted on the geographic and biological determinants that account for the distribution patterns of bat species in the country. The main objective of this study is to test the influence of vegetation type, elevation, and the presence of the Andes mountain range on bat species distribution in Ecuador. A database, including biological and geographic information, of more than 11,500 records was generated. Primary data was obtained from fieldwork and associated notes, natural history museum voucher collections and databases, and published literature. The records were organized and evaluated using multivariate analyses. Preliminary results suggest a relationship among vegetation type, elevation, and species composition. Our results also recognize three major bat faunas: Pacific, Andean, and Amazonian. Species richness in the Pacific and Amazonian faunas is very similar, with 116 and 125 species, respectively, whereas the Andean fauna only includes 31 species. The majority of bat species in Ecuador are distributed below 1200 m.

### **63. HIGH ROOST FIDELITY OF HAMMER-HEADED FRUIT BATS, *HYPSIGNATHUS MONSTROSUS*, UTILIZING A MAN-MADE DAY ROOST IN SOUTHERN NIGERIA**

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Roost fidelity in bats is known to increase with the stability of roost structure. A maternity colony of *Hypsignathus monstrosus* roosting under the eaves of a lecture theater was observed on a monthly basis between March, 2012 – April, 2013 on the Ugbowo campus of the University of Benin, Benin City. We review published accounts of day roosts of *H. monstrosus*, which are usually found in riverine forests, swamps, and mangroves. Our observation of this species roosting in a man-made structure is strikingly different from previous accounts. The colony has been continuously occupying this roost for more than four years, while natural foliage day roosts of hammer-headed fruit bats are reported to be rather unstable and maintained for no more than 10 days. We counted the number of adult females (lactating and non-lactating), and juveniles during the observation period. Our data suggests that in this rather protected situation, hammer-headed fruit bats seem to have adopted much higher site fidelity than reported in natural roosts. This higher site fidelity might be due to the stability of the roost structure and lower predation risk in an urban setting.

### **EVOLUTIONARY BIOLOGY**

### **64. CLASSIFICATION OF SINE SUBFAMILIES IN *PEROMYSCUS MANICULATUS***

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Transposable elements (TEs) are segments of DNA that can mobilize in a genome. They include diverse types including Short INterspersed Elements (SINEs), (Long INterspersed Elements (LINEs), Long Terminal Repeat (LTR) retrotransposons and DNA transposons. SINEs have been demonstrated to be a valuable marker set in phylogenetic analysis. We identified B2 SINEs in the recently released genome draft of *Peromyscus maniculatus* and characterized SINE subfamily evolution within the genome. In future work, we will use SINE loci to elucidate the phylogeny of *Peromyscus*, portions of which have proven difficult to resolve using more traditional methods. The identification of well-defined subfamilies and PCR results suggesting polymorphism of SINE insertion loci suggest that implementation of ME-scan, a TE analysis protocol, will lead to a well-resolved phylogeny of *Peromyscus*.

### **65. APPLICATION OF GENETIC DATA TO UNDERSTANDING CONSERVATION IN AN ENDANGERED SPECIES OF CAVE SPIDERS**

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Bexar County, Texas, has multiple karst zones and endangered, cave obligate invertebrates. Many of these endangered species are blind cave spiders in the genus *Cicurina*. These cave spiders inhabit areas subject to habitat degradation, especially through recent advances in transportation development within Bexar County. Morphological identifications are only possible with fully mature adult specimens, which creates difficulties associated with the rarity of adult specimens. To better understand the genetic and geographic limits of the species groups, we generated genetic data from the more abundant immature

specimens along with morphologically identified adults. Mitochondrial and nuclear genes were selected from those most commonly found among Araneae datasets. Sequence data were generated for the mitochondrial cytochrome *c* oxidase subunit I and the nuclear internal transcribed spacer I and II loci. Within Bexar County, two major clades have been recovered among the data. One major clade is associated with specimens from counties north of Bexar. The other major clade has not yet been affiliated with specimens from counties other than Bexar. This effort will help reduce future collecting efforts, as well as contribute to society's knowledge of the geographic limits of these species. Our end goal will not only contribute to knowledge of this species, but also meet the societal needs of Bexar County.

## **66. STOCHASTIC MULTILEVEL SELECTION AND THE EVOLUTION OF ALTRUISM**

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Though most studies focus on selection at the individual level selection at many levels can influence evolution. Different levels of selection can be working simultaneously to produce a result that cannot be explained from studying only one level. Labels like 'individual' and 'group' can be use as arbitrary terms for nested, organized entities. What research has focused on multilevel selection has treated it as a deterministic process – assigning fixed values to variables, such as fitness, that represent predictions of future potential. For example, an average is typically used when estimating the number of offspring an individual might produce. This narrowly defines an individuals' range of the potential number of offspring to one single value; ignoring the impacts of environmental and genetic stochasticity. In this study, we model stochastic variation in fitness both within and between groups, and ask how uncertainty at different levels influences the evolution of altruism.

## **67. BIO-DIVERSIFICATION OF SMALL MAMMALS ACROSS THE MESOAMERICAN HIGHLANDS**

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Several species of terrestrial small mammals of the family Cricetidae are co-distributed in the sparse highlands of Middle America. The objective of this study was to investigate the tempo and mode of diversification in widely distributed highland cricetid rodents in Nuclear Central America, using phylogenetic analyses of the mitochondrial cytochrome-*b* (*Cyt-b*). Phylogenetic analyses of mitochondrial DNA of different species of *Reithrodontomys*, *Peromyscus*, and *Neotoma* were used to determine levels of inter-specific differentiation, and to compare the phylogeographic signal of these taxa to aid in the interpretation of historical biogeographic events that may have broadly impacted these taxa across their distribution. Sequences of *Cyt-b* gene from samples collected in Mexico and Central America supported the taxonomic status of the *P. beatae* northwest of Isthmus of Tehuantepec-IT, and suggests that *P. beatae* southeast of the IT is a separate genetic unit. For *Neotoma ferruginea*, our results suggest it as a genetic unit different from *N. mexicana*, distributed west of the IT. A similar phylogenetic pattern occurs in other species co-distributed across the IT. Studies on several species of vertebrates of the same region are congruent with the lineage diversification during the end of the Pliocene and mostly during the Pleistocene, suggesting that climate change and geologic events related to the Isthmus of Tehuantepec have an effect on the bio-diversification across the Mesoamerican highlands.

## 68. MORPHOMETRIC AND GENETIC VARIATION IN EIGHT BREEDS OF ETHIOPIAN CAMELS (*CAMELUS DROMEDARIUS*)

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Ethiopian camels (*Camelus dromedarius*) historically have been a domesticated and closely guarded economic staple to indigenous peoples located throughout the country's territorial states. Seventeen morphometric variables were utilized to determine intra-species variation within eight breeds of camels, common in these regions. In addition, DNA sequences from the mitochondrial cytochrome-*b* locus and seven nuclear microsatellite loci were examined to assess genetic differentiation and to determine phylogenetic relationships. Exomorphic variation was detected in two of the breeds (Afar, and Jigjiga) using principle component analysis and linear discriminant function analysis. *Cytb* was examined in 28 individuals and depicted no separation within the breeds. Microsatellites in 105 individuals was analyzed with Structure 2.3.4 using five of the seven markers. The data for 524 individuals were analyzed and indicated three distinct groups. Finally it appears separation of breeds is not supported with *cytb* data and morphometric data.

## 69. LINE-1 RETROTRANSPOSON ACTIVITY: A POSSIBLE FAMILY-WIDE DECREASE IN SCIURIDAE

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Transposable elements (TEs) are selfish genetic elements capable of mobilizing in a genome. In most mammals, TEs occupy more than half of the genome. LINES and SINEs are often the dominant active TE in mammalian genomes. Previous bioinformatic analyses identified reduced activity from the LINE-1 (L1) lineage in the genome of the thirteen-lined ground squirrel, *Ictidomys tridecemlineatus* (formerly known as *Spermophilus tridecemlineatus*). The reduction in L1 activity is thought to have begun somewhere between 19-25 million years ago and all signs of activity ceased ~ 5 million years ago. Such LINE extinction events are rare in mammals with only four others identified thus far. If verified, over one hundred sciurid species may have evolved under reduced L1 loads, an observation that would significantly alter our understanding of mammalian genomic evolution in rodents. This study utilizes a high-throughput sequencing technique to investigate the *Ictidomys* L1 extinction in the context of the broader sciurid phylogeny. Using degenerate L1 primers, ~450bp fragments from ORF2 (reverse transcriptase), were amplified and sequenced using an Illumina MiSeq. From the hundreds of thousands resulting reads, L1 activity across the sciurid phylogeny was quantified using various distance and phylogenetic methods. By using taxa that diverged before and after the L1 extinction event, we were able to quantify the potential for L1 activity across the phylogeny.

## **70. EVOLUTION OF THE ZONADHESIN GENE REVEALS REPRODUCTIVE ADAPTATION UNIQUE TO DIVERGENCE OF EUTHERIAN MAMMALS**

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Reproductive isolation is a common but not absolute boundary between species, and molecules involved in reproduction are often subject to rapid evolutionary change. Species-specific gamete recognition is a known pre-zygotic isolation mechanism in marine invertebrates, but its significance in other taxa is not established. In mammals, zonadhesin (ZAN) is a rapidly evolving, multi-domain sperm protein that mediates species-specific adhesion to the egg's zona pellucida (ZP). The ZAN mRNA spans more than 7 kb in most mammalian taxa, and encodes multiple domain types including von Willebrand type-D (VWD) domains that possess ZP-binding activity. To examine ZAN molecular evolution, here we compared the ZAN VWD domain mRNA sequences for 56 species representing sixteen different orders of placental mammals. Aligned sequences from GenBank and Ensembl were analyzed using both Bayesian and maximum likelihood methods to generate a phylogenetic tree. In most cases, relationships corresponded to phylogenies recovered from other molecular and morphometric datasets. For example, Primates, Rodentia, Chiroptera, Perissodactyla, etc. each were recovered as monophyletic groups. Thus, sequence variability among ZAN VWD mRNAs in Eutherian mammals is phylogenetically informative. In addition, ZAN appears to be a uniquely adaptive gene found solely in Eutherian mammals. We conclude that ZAN molecular evolution correlates strongly with mammalian species divergence, possibly reflecting a contribution of this protein to reproductive isolation in Eutheria.

## **71. SINGLE LOCUS-BASED SPECIES DELIMITATION REVEALS MANY CRYPTIC SPECIES WITHIN THE GENUS *CALOMYS* (RODENTIA : SIGMODONTINAE)**

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Rodents of the genus *Calomys* are small granivorous mammals (Rodentia: Sigmodontinae) widely distributed in open habitats throughout South America (SA); currently, a total of 13 species are recognized in the genus. Some species within the genus are quite distinct utilizing morphological and genetic data, but more than two-thirds of the recognized species are remarkably homogenous, implying the presence of cryptic species. In addition, new species were described in relatively poorly sampled areas of SA in the last decade, but species delimitation is not assessed thoroughly. Revision of the systematic relationships among *Calomys* is imperative because earlier publications were mostly based on limited molecular data and geographic sampling to determine species limits. These factors are very critical for recently used robust analyses. Consequently, this project is specifically to test the species limits within the genus using inclusive geographical sampling and utilizing *cytb* sequence data. We analyzed 280 Cytochrome-b (*cytb*) sequences of different species of the genus *Calomys* using Bayesian General mixed Yule-coalescent (bGMYC) and Poisson Tree Process (PTP) methods. Concurrently, these methods show disparate results, however both clearly indicate that there are more cryptic species within the genus than previously estimated. This assessment is quite significant for the modern systematic surveys of the genus and equally important to test the hypothesis of co-evolutionary history proposed earlier between these reservoir hosts and arenaviruses. Furthermore, validity of results for these taxa will be assessed again including more molecular data generated from the next-generation sequencing technique.

## MICROBIOLOGY

### **72. MUCIN DEGRADATION MECHANISMS BY *BATRACHOCHYTRIUM DENDROBATIDIS* VM1 ISOLATE *IN-VITRO***

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*Batrachochytrium dendrobatidis* (*Bd*) has been a major contributor to the global amphibian decline, causing chytridiomycosis with epidermal hyperplasia and hyperkeratosis in adult animals. Amphibian skin is a key organ that provides defense because it contains mucus as a physical barrier, antibodies, antimicrobial peptides, lysozymes, and commensal bacteria. Previous studies have shown that *Bd* is capable of disturbing intercellular junctions of the skin and forms a germ tube. The mechanism of how *Bd* enters via the mucus layer has yet to be unraveled. Mucin is the major component of the mucus. Mucin degradation, the effect of mucin on zoospore attachment and growth were tested using plate assays, polyacrylamide gels, and the XTT assays (2, 3-bis (2-methoxy-4-nitro-5-sulfophenyl)-5-[(phenylamino) carbonyl]-tetrazolium hydroxide). Positive chemotaxis of *Bd* towards the mucin was observed and results suggest that mucin inhibits the adherence of *Bd* zoospores to surfaces. We also show that *Bd* sporangia, rather than zoospores, have the ability to degrade mucin. Mucin degradation is inhibited by Pepstatin A and ethylenediaminetetraacetic acid (EDTA) that are aspartyl proteases and metalloproteases respectively. We postulate that *Bd* enters the epidermis by first degrading the mucus layer through the activity of mucinolytic proteases. These studies will provide new targets to inhibit fungal penetration and treat chytridiomycosis.

### **73. ALTERATION IN CYTOKINE AND CHEMOKINE EXPRESSION DURING *STAPHYLOCOCCUS AUREUS* WOUND INFECTIONS**

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Chronic wounds, which include pressure ulcers, diabetic foot ulcers, and venous ulcers, affect approximately 6.5 million persons with an annual cost for treatment that may reach as high as \$25 billion dollars. Wound healing occurs through specific overlapping steps that involve different cell types and extracellular matrix protein and are mediated by cytokines and growth factors. Infection prevents or slows wound healing, yet the influence of specific microorganisms on these interactions is not well defined. *Staphylococcus aureus* is one of the microorganisms commonly isolated from infected chronic wounds. Using the murine model of wound infection, we examined the level of cytokine expression in *S. aureus*-infected full-thickness excision wounds compared with uninfected wound tissues. Tissues excised from the wounds at 24 hours were homogenized and total bacterial RNA was isolated. Cytokines expression was determined using RT<sup>2</sup> Profiler™ PCR Array Mouse Cytokines and Chemokines kit (QIAGEN). In uninfected wounds, the expression of numerous cytokines belonging to specific functional groups including; response to injury and tissue homeostasis; production of immune cells and hematopoiesis; and recruitment and activation of immune cells was significantly enhanced. However, the level of these cytokines was either reduced or only slightly increased in wounded/infected tissue. For example, while the expression of Cxcl5, a cytokine involved in the activation of immune cells, was increased in wounded tissues by 2000-fold, it was increased by only two-fold in wounded/infected tissue. These results suggest that wound infection by *S. aureus* interferes with the expression of numerous wound healing and immune response cytokines.

## **74. INTERACTIONS AMONG ENVIRONMENTAL VARIABLES AND MICROBIAL COMMUNITIES IN RESERVOIRS OF THE UPPER COLORADO AND BRAZOS RIVERS, TEXAS, AS A POTENTIAL PROXIMATE CAUSE OF GOLDEN ALGA BLOOMS**

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Understanding how interactions environmental variables and the microbial community associated with a history of toxic blooms of *Prymnesium parvum* (golden alga) can potentially lead to strategies to manage these blooms. The primary objective of this study was to characterize microbial communities, water quality variables, and their association with golden alga in selected Texas reservoirs. The composition of microbial communities at each sampling event was determined by 454 pyrosequencing of eDNA in water samples collected from 5 reservoirs of the Upper Colorado River (one sampled twice; two without history of toxic blooms) and one from the Brazos River. Environmental variables and golden alga abundance were determined at the time of sampling. Principal Component Analysis indicated that temperature (negative) and dissolved oxygen (positive) showed the strongest associations with golden alga presence among the environmental variables, in combination with higher relative abundances of bacterial classes Oscillatoriales and Planctomycetacia and lower abundance of Spirochaetia. Using taxonomic levels lower than class in the analysis failed to separate sampling events according to golden alga presence or absence suggesting that the presence or absence of the entire taxonomic groups may result in the development or decline of golden algal bloom rather than a suite of specific species.

## **75. A NOVEL MECP2 ACETYLATION SITE REGULATES BINDING WITH ATRX AND HDAC1**

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Tumorigenesis stems from errors incorporated in the genetic code and impaired epigenetic mechanisms involved in tumor suppression. Mutation in methyl-CpG-binding protein 2 (MeCP2) is known to cause a neurological disorder, rett syndrome (RTT), however its role in tumorigenesis remains poorly understood. MeCP2 regulates gene expression by recruiting co-repressors and histone deacetylases (such as SIN3A and HDAC1 respectively) to methylated gene promoters. MeCP2 modulates heterochromatin association by interacting with heterochromatin protein 1 (HP1). It has been shown that MeCP2 interacts with and recruits ATRX, a SWI2/SNF2 DNA helicase/ATPase, to regulate gene expression at a subset of imprinted domains. A recent study showed that overexpression of a histone deacetylase, Sirtuin1 (SIRT1) leads to reduced levels of acetylation of ectopically expressed MeCP2. Herein we show that conditions that induce MeCP2 acetylation in RKO colon cancer cells do not alter its promoter occupancy at target genes analyzed. Using mass spectrometry, we report that upon selective pharmacological inhibition of SIRT1 in colon and breast cancer cell lines, endogenous MeCP2 is acetylated at key sites known to be critical for binding to DNA and transcriptional regulators. We generated an acetylation mimetic mutation in MeCP2 (K171Q) and found that this mutant shows decreased binding to HDAC1 and ATRX in RKO cells. Similar results were obtained when SIRT1 was pharmacologically inhibited in RKO cells. We also demonstrate that RKO cells over-expressing this mutant show reduced proliferation as compared to those over-expressing MeCP2-wild type (WT). This study underscores the role played by MeCP2 and SIRT1 in cancer epigenetics.

**76. FROM BIGHORNS TO BULLFROGS: CONNECTIVITY OF AQUATIC RESOURCES IN SONORAN DESERT LANDSCAPE**

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Connectivity and isolation are natural elements of the landscape, but we may need to manage these at different scales because of tradeoffs between the needs of different suites of native species and protection against hyperconnectivity that facilitates expansion of invasives and diseases. Although large fauna like bighorn sheep may be able to travel relatively large distances, many desert species have low vagility and low dispersal capabilities. We examined connectivity within a nested framework at the scale of the entire network as well as within clusters that emerge at different species dispersal distances focusing on the invasive American bullfrog and native amphibian species. Using graph theory and movement distances based on reported bullfrog vagility, we analyzed wetland networks comprised of natural and anthropogenic waterbodies. These networks are composed of habitat clusters that emerge at various dispersal distances, eventually coalescing to form a single network. We identified clusters of connected wetlands important for native amphibians based on various structural metrics such as stepping-stones, hubs, and cutpoints. In addition we used circuit theory to identify corridors of dispersal among water sites. In so doing, we identified areas of potentially high ecological importance based on both graph theory and resistance mapping. Using a nested framework to identify important areas of connectivity, both for native populations and for invasives, can help managers plan for the connectivity of resources in a way that addresses sometimes conflicting management goals.

**77. THE INFLUENCE OF WEATHER PARAMETERS ON LESSER PRAIRIE-CHICKEN NEST SURVIVAL IN THE SHORT GRASS AND SAND SAGEBRUSH REGIONS**

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Lesser prairie-chicken (*Tympanuchus pallidicinctus*; LEPC) populations exist along a diverse climatic gradient. Temperature and precipitation impact nest survival in the sand shinnery oak (*Quercus havardii*) prairie in the southern extent of the range, but the potential impact remains unexplored in the northern extent of the range (short grass and sand sagebrush prairies). To assess the impact of environmental conditions on nest survival in the northern extent of the range, we collected nest data in the short-grass prairie (SGP), 2013–2014 ( $n=79$ ), and sand sagebrush (*Artemisia filifolia*) prairie (SSP), 1998–2002 ( $n=159$ ). We used the nest survival model in Program MARK to assess the effect size of biologically relevant environmental variables on nest survival for each ecoregion. There was model selection uncertainty for both regions, but each region had the same top model of comprised of total winter precipitation, hot days and cold days (short grass:  $AIC_c=425.01$ ,  $AIC_c w=0.52$ ; sand sagebrush:  $AIC_c=854.22$ ,  $AIC_c w=0.54$ ) indicating that the interactive effects of winter precipitation and temperature during incubation is important for nesting LEPCs in the northern part of their distribution. Our results corroborate similar findings in the sand shinnery oak prairie that found winter precipitation and temperature during incubation were good predictors of nest survival. Combined, our results suggest LEPCs respond similarly to environmental conditions across the distribution of the species.



## **78. BIRDS, TREES, AND HOUSE PRICES IN LUBBOCK, TEXAS**

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Urban areas are not what is usually thought of as quality habitat for wildlife, however as urbanization increases wildlife are forced to use the urban environment. Determining how homeowners value their urban landscapes could prove useful in helping homeowners not only increase house selling prices but also improve the quality wildlife habitat. First, we compared bird diversity to vegetation coverage in neighborhoods across Lubbock, Texas. The second objective is to study how bird diversity and vegetation coverage changes throughout the area. Our final objective is to observe how house prices differ when considering bird diversity and vegetation coverage. We performed bird point counts during the summer of 2014, recording every bird seen and heard. We also performed vegetation surveys from May to October 2014 recording number, height, and species of trees as well as other vegetation variables within the urban area of Lubbock, Texas. Recently-sold house prices were obtained from local real estate agents. Simple linear regressions were performed to determine, first, the factors that correspond to bird diversity; and, second, to explain variation in home prices in Lubbock, Texas. Our findings supplement knowledge of how birds use urban neighborhoods in Lubbock, Texas. Our study protocols identify methods and habitat variables that could be used to predict bird diversity in urban areas beyond Lubbock, Texas.

## **79. REFUGE OR LAST GASP: LARVAL FISH ASSEMBLAGES IN RESERVOIR FRAGMENTS ON LAKE TEXOMA**

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Lake Texoma is home to several isolated coves walled off by sedimentation as a result of reservoir aging. The reservoir fragments are relatively new features on the landscape, isolated from the reservoir and taking diverse forms. These fragments have been formed on the arms of two physicochemically distinct rivers entering Lake Texoma (Red and Washita). Fragmented coves are located within the river-reservoir interface, a highly productive and ecologically important transitional zone. We examined the structure of young-of-the-year (YOY) fish assemblages utilizing these habitats and investigated the influence of environmental factors on taxonomic and guild composition. Sampling was carried out in two phases from March through November 2014. The first phase (March-July) utilized light traps and push nets to target larval specimens. The second phase (August-November) utilized fyke nets to target juveniles. Differences in YOY fish abundance were observed between river arms and individual fragments. Some of this variation was related to physiochemical and morphological differences between fragments. While habitat generalists were dominant throughout our study area, some fragments hosted species that rely upon river floodplain habitats for reproduction. This work should provide managers with insights into the role that these novel habitats play in supplementing reservoir fish assemblages.

## **80. SEED BANK POTENTIAL OF MANGED WETLANDS ON THE UPPER TEXAS COAST**

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The upper Texas coast consists of the largest area of coastal associated wetlands in Texas, which provide critical habitats for a large numbers of wintering waterfowl and migrating shorebirds. This region has experienced dramatic declines in wetland quantity and quality from a variety of anthropogenic sources including agricultural conversion, urban expansion, saltwater intrusion, marsh subsidence, and freshwater inflow reduction. Manipulation of wetland hydrology, via intentional management of water inundation

and drawdown timing and duration, referred to as moist-soil management, is used to increase wetland habitat quality by producing high quality structure and food resources for wintering waterfowl. To meet existing and future habitat demands, increase management efficiency, characterizing potential vegetation community response to these hydrologic conditions in managed wetlands is essential. We conducted seed bank emergence studies on 21 fallow rice fields located on Anahuac National Wildlife Refuge in Chambers County, Texas. We collected 5 soil cores from each wetland which were mixed, evenly divided, placed in growth containers, and each half of the core exposed to either a moist-soil or saturated treatment to stimulate germination. Emerging plants were then removed placed in separate growth containers and grown until species identification was possible. A total of 9366 seedlings representing 65 species were identified. Plants were categorized as either desirable (d=6155) or undesirable (u=3508) based on waterfowl food value. Seedlings were then grouped into 30 day production windows to look at variance of stem density between plant status and time period, time period and treatment type, treatment type and plant status.

## **81. ASSESSING HABITAT-USE PATTERNS AND SURVEY METHODOLOGIES OF THE ENDANGERED SNAIL, PECOS ASSIMINEA, AT BITTER LAKE NATIONAL WILDLIFE REFUGE**

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Pecos *Assiminea* is an endangered, semi-aquatic snail endemic to two spring systems located in eastern New Mexico and west Texas. Basic biological information needed for effective monitoring and conservation is currently lacking for this species. Our objectives were to compare the effectiveness of surveys using two gear types, quadrats ( $n = 433$ ) and weathered wooden tiles left on the substrate ( $n = 549$ ), for estimating Pecos *Assiminea* distribution and relative abundance, and determine Pecos *assiminea* habitat use at two sites at Bitter Lake National Wildlife Refuge (BLNWR) in New Mexico. Pecos *Assiminea* presence in the quadrat surveys was associated with soil temperature, distance to the water's edge, and percent cover of common reed, kochia, saltgrass, and bulrush. Detection of snails was higher in the surveys of wooden tiles than those using quadrats. However, there was no clear relationship between population densities estimated by the quadrats and the probability of individuals being found on the wooden tiles. Wooden tiles seem to be a cost effective method of determining Pecos *Assiminea* presence, but they may not be capable of generating reliable estimates of abundance or habitat use. Our data will inform planned restoration and conservation actions for Pecos *Assiminea* at BLNWR.

## **82. POTENTIAL PLASTIC RESPONSE OF GUADALUPE BASS TO HYDROLOGICAL ALTERATION AND LANDSCAPE CHANGE WITHIN THE COLORADO RIVER BASIN**

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The Colorado River Basin in Texas has experienced major alterations to the hydrologic regime due to changing land and water use patterns. These anthropogenic influences on hydrologic variability have had major implications for riparian and aquatic ecosystems and the species dependent upon them, such as Guadalupe Bass *Micropterus treculii*. Our objective was to evaluate the relationship between the degree of hydrologic and landscape alteration changes in Guadalupe Bass morphology in portions of the Colorado River Basin that were previously or are currently inhabited by Guadalupe Bass. Hydrologic data

were obtained from the U.S. Geological Survey stream gauge stations and U.S. Geological Survey National Hydrography Dataset. The Indicators of Hydrologic Alteration (IHA) method was then used to calculate flow metrics for select streams for two periods, pre-1979 and post-1979. U.S. Geological Survey North American Landscape Characterization data and Texas Parks and Wildlife ecoregion data were used to characterize land use and land cover changes within the watersheds of the selected streams. Relationships between hydrologic alteration and landscape changes were compared to landmark-based morphometrics for Guadalupe Bass in the late 1970's and present. Discriminant function analysis results show that present-day individuals have deeper bodies and shorter head lengths than those individuals collected 35 years ago from the same locations. These locations vary in the degree of alteration to flow regime and anthropogenic disturbance across the landscape that they have experienced since the late 1970's. We will present the effects of landscape and flow regime alterations on the morphology of Guadalupe Bass within Colorado River Basin below Austin, Texas. Comparison of the present flow regime and ecomorphological traits to historical collections and hydrologic data will facilitate the assessment of future hydrologic alterations due to increases in urbanization and water withdrawals on Guadalupe Bass populations.

### **83. ANALYSIS OF MOTION-CAPTURED PICTURES LOCATED ON MAN-MADE WATER SOURCES IN THE SOUTHERN HIGH PLAINS OF WEST TEXAS**

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Given the loss of natural springs and the projected decline in yearly average precipitation due to climate change, the benefits or detriments of man-made water sources for wildlife is a contemporarily relevant conservation issue. Little research has addressed wildlife use of man-made water sources in the arid Southern Great Plains. We deployed motion-activated camera traps at 12 locations in Cochran, Hockley, Yoakum, and Terry Counties, Texas from March 2009 through February 2013. Natural springs in this study area have been dry for almost a century and the only surface water available are provided by stock tanks and their overflows used for cattle production. Our objectives were to assess species-specific temporal and seasonal patterns of use at man-made water sources, as well as to assess differences in use between above ground metal stock tanks and ground level overflows. We focused our assessment efforts on lesser prairie-chicken (*Tympanuchus pallidicinctus*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), coyote (*Canis latrans*), and all raptors (Accipitriformes, Falconiformes, Strigiformes). We collected 1,887,902 digital images, with 2,428 detections of prairie chicken, 8,899 detections of mule deer, 367 detections of pronghorn, 1,449 detections of coyote, and 1,004 detections of raptor. The average number of animals per visit was 2.0 for prairie chickens, 1.9 for mule deer, 1.4 for pronghorn, 1.2 for coyotes, and 1.1 for raptors. We are currently using analysis of variance to assess species-specific temporal and seasonal patterns of use, and assessing use in relation to environmental conditions of relative humidity, temperature, and precipitation.

### **PLANT & SOIL SCIENCES**

### **84. DIGITAL IMAGE ANALYSIS OF OLD WORLD BLUESTEM CANOPY COVER TO PREDICT LEAF AREA AND YIELD**

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WW-B.Dahl old world bluestem [*Bothriochla bladhii* (Retz) Blake] is a well-adapted perennial forage grass in the semi-arid Texas High Plains. B.Dahl yields well with limited irrigation where Ogallala Aquifer levels are diminishing. The research aims to estimate leaf area index, percentage light

interception, and ground cover from digital image analysis (DIA). The current research used an established pasture of B.Dahl at the Texas Tech University research station at New Deal, and has been conducted for 2 years. Field samplings included irradiance, measured above and below canopy for calculating light interception, and overhead photos, taken before clipping biomass at 8 cm stubble height for biomass and leaf area determination. Overhead photos were converted by ImageJ<sup>®</sup> software into two color groupings corresponding to green tissue cover and non-green (dead) cover plus bare ground for ground cover simulation. Samples were taken biweekly from 12 randomly selected plots during two growing periods in both year 2013 and 2014. Growth rates was greater in both Period 1. Light interception was linearly related to green ground cover as determined from DIA. Leaf area index was curvilinearly related to green ground cover in both periods. Future study is needed to improve the relationships and to evaluate its use under grazing. The ultimate purpose of this study is the application of the results will contribute to Texas Alliance for Water Conservation outreach programs to benefit local producers economically and ecologically.

## **PROPOSAL**

### **85. DIET OF PREGNANT AND LACTATING SEBA'S SHORT-TAILED FRUIT BAT(CAROLLIA PERSPICILLATA)**

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Optimal foraging theory is based on the premise that a species, generalist or specialist, will be efficient in collecting and handling food, while maintaining a diet that maximizes fitness. Dietary choices are influenced by extrinsic and intrinsic factors such as reproductive status. Pregnancy and lactation in females can be energetically expensive. With energy availability being one of the main precursors to reproductive success, nutrients such as calcium and nitrogen can also limit reproduction. Since energy and nutrition costs are high, choices in foraging strategies and diet are critical to maintain survival for both mother and young. I will study diets of pregnant and lactating Seba's short-tailed fruit bat (*Carollia perspicillata*) in the Macaregua Cave in Santander- Colombia. Furthermore, I will investigate techniques for early detection of pregnancy by analyzing progesterone levels and cytology samples. With milk composition influenced by dietary choices of the female, I will examine change in milk composition during pup growth. My research will test four hypotheses. First, pregnant and lactating females will have a generalist feeding strategy. Second, pregnant females will consume higher amounts of nitrogen rich fruits, while lactating females will consume higher amounts of calcium rich fruits. Third, progesterone levels can detect early pregnancy. Fourth, milk composition will change over time during pup growth. Results of my thesis will be scientifically valuable for understanding how diet differs during reproductive stages, detecting early pregnancy with noninvasive techniques, and the influence of lactational stage on milk composition.

### **86. STUDY OF CRINKLER-LIKE PROTEINS IN BATRACHOCHYTRIUM DENDROBATIDIS**

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The continual decline of amphibians worldwide has been partially attributed to the fungus *Batrachochytrium dendrobatidis* (*Bd*). This fungus causes inflammation and thickening of the keratinized layer of amphibian skin which disrupts the osmotic balance leading to cardiac arrest. *B. dendrobatidis* has been known to produce a wide range of proteases to help degrade amphibian skin components, proteases

to help degrade anti-microbial peptides, and many other virulence mechanisms. One set of proteins *Bd* is known to possess in its genome are Crinkler (CRN) and Crinkler-like proteins (CRN-like). Crinkler proteins are found in plant pathogenic fungi in the Oomycete group. One such fungus is *Phytophthora infestans* which infects potato leaves. CRN and CRN-like proteins invade plant tissue and cause necrosis or crinkling of the material to occur. *Bd* is known to possess 84 of these genes and they are increased in the presence of the amphibian thyroid hormone. While we know *Bd* has the genes present, the function of those genes is unknown. If *Batrachochytrium dendrobatidis* contains and expresses CRN family proteins which are similar to Oomycete proteins, then *B. dendrobatidis* may have the capability to cause necrosis or crinkling to occur in eukaryotic cells. Preliminary studies of *Bd* on tomato leaves have shown *Bd* may possess the ability to cause necrosis. The two different life stages of *Bd*, zoospores and zoosporangium, and the secreted supernatant were tested against the leaves. If *Bd* were capable of surviving on plant material and causing disease within plants, plants may allow *Bd* to survive in the absence of its primary host.

## **87. SOIL MICROBIAL COMMUNITY RESISTANCE AND RESILIENCE TO PETRODIESEL VERSUS BIODIESEL**

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Oil based drilling fluids are essential in oil and gas exploration and production however spills and their ultimate disposal result in soil contamination. Although drilling fluid use and disposal as sludge via land farming are permitted as long as required site restoration takes place, there is limited information about the effects of the oil bases on the soil, the microbial community or site restoration potential. As oil shale drilling increases worldwide, the effects of disposed drilling fluid sludge in land application should be examined. Petro-diesel, refined from crude oil, is the conventional choice for horizontal drilling. Biodiesels are being considered as a substitute from the assumption they have less impact because they are derived from vegetable oils. In this study, the effects of petro-diesel will be compared with three biodiesels in three soil types, a sandy loam, a sandy clay loam and a silt loam, which are common soils throughout Texas, the Midwest and Canada. Soil microbial community resistance and resilience will be measured by using 16S sequencing of the soil community DNA, and Biolog ECO and SFP2 microtiter plates for substrate utilization. Microbial community function will be measured from isolated soil proteins using mass spectrometry based proteomics. We will also address site restoration effects by testing seed germination and plant growth of environmentally relevant plant species. The overall hypothesis is that the base oils of biodiesel have less adverse impact than petro-diesel on soil microbial communities.

## **88. COMPARISON OF BARK AND RESIN DUCT ALLOMETRIC RELATIONSHIPS AMONGST VARIOUS MEMBERS OF PINES (*PINUS*) IN WESTERN TEXAS MOUNTAIN RANGES**

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Pine trees are affected by a variety of disturbances (pathogens, insects, fire) and have developed a suite of defensive traits to cope with them. Two predominant types of disturbances for pine trees are fire and bark beetles. The main defense against fire is bark investment, whereas the predominant defense against bark beetles is resin production. Resource availability hypothesis (RAH) postulates that investment in defense for plants is a costly measure, thus forcing plants to allocate its resources in an efficient manner. Recent research suggests that resin duct number and density are good predictors for defense against bark beetles. The allometric relationships between these predictors reveal how investment has changed over time. Understanding the relationship between investment in fire defense and bark beetle defense is integral to understanding and making predictions regarding susceptibility to attack and disturbance. Currently, little research has been done examining which bark beetles have reached these West Texas mountain ranges. I propose to investigate the tradeoffs exhibited by pine trees between bark investments for fire protection

and structural defenses against bark beetles. All four pine species present within the Chisos, Davis, and Guadalupe Mountains in Western Texas will be sampled to research within species variation. With increasing fire return interval, and climactic changes influencing bark beetle habitat range, this research will be essential in providing a better understanding of ecological function in this system.

## **TOXICOLOGY**

### **89. HUMAN HEALTH IMPLICATIONS VIA PFOS CONTAMINATION IN FISH NEAR BARKSDALE AIR FORCE BASE, LOUISIANA**

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Perfluorinated compounds (PFCs), upon being listed as emerging contaminants of concern by the EPA, have been the foci of many studies to determine toxicity, occurrence, and persistence in the environment. PFCs are long-chained carbon compounds saturated with fluorine and containing a hydrophilic head group, resulting in unique chemical properties that made them excellent grease and stain resisters and components in Aqueous Film Forming Foams (AFFFs). These same properties allow them to bioaccumulate in protein-rich regions like the liver, brain, and in serum. Due to their ubiquity in the environment, accumulation in biota around the globe has been documented. Our study site (Barksdale Air Force Base in Bossier City, Louisiana) historically conducted fire-fighting training on site with AFFFs containing PFCs like perfluorooctane sulfonate (PFOS). The current study focused on accumulation of PFOS in muscle tissue from 74 individual fish collected on site between August 2013 and September 2014 with implications for human health. While muscle (fillet) PFOS accumulation is significantly less than accumulation to other tissues like liver, we observed 82% of muscle samples having PFOS levels falling within state advisory levels. Fortunately, due to the location of our study, access to these more heavily contaminated areas is restricted; however, potential risk to the surrounding community remains. This study is part of a larger ecological risk assessment for PFCs at Barksdale AFB.

### **90. REPRODUCTIVE AND OFFSPRING EFFECTS OF CADMIUM ON THE FRESHWATER PULMONATE SNAIL *LYMNAEA STAGNALIS***

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Cadmium is toxic and ubiquitous in natural environments, but its sublethal effects on aquatic organisms are not well understood. The purpose of this study was to use energy-based biomarkers to detect sublethal effects in *Lymnaea stagnalis* adults exposed to cadmium for 8 weeks, and to test parental effects. We evaluated feeding and growth rate, number of egg masses, number of eggs and number of abnormal eggs. For the offspring we evaluated hatching success and time to hatch, as well as cadmium sensitivity. Adult snails were exposed to 5 cadmium concentrations 25, 50, 100, 200 and 400 ppb for 8 weeks. The egg masses collected were exposed to the respective concentration for 20 days at 3 different points of time during the 8 weeks. Feeding rate, growth rate, number of egg masses and number of eggs per egg mass decreased with increasing concentrations while the number of abnormal eggs increased. The number of hatched eggs increased over time, indicating that the longer the parents were exposed the more tolerant the offspring. Just like the F1 sensitivity test where the offspring of the higher concentrations showed more tolerance to the contaminant.

## 91. AN OVERVIEW OF FIELD AND LABORATORY RESEARCH TO INFORM ECOLOGICAL RISK ASSESSMENTS OF PERFLUOROOCTANE SULFONATE

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Perfluorooctane sulfonate (PFOS) is a surfactant that was used in common household items for its flame resistant properties until it was voluntarily phased out in the U.S. in 2002 due to concerns about potential environmental and human health effects. Perfluorooctane sulfonate was also a component of Aqueous Film Forming Foams (AFFFs) which was used to control fires. Hence, PFOS has been detected in a large number of waterways and animal tissues and was recently listed as a contaminant of emerging concern by the U.S. Environmental Protection Agency. Here we report results from laboratory, field and modeling-based research designed to inform an ecological risk assessment on a U.S. Air Force Base where AFFFs were used heavily in fire-fighting training. To this end, we conducted a series of acute and chronic toxicity studies on aquatic animals such as the gastropod *Lymnaea stagnalis*, fish such as *Gambusia affinis*, and mosquitoes such as *Aedes aegypti*. In all cases, PFOS is more toxic under chronic exposure conditions; because PFOS is persistent, understanding chronic toxicity is critically important. Our studies of PFOS toxicity also focus on sub-lethal effects including alterations in feeding rate and metabolism during chronic PFOS exposure. To better understand exposure and accumulation of PFOS in aquatic organisms, we developed a one-compartment uptake model parameterized from several studies. The data generated by this project will provide needed information to improve ecological risk estimates and provides a framework for both ecological and human health risk assessments for other sites contaminated with PFOS.

## 92. THE IMPACT OF LARVAL CROWDING ON MOSQUITO INSECTICIDE TOLERANCE

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The ecology of mosquito larval density is important because it has strong effects on survival and future fitness. Density effects can result from resource competition or crowding, the latter of which has received less research attention despite its ecological importance. Both physical and chemical components cause crowding interactions in larval mosquitoes, which result in increased mortality, prolonged development, and reduced size. The objectives of this research were to determine how different crowding conditions affect insecticide sensitivity. We hypothesized that stress due to crowding would increase insecticide sensitivity and that a specific density can be determined where the combined effect becomes biologically significant. Results indicate that when larvae are reared at various crowding densities (without resource competition) but later exposed to insecticide at equal densities they exhibit similar sensitivity. However, when larvae were reared at equal densities but exposed at various crowding densities there appears to be a protective effect of crowding, as more densely crowded larvae were significantly less sensitive. Possible mechanisms for this protective effect were investigated. Experiments inhibiting the major metabolic detoxification system, cytochrome P450 monooxygenases, indicate increased metabolism does not play a significant role. Modified larval exposure is likely an important mechanism. This research provides important insights into how mosquitoes may respond to control efforts as well as providing empirical recommendations on designing laboratory toxicity tests to better reflect ecological conditions in natural mosquito populations.

### **93. OCCURRENCE OF PERFLUORINATED COMPOUNDS IN WATER AND SEDIMENT FROM THE BARKSDALE AIR FORCE BASE IN BOSSIER CITY, LOUISIANA**

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Perfluorinated compounds (PFCs) are environmentally persistent surfactants that consist of fully fluorinated carbon chains and a terminal sulfonate or carboxylate polar head moiety. Due to their unique amphiphilic properties, PFCs are used in the manufacturing of products such as aqueous film forming foams (AFFFs). There is cause for concern of PFC contamination near the Barksdale Air Force Base resulting from run off and ground infiltration of AFFFs that were used during fire training. This study analyzed water and sediment samples that were collected over a 13-month sampling period from bayous upstream and downstream of two fire training areas located on the base to determine PFC occurrence and magnitude. A triple stage quadrupole LC/MS was used to scan for 6 different PFCs from sample extractions. Total PFC concentrations in the water and sediment samples ranged from non-detects to 7.1 ng/mL and non-detects to 31.4 ng/g, respectively. Generally, PFCs containing a sulfonate polar head moiety were quantified more frequently than PFCs containing a carboxylate moiety. Two PFCs of increasing concern, perfluorooctanesulfonic acid and perfluorooctanoic acid, were quantified in 79% and 64% of water samples, respectively. Correlation analysis revealed that several water quality parameters (e.g., temperature, dissolved oxygen) may have an influence on the concentration of PFCs in water. Concentrations of PFCs detected in water and sediment samples were then compared to sediment and water column passive sampler data to determine if passive samplers could be used as a less invasive method for estimating PFC concentrations in the environmen



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